**CMD 25-H12.1-Ref1**

Date: 2025-10-15

## Reference from NexGen Energy Ltd.

In the matter of

**NexGen Energy Ltd.**

Licence application to prepare a site for and construct its Rook 1 uranium mine and mill project

**Commission Public Hearing**
**Part 1**

November 19, 2025

## Référence de NexGen Energy Ltd.

À l’égard de

**NexGen Energy Ltd.**

Demande de permis concernant la préparation de l’emplacement et la construction de son projet de mine et d’usine de concentration d’uranium Rook I

**Audience publique de la Commission**
**Partie 1**

Le 19 novembre 2025

Document ID: DAMZHJW66V33-166150894-8324

Canada

## Volume 1: Management System / Preliminary Decommissioning and Reclamation Plan

| Document Title | Version | Date | [CNSC Reference #] (e-Doc) |
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| *Rook I Integrated Management System Policy* | 0 | October 2021 | Not referenced by CNSC |
| *Rook I Integrated Management System Manual* | 0 | December 2021 | [7] (e-Doc 7082254) |
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| *Rook I Training Program* | 1 | November 2022 | [10] (e-Doc 6923047) |
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| *Rook I Commissioning Management Program* | 1 | June 2023 | [9] (e-Doc 7079917) |
| *Rook I Asset Management Program* | 0 | December 2022 | [20] (e-Doc 6952660) |
| *Rook I Radiation Protection Program* | 1 | December 2022 | [21] (e-Doc 6952086) |
| *Rook I Radiation Code of Practice* | D | May 2025 | [22] (e-Doc 7527222) |
| *Rook I Health and Safety Program* | 2 | June 2023 | [11] (e-Doc 7079947) |
| *Rook I Environmental Protection Program* | 1 | June 2023 | [32] (e-Doc 7079976) |
| *Rook I Effluent and Emissions Plan* | 0 | August 2025 | [18] (e-Doc 7567142) |
| *Rook I Environmental Code of Practice* | A | August 2025 | [29] (e-Doc 7567139) |
| *Rook I Environmental Monitoring Plan* | 0 | August 2025 | [31] (e-Doc 7567141) |
| *Rook I Emergency Preparedness and Response Program* | 1 | December 2022 | [35] (e-Doc 6954276) |
| *Rook I Emergency Response Plan* | C | June 2023 | [36] (e-Doc 6952225) |
| *Rook I Ground Transportation Emergency Response Plan* | B | December 2022 | [37] (e-Doc 6952227) |
| *Rook I Fire Protection Program* | 1 | December 2022 | [38] (e-Doc 6952313) |
| *Rook I Waste Management Program* | 1 | June 2023 | [41] (e-Doc 7080164) |
| *Rook I Mine Waste Management Plan* | A | June 2023 | Not referenced by CNSC |
| *Rook I Site Water Management Plan* | A | June 2023 | [17] (e-Doc 7081301) |
| *Rook I Conventional Waste Management Plan* | A | June 2023 | Not referenced by CNSC |
| *Rook I Preliminary Decommissioning and Reclamation Plan* | 1 | March 2025 | [43] (e-Doc 7502879) |
| *Rook I Indigenous and Public Engagement Program* | 1 | November 2022 | [47] (e-Doc 6923476) |

# Integrated Management System Policy

# ROOK-IMS-POL-00001

# NexGen Energy
## Rook I Integrated Management System Policy

Guided by the values of honesty, respect, resilience, and accountability, NexGen is driven by the vision to become a world-leading uranium producer delivering the clean energy needs of the future. In support of this vision and consistent with these values, protecting and promoting the health, safety, and well-being of people and the environment through all aspects and phases of the Rook I Project is paramount. NexGen believes that worker injuries and ill-health are preventable and that impacts to the environment and biodiversity can be effectively minimized. Through consultation and engagement with Indigenous peoples, local communities, our workers and all stakeholders, and by embracing the application of technology and best practices, NexGen is focused on achieving elite standards in all facets of the business and across its lifecycle.

The Rook I Project is a generational project for Canada, and NexGen is committed to ensuring that, in all aspects of Rook I, our vision and approach is defined, planned, and controlled through the Rook I Integrated Management System (IMS). The Rook I IMS provides a transparent, risk-informed framework for excellence and accountability by:

- defining the organization and its context;
- complying with all applicable requirements;
- setting meaningful objectives and targets;
- effectively managing resources, information, communication, work, and change;
- identifying and resolving problems to prevent reoccurrence;
- monitoring results and performing assessments;
- seeking, sharing, and using experience; and
- continually improving the management system.

The Rook I IMS supports the health, safety, well-being, environment, and Indigenous and community processes of the organization. The guiding principles and commitments for each of these foundational organizational functions are outlined below.

The Rook I IMS Policy is applicable to all NexGen and contracted employees involved with supporting and executing activities related to the Rook I Project. It is posted at our offices, operations and on our website, and will be periodically reviewed and revised to ensure it continues to reflect and advance NexGen's vision and values.

### Health, Safety, and Well-being

The health, safety, and well-being of our employees and contractors is of paramount importance and guides decisions and actions. NexGen is committed to providing a safe and healthy workplace and work conditions for the prevention of work-related injury and ill-health by:

- establishing a strong safety culture which is periodically assessed and continually improved;
- identifying, assessing, managing, and eliminating (where possible) hazards and risks;
- managing hazards to ensure exposure is as low as reasonably achievable;

- ensuring that workers have the knowledge, skills, and tools to safely perform their duties;
- respecting workers' rights while establishing personal accountability for safety on the part of each individual;
- actively promoting and supporting our partners in building their capacity to be safe; and
- protecting public health and safety by actively promoting health and safety at home.

**Environment**

Recognizing and valuing the importance of protecting and preserving the environment through the lifecycle of the Project and for future generations, NexGen is committed to:

- exercising responsible stewardship of air, land, and water resources;
- applying economically viable best available technology and practices;
- keeping all releases and adverse impacts as low as reasonably achievable;
- respecting the principle of pollution prevention;
- designing and operating for responsible closure;
- minimizing the generation of waste;
- responsibly managing tailings and waste facilities throughout their lifecycle;
- responsibly managing energy use and greenhouse gas emissions; and
- monitoring and assessing against indicators and targets based on sound science.

**Indigenous and Community**

Acknowledging and valuing the community interests and aspirations of those impacted by the Project, NexGen is committed to fostering trusting relationships that facilitate collaboration and maximize the benefits of the Project to all stakeholders. NexGen is committed to:

- respecting the diverse cultures and perspectives of those with whom the Project interacts;
- proactively engaging with local communities;
- enhancing our workers' awareness of the history, traditions, and rights of Indigenous peoples;
- supporting the economic participation of affected communities;
- seeking to provide opportunities resulting in sustainable, lasting benefits to local communities beyond the Project lifecycle; and
- providing clear and timely information to those who have a direct interest in the Project.

*Signature redacted for public posting*

Leigh Curyer
President and Chief Executive Officer
NexGen Energy Ltd.

# Integrated Management System Manual

# ROOK-IMS-MAN-00003

# Rook I Project

## Integrated Management System Manual

ROOK-IMS-MAN-00003

December 2021

# Record of Revisions

| Version. No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| 0 | 15-Dec-2021 | Issued Final | Rob Paine | Luke Moger | Tony George |

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# 1.0 Introduction

The *Rook I Integrated Management System* (IMS) *Manual* (Manual) outlines the management system processes that provide a common framework for licensed activities supporting the Rook I Project (Project). This unified framework includes processes for implementing compliance measures, enabling continual improvement, and fostering a culture where protecting the health and safety of workers and preserving the environment are principal considerations guiding decisions and actions. NexGen has an established vision, values, and the *Rook I Integrated Management System Policy* (IMS Policy) that provide the foundation for the Project's IMS approach.

The IMS and its associated programs follow the Plan-Do-Check-Act cycle to identify, control, monitor, and continually improve Project processes.

## 1.1 Vision and Values

NexGen's corporate vison and values create a common purpose for the Project and guide workers on the goals of the organization. The vision and values are established by the NexGen executive, communicated to workers, and periodically reviewed and updated, as required.

## 1.2 Policy

The *IMS Policy* defines management system principles and expectations for:

- protecting the health, safety, and wellbeing of workers;
- preserving the environment;
- engaging with Indigenous communities and members of the public;
- complying with legal and other requirements; and
- continually improving management system processes and performance.

The IMS principles are based, in part, on the *IMS Policy* which applies to both NexGen and contracted workers and is posted in the workplace and on the company website.

The *IMS Policy* is endorsed by the designated NexGen executive and Rook I management.

## 1.3 Leadership

Rook I management provides leadership to guide and promote common purpose for workers at the Project. The business is defined, planned, and controlled through the IMS and its associated programs. Rook I management is accountable for the effectiveness of the IMS and is responsible for defining the organization and setting clear expectations for all workers to conform to applicable management system processes. Rook I management is committed to fully supporting and engaging all workers in IMS implementation and improvement as a means of systematically and reliably achieving desired Project outcomes and excellence in safety, radiation, and environmental protection.

## 1.4 Purpose

The IMS and its associated programs, plans, procedures, and work instructions describe management system processes for achieving Project objectives and completing work safely, reliably, and consistently. The IMS provides the mechanisms necessary for conforming to internal requirements and complying with legal requirements.

This document was prepared with regard for the references outlined in section 6.0, including the *Uranium Mines and Mills Regulations*, the Canadian Nuclear Safety Commission (CNSC) regulatory document

*REGDOC-2.1.1 Management System*, and Canadian Standards Association (CSA) document *CSA N286-12 Management System Requirements for Nuclear Facilities.*

## 1.5 Scope

The scope of the IMS includes the planning, delivery, evaluation, and improvement of the management system processes for the Project. The IMS requirements apply to the supporting programs as listed in section 6.1, and to workers engaged in licensed activities during Project's site preparation, construction, and commissioning. The IMS uses a graded, risk-based approach to implementing management system processes that accounts for the apparent level of risk, safety significance, and complexity of an activity.

## 1.6 Management System Principles

NexGen recognizes the importance of a robust, fully functional management system to protect worker health and safety, keep radiological exposures to workers and the environment as low as reasonably achievable (ALARA), and develop the Project reliably to meet requirements and objectives.

To effectively implement the IMS, NexGen's approach is reflected in the following management system principles:

- foster and promote a health and safety culture that encompasses the input of employees and contractors, proactively promotes prevention of workplace injury, illness, and disease, and enables continual improvement;
- define, plan, and control the business and the Project organization;
- actively identify, assess, manage, and control risks;
- plan, perform, and manage work and resources in a manner that protects the health and safety of persons and the environment;
- manage changes to facilities, design, organizational structure, key personnel, and processes in a manner that mitigates associated risks and maintains compliance with regulatory requirements;
- systematically control documentation and records;
- identify, resolve, and prevent problems using incident and deviation reporting as well as the corrective action process;
- enable effective internal and external communication;
- maintain conformance to internal requirements and compliance to regulatory requirements;
- seek, share, and use internal and external experience to foster continual improvement; and
- regularly assess, evaluate, and continually improve management system performance.

## 1.7 Management System Framework

The IMS and its associated processes are part of the management system hierarchy, which incorporates NexGen's vision and values, the governing *IMS Policy*, programs, and supporting plans, procedures, and work instructions as shown in Figure 1. The IMS processes enable a common integrated approach to Rook I programs, minimizing redundant or duplicated work and maximizing the use of shared processes to complete work in a safe, reliable manner.

IMS processes are introduced in this document and further described in detail through the associated plans, procedures, and work instructions. IMS processes are applied using a graded approach, as applicable, during the construction and commissioning phase of the Project. The graded approach is commensurate with the risks and characteristics of the activity and is further described in the supporting IMS documents, as applicable.

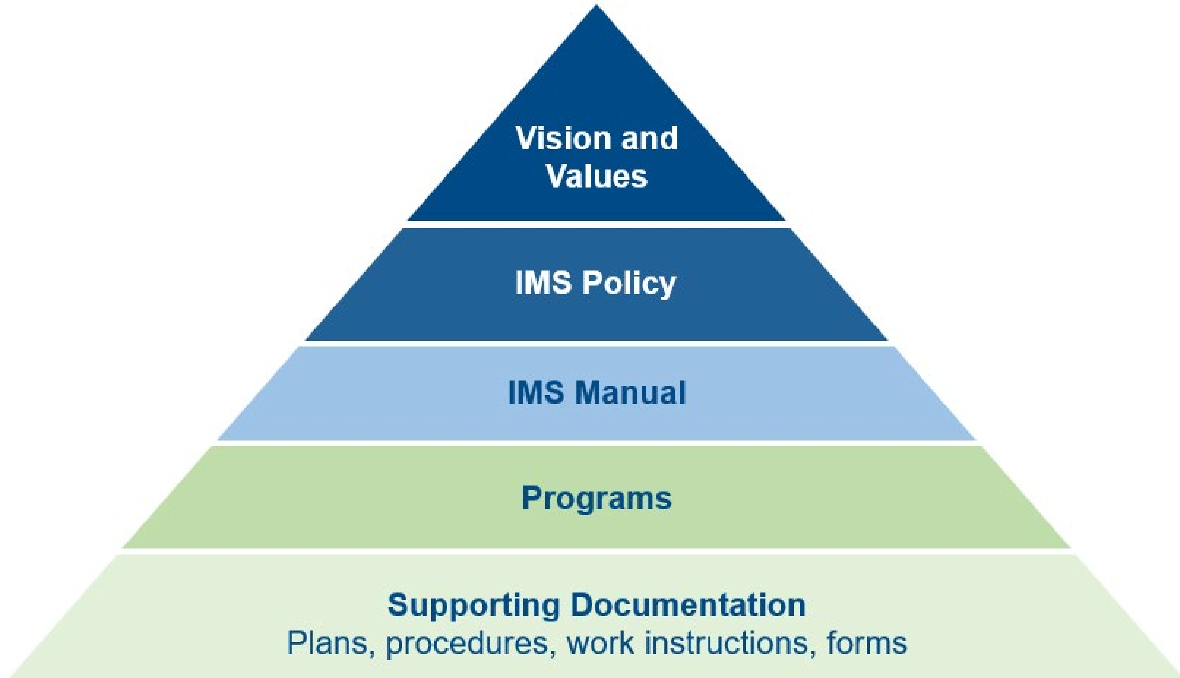


Figure 1: Rook I Integrated Management System Framework

## 1.8 Terminology

Terminology introduced in this Manual is provided below. A comprehensive list of common terms applicable across the IMS are available in the *Rook I Project Glossary*.

**audit** – Systematic, independent, and documented process for obtaining objective evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled (ISO 19011).

**competence** – Ability to apply knowledge and skills to achieve intended results (ISO 9000).

**context of the organization** – Combination of internal and external issues that can have an effect on an organization's approach to developing and achieving its objectives (ISO 9000).

**continual improvement** – Recurring activity to enhance performance (ISO 9000).

**contractor** – A person or company retained to provide a service to NexGen or perform work at the Project site. Contractors may supply material and goods as per a contract or purchase order.

**corrective action** – Action to eliminate the cause of an incident or deviation and to prevent recurrence (adapted from ISO 9000).

**deviation** – A departure from a management system requirement, licensed program requirement, permit, legal, or other requirement. Also known as a nonconformity.

**document** – Information and the medium on which it is contained (ISO 9000).

**effectiveness** – Extent to which planned activities are realized and planned results are achieved (ISO 9000).

**incident** – Occurrence arising out of, or in the course of, work that could or does result in injury and ill health, or an impact on the environment, radiation protection, emergency response, security, production, financial loss, or property damage (adapted from ISO 45001).

**inspection** – Determination of conformity to specified requirements (ISO 9000).

**integrated management system (IMS)** – A common framework of programs, plans, procedures, work instructions, and other supporting documentation describing management system processes for achieving Project objectives and completing work safety, reliably, and consistently while conforming to internal requirements and complying with legal requirements.

**integrated management system (IMS) program** – IMS documents which provide the scope and general description of inter-related processes for a licensed program (e.g., *Integrated Management System Manual*, *Health and Safety Program*, *Radiation Protection Program*, *Construction Management Program*).

**legal requirement** – For the purposes of this procedure, a requirement introduced through legislative act or regulation by an authority mandated by a legislative body, and which is applicable to the Project.

**licensed activities** – Project activities within the scope of CNSC licensing. Project site-based activities that may be outside the scope of CNSC licensed conditions are subject to the IMS on a risk-informed basis (i.e., where the consequence of human error poses a risk to the environment, the health and safety of persons, or to the security of Project facilities).

**management** – Coordinated activities to direct and control an organization (ISO 9000).

**measurement** – Process to determine a value (ISO 9000).

**measuring equipment** – Measuring instrument, software, measurement standard, reference material or auxiliary apparatus or combination thereof necessary to realize a measurement process (ISO 9000).

**monitoring** – Determining the status of a system, a process, a product, a service, or an activity (ISO 9000).

**objective** –Describes what the Project wishes to accomplish in order to support Project goals. This is a measurable aim to achieve a strategy and includes both improvement and maintenance objectives.

**organization** – Person or group of people that has its own functions with responsibilities, authorities, and relationships to achieve its objectives (ISO 9000).

**other requirement** – A requirement which may not be legally binding for the Project but which has been entered into by agreement with a third party.

**performance** – Measurable result (ISO 9000).

**policy** – Intentions and direction of an organization as formally expressed by its top management (ISO 9000).

**prime contractor** – Contractor, under contract directly with NexGen, who is responsible for the completion of a defined project and who hires and directs the work of multiple sub-contractors to do the same.

**procedure** – Specified way to carry out an activity or a process (ISO 9000). A document describing the overall intent and general flow of a process – the "what" of a process. Procedures provide the process purpose, scope, and associated responsibilities and references and may reference more detailed work instructions.

**process** – A set of interrelated or interacting activities that use inputs to deliver an intended result (ISO 9000).

**Project** – Short form for Rook I Project.

**quality** – Degree to which a set of inherent characteristics of an object fulfils requirements (ISO 9000).

**record** – Document stating results achieved or providing evidence of activities performed (ISO 9000).

regulatory requirement – Obligatory requirement specified by an authority mandated by a legislative body (ISO 9000).

**requirement** – Need or expectation that is stated, generally implied or obligatory (ISO 19011).

**review** – Determination of the suitability, adequacy, or effectiveness of an object to achieve established objectives (ISO 9000).

**risk** – Effect of uncertainty on objectives (ISO 31000). An uncertain event that, should it occur, could have a positive or negative effect on the Project. Risk is calculated by multiplying likelihood and consequence.

**stakeholder** – (also “interested party”) Person or organization that can affect, be affected by, or perceive itself to be affected by a decision or activity (ISO 9000).

**statutory obligation** – Obligatory requirement specified by a legislative body (ISO 9000).

**supplier** – (also “provider”) Organization that provides a product or a service (ISO 9000).

**target** – A defined measurement for an objective that is specific, measurable, achievable, relevant, and timebound.

**technical document** – (also “technical specification”) Provides technical detail requirements for the provision of a product or service (e.g., design criteria, engineering drawings, project execution documents).

**traceable** – (also “traceability”) Ability to trace the history, application, or location of an object (ISO 9000).

**training** – (also “train”) Means to give information and explanation to a worker with respect to a particular subject matter and to require a practical demonstration that the worker has acquired knowledge or skill related to the subject matter (The Saskatchewan Employment Act).

**validation** – Confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled (ISO 9000).

**worker** – Any person working for the Project, including NexGen employees and contractors.

# 2.0 Plan

The *Plan* component of the IMS consists of processes that support a systematic, graded approach to planning licensed activities. These processes are applicable to the supporting programs and include:

- identifying work processes for licensed activities;
- assessing and managing risks;
- setting and tracking management system objectives and targets;
- providing the resources necessary to implement and maintain management system functions;
- ensuring that all workers are competent and properly trained to perform assigned work;
- managing documents and records;
- effectively communicating with internal and external parties; and
- managing changes to process, key personnel, facilities, and equipment.

## 2.1 Requirement Identification

Requirements unique to the organizational context, including legal and statutory obligations, critical stakeholder needs, and the internal processes needed for reliable and safe Project development, are identified and addressed through the IMS.

Legal and statutory obligations are identified, tracked, communicated to internal parties as required, and monitored for change. The processes for meeting legal and statutory obligations are further described in section 2.4.3 and within the IMS procedure *Legal and Other Requirements*.

Stakeholder needs, as required, are identified, documented, tracked, and communicated to internal parties. The processes for considering and managing critical stakeholder needs are further described in the IMS procedure *Communication*.

Processes for licensed activities are identified and described in a defined format and presentation using tools such as process mapping and written procedures. The documented processes are used to plan and manage work and may also inform other IMS processes such as risk assessment, training plan development, and auditing of licensed activities. Process identification and requirements are described in the IMS procedure *Process Identification and Development.* The process for controlling process documentation is described in the IMS procedure *Document Management*.

## 2.2 Risk Management

The risk management process identifies hazards to people, the environment, systems, facilities, and equipment that are associated with a task or process. The objective of risk management activity is to reduce all health, safety, and environmental risks to acceptable levels and to keep radiological exposures to workers and the environment as low as reasonably achievable. Risks are assessed for significance and managed to acceptable levels through the application of controls.

The type of risk assessment performed is appropriate for the hazard, apparent level of risk, the safety significance, and the complexity of work. The general risk management framework, process, and requirements are described in the IMS procedure *Risk Management.* Other risk assessment methodologies (e.g., *Job Hazard Analysis, Safety Case for Long-Term Radioactive Waste Management*) are further described in the supporting programs, plans, and procedures, as applicable.

### 2.2.1 Hazard and Risk Identification

Hazard and risk listings are developed (as applicable) for actual or potential hazards and risks related to health, safety, environment, security, assets, economics, community, and compliance. Hazard and risk identification and assessment considers what, how, and why things may go wrong. A range of techniques may be used in identifying potential hazards and risks including, but not limited to:

- brainstorming among personnel who possess relevant knowledge and experience;
- using peer experience from similar industries or projects;
- completing field level hazard assessments;
- performing job hazard analyses;
- evaluating information from Project-specific deviations and audit findings;
- analyzing human health and ecological risk assessments (HHERA);
- studying failure modes and effects analysis (FMEA); and
- performing hazard and operability studies (HAZOP).

Hazard and risk listings are documented and tracked using risk registries and are periodically re-evaluated for accuracy.

### 2.2.2 Risk Assessment

Following the identification of hazards, an assessment is performed using a risk matrix appropriate for the type of assessment being performed and rated based on both the likelihood and severity of occurrence (i.e., inherent risk rating) as a means of developing rankings of relative priority. Hazards and risks with higher risk ratings require a greater degree of mitigation to reduce the risk to an acceptable level.

Hazards identified through field-based hazard identification tools are addressed as outlined in the *Rook I Health and Safety Program*.

### 2.2.3 Risk Registry

Documented risk registries are maintained to record and track relevant risk and control information. Controls are implemented, monitored, and maintained to keep risks at or below the thresholds established to protect worker health and safety and the environment.

Risk registries are updated periodically and referenced by management to assist with decision-making, identification of improvement opportunities, and changes which may be required to management system processes. Risk registries are maintained in accordance with the requirements and frequency described in the IMS procedure *Risk Management*.

## 2.3 Objectives and Targets

Objectives and targets are established at regular intervals for the IMS and its supporting programs to facilitate the achievement of Project-specific goals and act as a means of continually improving the IMS effectiveness. The management review process is used to set and evaluate objectives and targets. Once objectives have been approved by management, plans are developed, documented, and communicated to appropriate parties. Plans include controls to mitigate risks associated with the objectives, targets, and resource requirements, as applicable.

Objectives and targets are linked to clear accountabilities and tracked. Key performance indicators (KPIs) are established as a means of routinely monitoring and measuring performance against objectives and targets.

The process for setting and managing objectives and targets is described in the IMS procedures *Objectives and Targets* and *Management Review.* The process for establishing KPIs is described in the IMS procedure *Monitoring and Measurement*.

## 2.4 Resources

Rook I management is committed to providing the resources needed to establish, implement, maintain, and continually improve the IMS. In addition to providing the financial resources necessary to achieve objectives and meet requirements, management provides the infrastructure, work environment and the competent personnel necessary to operate and control the management system and the Project processes.

### 2.4.1 Roles and Responsibilities

Workers at every level of the Project are required to understand their role in the IMS and fulfill their responsibilities. As position titles and reporting hierarchy may be dynamic throughout various phases of construction and commissioning, responsibilities are described here for the main levels of personnel rather than specific positions. The Project's prime contractor performs their role in accordance with the scope and requirements of this Manual and its supporting programs and as required in accordance with *The Saskatchewan Employment Act*.

All roles and responsibilities for effectively implementing the IMS, including internal and external interfaces, are assigned to the positions outlined within the *Rook I Organizational Chart*. Workers are informed of the roles and responsibilities assigned to them and are accountable for understanding and fulfilling them. Although NexGen maintains overall accountability for Project activities, the term Rook I is used in the following role descriptions to reinforce that the role is applicable and may be assigned to NexGen employees and contractors performing work on behalf of the Project.

The *Rook I Organizational Chart* is a controlled document and is maintained in accordance with the IMS procedure *Document Management.* Significant changes to the *Rook I Organizational Chart* are communicated, as required, in accordance with the IMS procedures *Communication* and *Change Management*.

## NexGen Executive

NexGen executive is accountable for:

- establishing the direction, strategy, and policies of the organization;
- promoting behaviours that support a robust IMS culture;
- promoting the understanding that safety is a principal consideration guiding decisions and actions;
- communicating with external stakeholders, as appropriate;
- providing adequate resources to deliver the requirements of the IMS; and
- verifying the IMS is established, implemented, and maintained.

## Rook I Management

Rook I management is accountable for:

- maintaining effectiveness of the IMS;
- overseeing the development, implementation, and adherence to the IMS;
- promoting a culture where health and safety is a principal consideration guiding decisions and actions at all levels of the Project;
- setting IMS objectives and targets;
- promoting the integration of IMS requirements into Project processes;
- communicating the importance of effective management and of conforming to IMS requirements;
- communicating with external stakeholders, as appropriate;
- allocating adequate and appropriate resources to fulfill IMS implementation;
- managing resources for legal compliance with regulatory requirements and conformance with IMS requirements;
- providing appropriate resources for competence, training, and awareness of IMS requirements;
- controlling management system deviations and directing corrective action when required;
- participating in the management review process;
- monitoring and reporting on IMS performance and effectiveness to NexGen executive; and
- identifying and pursuing opportunities to achieve continual improvement.

## Program Management

Program management is responsible for:

- demonstrating and promoting a positive health and safety culture;
- overseeing the development, implementation, and adherence to the IMS, including the development of appropriate documentation and tools to effectively implement the IMS;
- setting annual objectives and targets related to the IMS, monitoring performance, and overseeing the preparation of internal and external reports regarding IMS activities and outcomes;
- managing resources for legal compliance with regulatory requirements and conformance with IMS requirements;
- confirming workers have the necessary competence, training, and awareness of IMS requirements;
- working with applicable departments to ensure that IMS roles and responsibilities are identified and described and that those with specific responsibilities are qualified to fulfill their roles;

- providing independent oversight of processes through monitoring and auditing activities;
- reporting on IMS performance and effectiveness to Rook I management;
- facilitating management review of the IMS; and
- overseeing continual improvement activities through management system evaluation and improvement action.

## Program Coordination

Program coordinators are responsible for:

- demonstrating and promoting a positive health and safety culture;
- tracking IMS performance using KPIs and preparing internal and external reports regarding IMS activities and outcomes;
- promoting the development, implementation, and adherence to IMS procedures and work instructions, including the development of appropriate tools to effectively implement the IMS;
- maintaining IMS data and records in a secure and controlled manner;
- working with applicable departments to verify IMS roles and responsibilities are identified and described, and those with specific responsibilities are qualified to fulfill their roles;
- performing quality control checks and analysis on IMS data and records to provide accurate statistics and reporting that will inform Project-related decisions;
- providing management system subject-matter expertise and support;
- supporting continual improvement through management system evaluation and improvement action;
- reporting on IMS performance and effectiveness to program management;
- preparing and supporting management review of the IMS and maintaining associated records including tracking the decisions and actions stemming from the review; and
- verifying monitoring processes are implemented in accordance with Program and regulatory requirements.

## Rook I Supervisors

Rook I supervisors are responsible for:

- demonstrating and promoting a culture where health and safety is a principal consideration at all levels of the Project;
- understanding, encouraging, and following the IMS and its requirements;
- overseeing department functions and supervising direct reports to verify conformance to IMS requirements;
- supporting the achievement of IMS objectives and targets;
- communicating and coordinating with other departments to facilitate effective implementation of the IMS;
- communicating with and directing contractors, as appropriate;
- participating in audits and inspections, as required;
- participating in the management review, as required; and
- identifying and supporting opportunities for continual improvement.

## Rook I Workers

Workers are responsible for:

- demonstrating and promoting a positive health and safety culture;
- understanding and following the *IMS Policy*, processes, and procedures;
- using all facilities, equipment, devices, and clothing intended to protect worker health and safety, protect the environment, and maintain security in accordance with procedures and training;

- working towards achieving objectives and targets in their area of assigned responsibility;
- communicating instances of noncompliance, deviation, and incidents or near misses;
- cooperating with auditors, incident investigators, regulators, and inspectors, as required; and
- identifying and reporting hazards and opportunities for improvement in the workplace.

### 2.4.2 Facilities and Equipment

Facilities and equipment supporting the effective implementation of the IMS and its associated processes are provided to workers. Facilities are designed, constructed, operated, and maintained with consideration for worker health, safety, wellbeing, and compliance with legal requirements.

Worker health, safety, and wellbeing and environmental protection are principal considerations during the design, construction, operation and maintenance of facilities and the selection, operation, and maintenance of equipment.

The processes for planning, documenting, and controlling the design, construction, installation, and commissioning of facilities and equipment are outlined in the *Rook I Construction Management Program* and the *Rook I Commissioning Management Program*. The processes for managing (including identifying and labelling), and maintaining equipment and materials is outlined in the *Rook I Asset Management Program*. The processes for safely and effectively managing waste are outlined in the *Rook I Waste Management Program*. The processes for protecting site assets from security threats and fire are outlined in the *Rook I Security Program* and the *Rook I Fire Protection Program,* respectively.

Processes for identifying and integrating human factors considerations in the design and development of Project facilities, systems, components, and processes are outlined in the *Rook I Human Factors Engineering Program Plan.*

### 2.4.3 Legal and Other Requirements

NexGen is committed to conforming to internal processes and complying with applicable legal and other requirements. Changes to applicable internal and external requirements are monitored and evaluated to identify whether updates to the IMS are required. IMS procedures and work plans are developed with consideration for all applicable legal requirements including the CNSC regulatory document *REGDOC 2.1.1 Management System* and *CSA* document *N286-12 Management System Requirements for Nuclear Facilities.*

The process for managing legal and other requirements is described in the IMS procedure *Legal and Other Requirements.*

## 2.5 Training and Competence

The Project follows a systematic approach to training (SAT) to qualify, educate, and train, as appropriate, workers to carry out the work assigned to them. Training requirements are aligned to competence criteria and performance requirements outlined for each position at the Project, and workers are evaluated against these criteria and their performance is subject to continual monitoring. Workers are provided feedback on their performance. Training records are controlled and managed in accordance with the IMS procedure *Records Management*.

Project workers and visitors are required to participate in site orientation upon their arrival, which includes information on general requirements for protecting personnel and the environment, camp rules, and expectations of personal conduct while at site. Site orientation is developed using the SAT process to verify all critical information for new personnel is included.

In addition to general information provided in site orientation, training specific to the IMS is provided as applicable to each individual's roles and responsibilities and includes as necessary:

- setting and monitoring of objectives and targets;
- coordinating and managing legal and other requirements;
- managing risk;
- managing change;
- communicating to external parties;
- document and records management;
- incident and deviation management;
- handling of corrective actions;
- coordinating and conducting management review;
- continual improvement; and
- conducting audits and investigations (supported with appropriate external training).

The Project's approach to developing, delivering, and managing training is outlined in the *Rook I Training Program.*

The *Rook I Training Program* is complemented by established organizational human resources practices to ensure Rook I workers are selected based on their ability to satisfy defined competencies and perform their assigned tasks safely and competently, and that workers receive timely feedback on their performance to reinforce expected behaviours and desired outcomes.

## 2.6 Documented Information

Information, including the identification of critical facilities and equipment and documents and records generated for or as a result of licensed activities are controlled to verify information is accurate, available when needed, and protected from uncontrolled alteration.

The processes for managing and maintaining facility and equipment identification are outlined in the *Rook I Asset Management Program.*

### 2.6.1 Document Management

Controlled documents are created internally (e.g., IMS Policy, programs, supporting plans, procedures, work instructions), have a unique identifier and are traceable, secure, reviewed, and readily accessible to those that require them. Controlled documents are also:

- periodically reviewed and revised for accuracy;
- reviewed by an authority considered appropriate for the subject matter;
- approved by the authority having accountability for the document scope; and
- promptly removed and archived for future reference when obsolete.

Documents from external sources (e.g., critical equipment operating manuals, applicable regulations, standards, codes) are made accessible by those who require the information.

The document management process, including the review frequency, is described in the IMS procedure *Document Management.*

### 2.6.2 Record Management

Record management focuses on information generated as evidence that management system processes are followed and that legal and other requirements are met. Records are maintained for each supporting program. Examples include, but are not limited to:

- worker identification;
- radiation dose identification;
- inspection notes;
- equipment testing results;
- monitoring results;
- training records and statistics;
- instances of change control;
- risk assessments and registries;
- deviation and incident reports;
- audit reports;
- corrective action reports;
- management review meeting minutes;
- KPI reports; and
- other recorded data critical to the management system.

Records associated with licensed activities are controlled for accuracy and are readable, complete, identifiable, traceable, readily accessible to those that require them, and preserved in accordance with the timelines described in the IMS procedure *Records Management.*

## 2.7 Communication

Communication is managed so that relevant information is shared among internal Project stakeholders (e.g., workers) and with external stakeholders (e.g., regulators, Indigenous communities, members of the public, shareholders, suppliers). Workers are made aware of the relevance and importance of their work related to the IMS objectives. Effective communication is enabled through timely communication using tools appropriate for the subject matter and audience.

Communication processes, including internal and external communication interfaces, are described in the IMS procedure *Communication.* Communication practices specific for Indigenous communities, local communities, and the public are outlined in the *Rook I Indigenous and Public Engagement Program.*

## 2.8 Change Management

Change is managed to protect worker health and safety, the environment, facilities, and equipment, and to promote consistent and effective execution of Project processes. This includes changes to Project:

- design;
- facilities;
- equipment;
- management system processes;
- organizational structure;
- key roles and responsibilities;
- documentation; and
- legal and other requirements.

The change management process verifies risks associated with changes are assessed and managed within their operational context. This includes:

- clearly defining and justifying changes;
- reviewing changes with relevant internal and external stakeholders and subject matter experts who understand the intent, requirements, and potential consequence of the change;
- documenting the change plan and its approval;
- implementing and verifying changes have been made according to the approved plan;
- following up to verify the change has been effective (i.e., validation); and
- communicating the change to those affected in a timely manner, including regulatory authorities if there are regulatory approval implications.

Changes to the IMS and its supporting processes and activities material to the licensing basis require advance approval from the CNSC. This includes any changes to licensed documents themselves or changes to supporting processes that could negatively impact the intent of licensed documents. As such, all proposed changes of this nature are summarized and communicated to the CNSC for endorsement in advance. The change management process is described in the IMS procedure *Change Management.*

# 3.0 Do

The *Do* component of the IMS consists of implementing controls that support safe and reliable execution of work. These activities include:

- controlling risks;
- controlling work;
- controlling design;
- procuring goods;
- managing contractors; and
- identifying and reporting incidents and deviations.

## 3.1 Risk Control

Controls are implemented to address hazards and associated risks identified through the risk assessment process, and to lower the risks to acceptable levels. The controls applied are specific to the nature of the risk and a graded approach is used so the level of control is commensurate with the level of risk. Health and safety risks, including radiological exposures to workers and the environment, are kept as low as reasonably achievable. Controls are documented, tracked, and periodically evaluated for effectiveness. The control evaluation frequency is defined in the IMS procedure *Risk Management*.

NexGen prevents, eliminates, and reduces risks with multiple types and layers of controls. A hierarchy of controls approach is followed when selecting controls to mitigate risk. This hierarchy of controls is illustrated in Figure 2.

The process for identifying, applying, and evaluating controls is described in the IMS procedure *Risk Management.*

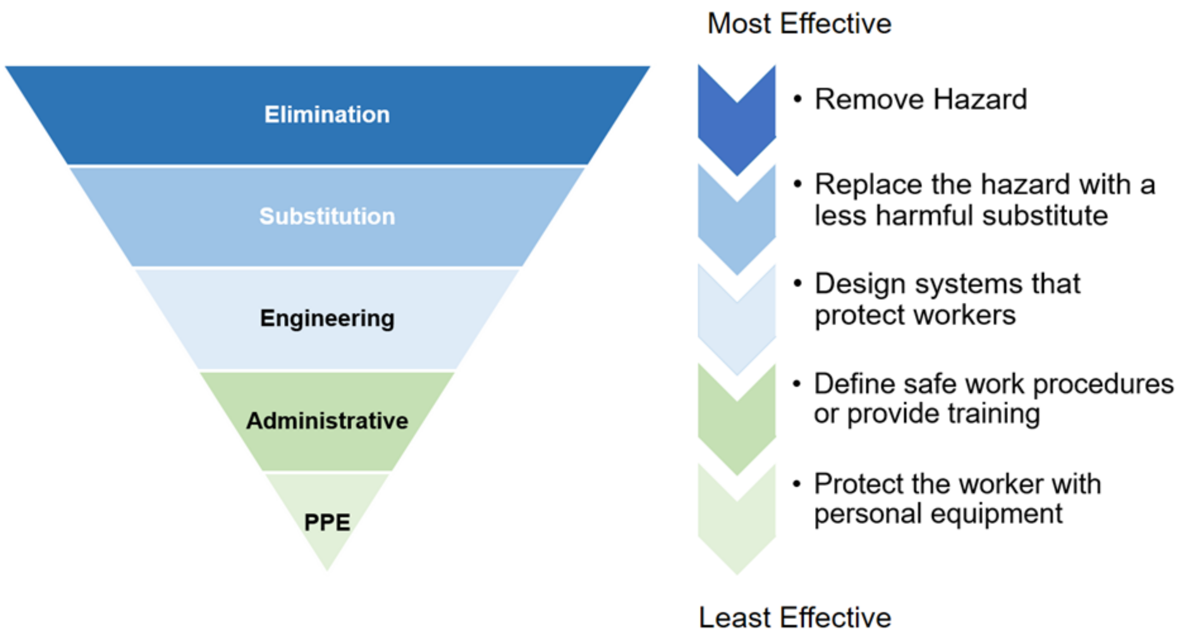


Figure 2: Hierarchy of Controls

### 3.1.1 Adaptive Management

Adaptive management may be used to reduce the uncertainty associated with hazards or risks when systems are highly dynamic and when there are gaps in information or understanding, opportunities to learn and gain new information, and opportunities to adjust activities or practices to realize improvements. Uncertainty is mitigated through application of a rigorous and systematic approach to learning from experience, gaining knowledge, adapting planning, and improving confidence in an approach.

Adaptive management deploys sequential steps to:

- assess and formulate the problem;
- design and develop a solution to address the problem;
- implement the solution;
- monitor for outcomes and impacts;
- evaluate monitoring results against established criteria; and
- adjust the approach with consideration for results.

The process for determining when, how, and where adaptive management should be used is further described in the IMS procedure *Risk Management*.

## 3.2 Work Control

Routine and non-routine work related to licensed activities is planned and documented. Work planning includes a clear description of what is required. This includes, but is not limited to:

- worker training;
- tool and material listings;
- task acceptance criteria;
- task sequencing;
- work scheduling; and

- measures to independently verify that requirements are met.

The control of work (including technical specifications, construction execution plans, material test plans, inspection and test plans, and turnover and commissioning plans) is outlined as required in the *Rook I Construction Management Program,* the *Rook I Commissioning Management Program,* and the *Rook I Asset Management Program*. The application of controls providing safe, effective work practices are described in the IMS procedure *Risk Management*.

## 3.3 Design Control

NexGen controls the design, construction, installation, commissioning, and turnover of facilities and equipment to ensure that processes and outcomes conform to requirements. The extent of control is commensurate with the risk of the specific nature, duration, and complexity of the work. Engineering tools and analytical software are controlled in accordance with standard industry practices. Design requirements are based on applicable industry standards and regulations and are approved by competent personnel. Facilities and equipment are assessed to verify design requirements are met prior to operation.

The processes for planning, documenting, and controlling the design, construction, installation, commissioning, and turnover of facilities and equipment are outlined in the *Rook I Construction Management Program,* the *Rook I Commissioning Management Program,* and associated plans, procedures, and work instructions. The site selection process, including performing feasibility studies for the environmental impact statement, defining requirements, and obtain approvals for site preparation are managed through the environmental assessment, permitting, and licensing processes.

## 3.4 Supply Chain

Supply chain controls are applied to procure equipment, materials, and services to meet internal, legal, and other requirements as well as technical specifications. This includes, but is not limited to, defining requirements for:

- purchasing, including scope of supply;
- technical performance requirements, including required inspection, testing, and acceptance;
- regulatory and management system compliance, including applicable codes, standards, and specifications;
- documentation, packaging, and delivery requirements;
- any sub-supplier/sub-contractor requirements;
- confirming the supplier understands and accepts all requirements;
- receipt and inspection;
- storage and handling;
- reporting and resolving issues;
- managing documentation and records; and
- preventing the use of counterfeit, fraudulent and suspect items.

The extent of controls that are applied depends on the potential impact the equipment, materials, or services supplied could have on quality and safety. Storage and handling controls specifically include:

- prevention of damage, deterioration, or loss;
- in-storage maintenance and inspections of items and storage areas;
- special handling of tooling and equipment, when required;
- inspection of repaired and returned items to ensure fitness for use; and
- identification and control of surplus items.

Purchased services are verified in accordance with planned verification. Supplier audits are planned and performed as required to confirm the initial and ongoing acceptability of the supplier's management system as described in section 4.2.

Information demonstrating suppliers or service providers have conformed to Project-specific criteria (including initiatives to support local suppliers) is documented and used to develop and maintain an approved supplier list. Supplier selection and award is based upon the continued approval of the supplier's capability and the ability of the supplier to meet the purchasing requirements within budgetary considerations.

The process for procuring equipment, materials, and contracted services is detailed in the IMS procedure *Contracts and Procurement*. The process for managing equipment and materials is outlined in the *Rook I Asset Management Program*.

### 3.4.1 Contractor Management

Contractors performing work related to licensed activities are subject to the requirements of the IMS. A graded approach in accordance with the level of risk and complexity of the work is used when awarding contracts. Contractors are assessed against a variety of criteria (e.g., maturity of management systems, known past performance) and assigned varying degrees of independence. Contractor performance is routinely monitored and assessed for conformance to applicable requirements. The process for ensuring contractors adhere to IMS requirements is outlined in the *Rook I Contractor Management Program.*

## 3.5 Deviation and Incident Reporting

Project employees and contractors are required to control and report deviations (also known as "nonconformities") as well as health, safety, and environmental incidents and near misses. On a risk-informed basis, deviations, incidents, and near misses are subject to detailed investigation and corrective actions applied as described in the IMS procedure *Investigation and Corrective Action.*

### 3.5.1 Deviation Control and Reporting

A deviation is a departure from a management system requirement, licensed program requirement, permit, legal, or other requirement. Employees and contractors are responsible for reporting deviations that they encounter while on site.

Deviations and the potential need for corrective action(s) may be identified through:

- receipts and inspections;
- audits and inspections (both internal and external);
- management review;
- evaluation of performance through monitoring and measurement;
- mechanical or system failure; and
- communication with stakeholders.

The process for providing information regarding deviations, including their immediate control and the handling of initial actions, is described in the IMS procedure *Incident and Deviation Management*. Construction-related deficiencies are managed in accordance with the *Rook I Construction Management Program* and the *Rook I Commissioning Management Program*.

### 3.5.2 Incident Identification and Reporting

An incident is an occurrence that could or does result in an injury, ill health, or an unplanned discharge or disturbance to the environment. Employees, contractors, and visitors are required to report information regarding incidents, including near-miss events, to their supervisor or site contact. Near misses are events or situations where an incident could have occurred but was avoided.

Certain incidents are required to be reported to applicable regulators within specified time frames. These events include:

- serious injuries;
- dangerous occurrences;
- notifiable medical conditions resulting from occupational exposure;
- exceedance of radiation action level or top administrative level;
- unplanned environmental discharges exceeding threshold limits; and
- any situation requiring activation of the emergency response team.

The process for the initial handling of incidents as well as the process for providing information regarding reportable events or situations to internal and external parties is described in the IMS procedure *Incident and Deviation Management*. Injuries, dangerous occurrences, and occupational exposures are outlined in the *Rook I Health and Safety Program.* Radiation exceedances and environmental exceedances are outlined in the *Rook I Radiation Protection Program* and *Rook I Environmental Protection Program,* respectively. Emergency response is outlined in the *Rook I Emergency Preparedness and Response Program*.

# 4.0 Check

The *Check* component of the IMS consists of ongoing performance monitoring and periodic analysis of results to ensure that the IMS is operating effectively. This includes monitoring and measurement, audits and inspections, and management review.

## 4.1 Monitoring and Measurement

Management system processes are continually monitored and measured to evaluate whether Project deliverables meet internal and external requirements.

Throughout the course of doing work, workers conduct self-checks to confirm approved processes are being followed and inputs and outputs meet requirements. Managers and supervisors participate in self-assessments through direct observation and coaching within their area of accountability. Work activities are verified by personnel who are independent from the work performed and on a graded, risk-based approach. Critical activities requiring specific independent verification are identified in technical specifications, procedures, or work instructions. Work involving low potential impacts are independently verified through routine supervisor oversight.

Verification activities specific to contractor oversight and construction management are critical to the Project and outlined in the *Rook I Contractor Management Program*, the *Rook I Construction Management Program*, and the *Rook I Commissioning Management Program*.

Ongoing performance monitoring serves to identify and resolve issues that could impact the safety of workers, protection of the environment, or the effectiveness of the Project facilities, equipment, and processes. Monitoring processes are specifically used to better understand and benchmark Rook I safety culture to inform improvement actions. Monitoring and measurement provide assurance to management and external stakeholders, such as regulators, that requirements are fulfilled. Monitoring and measuring equipment requiring calibration is managed as outlined in the *Rook I Asset Management Program*.

Information generated through performance monitoring, measurement, analysis, and evaluation is documented and reported to the accountable party.

The performance and effectiveness of the IMS and its supporting programs and processes are evaluated using program-specific leading and lagging KPIs. The KPIs are measurable elements selected to track progress toward achievement of an objective or target. In addition to KPIs, information from deviation reporting, internal and external audit reports, and other reviews is used to identify opportunities for performance improvement.

Monitoring, measurement, and performance evaluation processes and requirements are described in the IMS procedure *Monitoring and Measurement*, as well as in program-specific procedures and work instructions that relate to specific tasks.

## 4.2 Inspections and Audits

Audits are an important tool for verifying compliance with legal and other requirements and for verifying the effective implementation and ongoing performance of the IMS. These audits supplement, but are distinct from, other forms of auditing such as financial, accounting, and business process audits.

Audits of the IMS and the supporting programs are performed by personnel independent of the work being assessed, and are systematic, documented, and reviewed. Audit findings are fact-based and reviewed by management and those designated as responsible and accountable for the topic. Deviations or occurrences of noncompliance are documented and use the corrective action process to make the necessary improvements.

Internal audits are conducted by workers at regular intervals following the audit plan. At minimum, all elements of the management system must be audited at least once every five years. Independent assessors have access to the work site, workers, the work, documents, and records in accordance with the agreed audit plan. Regulatory audits are conducted by representatives from federal and provincial regulatory agencies. Rook I management determine the need to audit suppliers based on supply criticality and available performance data. Supplier audits assess the supplier's management system to verify processes exist and are effective for the prevention, detection, and removal of substandard, counterfeit, fraudulent, and suspect items. Supplier audits delegated to a third party are reviewed by NexGen to verify the results are acceptable.

Audit records demonstrate that the audit plan is followed, that the processes identified in the IMS have been audited according to the plan and include any protocols that were used to audit processes or requirements. The audit process and requirements are described in the IMS procedure *Audit Management.*

Workplace inspections are conducted to assure conformity of the management system and to assess compliance to regulatory requirements. Area-specific inspections scope, criteria, and frequency are discussed in relevant programs and the supporting procedures and work instructions (as applicable).

Audit and inspection records are managed as described in IMS procedure *Records Management.* Deviations identified as a result of audits and inspections are managed as described in the IMS procedures *Incident and Deviation Management* and *Investigation and Corrective Action.*

## 4.3 Management Review

Rook I management reviews the suitability, adequacy, and effectiveness of the IMS at established intervals. Management also evaluates the sustainability of the management system with a view to future challenges and opportunities.

The management review considers the entirety of the IMS, which includes items such as status of corrective actions, trends in deviations, changes in internal and external issues, performance and effectiveness of the management programs, audit findings, adequacy of resources, effectiveness of actions taken to address risk and opportunities for improvement, and the setting of objectives and targets.

At a minimum, management reviews are conducted annually. The outcomes from these reviews are documented and used to inform the development of strategic plans, objectives and targets, any need for changes to the IMS, resource needs, and additional actions. The management review process and requirements are described in the IMS procedure *Management Review.*

# 5.0 Act

The *Act* component of the IMS consists of performing corrective actions, as appropriate, and continually improving the management system. The results of these program elements feed back into *Plan* to complete the Plan-Do-Check-Act cycle.

## 5.1 Corrective Action Process

Events or situations identified from deviation or incident reports, audits, inspections, or management review that are deemed sufficiently serious in nature or potentiality are subject to an appropriate level of investigation, causal analysis, and the development of aligned actions to prevent reoccurrence. Responsibility for developing and completing corrective actions is typically assigned to the process owner. If an investigation is required, the level of investigation is determined with consideration for the actual or potential severity of the event or situation and a competent investigator is assigned. Investigations, causal analysis, and follow-up activities are supported by competent personnel.

Corrective actions are planned, implemented, verified, and reviewed for effectiveness commensurate with the level of risk. Records of corrective and preventive action are maintained according to the requirements as described in the IMS procedure *Records Management.*

The corrective action process and requirements are described in the IMS procedure *Investigation and Corrective Action.* Corrective actions required as a result of construction-related deficiencies are managed separately as described in the *Rook I Construction Management Program* and the *Rook I Commissioning Management Program*.

## 5.2 Continual Improvement

Continual improvement is an ongoing process to improve the suitability, adequacy, and effectiveness of the IMS. Rook I management and workers are expected to continually seek out improvement opportunities for the IMS and Project processes. This typically involves program monitoring, auditing, management review, self-assessment, and maintaining awareness of changes in the business environment. It may also include benchmarking Project performance against other similar projects and facilities.

Use of experience gained during Project development, including information gathered from relevant external sources, informs potential improvement opportunities. Potential sources of information include:

- incident investigations;
- lessons learned;
- worker experience;
- government and industry publications;
- industrial peer information exchange;
- professional associations; and
- monitoring results.

Experience gained within the business is made available to others based on its sensitivity.

Continual improvement opportunities are identified, documented, and evaluated as described in the IMS procedure *Continual Improvement.*

# 6.0 References

## 6.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-CHT-00001 | *Rook I Organizational Chart* |
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-IPE-PGM-00001 | *Rook I Indigenous and Public Engagement Program* |
| ROOK-HSF-PGM-00001 | *Rook I Health and Safety Program* |
| ROOK-RAD-PGM-00001 | *Rook I Radiation Protection Program* |
| ROOK-ENV-PGM-00001 | *Rook I Environmental Protection Program* |
| ROOK-TRN-PGM-00001 | *Rook I Training Program* |
| ROOK-CON-PGM-00001 | *Rook I Contractor Management Program* |
| ROOK-EMG-PRG-00001 | *Rook I Emergency Preparedness and Response Program* |
| ROOK-FIR-PGM-00001 | *Rook I Fire Protection Program* |
| ROOK-WST-PGM-00001 | *Rook I Waste Management Program* |
| ROOK-CST-PGM-00001 | *Rook I Construction Management Program* |
| ROOK-COM-PGM-00001 | *Rook I Commissioning Management Program* |
| ROOK-AST-PGM-00001 | *Rook I Asset Management Program* |
| ROOK-SEC-PGM-00001 | *Rook I Security Program* |
| To be confirmed | *Rook I Human Factors Engineering Program Plan* |
| ROOK-IMS-PRO-00001 | *Risk Management* |
| ROOK-IMS-PRO-00002 | *Process Identification and Development* |
| ROOK-IMS-PRO-00003 | *Objectives and Targets* |
| ROOK-IMS-PRO-00004 | *Document Management* |
| ROOK-IMS-PRO-00005 | *Records Management* |
| ROOK-IMS-PRO-00006 | *Contracts and Procurement* |
| ROOK-IMS-PRO-00007 | *Management Review* |
| ROOK-IMS-PRO-00008 | *Incident and Deviation Management* |
| ROOK-IMS-PRO-00009 | *Investigation and Corrective Action* |
| ROOK-IMS-PRO-00010 | *Monitoring and Measurement* |
| ROOK-IMS-PRO-00011 | *Communication* |
| ROOK-IMS-PRO-00012 | *Legal and Other Requirements* |
| ROOK-IMS-PRO-00013 | *Change Management* |
| ROOK-IMS-PRO-00014 | *Audit Management* |
| ROOK-IMS-PRO-00015 | *Continual Improvement* |

## 6.2 External

- Federal
  - *Nuclear Safety and Control Act*
  - *General Nuclear Safety and Control Regulations*
  - *Uranium Mines and Mills Regulations*
  - *Canadian Nuclear Safety Commission. REGDOC-2.1.1, Management System*
  - *Canadian Nuclear Safety Commission. REGDOC-3.1.2, Reporting Requirements*
- Provincial
  - *The Saskatchewan Employment Act*
- Other
  - *Canadian Standards Association. N286-12 Management system requirements for nuclear facilities*
  - *ISO 9001 Quality management system requirements*
  - *ISO 14001 Environmental management systems – Requirements with guidance for use*
  - *ISO 19011 Guidelines for auditing management systems*
  - *ISO 31000 Risk Management - Guidelines*
  - *ISO 45001 Occupational health and safety management systems – Requirements with guidance for use*

## Contractor Management Program
## ROOK-CON-PGM-00001

# Rook I Project

## Contractor Management Program

ROOK-CON-PGM-00001

December 2021

# Record of Revisions

| Version. No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| 0 | 15-Dec-2021 | Issued Final | Rob Paine | Kevin Oakes | Tony George |

## Table of Contents

## List of Figures

# 1.0 Introduction

The *Rook I Contractor Management Program* (Program) outlines the systematic and risk-based approach to managing contracted work as part of the NexGen Energy Ltd. (NexGen) Rook I Project (Project). It describes processes for maintaining compliance, enabling continual improvement, provides the framework to support effective contractor management, and confirms contractors perform work safely in accordance with applicable internal and external requirements.

This Program is part of the *Rook I Integrated Management System* (IMS) and is subject to the *Rook I Integrated Management System Policy* which provides the foundation for NexGen's approach to contractor management. The Program and its relationship to other IMS programs within the IMS hierarchy is shown in Figure 1. As a component of the IMS, this Program follows the Plan-Do-Check-Act cycle to identify, control, monitor, and continually improve contractor management processes for workers and the public, and the environment.

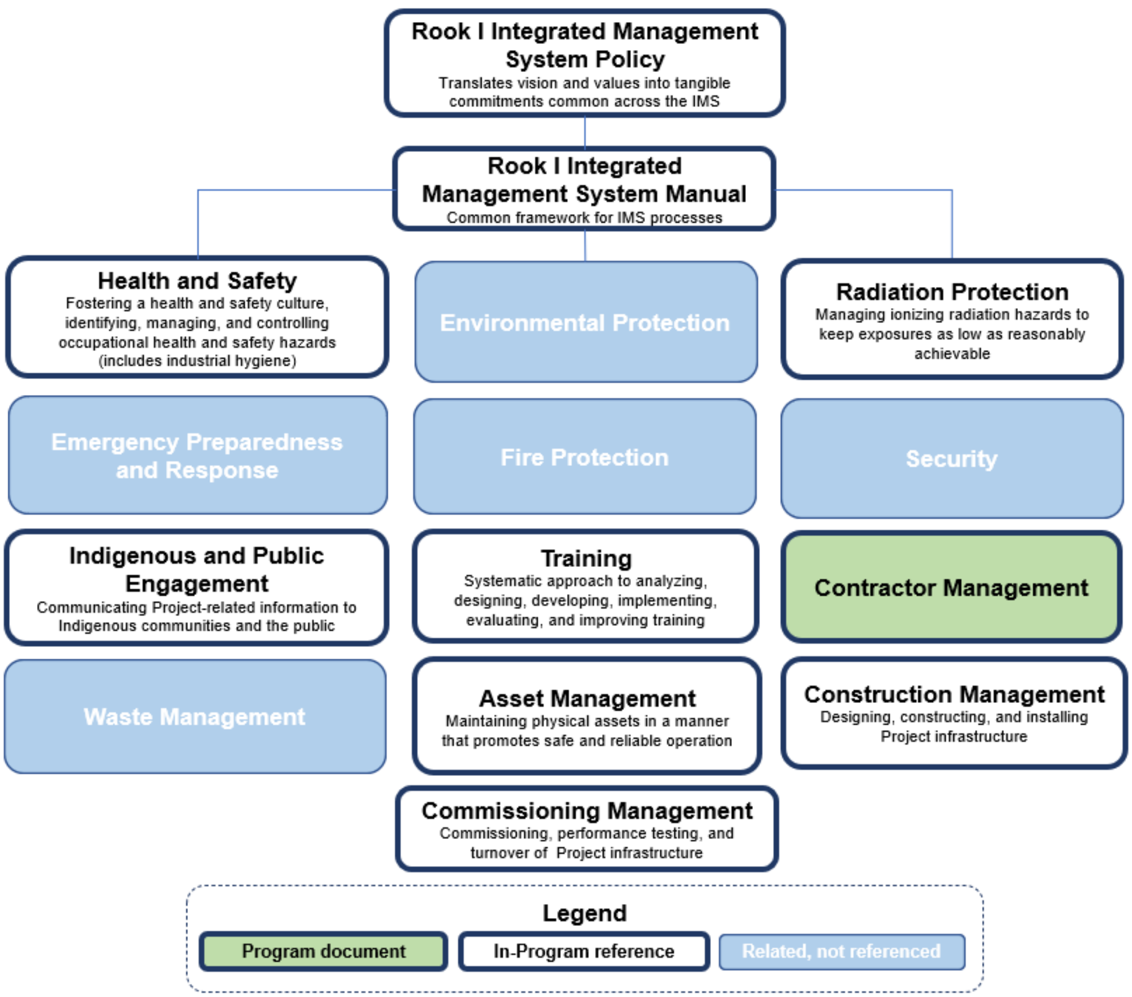


Figure 1 Program context within the IMS

## 1.1 Purpose

This Program describes the Project's principles, processes, and framework for effectively managing contractors, including planning for, managing, and assessing contracted work. This Program aligns with and meets all requirements of the references outlined in section 6.0, including *The Occupational Health and Safety Regulations, 2020*, and *The Mines Regulations, 2018*.

## 1.2 Scope

The scope of this Program includes planning, delivering, evaluating, and improving Project contractor management processes for effectively managing and continually improving contractor performance for on-site Project-related licensed activities during the Project's construction and commissioning phase.

This Program uses a graded, risk-based approach to implementing contractor management processes that account for the level of risk, safety significance, and complexity of the activity.

This Program does not apply to contractors working at their own facilities or cover occupational health and safety or construction management processes. These processes are conducted in accordance with the *Rook I Health and Safety Program* and the *Rook I Construction Management Program* and the *Rook I Commissioning Management Program*.

## 1.3 Program Principles

NexGen is accountable for all Project activities and recognizes the importance of effective contractor management as a means of protecting worker health and safety, preserving the environment, maintaining the security of the Project site, and reliably developing the Project in a manner that meets all applicable requirements. NexGen's approach to planning, managing, and assessing contracted work is reflected in the following Program principles:

- protecting and promoting the health, safety, and well-being of people and the environment through all aspects and phases of the business;
- establishing a strong safety culture which is periodically assessed and continually improved;
- managing contractors in a duly diligent manner;
- promoting and actively supporting our contractors in building their capacity to be safe;
- verifying workers have the knowledge, skills, and tools to safely perform their duties;
- identifying, assessing, managing, and eliminating (where possible) hazards and risks;
- effectively managing resources, information, communication, work, and change;
- complying with applicable requirements; and
- continually improving Program performance.

## 1.4 Terminology

Terminology introduced in this Program is provided below. A comprehensive list of common terms applicable to this Program and the Integrated Management System are available in the *Rook I Project Glossary*.

**contractor** – A person or company retained to provide a service to NexGen or perform work at the Project site. Contractor may supply material and goods as per a contract or purchase order.

**emergency contract work** – Contract work deemed time-critical because of a safety, environmental, radiation, or productivity risk.

**integrated management system (IMS)** – A common framework of programs, plans, procedures, work instructions, and other supporting documentation describing management system processes for achieving

Project objectives and completing work safety, reliably, and consistently while conforming to internal requirements and complying with legal requirements.

**licensed activities** – Project activities within the scope of CNSC licensing. Project site-based activities that may be outside the scope of CNSC licensed conditions are subject to the integrated management system on a risk-informed basis (i.e., where the consequence of human error poses a risk to the environment, the health and safety of people, or to the security of Project facilities).

**prime contractor** – Contractor, under contract directly with NexGen, who is responsible for the completion of a defined project and who directs the work of multiple sub-contractors to do the same.

**scope of work** – Written agreement from NexGen in which expected tasks and deliverables are detailed to align expectations between both parties.

**sub-contractor** – Party under contract to the contractor to provide a portion of work or services to the Project, which may include supply of services and material and goods.

**worker** – Any person working for NexGen including a contractor.

# 2.0 Plan

The *Plan* component of this Program includes processes that support a systematic, risk-based approach to planning contracted work. Elements of planning include:

- identifying relevant hazards associated with contracted work and applying appropriate controls to manage the associated risks;
- setting Program-specific objectives and targets;
- providing the appropriate parties with the information and resources necessary to implement Program processes;
- identifying and managing applicable requirements appropriate for the scope and nature of contracted work;
- confirming all contracted and sub-contracted workers are qualified and competent to perform work safely;
- establishing communication processes to verify relevant information (e.g., health, safety, environment) is shared between contractors and the appropriate Project representatives;
- managing change to processes, personnel, design, facilities, and equipment that occur before or during the execution of contracted work; and
- managing information generated for or due to contracted work.

## 2.1 Risk Management

The risk management process identifies hazards to people, the environment, systems, facilities, and equipment associated with a task or process. Risks are assessed for significance, managed to acceptable levels through the application of controls, and tracked in risk registries. The general risk management framework, process, and requirements are outlined in the *Rook I Integrated Management System Manual* (IMS Manual).

For contracted work, scope-specific risk assessments are completed when developing the contract scope of work. The type of risk assessment performed is appropriate for the scope, complexity, apparent level of risk, and safety significance of the planned work. As appropriate, scope-specific hazards, risks, and controls are identified and documented in consultation with contractor representatives. As required, risk assessments are re-evaluated for accuracy as contracted work progresses.

Other risk or hazard assessment methodologies (e.g., job hazard analysis) may be used when preparing for and carrying out contracted work.

Alternate risk assessment methodologies proposed by contractors may be used if deemed functionally equivalent to established Project processes and formally authorized by the Rook I contract representative.

### 2.1.1 Pre-Award of Work

The Project follows a systematic and risk-based approach to identify and select contractors and service providers that will meet established requirements. Contractors are assessed to determine the quality of their management systems, ability to comply with applicable requirements, and ability to manage potential hazards and risks that may be present while performing work. Contractors are pre-qualified and evaluated against established classification criteria and assigned a rating that corresponds to the level and type of oversight required to confirm work is performed safely and in accordance with requirements as described in section 3.3. Classification criteria includes, but is not limited to:

- health, safety, and environment readiness and reliability;
- commercial and financial capabilities;
- experience/projects;
- quality of previous work performed;
- management and supervisory experience and capability;
- maturity of management system and internal controls;
- location and makeup of the workforce;
- equipment fleet (where applicable); and
- technical ability.

Contractors that meet established requirements are documented and tracked in an approved supplier list as part of the supplier evaluation process outlined in the IMS Manual. The approved supplier list is managed in accordance with the document and record management process outlined in the IMS Manual.

As work packages are identified and prepared, steps are taken to engage and finalize suitable contractor participation, including:

- assembling and reviewing a contract *Scope of Work*;
- tendering work to qualified vendors;
- evaluating bids on set criteria; and
- identifying the contractor best suiting the criteria.

The process for classifying contractors is further defined in the contractor management procedure *Contractor Pre-Work*.

## 2.2 Objectives and Targets

Program objectives and targets are established at regular intervals, linked to clear accountabilities, and monitored for status to completion. Objectives and targets are tangible, documented actions that result in improvements to contractor management processes and Program outcomes.

Setting and managing objectives and targets, including establishing monitoring measures, is outlined in the IMS Manual.

## 2.3 Resources

Rook I management is committed to providing the necessary resources to establish, implement, maintain, and continually improve this Program and its associated processes. In addition to providing the required financial resources to achieve objectives and meet requirements, management provides the infrastructure, work environment, and the competent personnel necessary to implement the Program and facilitate the successful execution of contracted work.

### 2.3.1 Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Program. Workers are informed of their roles and responsibilities and are accountable for understanding and fulfilling them. The Project's prime contractor performs their role in accordance with the scope and requirements of this Program and as required, in accordance with *The Saskatchewan Employment Act*.

Although NexGen maintains overall accountability for Project activities, the term Rook I is used in the following role descriptions to reinforce that the role is applicable and may be assigned to NexGen employees and contractors performing work on behalf of the Project.

#### NexGen Executive

NexGen executive is accountable for:

- establishing the direction, strategy, and policies of the organization;
- promoting behaviours that support a robust health and safety culture;
- promoting the understanding that safety is a principal consideration guiding decisions and actions; and
- providing adequate resources to deliver the requirements of this Program.

#### Rook I Management

Rook I management is accountable for:

- assuming accountability for the effectiveness of this Program;
- promoting a culture where safety is a principal consideration guiding decisions and actions at all levels of the Project;
- approving annual Program objectives and targets;
- promoting the integration of the Program requirements into Project processes, including supply chain management processes as outlined in the IMS Manual;
- communicating the importance of effective management and of conforming to Program requirements;
- allocating adequate and appropriate resources to fulfill Program implementation;
- confirming proper documentation and tools have been developed to implement this Program effectively;
- controlling relevant incidents and deviations and directing corrective action when required;
- participating in the management review process;
- monitoring and reporting on Program performance and effectiveness to the Executive;
- providing independent oversight of processes through monitoring and auditing activities; and
- identifying and pursuing opportunities to achieve continual improvement.

#### Program Management

Program management is responsible for:

- overseeing the development, implementation, and adherence to this Program;
- setting annual objectives and targets, monitoring performance, and preparing internal and external reports regarding Program activities and outcomes;
- managing resources for legal compliance with regulatory requirements and conformance with Program requirements;
- confirming workers have the necessary competence, training, and awareness of Program requirements;
- working with applicable departments to confirm Program roles and responsibilities are identified and described and that those with specific responsibilities are qualified to fulfill their roles;
- arranging independent oversight of processes through monitoring and auditing activities;

- reporting on Program performance and effectiveness to Rook I management;
- facilitating management review of this Program; and
- promoting, identifying, and supporting continual improvement through Program evaluation.

## Program Coordination

The Program coordinator is responsible for:

- demonstrating and promoting a positive health and safety culture;
- leading the development, implementation of, and adherence to Program procedures and work instructions;
- providing subject matter expertise and contractor management support;
- confirming that department personnel meet and maintain required Program-specific training qualifications;
- assisting Rook I contract representatives to implement this Program; and
- preparing and supporting management review and maintaining associated records including tracking the decisions and actions stemming from the review; and
- verifying monitoring processes are implemented in accordance with Program and regulatory requirements.

## Rook I Contract Representative

The Rook I contract representative is responsible for:

- managing the contractor at the Project site and being the single point of accountability to whom the contractor is directly delivering a service;
- remaining accountable for the contractor on site but may delegate some responsibilities to the contractor supervisor;
- facilitating a risk assessment in collaboration with the contractor prior to commencement of work;
- leading a contract kickoff meeting with internal and external stakeholders to agree on team members and subcontractor involvement;
- establishing clear lines of communication and reporting relationships and meeting routines;
- identifying risks and controls in the risk assessment and reiterating key Project site specific conditions
- confirming that Rook I expectations are clearly and effectively communicated to all contractors and their leadership;
- establishing that contractor management plans, risk and management of change processes are appropriate to effectively manage on-site risk;
- managing contractor site access, arranging permits, permissions and authorizations for work where required;
- leading contractor review meetings;
- directing supervision and day-to-day engagement and management of contractors for the safe execution of the applicable scope of work;
- maximizing time in field to actively manage and oversee day to day contractor activities and for active coaching/mentoring of contractor leadership and employees;
- performing formal in-field verifications and inspections on contractor activities to verify that the work is being carried out according to the agreed standards and complies with applicable legislation;
- confirming adequate closure or following up on actions arising from incident investigations, audits, inspections, and verifications to verify gaps identified are adequately addressed;
- working with contractors to resolve systemic contract issues (e.g., scope changes, pricing, competency); and

- involving the contracts and procurement team on commercial issues impacting on contractual agreements, where applicable.

## Rook I Contractor Supervisor

Contractor supervisors are responsible for:

- possessing the required experience, qualifications, knowledge, and supervisory skills to oversee contracted work activities that take place at the Project;
- planning, organizing, and controlling the work and the work schedule according to the contractual agreement;
- notification of changes to contracted work activities;
- confirming contractor staff are fit for duty and competent to perform assigned work;
- supervising contractor staff;
- providing a safe workplace by demonstrating leadership and through regular inspections and assessments;
- regularly liaising with accountable Rook I manager;
- confirming that all equipment used at the Project is maintained and in good working condition and that all equipment and tools are used in accordance with their intended use;
- confirming workers inspect work areas at the beginning of each shift, and as necessary, to verify that the area and equipment are safe;
- taking immediate steps to protect the health and safety of any worker who will be at risk;
- confirming qualified, and authorized workers commence repairs as soon as reasonably practical if defects in equipment or unsafe conditions exist;
- verifying traceability of equipment and parts back to the supplier and producing a certificate or manual indicating the serviceability and purpose of the equipment;
- reporting incidents and deviations proficiently (including unsafe conditions that exist or any dangerous occurrences observed) and taking immediate steps to protect the safety of workers;
- possessing a valid supervisor certificate or valid temporary authorization indicating suitable qualifications; and
- providing notice in writing to the employer, workers, and self-employed of any emergency facilities provided by the contractor and the existence of a workplace safety committee or representative.

## Rook I Supervision

Rook I supervisors are responsible for:

- demonstrating and promoting a culture where safety is a principal consideration at all levels of the Project;
- understanding, encouraging, and following this Program and its requirements;
- overseeing department functions and supervising direct reports to maintain conformance to Program requirements;
- supporting the achievement of Program objectives and targets;
- communicating and coordinating with other departments to facilitate effective implementation of this Program;
- participating in audits and inspections, as required;
- participating in management reviews, as needed; and
- identifying and supporting continual improvement.

### Rook I Workers

Workers are responsible for:

- demonstrating and promoting a positive health and safety culture;
- understanding and following the Program processes and procedures;
- working toward the achievement of objectives and targets in their area of assigned responsibility;
- recognizing, identifying, and promptly communicating occupational health and safety hazards or opportunities for improvement to prevent injury, illness, and disease to themselves or other workers;
- maintaining appropriate qualifications and competence for the work undertaken; and
- cooperating with auditors, regulators, investigators, and inspectors, as required.

## 2.3.2 Facilities and Equipment

Facilities and equipment supporting the effective implementation of this Program and its associated processes are provided to employees and contractors. Facilities are designed, constructed, operated, and maintained with consideration for worker health, safety, and well-being and in compliance with legal requirements.

Contractor-owned facilities and equipment placed for use on-site are required to meet these same general standards and are subject to periodic audits and assessments which may include checks before work is initiated. Tools and equipment leaving the Rook I site that may have been subject to contamination, will be monitored for radiation in accordance with the *Rook I Radiation Protection Program*.

The processes for planning, documenting, and controlling the design, construction, installation of facilities and equipment are outlined in the *Rook I Construction Management Program.* Commissioning, performance testing, and turnover of structures, systems, components, and documents are within the scope of the *Rook I Commissioning Management Program*.

The process for procuring equipment, materials, and contracted services is outlined in the IMS Manual. The process for managing and maintaining equipment and materials are outlined in the *Rook I Asset Management Program.*

## 2.3.3 Legal and Other Requirements

NexGen is committed to conforming to internal processes and to complying with applicable legal and other requirements. Internal and legal and other requirements applicable to contracted work are outlined in the contract scope of work and contract agreements. Contractors are obligated to perform work in accordance with the requirements identified.

Contractor management procedures and associated documents are developed with consideration for applicable legal requirements, including the provincial and federal regulations referenced in section 6.0.

Changes to relevant internal and external requirements are monitored and evaluated to identify whether updates to this Program, scopes of work, or related processes are required in accordance with the change management process outlined in the IMS Manual.

The process for managing legal and other requirements is outlined in the IMS Manual.

# 2.4 Training and Competence

Appropriate and timely training is integral to completing work safely and efficiently. The Project follows a systematic approach to training (SAT) to educate, train, and qualify workers including contractors to carry out assigned work. Training requirements are monitored as a means of providing workers with the training they require, when they require it, to maintain competency and work safely. In the case of training gaps related to site-specific requirements, training is provided to verify contractors are qualified to carry out the work assigned to them.

Program-specific training requirements are defined and managed as part of the *Rook I Training Program*.

For contracted work, scope-specific training and qualification requirements are assessed and identified prior to work initiation, documented as part of the scope of work, and monitored to verify contractors maintain the knowledge, skills, and competence they require to work safely. Contractors with specialized skill sets (e.g., certified journeyperson) must provide documentation demonstrating proof and status of qualification prior to the initiation of work. If unanticipated, specialized training is required during project execution, the Rook I contract representative reviews the scope of work with affected contractor(s) to determine if an alternate approach may be used to complete the task.

Project workers and visitors are required to participate in site orientation upon their arrival, which includes information on camp policies, expectations of personal conduct while at the site, and general requirements for protecting personnel and the environment.

## 2.5 Document and Record Management

Documents and records are controlled to verify the information is accurate, available when needed, and protected from uncontrolled alteration. Documents include Program-specific procedures and work instructions. In addition to the common management system records outlined in the IMS Manual, records specific to this Program include, but are not limited to:

- completed scopes of work;
- contracts and change orders;
- training and qualification certificates or records;
- inspection forms and audit results;
- contractor incident and deviation reports;
- work orders and permits;
- meeting minutes;
- turnover documents (e.g., operating manuals, drawings including as-builts); and
- equipment maintenance records.

Documents and records are readily accessible to those that require them.

Documented information controlled by contractors that is generated by or directly impacts site activities is subject to equivalent requirements for safekeeping.

The processes for managing documents and records are outlined in the IMS Manual.

## 2.6 Communication

Effectively communicating information to workers is vital for maintaining a strong health and safety culture. Information is managed and shared among internal Project stakeholders including contractors, as required. Timely communication with contractors facilitates successful outcomes during the tendering, awarding, pre-arrival, and post-contract phases, as well as throughout the contractor's time on site. Workers are informed of their duties and responsibilities, and changes to personnel, processes, facilities, or equipment are communicated to those affected (as required).

Effective communication is enabled using communication tools appropriate for the subject matter and audience. Tools used to communicate contractor-relevant information related to the Project include, but are not limited to:

- scope of work;

- contractual documents and change orders;
- health and safety meetings;
- pre-mobilization, kickoff, progress, pre-shift, and closeout meetings;
- information postings in the workplace;
- sharing of relevant information over email and document management system; and
- verbal communications at the work face.

Internal and external communication principles and processes are further outlined in the IMS Manual. Communication practices specific for Indigenous communities, local communities, and the public are described in the *Rook I Indigenous and Public Engagement Program*.

## 2.7 Change Management

Change is managed to maintain the protection of health and safety, the environment, and property, and to promote consistent and effective execution of site processes. This includes changes to Project:

- design;
- facilities;
- equipment;
- management system processes;
- organizational structure;
- key roles and responsibilities;
- documentation; and
- legal and other requirements.

Changes are evaluated with consideration for the impact on this Program and the related health and safety processes. This maintains:

- change is clearly defined;
- risks associated with the change are assessed and managed;
- the change is communicated to those affected; and
- the related documentation is updated.

In the case of contractors, change is managed for changes to the contract scope of work. Changes are made in accordance with the change management process outlined in the IMS Manual.

# 3.0 Do

The *Do* component of this Program includes implementing the elements developed in the planning phase in alignment with the hierarchy of controls outlined in the IMS Manual. This includes the implementation of controls for risk management to verify contractors meet contractual obligations. These efforts include, but are not limited to:

- planning and maintaining oversight of the contractors performance to confirm work is completed safely and in accordance with contractual obligations;
- determining and verifying the necessary qualifications and contractor competencies appropriate to the contracted work; and
- evaluating contractor performance for safe work behaviours, as well as the quality of work and adherence to design.

These obligations are met by managing all processes associated with contracting, including:

- identifying qualified contractors;
- preparing contractors to conduct work;
- managing contractors; and
- assessing work performed by contractors.

A Rook I contract representative is assigned for each package of work and is responsible for the overseeing the application of Program requirements.

## 3.1 Emergency Work

Where there is an immediate threat to health, safety or the environment, contractors may be requested to perform work to prevent or mitigate the hazard. The process for managing contracted work during emergencies is described in contractor management procedure *Contractor Pre-Work*.

## 3.2 Pre-Work Preparation

After contract award (including finalizing any terms and conditions) and before beginning work on the Project site, steps are taken to confirm the contractor is ready to perform work safely and effectively, including:

- classifying the work based on the nature and complexity of the work;
- agreeing to and receiving the submission of shop/fabrication drawings and preparation to expedite materials;
- confirming all required competencies are in place;
- confirming that management system requirements are established and understood;
- verifying the duties, responsibilities and authorities of contractor personnel are clearly defined, understood, and documented;
- providing mobilization information and preparing for contractor arrival to the site using a pre-mobilization checklist;
- providing site orientation for general site rules and safe work expectations, and training as identified;
- reviewing the scope of work with the contractor; and
- introducing and orienting the contractor to the work area.

The process for completing pre-work preparation is further defined in the contractor management procedure, *Contractor Pre-Work*.

## 3.3 Oversight of Contracted Work

Upon completion of the kick-off meeting, the contractor's work on the Project is initiated.

Over the contract period, the Rook I contract representative provides oversight of the contractor's work relative to the classification of work defined under section 3.2. This oversight can include, but is not limited to:

- pre-shift meetings;
- progress meetings and reports;
- desk-top audits (e.g., training, permits);
- workplace and field inspections (e.g., health and safety, quality);
- hazard assessments (job, field level);
- job task observations;
- incident and deviation reporting; and
- review of health, safety, and environment statistics.

Once work is completed, the Rook I contract representative performs field validation to confirm the absence of deficiencies. Where practicable, if deficiencies exist, the contractor remedies the deficiencies according to contractual requirements prior to demobilizing from the site.

The process for managing contracted work is further defined in the contractor management procedure, *Contractor Work Oversight*.

### 3.3.1 Subcontractors

Contracted scope will be performed according to contract terms. If the contract allows sub-contracting a portion of the scope of work, the sub-contractors (i.e., contractors that have been hired by other contractors to perform work on their behalf at the Project site) are subject to the same requirements and expectations of the contractor including pre-approval of sub-contractors where required.

Oversight for verifying requirements are met is the responsibility of the contractor supervisor. Additional information on managing subcontractors is outlined in the contractor management procedure, *Contractor Work Oversight*.

## 3.4 Post-Contract Work Assessment

A post-contract work assessment is conducted following completion of work and demobilization and is used to evaluate the contractor on work elements including, but not limited to:

- safety;
- quality;
- organization;
- execution; and
- administration.

Where possible, the post-contract work assessment is performed with the contractor in attendance. The assessment creates a record of contractor performance and is intended to encourage improvement. Where a contractor has under-performed work expectations they may be prohibited from future work at the site.

The process for assessing completed work is further defined in the contractor management procedure *Post-Contract Work Assessment*.

## 3.5 Incident and Deviation Reporting

Workers (including all contractors) and visitors are required to report information regarding health, safety, environmental, and incidents (including near misses) and deviations. Near misses are events or situations where an occupational or environmental exposure could have occurred but was avoided.

Reported information is documented and tracked in accordance with the IMS Manual. Internal events that meet or exceed applicable legislated reporting thresholds, including those that are reportable in accordance with the *General Nuclear Safety and Control Regulations*, are reported to applicable regulatory representatives within legislated timelines.

The process for providing information regarding reportable events or situations to internal and external parties is outlined in the IMS Manual.

# 4.0 Check

The *Check* component of this Program consists of ongoing performance monitoring, periodic audits and inspections, reviews, and analysis of results to verify the Program is functioning effectively.

## 4.1 Monitoring and Measurement

This Program is continually monitored and measured to evaluate whether Project deliverables meet external and internal requirements. Program-specific monitoring and measurement include, but are not limited to, both leading and lagging key performance indicators.

Monitoring and measurement processes and requirements are outlined in the IMS Manual.

## 4.2 Inspections and Audits

The performance and effectiveness of this Program and its associated procedures are monitored and verified with regular conformance audits. Qualified personnel who are independent of the work being assessed conduct audits as outlined in the IMS Manual.

In addition to audits, routine workplace inspections are conducted by competent personnel to verify that controls are in place and effective. This includes but is not limited to inspections of contracted work in progress and completed work. Workplace inspections are performed and documented as outlined in the *Rook I Health and Safety Program*, or as outlined in applicable contractor processes.

External compliance audits and inspections are conducted by regulators; conformance audits and inspections are conducted by third parties, as required.

Deviations, instances of regulatory noncompliance, and opportunities for improvement identified through audits and inspections are managed as outlined in the IMS Manual.

## 4.3 Management Review

This Program and supporting processes are subject to review and evaluation by Rook I management. Management review information includes:

- proposed Program-specific objectives and targets or their current status;
- upcoming or new legislation or regulation related to the Program and plans to address these requirements;
- significant changes in contractor management risks;
- significant changes to the Program;
- contractor performance review;
- audit and inspection findings
- trends in contractor incidents and deviations, and the status of related investigations and corrective actions; and
- proposed continual improvement actions or their current status.

The management review process is outlined in the IMS Manual.

# 5.0 Act

The *Act* component of this Program consists of facilitating continual improvement and confirming that, when required, corrective actions are taken and appropriately managed. The results of these Program elements feed back into *Plan* to complete the Plan-Do-Check-Act cycle.

## 5.1 Corrective Action Process

Contractor management incidents including near misses and deviations to this Program are evaluated and investigated, as required. Appropriate actions are developed and implemented to correct and prevent reoccurrence. Corrective actions are planned, implemented, verified, and reviewed for effectiveness corresponding with the risk level.

The corrective action process is outlined in the IMS Manual.

Construction deviations are corrected corresponding with the associated actual and probable severity. As required, these deviations are subject to corrective actions to prevent reoccurrence. Construction deviations are managed as outlined in the *Rook I Construction Management Program*.

## 5.2 Continual Improvement

Continual improvement is an ongoing process to improve the suitability, adequacy, and effectiveness of the IMS. Rook I workers continually seek out improvement opportunities for the IMS and Project processes, which occur through a combination of Program monitoring, auditing, management review, and maintaining awareness of changes in the business environment. Improvement may also involve benchmarking the Project performance against other similar projects and facilities.

The use of experience gained during Project construction and commissioning, including information collected from relevant external sources, informs potential improvement opportunities. Potential sources of information include:

- incident investigations;
- lessons learned;
- worker experience;
- government and industry publications;
- industrial peer information exchange;
- professional associations; and
- monitoring results.

Continual improvement opportunities are identified, documented, evaluated, and implemented as outlined in the IMS Manual.

# 6.0 References

## 6.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-CHT-00001 | *Rook I Organizational Chart* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-RAD-PGM-00001 | *Rook I Radiation Protection Program* |
| ROOK-TRN-PGM-00001 | *Rook I Training Program* |
| ROOK-AST-PGM-00001 | *Rook I Asset Management Program* |
| ROOK-CST-PGM-00001 | *Rook I Construction Management Program* |
| ROOK-COM-PGM-00001 | *Rook I Commissioning Management Program* |
| ROOK-HSF-PGM-00001 | *Rook I Health and Safety Program* |
| ROOK-IPE-PGM-00001 | *Rook I Indigenous and Public Engagement Program* |

| Document Number | Document Title |
|---|---|
| ROOK-CON-PRO-00001 | *Contractor Pre-Work* |
| ROOK-CON-PRO-00002 | *Contractor Work Oversight* |
| ROOK-CON-PRO-00003 | *Post-Contract Work Assessment* |

## 6.2 External

- Federal
    - *Canadian Nuclear Safety Commission REGDOC-2.1.1, Management System*
    - *Canadian Nuclear Safety Commission REGDOC-2.2.2, Personnel Training*
- Provincial
    - *The Saskatchewan Employment Act*
    - *The Occupational Health and Safety Regulations, 2020*
    - *The Mines Regulations, 2018*
- Other
    - *Canadian Standards Association. N286-12 Management System Requirements for Nuclear Facilities*

# Training Program
# ROOK-TRN-PGM-00001

# Rook I Project

## Training Program

ROOK-TRN-PGM-00001

November 2022

# Record of Revisions

| Version. No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| 0 | 15-Dec-2021 | Issued Final | Jon Henderson | Kevin Oakes | Tony George |
| 1 | 3-Nov-2022 | Issued Final | Jerred Lawson | Rob Paine | Luke Moger |

# Table of Contents

# List of Figures

# 1.0 Introduction

The *Rook I Training Program* (Program) outlines the systematic and risk-based approach to developing, delivering, and managing training as part of the NexGen Energy Ltd. (NexGen) Rook I Project (Project). The Program provides the framework and describes the processes for maintaining compliance, enabling continual improvement, and employing a systematic approach to training (SAT) to provide workers and visitors with the right knowledge, skills, and safety-related attributes to perform work safely and reliably.

This Program is part of the *Rook I Integrated Management System* (IMS) and is subject to the *Rook I Integrated Management System Policy* which provides the foundation for NexGen's approach to training. The Program and its relationship to other IMS programs within the IMS hierarchy is shown in Figure 1. As a component of the IMS, this Program follows the Plan-Do-Check-Act cycle to identify, control, monitor, and continually improve all aspects of training.

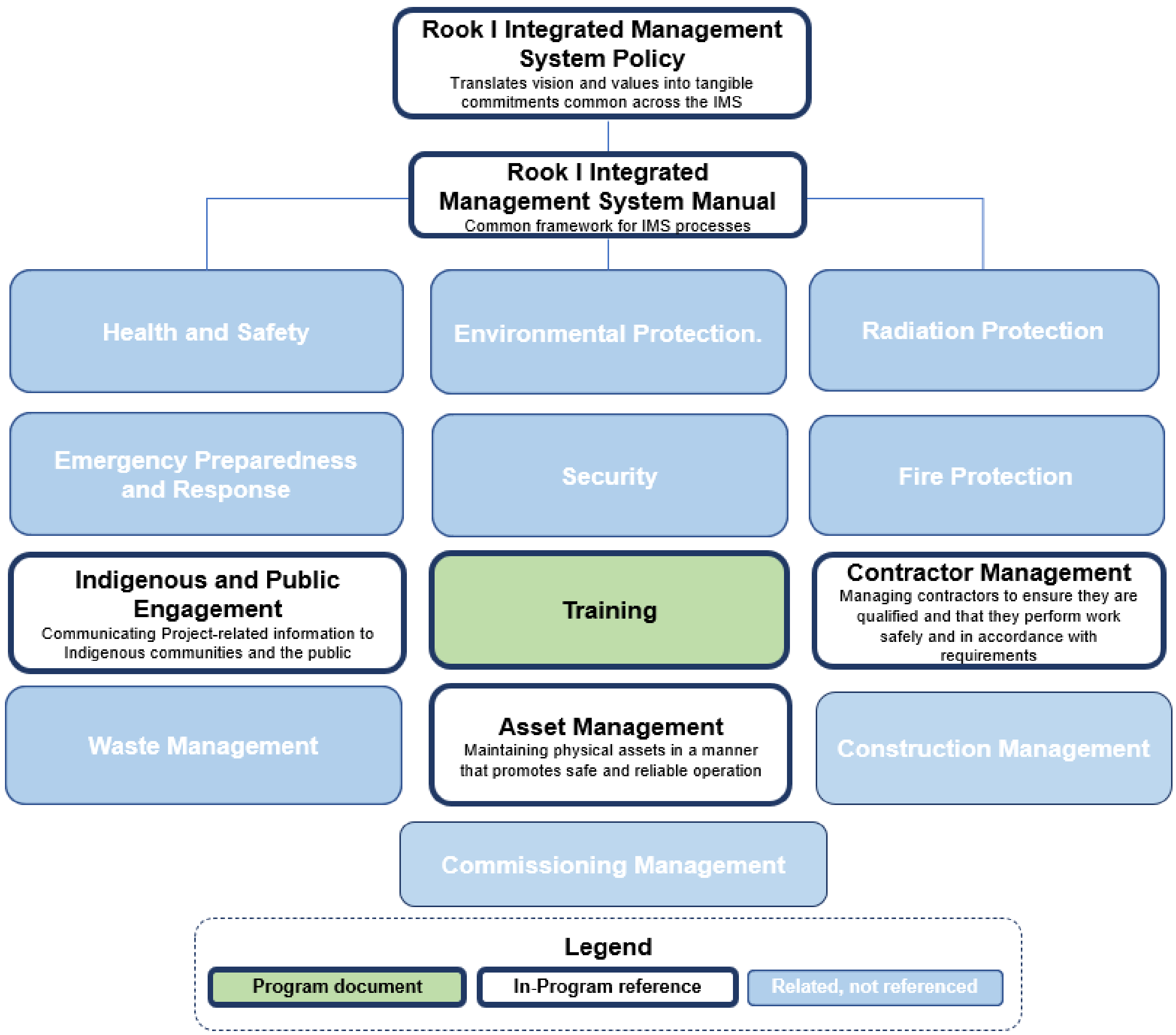


Figure 1: Program Context Within the IMS

## 1.1 Purpose

This Program describes the Project's principles, processes, and framework for effectively identifying the training needs of workers; designing, developing, and delivering training material; managing training records; and monitoring and evaluating training effectiveness. This Program aligns with and meets all requirements of the references outlined in section 6.0, including the Canadian Nuclear Safety Commission (CNSC) *REGDOC-2.2.2, Personnel Training*.

## 1.2 Scope

The scope of this Program includes processes for identifying, planning, delivering, evaluating, and continually improving training. The processes outlined as part of this Program apply to workers in safety-sensitive positions that are engaged in licensed activities during the site preparation, construction, and commissioning phase of the Project.

This Program uses a graded, risk-based approach to implementing training processes that accounts for the level of risk, safety significance, and complexity of the activity.

The processes outlined apply to developing, delivering, and managing training for the IMS, including topics related to health, safety, environment, radiation, emergency response, security, and contractor management.

## 1.3 Program Principles

NexGen recognizes the importance of properly trained and fully competent workers to achieve Project outcomes safely and reliably. NexGen's approach to training is reflected in the following principles:

- protecting and promoting the health, safety, and well-being of people and the environment through all aspects and phases of the Project;
- incorporating Indigenous inclusion training framework and tools;
- establishing a strong health, safety, and environment culture which is periodically assessed and continually improved;
- verifying workers have the knowledge, skills, and tools to perform their duties safely and in a manner that protects the environment;
- systematically defining, developing, and maintaining training;
- complying with applicable legal and other requirements; and
- continually improving Program performance.

## 1.4 Systematic Approach to Training

This Program adopts an SAT to analyze training needs, design and develop training content, implement training courses, evaluate training performance, and identify opportunities for continual improvement as shown in Figure 2. The SAT process verifies all workers are qualified and competent to perform their assigned work safely and effectively in accordance with NexGen expectations and applicable regulatory requirements.

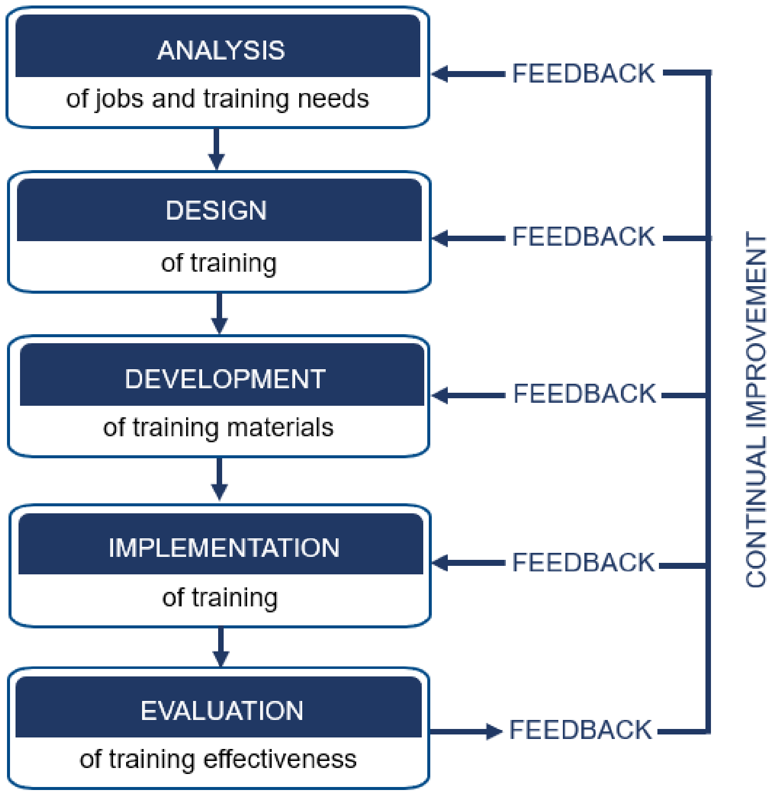


Figure 2: Systematic Approach to Training

## 1.5 Terminology

A comprehensive list of common terms applicable to this Program and the IMS are available in the *Rook I Project Glossary*.

**attributes** – Physical or mental skills needed to perform a task.

**continuing training** – A structured curriculum that maintains and enhances knowledge, skills, and safety-related attributes. Refresher training, requalification training, and updates to training are also considered continuing training.

**difficulty, importance, and frequency (DIF) analysis** – A systematic process to determine if a task requires training, and if retraining or continuing training is required.

**integrated management system (IMS)** – A common framework of programs, plans, procedures, work instructions, and other supporting documentation describing management system processes for achieving Project objectives and completing work safely, reliably, and consistently while conforming to internal requirements and complying with legal requirements.

**integrated management system (IMS) program** – IMS documents which provide the scope and general description of inter-related processes for a licensed program (e.g., *Rook I Integrated Management System Manual*, *Rook I Health and Safety Program*, *Rook I Radiation Protection Program*, *Rook I Construction Management Program*).

**job task analysis (JTA)** – The process used to define the specific steps that make up a task and collect data to help determine training requirements and associated resources.

**job task observation (JTO)** – The physical observation of an individual performing a work task to verify that all work processes are correctly followed.

**key performance indicator (KPI)** – A quantifiable measure used to evaluate the success of a process or organization in meeting performance objectives. A KPI must be consistently measurable, comparable to a target, and display change over time (i.e., trending).

**knowledge** – The theoretical and practical understanding which can be applied to the completion of a task.

**learning objective** – A statement describing the learner's expected performance upon completion of training for each task addressed in the training module**.** Learning objectives must be measurable and include a performance statement, condition statement, and standard to which the performance must conform.

**licensed activities** – Project activities within the scope of Canadian Nuclear Safety Commission (CNSC) licensing. Project site-based activities that may be outside the scope of CNSC licensed conditions are subject to the integrated management system on a risk-informed basis (i.e., where the consequence of human error poses a risk to the environment, the health and safety of people, or to the security of Project facilities).

**organizational analysis** – Process used to study and record the responsibilities, duties, skills, accountability, work environment, and ability requirements of a specific position.

**prime contractor** – Contractor, under contract directly with NexGen, who is responsible for the completion of a defined project and who directs the work of multiple sub-contractors to do the same.

**Project site** – Term used to describe all property within the physical NexGen Rook I boundary.

**safety-sensitive position** – A position that has a role in the operation of a high-security site, where impaired performance could result in a significant incident affecting the environment, public, health and safety of workers and others at the Project site, or safety and security of Project site facilities. This definition applies to all workers who are regularly required to rotate through or regularly relieve others in safety-sensitive positions. Those who directly supervise working-level positions or may perform the same duties or exercise the same responsibilities as safety-sensitive positions, are deemed to hold safety-sensitive positions.

**skills** – Quantifiable and measurable activities or processes a worker can accomplish. Mental and/or physical activities that require a measured degree of proficiency. Skills can be developed with practice and training.

**systematic approach to training (SAT)** – A structured approach used to manage training modules, widely known as an instructional design model.

**training** – (also "train") To give information and explanation to a worker with respect to a particular subject matter and to require demonstration that the worker has acquired knowledge or skill related to the subject matter (Saskatchewan Employment Act).

**training development plan** – A document that describes how output of the analysis and design phases is intended to be used during the development phase to meet the requirements of defined learning objectives.

**training evaluation** – The assessment of the effectiveness and efficiency of the training as delivered and verification of whether the trainees have mastered the learning objectives and acquired the competence needed to perform the job safely.

**training needs analysis** – A process comparing job performance requirements to actual job performance to identify gaps in knowledge, skills, and attributes (KSAs) to determine if a new training module is required, an existing module needs to be modified, or no action is necessary.

**worker** – Any person working for NexGen, including a contractor.

# 2.0 Plan

The *Plan* component of this Program includes processes that support a systematic, risk-based approach to managing training. Elements of planning include:

- using training as a control to mitigate risk;
- setting Program-specific objectives and targets to implement Program processes;
- providing the appropriate parties with the information and resources necessary;
- managing change to process, personnel, design, facilities, and equipment;
- communicating relevant information regarding training management to appropriate parties; and
- analyzing training needs, designing training development plans, and developing training materials.

## 2.1 Risk Management

The risk management process includes identifying hazards that could affect the health and safety of workers or the environment, assessing the significance of the associated risks, and managing the risks to acceptable levels through the application of controls. Risk registers are maintained to record and track relevant information regarding risks and controls, including any instances where training has been identified as a means of risk mitigation. The general risk management methodology and hierarchy of controls are outlined in the *Rook I Integrated Management System Manual* (IMS Manual).

Within the hierarchy of controls, training is a type of administrative control that can be used to mitigate risks. Examples of training that meets the unique risks of the Project include:

- site orientation (e.g., general requirements for protecting workers, the environment, as well as rules and expectations of personal conduct while at the site);
- health and safety training (e.g., control of hazardous energy, confined space, fall protection); and
- radiation protection training (e.g., radiation theory, sources, and practices that can reduce exposure).

The need for and type of training is determined during training analysis and is based on task safety significance, complexity, and frequency as described in section 2.7. If training is required, the analysis results inform the required training levels and frequencies.

## 2.2 Objectives and Targets

Program objectives and targets are established at regular intervals, linked to clear accountabilities, and monitored for status to completion. Objectives and targets are tangible, documented actions that result in improvements to training processes and Program outcomes.

Setting and managing objectives and targets, including establishing monitoring measures, is outlined in the IMS Manual.

## 2.3 Resources

Rook I management is committed to providing the necessary resources to establish, implement, maintain, and continually improve this Program and its associated processes. In addition to providing the required financial resources to achieve objectives and meet requirements, management provides the infrastructure, work environment, and competent workers necessary to implement this Program.

### 2.3.1 Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Program. Workers are informed of their roles and responsibilities and are accountable for understanding and fulfilling them. Appendix A summarizes Project safety-sensitive positions where the consequence of human error poses a risk to the health and safety of people, the environment, or the security of the nuclear facilities and nuclear substances.

This Program is complemented by human resource practices established to confirm Project workers:

- are selected based on their ability to satisfy defined competencies;
- perform their assigned tasks safely and competently; and
- receive feedback on their performance to reinforce expected behaviours and desired outcomes.

The Project's prime contractor performs their role in accordance with the scope and requirements of this Program and its supporting information and as required in accordance with *The Saskatchewan Employment Act.* The processes for selecting and overseeing contractors are outlined in the *Rook I Contractor Management Program*.

Although NexGen maintains overall accountability for Project activities, the term Rook I is used in the following role descriptions to reinforce that the role is applicable and may be assigned to NexGen employees and contractors performing work on behalf of the Project.

#### NexGen Executive

NexGen executive is accountable for:

- establishing the direction, strategy, and policies of the organization;
- promoting behaviours that support a robust health and safety culture;
- promoting the understanding that safety is a principal consideration guiding decisions and actions; and
- providing adequate resources to deliver the requirements of this Program.

#### Rook I Management

Rook I management is accountable for:

- maintaining effectiveness of this Program;
- promoting a culture where safety is a principal consideration guiding decisions and actions at all levels of the Project;
- approving annual Program objectives and targets;
- allocating adequate and appropriate resources to fulfill Program implementation;
- evaluating the effectiveness of this Program and, when required, taking corrective or preventive action confirming the integration of the Program requirements into Project processes;
- communicating the importance of effective management and of conforming to Program requirements;
- developing proper documentation and tools to implement this Program effectively;
- preparing and supporting management review and maintaining associated records including tracking the decisions and actions stemming from the review;
- monitoring and reporting on Program performance and effectiveness to the NexGen executive;
- providing independent oversight of processes through monitoring and auditing activities; and
- identifying and pursuing opportunities to achieve continual improvement.

## Program Management

Program management is responsible for:

- demonstrating and promoting a positive health and safety culture;
- overseeing the development and implementation of this Program;
- communicating with the applicable regulatory agencies (e.g., CNSC) on behalf of the Project;
- setting annual objectives and targets, monitoring performance, and preparing internal and external reports regarding Program activities and outcomes;
- managing resources to confirm legal compliance with regulatory requirements and conformance with Program requirements;
- confirming workers have the necessary competence, training, and awareness of Program requirements;
- confirming that those responsible for delivering training meet and maintain required qualifications for the creation and delivery of training;
- identifying and contracting qualified external trainers to deliver highly specialized training modules;
- delivering all training according to internal and external requirements;
- securely maintaining all training materials and records;
- providing independent oversight of processes through monitoring and auditing activities;
- reporting on Program performance and effectiveness to Rook I management;
- preparing and supporting management review and maintaining associated records including tracking the decisions and actions stemming from the review;
- overseeing the creation and improvement of training material following the SAT process;
- participating in audits and inspections, as required; and
- promoting, identifying, and supporting continual improvement through Program evaluation.

## Program Coordination

The Program coordinator is responsible for:

- demonstrating and promoting a positive health and safety culture;
- leading the development, implementation of, and adherence to Program procedures and work instructions;
- providing subject matter expertise and training-focused support;
- conducting training-related incident investigations and initiating applicable regulatory reporting when assigned;
- maintaining Program-specific data and records in a secure and controlled manner;
- monitoring training records to identify upcoming expiration dates for time-sensitive qualification and certifications;
- verifying department personnel meet and maintain required Program-specific training qualifications;
- participating in audits and inspections, as required; and
- preparing and supporting management review and maintaining associated records, including tracking the decisions and actions stemming from the review.
- promoting, identifying, and supporting continual improvement

### Rook I Supervision

Rook I supervisors are responsible for:

- demonstrating and promoting a culture where health and safety is a principal consideration at all levels of the Project;
- understanding and following this Program and its requirements;
- overseeing department functions and supervising direct reports to verify conformance to Program requirements;
- supporting the achievement of Program objectives and targets;
- conforming to Program procedures and training;
- supervising direct reports regarding conformance to Program requirements;
- supporting direct reports in planning work activities to mitigate risks;
- communicating and coordinating with other departments to facilitate effective implementation of this Program;
- verifying workers are properly trained and qualified before being assigned work;
- continually evaluating training recipients in the workplace on their ability to perform tasks for which they were trained;
- participating in audits and inspections, as required;
- participating in management reviews, as required; and
- identifying and supporting opportunities for continual improvement;

### Rook I Workers

Workers are responsible for:

- demonstrating and promoting a positive health and safety culture;
- engaging in the application of this Program and its requirements;
- communicating hazards or deviations, and if safe to do so, taking action to contain or control the hazard to mitigate the impact;
- performing assigned work duties;
- participating in training sessions as required; and
- monitoring compliance with training requirements and reporting any expiring or expired qualifications to supervisors or other appropriate internal authority.

## 2.3.2 Facilities and Equipment

Facilities and equipment supporting the effective implementation of this Program and its associated processes are provided to workers. Facilities are designed, constructed, operated, and maintained with consideration for worker health, safety, well-being, and compliance with legal requirements.

Workers and visitors are provided with access to the proper facilities and equipment to enable effective training and to support the implementation of this Program. Facilities (e.g., classrooms) and equipment (e.g., fall arrest harnesses, fire extinguishers) used for practical demonstrations and skill tests are appropriate for the subject matter and meet the needs of the training course participants.

Training equipment is operated and maintained in accordance with manufacturers' specifications and in compliance with legal and regulatory requirements. The processes for managing and maintaining equipment are outlined in the *Rook I Asset Management Program*.

### 2.3.3 Legal and Other Requirements

NexGen is committed to conforming to internal processes and complying with applicable legal and other requirements. Training processes are developed with consideration for applicable legal requirements, including the regulations referenced in section 6.0. Changes to relevant internal and external requirements are monitored and evaluated to identify whether updates to this Program or related training processes are required.

The process for managing legal and other requirements is outlined in the IMS Manual.

## 2.4 Document and Record Management

Training documents and records demonstrate that the training processes are being followed. Documents and records are controlled to verify information is accurate, available when needed, and protected from uncontrolled alteration. Documents include Program-specific procedures, work instructions, guidelines, and forms.

In addition to the common management system records outlined in the IMS Manual, records specific to this Program include, but are not limited to:

- organizational analyses;
- gap analyses;
- job task analyses;
- training development plans;
- course outlines;
- training assessment results;
- course evaluations;
- training requirement checklists;
- worker qualification records; and
- course certificates (as required).

Rook I management, supervisors, workers, and worker representatives (as required) have access to applicable training and qualification records. At minimum, training records are retained for the period that the worker is employed at the Project and are monitored to identify upcoming expiration dates for time-sensitive qualifications and certifications.

The processes for managing documents and records are outlined in the IMS Manual.

## 2.5 Communication

Effectively communicating training information to workers is vital for maintaining a strong health and safety culture. Tools used to communicate training-specific information related to the Project include, but are not limited to:

- routine safety moments to begin meetings or training courses;
- training-focused toolbox meetings;
- workplace training safety posters;
- scheduled in-class or on-the-job training;
- town hall meetings;
- posted information required by regulation; and
- signage.

Workers are informed of their duties and responsibilities, and changes to personnel, processes, facilities, or equipment are communicated to those affected (as required).

Internal and external communication principles and processes are further outlined in the IMS Manual and the *Rook I Indigenous and Public Engagement Program*.

## 2.6 Change Management

Change is managed to protect worker health and safety, the environment, and property, and to promote consistent and effective execution of Project site processes. This includes changes to Project:

- design;
- facilities;
- equipment;
- management system processes;
- organizational structure;
- key roles and responsibilities;
- documentation; and
- legal and other requirements.

Following a risk-based approach, changes are evaluated with consideration for impact to this Program. Changes impacting training are managed within the SAT process. Training documentation is updated as required and re-training needs are evaluated on a risk-informed basis.

The change management process is outlined in the IMS Manual.

## 2.7 Training Analysis

Training analysis is a foundational component of the SAT process. It is used to:

- specify roles, jobs, duties, and tasks requiring training; and
- identify knowledge, skills, and safety-related attributes required to complete work safely and consistently.

Training analysis relies on inputs from process documentation (e.g., procedures, work instructions), subject matter experts, and workers to define the purpose, scope, target audience, methods, and frequency of training.

Training analysis includes the following fundamental processes:

- organizational analysis;
- training needs analysis;
- gap analysis; and
- job task analysis.

Organizational analysis is an initial step in training analysis that identifies the required training for safety-sensitive positions engaged in licensed activities. An organizational analysis involves assessing the risks and hazards associated with the position and reviewing applicable Project policies, procedures, and legal and other requirements to determine whether training is required.

A training needs analysis is triggered when:

- there is a gap between worker training and the skill and knowledge required to perform tasks;
- there is a gap in skill and knowledge resulting from changes described in section 2.6; or

- an investigation into an incident, deviation, or deficiency identifies training as a possible corrective action.

The training needs analysis process is outlined in Figure 3.

Gap analyses are performed when an identified gap impacts an existing training module. Results from the gap analysis help identify if further training action is required. Gap analyses consider regulatory, Project, and worker performance requirements in assessing possible solutions for the identified gap(s).

Job task analyses are conducted if a gap identified during the training needs analysis does not impact an existing training module. Job task analysis identifies and documents how a role, job, or duty is properly performed during both routine and non-routine (e.g., emergency) Project conditions, and the knowledge and skills required to perform that role, job, or duty both correctly and safely. Job task analysis also identifies any prerequisite education, training, language, or experience requirements. Tasks are assessed for their associated risks, difficulty, importance, and frequency to determine which tasks require one-time training or continuing training, and to define content requirements for training courses.

Training analysis processes are further described in the training procedure, *Training Analysis*.

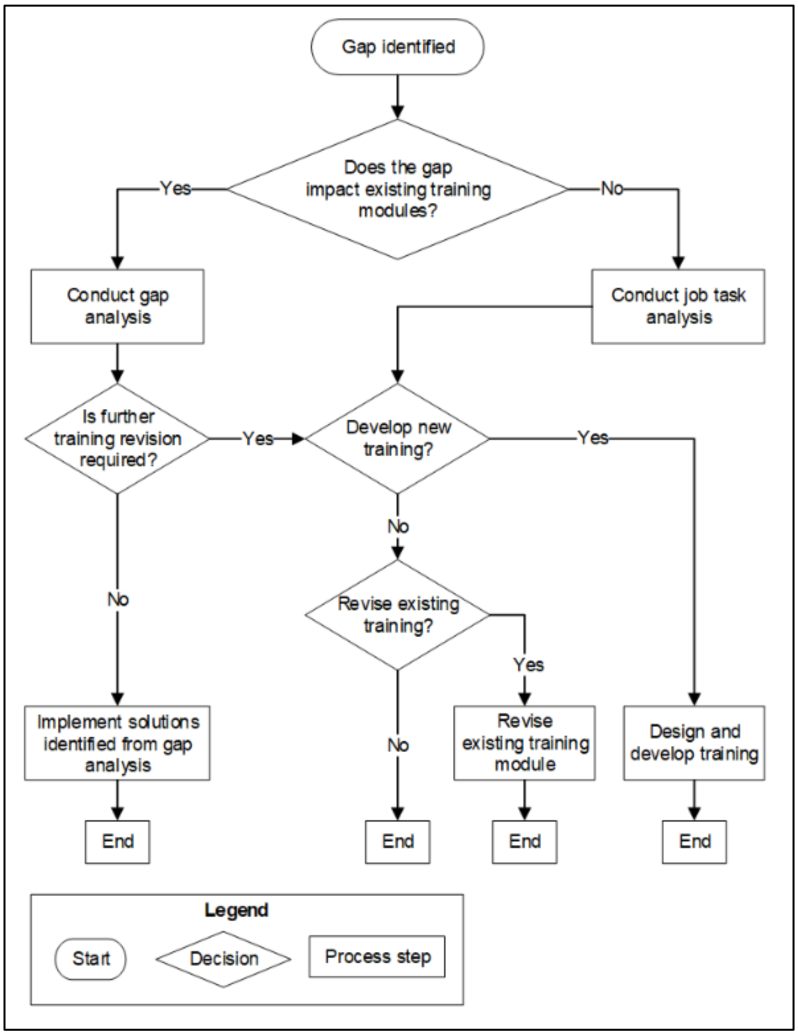


Figure 3: Training Needs Analysis Flowchart

## 2.8 Training Design

Training design incorporates information from training analysis to develop learning objectives and establish the framework for presenting training materials and assessing knowledge, skills, and attributes of training participants. This includes defining instructional strategies required to achieve learning objectives, including:

- delivery media (e.g., presentations, books, live demonstrations);
- delivery method (e.g., classroom presentation, practical demonstration); and
- learning environment (e.g., on-site, off-site, field).

Training design also documents continuing training and requalification conditions (if required) and outlines the learning assessment plan, which describes the type of evaluation used to measure and verify trainee progress towards achieving required learning objectives. Assessments are based on trainee knowledge (e.g., written exams), performance, or a combination of both.

Information generated during training analysis and design is captured in training development plans.

Training design processes, including training development plans, are further described in the procedure, *Training Design and Development*.

## 2.9 Training Development

Training development involves the production or procurement of training materials necessary to support defined learning objectives. Where possible, materials from vendors and contractors may be evaluated for use and incorporated into the training development process.

Instructional materials may include, but are not limited to:

- trainee manuals and handouts (i.e., reference material);
- instructional guides (i.e., specification for instruction); and
- course material (e.g., electronic, paper-based, training aids, equipment).

Assessment material may include question banks and sample tests.

Instructional and assessment materials are considered controlled documents. They are managed in accordance with the document management process as outlined in the IMS Manual.

Prior to implementing training course material, the effectiveness of training materials and assessments methods may be evaluated using pilot courses. Pilot courses are reviewed by subject matter experts, tested with workers who are representative of the target audience, and improved based on feedback received.

The training development process is described in the procedure, *Training Design and Development*.

## 2.10 Training Requirement Checklists

Training requirements for each position are organized into checklists for Project departments and managed as departmental records. Training requirement checklists include specific training required to be completed by workers. Training requirement checklists also outline the timeline for when the requirements must be completed.

# 3.0 Do

The *Do* component of this Program includes implementing the elements described in section 2.0. This includes the implementation of training, managing contractor qualifications, verifying qualification equivalency, and managing training records.

## 3.1 Training Implementation

Training implementation includes training delivery preparation (e.g., setting up the training environment), delivering training to the target audience, and evaluating training participant progress in achieving the required learning objectives.

Training is developed, delivered, and assessed by those who possess the required knowledge, skills, and qualifications. External training providers (e.g., emergency preparedness and response, specialized equipment) may be used to develop, deliver, or assess training for the Project. Training developed and delivered by external training providers is evaluated to verify it meets the learning objectives established for the task.

Confirmation of required training qualifications of trainers (i.e., NexGen and contractors) is described in the procedure, *Training Implementation and Evaluation*.

Training assessment results and course evaluations are preserved as records in accordance with the record management process as outlined in the IMS Manual.

The training implementation process is described in the training procedure, *Training Implementation and Evaluation*.

## 3.2 Contractor Management

Contractors working at the Project are subject to the requirements of this Program. The process for verifying contractors adhere to Program requirements is outlined in the *Rook I Contractor Management Program*. The qualification verification process is described in section 3.3.

Contractors hired for their specialized training and knowledge (e.g., journeyperson certification) must provide documentation of those qualifications before mobilizing to the Project site.

## 3.3 Qualification Verification

Qualification verification is used to review and evaluate whether previous training and experience is adequate to grant qualification for a specific set of responsibilities or tasks at the Project.

If the previous training and experience are considered adequate, workers are evaluated to confirm they possess the necessary knowledge, skills, and attributes to perform their work safely and effectively. The training qualification verification process is described in the training procedure, *Training Implementation and Evaluation*.

# 4.0 Check

The *Check* component of this Program consists of ongoing performance monitoring, periodic audits and inspections, reviews, and analysis of results to verify that the Program is operating effectively. This includes training evaluation, inspections, audits, and management review.

## 4.1 Training Evaluation

Training evaluation is a form of monitoring and measurement that confirms effectiveness of training course delivery and verifies workers have achieved the learning objectives and acquired the knowledge, skills, and attributes required to competently complete work safely and consistently.

Training evaluations methodologies include:

- using tests and surveys during the course to measure trainee knowledge and skills improvement;
- requesting formal feedback from trainees on instructor effectiveness, training course environment, and training content; and
- working with managers and supervisors to evaluate training recipients in the workplace on their ability to perform the tasks for which they were trained (e.g., job task observations).

Training evaluation results are documented during training course reviews. The training evaluation process is described in the training procedure, *Training Implementation and Evaluation.* The general monitoring and measurement process is outlined in the IMS Manual.

## 4.2 Inspections and Audits

The performance and effectiveness of this Program and its associated procedures are monitored and verified with regular conformance audits. Qualified individuals independent of the work being assessed conduct audits as outlined in the IMS Manual.

In addition to audits, routine internal inspections are conducted by workers (e.g., field level hazard and risk assessments) as part of monitoring the effectiveness of training as a control to manage risk. Workplace inspections are performed, documented, and communicated where applicable.

External compliance audits and inspections are conducted by regulators; conformance audits and inspections are conducted by third parties, as required.

Deviations, instances of regulatory noncompliance, and opportunities for improvement identified through audits or inspections are managed as outlined in the IMS Manual.

## 4.3 Management Review

This Program and supporting processes are subject to review and evaluation by Rook I management.

Management review information includes:

- proposed Program-specific objectives and targets or their current status;
- upcoming or new legislation related to the Program and plans to address these requirements;
- significant changes in hazards that require training to mitigate risks;
- significant changes to the Program;
- training key performance indicators;
- audit and inspection findings;
- trends in training incidents and deviations, and the status of investigations and corrective actions; and
- proposed continual improvement actions or their current status.

The management review process is outlined in the IMS Manual.

# 5.0 Act

The *Act* component of this Program consists of facilitating continual improvement and verifying that, when required, corrective actions are taken and appropriately managed. The results of these program elements feed back into *Plan* to complete the Plan-Do-Check-Act cycle.

## 5.1 Corrective Action Process

Deviations to this Program are evaluated and investigated, as required. Appropriate actions are developed and implemented to correct and prevent reoccurrence. Corrective actions are planned, implemented, verified, and reviewed for effectiveness corresponding with the risk level.

The corrective action process is outlined in the IMS Manual.

## 5.2 Continual Improvement

Continual improvement is an ongoing process to improve the suitability, adequacy, and effectiveness of the IMS. Workers continually seek out improvement opportunities for the IMS and Project processes through Program monitoring, auditing, management review, and maintaining awareness of changes in the business environment. Improvement may also involve benchmarking the Project's performance against other similar projects and facilities.

The use of experience gained during Project construction and commissioning, including information collected from relevant external sources, informs potential improvement opportunities.

Potential sources of information include:

- incident investigations;
- lessons learned;
- worker experience;
- training modules evaluations;
- government and industry publications;
- industrial peer information exchange;
- professional associations; and
- monitoring results.

Continual improvement opportunities are identified, documented, evaluated, and implemented as outlined in the IMS Manual.

# 6.0 References

## 6.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-CHT-00001 | *Rook I Organizational Chart* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-CON-PGM-00001 | *Rook I Contractor Management Program* |
| ROOK-AST-PGM-00001 | *Rook I Asset Management Program* |

| | |
|---|---|
| ROOK-IPE-PGM-00001 | *Rook I Indigenous and Public Engagement Program* |
| ROOK-TRN-PRO-00001 | *Training Analysis* |
| ROOK-TRN-PRO-00002 | *Training Design and Development* |
| ROOK-TRN-PRO-00003 | *Training Implementation and Evaluation* |

## 6.2 External

- Federal
    - *General Nuclear Safety and Control Regulations*
    - *Uranium Mines and Mills Regulations*
    - *Canadian Nuclear Safety Commission REGDOC-2.2.2, Personnel Training*
- Provincial
    - *The Saskatchewan Employment Act*
- Other
    - *Canadian Standards Association. N286-12 Management System Requirements for Nuclear Facilities*

# Appendix A: Rook I Safety-Sensitive Positions

## Rook I Safety-Sensitive Positions

| Activity | Positions | Duty Area(s) | Engaged in licensed activities? | Consequence of human error risk to health, safety, environment, or security? |
|---|---|---|---|---|
| Construction[1] | All[2] | Preparing, installing, and constructing Project structures, systems, and components | Yes | Yes |
| Commissioning[1] | All[2] | Verifying that constructed Project structures, systems, and components are prepared for safe and reliable operation | Yes | Yes |
| Health, Safety, Radiation, Environment, and Security[1] | All[2] | Overseeing and performing work related to occupational health and safety; radiation protection; industrial hygiene; environmental protection; emergency preparedness and response; fire protection; and site security | Yes | Yes |

[1] Project site-based positions only

[2] Subject to change based on the results of organizational analysis

# Construction Management Program
# ROOK-CST-PGM-00001

# Rook I Project

## Construction Management Program

ROOK-CST-PGM-00001

December 2022

# Record of Revisions

| Version No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| 0 | 20-Dec-2022 | Issued Final | Jon Henderson | Rob Paine<br>Paul Barnes<br>Kevin Oakes | Kevin Small |

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# 1.0 Introduction

The *Rook I Construction Management Program* (Program) outlines the systematic and risk-based approach to designing, preparing, installing, and constructing structures, systems, and components as part of the NexGen Energy Ltd. (NexGen) Rook I Project (Project). The Program describes processes to verify that structures, systems, and components are designed, prepared, installed, and constructed in accordance with applicable legal and other requirements, fostering a culture where protecting workers and the environment is a principal consideration guiding decisions and actions, and enabling continual improvement.

This Program is part of the *Rook I Integrated Management System* (IMS). All aspects of the IMS are subject to the *Rook I Integrated Management System Policy* which provides the foundation for NexGen's approach to construction management.

The Program and its relationship to other IMS programs within the IMS hierarchy is shown in Figure 1. As a component of the IMS, this Program follows the Plan-Do-Check-Act cycle to identify, control, monitor, and continually improve construction management processes.

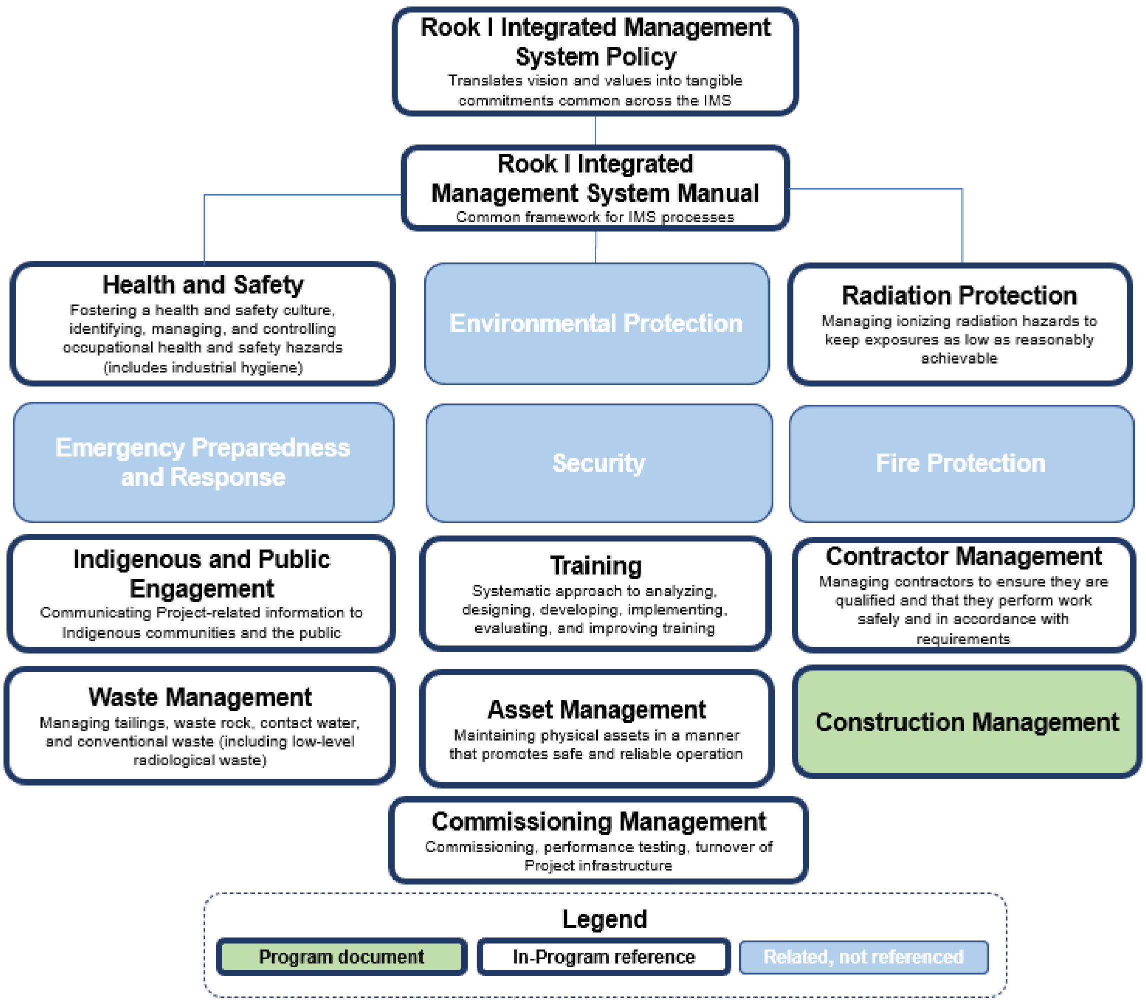


Figure 1: Program Context Within the IMS

## 1.1 Purpose

This Program describes the Project principles, processes, and framework to safely and reliably design, prepare, install, and construct Project structures, systems, and components in a controlled manner that meets applicable legal and other requirements.

This Program aligns with requirements of the references outlined in section 6.2, including the *Nuclear Safety and Control Act* and associated regulations.

## 1.2 Scope

The scope of this Program includes planning, delivering, evaluating, and improving Project processes for effectively designing, constructing, and installing structures, systems, and components.

This Program applies to workers performing on-site Project-related, licensed activities during the site preparation, construction, and commissioning phase of the Project, including installation of structures, systems, and components located on surface or underground within the Project site.

This Program uses a graded, risk-based approach to implementing processes that account for the level of risk, safety significance, and complexity of the construction activity.

The Program is implemented in an integrated manner with other Programs as shown in Figure 1. Commissioning, performance testing, and turnover of structures, systems, components, and documents for operation are within the scope of the *Rook I Commissioning Management Program*. Managing waste (e.g., waste rock) is within the scope of the *Rook I Waste Management Program.* Maintaining facilities and equipment during construction is within the scope of the *Rook I Asset Management Program.*

## 1.3 Program Principles

NexGen recognizes the importance of constructing the Project to meet design specifications while protecting workers, the environment, and stakeholder interests. This approach to construction management is reflected in the following principles:

- protecting and promoting the health, safety, and well-being of workers and the environment through all aspects and phases of the Project;
- establishing a strong health, safety, and environment culture which is periodically assessed and continually improved;
- placing quality as a priority commitment that complements the health, safety, and well-being of workers and the environment, supports schedule success, and optimizes overall costs;
- verifying workers have the knowledge, skills, training, and tools to perform their duties safely;
- managing information, resources, work performance, and change;
- managing communication so relevant information is shared among stakeholders and workers including contractors in a timely fashion;
- delivering controlled design and construction work conducted by competent workers;
- controlling materials, facilities, and equipment to maintain a safe worksite, integrity of structures, systems, and components, and construction in accordance with design requirements;
- complying with applicable legal and other requirements; and
- continually improving Program performance.

## 1.4 Terminology

A comprehensive list of common terms applicable to this Program and the IMS are available in the *Rook I Project Glossary*.

**concession** – A written authorization to use, release, reject, or waive an item that does not conform to or deviate from contractual, scoped, designed, or specified requirements.

**constructability** – The systematic method used to optimize construction knowledge and experience in planning, design, procurement, and field operations to achieve overall Project objectives.

**constructability review** – Formal review to identify and record constructability issues on the basis of work type and discipline at each Project stage, providing a structured methodology to identify key concerns and methods of resolution. Constructability reviews require flexibility in both philosophy and design to enable construction management to establish attainable means and methods of execution and performance

**construction deficiency** – Deficiency in characteristics, documentation, or procedures that makes the quality of material, service, product, structure, system, or component unacceptable or indeterminate.

**construction deficiency report** – A report documenting a construction deficiency occurring in severity sufficient to consider rejection of the product, process, service, structure, system, or component. In some situations, the product, process, service, structure, system, or component may be accepted as-is, and in other situations it will require corrective action.

**construction management** – The functional discipline which plans, coordinates, communicates with, and supervises construction activities executed by others regarding safety, quality, scope, time, and cost. This term also defines the functional grouping of construction management work processes.

**construction work package** – A discrete portion of construction work developed as a logical subdivision of the overall construction scope, and split into distinct and manageable packages by geographical area and discipline.

**contractor** – A person or company retained to provide a service to NexGen or perform work at the Project site. Contractors may supply material and goods as per a contract or purchase order.

**corrective action** – An action taken to eliminate the cause of a detected construction deficiency or other undesirable situation (adapted from ISO 9000).

**data** – Drawings, documents, information, manuals, method statements, plans, procedures, certificates, and reports required to be supplied under a contract.

**effectiveness** – The extent to which planned activities are realized and planned results are achieved.

**engineering change notice** – A documented, approval notification of changes required to engineering deliverables that have been issued for an already awarded package or contract.

**field engineer** – The engineer responsible for reviewing the temporary works.

**handover (also referred to as "turnover")** – Refers to the jurisdictional transfer of structures, systems, or components from one phase of the project to the next (e.g., construction to pre-commissioning, pre-commissioning to process commissioning, process commissioning to operations).

**handover to pre-operational testing** – The transfer of structures, systems, and components at the end of the construction inspection and testing phase to pre-operational testing for initial inspection, testing, and operation.

**hazard and operability (HAZOP) study–** A detailed hazard and operability problem identification process, carried out by a team. HAZOP deals with the identification of potential deviations from design intent, examination of possible causes, and assessment of consequences.

**hold point** – A mandatory verification point beyond which the contractor must not proceed without the written approval of the authorized representative of the Project.

**inspection and test plan (ITP)** – A document typically provided by the vendor or contractor defining specific manufacturing or construction inspection and testing requirements that must be completed to satisfy conformance requirements. The documentation must also identify the review, verification, witness, or hold points necessary for each requirement by each party to verify conformity.

**integrated management system (IMS)** – A common framework of programs, plans, procedures, work instructions, and other supporting documentation describing management system processes for achieving Project objectives and completing work safety, reliably, and consistently while conforming to internal requirements and complying with legal requirements.

**job hazard analysis (JHA)** – A hazard identification and control process used to describe each task of a job, the associated hazards, and controls required to mitigate the risk of each hazard and keep workplace exposures to hazards as low as reasonably achievable.

**licensed activities** – Project activities within the scope of Canadian Nuclear Safety Commission (CNSC) licensing. Project site-based activities that may be outside the scope of CNSC licensed conditions are subject to the integrated management system on a risk-informed basis (i.e., where the consequence of human error poses a risk to the environment, the health and safety of people, or to the security of Project facilities).

**piping and instrumentation diagram (P&ID)** – A visual representation of equipment, vessels, piping, and instruments in diagrammatic form indicating equipment items and number, process piping or transfer devices and numbers, line sizes and numbers, measurement and control points, control valves, instrumentation, and control loops

**preventive action** – An action taken to eliminate the cause of a potential construction deficiency or other potential undesirable situation.

**prime contractor** – Entity responsible for overseeing the safe execution of all work on site within the scope of a defined construction project, who is either the owner of the worksite or a contractor who has entered into a written agreement with the owner to perform the duties of prime contractor.

**project management** – The functional group responsible for overall Project execution.

**Project site** – Term used to describe all property within the physical NexGen Rook I boundary.

**punch list** – A list of items of work or deliverables that require completion or correction to close out the scope of work. Items on a punch list typically include minor corrections, alterations, repairs, or items or conditions considered sub-standard, such as those mandated by either drawings or specifications or other contract documents.

**punch list item** – A construction deficiency whose remedy is clear and whose repairs can be carried out to 100% of specifications in a timely fashion (e.g., a missing breaker cover).

**quality assurance –** Part of quality management focused on providing confidence that quality requirements will be fulfilled.

**quality control –** Part of quality management focused on fulfilling quality requirements.

**reject** – The term is used to refuse release of a specific product, material, structure, system, or component.

**request for information (RFI)** – For the purposes of the construction project, a documented request for information or clarification on a prescribed form issued from one contract party to another concerning an issue or contract document (e.g., drawing, specification, instruction, other issue, or situation as applicable). The response is added to the form and returned to the originator.

**single line diagram (SLD)** – A representation of an electrical distribution system starting from the incoming electrical feed through to the individual electrical loads, where a single line is used to indicate the connections between the electrical equipment.

**site** –The location reserved for the lay-out and construction of the Rook I Project, including areas for temporary facilities required for the performance of work.

**site instruction** – A document used to transmit information having minor or no impact on cost or schedule related to a specific contract or scope of work to the relevant contractor.

**structures, systems, and components** – A general term encompassing all of the elements of a facility or activity that contribute to protection and safety. A structure is a passive element (e.g., buildings, vessels, shielding). A system is comprised of several components assembled to perform a specific (i.e., active) function. A component is a discrete element of a system (e.g., wires, transistors, integrated circuits, motors, relays, solenoids, pipes, fittings, pumps, tanks, valves).

**surveillance** – Monitoring or observing to verify whether an item or activity conforms to specified requirements.

**temporary works** – An "engineered solution" used to provide access, protection, support, or services for workers, equipment, and materials during construction, maintenance, or demolition of permanent works. Temporary works are also required to provide temporary service, repair, or support for any part of permanent works until the permanent works have achieved a state of completion, allowing temporary works to be removed.

**walk-down** – A formal inspection of a section of the plant prior to turnover to verify structures, systems, and components are installed according to the design and compile a punch list of outstanding deficiencies.

**work breakdown structure (WBS)** – A deliverable-oriented grouping of Project elements that organizes and defines the total Project work scope, including permanent plant facilities organized according to the facilities breakdown structure and temporary facilities and services required to construct the permanent plant facilities. Each descending level represents an increasingly detailed definition of the project work.

**worker** – Any person working for NexGen, including a contractor.

# 2.0 Plan

The *Plan* component of this Program includes processes that support a systematic, graded, risk-based approach to designing, preparing, installing, and constructing Project structures, systems, and components. Planning processes include:

- designing structures, systems, and components;
- identifying and communicating construction hazards and assessing associated risks;
- setting Program-specific objectives and targets for design and operations to implement Program processes;
- preparing, maintaining, and regularly reviewing the construction schedule;
- providing the appropriate parties with the necessary information and resources;
- planning, ordering, receiving, securing necessary materials and equipment for the Project;
- assigning appropriate resources;
- verifying workers are competent and adequately trained to control risks and perform work;
- managing change to process, workers, design, facilities, and equipment; and
- receiving and maintaining documents and records.

## 2.1 Design

Design is the process of defining and documenting the planned physical assets for the Project and provides information for asset selection and construction activities. The Project is planned and designed using a life cycle approach that considers safety and reliability Project during construction, operation, and closure. Life cycle design is an effective control to limit risks, control costs, and maintain integrity through the various phases of the Project.

Design is based, as applicable, upon inputs obtained from:

- functional requirements;
- location and interfacing requirements;
- performance requirements;
- operational requirements;
- environmental considerations;
- safety considerations;
- codes, standards, and jurisdictional requirements;
- contractual and customer considerations;
- supply and logistics considerations;
- stakeholder impact considerations;
- human factor considerations;
- experience from previous designs;
- design requirements for each specific engineering discipline;
- fabrication considerations;
- installation considerations;
- commissioning considerations;
- in-service considerations;
- research, technical studies, data, and reports;
- decommissioning requirements; and
- economic considerations.

These inputs are developed and provided to the design teams for basic design and engineering, vendor equipment selection and detailing, and final detailed design and engineering.

Design work is performed by qualified workers and documented in the form of design criteria records, calculations, drawings, and technical specifications. Design work documentation is used as the basis for preparing, installing, and constructing Project facilities, equipment, and process systems.

Design work incorporates risk control methods to eliminate, prevent, or reduce identified risks to workers, equipment, and the environment for the Project life cycle.

Design work documents Project needs and requirements using plans and specifications for guidance and direction of work. It is used to plan, prepare, install, and construct the structures, systems, and components necessary for the Project systems. The design is updated, and risks and associated controls are re-evaluated as required during construction to reflect changing needs and circumstances.

Two types of design that occur as part of Project construction are:

- pre-construction design; and
- temporary works design.

### 2.1.1 Pre-construction Design

Pre-construction design is engineering design that occurs in advance of construction that details Project concept needs.

Pre-construction design:

- provides instruction and information for the construction team to follow;
- incorporates input on site conditions, design specialist recommendations, and stakeholder interests;
- considers health, safety, environmental protection needs, and life cycle requirements;
- provides details for required structural, mechanical, piping, and electrical structures, systems, and components in plans and specifications, including configuration or modularization;
- provides details on the location of the planned permanent structures, systems, and components;
- states jurisdictional and Project-specific requirements (e.g., site environmental restrictions, stakeholder interests), codes, standards, and testing requirements;
- creates work models;
- lists required equipment and materials;
- specifies methods of preparation, installation, and construction of structures, systems, and components with operational characteristics;
- informs structure, system, and component selection, and
- indicates requirements for special tools, equipment, materials, and services needed for Project completion.

Pre-construction design is completed by qualified and experienced engineering firms in accordance with each firm's recognized quality management system (e.g., ISO 9001), which incorporates formal procedures and controls on the design process including inputs, outputs, and client interfaces. Designs are controlled and independently verified by qualified workers.

### 2.1.2 Temporary Works Design

Temporary works are the parts of a construction project needed to safely establish permanent works. Temporary works include works required for construction such as power plants or dormitories and are usually removed after use. In some cases, the temporary works may be incorporated into the permanent works (e.g., haul road foundations may be used for permanent road foundations).

The requirement for and design of temporary works depends on:

- safety significance of associated activities;
- material and equipment type;
- placement location;
- accessibility;
- construction stage;
- degree of modularization in design; and
- vendor supply of licensed products.

Development of design and work plans for temporary works considers observations of site conditions (e.g., ground conditions), design requirements (e.g., locations, configurations, measurements, specifications), and applicable legal and other requirements. Design and work plans for temporary works are developed by competent personnel with input from Project designers as required and independently verified by competent workers.

Temporary works include, but are not limited to:

- delineation of pedestrian walkways and separation zones from vehicles and powered mobile equipment;
- excavated ground support (e.g., crane mats, piling, shoring, bracing, rock bolts);
- access ramps and pathways for workers and equipment (e.g., sloped grades, jersey barriers, stairs);
- scaffolding for access to pipes, electrical cable trays, and devices located at height;
- barricades, handrails, and travel restraint;
- swing-stages for working at height to install cladding and flashing;
- formwork and falsework to mold concrete elements and provide access or secure embedded components;
- hoarding and protective structures to shelter materials and work from harsh weather;
- lifting devices and spreader beams adequate to support and lift without damage to material and equipment;
- mining movable structures (e.g., Galloway work platforms, installation skeletons in the mine shaft); and
- temporary conveyances (e.g., buckets, skips, worker-lifting man-baskets).

The process for designing and managing temporary works is described in the construction management procedure *Temporary Works*.

## 2.2 Risk Management

The risk management process includes identifying construction management hazards that could affect the health and safety of workers or the environment, assessing the significance of the associated risks, and managing the risks to acceptable levels through the application of controls as described in section 3.1. The type of risk assessment performed is commensurate with the topic, apparent level of risk, safety significance, and complexity of work.

The multi-layered approach to routinely and effectively managing risks of construction management for workers and the environment is outlined in the *Rook I Integrated Management System* (IMS) *Manual*.

### 2.2.1 Hazard Identification

Hazards are identified, documented, and tracked in a manner appropriate for the type of risk assessment performed, e.g., hazard and operability studies (HAZOPs).

Hazard listings are developed as applicable for actual and potential hazards related to health, safety, environment, security, radiation, and compliance. A range of techniques may be used for identifying potential hazards. These include, but are not limited to:

- use of peer experience from similar industries or projects;
- use of checklists based on historical information and knowledge accumulated from similar projects;
- human health risk assessments and ecological risk assessments;
- failure modes and effects analysis;
- HAZOPs;
- information from Project-specific nonconformities and audit findings;
- job hazard analyses (JHAs); and
- field level hazard assessments (FLHAs).

Hazard identification is applied at various steps of the construction management process, as summarized in Table 1.

Table 1: Hazard Identification During Construction Management

| Step | Prepared By | Example Process/Method |
|---|---|---|
| Design (at any point) | Design Team | In accordance with engineering firm's design hazard identification and risk assessment process under its quality management system. |
| Pre-construction Design | Construction Team | Constructability reviews |
| Contractor Mobilization | Contractor | Contractor job hazard analysis (as accepted by the Project) |
| Work Face Planning | Construction Team | Hazard and risk assessment of work packages (taking into consideration existing contractor and NexGen JHAs). |
| Construction | Worker | FLHA (Field Level Hazard Assessment) |

Hazard listings are documented and tracked using risk registers and are periodically re-evaluated for accuracy. The general hazard identification process is outlined in the IMS Manual and further defined in the supporting programs, plans, and procedures, as applicable.

### 2.2.2 Risk Assessment

Following identification of construction management hazards from facilities design and equipment selection, construction risks are assessed using a risk matrix appropriate for the type of assessment being performed. Information from the risk assessment process is used to identify appropriate controls that effectively mitigate risk to acceptable levels. Controls are discussed further in section 3.1.

The general risk assessment process is outlined in the IMS Manual.

### 2.2.3 Risk Register

Documented risk registers are maintained and reviewed to record and track relevant information regarding construction risks and controls. Controls are implemented, monitored, and maintained to protect worker and environmental health and safety. Risk registers are reviewed, updated periodically, and referenced to assist with decision making, improvement opportunities, and changes to construction management processes.

Requirements for developing and maintaining risk registers are outlined in the IMS Manual.

### 2.2.4 Constructability Reviews

Constructability reviews are systematic, risk-based studies initiated during pre-construction design to mitigate risks and optimize construction methods by identifying, documenting, and evaluating factors including, but not limited to:

- worker safety;
- environmental protection;
- integrity of structures, systems, and components; and
- construction quality, schedule, and cost.

Constructability reviews are performed by multi-disciplinary teams of qualified individuals and with consideration of inputs that include, but are not limited to:

- methods of safe work performance;
- best practices observed from experience;
- lessons learned;
- practical construction knowledge;
- methods to eliminate impractical construction practices;

- methods to reduce the need for specialty resources; and
- methods to expedite the schedule.

Outcomes from constructability reviews are used to:

- select measures to mitigate risks to workers and the environment;
- inform the development of construction work plans, as described in section 3.4;
- identify opportunities to substitute materials and equipment;
- identify instances that require redesign;
- identify administrative needs to be specified; and
- optimize time and cost.

The process for performing constructability reviews is described in the construction management procedure *Constructability Reviews*.

## 2.3 Objectives and Targets

Program objectives and targets are established at regular intervals, linked to clear accountabilities, and monitored for status to completion. Objectives and targets are tangible, documented actions that result in improvements to the construction management processes and Program outcomes. Setting and managing objectives and targets, including establishing monitoring measures, is outlined in the IMS Manual.

## 2.4 Construction Schedule

The construction schedule documents construction-related tasks and outlines the sequence, key milestones, and planned dates for starting and finishing tasks. The construction schedule ties together the desired task completion dates with estimated durations for discrete tasks, their relationship to one another, planned timing, availability of required resources (e.g., work rotations, specialised trades, key materials, equipment), logical sequence of work, and task descriptions to establish the basis for construction work execution as described in section 3.5.

The construction schedule is organized by common grouping of tasks (i.e., work breakdown structure) to enable consistency with engineering design categories, cost allocation and tracking, purchasing, and task management. This information is compiled and used to establish priorities and sequencing for procurement, detailed engineering activities, and construction of the Project.

The construction schedule is developed by qualified workers in consultation with Project management and with consideration for design constraints, procurement lead times, and other relevant factors (e.g., approval timelines, weather). The construction schedule is managed by qualified workers and periodically reviewed and revised to monitor task status, confirm activities status, estimate remaining durations, and evaluate overall Project progress. The most current construction schedule is routinely communicated to Project and Rook I management.

Guidance for developing and managing the construction schedule is further described in the construction management guideline *Construction Work Schedule Development and Management Guide*.

## 2.5 Procurement

Procurement is the process of purchasing and contracting materials, equipment, and services that meet specified requirements of structures, systems, and components as designed and described on plans and specifications for construction and installation of structures, systems, and components for the Project.

Materials, equipment, and services required are selected based on design plans and specifications. Procurement requirements are established by design selections which are documented and provided to approved vendors or contractors along with a request for proposal to supply the goods and services requested.

The process for procuring equipment, materials, and contracted services is outlined in the IMS Manual. The process for managing and maintaining equipment and materials are outlined in the *Rook I Asset Management Program*.

## 2.6 Resources

Rook I management is committed to providing the necessary resources to establish, implement, maintain, and continually improve this Program and its associated processes. In addition to providing the required financial resources to achieve objectives and meet requirements, management provides the infrastructure, work environment, and competent workers necessary to implement the Program and construction management processes.

### 2.6.1 General Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Program. Workers are informed of their roles and responsibilities and are accountable for understanding and fulfilling them. The Project prime contractor performs their role in accordance with the scope and requirements of this Program and its supporting information and as required in accordance with *The Saskatchewan Employment Act*. Although NexGen maintains overall accountability for Project activities, the term Rook I is used in the following role descriptions to reinforce that the role is applicable and may be assigned NexGen employees and contractors performing work on behalf of the Project.

#### NexGen Executive

NexGen executive is accountable for:

- establishing the direction, strategy, and policies of the organization;
- promoting behaviours that support a robust health and safety culture;
- promoting the understanding that safety, including safe and reliable construction management, is a principal consideration guiding decisions and actions; and
- providing adequate resources to deliver the requirements of this Program.

#### Rook I Management

Rook I management is accountable for:

- demonstrating and promoting a culture where health and safety is a principal consideration guiding decisions and actions at all levels of the Project;
- maintaining effectiveness of this Program;
- approving annual Program objectives and targets;
- promoting the integration of the Program requirements into Project processes;
- communicating the importance of effective management and of conforming to Program requirements;
- allocating adequate and appropriate resources to fulfill Program implementation;
- developing appropriate documentation and tools to implement this Program effectively;
- controlling incidents, deviations, and construction deficiencies and directing corrective action when required;
- monitoring and reporting on Program performance and effectiveness to NexGen executive;
- providing independent oversight of processes through monitoring and auditing activities; and
- identifying and pursuing opportunities to achieve continual improvement.

## Program Management

Program management is responsible for:

- demonstrating and promoting a culture where health and safety is a principal consideration guiding decisions and actions at all levels of the Project;
- overseeing the development, implementation, and adherence to this Program;
- communicating with the applicable regulatory agencies (e.g., Canadian Nuclear Safety Commission) on behalf of the Project;
- setting annual objectives and targets, monitoring performance, and preparing internal and external reports regarding Program activities and outcomes;
- developing relevant key performance indicators (KPIs) related to the health of the Program and implementing them at the Project;
- managing resources to confirm legal compliance with regulatory requirements and conformance with Program requirements;
- confirming workers have the necessary competence, training, and awareness of Program requirements;
- working with applicable departments to confirm that Program roles and responsibilities are identified and described and that those with specific responsibilities and are qualified to fulfill their roles;
- providing independent oversight of processes through monitoring and auditing activities;
- reporting on Program performance and effectiveness to Rook I management;
- facilitating management review of this Program; and
- promoting continual improvement through Program evaluation.

## Program Coordination

The Program coordinator is responsible for:

- demonstrating and promoting a culture where health and safety is a principal consideration guiding decisions and actions at all levels of the Project;
- leading the development of, implementation of, and adherence to Program procedures, work instructions, and maintenance plans;
- conducting construction management incident investigations and initiating applicable regulatory reporting when assigned;
- maintaining Program-specific data and records in a secure and controlled manner;
- providing construction management subject matter expertise;
- verifying workers meet and maintain required Program-specific training qualifications;
- verifying monitoring processes are implemented in accordance with Program and regulatory requirements; and
- reporting on Program performance as part of the management review process.

## Rook I Supervision

Rook I supervisors are responsible for:

- demonstrating and promoting a culture where health and safety is a principal consideration guiding decisions and actions at all levels of the Project;
- understanding, encouraging, and following this Program and its requirements;
- overseeing department functions and supervising direct reports to verify conformance to Program requirements;
- providing workers with the appropriate tools, equipment, procedures, and knowledge for the tasks being performed;

- supporting the achievement of Program objectives and targets;
- conforming to Program procedures and training;
- supervising direct reports regarding conformance to Program requirements;
- communicating and coordinating with other departments to facilitate effective implementation of this Program;
- supporting direct reports in planning work activities that mitigate construction management risks;
- reviewing work completed by their reports to verify it is completed in a safe and effective manner;
- participating in audits and inspections, as required;
- participating in management reviews, as needed; and
- identifying and supporting continual improvement.

#### Rook I Workers

Rook I workers are responsible for:

- demonstrating and promoting a positive health and safety culture;
- working toward the achievement of objectives and targets in their area of assigned responsibility;
- adhering to established and applicable use, care, and maintenance procedures for assets;
- meeting and maintaining required Program-specific training qualifications;
- using all equipment, devices, and facilities intended for construction in accordance with established procedures and applicable training;
- adhering to Project-specific processes established to maintain and promote the timely and accurate construction of the Project;
- recognizing and promptly communicating hazards or deviations that present a risk to the safety and health of workers, the environment, or the public; if safe to do so, taking action to contain or control the hazard to mitigate the impact;
- organizing, receiving, moving, erecting, and installing the materials, structures, and equipment; and
- cooperating with auditors, regulators, and inspectors, as needed.

### 2.6.2 Construction Management Roles and Responsibilities

In addition to the relevant roles and responsibilities assigned to Rook I workers and similar functional level positions described in section 2.6.1, the following roles and responsibilities specific to construction management also apply:

#### Construction Manager

The construction manager is responsible for:

- verifying installations conform with plans and specifications;
- verifying equipment placement and connection conform with plans, specifications, and manufacturers' requirements;
- turning over installed structures, systems, and components to the commissioning manager; and
- collaborating with the commissioning manager to provide support workers for commissioning.

#### Construction Discipline Leads

The construction discipline leads are responsible for:

- representing the respective engineering disciplines (e.g., civil, structural, process, mechanical, electrical, instrumentation);
- controlling and coordinating construction;

- observing and inspecting work in progress;
- verifying systems conform with plans and specifications; and
- verifying construction deficiencies are identified and resolved.

### Field Engineering

The field engineer is responsible for:

- monitoring and inspecting construction works during progress of the works;
- completing walk-downs;
- managing punch lists;
- managing deficiencies;
- assisting during pre-operational testing and turnover to the commissioning team;
- managing the field change and approval process;
- managing and expediting requests for information; and
- confirming engineering approvals are provided for on-site modifications or site requirements.

### Vendor Representatives

The vendor representatives are responsible for:

- attending at site;
- inspecting supplied equipment;
- supporting installation of supplied equipment;
- identifying deficiencies;
- confirming critical deficiencies are remedied;
- assisting and supporting operation of supplied equipment during testing and commissioning;
- conducting tests as required;
- observing equipment operations; and
- preparing acceptance reports.

## 2.6.3 Facilities and Equipment

Facilities and equipment supporting the effective implementation of this Program and its associated processes are provided to workers. Facilities are designed, constructed, operated, and maintained with consideration for protection of worker health, safety, well-being, and compliance with legal requirements.

Worker health, safety, and well-being and environmental protection are principal considerations during the design, construction, commissioning, operation, and maintenance of facilities and the selection, operation, and maintenance of equipment.

Facilities and equipment required for construction management include, but are not limited to:

- safe and secure work areas;
- laydown and material storage areas for materials, equipment, and parking;
- support structures (e.g., living accommodations, offices, lunchrooms, dry/wet facilities, wash-cars);
- temporary works (e.g., scaffolding, temporary conveyances); and
- powered mobile equipment (e.g., cranes, forklifts, boom trucks, skid steer, front-end loaders, trucks, drills, load haul dump loaders).

NexGen provides facilities to support the effective implementation of this Program and its associated processes. Construction equipment, including contractor equipment, and commissioned facilities and equipment are operated and maintained as outlined in the *Rook I Asset Management Program.*

The processes for managing, and maintaining equipment and materials is outlined in the *Rook I Asset Management Program.*

### 2.6.4 Legal and Other Requirements

NexGen is committed to conforming to internal processes and to complying with applicable legal and other requirements. Construction management procedures and work instructions are developed with consideration for applicable legal requirements including the regulations referenced in section 6.2.

Structures, systems, and components are designed, installed, and constructed with consideration for applicable legal and other requirements which are documented in the form of:

- design drawings;
- technical specifications;
- vendor documents; and
- quality assurance and quality control records and tests.

Changes to applicable internal and external requirements are monitored and evaluated to identify whether updates to this Program or related construction management processes are required.

The process for managing legal and other requirements is outlined in the IMS Manual.

## 2.7 Training and Competence

The Project follows a systematic approach to training (SAT) to appropriately educate, train, and qualify workers to carry out assigned work. Training requirements are monitored as a means of providing workers with the training they require when they require it to maintain competency and work safely. Program-specific training requirements, including tracking worker credentials and qualifications for expiry, are defined and managed as part of the *Rook I Training Program* and the *Rook I Contractor Management Program*.

Project workers and visitors are required to participate in site orientation upon their arrival. Site orientation includes information on the general requirements for protecting workers and the environment, as well as camp rules and expectations of personal conduct while at site. Site orientation is developed using the SAT process to confirm all critical information for new workers is included.

## 2.8 Document and Record Management

Documents and records are controlled to verify the information is accurate, available when needed, and protected from uncontrolled alteration. Documents include program-specific procedures and work instructions. In addition to the common management system records outlined in the IMS Manual, records specific to this Program include, but are not limited to:

- plans and specifications;
- design and change management document records;
- construction schedule and status records;
- flow sheets and single line diagrams;
- process and instrumentation drawings;
- work plans and work face plans;
- construction checklists from vendor operations manuals;
- quality assurance and quality control inspection test plan results, completion lists, and checklists;
- vendor verification sign-off sheets;
- marked-up drawings;
- construction non-conformance and corrective action reports;

- deficiencies status of completion lists; and
- sign-off certificates.

As part of the Program, records of observations are made for the use of operations for all structures, systems, and components brought into operation. These records are part of the quality assurance and quality control effort and are provided at turnover to commissioning.

Documents and records are readily accessible to those that require them.

The processes for managing documents and records are outlined within the IMS Manual.

## 2.9 Communication

Effectively communicating construction management and Project design information to workers is vital for maintaining a strong health and safety culture. Consistent, controlled communication is critical in providing workers involved with construction and installation activities with the correct information at the correct time to safely perform construction duties. Information is taken from plans, specifications, and vendor operations manuals and combined with status of work for communication to workers.

Tools used to communicate the construction management information related to the Project include, but are not limited to:

- information postings on bulletin boards as required by regulation;
- workplace construction management safety posters;
- routine safety moments at the beginning of meetings or training courses;
- construction-focused toolbox meetings;
- plans, specifications, and reference drawings (e.g., single line diagrams, piping and instrumentation diagram [P&ID]);
- scheduled meetings for safety, quality, schedule planning;
- construction schedule;
- inventory, procurement, and shipping status updates;
- work plans;
- electronic billboard monitors;
- barricades, fences, restrictive warning tape, and signage;
- electronic communication technology (e.g., two-way radios, cellular telephones, telephone lines horns, lights, public address speakers); and
- status completion tags for lock-out/tag-out, energization in progress, mechanical, piping, electrical, instrumentation, and final completion mounted on equipment being commissioned.

Workers and visitors are informed of their duties and responsibilities, and changes to workers, processes, facilities, or equipment are communicated to those affected as required.

Internal and external communication principles and processes are further outlined in the IMS Manual. Communication practices specific for Indigenous communities, local communities, and the public are outlined in the *Rook I Indigenous and Public Engagement Program*.

### 2.9.1 Request for Information

Requests for information and clarifications between NexGen, its contractors and subcontractors concerning issues or contract documents (e.g., drawing, specification, instruction, other issue or situation, as applicable) is managed using a request for information (RFI) process.

The RFI process is further described in the construction management procedure *Site Request for Information*.

## 2.10 Change Management

Change is managed to protect worker health, safety, the environment, and property to promote consistent and effective execution of Project processes. This includes changes to:

- design;
- facilities;
- equipment;
- management system processes;
- organizational structure;
- key roles and responsibilities;
- documentation; and
- legal and other requirements.

Changes are evaluated with consideration for the impact on this Program and the related construction processes. This confirms:

- change is clearly defined;
- risks associated with change are assessed and managed;
- change is communicated to those affected; and
- the related documentation is updated.

The general change management process is outlined in the IMS Manual.

Engineer design changes are managed in accordance with the design team's quality management system and communicated through engineering change notices as described in the construction management procedure *Construction Change*.

### 2.10.1 Field Changes

Field changes are temporary or permanent changes to design requirements, physical configuration, or facility configuration information that occur during construction. Field changes are documented and managed in a controlled manner to mitigate risk to health, safety, and the environment, maintain alignment with the design basis, and comply with legal and other requirements.

The process to manage field changes in conditions, including the application of change management when appropriate, is described in the construction management procedure *Construction Change*.

Field mark-up documents capture field change to Project documentation issued during the course of construction to confirm changes are reflected in the installed, fabricated, constructed, or commissioned conditions.

The process to manage field mark-up documents is described in the construction management procedure *Field Mark-ups*.

### 2.10.2 Issuing Site Instructions

Circumstances may arise where it is necessary to transmit instructions swiftly to a contractor (e.g., emergency situations) to maintain worker health and safety, protect the environment, and avoid Project delays.

The process to transmit instructions quickly is further described in the construction management procedure *Site Instructions.*

# 3.0 Do

The *Do* component of this Program includes implementing the construction management requirements described in section 2.0 to support safe and reliable construction work execution.

## 3.1 Risk Control

Controls identified during risk assessment are used to eliminate, prevent, or reduce the risk of worker, equipment, and environmental impacts associated with construction activities. Controls appropriate for the hazard and corresponding level of risk are selected and implemented with consideration for the hierarchy of controls as described in Figure 2. Examples of controls include facilities, equipment, processes, products, work practices, and personal protective equipment.

Risk controls for construction are implemented to reduce identified construction hazards using the hierarchy of controls. Where possible, controls are used in combinations to effectively prevent or reduce the risk to the worker or the environment.

Controls are used, operated, and maintained according to their design, limitations, and applicable training. Adherence to procedures and training are critical to preserve the effectiveness of controls.

Risk controls for design are implemented according to the engineering design team's recognized (e.g., ISO 9001) quality management system to minimize design errors. Design also incorporates risk control methods to eliminate, prevent, or reduce identified risks to workers, equipment, and the environmental over the Project life cycle. Risk controls incorporated into the design use the hierarchy of controls and are re-evaluated for design changes.

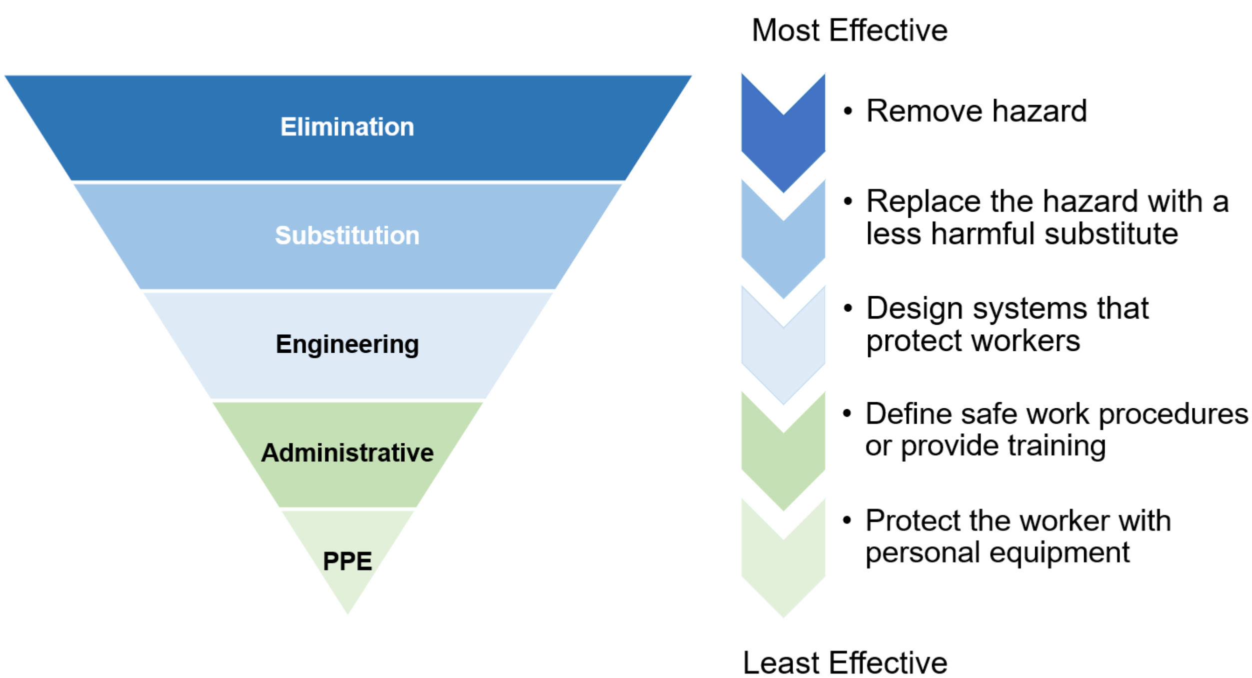


Figure 2: Hierarchy of Controls

### 3.1.1 Elimination and Substitution

The most effective measure to control construction-related risks is by eliminating or substituting the hazard. An example of hazard elimination is the off-site pre-assembly of structures, systems, or components to reduce the number of workers on site engaged in high-risk activities (e.g., working at height). Replacing a hazardous chemical (e.g., oil, acid) with a non-hazardous alternative (e.g., water) is an example of a hazard substitution.

Whenever possible, eliminating or substituting hazards is conducted during design of or modifications to structures, systems, and components that reduce or eliminate the interaction with workers and the environment.

Changes made to eliminate or substitute an existing hazard control are subject to the change management process as described in section 2.10 and outlined in the IMS Manual.

### 3.1.2 Engineering Controls

Engineering controls are used when completely removing or replacing a hazard is not practical or possible. Engineering controls involve designing structures, systems, and components in a manner that reduces hazard exposure. Engineering controls are developed with the goal of eliminating or substituting the exposure pathway where possible.

Secondary containment around a liquid fuel storage tank is an example of an engineering control for reducing the likelihood of an unplanned discharge to the natural environment.

Design changes resulting in implementing new or modifying existing engineering controls are subject to the design change management process as described in design team’s quality management system.

### 3.1.3 Administrative Controls

Administrative controls are an important component of risk mitigation, and are typically used in combination with other types of controls. Administrative controls include training, supervision, written policies, procedures, processes, and rules. Examples of common administrative controls used by the Project are described further in this section.

#### Plans, Procedures, and Work Instructions

If risk assessment determines it to be appropriate, instructions for completing tasks associated with licensed activities may be documented in the form of plans, procedures, and work instructions. Work planning documentation is subject to the document management process outlined in the IMS Manual.

#### Job Hazard Analysis

A job hazard analysis (JHA) is performed to evaluate work when an activity or process has the potential to present a significant risk, and an established plan, procedure, or work instruction does not exist. A JHA is valid only for the task for which it is prepared and issued, and is subject to review and revision if a change to scope or nature of work is encountered. The requirements for completing a JHA are outlined in the *Rook I Health and Safety Program*.

#### Signage

Signage may be used to identify hazardous substances, conditions, areas or activities where deviations could result in an environmental or health and safety risk. Warning signage may also be used to identify sensitive receptors (e.g., particularly sensitive habitat, established wildlife routes) or hazardous work conditions (e.g., confined spaces, overhead work).

An equipment tagging procedure is implemented to identify ownership (e.g., pre-operational testing, commissioning) and status (e.g., do not operate, lubrication status, temporary alteration) of constructed structures, systems, or components handed over by construction.

#### Warning Systems

Real-time monitors and alarms (e.g., back-up alarms, flashing lights on vehicles) may be installed to inform workers of potential workplace health, safety, or environmental hazards. These monitors and alarms, which may be audible or visual, identify potential interactions or abnormal conditions and allow for prompt avoidance and response.

### 3.1.4 Personal Protective Equipment

Personal protective equipment (PPE) includes protective clothing and devices designed to protect workers from exposure to contaminants. PPE is considered the last line of defence and is typically used in combination with other types of controls. PPE required to complete work safely is provided and periodically inspected to verify it has not passed its expiry date or become damaged during use.

The selection, use, and maintenance of PPE are outlined in the *Rook I Health and Safety Program.*

## 3.2 Construction Material Management

Construction material management is the controlled method of ordering, shipping, receiving, storing, and dispensing of materials and components.

Construction materials and equipment are monitored from the time they are ordered until they are received and stored at site.

Materials and equipment are ordered and shipped to the Project site by specified means. Construction material inventory is managed to control materials and equipment received. Construction materials are issued from defined storage locations on-site, prepared for use, and either used to install or installed as structures, systems, and components of the Project. Workers are required to receive, unload, handle, store, and secure materials and equipment delivered to the site until installed.

Construction materials procurement is outlined in the IMS Manual. Receiving inspection requirements are described in the construction management procedure *Construction Quality Control.*

To preserve equipment warranties and guarantees, a preservation and maintenance schedule is developed and implemented by NexGen in consultation with vendor representatives to identify materials, structures, systems, or components, either in storage or installed, that require preservation activities or routine maintenance before handover to pre-operational testing.

## 3.3 Contractor Management

Contractors performing construction work at the Project are subject to the requirements of this Program. Contractors are provided direction and support for the performance of work to prepare, install, and construct Project structures, systems, and components.

Contracted scopes of work are developed from plans, specifications, and vendor operations manuals and are performed according to contract terms. If the contract allows sub-contracting a portion of the scope of work, sub-contractors are subject to the same requirements and expectations as contractors including pre-approval of sub-contractors, where required.

Contractors construct and install Project structures, systems, and components as per Project design plans, specifications, and vendor operation manuals. Contractors are responsible for procurement, receipt, and handling of temporary and permanent materials and equipment, storage and maintenance of their purchased inventory as described in section 3.2, component installation, cleanup of their worksites, and disposal of their construction waste.

Contractors provide construction trades workers for specific disciplines (e.g., millwrights, pipefitters, electricians, instrumentation technicians) to assist in attending and observing the structures, systems, and components during the commissioning of the work.

Contractor activities are specified by the construction work packages.

Additional information on managing contractors and subcontractors is outlined in the *Rook I Contractor Management Program*.

Contractor equipment is assessed periodically for conformance to applicable requirements using a risk-based approach as outlined in the *Rook I Asset Management Program*.

## 3.4 Construction Work Planning

Construction work is planned with input from the description of the work shown in plans, specifications, and vendor assembly and operation manuals. Work is planned with consideration of resources required (e.g., workers, materials, equipment, services providers) and available according to the construction sequence provided in the construction schedule.

Construction work planning describes worker resources, information, tools, materials delivery, equipment availability, and services to prepare, install, and construct the structures, systems, and components. Construction work planning states who will do what task, when the work will be performed, where the work is located, and how the work will be performed according to the construction schedule.

Construction work planning consists of construction work packages as described in section 3.4.1, and work face plans as described in section 3.4.2.

To control construction effectively, construction planning is completed independently for two areas of the Project:

- surface structures, systems, and components for Project infrastructure and the mill; and
- underground structures, systems, and components including headframe, hoist houses, and ventilation structures.

Each area is divided into project planning and development of baseline schedules for coordinating and controlling each area of work. Both areas follow the same planning process. The process for work planning is outlined in the construction management procedure *Construction Work Packages*.

### 3.4.1 Construction Work Packages

Construction work packages form the basis of the construction contracts with each contract consisting of either a single work package or a combined set of work packages. They are prepared to allow separate contracting of the work to specific specialty contractors or craft trades.

Construction work packages are developed from plans, specifications, and vendor assembly and operations manuals for construction and installation of Project structures, systems, and components. They are organized by following the work breakdown structure of the construction schedule and prepared to follow the designed engineering work packages.

Construction work packages describe responsibilities and requirements of what must be performed by the work activities to complete the work described, shown, and required by the plans, specifications, and vendor operations manuals, to the specified timing in the construction schedule.

The process for preparing and managing work packages is described in the construction management procedure *Construction Work Packages*.

### 3.4.2 Work Face Planning

Work face planning breaks down each of the construction work packages into its elements. Work face planning consists of small, well-defined tasks for each of the work face work groups.

Work face planning confirms necessary elements and resources are ready on-site and available for planned work. It includes pertinent information to support and instruct workers on how to complete the work described in the plan, including:

- drawings;
- specifications;
- resource requirements;
- inspection criteria; and
- safety critical information.

Contractors follow their established processes for work face planning.

## 3.5 Construction Work Execution

Construction work is divided into work packages for assignment to specific specialty suppliers, vendors, and trade craft contractors (e.g., labourers, carpenters, millwrights, pipefitters, electricians) specialized to perform the type of work contained within the work packages (e.g., site earthworks, concrete structural work, structural steel work, mechanical work, electrical work instrumentation, mining works).

Work face planning is used to organize and deliver the elements of work to install and construct the structures, systems, and components. Each contractor work group is required to use work face planning to perform the work. Work groups receive the work face plan, perform the work, perform the quality control, and report the completion of the work.

Work is completed based upon the activities described in the work face plan and their planned sequence of timing completion as guided by the planned schedule of the work. The work is directed by construction management and supervisors. The work is performed by the workers who possess the required skills and training and have access to the appropriate tools, equipment, and parts to prepare, construct, install, and connect all structures, systems, and components for the designed Project.

Work is verified by vendor representative observation and control, and the quality assurance and quality control workers who monitor, witness, and record the work progress to completion as described in section 4.2.1.

Waste handling and disposal are outlined in the *Rook I Waste Management Program*.

Materials and equipment ordering is outlined in the IMS Manual.

### 3.5.1 Surface Facilities Construction

Surface facilities construction is the construction and installation of structures, systems, and components on the surface of the site.

Contractors are managed to confirm work is performed safely to prescribed quality standards in accordance with drawings and specifications for:

- site preparation;
- required materials and equipment receipt;
- equipment components installation; and
- facilities construction in readiness for commissioning while maintaining the site surface area.

Control strategies used to protect workers and the environment include, but are not limited to:

- regulating entrance and egress to the site;
- establishing traffic flow patterns;
- separating and controlling pedestrian and powered mobile equipment interactions to protect workers;
- organizing and maintaining laydown areas for location of received goods; and
- cordoning-off and barricading work areas while work is performed.

### 3.5.2 Underground Facilities Construction

Underground facilities construction is the construction and installation of structures, systems, and components for underground mine shaft sinking and development, including ventilation fans, headframe, hoist house, and shaft collar.

Underground contractors are managed to confirm work is performed safely to prescribed quality standards in accordance with drawings and specifications for:

- mine shaft preparation and underground development;
- required materials and equipment receipt;
- structures, systems, and components installation in the mine shaft and underground workings; and
- structures, systems, and components construction underground in readiness for commissioning while maintaining the mine ventilation system, surface facilities, mine equipment, and underground structures.

Control strategies used to protect workers and the environment include, but are not limited to:

- controlling and regulating mine entrance and egress;
- establishing, controlling, maintaining, and monitoring mine ventilation;
- establishing traffic flow patterns to remove rock from the mine and move equipment and materials into the mine;
- separating pedestrian and powered mobile equipment interactions to protect workers;
- regulating work (e.g., blasting, blowing smoke, mucking material, cleaning the face, drilling, loading blast holes) by timing and testing to protect workers;
- organizing and maintaining laydown areas for receiving goods; and
- cordoning-off and barricading mine work areas while work is performed.

Facilities managed for underground activities include, but are not limited to:

- surface laydown areas where underground supply material and equipment are stored;
- explosives magazines;
- waste rock and ore storage locations;
- mine shaft, underground drifts, remucks, and stope areas;
- headframe structures;
- hoisting buildings and equipment;
- ventilation fans and air ducting;
- underground offices; and
- underground electrical rooms and power distribution, shops, and maintenance areas.

## 3.6 First Fills of Oils and Lubricants

The long-term health of systems and components requires initial lubricated and correct fill with required lubricant, working fluid, chemicals, and materials. The process for completing first fills is described in the construction management procedure *First Fills and Lubrications*.

## 3.7 Work Closeout

Work closed out means completion and verification of construction and installation of all structures, systems, and components. Work is complete when all planned and specified structures, systems, and components are prepared, installed, and constructed in place as per plans, specifications, and vendor operation manuals so that required operational structures, systems, and components are ready for commissioning. Construction workers and equipment are demobilized when no longer required as described in section 3.9.

The process for work closeout is outlined in the construction management procedure *Construction Quality Control*.

## 3.8 Construction Handover to Pre-Operational Testing

Construction handover verifies that construction work is complete, and the structure, system, or component is ready for transfer to pre-operational testing. Following turnover, accountability for constructed structures, systems, and components is transferred to the pre-operational testing team in a planned and controlled manner. This includes providing the pre-operational testing team with applicable information including, but not limited to:

- construction records and marked-up drawings;
- remaining construction punch list items;
- quality control and installation testing records;
- warranty certificates;
- operating manuals used for installation; and
- records and logbooks pertaining to the installed equipment used during construction (e.g., overhead cranes, mine hoists, mine winches).

Construction deficiencies identified during closeout and handover are managed in accordance with section 4.1.1 and the commissioning punch list process outlined in the *Rook I Commissioning Management Program.*

The construction turnover is described int the construction management procedure *Construction Handover to Pre-Operational Testing*.

## 3.9 Demobilization

Demobilization is the departure from site of construction workers, contractor tools, and equipment. Construction workers and equipment are demobilized when no longer required.

Construction work ends with construction team demobilization, including removal of worker personal tools and effects, contractor-owned tools, non-mobile and mobile equipment, storage containers, offices, lunchrooms, and vehicles from site.

Prior to demobilization and upon turnover of structures, systems, and components to commissioning, waste and excess construction materials must be properly managed (e.g., stored, disposed) and work areas left clean. Contractors demobilize from site as their work is completed (e.g., the concrete contractor will be demobilized upon the completion of concrete work, the mechanical work or electrical work may still be ongoing).

Contractor waste and excess materials are managed as outlined in the *Rook I Waste Management Program*.

The return of worker radiation monitoring devices and clearance of equipment and materials for off-site release are outlined in the *Rook I Radiation Protection Program.*

The demobilization process for contractors is outlined in the *Rook I Contractor Management Program.*

# 4.0 Check

The *Check* component of this Program consists of ongoing performance monitoring, periodic audits, inspections, reviews, and analysis of results to verify that the Program is operating effectively.

## 4.1 Incident and Deviation Reporting

Workers and visitors are required to report information regarding health, safety, and environmental incidents including near-misses and deviations. Near-misses are events or situations where an occupational or environmental exposure could have occurred but was avoided.

Reported information is documented and tracked as outlined in the IMS Manual. Incidents and deviations that meet or exceed applicable legislated reporting thresholds, including those that are reportable as outlined in the *General Nuclear Safety and Control Regulations*, are reported to applicable regulatory representatives within legislated timelines.

The process for providing information regarding reportable events or situations to internal and external parties is outlined in the IMS Manual.

### 4.1.1 Construction Deficiencies

Construction deficiencies are deficiencies in characteristics, documentation, or procedures that make the quality of material, service, product, or structure, system, or component unacceptable or indeterminate.

Construction deficiencies whose remedy is clear and for which repairs can be carried out to 100% of specifications in a timely fashion (e.g., a missing breaker cover) are managed using punch lists. Punch list items subsequently determined to be more complex and construction deficiencies that cannot be corrected to 100% of specifications in a few days because the remedy is not clear or the decision on how to resolve the issue requires assessment through a construction deficiency report as described in the construction management procedure *Construction Deficiencies.*

If a construction deficiency is fit for purpose as agreed by the engineering representative and the owner's representative (e.g., a similar but not identical paint colour, a higher quality component used) a concession record stating that the construction deficiency is fit for purpose and acceptable is generated and the change authorized and noted as part of the quality assurance documents. Concession records are further described in the construction management procedure *Construction Deficiencies.*

If a construction deficiency is not fit for purpose, the construction deficiency is subject to documentation and correction as described in the construction management procedure *Construction Deficiencies.* Frequent corrections of construction deficiencies may require corrective action in accordance with the corrective action process as described in section 5.1.

The process to check and monitor is outlined in the IMS Manual.

## 4.2 Monitoring and Measurement

Management system processes of the Program are continually monitored and measured to evaluate whether Project deliverables meet external and internal requirements.

Program performance and effectiveness are evaluated by observation and testing for quality control and to monitor for deviation from the planned design on a prescribed frequency by the Project management team using:

- established Program-specific KPIs;
- deviation reporting;

- internal audit reports as completed according to the internal audit schedule; and
- external compliance audit reports (as completed and available).

Regulatory reporting on work required to maintain compliance is performed on a frequency as outlined in relevant regulations. Work requiring regulatory reporting on completion or on routine intervals is identified within the maintenance strategy and schedule.

Performance monitoring results are used to inform Program improvement opportunities as required.

General monitoring and measurement processes and requirements are outlined in the IMS Manual.

### 4.2.1 Quality Assurance and Quality Control

Quality assurance and quality control is verification the construction and installation of structures, systems, and components is in accordance with prescribed design plans, specifications, vendor operations manuals, building codes, and licensing standards. Quality assurance and quality control are captured through inspection and reporting procedures. Inspection and test plans (ITPs) are used to define and document:

- inspection and testing requirements;
- acceptance criteria;
- contractor audit, hold points, inspection, testing, review, and surveillance points in time; and
- owner witness and verify points.

The process for developing ITPs is outlined in the construction management procedure *Inspection and Test Plan Management.*

Quality assurance and quality control of the work includes, but is not limited to:

- reviewing and checking the plans, specifications, and vendor operation manuals for requirements;
- observing and witnessing the installation of the work to verify requirements have been met;
- signing-off inspection hold points for observation and witnessing of assembly and testing; and
- preparing and collecting quality control documents during and at completion of the work.

The process for completing quality assurance and quality control activities is described in the construction management procedure *Construction Quality Control*.

The process for managing construction deficiencies is summarized in section 4.1.1.

## 4.3 Inspections and Audits

The performance and effectiveness of this Program and its associated procedures are monitored and verified with regular conformance audits. Qualified individuals independent of the work being assessed conduct audits as outlined in the IMS Manual.

Routine internal inspections, in addition to audits, are conducted by workers as part of monitoring the effective use of controls and managing risks. Workplace inspections are performed, documented, and communicated where applicable as outlined in the *Rook I Health and Safety Program*.

Routine physical asset inspections are scheduled and completed in accordance with the structures, systems, and components installation workflow and in accordance with requirements as outlined in the *Rook I Asset Management Program*.

Pre-use inspections of equipment (e.g., mobile equipment, cranes and lifting devices, personal protective equipment, portable tools) are completed as required by regulation.

Vendor audits are completed in accordance with regulatory requirements and as part of the evaluation and selection processes as outlined in the IMS Manual.

External compliance audits and inspections are conducted by regulators; conformance audits and inspections are conducted by third parties, as required.

Deviations, instances of regulatory noncompliance, and opportunities for improvement identified through audits or inspections are managed as outlined in the IMS Manual.

## 4.4 Management Review

This Program and supporting processes are subject to regular review and evaluation by Project and Rook I management. In addition to the general topics outlined in the IMS Manual, inputs specific to construction management include, but are not limited to:

- proposed Program-specific objectives and targets or current status;
- upcoming or new legislation or regulation related to the Program and plans to address these requirements;
- significant changes to the Program;
- workplace monitoring and dosimetry results;
- audit and inspection findings;
- status of quality assurance and quality control;
- compliance to construction structures, systems, and components work required by regulation; and
- proposed continual improvement actions or current status.

The management review process is outlined in the IMS Manual.

# 5.0 Act

The *Act* component of this Program consists of facilitating continual improvement and verifying that, when required, appropriate corrective actions are taken and managed. The results of these Program elements feed back into *Plan* to complete the Plan-Do-Check-Act cycle.

## 5.1 Corrective Action Process

Construction deficiencies are assessed through the construction management procedures *Construction Quality Control* and *Construction Deficiencies.*

Construction management incidents including near-misses and deviations to this Program are evaluated and investigated as required. Appropriate actions are developed and implemented to correct and prevent reoccurrence. Corrective actions are planned, implemented, verified, and reviewed for effectiveness corresponding with the risk level. The corrective action process is outlined in the IMS Manual.

## 5.2 Continual Improvement

Continual improvement is an ongoing process to improve the suitability, adequacy, and effectiveness of the IMS. Workers continually seek out improvement opportunities for the IMS and Project processes through Program monitoring, auditing, management review, and maintaining awareness of changes in the business environment. Improvement may also involve benchmarking Project performance against other similar projects and facilities.

The use of experience gained during Project construction and commissioning, including information collected from relevant external sources, informs improvement opportunities. Potential sources of information include:

- worker experience;
- incident investigations;

- quality assurance and quality control preventive action reports;
- quality assurance and quality control corrective action reports;
- non-conformance reports of disposition of variance to drawings or specifications;
- lessons learned;
- government and industry publications;
- industrial peer information exchange; and
- professional associations.

Continual improvement opportunities are identified, documented, evaluated, and implemented as outlined in the IMS Manual.

# 6.0 References

## 6.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-CHT-00001 | *Rook I Organizational Chart* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-AST-PGM-00001 | *Rook I Asset Management Program* |
| ROOK-COM-PGM-00001 | *Rook I Commissioning Management Program* |
| ROOK-CON-PGM-00001 | *Rook I Contractor Management Program* |
| ROOK-HSF-PGM-00001 | *Rook I Health and Safety Program* |
| ROOK-IPE-PGM-00001 | *Rook I Indigenous and Public Engagement Program* |
| ROOK-RAD-PGM-00001 | *Rook I Radiation Protection Program* |
| ROOK-TRN-PGM-00001 | *Rook I Training Program* |
| ROOK-WST-PGM-00001 | *Rook I Waste Management Program* |
| ROOK-CST-PRO-00001 | *Constructability Reviews* |
| ROOK-CST-PRO-00002 | *Construction Change* |
| ROOK-CST-PRO-00003 | *Construction Deficiencies* |
| ROOK-CST-PRO-00004 | *Construction Handover to Pre-Operational Testing* |
| ROOK-CST-PRO-00005 | *Construction Quality Control* |
| ROOK-CST-PRO-00006 | *Construction Work Packages* |
| ROOK-CST-GDE-00002 | *Construction Work Schedule Development and Management Guide* |
| ROOK-CST-PRO-00007 | *Field Mark-ups* |
| ROOK-CST-PRO-00008 | *First Fills and Lubrications* |
| ROOK-CST-PRO-00009 | *Inspection and Test Plan Management* |
| ROOK-CST-PRO-00010 | *Site Instructions* |
| ROOK-CST-PRO-00011 | *Site Request for Information* |
| ROOK-CST-GDE-00001 | *Temporary Works* |

## 6.2 External

- Federal
  - *Nuclear Safety and Control Act*
  - *General Nuclear Safety and Control Regulations*
- Provincial
  - *The Saskatchewan Employment Act*
- Other
  - *Canadian Standards Association. N286-12 Management system requirements for nuclear facilities*

**Commissioning Management Program**

**ROOK-COM-PGM-00001**

# Rook I Project

## Commissioning Management Program

ROOK-COM-PGM-00001

June 2023

# Record of Revisions

| Version No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| 0 | 21-Dec-2022 | Issued Final | J. Henderson | R. Paine | K. Small |
| 1 | 29-Jun-2023 | Issued Final | J. Henderson | P. Barnes<br>R. Paine | K. Small |

# Table of Contents

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# 1.0 Introduction

The *Rook I Commissioning Management Program* (Program) outlines the systematic and risk-based approach to verifying constructed structures, systems, and components are prepared for safe and reliable operation as part of the NexGen Energy Ltd. (NexGen) Rook I Project (Project). This verification includes activities to confirm that constructed structures, systems, and components operate in accordance with design plans, specifications, and vendor operations manuals, and meet all legal and other requirements. The Program describes processes for energizing and testing structures, systems, and components, verifying compliance, fostering a culture where protecting workers and the environment is a principal consideration guiding decisions and actions, and enabling continual improvement.

This Program is part of the *Rook I Integrated Management System* (IMS). All aspects of the IMS are subject to the *Rook I Integrated Management System Policy* which provides the foundation for NexGen's approach to commissioning management. The Program and its relationship to other IMS programs within the IMS hierarchy is shown in Figure 1. As a component of the IMS, this Program follows the Plan-Do-Check-Act cycle to identify, control, monitor, and continually improve commissioning management processes.

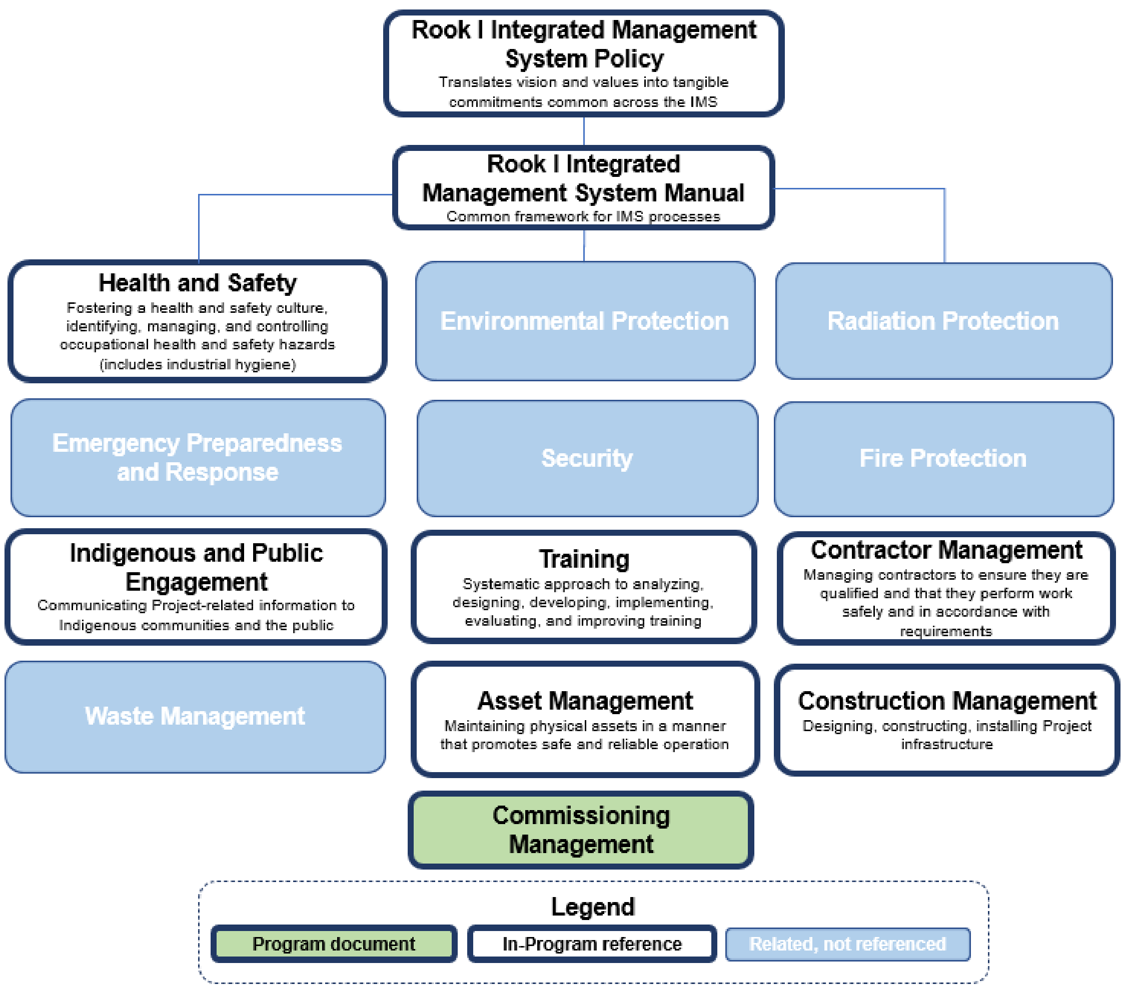


Figure 1 Program Context Within the IMS

## 1.1 Purpose

This Program describes the Project principles, processes, and framework for the safe, reliable, and controlled commissioning of structures, systems, and components with specified testing in preparation for operation according to the design basis. The Program provides a process that tests and verifies constructed structures, systems, and components. The Program provides a framework for planning, preparing, pre-testing, controlling the start-up, and performing tests of structures, systems, and components.

Commissioning controls the sequence and energization of structures, systems, and components following guidance from design plans, specifications, and vendor operations manuals. The commissioning process test observations are documented for reference. Structures, systems, and components are turned over for operation upon completion of commissioning. This Program aligns with and meets the requirements of the references outlined in section 6.0, including the *Nuclear Safety and Control Act* and associated regulations.

## 1.2 Scope

The scope of this Program includes planning, delivering, evaluating, and improving Project processes for effectively managing and continually improving commissioning processes for Project-related structures, systems, and components located on surface and underground. The processes outlined as part of this Program apply to all workers during the site preparation, construction, and commissioning phase of the Project.

This Program outlines the processes to verify and demonstrate that constructed structures, systems, and components can be safely and reliably operated within a planned schedule and in accordance with applicable legal and other requirements. The Program starts after the handover of constructed structures, systems, and components to commissioning and ends with the handover of structures, systems, and components for operation.

This Program includes pre-testing and performance testing without or with inert materials (i.e., pre-operational testing) and with process materials (i.e., process commissioning). This work proceeds during Project site preparation, construction, and installation of structures, systems, and components as these become ready for commissioning, both for surface and underground works. The Program introduces process materials and reagents into process systems for operation testing and ramp-up to design parameters.

This Program uses a graded, risk-based approach to implementing the commissioning processes that accounts for the level of risk, safety significance, and complexity of the activity.

This Program is implemented in an integrated manner with the other IMS programs as shown in Figure 1. Designing, constructing, and installing assets is within the scope of the *Rook I Construction Management Program*. Maintaining facilities and equipment during construction is within the scope of the *Rook I Asset Management Program*.

## 1.3 Program Principles

NexGen recognizes the importance of effective structures, systems, and components commissioning management to achieve Project outcomes of safety and reliability, while maintaining commissioning-specific considerations. The approach to commissioning is reflected in the following principles:

- protecting and promoting the health, safety, and well-being of people and the environment through all aspects and phases of the Project;
- establishing a strong health, safety, and environment culture which is periodically assessed and continually improved;
- prioritizing a commitment to quality to complement safety, support schedule success, and optimize overall costs;
- managing resources and work performance;

- verifying workers have the knowledge, skills, training, and tools to perform their duties safely and in a manner that protects the environment;
- communicating relevant information among workers and relevant stakeholders according to work relevance and importance;
- protecting and controlling structures, systems, and components until handover for operation;
- verifying safe and reliable energization and operation of structures, systems, and components with produced Project materials;
- facilitating safe and reliable handover of control of structures, systems, and components for operation;
- complying with applicable legal and other requirements; and
- continually improving Program performance.

## 1.4 Terminology

A comprehensive list of common terms applicable to this Program and the IMS are available in the Rook I Project Glossary

**commissioning tag** – An identification tag or sticker placed on components within the handover to signify handover to the process commissioning team. No work may be performed by any entity on equipment identified with a process commissioning tag without obtaining authorization from the commissioning manager.

**engineering change notice** – A documented, approval notification of changes required to engineering deliverables that have been issued for an already awarded package or contract.

**handover (also referred to as "turnover")** – Refers to the jurisdictional transfer of structures, systems, or components from one phase of the Project to the next (e.g., construction to pre-commissioning, pre-commissioning to process commissioning, process commissioning to operations).

**handover to operations** – The handover of structures, systems, and components from the process commissioning team to the operations team for continued operation and maintenance. The process commissioning team continues directing and coordinating the overall commissioning program until process commissioning testing is complete and the final handover acceptance certificate is issued. Final handover to the owner operations team occurs after successful completion of the plant performance tests.

**handover to process commissioning** – The handover of structures, systems, and components from pre-operational testing to commissioning for maintenance start-up and continued operation using process materials. Pre-operational testing continues directing and coordinating the overall pre-operational testing program until pre-operational testing acceptance is complete and the final handover to process commissioning certificate is issued.

**handover to process commissioning certificate** – The certificate identifying the structures, systems, and components being handed over from pre-operational testing to process commissioning with authorized and applicable signatures that verify the validity of the handover.

**inspect (checkout)** – In the context of commissioning management, to visually check the correct installation and arrangement against the design.

**integrated management system (IMS)** – A common framework of programs, plans, procedures, work instructions, and other supporting documentation describing management system processes for achieving Project objectives and completing work safety, reliably, and consistently while conforming to internal requirements and complying with legal requirements.

**job hazard analysis (JHA)** – A hazard identification and control process used to describe each task of a job, the associated hazards, and controls required to mitigate the risk of each hazard and keep workplace exposures to hazards as low as reasonably achievable (ALARA).

**licensed activities** – Project activities within the scope of Canadian Nuclear Safety Commission (CNSC) licensing. Project site-based activities that may be outside the scope of CNSC licensed conditions are subject to the integrated management system on a risk-informed basis (i.e., where the consequence of human error poses a risk to the environment, the health and safety of people, or to the security of Project facilities).

**operate** – In the context of commissioning management, to prove that the logic of control systems conforms to the design schematic or control diagram.

**piping and instrumentation diagram (P&ID)** – A visual representation of equipment, vessels, piping, and instruments in diagrammatic form indicating equipment items and number, process piping or transfer devices and numbers, line sizes and numbers, measurement and control points, control valves, instrumentation, and control loops.

**prime contractor** – Entity responsible for overseeing the safe execution of all work on site within the scope of a defined construction project, who is either the owner of the worksite or a contractor who has entered into a written agreement with the owner to perform the duties of prime contractor.

**Project site** – Term used to describe all property within the physical NexGen Rook I boundary.

**punch list** – A list of items of work or deliverables that require completion or correction to close out the scope of work. Items on a punch list typically include minor corrections, alterations, repairs, or items or conditions considered sub-standard, such as those mandated by either drawings or specifications or other contract documents.

**single line diagram (SLD)** – A representation of an electrical distribution system starting from the incoming electrical feed through to the individual electrical loads, where a single line is used to indicate the connections between the electrical equipment.

**test** – In the context of commissioning management, to apply a voltage, current, fluid, or mechanical pressure to establish the integrity of wiring, piping, or mechanical linkage to obtain the specified function, response, or operability of individual components.

**verify** – In the context of commissioning management, to confirm the intended function, response, or operability under simulated or actual conditions.

**worker** – Any person working for NexGen, including a contractor.

# 2.0 Plan

The *Plan* component of this Program includes processes that support a systematic, graded, risk-based approach to managing commissioning of Project structures, systems, and components, including:

- identifying and communicating commissioning hazards and assessing the associated risks;
- setting Program-specific objectives and targets to implement Program processes;
- scheduling commissioning activities;
- allocating the necessary commissioning resources;
- verifying workers are competent and adequately trained to perform work;
- providing the appropriate parties with the information and resources necessary;
- managing documents and records; and
- managing change to process, personnel, design, facilities, and equipment.

## 2.1 Risk Management

The risk management process identifies Project-related commissioning hazards to people, the environment, structures, systems, and components associated with a task or process. Risks are assessed for significance, managed to acceptable levels through the application of controls, and tracked in risk registries. The general risk management framework, process, and requirements are outlined in the *Rook I Integrated Management System* (IMS) *Manual*.

The type of risk assessment performed is appropriate for the task, apparent level of risk, safety significance, and complexity of work. Risk management requires, but is not limited to, hazard identification, risk assessment, risk registration, and Program-specific risk mitigation.

The multi-layered approach to routinely and effectively managing risks of commissioning for workers and the environment is outlined in the IMS Manual.

### 2.1.1 Hazard Identification

Hazards are identified, documented, and tracked in a manner that is appropriate for the type of risk assessment performed (e.g., hazard and operability studies).

Hazard listings are developed as applicable for actual and potential hazards related to health, safety, environment, security, radiation, operations (e.g., property damage), and compliance. Specific to commissioning, hazard identification considers and plans for these common hazards and risks within the context of the initial system or component energization, and the interaction of the system or component with other connected systems.

Examples of such failures during commissioning can include, but are not limited to:

- electrical switch failures arc flash;
- transformer failures arc flash;
- valves, pipes, or vessel failures or leakage;
- interactive equipment failure causing equipment damage; and
- mechanical imbalance causing vibration.

A range of techniques may be used for identifying potential hazards. These include, but are not limited to:

- using checklists based on historical information and knowledge accumulated from similar projects;
- sharing peer experience from similar industries or projects;
- using information from Project-specific nonconformities and audit findings;
- using hazard and operability studies;
- using job hazard analysis (JHAs); and
- using field level hazard assessments (FLHAs).

Hazard analyses are performed by qualified workers based on reviews of plans, specifications, and vendor operations manuals. Hazards are considered during commissioning execution planning and again during commissioning work implementation on a system-by-system basis as these apply to the energization of components within the system, loading of those components with energy, fluids, or materials, and interaction of the considered system with other connected systems.

Hazard listings are documented and tracked using risk registers and are periodically re-evaluated for accuracy and any changes in the hazard analysis.

### 2.1.2 Risk Assessment

Following the identification of commissioning hazards, risks to worker health, safety, and the environment are assessed with consideration for a range of factors, including:

- who or what is affected;
- the potential risk exposure;
- the severity of the risk exposure; and
- the likelihood and duration of exposure to the hazard.

Commissioning risk criteria that correlate to the severity, likelihood and duration of potential exposure, injury, environmental event, operational issues, and property damage, are defined in a risk matrix appropriate for the type of assessment being performed. Commissioning risk criteria are based on relevant health, safety, radiation, and environmental risks applicable to the hazard.

Information from the risk assessment process is used to identify appropriate controls that effectively mitigate risk to acceptable levels. Controls are discussed further in section 3.1.

### 2.1.3 Risk Register

Documented risk registers are maintained to record and track relevant information regarding commissioning risks and controls. Controls are implemented, monitored, and maintained to protect worker and environmental health and safety. Risk registers are reviewed and updated as necessary to assist with decision making, improvement opportunities, and changes to commissioning processes.

The requirements for developing and maintaining risk registers are outlined in the IMS Manual.

## 2.2 Objectives and Targets

Program objectives and targets are established at regular intervals, linked to clear accountabilities, and monitored for status to completion. Objectives and targets are tangible, documented actions that result in improvements to commissioning processes and Program outcomes.

Setting and managing objectives and targets, including establishing monitoring measures, is outlined in the IMS Manual.

### 2.2.1 Commissioning Design Basis

The commissioning design basis provides information required for a systematic and controlled method of safely and reliably energizing and loading each component and system. The commissioning design basis is a compilation of information required to plan the step-by-step process for commissioning all structures, systems, and components by individual system and component and is used to inform the development of the commissioning execution plan as described in section 3.3.

The *Rook I Construction Management Program* provides input to the commissioning design basis by confirming that structures, systems, and components are installed and ready for commissioning. This confirmation is provided from construction quality assurance and quality control documentation (e.g., deficiency lists, verification tests) which verifies structures, systems, and components are properly installed and ready for commissioning.

The commissioning design basis is based on, but not limited to:

- piping and instrumentation drawings (P&IDs);
- equipment lists;
- system descriptions;
- design plans and specifications;

- vendor operations manuals;
- system operations manuals;
- design output performance parameters; and
- commissioning schedules.

The process for developing and reviewing the commissioning design basis is described in the commissioning procedure *Commissioning Execution Plan Requirements.*

## 2.3 Commissioning Schedule

The commissioning schedule outlines the tasks, sequencing, and planned dates for preparing, verifying, and energizing structures, systems, and components, and turning them over for operation. The commissioning schedule documents the priorities and planned availability of required commissioning resources to facilitate energizing structures, systems, and components in an organized, efficient, and sequential manner.

The commissioning schedule accounts for testing durations, the safe and logical sequence of energizing structures, systems, and components, availability of resources (e.g., workers, vendor representatives, power, water, fuel, ore, slurry), and the desired energization dates. The commissioning schedule incorporates planned start dates, durations, and expected finish dates for commissioning and handover of verified systems.

The Project needs and requirements represented in the schedule drive the timing and sequence of structures, systems, and components handover from construction to commissioning, and the commissioning schedule indicates the handover of these Project assets for operation.

The schedule is periodically reviewed and revised (as required) to monitor and confirm the status of tasks and evaluate overall Program progress. Updated versions of the commissioning schedule are routinely communicated to Rook I management and key stakeholders.

The process for developing, reviewing, and managing the commissioning schedule is integrated into construction scheduling as outlined in *Rook I Construction Management Program* with additional details provided in the commissioning management procedure *Commissioning Execution Plan Requirements*.

## 2.4 Resources

Rook I management is committed to providing the necessary resources to establish, implement, maintain, and continually improve this Program and its associated processes. In addition to providing the required financial resources to achieve objectives and meet requirements, management provides the infrastructure, work environment, and the competent workers necessary to implement the Program and commissioning protection processes.

### 2.4.1 General Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Program. Workers are informed of their roles and responsibilities and are accountable for understanding and fulfilling them. The Project prime contractor performs their role in accordance with the scope and requirements of this Program and its supporting information and as required in accordance with *The Saskatchewan Employment Act*.

Although NexGen maintains overall accountability for Project activities, the term Rook I is used in the following role descriptions to reinforce that the role is applicable and may be assigned to NexGen employees and contractors performing work on behalf of the Project.

## NexGen Executive

NexGen executive is accountable for:

- establishing the direction, strategy, and policies of the organization;
- promoting behaviours that support a robust health and safety culture;
- promoting the understanding that safety, including safe and reliable commissioning of structures, systems, and components, is a principal consideration guiding decisions and actions; and
- providing adequate resources to deliver the requirements of this Program.

## Rook I Management

Rook I management is accountable for:

- demonstrating and promoting a culture where health and safety is a principal consideration at all levels of the Project;
- the effectiveness of this Program;
- approving Program objectives and targets;
- promoting the integration of the Program requirements into Project processes;
- communicating the importance of effective management and of conforming to Program requirements;
- allocating adequate and appropriate resources to fulfill Program implementation;
- developing appropriate documentation and tools to implement this Program effectively;
- monitoring and reporting on Program performance and effectiveness to the NexGen executive;
- providing independent oversight of processes through monitoring and auditing activities; and
- identifying and pursuing opportunities to achieve continual improvement.

## Program Management

Program management is responsible for:

- demonstrating and promoting a culture where health and safety is a principal consideration at all levels of the Project;
- overseeing the development, implementation, and adherence to this Program;
- communicating with the applicable regulatory agencies (e.g., Canadian Nuclear Safety Commission) on behalf of the Project;
- setting annual objectives and targets, monitoring performance, and preparing internal and external reports regarding Program activities and outcomes;
- developing relevant key performance indicators (KPIs) related to the health of the Program and implementing them at the Project;
- managing resources to confirm legal compliance with regulatory requirements and conformance with Program requirements;
- confirming workers have the necessary competence, training, and awareness of Program requirements;
- working with applicable departments to confirm that Program roles and responsibilities are identified and described and that those with specific responsibilities are qualified to fulfill their roles;
- providing independent oversight of processes through monitoring and auditing activities;
- reporting on Program performance and effectiveness to Rook I management;
- facilitating management review of this Program; and
- promoting, identifying, and supporting continual improvement through Program evaluation.

## Program Coordination

The Program coordinator is responsible for:

- demonstrating and promoting a culture where health and safety is a principal consideration at all levels of the Project;
- leading the development, implementation of, and adherence to Program procedures and work instructions;
- providing commissioning management subject matter expertise;
- conducting commissioning incident investigations, as required, and initiating applicable regulatory reporting when assigned;
- maintaining Program-specific data and records in a secure and controlled manner;
- verifying workers meet and maintain required Program-specific training qualifications;
- verifying that all monitoring processes are implemented in accordance with Program and regulatory requirements; and
- reporting on Program performance as part of the management review process.

## Rook I Supervision

Rook I supervisors are responsible for:

- demonstrating and promoting a culture where health and safety is a principal consideration at all levels of the Project;
- understanding, promoting, and following this Program and its requirements;
- overseeing department functions and supervising direct reports to verify conformance to Program requirements;
- providing workers with the appropriate tools, equipment, procedures, and knowledge for the tasks being performed;
- supporting the achievement of Program objectives and targets;
- conforming to Program procedures and training;
- supervising direct reports regarding conformance to Program requirements;
- supporting direct reports in planning work activities to mitigate commissioning risks;
- communicating and coordinating with other departments to facilitate effective implementation of this Program;
- participating in audits and inspections, as required;
- participating in management reviews, as needed; and
- identifying and supporting continual improvement.

## Rook I Workers

Rook I workers are responsible for:

- demonstrating and promoting a positive health and safety culture;
- working toward the achievement of objectives and targets in their area of assigned responsibility;
- meeting and maintaining required Program-specific training qualifications;
- using all facilities, equipment, and devices that are intended for commissioning in accordance with established procedures and applicable training;
- adhering to Project-specific processes established to maintain and promote commissioning;
- recognizing and promptly communicating hazards or deviations that present a risk to the safety and health of workers, the environment, or the public; if safe to do so, taking action to contain or control the hazard to mitigate the impact;

- attending and observing at assigned positions for the organization and operation of structures, systems, and components during commissioning;
- testing structures, systems, and components under the direction of the commissioning manager; and
- cooperating with auditors, regulators, and inspectors, as needed.

### 2.4.2 Commissioning Management Roles and Responsibilities

In addition to the relevant roles and responsibilities assigned to Rook I workers and similar functional level positions described in section 2.4.1, the following commissioning-specific roles and responsibilities described in this section also apply.

#### Construction Manager

The construction manager is responsible for:

- turning over structures, systems, and components in completed condition as per plans, specifications, and vendor operations manuals; and
- collaborating with the commissioning manager as required in the operation and monitoring of installed structures, systems, and components during commissioning.

#### Commissioning Manager

The commissioning manager is responsible for:

- receiving and taking care, custody, and control of structures, systems, and components turned over by the construction manager;
- leading commissioning activities; and
- turning over tested and commissioned structures, systems, and components for operation.

#### Commissioning Leads

The commissioning leads are responsible for:

- taking direction from the commissioning manager;
- representing the respective engineering disciplines (e.g., process, mechanical, electrical, instrumentation and control);
- arranging support workers;
- verifying the commissioning schedule is followed as sequenced;
- verifying checklists are completed and deficiencies cleared;
- coordinating the commissioning work; and
- verifying the acceptability of structures, systems, and components.

#### Commissioning Supervisors

Commissioning supervisors are responsible for:

- demonstrating and promoting a culture where safety, including commissioning safety, is a principal consideration at all levels of the Project;
- overseeing commissioning functions and supervising direct reports to verify conformance to commissioning requirements;
- providing workers with the appropriate tools, equipment, procedures, and knowledge for the tasks being performed;
- conforming to Program procedures and training;
- supervising direct reports regarding conformance to commissioning requirements;

- supporting direct reports in planning work activities to mitigate commissioning risks;
- communicating and coordinating with construction and maintenance and operations to facilitate effective implementation of commissioning activities;
- participating in audits and inspections, as required; and
- identifying and supporting continual improvement.

#### Operational Readiness Manager

The operational readiness manager is responsible for:

- collaborating with the commissioning manager in the operation and monitoring of the installed structures, systems, and components during commissioning;
- receiving structures, systems, and components turned over from the commissioning manager;
- receiving test results and operations manual documentation;
- signing-off certification of structures, systems, and components; and
- assuming care, custody, and control of assets.

#### Vendor Representatives

The vendor representatives are responsible for:

- attending at site;
- inspecting installation of supplied structures, systems, and components;
- identifying deficiencies;
- verifying remediation of critical deficiencies;
- assisting and supporting operation of supplied structures, systems, and components during commissioning;
- conducting manufacturer-required tests;
- observing installed structures, systems, and components operation; and
- preparing acceptance reports.

### 2.4.3 Facilities and Equipment

Facilities and equipment supporting the effective implementation of this Program and its associated processes are provided to workers to enable preparation, testing, energization, and operation of structures, systems, and components.

Facilities are designed, constructed, commissioned, operated, and maintained with consideration for keeping worker health, safety, and well-being in compliance with legal requirements.

Equipment required to facilitate commissioning is provided when required. This includes, but is not limited to:

- personal protective equipment (PPE);
- two-way radios;
- electric testing devices (e.g., multi-meter, power probes);
- specialized assessment and diagnostic testing equipment;
- pressure gauges and flowmeters;
- portable computers for programming components in the field;
- hand and power tools;
- pumps and hoses for filling and emptying vessels;
- mobile equipment;
- rigging and lifting hardware;

- skid steel loaders and haul trucks for cleaning spillage;
- barricades, warning tape, and signage;
- lock-out and tag out equipment; and
- equipment status tags indicating the component status in the commissioning process.

The process for procuring and receiving equipment required for commissioning is outlined in the IMS Manual.

Commissioning materials (e.g., commissioning spares, operational spares, strategic spare parts) receipt, storage, handling, and inventory management follow the process as outlined for construction materials as outlined in the *Rook I Construction Management Program*.

Temporary works (e.g., access scaffolds, props, shoring, excavation support, falsework and formwork, temporary lighting) required for commissioning are designed and managed in accordance with temporary works requirements outlined in the *Rook I Construction Management Program*.

The processes for maintaining facilities and equipment are outlined in the *Rook I Asset Management Program*.

### 2.4.4 Legal and Other Requirements

NexGen is committed to conforming to internal processes and to complying with applicable legal and other requirements. Commissioning management procedures and work instructions are developed with consideration for applicable legal requirements including the regulations referenced in section 6.0. Changes to relevant internal and external requirements are monitored and evaluated to identify whether updates to this Program or related commissioning management processes are required.

Structures, systems, and components are designed, tested, and operated with consideration for all applicable legal and other requirements which are documented in, but not limited to:

- design drawings;
- technical specifications;
- vendor operations manuals; and
- quality assurance and quality control records and tests.

Changes to relevant internal and external requirements are monitored and evaluated to identify whether updates to this Program or related commissioning processes are required.

The process for managing legal and other requirements is outlined in the IMS Manual.

## 2.5 Training and Competence

The Project follows a systematic approach to training (SAT) to educate, train, and qualify workers to carry out the work assigned to them. Training requirements are monitored as a means of providing workers with the training they require when they require it to maintain competency and work safely. Program-specific training requirements are defined and managed as part of the *Rook I Training Program*.

Project workers and visitors are required to participate in site orientation upon their arrival. Site orientation includes information on the general requirements for protecting workers and the environment, as well as camp rules and expectations of personal conduct while at site. Site orientation is developed using the SAT process to confirm all critical information for new workers is included.

## 2.6 Document and Record Management

Documents and records are controlled to verify the information is accurate, available when needed, and protected from uncontrolled alteration. Documents include Program-specific procedures and work instructions. In addition to the common management system records outlined in the IMS Manual, records specific to this Program include, but are not limited to:

- construction records, red-lined drawings, and specifications;
- piping and instrumentation diagram drawings;
- flow sheets and single line diagrams;
- commissioning schedule;
- commissioning execution plans;
- lock-out and tag-out plans;
- commissioning checklists from vendor operations manuals;
- test results and checklists;
- vendor verification sign-off sheets;
- commissioning status records and tags for mechanical, piping, electrical, instrumentation, and final completion;
- deficiencies status of completion lists; and
- ready for operations certificates.

Documents and records are readily accessible to those that require them.

The processes for managing documents and records are outlined within the IMS Manual.

## 2.7 Communication

Effectively communicating commissioning information from plans, specifications, and vendor operations manuals to workers is vital for maintaining a strong health and safety culture.

Commissioning relies on interfaces across multiple disciplines and work groups to verify structures, systems, and components operate in accordance with design plans, specifications, vendor operations manuals, and the commissioning schedule. Consistent, controlled communication is critical in providing workers involved with commissioning activities the correct information at the correct time. Commissioning work with energized operating systems requires accurate and timely communications to control risks not present in static systems.

Workers are informed of their duties and responsibilities, and changes to personnel, processes, facilities, or equipment are communicated to those affected.

Tools used to communicate commissioning information include, but are not limited to:

- routine safety moments to begin meetings or training courses;
- commissioning-focused toolbox meetings;
- workplace safety posters;
- posted information required by regulation;
- hard copy drawings, specifications, and vendor operations manuals;
- reference drawings (e.g., single line diagrams, P&ID drawings);
- commissioning execution plans;
- work group meetings;
- barricades, fences, and restrictive warning tape and signage;

- commissioning tags for energization in progress, mechanical, piping, electrical, instrumentation, and final completion mounted on equipment being commissioned;
- electronic billboard monitors;
- human-machine interface electronic monitor screen views; and
- electronic technology equipment (e.g., two-way radios, cellular telephones, telephone lines horns, lights, public address speakers).

Internal and external communication principles and processes are further outlined in the IMS Manual. Communication practices specific for Indigenous communities, local communities, and the public are outlined in the *Rook I Indigenous and Public Engagement Program*.

## 2.8 Change Management

Change is managed to protect worker health, safety, the environment, structures, systems, and components, and to promote consistent and effective execution of Project processes. This includes but is not limited to changes to Project:

- design;
- facilities;
- equipment;
- management system processes;
- organizational structure;
- key roles and responsibilities;
- documentation;
- legal and other requirements; and
- commissioning processes.

Changes are evaluated with consideration for the impact on this Program and the related commissioning processes. This confirms:

- change is clearly defined;
- risks associated with change are assessed and managed;
- change is communicated to those affected; and
- related documentation is updated.

Changes resulting from commissioning deficiencies are addressed through the commissioning deficiency process as described in section 3.5.1.

Engineer design changes are managed according to the design firm's quality management system and communicated through engineering change notices as outlined in the *Rook I Construction Management Program*.

The general change management process is outlined in the IMS Manual.

# 3.0 Do

The *Do* component of this Program includes implementing commissioning management elements described in section 2.0 to support safe and reliable commissioning work execution.

## 3.1 Risk Control

Commissioning is the first time structures, systems, and components are energized and operated in unison. Risk control is critical so that failure of new structures, systems, and components under energization and loading does not harm workers or the environment.

Controls are identified during risk assessment and used to eliminate, prevent, or reduce the risk of worker, equipment, and environmental impacts associated with commissioning activities. Controls appropriate for the hazard and corresponding level of risk are selected and implemented with consideration for the hierarchy of controls, as described in Figure 2.

Where possible, controls are used in combinations to effectively prevent or reduce the risk to the environment and keep releases as low as reasonably achievable (ALARA).

Controls are used, operated, and maintained according to their design, limitations, and applicable training. Adherence to procedures and training are critical in preserving the effectiveness of controls.

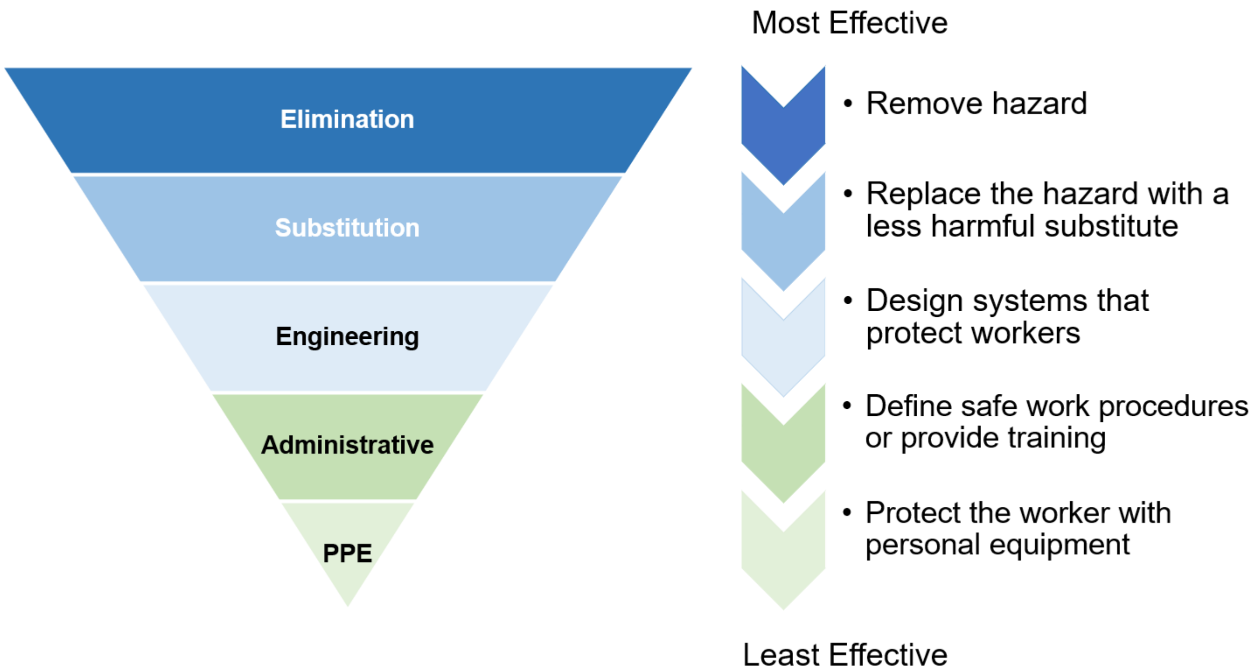


Figure 2: Hierarchy of Controls

### 3.1.1 Elimination and Substitution

The most effective measure to control commissioning risk is by eliminating or substituting the hazard. Examples of elimination or substitution controls used during commissioning include, but are not limited to:

- testing and filling a pipe or vessel with water instead of chemicals or process slurry as an alternative to pressure testing to avoid a chemical or slurry spill and the exposure of workers; and
- using automated valves instead of human-operated valves to remove workers from the risk location.

Whenever possible, eliminating or substituting hazards is conducted during design or modifications to structures, systems, and components that reduce or eliminate the interaction with the environment.

Changes made to eliminate or substitute an existing hazard control are subject to the change management process as outlined in the IMS Manual.

### 3.1.2 Engineering Controls

Engineering controls are used when completely removing or replacing a hazard is not practical or possible. Engineering controls involve designing structures, systems, and components in a manner that reduces hazard exposure. Engineering controls are developed with the goal of eliminating or substituting the exposure pathway where possible.

Examples of engineering controls used during commissioning include, but are not limited to:

- designing and installing caged ladders or handrails at high platforms;
- computer modeling of process loading and material flow in active systems, verified by instruments in the system being commissioned;
- using closed-circuit TV or video monitors instead of workers in hazardous areas; and
- providing secondary containment curbs around a pump, vessel, or tank to contain spillage from charging or draining during testing.

Design changes resulting in implementing new or modifying existing engineering controls are subject to the change management process as outlined in the IMS Manual.

### 3.1.3 Administrative Controls

Administrative controls are a component of risk mitigation typically used in combination with other types of controls. Administrative controls include training, supervision, written policies, procedures, rules, and processes.

Examples of administrative controls used during commissioning include, but are not limited to:

- training participants in the commissioning process;
- communicating the daily commissioning activities to participants and non-participants;
- erecting restrictive barricades and signage;
- attaching status tags on equipment (e.g., energized, do not operate); and
- providing lock-out and tag-out procedures.

#### Plans, Procedures, and Work Instructions

Instructions for completing commissioning tasks associated with licensed activities are documented in the form of plans, procedures, and work instructions if determined necessary through a risk assessment.

Commissioning execution planning documentation is subject to the document management process as outlined in the IMS Manual.

#### Job Hazard Analysis

A JHA is performed to evaluate work when an activity or process has the potential to present a significant risk and an established plan, procedure, or work instruction does not exist.

A JHA is valid only for the task for which it is prepared and issued and is subject to review and revision if a change to scope or nature of work is encountered.

The requirements for completing a JHA are outlined in the *Rook I Health and Safety Program*.

### Signage and Status Tags

Signage and status tags may be used to identify hazardous substances, conditions, areas, hazardous work conditions (e.g., confined spaces, overhead work, energized equipment), or activities where deviations could result in a health, safety, radiation, or environmental risk.

### Warning Systems

Real-time monitors and alarms (e.g., start-up alarms) are installed to inform workers of planned energization and operation of structures, systems, and components and unplanned environmental interactions. These monitors and alarms, which are audible or visual, identify potential upset or abnormal conditions and allow for prompt response and mitigation.

### 3.1.4 Personal Protective Equipment

PPE includes protective clothing and devices designed to protect workers from exposure to contaminants. PPE is considered the last line of defence and is typically used in combination with other types of controls. PPE required to complete work safely is provided and periodically inspected to verify it has not passed its expiry date or become damaged during use.

PPE used during commissioning includes protective clothing such as:

- safety work boots and shoes;
- arc flash, fire resistant, and reflective coveralls;
- gloves;
- safety glasses; and
- hardhats.

The selection, use, and maintenance of PPE are outlined in the *Rook I Health and Safety Program.*

## 3.2 Contractor Management

Contractors performing work at the Project are subject to the requirements of this Program. Contractor support may be used to assist in attending and observing the structures, systems, and components during energization and testing operations of the commissioning work.

Contractors are provided direction and support for the performance of commissioning work. The process for verifying contractors adhere to requirements of this Program is outlined in the *Rook I Contractor Management Program*.

## 3.3 Commissioning Execution Planning

Commissioning execution planning is the review of plans, specifications, and vendor operations manuals for all operable structures, systems, and components to determine commissioning requirements necessary to verify conformance of structures, systems, and components to the commissioning design basis. Commissioning execution planning includes documented instructions and guidance material for commissioning. Plans, specifications, and vendor operations manuals are reviewed and verified before energizing any structure, system, or component.

Commissioning execution planning formulates safe and reliable methods to control, test, energize, and operate structures, systems, and components without material or with inert materials (i.e., pre-operational testing) and with process materials (i.e., process commissioning). Commissioning timing and sequencing is based upon the commissioning schedule and vendor operations manual information as described in section 2.3.

Commissioning execution planning also requires preparing, organizing, and receiving the necessary materials (e.g., ore, slurry) for introduction into and movement through process systems, and disposing of used materials and fluids after testing if not of value to the output. The commissioning execution plans also specify the inspection, tests, and records required for commissioning activities. Commissioning execution plans are developed by the commissioning manager in collaboration with discipline (e.g., mechanical, electrical, instrumentation) planners specific to the component and the system being commissioned.

The process for preparing and reviewing commissioning execution plans is described in the commissioning management procedure *Commissioning Execution Plan Requirements*.

## 3.4 Commissioning

Commissioning uses tools and equipment to:

- inspect systems;
- assign workers to attend equipment and systems as observers and operators;
- energize the component equipment in sequence;
- test equipment and systems; and
- observe and record results.

Workers with the necessary knowledge and skills (e.g., millwrights, pipefitters, electricians, instrumentation technicians) assist in operating and monitoring structures, systems, and components during commissioning.

Structures, systems, and components are tested, adjusted, repaired, and verified mechanically, electrically, and with instrumentation by component during operation by commissioning. Upon verification of operability, systems are energized progressing from discharge point to source. Structures, systems, and components are tested, adjusted, and operated to the design parameters specified.

Commissioning test results are documented, independently verified, and preserved for reference.

Commissioning is complete when systems have been demonstrated to operate safely in accordance with their design parameters and the achievement has been formally acknowledged and documented. Commissioned structures, systems, and components verified as tested are documented as being ready for handover in a state of operable readiness.

### 3.4.1 Staged Commissioning

Staged commissioning is completed in accordance with the commissioning execution plan. Staged commissioning consists of the planned and controlled sequential testing, energization, and operation of structures, systems, and components in stages to verify safe and reliable operation. The results of each commissioning stage are documented, reviewed by a designated commissioning lead, evaluated against established commissioning criteria, and either accepted for advancement to the subsequent stage (with or without conditions) or rejected. Deficiencies are documented on a punch list as described in section 3.5.1. Records of testing and energization of structures, systems, and components are generated.

Installed structures, systems, components, and their interconnection are reviewed by commissioning workers to understand system controls, testing required, input material handled, and output product. Resources are assigned to pre-test structures, systems, and components before energization, systematically control energization, and operate and test the systems to design parameters.

Individual components are energized in a planned and controlled sequence until the entire system is energized and operable. Each system is operated with components energized and the system is tested for compliance with design parameters.

The commissioning strategy and the process of equipment testing and handover from construction through pre-operational testing, commissioning, and equipment and process start-up are provided in commissioning execution plans.

### 3.4.2 Commissioning Handover

Handover, also referred to as turnover, refers to the jurisdictional transfer of structures, systems, and components from one phase of the project to the next (i.e., construction to pre-operational testing, pre-operational testing to commissioning and commissioning to operations). Commissioning handover to operations represents the end of commissioning and transfers the commissioned system including documentation of test results, operations manuals, and system controls as requested in the Project specifications.

Each handover confirms that work is complete, and structures, systems, and components are ready for the next phase.

The process for turning over constructed structures, systems, and components from construction to pre-commissioning is outlined in *Rook I Construction Management Program*. Handover processes during the commissioning phase are described in the commissioning management procedures *Handover from Pre-Operational Testing to Process Commissioning* and *Handover from Process Commissioning to Operations.*

Assets placed in service following commissioning testing have inspection and maintenance programs in place as outlined in the *Rook I Asset Management Program*. Spare parts and remaining consumables required for operations are transferred to NexGen for management as outlined in the *Rook I Asset Management Program.*

## 3.5 Incident and Deviation Reporting

Workers and visitors are required to report information regarding health, safety, and environmental incidents including near-misses and deviations. Near-misses are events or situations where an occupational or environmental exposure could have occurred but was avoided.

Reported information is documented and tracked as outlined in the IMS Manual. Incidents and deviations that meet or exceed applicable legislated reporting thresholds, including those that are reportable in accordance with the *General Nuclear Safety and Control Regulations*, are reported to applicable regulatory representatives within legislated timelines.

The process for providing information regarding reportable events or situations to internal and external parties is outlined in the IMS Manual.

### 3.5.1 Commissioning Deficiencies

Commissioning deficiencies are structure, system, and component operability or performance concerns identified during staged commissioning and performance testing.

All commissioning deficiencies are documented on a commissioning punch list and assigned a completion priority which determines which deficiencies must be addressed before advancing to the next stage. Minor commissioning deficiencies (e.g., changes to valve orientation) are subject to correction (i.e., a one-time modification or repair) as directed by the commissioning manager. Major commissioning deficiencies (e.g., change in control logic, equipment upgrades) are managed through the construction deficiency report process as outlined in the *Rook I Construction Management Program*.

The process and criteria for determining when a commissioning deficiency requires resolution is described in the commissioning management procedure *Commissioning Punch List*.

# 4.0 Check

The *Check* component of this Program consists of ongoing performance monitoring, daily logbook record entries, periodic audits and inspections, reviews, and analysis of results to verify that the Program is operating effectively.

## 4.1 Monitoring and Measurement

Management system processes are continually monitored and measured to evaluate whether Project deliverables meet external and internal requirements.

Program performance and effectiveness are evaluated on a prescribed frequency by the Project management team using the following information:

- established Program-specific KPIs;
- deviation reporting;
- internal audit reports as completed according to the internal audit schedule; and
- external compliance audit reports as completed and available.

Performance monitoring results are used to inform Program improvement opportunities as required.

General monitoring and measurement processes and requirements are outlined in the IMS Manual.

## 4.2 Inspections and Audits

Inspections and audits are tools for verifying compliance with legal and other requirements for the effective implementation of the Program. The performance and effectiveness of this Program and its associated procedures are monitored and verified with regular conformance audits. Qualified individuals independent of the work being assessed conduct audits as outlined in the IMS Manual.

Routine internal inspections, in addition to audits, are conducted by workers as part of monitoring effective use of controls and managing risks. Workplace inspections are performed, documented, and communicated where applicable as outlined in the *Rook I Health and Safety Program*.

Inspections of structures, systems, and components are completed before energization and start-up.

External compliance inspections and audits are conducted by regulators; conformance audits and inspections are conducted by third parties as required.

Deviations, instances of regulatory noncompliance, and opportunities for improvement identified through audits or inspections are managed as outlined in the IMS Manual.

## 4.3 Management Review

This Program and supporting processes are subject to review and evaluation by Rook I management. Management review information includes:

- proposed Program-specific objectives and targets or current status;
- upcoming or new legislation or regulation related to the Program and plans to address these requirements;
- significant changes to the Program;
- compliance to commissioning work required by regulation;
- inspection and audit status of commissioning objectives, targets, and KPIs;

- status of corrective actions; and
- proposed continual improvement actions or current status.

The management review process is outlined in the IMS Manual.

# 5.0 Act

The *Act* component of this Program consists of facilitating continual improvement and verifying that, when required, appropriate corrective actions are taken and managed. The results of these Program elements feed back into *Plan* to complete the Plan-Do-Check-Act cycle.

## 5.1 Corrective Action Process

Commissioning deficiencies (e.g., equipment failure) are managed as outlined in the *Rook I Construction Management Program*.

Commissioning incidents including near-misses and deviations to this Program are evaluated and investigated as required. Appropriate actions are developed and implemented to correct and prevent reoccurrence. Corrective actions are planned, implemented, verified, and reviewed for effectiveness commensurate with the risk level. The corrective action process is outlined in IMS Manual.

## 5.2 Continual Improvement

Continual improvement is an ongoing process to improve the suitability, adequacy, and effectiveness of the IMS. Workers continually seek out improvement opportunities for the IMS and Project processes through Program monitoring, auditing, and management review as well as maintaining awareness of changes in the business environment. Improvement may also involve benchmarking Project performance against other projects and facilities.

The use of experience gained during commissioning, including information collected from relevant external sources, informs improvement opportunities. Potential sources of information include:

- worker experience;
- incident investigations
- quality assurance and quality control reports;
- commissioning issue reports documenting disposition of variances to drawings or specifications;
- lessons learned;
- government and industry publications;
- industrial peer information exchange; and
- professional associations.

Continual improvement opportunities are identified, documented, evaluated, and implemented as outlined in the IMS Manual.

# 6.0 References

## 6.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-CHT-00001 | *Rook I Organizational Chart* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-AST-PGM-00001 | *Rook I Asset Management Program* |
| ROOK-CON-PGM-00001 | *Rook I Contractor Management Program* |
| ROOK-CST-PGM-00001 | *Rook I Construction Management Program* |
| ROOK-HSF-PGM-00001 | *Rook I Health and Safety Program* |
| ROOK-IPE-PGM-00001 | *Rook I Indigenous and Public Engagement Program* |
| ROOK-TRN-PGM-00001 | *Rook I Training Program* |
| ROOK-COM-PRO-00001 | *Commissioning Execution Plan Requirements* |
| ROOK-COM-PRO-00002 | *Handover from Pre-operational Testing to Process Commissioning* |
| ROOK-COM-PRO-00003 | *Handover from Process Commissioning to Operations* |
| ROOK-COM-PRO-00004 | *Commissioning Punch List* |

## 6.2 External

- Federal
  - *General Nuclear Safety and Control Regulations*
  - *Nuclear Safety and Control Act*
- Provincial
  - *The Saskatchewan Employment Act*
- Other
  - *Canadian Standards Association. N286-12 Management system requirements for nuclear facilities*

# Asset Management Program
# ROOK-AST-PGM-00001

NexGen Energy Ltd.

# Rook I Project

## Asset Management Program

ROOK-AST-PGM-00001

December 2022

# Record of Revisions

| Version No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| 0 | 21-Dec-2022 | Issued Final | Jon Henderson | Rob Paine | Kevin Small |

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## 1.0 Introduction

The *Rook I Asset Management Program* (Program) outlines the systematic and risk-based approach to managing physical assets as part of the NexGen Energy Ltd. (NexGen) Rook I Project (Project). It describes asset management processes for maintaining compliance, enabling continual improvement, and fostering a culture where protecting workers and the environment is a principal consideration guiding decisions and actions. The Program provides the framework for selecting, acquiring, maintaining, and dispositioning physical assets in a manner that promotes safe and reliable performance.

This Program is part of the *Rook I Integrated Management System* (IMS). All aspects of the IMS are subject to the *Rook I Integrated Management System Policy* which provides the foundation for NexGen's approach to asset management. The Program and its relationship to other IMS programs within the IMS hierarchy is shown in Figure 1. As a component of the IMS, this Program follows the Plan-Do-Check-Act cycle to identify, control, monitor, and continually improve asset management processes for workers, the public, and the environment.

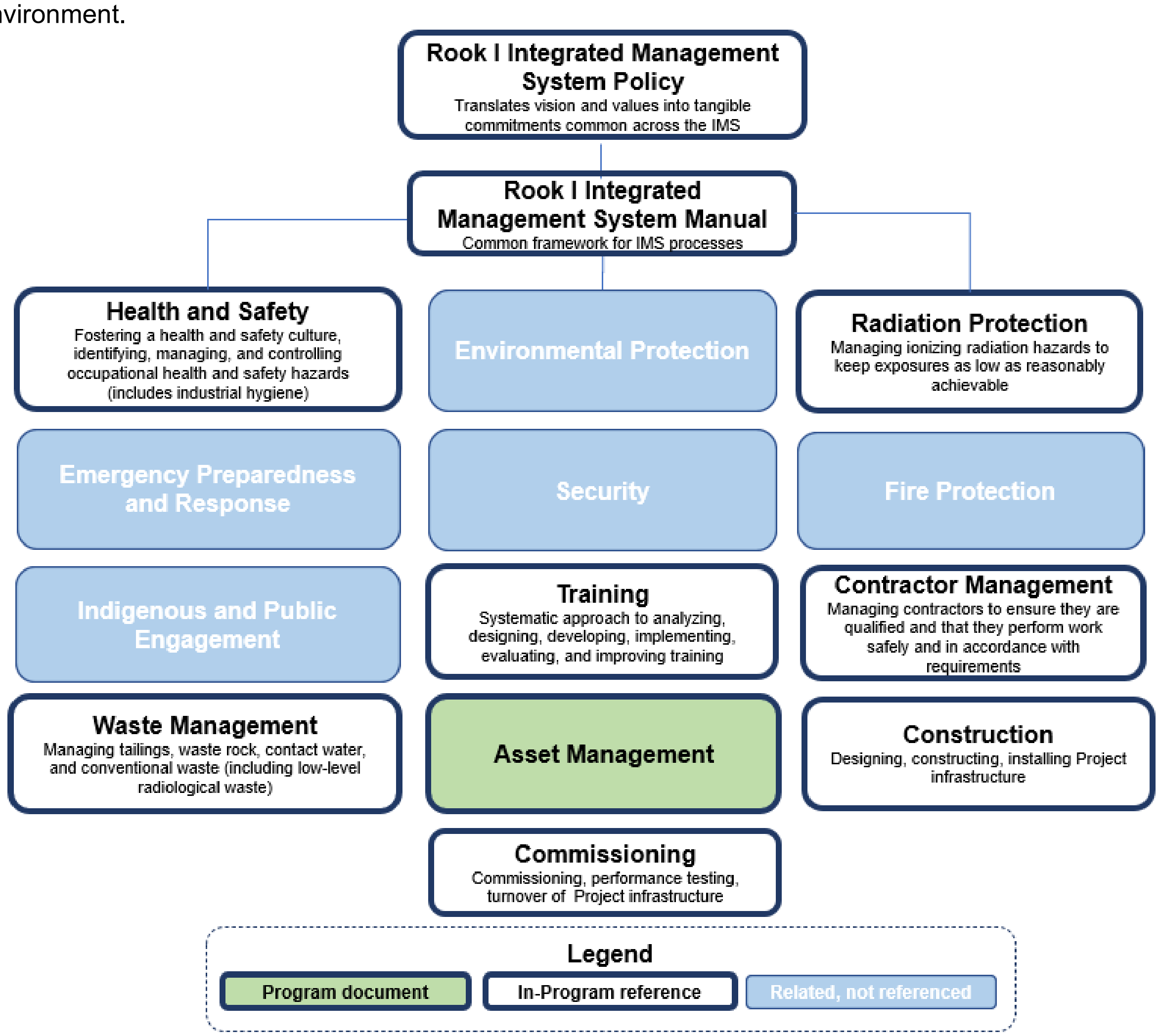


Figure 1: Program Context Within the IMS

## 1.1 Purpose

This Program describes the Project principles, framework, and processes for selecting, acquiring, maintaining, and dispositioning physical assets. This Program aligns with and meets all requirements of the references described in section 6.2, including the *Nuclear Safety and Control Act* and associated regulations.

## 1.2 Scope

The scope of this Program includes planning, delivering, evaluating, and improving Project processes for effective physical asset management for Project-related licensed activities. It includes processes for effectively managing assets throughout their life cycle including selection, acquisition, maintenance, and disposition. The processes outlined as part of this Program apply to all workers during the site preparation, construction, and commissioning phase of the Project.

This Program applies to all physical assets owned, leased, constructed, commissioned, or operated by the Project using a systematic, risk-based approach. Physical assets may include inventory (e.g., reagents, consumables, maintenance and critical spare parts), purchased goods, buildings, structures, mobile and fixed equipment, tools, monitoring equipment, and other physical infrastructure on surface, underground, and in transit to site.

Leased land, non-physical assets (e.g., knowledge, data, software, databases, goodwill, intellectual property), and financial assets are excluded from the scope of this Program.

Assets under construction or undergoing commissioning or performance testing prior to operation are excluded from the scope of this Program.

Contractor equipment is not subject to the requirements of this Program but may be assessed periodically for conformance to applicable requirements using a risk-based approach.

The Program is implemented in an integrated manner with other Programs as shown in Figure 1. Designing, constructing, and installing assets is within the scope of the *Rook I Construction Management Program.* Commissioning, performance testing, and turnover of structures, systems, components, and documents are within the scope of the *Rook I Commissioning Management Program*.

## 1.3 Program Principles

NexGen recognizes the importance of maintaining asset integrity, reliability, and design basis functionality to protect people and the environment, and to achieve Project outcomes. Asset reliability is achieved when an asset is available as required and functions as detailed in design specifications for a defined period, in accordance with applicable requirements.

This approach to asset management is reflected in the following Program principles:

- protecting and promoting the health, safety, and well-being of people and the environment through all aspects and phases of the Project;
- establishing a strong safety culture which is periodically assessed and continually improved;
- adopting a systematic, risk-based approach to asset management accounting for risk level, safety significance, and complexity;
- taking a proactive approach to preventing incidents by identifying, assessing, managing, and eliminating (where possible) hazards and risks and establishing appropriate asset controls;
- delivering controlled work conducted by workers possessing the knowledge, skills, and tools to perform their duties safely;
- maintaining assets in a condition that supports safe and reliable asset performance throughout their life cycle;

- effectively managing resources, information, communication, work, and change;
- complying with applicable legal and other requirements; and
- continually improving Program performance.

## 1.4 Program Framework

Life cycle asset management is founded on the understanding that considerations for safe and reliable asset operation begin once an asset is identified as required and ends when an asset is permanently removed from service. Life cycle asset management is an effective control to limit risks, control costs, maintain asset integrity, and continually improve asset reliability. The asset management life cycle consists of the following four stages:

- selection: identifying and specifying assets that comply with defined requirements;
- acquisition: procuring and onboarding assets from qualified vendors;
- maintenance: systematically managing asset integrity and reliability; and
- disposition: permanently removing assets from service or use in a controlled manner.

The asset management life cycle framework is illustrated in Figure 2.

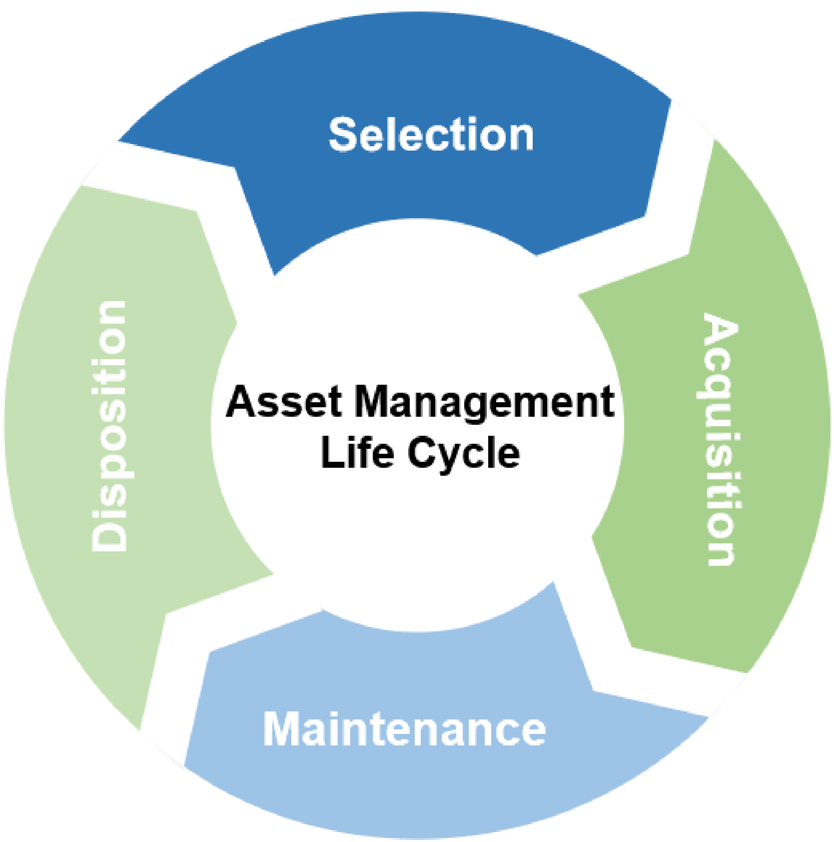


Figure 2: Asset Management Program Framework

## 1.5 Terminology

A comprehensive list of common terms applicable to this Program and the IMS are available in the *Rook I Project Glossary*.

**asset** – An item, thing, or entity that has potential or actual value to an organization.

**asset disposition** – Removal of an asset from site or active service.

**asset management** – The coordinated activity of an organization to realize value from assets.

**breakdown work** – Work resulting from a condition impacting the immediate productivity of the plant or circuit.

**corrective maintenance** – Work to restore equipment to proper operating condition before breakdown occurs.

**critical spare** – A spare asset or asset component that has been deemed necessary to keep on-hand and in operable condition in order to mitigate the effect of an unplanned failure.

**emergency work** – Work resulting from a condition that can pose immediate and serious threat to the safety, health, welfare of plant workers or people in the nearby communities, or the environment, or exposes site assets to expensive damage or appreciable loss of capacity.

**integrated management system (IMS)** – A common framework of programs, plans, procedures, work instructions, and other supporting documentation describing management system processes for achieving Project objectives and completing work safety, reliably, and consistently while conforming to internal requirements and complying with legal requirements.

**licensed activities** – Project activities within the scope of Canadian Nuclear Safety Commission (CNSC) licensing. Project site-based activities that may be outside the scope of CNSC licensed conditions are subject to the integrated management system on a risk-informed basis (i.e., where the consequence of human error poses a risk to the environment, the health and safety of people, or to the security of Project facilities).

**non-routine work** – Work performed by the maintenance department that does not fall into the categories of standard maintenance activities (e.g., equipment modifications).

**predictive maintenance** – The use of technologically sophisticated devices such as vibration trend analysis to predict future impending equipment problems.

**preventive maintenance** – Time or interval-based maintenance designed to avert or detect equipment problems.

**prime contractor** – Entity responsible for overseeing the safe execution of all work on-site within the scope of a defined construction project, who is either the worksite owner or a contractor who has entered into a written agreement with the owner to perform the duties of prime contractor.

**Project site** – Term used to describe all property within the physical NexGen Rook I boundary.

**worker** – Any person working for NexGen, including a contractor.

# 2.0 Plan

The *Plan* component of this Program includes processes that support a systematic, risk-based approach to asset management planning. Planning processes include:

- identifying and communicating asset management hazards and assessing the associated risks;
- ranking assets according to their importance to support the development of appropriate maintenance activities;
- setting Program-specific objectives and targets to implement asset management processes;
- selecting assets that meet defined requirements;
- striving to acquire assets to minimize life cycle costs;
- verifying workers are competent and adequately trained to perform work;
- providing the appropriate parties with information and resources necessary to manage assets;
- managing change to process, personnel, design, facilities, and equipment; and
- maintaining compliance to legal and other requirements.

## 2.1 Risk Management

The risk management process for asset management begins with identifying asset-related hazards that could affect the health and safety of workers or the environment, or impact reliable Project delivery.

The general risk management methodology is outlined in the *Rook I Integrated Management System Manual* (IMS Manual). Program-specific risk assessment methodologies (i.e., asset importance ranking) are described in section 2.1.1.

### 2.1.1 Asset Importance Ranking

Asset importance ranking is a systematic, risk-based evaluation of potential asset failures to identify risks to worker health and safety, the environment, site security, and Project infrastructure. Assets are assigned rankings based on a likelihood and consequence of failure and grouped into similar categories. Methods to prevent premature failure are identified with consideration of industry standard practices and manufacturers' recommendations to inform asset maintenance and storage strategies and to control risks.

The likelihood of failure considers the factors influencing the potential that an asset will cease to perform as intended under both routine and non-routine Project conditions.

The consequence of failure considers both impacts arising from the failure (e.g., risk to workers or the environment in direct proximity to the failure while occurring) as well as impacts arising from unexpected unavailable equipment (e.g., environmental risk due to the failure of a pump system, health, and safety risk due to failure of fire suppression system). The likelihood and consequence of failure is assessed, and a ranking assigned as outlined in Table 1. Assets assigned a high importance ranking are further evaluated by workers with relevant qualifications and expertise as describe in section 2.6, and a formal process hazard analysis method (e.g., failure modes and effects analysis) is used to identify appropriate controls.

Table 1: Asset Ranking Detail

| Ranking | Description | Examples of Control Strategies |
|---|---|---|
| Low | Maintained in consideration of manufacturers' recommendations. | Preventive maintenance<br>Run to failure and replaced |
| Moderate | Maintained in consideration of manufacturers' recommendations. Additional controls implemented as required. | Preventive maintenance<br>Predictive maintenance (asset specific) |
| High | Maintained in consideration of manufacturers' recommendations. Further detailed assessment recommended to establish appropriate controls. | Predictive maintenance<br>Engineered controls<br>Continuous monitoring |

The process for completing asset importance ranking is described in the asset management procedure *Asset Importance Ranking.* Maintenance strategies are further described in sections 3.1 and 3.2.

## 2.2 Objectives and Targets

Program objectives and targets are established at regular intervals, linked to clear accountabilities, and monitored for status to completion. Program objectives and targets are tangible, documented actions that result in improvements to asset management processes and Program outcomes. Objectives and targets are set on an ongoing basis to reflect the maintenance maturity and are monitored through key performance indicators (KPIs) which may include, but are not limited to:

- plant and system availability;
- schedule compliance;
- work type ratios; and
- unplanned outage intervals.

Setting objectives and targets, including establishing monitoring measures, is outlined in the IMS Manual.

## 2.3 Asset Selection

Asset selection is the process of finalizing asset specifications (e.g., make, model), performance criteria (e.g., operating capacities, safety features), and procurement requirements (e.g., certifications) to maintain safety of workers and the environment, comply with regulatory requirements, and support life cycle reliability.

Asset selection is informed by the design process and may include (as applicable) an objective and comparative evaluation of potentially suitable assets with consideration for worker health, safety, environmental protection, life cycle costs, social considerations, and expert input. Asset selection is managed as outlined in the *Rook I Construction Management Program*.

## 2.4 Asset Acquisition

Asset acquisition is the process of obtaining assets that satisfy requirements in a controlled manner. Asset acquisition includes:

- assessing vendor qualifications;
- procuring assets from qualified vendors;
- onboarding assets in a controlled manner; and
- evaluating vendor performance throughout all procurement stages.

Asset acquisition is managed as outlined in the IMS Manual.

### 2.4.1 Vendor Qualification

Vendor qualification is a systematic and risk-based approach to identify and select vendors that meet established requirements. Vendors are assessed to determine their ability to provide goods or services to identified requirements. Physical assets procured by the Project must be supplied by a qualified vendor. Vendor qualification criteria includes, but is not limited to:

- ability to provide a technically adequate and economical product;
- ability to achieve delivery dates;
- use of a suitable management system;
- possession of a satisfactory supply history;
- supplier ethics policy or code of business conduct; and
- oversight of supplier's supply chain.

Additional evaluation criteria may be applied to vendors supplying assets ranked as high importance as described in section 2.1.1. This includes, but is not limited to, a vendor's ability to supply assets requiring a code certification (e.g., electrical equipment, personal protective equipment, lifting devices) or critical spares, spare parts, and assemblies.

The vendor evaluation process, including requirements for selecting local vendors and requalifying vendors, is outlined in the IMS Manual.

Vendors that meet established requirements are documented and tracked in an approved supplier list outlined in the IMS Manual.

### 2.4.2 Asset Procurement

Asset procurement is the process of purchasing assets that meet specified requirements. Asset procurement requirements finalized during asset selection are documented and provided to approved vendors along with a request for proposal to satisfy the request. Procurement requirements include, but are not limited to:

- scope of supply;
- technical performance requirements, including required inspection, testing, and acceptance;
- applicable codes, standards, and specifications, including jurisdictional requirements;
- packaging and delivery requirements;
- documentation requirements and timing;
- reporting and corrective action requirements;
- management system standard and applicable requirements;
- sub-supplier requirements; and
- provisions for control of records.

Vendor proposals are evaluated according to the procurement requirements, the preferred vendor is selected, and the asset is ordered.

Physical assets provided to the Project are verified on or off site and are either accepted to be supplied according to requirements outlined during asset procurement or are quarantined for return as nonconforming items. Additional inspections on-site may be required for equipment and spares received based on importance rankings and to assess for damage in shipment. Items that do not conform to the procurement requirements are identified and segregated to prevent inadvertent installation or use. Nonconforming and damaged items are managed in accordance with the deviation management process outlined in the IMS Manual. The process for procuring equipment, materials, and contracted services is outlined in the IMS Manual.

### 2.4.3 Asset Onboarding

Asset onboarding is a systematic approach to identifying, storing, and managing asset data important to maintaining asset integrity and enabling safe and reliable asset performance. Asset onboarding also includes the setup of maintenance and operations requirements within relevant systems. Relevant asset data may include, but is not limited to:

- drawings;
- performance criteria;
- procurement specifications;
- storage requirements;
- bills of materials;
- operations and maintenance manuals;
- equipment set points;
- installation tolerances;
- baseline non-destructive examination measurements;
- preventive maintenance schedules; and
- predictive maintenance and monitoring requirements.

Asset information is reviewed to determine which data is relevant and needs to be captured for asset performance and maintenance.

A unique asset identifier is assigned in accordance with an established asset hierarchy, and assets are labelled as described in the asset management procedure *Asset Identification*. Operational and maintenance training needs are assessed as outlined in the *Rook I Training Program*, and relevant asset data is cataloged in accordance with the document management process as outlined in the IMS Manual. The asset onboarding process is described in the asset management procedure *Asset Onboarding*.

### 2.4.4 Vendor Evaluation

Vendor evaluation is the process of verifying that vendors have provided assets in accordance with the requirements identified during asset procurement and onboarding. Vendor evaluations are periodically performed on a risk-based frequency to monitor vendor adequacy and to enable consistent delivery of assets in accordance with defined requirements. Vendor evaluations may be performed using a combination of desktop (e.g., document reviews) or in-person (e.g., facility tours) assessment techniques. Vendor evaluations are documented and tracked. The results are used to update the approved supplier list and inform vendor selection and oversight requirements for future purchases. The process for evaluating vendors and informing them of their status is outlined in the IMS Manual.

## 2.5 Resources

Rook I management is committed to providing the necessary resources to establish, implement, maintain, and continually improve this Program and its associated processes. In addition to providing the required financial resources to achieve objectives and meet requirements, management provides the infrastructure, work environment, and competent personnel necessary to implement the Program and asset management processes.

### 2.5.1 Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Program. Workers are informed of their roles and responsibilities and are accountable for understanding and fulfilling them. The Project prime contractor performs their role in accordance with the scope and requirements of this

Program and its supporting information and as required in accordance with *The Saskatchewan Employment Act*.

Although NexGen maintains overall accountability for Project activities, the term Rook I is used in the following role descriptions to reinforce that the role is applicable and may be assigned NexGen employees and contractors performing work on behalf of the Project.

### NexGen Executive

NexGen executive is accountable for:

- establishing the direction, strategy, and policies of the organization;
- promoting behaviours that support a robust health and safety culture;
- promoting the understanding that safety, including safe and reliable management of assets, is a principal consideration guiding decisions and actions; and
- providing adequate resources to deliver the requirements of this Program.

### Rook I Management

Rook I management is accountable for:

- demonstrating and promoting a culture where health and safety is a principal consideration guiding decisions and actions at all levels of the Project;
- the effectiveness of this Program;
- approving annual Program objectives and targets;
- promoting the integration of the Program requirements into Project processes;
- communicating the importance of effective management and of conforming to Program requirements;
- allocating adequate and appropriate resources to fulfill Program implementation;
- developing appropriate documentation and tools to implement this Program effectively;
- monitoring and reporting on Program performance and effectiveness to the NexGen executive;
- providing independent oversight of processes through monitoring and auditing activities; and
- identifying and pursuing opportunities to achieve continual improvement.

### Program Management

Program management is responsible for:

- demonstrating and promoting a culture where health and safety is a principal consideration guiding decisions and actions at all levels of the Project;
- overseeing the development, implementation, and adherence to this Program;
- setting annual objectives and targets, monitoring performance, and preparing internal and external reports regarding Program activities and outcomes;
- developing relevant KPIs related to the health of the Program and implementing them at the Project;
- managing resources to confirm legal compliance with regulatory requirements and conformance with Program requirements;
- confirming workers have the necessary competence, training, and awareness of Program requirements;
- working with applicable departments to confirm that Program roles and responsibilities are identified and described and that those with specific responsibilities have the necessary qualifications to fulfill their roles;
- providing independent oversight of processes through monitoring and assessment activities;
- reporting on Program performance and effectiveness to Rook I management;
- facilitating management review of this Program; and
- confirming continual improvement through Program evaluation.

## Program Coordination

The Program coordinator is responsible for:

- demonstrating and promoting a culture where health and safety is a principal consideration guiding decisions and actions at all levels of the Project;
- leading the development, implementation of, and adherence to Program procedures, work instructions, and maintenance plans;
- Participating in or leading asset management incident investigations and initiating applicable regulatory reporting when assigned;
- maintaining Program-specific data and records in a secure and controlled manner;
- providing asset management subject matter expertise;
- verifying workers meet and maintain required Program-specific training qualifications;
- verifying monitoring processes are implemented in accordance with Program and regulatory requirements; and
- reporting on Program performance as part of the management review process.

## Rook I Supervision

Rook I supervisors are responsible for:

- demonstrating and promoting a culture where health and safety is a principal consideration guiding decisions and actions at all levels of the Project;
- understanding, encouraging, and following this Program and its requirements;
- overseeing department functions and supervising direct reports to verify conformance to Program requirements;
- providing workers with the appropriate tools, equipment, procedures, and knowledge for the tasks being performed;
- supporting the achievement of Program objectives and targets;
- communicating and coordinating with other departments to facilitate effective implementation of this Program;
- conforming to Program procedures and training;
- supervising direct reports regarding conformance to Program requirements;
- supporting direct reports in planning work activities that mitigate asset management risks;
- reviewing work completed by their reports to verify it is completed in a safe and effective manner;
- participating in audits and inspections, as required;
- participating in management reviews, as needed; and
- identifying and supporting continual improvement.

## Rook I Workers

Rook I workers are responsible for:

- demonstrating and promoting a positive health and safety culture;
- working toward the achievement of objectives and targets in their area of assigned responsibility;
- adhering to established and applicable use, care, and maintenance procedures for assets;
- meeting and maintaining required Program-specific training qualifications;
- using all equipment, devices, and facilities that are intended for maintenance of assets in accordance with established procedures and applicable training;
- adhering to Project-specific processes established to maintain and promote asset management;

- recognizing and promptly communicating hazards or deviations that present a risk to the safety and health of workers, the environment, or the public. If safe to do so, taking action to contain or control the hazard to mitigate the impact;
- identifying and reporting on assets in their work area requiring maintenance;
- supporting the execution of asset integrity tasks, and
- cooperating with auditors, regulators, and inspectors, as needed.

### 2.5.2 Facilities and Equipment

Facilities and equipment supporting the effective implementation of this Program and its associated processes are provided to workers.

Facilities (e.g., appropriate spaces and technology for adequately conducting assessment, inspection, and maintenance work) are designed, constructed, operated, and maintained with consideration for keeping worker health, safety, and wellbeing in compliance with legal requirements.

Equipment such as personal protective equipment (PPE), hand and power tools, mobile equipment, rigging and lifting hardware, and specialised assessment and diagnostic equipment are provided when required to facilitate effective asset management. Equipment is operated and maintained in accordance with this Program, including legal and other requirements, and in consideration of the manufacturers' specifications.

### 2.5.3 Legal and Other Requirements

NexGen is committed to conforming to internal processes and to complying with applicable legal and other requirements. Risk-based asset maintenance strategies, plans, procedures, and work instructions are developed with consideration for all applicable internal processes and legal requirements including the legislation referenced in section 6.0.

Compliance to planned work (e.g., regulatory maintenance requirements such as refrigeration inspections, fire suppression equipment inspections and testing) is documented and tracked to demonstrate adherence to regulated requirements and timeframes. Changes to relevant internal and external requirements are monitored and evaluated to identify whether updates to this Program or related asset management processes are required.

The process for managing legal and other requirements is outlined in the IMS Manual.

## 2.6 Training and Competence

The Project follows a systematic approach to training (SAT) to educate, train, and qualify workers to carry out the work assigned to them. Training requirements are monitored as a means of providing workers with the training they require, when they require it, to maintain competency and work safely. Program-specific training requirements are defined and managed as part of the *Rook I Training Program*.

## 2.7 Document and Record Management

Documents and records generated for this Program or due to licensed activities are controlled to confirm the information is accurate, readily accessible to those that require them, available when needed, and protected from uncontrolled alteration. In addition to the common management system documents and records outlined in the IMS Manual, documents, and records specific to this Program include, but are not limited to:

- Program-specific procedures and work instructions;
- asset maintenance strategies;
- technical specifications;
- manuals;
- drawings and specifications;

- asset importance rankings;
- maintenance work orders;
- inspection results;
- certifications;
- spare parts lists; and
- site inventory.

All documentation relevant to an asset is traceable to that asset. The processes for managing documents and records are outlined in the IMS Manual.

## 2.8 Communication

Effectively communicating asset management information to workers is vital for maintaining a strong health and safety culture. Tools used to communicate information related to the Project include, but are not limited to:

- objectives and targets, including KPIs;
- occupational health, safety, environmental, and radiation bulletins and notices;
- maintenance strategy;
- work instructions and procedures;
- maintenance work orders;
- shift line-up meetings;
- routine safety moments to begin meetings or training courses;
- inventory, procurement, and shipping status updates; and
- job task observations.

Workers are informed of their duties and responsibilities. Changes to workers, processes, facilities, or equipment are communicated to those affected. Internal and external communication principles and processes are further outlined in the IMS Manual.

## 2.9 Change Management

Change is managed to maintain protection of worker health and safety, the environment, and property, and to promote the consistent and effective execution of site processes. This includes changes to Project:

- design;
- facilities;
- equipment;
- management system processes;
- organizational structure;
- key roles and responsibilities;
- documentation; and
- legal and other requirements.

Changes are evaluated with consideration for impact to this Program and the related asset management processes. This maintains that:

- change is clearly defined;
- risks associated with the change are assessed and managed;
- the change is communicated to those affected; and
- related documentation is updated.

Asset importance rankings and maintenance reliability strategies are reviewed on a scheduled basis to incorporate operating knowledge and technology changes. Changes in operating conditions (e.g., loading rates, run times, physical environment) may require that the corresponding ranking be reviewed as part of the change management process outlined in the IMS Manual.

# 3.0 Do

The *Do* component of this Program includes implementing the elements developed in the planning phase in alignment with the hierarchy of controls outlined in the IMS Manual. This includes the implementation of controls for risk management, asset maintenance workflow, asset-type specific strategies, contractor management, inventory management, asset disposition, and reporting incidents and deviations.

## 3.1 Asset Maintenance

Asset maintenance refers to actions taken to enable safe asset operating conditions and to correct deficiencies. This includes work identification and approval, planning, scheduling, execution, and closeout. The workflow diagram in Figure 3 illustrates the asset maintenance workflow, with each step described in the included sections.

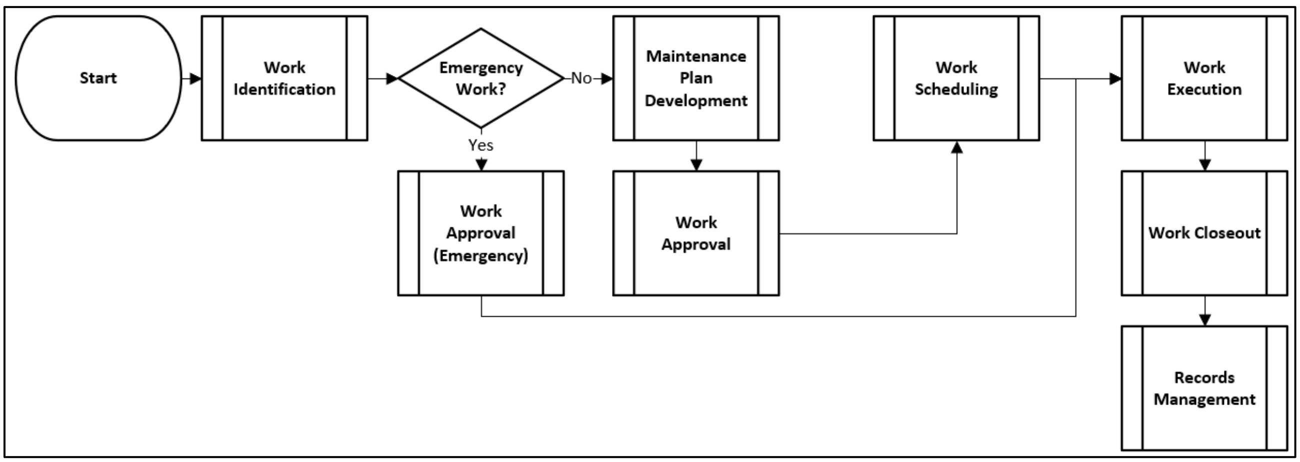


Figure 3: Asset Maintenance Workflow

### 3.1.1 Risk-based Asset Maintenance Strategy

The asset maintenance strategy uses a risk-based approach to identify maintenance methodologies based on asset importance rankings. Asset-specific maintenance requirements and frequencies are defined, documented, periodically reviewed, and revised (as required) according to the asset maintenance strategy. Maintenance strategy development is an iterative process that may involve the use of tools such as risk assessment, reliability centered maintenance, and engineered controls to improve asset management outcomes.

The use of the asset maintenance strategy to develop specific maintenance requirements and frequencies for individual assets is described in the asset management procedure *Maintenance Strategy*.

### 3.1.2 Asset Maintenance Work Identification and Approval

Asset maintenance work identification is the first step in initiating a maintenance workflow. It involves identifying maintenance needs and logging requests for maintenance work. Specific types of maintenance work are identified as follows in Table 2.

Table 2: Maintenance Work Identification Types

| Source | Maintenance Type | Description |
|---|---|---|
| Maintenance Strategy | Preventive | Work identified through the asset maintenance strategy to be scheduled based on calendar, asset operating hours, or other metrics. |
| | Predictive | Work such as non-destructive inspection, performance data, and test work as identified through an asset maintenance strategy. Performed to gauge the current and predicted future health of an asset and generate follow up requests for corrective work. Scheduled based on calendar, operating hours, or other metrics. |
| Identification in Field | Corrective | Work identified through routine inspection, observation, or as a follow up from predictive or other maintenance work. Required to address deficiencies and maintain assets in safe operating condition. |
| | Breakdown | Work required to repair non-functional assets and return them to service. |
| | Non-routine | Work such as equipment modifications, additions, or removals that is performed by the maintenance workers. |
| | Emergency | Work deemed time critical as a result of a safety, environmental, radiation or productivity risk. Following management approval, follows an expedited path through to execution, bypassing the planning and scheduling stages. |

Prior to execution, maintenance work must obtain financial and technical approval. Technical work approval includes consultation with appropriate safety, environment, radiation, and engineering experts through the asset maintenance work approval process.

For preventive and predictive work, asset maintenance work approval occurs during maintenance strategy creation. For corrective, breakdown, non-routine, and emergency maintenance requests, asset maintenance work approval occurs at work request creation and considers previously scheduled work to determine priority. Changes to work scope or cost may trigger a re-approval process.

Maintenance work identification (excluding emergency asset maintenance) is described in the asset management procedure *Work Identification and Approval*.

The process for identifying, approving, and controlling emergency work is described in the asset management procedure *Emergency Work Management.*

### 3.1.3 Asset Maintenance Work Planning

Once maintenance work is approved, asset maintenance work planning defines and describes maintenance-specific work tasks in a work order. Asset maintenance work planning enables safe and consistent work to be performed to specified requirements, on time, and on budget. It includes, but is not limited to, identifying and documenting:

- resources required, including people, tools, and equipment;
- safe work practices;
- skills and qualifications required of those performing the work;
- methods;
- criteria;
- preparation;
- materials, and
- documentation and necessary information required for identified maintenance work.

The level of detail outlined in a maintenance work plan is commensurate with complexity and safety significance of the work.

Work requirements are summarized in the form of a work order and provided to those responsible for performing the work. Asset maintenance work planning is managed as described in the asset management procedure *Work Planning*.

### 3.1.4 Asset Maintenance Work Scheduling

Asset maintenance work scheduling prioritizes and assigns planned asset maintenance work. Maintenance schedules are informed by maintenance strategies, asset utilization plans, the safety significance of the work, and regulatory requirements, and includes time allotments for safe shutdown, work execution, and returning assets to service in a safe and controlled manner.

Asset maintenance work required by regulation is specifically identified on the schedule and communicated to the responsible supervisor. Regulatory work compliance including report submission is managed throughout the scheduling and execution process. Examples of asset maintenance work required by regulation include, but are not limited to, fire fighting equipment, refrigeration equipment, boilers, and pressure vessels.

Asset maintenance work scheduling, including both routine operation and shutdown management, is managed as described in the asset management procedure *Work Scheduling*.

### 3.1.5 Asset Maintenance Work Execution

Asset maintenance work is conducted in accordance with maintenance plans and schedules by workers who possess the required skills and training and have access to the appropriate tools, equipment, and parts.

Assets that require off-site maintenance are cleaned, scanned, and prepared for shipment in accordance with the requirements outlined in the *Rook I Radiation Protection Program*.

Asset maintenance execution is managed as described in the asset management procedure *Work Execution*.

### 3.1.6 Asset Maintenance Work Closeout

Asset maintenance work closeout is the final step in the asset maintenance workflow during which asset handover is coordinated, and the asset owner is notified if the asset needs to be returned to operation. Asset turnover includes completing start up checks or independent verification as identified in the asset maintenance work plan to verify that work was completed to requirements and the asset is safe to return to service. Any deficiencies are managed through the maintenance system beginning at asset maintenance work identification as described in section 3.1.2, and the asset is tagged out if not safe to return to service.

Any relevant information found during execution including errors on the bill of materials, suggested improvements to the job plan, or changes in condition is recorded on the work order and returned for filing or further action.

Follow-up work identified during the maintenance work closeout is tracked on a corrective work order for completion as described in the asset management procedure *Work Identification and Approval*.

Asset maintenance work closeout is managed as described in the asset management procedure *Work Closeout*.

## 3.2 Asset-type Specific Strategies

In addition to the general asset maintenance activities described above, specific maintenance strategies are adopted for assets that:

- pose unique risks to health, safety, or the environment;
- require specialised skills to assess, inspect, or maintain; or
- have specific regulatory requirements.

Items managed through an asset-type specific strategy may include asset-type specific risk criteria, action logs, and maintenance strategy. Maintenance strategy documentation is managed so that inspection schedules, history, and action log items specific to an asset-type are identified for retrieval. Assets deemed low risk and lacking a regulatory driver may be excluded from the requirements of the asset-type specific strategy.

A prioritized action list is generated to document necessary repairs and improvements after scheduled inspections are completed for an asset-type specific strategy.

The following sections outline currently identified asset integrity programs to be implemented at the Project, as described in the asset management procedure *Asset-type Specific Strategies*.

### 3.2.1 Structural Integrity

Structural integrity maintenance includes routine inspection, remediation, and regulatory reporting requirements for all structural assets at the Project as required by *The Mines Regulations, 2018* and *The Occupational Health and Safety Regulations, 2020*, including but not limited to:

- buildings, including structural elements, cladding, roof, and wall systems;
- foundations, including concrete, pilings, and anchorage;
- tank, vessel, and equipment foundations and structural supports;
- interior and exterior grating, stairs, handrail, and related structural supports;
- electrical cable tray and conduit; and
- pipe supports.

### 3.2.2 Mine Workings Management

This asset-type strategy includes required inspections to verify ground control and underground workings are routinely inspected and maintained in safe order, as required by *The Mines Regulations, 2018.*

### 3.2.3 Ventilation Management

This asset-type strategy includes required inspections to verify surface facility and underground ventilation systems are maintained at or above acceptable minimum airflow values as required by *The Mines*

*Regulations, 2018, The Occupational Health and Safety Regulations, 2020,* and *REGDOC-2.5.4, Design of Uranium Mines and Mills: Ventilation Systems.*

### 3.2.4 Containment Management

This asset-type strategy includes required inspections to verify containment structures, including berms, retaining walls, sumps, sloped floors, and graded or lined surfaces are inspected and maintained in functioning condition to provide the required storage capacities, in accordance with *REGDOC 2.9.1, Environmental Protection: Environmental Principles, Assessments and Protection Measures*, and *The Hazardous Substances and Waste Dangerous Goods Regulations.*

### 3.2.5 Lifting Device Management

This asset-type strategy includes required inspections to verify lifting devices, including fixed and portable cranes, hoists, mine hoists, conveyances, material skips, lift points, jigs, stands, and related hardware are inspected and maintained in safe operating condition in accordance with *The Mines Regulations, 2018, The Occupational Health and Safety Regulations, 2020*, and the *Passenger and Freight Elevator Regulations*.

### 3.2.6 Tank, Boiler, and Pressure Vessel Management

This asset-type strategy includes required inspections to verify integrity of tanks, pressure vessels, industrial furnaces, and bulk storage containers are inspected and maintained in accordance with *The Boiler and Pressure Vessel Act and Regulations*, *REGDOC 2.9.1, Environmental Protection: Environmental Principles, Assessments and Protection Measures*, and *The Hazardous Substances and Waste Dangerous Goods Regulations*.

### 3.2.7 Pipeline Integrity

This asset-type strategy is intended to provide a routine and systematic approach to assessing pipeline functionality and service life while reducing costs by grouping similar assessments. Risk assessments on site pipelines consider current condition, materials of construction, corrosivity of material, atmosphere, and lining, as well as the risk to workers and environment from pipeline leakage or catastrophic failure.

## 3.3 Contractor Management

Contractors performing work including inspections, consulting, or maintenance execution on Project assets are subject to the requirements of this Program. The process for verifying contractors adhere to requirements is outlined in the *Rook I Contractor Management Program*.

Contractors are responsible for confirming that contractor-owned or contractor-leased assets are procured, stored, managed, operated, and dispositioned in a manner that maintains asset integrity, safety of workers, and protection of the environment. Contractor equipment is not subject to the requirements of this Program, but may be assessed periodically for conformance to applicable requirements using a risk-based approach. This may include, but is not limited to, review of maintenance and inspection records, certifications, and test reports.

Work performed by contractors on Project assets, including asset maintenance work plan creation, asset inspection, or asset maintenance work execution is performed in accordance with this Program.

## 3.4 Incident and Deviation Reporting

Employees, contractors, and visitors are required to report defects in physical assets identified through pre-use inspections, routine work, maintenance, and inspection activities to their supervisor or with a maintenance request in accordance with the asset management procedure *Work Identification and Approval*.

Equipment identified as unsafe for use is tagged out, reported to their supervisor, and managed through the asset maintenance workflow process.

Workers and visitors are also required to report information regarding health, safety, and environmental near-misses, deviations, and incidents. Near-misses are events or situations where an occupational or environmental exposure could have occurred but was avoided.

Asset management incidents and deviations include, but are not limited to:

- failure of an asset to perform to specification;
- damage to an asset; and
- failure to maintain an asset within regulatory requirements.

Internal events that exceed applicable regulated reporting thresholds, including those that are reportable in accordance with the *General Nuclear Safety and Control Regulations,* are reported to applicable regulatory representatives within legislated timelines.

The IMS Manual outlines the process for:

- documenting and tracking reported information, and
- providing information regarding reportable events or situations to internal and external parties.

## 3.5 Inventory Management

Inventory refers to equipment, parts, consumables, bulk reagents, and assemblies required to enable effective asset performance and maintenance, and to safely manage asset failures in a timely fashion. Materials intended for construction and commissioning work are not considered inventory and are managed in accordance with the processes outlined in the *Rook I Construction Management Program* and the *Rook I Commissioning Management Program.*

Maintaining adequate inventory levels provides the Project with timely access to assets required for safe and reliable operation and is important due to the remote nature of the Project. The Project provides dedicated space for storing required inventory and assigns workers to manage inventory levels and inventory storage assignment.

Inventory management is described in the asset management procedure *Inventory Management.*

### 3.5.1 Inventory Assessment

Inventory assessment is the process used to determine what materials and quantities are required to be maintained as inventory. Decisions related to site inventory additions follow an approval process based on the value of assets to be added.

Stock levels are determined based on inventory lead time, site usage, and asset importance as described in section 2.1.1. Inventory levels are reviewed on an ongoing basis to maintain appropriate stocking levels. Routine cycle counts are performed to verify accurate inventory levels.

Identified inventory assets and maintenance spares include a list of associated assets and maintenance strategies. Routine obsolescence reviews are performed to identify surplus and control inventory.

Commissioning spares, if applicable, are catalogued, retained, and turned over to inventory only if they align with maintenance or critical spare requirements as described in section 3.5.3.

Inventory assessment is described in the asset management procedure *Inventory Management.*

### 3.5.2 Inventory Storage and Control

Inventory is stored and controlled as required to track accurate inventory levels and prevent damage, deterioration, or loss. Inventory controls include both administrative and engineered methods that may include, but are not limited to, locked warehouse access, radio-frequency identification (RFID) sign-out, or vending machines. Methods of control, special storage requirements (e.g., heated, radiation protected, non-flammable), inspection, and acceptance requirements are identified during asset acquisition.

Inventory information is stored and controlled, and maintenance required on inventory items is managed in accordance with this Program.

Inventory is coordinated with site maintenance and operations schedules so that inventory levels are adjusted to meet operational needs. Where practical, the warehouse coordinates with maintenance and operations teams to kit and deliver required inventory to the workplace according to schedule.

Inventory storage and control is described in the asset management procedure *Inventory Management.*

### 3.5.3 Critical Spares Management

Critical spares refer to parts or assemblies identified to high importance ranked assets, which are identified as a risk control to mitigate the consequence to safety, the environment, or productivity caused by asset failure. Critical spares are not subject to removal based on lack of usage and are routinely inspected and maintained in good order until the associated asset is removed from service, or the risk is mitigated through an alternate control.

Items tagged as critical spares are associated to a specific asset and identified by the asset number.

## 3.6 Asset Disposition

Asset disposition is the process for permanently removing a physical asset from service or inventory in a controlled manner. Asset disposition includes checking inventory to verify obsolete spare parts are disposed and relevant maintenance strategies are removed or modified. If asset disposition constitutes a change as outlined in the IMS Manual*,* it is managed in accordance with the requirements outlined therein.

Final disposal of assets in a manner that protects people and the environment is outlined in the *Rook I Waste Management Program*. Off-site release of dispositioned assets is subject to clearance for off-site release requirements as outlined in the *Rook I Radiation Protection Program*. Asset disposition is described in the asset management procedure *Asset Disposition.*

# 4.0 Check

The *Check* component of this Program consists of ongoing performance monitoring, periodic reviews and audits, and analysis of results to verify that the Program is operating effectively.

## 4.1 Monitoring and Measurement

Management system processes are continually monitored and measured to evaluate whether Project deliverables meet external and internal requirements.

Program performance and effectiveness are evaluated on a prescribed frequency by the Project management team using the following information:

- established Program-specific KPIs;
- deviation reporting;

- internal audit reports as completed according to the internal audit schedule; and
- external compliance audit reports, as completed and available.

Regulatory reporting on all work required to maintain compliance is performed on a frequency as outlined in the relevant regulations. All work requiring regulatory reporting on completion, or on routine intervals, is identified within the maintenance strategy and schedule.

Performance monitoring results are used to inform Program improvement opportunities as required.

General monitoring and measurement processes and requirements are outlined in the IMS Manual.

## 4.2 Audits and Inspections

The performance and effectiveness of this Program and its associated procedures are monitored and verified with regular conformance audits. Qualified individuals independent of the work being assessed conduct audits as outlined in the IMS Manual.

Routine internal inspections, in addition to audits, are conducted by workers as part of monitoring the effective use of controls and managing risks. Workplace inspections are performed, documented, and communicated where applicable as outlined in the *Rook I Health and Safety Program*.

Routine physical assets inspections are scheduled and completed in accordance with the asset maintenance workflow and in accordance with regulatory requirements as described in section 3.1.

Pre-use inspections of equipment (e.g., mobile equipment, cranes and lifting devices, personal protective equipment, portable tools) are completed where required by regulation.

External compliance audits and inspections are conducted by regulators; conformance audits and inspections are conducted by third parties as required.

Deviations, instances of regulatory noncompliance, and opportunities for improvement identified through audits or inspections are managed as outlined in the IMS Manual.

## 4.3 Management Review

This Program and its supporting processes are subject to regular review and evaluation by Project management. In addition to the general topics outlined in the IMS Manual, inputs specific to asset management include, but are not limited to:

- status of asset management objectives, targets, and KPIs;
- audit and inspection findings;
- proposed continual improvement actions or their status;
- status of corrective actions;
- compliance to asset maintenance work required by regulation;
- significant changes to the Program; and
- upcoming or new legislation or regulation related to the Program and plans to address these requirements.

The management review process is outlined in the IMS Manual.

# 5.0 Act

The *Act* component of this Program consists of facilitating continual improvement and verifying that, when required, appropriate corrective actions are taken and managed. The results of these Program elements feed back into *Plan* to complete the Plan-Do-Check-Act cycle.

## 5.1 Corrective Action Process

Asset management incidents, including near-misses, and deviations to this Program or specified requirements are evaluated and investigated as required. Appropriate actions are developed and implemented to correct and prevent reoccurrence. Corrective actions are planned, implemented, verified, and reviewed for effectiveness commensurate with the risk level.

The corrective action process is outlined in the IMS Manual.

## 5.2 Continual Improvement

Continual improvement is an ongoing process to improve the suitability, adequacy, and effectiveness of the IMS. Workers continually seek out improvement opportunities for the IMS and Project processes through a combination of Program monitoring, auditing, management review, and maintaining awareness of changes in the business environment. Improvement may also involve benchmarking the Project performance against other similar projects and facilities.

The use of experience gained during Project construction and commissioning, including information collected from relevant external sources, informs improvement opportunities. Potential sources of information include:

- worker experience;
- incident investigations;
- adverse trends;
- lessons learned;
- government and industry publications;
- industrial peer information exchange; and
- professional associations.

Continual improvement opportunities are identified, documented, evaluated, and implemented as outlined in the IMS Manual.

# 6.0 References

## 6.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-CHT-00001 | *Rook I Organizational Chart* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-COM-PGM-00001 | *Rook I Commissioning Management Program* |
| ROOK-CON-PGM-00001 | *Rook I Contractor Management Program* |
| ROOK-CST-PGM-00001 | *Rook I Construction Management Program* |
| ROOK-HSF-PGM-00001 | *Rook I Health and Safety Program* |
| ROOK-RAD-PGM-00001 | *Rook I Radiation Protection Program* |
| ROOK-TRN-PGM-00001 | *Rook I Training Program* |
| ROOK-WST-PGM-00001 | *Rook I Waste Management Program* |
| ROOK-AST-PRO-00001 | *Asset Identification* |
| ROOK-AST-PRO-00002 | *Asset Onboarding* |
| ROOK-AST-PRO-00003 | *Asset Importance Ranking* |
| ROOK-AST-PRO-00004 | *Maintenance Strategy* |
| ROOK-AST-PRO-00005 | *Work Identification and Approval* |
| ROOK-AST-PRO-00006 | *Emergency Work Management* |
| ROOK-AST-PRO-00007 | *Work Planning* |
| ROOK-AST-PRO-00008 | *Work Scheduling* |
| ROOK-AST-PRO-00009 | *Work Execution* |
| ROOK-AST-PRO-00010 | *Work Closeout* |
| ROOK-AST-PRO-00011 | *Asset-Type Specific Strategies* |
| ROOK-AST-PRO-00012 | *Inventory Management* |
| ROOK-AST-PRO-00013 | *Asset Disposition* |

## 6.2 External

- Federal
  - *General Nuclear Safety and Control Regulations*
  - *Nuclear Safety and Control Act*
  - *REGDOC-2.5.4 Design of Uranium Mines and Mills: Ventilation Systems*
  - *REGDOC 2.9.1 Environmental Protection: Environmental Principles, Assessments and Protection Measures*
  - *CSA N286:12 Management system requirements for nuclear facilities*
- Provincial
  - *The Saskatchewan Employment Act*
  - *The Occupational Health and Safety Regulations, 2020*

- *The Mines Regulations, 2018*
- *The Boiler and Pressure Vessel Regulations*
- *Hazardous Substances and Waste Dangerous Goods Regulations*

# Radiation Protection Program
# ROOK-RAD-PGM-00001

# Rook I Project

## Radiation Protection Program

ROOK-RAD-PGM-00001

December 2022

# Record of Revisions

| Version No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| 0 | 15-Dec-2021 | Issued Final | Jon Henderson | Kevin Oakes | Tony George |
| 1 | 21-Dec-2022 | Issued Final | Jon Henderson | Rob Paine | Luke Moger |

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# 1.0 Introduction

The *Rook I Radiation Protection Program* (Program) outlines the systematic and risk-based approach to managing ionizing radiation hazards as part of the NexGen Energy Ltd. (NexGen) Rook I Project (Project). This Program describes the processes for maintaining compliance, enabling continual improvement, and fostering a culture where protecting workers and the environment is a principal consideration guiding decisions and actions.

This Program is part of the *Rook I Integrated Management System* (IMS) and is subject to the *Rook I Integrated Management System Policy* which provides the foundation for NexGen's approach to radiation protection. The Program and its relationship to other IMS programs within the IMS hierarchy is shown in Figure 1. As a component of the IMS, this Program follows the Plan-Do-Check-Act cycle to identify, control, monitor, and continually improve radiation protection processes for workers, the public, and the environment.

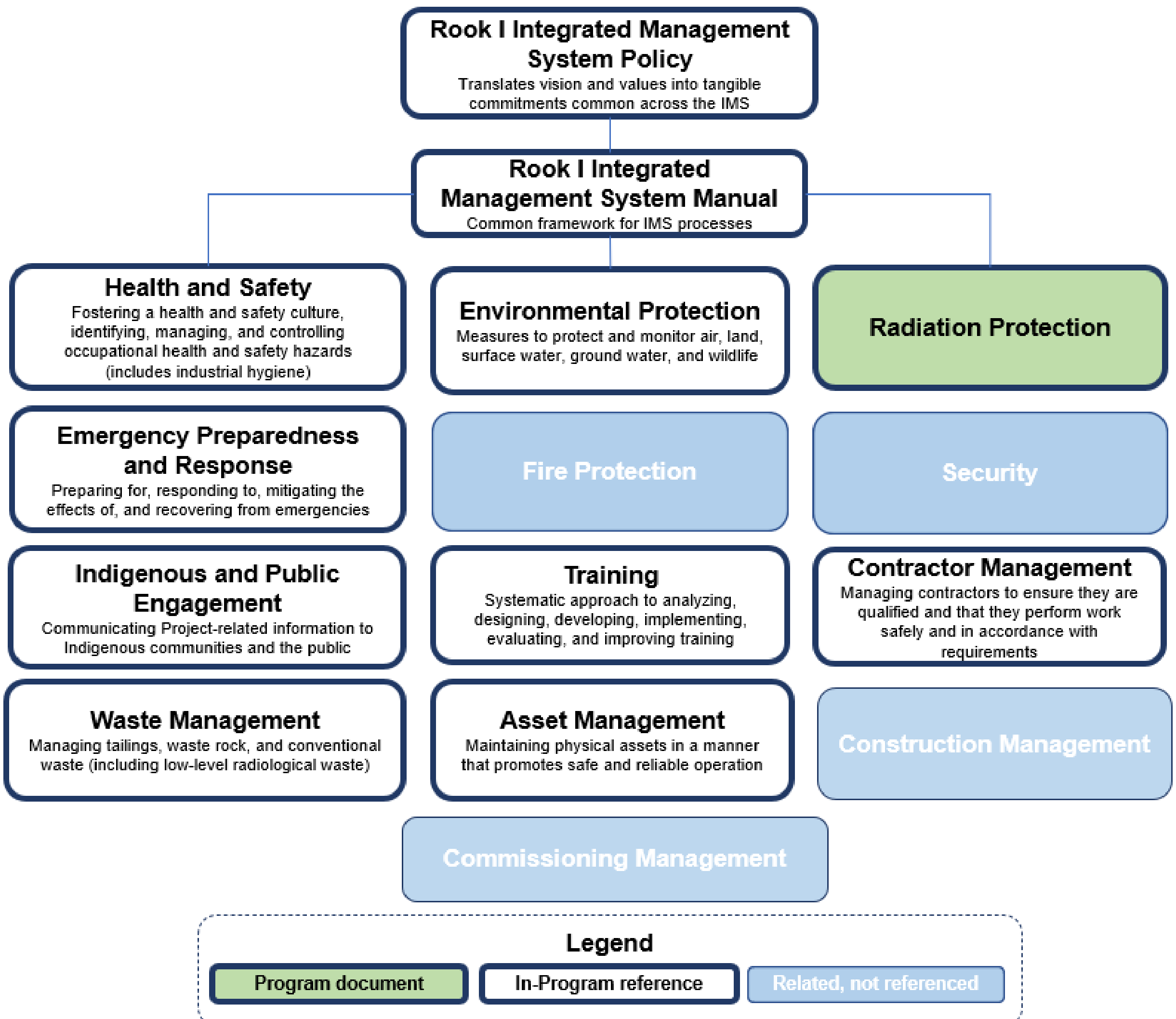


Figure 1: Program Context Within the IMS

## 1.1 Purpose

This Program describes the Project principles, processes, and framework for effectively protecting workers, the public, and the environment from ionizing radiation hazards. This Program aligns with and meets all requirements of the references outlined in section 6.2, including the *Nuclear Safety and Control Act* and associated regulations.

## 1.2 Scope

The scope of this Program includes planning, delivering, evaluating, and improving Project processes for effectively managing and continually improving radiation protection for on-site, Project-related licensed activities during the Project site preparation, construction, and commissioning phase.

This Program uses a graded, risk-based approach to implementing radiation protection processes that accounts for the level of risk, safety significance, and complexity of activities.

The mining of uranium ore and production of uranium concentrate are not within the scope of this Project phase; however, the processes described herein account for the possibility of encountering ionizing radiation hazards and establishing and maintaining effective radiation protection measures throughout the Project life cycle. The Program and its supporting processes are subject to periodic review and will be revised as required to maintain measures necessary to safely manage ionizing radiation hazards.

To protect overall worker health, this Program and the *Rook I Health and Safety Program* are implemented in an integrated manner.

Preventing uncontrolled releases, managing planned releases, and monitoring the environment for radiological contaminants are within the scope of the *Rook I Environmental Protection Program* and the *Rook I Waste Management Program*.

Nuclear substances and radiation devices that are exempt from licence requirements in accordance with the *Nuclear Substances and Radiation Devices Regulations* are managed outside the scope of this Program in accordance with internal processes and provincial laws and regulations where applicable.

## 1.3 Program Principles

NexGen recognizes the importance of keeping radiological exposures to workers and the environment as low as reasonably achievable (ALARA) while maintaining the security of the Project site and nuclear substances. This approach to radiation protection is reflected in the following principles:

- protecting and promoting the health, safety, and well-being of people and the environment through all aspects and phases of the Project;
- establishing a strong health, safety, and environment culture which is periodically assessed and continually improved;
- verifying workers have the knowledge, skills, and tools to safely perform their duties and in a manner that protects the environment;
- identifying and understanding workplace radiation hazards and actively participating in implementing controls;
- identifying, assessing, managing, and eliminating (where practicable) radiological risks such that exposure to workers is minimized;
- complying with applicable legal and other requirements; and
- continually improving Program performance.

## 1.4 As Low as Reasonably Achievable

This Program adopts the ALARA principle to confirm occupational and public exposures to radiation are minimized. The ALARA principle is a key driver of the Project site's health and safety culture, and the basis for all decisions made within this Program.

The Project site uses a consistent approach to select the most appropriate option for minimizing radiation exposure including:

- identifying a potential radiation exposure situation;
- identifying and evaluating the radiation protection options;
- assessing the feasibility of the possible options;
- selecting and implementing the most appropriate options; and
- monitoring and evaluating the performance of the selected options and re-assessing if needed.

A description of how this process is applied at the Project site is described in the radiation protection procedure *As Low as Reasonably Achievable*.

## 1.5 Terminology

Terminology introduced in this Program is provided below. A comprehensive list of common terms applicable to this Program and the IMS are available in the *Rook I Project Glossary*.

**abnormal intake** – Intake of uranium determined via urine bioassay sampling that corresponds to or exceeds a kidney concentration of 1.0 microgram of uranium per gram of kidney (µg U/g).

**action level** – A specific dose of radiation that, if reached, may indicate a loss of control of part of a licensee's radiation protection program and triggers a requirement for specific action to be taken.

**administrative level** – A list of specific actions to be taken based on radiological monitoring in the workplace; identified for all radiological hazard types during normal operating conditions and used to verify optimal conditions for workers.

**airborne radioactive material** – Refers to radioactive material that is suspended in air and poses an inhalation risk (e.g., radon progeny, radon gas, long-lived radioactive dust).

**as low as reasonably achievable (ALARA)** – Minimizing the risk of adverse health, safety, environmental, and radiological impacts to the lowest extent practicable, considering technical, legal, social, and economic factors. Specifically for this Program, ALARA refers to keeping the effective dose and equivalent dose received by and committed to persons as low as reasonably achievable, considering social and economic factors, as outlined in the *Radiation Protection Regulations*.

**class 7 radioactive material** – Radioactive materials requiring transport using Transport Canada's *Transportation of Dangerous Goods* (TDG) *Regulations.*

**clearance** – The removal of items that may contain residual levels of radioactive materials within authorized practices from radiological control. In general terms, this refers to verifying that objects that may have become contaminated while on site meet the criteria to be able to be released to the public.

**contamination** – The presence of radioactive substances in locations where they are not desired, including on objects or workers. Also, the presence of a radioactive substance on a surface in quantities in excess of 0.4 becquerels per square centimetre ($Bq/cm^2$) for beta and gamma emitters and low toxicity alpha emitters, or 0.04 $Bq/cm^2$ for all other alpha emitters, over a 300 $cm^2$ area or the entire surface if the total surface area being tested is less than 300 $cm^2$.

**contamination zone** – Area of the Project site with a specified contamination limit or allowable amount of contamination. Contamination zones have specific requirements for transitioning from areas of higher contamination risk to those with lower contamination risk.

**continuous air monitor (CAM)** – A device used in the workplace to measure radon progeny and update workers as to the concentrations in real time.

**direct reading dosimeter (DRD)** – A monitoring device worn by workers to measure and display the gamma dose rate, and their cumulative dose in real time while in use.

**dose** – The concentration of energy absorbed in human tissue as a result of exposure to ionizing radiation, usually multiplied by a weighting factor in order to assess the potential for immediate or long-term damage.

**dosimetry** – The process of measuring and assigning a dose of ionizing radiation to a specific individual.

**effective dose** – The sum of the products, in sieverts, obtained by multiplying the equivalent dose of radiation received by and committed to each organ or tissue by its associated weighting factor from the *Radiation Protection Regulations*. In more general terms, this means the whole-body dose from all forms of radiation measured at the Project site including gamma, radon progeny, radon gas, and long-lived radioactive dust.

**equivalent dose** – The absorbed dose to a specific organ, in sievert, calculated as per the weighting factors set out in the *Radiation Protection Regulations*. This takes into account the energy absorbed as well as the potential for damage to the specific organ or tissue.

**exemption quantity** – In general terms, refers to a level of radiation activity below which a nuclear substance can be possessed without requiring licensing by the Canadian Nuclear Safety Commission (CNSC). Refer to the *Nuclear Substances and Radiation Devices Regulations* for detailed descriptions of exemption quantity for specific isotopes.

**gamma radiation** – Penetrating electromagnetic radiation emitted from an atom's nucleus. Also called gamma rays.

**integrated management system (IMS)** – A common framework of programs, plans, procedures, work instructions, and other supporting documentation describing management system processes for achieving Project objectives and completing work safety, reliably, and consistently while conforming to internal requirements and complying with legal requirements.

**ionizing radiation** – For the purposes of radiation protection, radiation capable of producing ion pairs in biological material(s). Note: Ionizing radiation is constantly present in the environment and includes the radiation that comes from both natural and artificial sources, such as cosmic rays, terrestrial sources (radioactive elements in the soil), ambient air (radon), and internal sources (food and drink).

**leak test** – With respect to sealed sources (including sealed sources within prescribed equipment) or nuclear substances used as shielding, a method of verifying the integrity of the encapsulation of the sealed source or ensuring that the nuclear substance used for shielding is not readily removable from the surface of that shielding.

**licensed activities** – Project activities within the scope of Canadian Nuclear Safety Commission (CNSC) licensing. Project site-based activities that may be outside the scope of CNSC licensed conditions are subject to the integrated management system (IMS) on a risk-informed basis (i.e., where the consequence of human error poses a risk to the environment, the health and safety of people, or to the security of Project facilities).

**long-lived radioactive dust (LLRD)** – Refers to isotopes within the uranium decay chain with long half-lives that exist in the form of small dust particulates that may be inhaled, ingested, or introduced into the body via wound contamination.

**nuclear density gauge (NDG)** – A device that uses a radiation source and sensor to measure density, thickness, moisture, or fill level.

**nuclear energy worker (NEW)** – A worker who has a reasonable probability to receive an effective dose of radiation of 1 mSv/year or greater.

**nuclear substances and radiation devices** – Those substances and devices required to be licensed by the Canadian Nuclear Safety Commission (CNSC) for use at the Project.

**particulate radiation** – Ionizing radiation that takes the form of small, charged particles that are potentially hazardous if ingested, inhaled, or introduced via an open wound. Examples include alpha and beta radiation.

**personal protective equipment (PPE)** – Includes equipment an individual may use to minimize hazards associated with performing a particular task. This includes, but is not limited to, safety glasses, gloves, hard hats, safety boots/shoes, coveralls, respirators, harnesses.

**Project site** – Term used to describe all property within the physical NexGen Rook I Project boundary.

**prime contractor** – Entity responsible for overseeing the safe execution of all work on-site within the scope of a defined construction project, who is either the worksite owner or a contractor who has entered into a written agreement with the owner to perform the duties of prime contractor.

**radiation device** – Device required to be licensed by the CNSC that contains more than the exemption quantity of a nuclear substance and that enables the nuclear substance to be used for its radiation properties (*Nuclear Substances and Radiation Devices Regulations*). In the context of the Project, nuclear density gauges are radiation devices.

**radiation hazard analysis (RHA)** – The process used to assess the radiation hazards and risks of non-routine work in order to put controls in place to keep doses as low as reasonably achievable (ALARA).

**radiation work permit (RWP)** – Permit used after the completion of an RHA to document exposures during potentially high-risk radiation exposure situations and keep doses as low as reasonably achievable (ALARA).

**radon gas (RnG)** – Radon gas (isotope radon-222) is a short-lived, gaseous decay product in the uranium decay chain. Radon gas decays into the radon progeny isotopes.

**radon progeny (RnP)** – Refers to the airborne, short-lived (half-lives under 30 minutes) decay products of radon-222 (radon gas), bismuth-214, lead-214, polonium-214, and polonium-218.

**sealed source** – A nuclear substance in a sealed capsule or in a cover to which the substance is bonded, where the capsule or cover is strong enough to prevent contact with or the dispersion of the substance under the conditions for which the capsule or cover is designed (as outlined in *Nuclear Substances and Radiation Devices Regulations*).

**sievert (Sv)** – The unit used to report radiation dose. Radiation dose is typically reported in millisieverts (mSv) or microsieverts (μSv).

**similar exposure group (SEG)** – A group of workers having the same general exposure profile for the occupational health hazard(s) anticipated or being evaluated because of the similarity and frequency of the tasks they perform, the materials and processes with which they work, and the similarity of the way they perform those tasks.

**subject matter expert (SME)** – Person providing the knowledge and expertise in a specific subject for a project. An SME verifies content is accurate.

**systematic approach to training (SAT)** – A structured approach used to manage training modules, widely known as an instructional design model.

**worker** – Any person working for NexGen, including a contractor.

# 2.0 Plan

The *Plan* component of this Program includes processes that support a systematic, risk-based approach to managing radiological hazards. Elements of planning include:

- communicating relevant radiation hazards and assessing the associated risks;
- setting Program-specific objectives and targets to implement Program processes;
- providing the appropriate parties with the information and resources necessary;
- verifying workers are competent and adequately trained to perform work;
- managing change to process, personnel, design, facilities, and equipment; and
- preparing for emergencies.

## 2.1 Risk Management

The risk management process includes identifying Project-related radiation hazards that could affect the health and safety of workers, the public, or the environment, assessing the significance of the associated risks, and managing the risks to acceptable levels through the application of controls as described in section 3.1.

The multi-layered approach to routinely and effectively managing risks of radiation exposure for workers and the environment is outlined in the *Rook I Integrated Management System Manual* (IMS Manual).

### 2.1.1 Hazard Identification

Ionizing radiation is energy that can damage cells and tissues by detaching electrons from atoms. There are three forms of ionizing radiation present at the Project site (i.e., alpha, beta, and gamma) and each pose different hazards to human health and the environment. Alpha and beta radiation take the form of small, charged particles that are potentially hazardous if ingested, inhaled, or introduced via an open wound. Gamma radiation is in the form of a wave of energy and can penetrate through skin and protective clothing. Sources of ionizing radiation at the Project site and their potential exposure pathways are listed in Table 1.

The likelihood of encountering specific hazards is subject to change based on the nature of activities during the Project site preparation, construction, and commissioning phase. The potential risk from exposure to ionizing radiation is based on multiple factors including duration of exposure, form of hazard, and distance from the source.

Hazards are identified, documented, and tracked in a manner that is appropriate for the type of risk assessment performed (e.g., field level hazard assessment, job hazard analysis).

Table 1: Ionizing Radiation Sources at the Project

| Type of Radiation | Exposure Pathway | Sources[1] |
|---|---|---|
| Gamma | External exposure | Mineralization, nuclear density gauges (NDG), aged uranium ore concentrate |
| Radon progeny | Inhalation | Mine or process water, mineralization |
| Radon gas | Inhalation | Mine or process water |
| Long-lived radioactive dust | Inhalation, ingestion, wound contamination | Mineralization, uranium ore concentrate[2] |

[1] Listed sources of radiation are typical of uranium mining and milling facilities and not meant to be a comprehensive representation of any particular phase of Project site preparation, construction, or commissioning.

[2] As well as being a radiological hazard, internal exposure to uranium ore concentrate is toxic; the toxicity risk is managed in collaboration with the *Rook I Health and Safety Program*.

### 2.1.2 Risk Assessment

Following the identification of radiation hazards, risks to worker health and safety and the environment are assessed with consideration for a range of factors, including:

- who or what is affected;
- the potential exposure;
- the severity and rate of the exposure; and
- the frequency and duration of exposure to the hazard.

Radiation risk criteria that correlate to the severity, frequency, and duration of potential exposure is defined in a risk matrix appropriate for the type of assessment being performed. Information from the risk assessment process is used to identify appropriate controls that effectively mitigate risk to acceptable levels. Controls are described in section 3.1.

### 2.1.3 Risk Register

Documented risk registers are maintained to record and track relevant information regarding radiation risks and controls. Controls are implemented, monitored, and maintained to protect workers, the public, and the environmental. Risk registers are reviewed and updated as necessary to assist with decision making, improvement opportunities, and changes to radiation protection processes. The requirements for developing and maintaining risk registers are outlined in the IMS Manual.

### 2.1.4 Worker Classification

Workers at the Project site who have a reasonable probability, based on the exposure risk assessment for their similar exposure group (SEG), of exceeding a radiation dose of 1 millisievert (mSv) per year are classified as nuclear energy workers (NEWs) and are subject to personal exposure monitoring. Workers who are not considered to be nuclear workers (i.e., non-NEW) are those who either do not work in radiation areas, or whose activities in radiation areas are controlled such that they are highly unlikely to exceed 1 mSv during their time on site. NEWs are required to be at least 18 years of age. The occupational exposure risk assessment and monitoring process is described in the *Rook I Health and Safety Program*.

NEWs are informed of the following in writing:

- that they are NEWs;
- the risks associated with radiation to which they may be occupationally exposed working at the Project site, including the risks to fetuses, embryos, and breastfeeding infants;
- the rights of pregnant or breastfeeding NEWs defined in the *Radiation Protection Regulations*;
- the applicable effective and equivalent dose limits, including emergency dose limits, prescribed in the *Radiation Protection Regulations*;
- their radiation dose levels; and
- their responsibilities during an emergency and the radiation risks they may be exposed to during control of an emergency.

NEWs are required to provide a written acknowledgement to NexGen that they have received information regarding their classification, been informed of the occupational radiation risks to which they may be exposed, and been informed of the rights of pregnant or breastfeeding NEWs. NEWs are required to provide applicable personal information to NexGen so their dosimetry information can be provided to Health Canada's National Dose Registry. Personal dosimetry information is also routinely provided to regulators and licensed dosimetry services as required. Workers are informed of the reasons personal information is collected and of the parties with which such personal information may be shared.

Classifying and managing NEWs, including determining appropriate accommodations for pregnant or breastfeeding workers, is described in the radiation protection procedure *Worker Dosimetry*.

## 2.2 Objectives and Targets

Program objectives and targets are established at regular intervals, linked to clear accountabilities, and monitored for status to completion. Objectives and targets are tangible, documented actions that result in improvements to radiation protection processes and Program outcomes.

Setting and managing objectives and targets, including establishing monitoring measures, is outlined in the IMS Manual.

## 2.3 Resources

Rook I management is committed to providing the necessary resources to establish, implement, maintain, and continually improve this Program and its associated processes. In addition to providing the required financial resources to achieve objectives and meet requirements, management provides the infrastructure, work environment, and the competent workers necessary to implement radiation protection processes.

### 2.3.1 Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Program. Workers are informed of their roles and responsibilities and are accountable for understanding and fulfilling them. The Project prime contractor performs their role in accordance with the scope and requirements of this Program and its supporting information and as required in accordance with *The Saskatchewan Employment Act*. Although NexGen maintains overall accountability for Project activities, the term Rook I is used in the following role descriptions to reinforce that the role is applicable and may be assigned NexGen employees and contractors performing work on behalf of the Project.

#### NexGen Executive

NexGen executive is accountable for:

- establishing the direction, strategy, and policies of the organization;
- promoting behaviours that support a robust health and safety culture;
- promoting the understanding that safety, including radiation safety, is a principal consideration guiding decisions and actions; and
- providing adequate resources to deliver the requirements of this Program.

#### Rook I Management

Rook I management is accountable for:

- demonstrating and promoting a culture where safety, including radiation safety, is a principal consideration guiding decisions and actions at all levels of the Project;
- maintaining effectiveness of this Program;
- approving annual Program objectives and targets;
- promoting the integration of Program requirements into Project processes;
- communicating the importance of effective management and of conforming to Program requirements;
- allocating adequate and appropriate resources to fulfill Program implementation;
- developing proper documentation and tools to implement this Program effectively;
- controlling radiation incidents and deviations and directing corrective action when required;
- participating in the management review process;
- monitoring and reporting on Program performance and effectiveness to the NexGen executive;
- providing independent oversight of processes through monitoring and auditing activities; and
- identifying and pursuing opportunities to achieve continual improvement.

## Program Management

Program management is responsible for:

- demonstrating and promoting a culture where safety, including radiation safety, is a principal consideration guiding decisions and actions at all levels of the Project;
- overseeing the development, implementation, and adherence to this Program;
- communicating with the applicable regulatory agencies (e.g., Canadian Nuclear Safety Commission [CNSC]) on behalf of the Project;
- setting annual objectives and targets, monitoring performance, and preparing internal and external reports regarding Program activities and outcomes;
- managing resources to confirm legal compliance with regulatory requirements and conformance with Program requirements;
- confirming workers have the necessary competence, training, and awareness of Program requirements;
- working with applicable departments to confirm that Program roles and responsibilities are identified and described and that those with specific responsibilities are qualified to fulfill their roles;
- providing independent oversight of processes through monitoring and auditing activities;
- reporting on Program performance and effectiveness to Rook I management;
- facilitating management review of this Program and maintaining associated records including tracking decisions and actions stemming from the review; and
- promoting, identifying, and supporting continual improvement through Program evaluation.

## Program Coordination

The Program coordinator is responsible for:

- demonstrating and promoting a culture where safety, including radiation safety, is a principal consideration guiding decisions and actions at all levels of the Project;
- directing the applicable actions of radiation department personnel and applicable workers in accordance with the *Rook I Radiation Code of Practice*;
- leading the development, implementation of, and adherence to Program procedures and work instructions;
- providing radiation protection subject matter expertise;
- conducting radiation incident investigations and initiating applicable regulatory reporting when assigned;
- maintaining Program-specific data and records in a secure and controlled manner;
- verifying workers meet and maintain required Program-specific training qualifications;
- preparing and supporting management review and maintaining associated records including tracking the decisions and actions stemming from the review; and
- verifying all monitoring and dosimetry processes are implemented in accordance with Program and regulatory requirements.

## Rook I Supervision

Rook I supervisors are responsible for:

- demonstrating and promoting a culture where safety, including radiation safety, is a principal consideration guiding decisions and actions at all levels of the Project;
- understanding, encouraging, and following this Program and its requirements;
- overseeing department functions and supervising direct reports to verify conformance to Program requirements;
- supporting the achievement of Program objectives and targets;

- conforming to Program procedures and training;
- supervising direct reports regarding conformance to Program requirements;
- supporting direct reports in planning work activities to mitigate radiation risks;
- communicating and coordinating with other departments to facilitate effective implementation of this Program;
- participating in audits and inspections, as required;
- participating in management reviews, as needed; and
- identifying and supporting opportunities for continual improvement.

#### Rook I Workers

Workers are responsible for:

- demonstrating and promoting a positive health and safety culture, including radiation safety;
- working toward the achievement of objectives and targets in their area of assigned responsibility;
- recognizing, identifying, and promptly communicating radiation hazards or opportunities for improvement to prevent exposures to themselves, other workers, and the environment;
- adhering to established and applicable use, care, and maintenance procedures for radiation exposure controls;
- meeting and maintaining required Program-specific training qualifications;
- using all equipment, devices, and facilities that are intended for radiation protection and dosimetry purposes in accordance with established procedures and applicable training;
- adhering to Project-specific processes established to maintain and promote radiation protection;
- taking all reasonable precautions to confirm the radiation protection for themselves and fellow workers;
- participating in radiation protection risk assessment processes; and
- cooperating with auditors, regulators, and inspectors, as needed.

### 2.3.2 Facilities and Equipment

Facilities and equipment supporting the effective implementation of this Program and its associated processes are provided to workers. Facilities are designed, constructed, operated, and maintained with consideration for keeping radiation exposures ALARA and worker health, safety, and well-being in compliance with legal requirements (e.g., designing work areas to confirm effective contamination control).

NexGen provides facilities to support the effective implementation of this Program and its associated processes (e.g., safe storage for radiation monitoring equipment).

Appropriate fixed and portable equipment and personal protective equipment (PPE) to prevent or minimize radiation exposure are available at the Project site. This includes:

- dust suppression systems;
- building and mine ventilation systems;
- shielding; and
- area and personal air monitoring systems.

Radiation monitoring equipment used to collect, analyze, and quantify data is selected, tested, and calibrated for its intended use. Competent workers operate and maintain equipment with consideration for the manufacturers' specifications and the applicable analytical methods.

The process for procuring equipment is outlined in the IMS Manual and the process for maintaining equipment is outlined in the *Rook I Asset Management Program*.

### 2.3.3 Legal and Other Requirements

NexGen is committed to conforming to internal processes and complying with applicable legal and other requirements. Radiation protection procedures and work instructions are developed with consideration for applicable legal requirements, including the regulations referenced in section 6.2. Changes to relevant internal and external requirements are monitored and evaluated to identify whether updates to this Program or related radiation protection processes are required.

The process for managing legal and other requirements is outlined in the IMS Manual.

## 2.4 Training and Competence

Appropriate and timely training is integral to the use, care, and maintenance of controls for radiation protection of workers, the public, and the environment. The Project follows a systematic approach to training (SAT) to educate, train, and qualify workers to carry out the work assigned to them. Training requirements are monitored as a means of providing workers with the training they require when they require it to maintain competency and work safely. Program-specific training requirements are defined and managed as part of the *Rook I Training Program.*

Project workers and visitors are required to participate in site orientation upon their arrival, which includes information on camp policies, and expectations of personal conduct while at the site. Site orientation is developed using the SAT process to confirm all critical information for new workers is included.

### 2.4.1 Worker Training

All workers at the Project, including non-nuclear energy workers and short-term visitors, are informed of applicable radiation hazards and controls as part of Project site orientation.

All NEWs are required to complete a training course regarding basic radiation principles and site-specific radiological hazards and controls. All supervisors of NEWs and radiation department personnel are required to complete training for their specific roles and responsibilities under this Program. Additional requirements for administering and overseeing required radiation protection training for workers and site visitors is described in the radiation protection procedure *Radiation Training*.

### 2.4.2 Radiation Department Training and Qualification

Rook I workers are selected based on their ability to satisfy defined competencies and perform their assigned tasks safely and competently. Radiation department personnel have prior training or relevant work experience in a related field and participate in ongoing professional development applicable to their role. Radiation technicians must participate in progression training specific to their duties under the supervision of senior radiation department personnel. Progression training is developed according to the requirements of the *Rook I Training Program*.

## 2.5 Document and Record Management

Documents and records generated for or due to licensed activities are controlled to verify the information is accurate, available when needed, and protected from uncontrolled alteration. Documents include Program-specific procedures and work instructions. In addition to the common management system records outlined in the IMS Manual, records specific to this Program include, but are not limited to:

- name and job category of each NEW;
- dosimetry records;
- workplace and contamination monitoring results;
- documented hazard analyses;
- work permits;

- completed inspection forms; and
- equipment inventories.

Documents and records are readily accessible to those that require them.

Dosimetry records are considered personal health information and managed in accordance with applicable privacy legislation. Dosimetry records are also stored in Health Canada's National Dose Registry database.

The processes for managing documents and records are outlined within the IMS Manual.

## 2.6 Communication

Effectively communicating radiation protection information to workers is vital for maintaining a strong health and safety culture. Tools used to communicate radiation protection information related to the Project include, but are not limited to:

- routine safety moments to begin meetings or training courses;
- radiation-focused toolbox meetings;
- workplace radiation safety posters;
- town hall meetings;
- posting information required by regulation;
- *Radiation Hazard Analysis* and *Radiation Work Permit* processes; and
- signage.

Workers are informed of their duties and responsibilities, and changes to personnel, processes, facilities, or equipment are communicated to those affected (as required).

Internal and external communication principles and processes are further outlined in the IMS Manual. Communication practices specific for local Indigenous groups, local communities, and the public are outlined in the *Rook I Indigenous and Public Engagement Program*.

### 2.6.1 Availability of Oversight Documents

The following information is posted in the workplace in a location accessible to all workers:

- the *Nuclear Safety and Control Act* and associated regulations that apply to the Project;
- the *Rook I Project Licence to Prepare Site and Construct*;
- the *Rook I Radiation Code of Practice*;
- workplace monitoring and inspection records; and
- instructions for workers when encountering an accident in which a nuclear substance or device may be involved.

This information is specific to the *Rook I Radiation Protection Program*. Additional information will be posted as required.

Individual dosimetry and training records are available to workers and supervisors as applicable, in accordance with privacy legislation.

### 2.6.2 Dosimetry and Workplace Monitoring Review

Review, analysis, and quality assurance of personal dosimetry and workplace monitoring results are performed on an established basis to identify trends or abnormal results and take appropriate corrective actions as described in the radiation protection procedure *Routine Radiation Inspections and Reviews*. Any exceedances of established internal or external regulatory limits are reported, investigated, and corrected as required as outlined in the IMS Manual.

### 2.6.3 Routine Regulatory Reports

Monitoring and dosimetry results are routinely reported to regulatory agencies as required by applicable permits, licences, and approvals, and as described in the radiation protection procedure *Routine Radiation Inspections and Reviews*.

## 2.7 Change Management

Change is managed to protect worker health and safety, the public, the environment, and property, and to promote consistent and effective execution of Project site processes. This includes changes to Project:

- design;
- facilities;
- equipment;
- management system processes;
- organizational structure;
- key roles and responsibilities;
- documentation; and
- legal and other requirements.

Changes are evaluated with consideration for the impact on this Program and the related radiation protection processes. This maintains that:

- change is clearly defined;
- risks associated with the change are assessed and managed;
- change is communicated to those affected; and
- related documentation is updated.

The general change management process is outlined in the IMS Manual. Changing conditions encountered during work execution affecting radiation protection practices are managed as described in the radiation protection procedure *As Low as Reasonably Achievable*.

## 2.8 Emergency Preparedness and Response

Preparing for and responding to emergency events and situations is critical to minimizing the potential impact on worker health and safety. Preparation and response measures account for the potential to encounter radiological hazards and the controls required to maintain worker protection. The *Rook I Emergency Preparedness and Response Program* describes the framework, principles, and processes used to prevent, plan for, effectively and safely respond to, and mitigate the effects of emergency events and situations. The framework described in the *Rook I Emergency Preparedness and Response Program* is further detailed in three supporting plans that outline requirements for preparing for and responding to emergencies:

- Project emergencies (surface and underground) are described in the *Emergency Response Plan*.
- Transportation emergencies are described in the *Ground Transportation Emergency Response Plan*.
- Crisis events are described in the *Crisis Management Plan*.

These plans have been developed in consultation with radiation protection subject matter experts and include information for protecting workers, the public, and the environment from radiation and the roles and responsibilities for radiation protection subject matter experts. Due to the nature of the materials produced at the Project site, it is not anticipated that emergency dose limits, as specified by the *Radiation Protection Regulations*, would ever be exceeded by emergency responders. The *Emergency Response Plan*, *Ground Transportation Emergency Response Plan*, and *Crisis Management Plan* outline actions to be taken to protect workers from radiological hazards and keep exposures ALARA. NexGen will not request that pregnant workers participate in the control of an emergency.

## 2.9 Packaging and Transport of Radioactive Materials

Unless the exemption criteria described in the *Packaging and Transport of Nuclear Substances Regulations* are met, radioactive materials are classified as Class 7 radioactive materials by Transport Canada and, prior to shipping, are required to be further classified into material types in accordance with the International Atomic Energy Agency *Regulations for the Safe Transport of Radioactive Materials*. Class 7 materials are not to be transported off the Project site unless they are in transit to a person or location licensed to receive them. All Class 7 materials are packaged, labelled, and shipped in consultation with the radiation department. The *Packaging and Transport of Nuclear Substances Regulations* are followed for all Class 7 shipments. All shipments and handling of Class 7 materials follow the radiation protection procedure *Packaging and Transport of Radioactive Materials*.

Transporting uranium ore concentrate beyond the Project boundary is not within the scope of the construction and commissioning phase of the Project.

Any offsite emergency or dangerous occurrence involving Class 7 radioactive materials is within the scope of the *Ground Transportation Emergency Response Plan*.

# 3.0 Do

The *Do* component of this Program includes implementing Program elements developed in section 2.0 in alignment with the hierarchy of controls described in Figure 2 and outlined in the IMS Manual. This includes implementing controls for risk management, workplace monitoring, worker dosimetry, radiation equipment maintenance, contractor management, and reporting incidents and deviations.

## 3.1 Radiation Exposure Risk Controls

The controls identified during risk assessment are used to eliminate, prevent, or reduce the risk of elevated radiation exposure to workers or contamination of the workplace or environment. Controls appropriate for the hazard and corresponding level of risk are selected and implemented with consideration for the hierarchy of controls, as described in Figure 2. Examples include facilities, equipment, processes, products, work practices, and PPE.

Where reasonably practicable, controls are used in combination to effectively prevent or reduce the risk to workers, the public, or the environment. This includes minimizing time near the source, maximizing distance from the source, and using shielding where practicable.

Controls are used, operated, and maintained according to their design, limitations, and applicable training. Adherence to procedures and training are critical in preserving the effectiveness of controls.

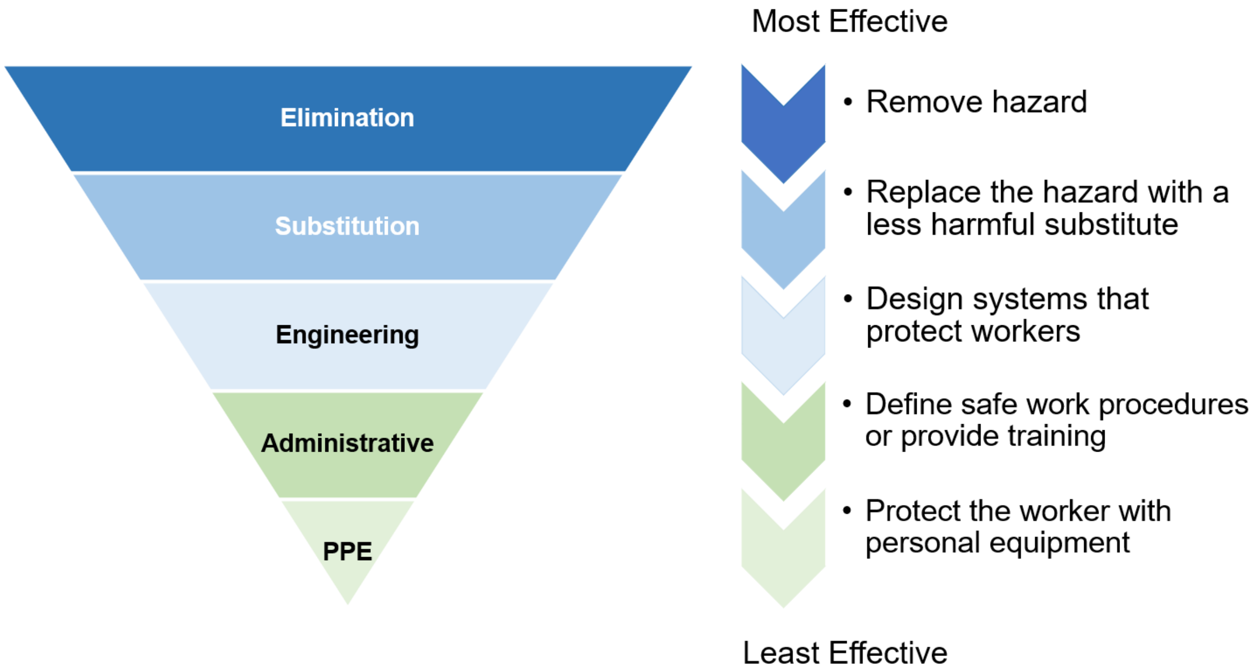


Figure 2: Hierarchy of Controls

### 3.1.1 Elimination and Substitution

Due to the inherent radioactive nature of uranium, elimination and substitution are not typically considered relevant control strategies for radiological hazards at the Project site. It is often possible to apply these types of controls to the exposure pathways, rather than the source itself; elimination or substitution of exposure pathways can also be categorized as engineering controls. For example, the common engineering control of closing off a radiation area so it cannot be entered could also be considered elimination of the exposure pathway. Opportunities to eliminate or substitute radiological hazards are considered on a case-by-case basis.

### 3.1.2 Engineering Controls

When completely removing or replacing a hazard is not possible or practicable, engineering controls may be used. Engineering controls involve designing facilities, equipment, and systems in a manner that reduces hazard exposure. Engineering controls are developed with the objective of eliminating or substituting the exposure pathway where practicable. Ventilation is an example of an important engineering control for reducing occupational exposures to airborne radiation at the Project site.

Any design changes made to implement new or modify existing engineering controls are subject to the change management process outlined in the IMS Manual.

### 3.1.3 Administrative Controls

Administrative controls are an essential component of risk mitigation and are typically used in combination with other types of controls. Administrative controls include training and supervision as well as written policies, rules, and processes. Examples of common administrative controls used by the Project are described in this section.

## Radiation Code of Practice

The *Rook I Radiation Code of Practice* provides guidance for radiation department personnel and the general workforce to appropriately respond to measured radiation exposure levels, radiation warning systems, and dose exceedances. The response thresholds and instructions for each specific hazard are the frameworks for the Project risk-based approach to mitigating elevated radiation levels to acceptable concentrations, as well as planning for and responding to unusual or unexpected situations.

The *Rook I Radiation Code of Practice* includes action levels and administrative levels. Action levels are required by the *Radiation Protection Regulations* and correspond to effective (i.e., whole body) individual dosimetry results that, if reached within specified time frames, may indicate a loss of control of the *Radiation Protection Program*. Administrative levels correspond to deviations from expected monitoring results during routine work in both surface and underground areas. Monitoring deviations could result in a dosimetry action level exceedance if actions are not put in place to mitigate the conditions. Administrative levels are intended to support the ALARA principle and proactively prevent action-level exceedances.

## Plans, Procedures, and Work Instructions

If risk assessment determines it to be appropriate, instructions for completing tasks associated with licensed activities may be documented in the form of plans, procedures, or work instructions. Work planning documentation is subject to the document management process outlined in the IMS Manual.

## Radiation Hazard Analysis

When a task presents a significant risk to worker health and safety or it has no established plan, procedure or work instruction, a job hazard analysis is performed to plan the work as outlined in the *Rook I Health and Safety Program*. If there is a significant radiation exposure risk, a radiation hazard analysis (RHA) must also be performed to precisely identify the radiological hazards, risks, and controls necessary. RHA is an important tool for keeping radiation exposures ALARA. Radiation department personnel must participate in the performance of RHAs.

The requirements for completing a job hazard analysis are outlined in the *Rook I Health and Safety Program*.

The requirements for completing an RHA are described in the radiation protection procedure *As Low as Reasonably Achievable* and its associated work instructions.

## Radiation Work Permits

For completing certain Project tasks, written radiation work permits (RWPs) may be required that detail the controls in place to protect workers from radiation. RWPs may also be used to document potential exposure. The requirement for a RWP depends on the exposure risk of the associated activity. RWPs may be used to keep exposures ALARA during certain tasks.

RWPs are valid only for the tasks for which they are issued and are subject to review and revision if changes to scope or nature of work are encountered. Tasks requiring RWPs are periodically checked by competent workers to verify task-specific work permit requirements are followed. The RWP process is further described in the radiation protection procedure *As Low as Reasonably Achievable*.

## Signage

Where there are radioactive substances greater than 100 times the exemption quantity as defined by the *Nuclear Substances and Radiation Devices Regulations* (including NDGs), or the gamma dose rate may be reasonably expected to exceed 25 microsieverts per hour (µSv/hr), warning signs will be posted bearing the radiation warning symbol as outlined in Schedule 3 of the *Radiation Protection Regulations*, the words "RAYONNEMENT – DANGER – RADIATION", and the average dose rate for the area.

Locations where a nuclear substance or device is used or stored also require a sign indicating the name or job title and phone number of a person who can be reached (i.e., radiation supervisor on duty) in case of an emergency involving the substance or device. Nuclear substances and devices, including equipment check sources, are labelled in accordance with the *Radiation Protection Regulations*.

Radiation warning signs are not to be posted where the radiation levels or equipment indicated on the sign are not present.

#### Warning Systems

Where there is a reasonable possibility of elevated airborne radon progeny (RnP), continuous air monitors are installed to inform workers of the airborne radiation concentration, in accordance with the *Rook I Radiation Code of Practice*.

Workers who enter areas with dose rates that may exceed 100 μSv/hr of gamma radiation must use a direct reading dosimeter and are required to follow the requirements of the *Rook I Radiation Code of Practice*.

### 3.1.4 Personal Protective Equipment

PPE includes protective clothing, safety glasses, gloves, and respiratory protection devices designed to protect workers from radiation exposure. PPE is considered the last line of defence and is typically used in combination with other types of controls. The PPE required to complete work safely is provided and is periodically inspected to verify it has not passed the date of expiry or become damaged during use.

Respiratory protection may only be used to reduce radiation exposure in temporary or unforeseen circumstances when the exposure hazard cannot be fully managed through elimination, substitution, or the use of engineering or administrative controls. The *Rook I Radiation Code of Practice* outlines the circumstances under which respiratory protection may be used.

The selection, use, and maintenance of PPE are outlined in the *Rook I Health and Safety Program*.

### 3.1.5 Contamination Control

Contamination is the introduction of radiological particulates into an area where they are not permitted. All areas of the Project site both indoor and outdoor are divided into contamination control zones based on the thresholds for allowable removable and fixed surface contamination within each zone. The contamination control process, via routine monitoring, verifies that particulate radiation from more contaminated zones is not routinely being tracked into areas with lower thresholds. PPE and personal hygiene restrictions apply to workers moving between and within zones. Eating and drinking restrictions are applicable within designated areas. The *Contamination Control* radiation protection procedure describes the various contamination zones, contamination limits, monitoring frequencies and methods, instructions for transitioning from one zone to another, and cleaning requirements.

### 3.1.6 Clearance of Objects for Offsite Release

All objects from potentially contaminated work areas that need to be transported off site must be thoroughly cleaned and checked for contamination prior to release as described in the radiation protection procedure *Clearance for Offsite Release*. Objects will not be released if surface contamination exceeds the clearance limits defined in the radiation protection procedure *Clearance for Offsite Release*.

### 3.1.7 Managing Nuclear Substances and Radiation Devices

Nuclear substances and radiation devices may be used during the Project site preparation, construction, and commissioning phase. Any nuclear substances and radiation devices would be licensed and managed in accordance with the *Nuclear Substances and Radiation Devices Regulations*. Nuclear substances and radiation devices licensed at the Project site, such as nuclear density gauges, are listed in Appendix A:.

All licensed nuclear substances and devices follow the labelling requirements set out in the *Radiation Protection Regulations*. Only certified radiation devices are used at the Project site.

Unplanned incidents involving radiation devices are managed by the radiation department in accordance with regulatory requirements.

More information on the management and security of nuclear substances and devices at the Project site is contained in the radiation protection procedure *Nuclear Substance and Radiation Device Management*. The process for providing information regarding reportable events or situations to internal and external parties is outlined in the IMS Manual.

## 3.2 Equipment Procurement and Maintenance

Equipment and material procured to enable the implementation of this Program are subject to the requirements outlined in the IMS Manual. Equipment is stored, maintained, and calibrated with consideration of the frequency and type of use and the manufacturers' or stated regulatory specifications.

All equipment used to monitor radiation is required to be calibrated no less than once every 12 months. Calibration and maintenance records are kept and made available to anyone who may request them. NDGs or other sealed sources are leak tested regularly in accordance with the *Nuclear Substances and Radiation Devices Regulations*.

Equipment used to take measurements as part of this Program is quality checked daily prior to use to verify proper equipment function. Work instructions on daily checks, calibration, and proper use are available for each piece of radiation measurement equipment as described in the *Radiation Measurement Equipment Management* procedure.

## 3.3 Contractor Management

Contractors performing work at the Project site are subject to the requirements of this Program. The process for ensuring contractors adhere to requirements is outlined in the *Rook I Contractor Management Program*.

## 3.4 Incident and Deviation Reporting

Workers and visitors are required to report information regarding health, safety, and environmental incidents (including near-misses) and deviations. Radiation incidents and deviations include, but are not limited to:

- dose exceedances above internal or regulatory thresholds;
- unexpected dosimetry or monitoring results;
- contamination events; and
- radiation near-misses.

Radiation near-misses are events or situations where an occupational or environmental radiation exposure could have occurred but was avoided.

Reported information is documented and tracked in accordance with the IMS Manual. Internal events that meet or exceed applicable legislated reporting thresholds, including those that are reportable in accordance with the *General Nuclear Safety and Control Regulations*, are reported to applicable regulatory representatives within legislated timelines.

The process for providing information regarding reportable events or situations to internal and external parties is outlined in the IMS Manual.

# 4.0 Check

The *Check* component of this Program consists of ongoing performance monitoring, periodic audits and inspections, reviews, and analysis of results to verify that the Program is operating effectively.

# 4.1 Monitoring and Measurement

Management system processes are continually monitored and measured to evaluate whether Project deliverables meet external and internal requirements. Program-specific monitoring and measurement includes reviews of dosimetry and monitoring results as described in section 2.6.2.

General monitoring and measurement processes and requirements are outlined in the IMS Manual.

## 4.1.1 Radiation Exposure Monitoring

Based on risk, selected areas of the Project site are routinely monitored for airborne RnP, radon gas (RnG), and gamma radiation. SEGs are routinely monitored for long-lived radioactive dust (LLRD) exposure. All sample results are compared to their respective administrative level thresholds outlined in the *Rook I Radiation Code of Practice*, which defines the actions to be taken to mitigate elevated radiation levels, if applicable. These results may be used to estimate dosimetry requirements for some workers as described in section 4.1.2. Readings from real-time radiation warning systems, such as continuous air monitors and direct reading dosimeters, are not considered dosimetry results; these monitors inform workers of changing radiological conditions in the workplace so working conditions can be adjusted as required to minimize exposures.

The monitoring frequencies and processes used at the Project to monitor radiation levels are described in the radiation protection procedure *Radiation Exposure Monitoring*. Monitoring equipment usage, including quality control, is described in the radiation protection procedure *Radiation Measurement Equipment Management*, and its maintenance is outlined in the *Rook I Asset Management Program*.

## 4.1.2 Worker Dosimetry

To ensure worker exposures remain ALARA, worker exposures to gamma radiation, LLRD, RnP, and RnG are routinely monitored (as applicable) as described in section 4.1.1. Personal dosimetry equipment is provided for all workers who require it, and dose records are maintained for each NEW at the Project site. Effective (whole body) and equivalent (organ-specific) doses are measured and recorded as applicable. RnP exposure is measured or estimated and included in each NEW's overall effective dose.

Health Canada's National Dose Registry requires NEWs be classified by job class. A job class is represented by a SEG at the Project. Where Project radiation monitoring data does not exist, SEG dosimetry modelling and exposure risk assessments are performed by subject matter experts for each phase of the Project. Dosimetry modelling and SEG exposure risk assessments identify radiation sources (e.g., gamma, LLRD, RnP, and RnG where applicable) and determine reasonable likelihood of exceeding effective dosimetry thresholds (e.g., 5 mSv/year) requiring licensed dosimetry services. Information from the exposure risk assessment is also used to inform exposure controls, monitoring methods, and dosimetry equipment used to ascertain their exposure and dose from each applicable radiation source. As monitoring data is accumulated, exposure risk assessments are updated and changes to exposure controls, monitoring methods, and dosimetry equipment are made as required. Exposure risk assessments are updated as outlined in the *Rook I Health and Safety Program.*

For SEGs where workers are unlikely to exceed 5 mSv/year, appropriate components of the effective dose are estimated based on exposure monitoring. In accordance with the *Radiation Protection Regulations*, when workers have a reasonable probability, based on their exposure risk assessment, of exceeding an effective dose of 5 mSv/year, official results are obtained using licensed dosimetry products and providers.

Special monitoring conditions are applied to a female NEW who has informed the licensee in writing that she is pregnant to confirm the pregnancy dose limit is not exceeded, in accordance with the *Radiation Protection Regulations*. Additional monitoring is also applied to breastfeeding NEWs to minimize dose.

Doses are routinely reviewed and compared to internal and external limits. The *Rook I Radiation Code of Practice* defines the actions to be taken based on effective dosimetry results that exceed defined thresholds in the form of action levels. Action level exceedances typically indicate a loss of control. NexGen is committed to ensuring that all workers, including pregnant or breastfeeding NEWs and non-NEWs, do not exceed annual regulatory effective or equivalent dose limits.

The Project dosimetry processes, including the process to measure or estimate (where applicable) each dose component and the actions to take in the event of an abnormal dosimetry result, are described in the radiation protection procedure *Worker Dosimetry*.

### 4.1.3 Contamination Control Monitoring

All workplaces other than those designated as contaminated zones are monitored for fixed and removable surface contamination as described in the radiation protection procedure *Contamination Control* as described in section 3.1.5.

### 4.1.4 Urine Bioassay Monitoring

NEWs at the Project site participate in a routine urine bioassay program. Doses are not ascertained from bioassay results except in the rare situation of an abnormal intake. The criteria for participation in the urine bioassay program, frequency of monitoring, and actions to take in the event of an unexpected result or abnormal intake, are described in the radiation protection procedure *Urine Bioassay Monitoring*.

The RHA process may also indicate the need for a worker to submit non-routine urine bioassay samples, depending on the circumstances. The requirements for completing an RHA are described in the radiation protection procedure *As Low as Reasonably Achievable*.

Although uranium ore concentrate is not anticipated to be generated during this Project phase, workers who are present in areas where there is a risk of exposure to uranium ore concentrate participate in a targeted urine bioassay monitoring program. Uranium ore concentrate is toxic if taken into the body by inhalation, absorption through the skin, injection, ingestion, or through wounds.

## 4.2 Inspections and Audits

The performance and effectiveness of this Program and its associated processes are monitored and verified with regular conformance audits. Qualified individuals who are independent of the work being assessed conduct audits as outlined in the IMS Manual.

Workplace inspections monitor the effective use of radiation exposure controls (e.g., to verify that radiation signage is meeting regulatory requirements). NexGen performs, documents, and communicates workplace inspections as outlined in the *Rook I Health and Safety Program*.

External compliance inspections and audits are conducted by regulators; conformance audits and inspections are conducted by third parties, as required.

Deviations, instances of regulatory noncompliance, and opportunities for improvement identified through inspections or audits are managed as outlined in the IMS Manual.

## 4.3 Management Review

This Program and supporting processes are subject to review and evaluation by Rook I management. Management review information includes:

- proposed Program-specific objectives and targets or their current status;
- upcoming or new legislation or regulation related to the Program and plans to address these requirements;
- significant changes in radiation risks;
- significant changes to the Program;
- workplace monitoring and dosimetry results;
- trends in radiation incidents and deviations, and the status of related investigations and corrective actions; and
- proposed continual improvement actions or their current status.

The management review process is outlined in the IMS Manual.

# 5.0 Act

The *Act* component of this Program consists of facilitating continual improvement and ensuring that, when required, appropriate corrective actions are taken and managed. The results of these program elements feed back into *Plan* to complete the Plan-Do-Check-Act cycle.

## 5.1 Corrective Action Process

Radiation incidents (including near-misses) and deviations to this Program are evaluated and investigated as required. Appropriate actions are developed and implemented to correct and prevent reoccurrence. Corrective actions are planned, implemented, verified, and reviewed for effectiveness corresponding with the risk level. The corrective action process is outlined in the IMS Manual.

## 5.2 Continual Improvement

Continual improvement is an ongoing process to improve the suitability, adequacy, and effectiveness of the IMS. Workers continually seek out improvement opportunities for the IMS and Project processes which occur through Program monitoring, auditing, management review, and maintaining awareness of changes in the business environment. Improvement may also involve benchmarking Project performance against other similar projects and facilities.

The use of experience gained during Project construction and commissioning, including information collected from relevant external sources, informs improvement opportunities.

Potential sources of information include, but are not limited to:

- worker experience;
- government and industry publications;
- industrial peer information exchange;
- professional associations;
- dosimetry or monitoring results;
- lessons learned; and
- incident investigations.

Continual improvement opportunities are identified, documented, evaluated, and implemented as outlined in the IMS Manual.

# 6.0 References

## 6.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-CHT-00001 | *Rook I Organizational Chart* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-TRN-PGM-00001 | *Rook I Training Program* |
| ROOK-AST-PGM-00001 | *Rook I Asset Management Program* |
| ROOK-HSF-PGM-00001 | *Rook I Health and Safety Program* |
| ROOK-EMG-PGM-00001 | *Rook I Emergency Preparedness and Response Program* |
| ROOK-CON-PGM-00001 | *Rook I Contractor Management Program* |
| ROOK-ENV-PGM-00001 | *Rook I Environmental Protection Program* |
| ROOK-WST-PGM-00001 | *Rook I Waste Management Program* |
| ROOK-IPE-PGM-00001 | *Rook I Indigenous and Public Engagement Program* |
| ROOK-RAD-COP-00001 | *Rook I Radiation Code of Practice* |
| ROOK-RAD-PRO-00001 | *As Low As Reasonably Achievable* |
| ROOK-RAD-PRO-00002 | *Radiation Exposure Monitoring* |
| ROOK-RAD-PRO-00003 | *Worker Dosimetry* |
| ROOK-RAD-PRO-00004 | *Contamination Control* |
| ROOK-RAD-PRO-00005 | *Urine Bioassay Monitoring* |
| ROOK-RAD-PRO-00006 | *Clearance for Offsite Release* |
| ROOK-RAD-PRO-00007 | *Packaging and Transport of Radioactive Materials* |
| ROOK-RAD-PRO-00008 | *Nuclear Substance and Radiation Device Management* |
| ROOK-RAD-PRO-00009 | *Radiation Measurement Equipment Management* |
| ROOK-RAD-PRO-00010 | *Radiation Training* |
| ROOK-RAD-PRO-00011 | *Routine Radiation Inspections and Reviews* |
| ROOK-EMG-PLN-00001 | *Emergency Response Plan* |
| ROOK-EMG-PLN-00002 | *Ground Transportation Emergency Response Plan* |
| ROOK-EMG-PLN-00003 | *Crisis Management Plan* |

## 6.2 External

- International (International Atomic Energy Agency)
  - *Regulations for the Safe Transport of Radioactive Materials (SSR-6)*
- Federal
  - *Nuclear Safety and Control Act*
    - *Uranium Mines and Mills Regulations*
    - *General Nuclear Safety and Control Regulations*
    - *Nuclear Substances and Radiation Devices Regulations*

    - *Packaging and Transport of Nuclear Substances Regulations*
    - *Radiation Protection Regulations*
  - *Transportation of Dangerous Goods Regulations*
- Provincial
  - *The Saskatchewan Employment Act*

# Appendix A: Nuclear Substance and Radiation Device Listing

# Radiation Code of Practice
# ROOK-RAD-COP-00001

# Rook I Radiation Protection Program

## Radiation Code of Practice

ROOK-RAD-COP-00001



May 2025

# Record of Revisions

| Revision No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| A | 18-Dec-2020 | Initial document framework for early CNSC review and feedback | R. Reist | J. Henderson<br>L. Moger | N/A |
| B | 16-Dec-2021 | Updated working draft for early review and feedback | R. Reist | J. Henderson<br>L. Moger | N/A |
| C | 22-Dec-2022 | Updated to improve clarity and address CNSC feedback | R. Reist | A. Ehman<br>J. Henderson<br>L. Moger | N/A |
| D | 01-Apr-2025 | Revision based on construction phase dose assessment | M. Lepage | A. Ehman<br>J. Giroux<br>J. Henderson<br>L. Moger<br>C. Sarauer | N/A |

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# 1.0 Introduction

The *Rook I Radiation Code of Practice* (RCOP) provides instructions for the radiation department and workers to appropriately respond to dose exceedances and measured radiation exposure levels. NexGen's Rook I Project (Project) follows a risk-based approach to planning for and responding to unusual or unexpected situations, mitigating elevated radiation levels to acceptable concentrations or dose rates, and keeping exposures as low as reasonably achievable (ALARA). The response thresholds and instructions for each specific hazard are the frameworks for this risk-based approach to radiation safety.

This document has been developed in accordance with the requirements of the Canadian Nuclear Safety Commission (CNSC) *Uranium Mines and Mills Regulations*, *Radiation Protection Regulations*, and *G-218 Preparing Codes of Practice to Control Radiation Doses at Uranium Mines and Mills*. Administrative and action level values are informed by radiological exposure assessment performed by Arcadis Canada Inc. during Project design[1]. Respectively, these values are appropriate to keep exposures ALARA and indicate potential loss of control of the *Rook I Radiation Protection Program* (Program) for the Project site preparation and construction phase (Construction phase).

## 1.1 Purpose

The RCOP is a regulatory requirement as prescribed by the CNSC *Uranium Mines and Mills Regulations.* The RCOP directs the responses of a licensee under radiological conditions that may indicate a loss of control of their radiation protection program while keeping doses ALARA.

The RCOP includes action levels designed to prevent regulatory dose limit exceedances, as well as administrative levels which are intended to prevent action level exceedances.

This RCOP also describes:

- radiation work permits (RWPs) in consideration of action and administrative levels;
- assumptions regarding measurements, calculations, and actions taken within the framework of the RCOP; and
- guidance on the use of respiratory protection to minimize exposure to radiation hazards.

## 1.2 Scope

The RCOP applies to routine exposure monitoring and non-emergency dosimetry results from on-site Project activities in both underground and surface work settings.

Action levels are required by the *Radiation Protection Regulations* and correspond to total effective dose results that, if reached or exceeded in specified time frames, may indicate a loss of control of the Program. Administrative levels correspond to deviations from expected monitoring results during routine work and are intended to support the ALARA principle and proactively prevent action level exceedances.

Exposures associated with planned and controlled non-routine work as performed under RWP that meet or exceed administrative or action level values do not trigger response actions unless planned controls are determined to be ineffective or inadequate retroactively. Exposures accrued under RWP contribute to worker total effective dose.

[1] Arcadis Canada Inc, 2025. *Rook I Project: Construction Phase Radiological Assessment*

Effective dose limits for emergency situations follow the requirements of the CNSC *Radiation Protection Regulations*.

## 1.3 Definitions

A comprehensive list of common terms applicable to this code of practice and the *Rook I Integrated Management System Manual* (IMS Manual) are available in the *Rook I Project Glossary.*

**absorbed dose** – The amount of energy deposited by ionizing radiation per unit mass of material. The SI unit for absorbed dose is the gray (Gy), which is equivalent to 1 joule per kilogram (J/kg).

**action level** – A specific dose of radiation that, if reached, may indicate a loss of control of part of a licensee's radiation protection program and triggers a requirement for specific action to be taken.

**administrative level** – A list of specific actions to be taken based on radiological monitoring in the workplace; identified for all radiological hazard types during normal operating conditions and used to verify optimal conditions for workers.

**air-purifying respirator** – A respirator with an air-purifying cartridge, filter, or canister that removes specific air contaminants by passing ambient air through the air-purifying element, including cartridge masks and powered air purifying respirators (PAPRs).

**annual limit on intake (ALI) –** The activity of a radionuclide that, when taken into the body, results in an effective dose of 20 mSv.

**as low as reasonably achievable (ALARA)** – A guiding principle aimed at minimizing the risk of adverse health, safety, environmental, and radiological impacts to the lowest extent practicable, considering technical, legal, social, and economic factors.

**assigned protection factor (APF)** – The anticipated level of respiratory protection that would be provided by a properly functioning respirator or class of respirators to properly fitted and trained users.

**atmosphere-supplying respirator** – A respirator that supplies the user with breathing air/gas from a source independent of the ambient atmosphere.

**becquerel (Bq)** – The SI unit of radioactivity, defined as one nuclear decay per second.

**committed dose (also committed effective dose)** – The dose of radiation, received by an organ or tissue from a nuclear substance during the 50 years after the substance is taken into the body of a person 18 years old or older or during the period beginning at intake and ending at age 70, after it is taken into the body of a person less than 18 years old. Its unit of measurement is the sievert (Sv).

**CNSC** – Canadian Nuclear Safety Commission.

**derived air concentration (DAC) –** The concentration of a radionuclide in air that, when inhaled at a breathing rate of 1.2 $m^3$ per hour for 2,000 hours per year, results in the intake of 1 annual limit on intake (ALI).

**direct reading dosimeter (DRD)** – A monitoring device worn by workers to measure and display the gamma dose rate, and their cumulative dose in real time while in use.

**dose rate** – A measurement of the potential radiation dose relative to time, typically measured in microsieverts per hour (µSv/hr).

**dosimetry** – The process of measuring and assigning a dose of ionizing radiation to a specific individual.

**effective dose** – The sum of equivalent doses multiplied by organ or tissue weighting factors as listed in the *Radiation Protection Regulations*. Its unit of measurement is the sievert (Sv).

**equivalent dose** – A measure of radiation exposure to specific organs and tissues in the human body which correlates to the probability of adverse health effects such as cancer or genetic damage. It is determined by multiplying the absorbed dose by a radiation weighting factor. Its unit of measurement is the sievert (Sv).

**exposure** – Refers to being in the presence of ionizing radiation. This is distinguished from the scientific definition of exposure which is a measure of the ionizing potential of X-rays or gamma rays in air.

**gamma radiation** – Penetrating electromagnetic radiation emitted from an atom's nucleus. Also called gamma rays.

job hazard analysis (JHA) – A hazard identification and control process used to describe each task of a job, the associated hazards, and controls required to mitigate the risk of each hazard and keep workplace exposures to hazards as low as reasonably achievable (ALARA).

**long-lived radioactive dust (LLRD)** – Refers to isotopes within the uranium decay chain with long half-lives that exist in the form of small dust particulates that may be inhaled, ingested, or introduced into the body via wound contamination.

**LRWS** – Saskatchewan Ministry of Labour Relations and Workplace Safety.

**radiation safety officer (RSO)** – A radiation staff member on site responsible for the implementation and oversight of the radiation protection program.

**radiation work permit (RWP)** – Permit used after the completion of a job hazard analysis (JHA) to document exposures during potentially high-risk radiation exposure situations and keep doses as low as reasonably achievable (ALARA).

**radon gas (RnG)** – A radioactive noble gas formed through the alpha decay of radium. Over 99.9% of radon is Rn-222, which originates from the U-238 decay chain.

**radon progeny** (**RnP)** – The short-lived decay products of Rn-222: Po-218 (α-decay), Pb-214 (β-decay), Bi-214 (β-decay), and Po-214 (α-decay).

**respirator** – A device worn to protect the user from inhaling a hazardous airborne contaminant or atmosphere. This includes, but is not limited to, air purifying respirators, supplied-air respirators, self-contained breathing apparatus (SCBA), and escape respirators.

**sievert (Sv)** – The unit of measure for radiation dose. It is typically reported in millisieverts (mSv) or microsieverts (mSv).

**similar exposure group (SEG)** – A group of workers having the same general exposure profile for the occupational health hazard(s) anticipated or being evaluated because of the similarity and frequency of the tasks they perform, the materials and processes with which they work, and the similarity of the way they perform those tasks.

**total effective dose (TED)** – The sum of all effective doses from all radiation sources and exposure pathways, both internal and external to the body. The SI unit for TED is the sievert (Sv).

**working level (WL)** – Unit used to measure radon progeny concentrations in air. It is equivalent to $2.08 \times 10^{-5}$ joules of potential alpha energy per cubic metre ($J/m^3$).

**working level month (WLM)** – Unit of exposure to radon progeny. It is equivalent to inhaling 1 WL of radon progeny for 170 hours (one working month).

# 2.0 Dosimetry Action Levels

Dosimetry action levels correspond to total effective dose results that may indicate a loss of control of the Program. Action levels are considered to have been reached or exceeded when the radiation safety officer (RSO), or designate, confirms the validity of elevated results.

Dosimetry action levels are reviewed annually and updated as necessary based on the best and most current information available.

Action levels do not apply to work planned solely under RWP provided results are consistent with the evaluation made during planning.

## 2.1 Surface Action Levels

Surface workers are not expected to encounter radioactive material except when hauling potentially mineralized rock from underground.

Table 1: Dosimetry Action Levels for Surface Construction

<table>
<tr><th>Effective Dose/Time Period</th><th>Actions Required if<br>Effective Dose/Time Period Met or Exceeded</th></tr>
<tr><td>0.25 mSv/week<br>One week is considered to be seven consecutive working days. Weekly effective dose is obtained from exposure monitoring, DRD results, or official dosimetry.</td><td rowspan="2">1. Notify immediately:<br>a. Site Manager, applicable area manager<br>b. Worker, worker’s supervisor<br>c. Manager, Health, Safety, Environment, Radiation<br>d. RSO<br>2. Notify within 24 hours:<br>a. CNSC<br>b. Saskatchewan Ministry of Labour Relations and Workplace Safety (LRWS)<br>3. Investigate to establish the cause for reaching the action level<br>4. Identify and take action to restore Program effectiveness<br>5. Provide a full report to the CNSC and LRWS within 21 days of initial notification</td></tr>
<tr><td>0.75 mSv/quarter<br>Quarters are considered the three months of an official dosimetry reporting period. Quarterly effective dose is obtained from official dosimetry results whenever possible.</td></tr>
</table>

## 2.2 Underground Action Levels

Underground work includes shaft sinking and mine development. Underground workers are classified as nuclear energy workers (NEWs), as they will potentially encounter radioactive material.

Table 2: Dosimetry Action Levels for Underground Development

| Effective Dose/Time Period | Actions Required if Effective Dose/Time Period Met or Exceeded |
|---|---|
| **1 mSv/week**<br>One week is considered to be seven consecutive working days. Weekly effective dose is obtained from exposure monitoring results. | 1. Notify immediately:<br>a. Site Manager, applicable area manager<br>b. Worker, worker's supervisor<br>c. Manager, Health, Safety, Environment, Radiation<br>d. RSO<br>2. Notify within 24 hours:<br>a. CNSC<br>b. Saskatchewan Ministry of Labour Relations and Workplace Safety (LRWS)<br>3. Investigate to establish the cause for reaching the action level<br>4. Identify and take action to restore Program effectiveness<br>5. Provide a full report to the CNSC and LRWS within 21 days of initial notification |
| **3 mSv/quarter**<br>Quarters are considered the three months of an official dosimetry reporting period. Quarterly effective dose is obtained from official dosimetry results whenever possible. | |
| **5 mSv/half-year**<br>Half-year is considered the first two quarters of the year. Half-year effective dose is obtained from official dosimetry results whenever possible. | |

Action level reporting for both the initial notification and full report follows the content requirements of *REGDOC 3.1.2 Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills*. The process for determining reporting requirements and associated reporting time frames and for initiating and managing this reporting is outlined in the IMS Manual procedure *Incident and Deviation Management.*

## 3.0 Administrative Levels

Exposure monitoring administrative levels are limits set for routine radiation area monitoring. Monitoring results above these limits may indicate an unexpected condition that requires mitigative action. By keeping exposure monitoring results below these limits, general worker doses will be kept ALARA. Radiation monitoring results are obtained according to the Program and its associated procedures and work instructions.

Administrative levels apply to exposure monitoring results measured during routine work in both surface and underground areas. Measurements taken during higher-risk work that is planned and controlled under RWP are not subject to the same administrative level criteria. Doses received under RWP will be added to worker total effective dose.

Based on the radiological exposure assessment performed by Arcadis Canada Inc.[1], the administration levels are appropriate to keep exposures ALARA for the construction phase of the Project.

## 3.1 Exposure Monitoring

### 3.1.1 Gamma Radiation

Gamma radiation administrative levels are limits for area dose rates and total gamma exposure. Gamma measurements are reported as a dose rate in units of microsieverts per hour (µSv/hr), or as a cumulative dose from a direct reading dosimeter (DRD) in microsieverts (µSv). Administrative levels for gamma results measured by the radiation department in the workplace are shown in Table 3, and individual worker DRD results are shown in Table 4.

Table 3: Gamma Dose Rate Administrative Levels

| Level | Gamma Dose Rate (µSv/hr) | Actions Required |
|---|---|---|
| 1 | ≤ 6 | 1. Normal/expected result; continue routine monitoring |
| 2 | > 6 and ≤ 15 | 1. Investigate cause and mitigate, if possible<br>2. Notify RSO and area manager |
| 3 | > 15 and ≤ 60 | 1. Post radiation warning signs<br>2. Investigate cause and mitigate, if possible<br>3. Use RWP and DRD to work in area; inform workers in area to watch DRD for elevated results (see Table 4)<br>4. Notify RSO and area manager |
| 4 | > 60 | 1. As per Level 3, plus:<br>2. Notify Manager, Health, Safety, Environment, and Radiation<br>3. Use DRD and RWP to enter area<br>4. Notify CNSC and LRWS within 72 hours in accordance with IMS procedure *Incident and Deviation Management* |

Table 4: Individual Worker DRD Administrative Levels

| Level | DRD Result (µSv) | Actions Required |
|---|---|---|
| 1 | ≤ 30 per day | 1. Normal/expected result; worker to continue routine work and record results |
| 2 | > 30 and ≤ 120 per day | 1. Worker to record results<br>2. Worker to inform supervisor and the radiation department |
| 3 | > 120 per day | 1. Worker to leave area immediately and notify supervisor and the radiation department<br>2. Supervisor and the radiation department to determine if worker can go back to workplace or if the worker is at risk of exceeding 240 µSv per week<br>3. Supervisor to notify the area manager and Manager, Health, Safety, Environment, and Radiation |
| 4 | > 120 and ≤ 240 total/week | 1. As per Level 3, plus:<br>2. Supervisor to remove worker from area for remainder of week **or** submit written plan to radiation manager and area manager describing how worker's results will not exceed 240 µSv per week<br>3. Radiation department to review worker's DRD results daily for remainder of week |
| 5 | > 240 total/week | 1. Remove worker from area for remainder of week<br>2. Calculate estimated weekly effective dose based on existing exposure monitoring results<br>3. If dosimetry action level has been exceeded, report as per Table 2<br>5. If dosimetry action level has not been exceeded, notify CNSC and LRWS within 72 hours in accordance with IMS procedure *Incident and Deviation Management* |

### 3.1.2 Radon Progeny

Radon progeny administrative levels as described in Table 5 refer to results from grab sample air monitoring by the radiation department. Radon progeny is reported in units of working levels (WLs).

Table 5: Radon Progeny Administrative Levels

| Level | RnP Concentration (WL) | Actions Required |
|---|---|---|
| 1 | ≤ 0.06 | 1. Normal/expected result; continue routine monitoring |
| 2 | > 0.06 and ≤ 0.12 | 1. Resample to confirm result<br>2. If sample is confirmed, investigate cause and mitigate, if possible; notify RSO<br>3. Resample every 24 hours until conditions return to normal<br>4. If 24-hour resample is still elevated, routine work no longer permitted in area and RWP required; rope off area and post warning signs; notify RSO and area manager |
| 3 | > 0.12 and ≤ 0.30 | 1. Resample to confirm result<br>2. If sample is confirmed, investigate cause and mitigate, if possible<br>3. Resample every 24 hours until conditions return to normal<br>4. Routine work no longer permitted in area; RWP required; rope off area and post warning signs; notify RSO and area manager<br>5. RWP work in area must be limited to 6 hours <u>or</u> require appropriate respiratory protection |
| 4 | > 0.30 and ≤ 0.60 | 1. Resample to confirm result<br>2. If sample is confirmed, investigate cause and mitigate, if possible; respiratory protection required<br>3. Resample every 24 hours until conditions return to normal<br>4. Routine work no longer permitted in area; RWP required; rope off area and post warning signs; notify RSO, Manager, Health, Safety, Environment, and Radiation, and area manager<br>5. All essential work in area must be done under RWP using appropriate respiratory protection |
| 5 | >0.60 | 1. Resample immediately to confirm result<br>2. If result is confirmed, suspend operations in the area; workers to leave area immediately; inform supervisor, area manager, and RSO; RSO to notify Manager Health, Safety, Environment, and Radiation, and area manager<br>3. Restrict area and post warning signs; resample every 24 hours until conditions return to normal<br>4. Investigation and remediation of cause or other essential work in area must be done under RWP using appropriate respiratory protection.<br>5. Notify CNSC and LRWS within 72 hours in accordance with IMS procedure *Incident and Deviation Management* |

### 3.1.3 Long-lived Radioactive Dust

Long-lived radioactive dust (LLRD) administrative levels as shown in Table 6 refer to area monitoring results or personal monitoring results collected for similar exposure groups (SEGs). LLRD is reported in units of derived air concentration (DAC), which standardizes the exposure risk of the different types of LLRD (i.e., uranium ore, tailings, or uranium ore concentrate).

Table 6: LLRD Administrative Levels

| Level | LLRD Result (DAC) | Actions Required |
|---|---|---|
| 1 | ≤ 0.15 | 1. Normal/expected result; continue routine work and record results |
| 2 | > 0.15 and ≤ 0.30 | 1. Investigate cause and mitigate, if possible<br>2. Notify RSO and area manager<br>3. For area result, resample within 24 hours if result unexpected<br>4. If SEG result occurs twice in one quarter, perform review to determine if sampling frequency should be increased |
| 3 | > 0.30 and ≤ 0.60 | 1. Investigate cause and mitigate, if possible<br>2. Notify RSO, area manager, and Manager Health, Safety, Environment, and Radiation<br>3. For area result, resample within 24 hours<br>4. For SEG sample, perform review to determine if sampling frequency should be increased<br>5. If corrective actions are implemented, perform additional monitoring to assess adequacy of mitigation |
| 4 | > 0.60 and ≤ 1.20 | 1. As per Level 3, plus:<br>2. Routine work not permitted in area where result was obtained; rope off area and post warning signs<br>3. For area result, resample within 24 hours<br>4. Investigation and remediation of cause or other essential work in area must be done under RWP using appropriate respiratory protection; a urine bioassay sample must be part of the RWP requirements |
| 5 | > 1.20 | 1. As per Level 4, plus:<br>2. Notify CNSC and LRWS within 72 hours in accordance with IMS procedure *Incident and Deviation Management* |

### 3.1.4 Radon Gas

Radon gas administrative levels as shown in Table 7 refer to results from grab sample air monitoring during routine operations. Radon gas is reported in units of Becquerels per metre cubed ($Bq/m^3$). It is expected that radon progeny (RnP) samples are taken alongside all radon gas (RnG) samples.

Table 7: Radon Gas Administrative Levels

| Level | RnG Result ($Bq/m^3$) | Actions Required |
|---|---|---|
| 1 | ≤ 3,000 | 1. Normal/expected result; continue routine work and record results |
| 2 | > 3,000 and ≤ 6,000 | 1. Investigate cause and mitigate if possible.<br>2. Resample within 24 hours if result is unexpected.<br>3. Notify RSO and area manager. |
| 3 | > 6,000 and ≤ 12,000 | 1. Routine work not permitted in area; rope-off and post warning signage; RWP required.<br>2. Investigate cause and mitigate if possible; resample every 24 hours until result returns to normal.<br>3. Notify RSO, area manager, and Manager Health, Safety, Environment, Radiation.<br>4. Perform review to determine if RnP sampling frequency should be increased. |
| 4 | > 12,000 and ≤ 30,000 | 1. As per Level 3, plus:<br>2. Remediation of cause or other essential work in area must be done under RWP using appropriate respiratory protection |
| 5 | > 30,000 | 1. As per Level 4, plus:<br>2. Notify CNSC and LRWS within 72 hours in accordance with IMS procedure *Incident and Deviation Management* |

### 3.1.5 Urine Bioassay

The urine bioassay program is described in the procedure *Urine Bioassay Monitoring*. Urine Bioassay administrative levels refer to the results from bioassay samples provided by workers.

Samples will be collected routinely according to worker exposure risk. Table 8 is based on the Arcadis report *Rook I Project: Evaluation of Uranium Kidney Burden*. Urine bioassay measures the uranium in urine (U in U) concentration and results are reported in micrograms (µg) of uranium (U) per litre (L) of urine.

Table 8: Urine Bioassay Administrative Levels

| Level | U in U Concentration (µg U/L) | Actions Required |
|---|---|---|
| 1 | ≥ 1 and ≤ 3 | 1. Resample required. |
| 2 | > 3 and ≤ 10 | 1. Notify worker, worker's supervisor, and RSO.<br>2. Investigate cause and take corrective actions as needed.<br>3. Remove worker from high LLRD exposure areas and tasks; re-sample daily until result is < 1. |
| 3 | > 10 and ≤ 30 | 1. As per Level 2, plus:<br>2. Notify Manager, Health, Safety, Environment, and Radiation.<br>3. Remove worker from high LLRD exposure areas and tasks and initiate sampling protocols as outlined in procedure *Urine Bioassay Monitoring*.<br>4. Investigate cause and take corrective actions as needed. |
| 4 | > 30 | 1. As per Level 3, plus:<br>2. Notify site manager.<br>3. Notify CNSC and LRWS within 72 hours in accordance with IMS procedure *Incident and Deviation Management.* |

# 4.0 Supplemental Information

## 4.1 Radiation Work Permits

An RWP is an administrative tool for documenting worker exposures during non-routine work. Implementing an RWP requires that exposure risks have been considered during a job hazard analysis (JHA) and qualified workers have selected optimized exposure control options. Use of an RWP typically indicates a situation in which radiation exposure risk may be elevated. As such, radiological hazards are closely monitored to verify exposure controls are adequate and exposures remain ALARA. Since RWPs are not considered routine work situations, area and dose monitoring during an RWP is not within the scope of RCOP administrative and action levels provided the implemented controls are adequate and effective retrospectively. Radiation doses obtained during an RWP contribute to total effective dose.

The process for performing a JHA, initiating an RWP, and using an RWP to plan, implement, control, and evaluate an exposure situation is described in the procedure *As Low As Reasonably Achievable* and its associated work instructions.

## 4.2 Assumptions

The RCOP includes the following assumptions:

- unless otherwise specified, “actions required” are specific to representatives of the radiation department;
- notification, other than for top administrative level exceedances, may take the form of verbal or written communications;
- when notified of an action or administrative level exceedance, workers are required to take any applicable actions outlined in the RCOP or their departmental work instructions; work planned in an area while radiological conditions are elevated must follow the requirements outlined herein;
- notifications to regulators follow the requirements of *REGDOC 3.1.2 Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills*;
- investigations are performed in collaboration with qualified and competent workers (e.g., engineering department, ventilation technicians);
- measurements are only valid if reproduceable and performed according to applicable work instructions within the Program;
- response to elevated results may not be required in areas that are unoccupied; these areas will be regularly monitored with restricted access;
- unless otherwise specified, effective dose calculations follow the methods outlined in *REGDOC 2.7.2 Dosimetry (Volume I), Ascertaining Occupational Dose*;
- administrative and action level values are based on internal modelling results for estimated routine worker exposures performed by Arcadis Canada Inc.; and
- RnP effective dose contributions to action and administrative levels were calculated using the 10 mSv/WLM conversion factor recommended in *ICRP Publication 137: Occupational Intakes of Radionuclides*. This approach supports the ALARA principle throughout all phases of the Project and aligns with regulatory compliance expectations in the event this conversion factor is formally adopted by the CNSC. Official reported doses for RnP will be determined using the CNSC approved dose conversion factor (currently 5 mSv/WLM).

## 4.3 Respiratory Protection

Respirators are not used for protection from radiological hazards unless permission is granted from the RSO. In these situations:

- the work is deemed essential;
- the work is considered hazardous to perform without respiratory protection;
- a JHA must be performed; and
- the work must be performed under RWP.

According to the hierarchy of controls, personal protective equipment, including respirators, should be considered the last line of defense. Respirators should not be used unless all other options for keeping worker exposures ALARA have been exhausted.

Both air-purifying respirators and atmosphere-supplying respirators are in use at the Project. Only atmosphere-supplying respirators may be used for protection from radon gas.

Respirator use for non-radioactive contaminants is outside the scope of the Program. Respirators used for protection from other contaminants where radiation is also present will not receive dose reduction credit unless that work is performed under RWP.

More information is outlined in the *Rook I Health and Safety Program* procedure *Respiratory Protection*, which aligns with the requirements of *CSA Z94.4-18 Selection, use and care of respirators.*

Workers wearing respiratory protection to protect from radiation hazards must meet the following criteria:

- a JHA has been performed and RWP is used to plan and control the work;
- workers have been trained and fit tested for the respirators used;
- workers adhere to their responsibilities for respirator use, care, and maintenance as described in the procedure *Respiratory Protection,* which includes but is not limited to maintaining an interference-free seal to the face when using tight-fitting facepieces, including being clean shaven (i.e., no facial hair) and preventing jewelry, clothing, cosmetics, or other PPE from affecting respirator seal or operation; and
- personal radiation dosimeters for RnP or LLRD (or RnG if available) are removed before working while using a respirator (Note: Alternate methods are implemented for determining radiological exposure.).

# 5.0 References

## 5.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-RAD-PGM-00001 | *Rook I Radiation Protection Program* |
| ROOK-HSF-PGM-00001 | *Rook I Health and Safety Program* |
| ROOK-RAD-PRO-00001 | *As Low as Reasonably Achievable* |
| ROOK-HSF-PRO-00005 | *Respiratory Protection* |
| ROOK-IMS-PRO-00008 | *Incident and Deviation Management* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| N/A | Arcadis Canada Inc (Apr 2025). *Rook I Project: Construction Phase Radiological Exposure Assessment* |

## 5.2 External

- Federal
  - *Nuclear Safety and Control Act*
    - *Uranium Mines and Mills Regulations*
    - *Radiation Protection Regulations*
    - *REGDOC 3.1.2 Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills*
    - *G-218 Preparing Codes of Practice to Control Radiation Doses at Uranium Mines and Mills*
    - *REGDOC 2.7.1, Version 1.1 Radiation Protection*
    - *REGDOC 2.7.2 Dosimetry (Volume I), Ascertaining Occupational Dose*
  - *CSA Z94.4-18 Selection, use, and care of respirators*
- Other
  - *ICRP PUBLICATION 137 Occupational Intakes of Radionuclides: Part 3 ICRP 137 (Chapter 12), SAGE 2017*

# Health and Safety Program
# ROOK-HSF-PGM-00001

NexGen Energy Ltd.

# Rook I Project

## Health and Safety Program

ROOK-HSF-PGM-00001

June 2023

# Record of Revisions

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| 0 | 15-Dec-2021 | Issued Final | J. Henderson | K. Oakes | T. George |
| 1 | 31-Oct-2022 | Issued Final | J. Henderson | R. Paine | L. Moger |
| 2 | 29-Jun-2023 | Issued Final | J. Henderson | W. Anderson<br>R. Paine | L. Moger |

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# 1.0 Introduction

The *Rook I Health and Safety Program* (Program) outlines the systematic and risk-based approach to managing occupational health and safety hazards as part of the NexGen Energy Ltd. (NexGen) Rook I Project (Project). It provides the framework and describes the processes for maintaining active worker engagement, compliance, enabling continual improvement, and fostering a culture where protecting the health and safety of workers and the environment is a principal consideration guiding decisions and actions.

This Program is part of the *Rook I Integrated Management System* (IMS). All aspects of the IMS are subject to the *Rook I Integrated Management System Policy* (Policy) which provides the foundation for NexGen's approach to health, safety, and well-being. The Program and its relationship to other IMS programs within the IMS hierarchy is shown in Figure 1. As a component of the IMS, this Program follows the Plan-Do-Check-Act cycle to identify, control, monitor, and continually improve processes for workers, the public, and the environment.

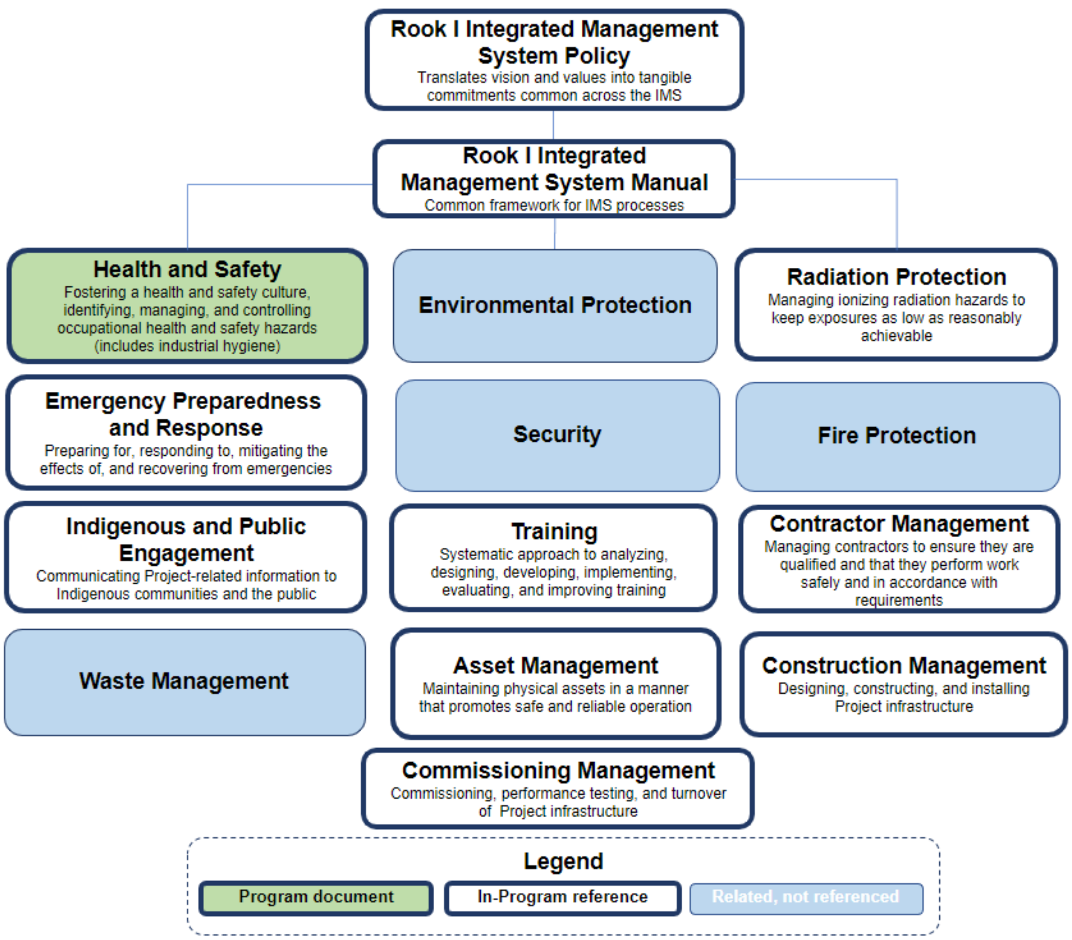



Figure 1: Program Context Within the IMS

## 1.1 Purpose

This Program describes the Project's principles, processes, and framework for effectively managing worker health, safety, and well-being and for fostering a strong health and safety culture for the Project. This Program aligns with and meets all requirements of the references outlined in section 6.0, including the *Nuclear Safety and Control Act, The Saskatchewan Employment Act,* and associated regulations.

## 1.2 Scope

The scope of this Program includes planning, delivering, evaluating, and improving Project processes for effectively managing risks and continually improving worker health, safety, and well-being. The processes outlined as part of this Program apply to all workers performing licensed activities during the site preparation, construction, and commissioning phase of the Project.

This Program uses a graded, risk-based approach to implementing processes related to worker health, safety, and well-being that accounts for the apparent level of risk, safety significance, and complexity of an activity.

Occupational health risks arising from ionizing radiation fall within the scope of the *Rook I Radiation Protection Program*. To protect overall worker health, this Program and the *Rook I Radiation Protection Program* are implemented in an integrated manner, wherever practicable.

## 1.3 Program Principles

NexGen recognizes the importance of worker health, safety, and well-being to achieve Project outcomes of safety and reliability, while maintaining the approach to preventing workplace injury, illness, and disease. This approach to health and safety is reflected in the following Program principles:

- protecting and promoting the health and safety of workers and the environment through all aspects and phases of the Project;
- establishing a strong health, safety, and environment culture which is periodically assessed and continually improved;
- fostering health and safety in IMS programs requiring safe behaviour and empowering workers to be health and safety leaders;
- identifying, assessing, and managing occupational health hazards such that exposure risks to workers are as low as reasonably achievable (ALARA);
- verifying workers have the knowledge, skills, and tools to perform their duties safely and in a manner that protects the environment;
- complying with applicable legal and other requirements; and
- continually improving Program performance.

## 1.4 Health and Safety Culture

NexGen is committed to fostering a strong health and safety culture that is aligned with its values and empowers workers to be health and safety leaders.

In alignment with the Policy, the health and safety culture:

- values employee and contractor input;
- promotes proactive prevention of workplace injury, illness, and disease; and
- enables continual improvement.

## 1.5 Terminology

Terminology introduced in this Program is provided below. A comprehensive list of common terms applicable to this Program and the IMS are available in the *Rook I Project Glossary.*

**as low as reasonably achievable (ALARA)** – Minimizing the risk of adverse health, safety, environmental, and radiological impacts to the lowest extent practicable, considering technical, legal, social, and economic factors.

**field level hazard assessment (FLHA)** – A process of hazard identification and control (mitigation) in work planning conducted by all personnel involved in performing a task. An FLHA is conducted in the field.

**incident** – Occurrence arising out of, or in the course of, work that could or does result in injury and ill health, or an impact on the environment, radiation protection, emergency response, security, production, financial loss, or property damage (adapted from ISO 45001).

**integrated management system (IMS)** – A common framework of programs, plans, procedures, work instructions, and other supporting documentation describing management system processes for achieving Project objectives and completing work safety, reliably, and consistently while conforming to internal requirements and complying with legal requirements.

**job hazard analysis (JHA)** – A hazard identification and control process used to describe each task of a job, the associated hazards, and controls required to mitigate the risk of each hazard and keep workplace exposures to hazards ALARA.

**key performance indicator (KPI)** – A quantifiable measure used to evaluate the success of a process or organization in meeting performance objectives. A KPI must be consistently measurable, comparable to a target, and display change over time (i.e., trending).

**licensed activities** – Project activities within the scope of Canadian Nuclear Safety Commission (CNSC) licensing. Project site-based activities that may be outside the scope of CNSC licensed conditions are subject to the integrated management system on a risk-informed basis (i.e., where the consequence of human error poses a risk to the environment, the health and safety of people, or to the security of Project facilities).

**personal protective equipment (PPE)** – Includes equipment an individual may use to minimize hazards associated with doing a particular task. This includes, but is not limited to, safety glasses, gloves, hard hats, safety boots/shoes, coveralls, respirators, and harnesses.

**prime contractor** – Entity responsible for overseeing the safe execution of all work on-site within the scope of a defined construction project, who is either the worksite owner or a contractor who has entered into a written agreement with the owner to perform the duties of prime contractor.

**safe work practice** – A governing document outlining the foundation for the safe execution of a specific type of work or job by providing a mandatory set of minimum standards for the work to be done. Safe work practices are commonly referred to as the “Do’s and Don’ts” around a job.

**work instruction** – A document that sets out the sequential steps for completing a particular task in a safe manner.

**worker** – Any person working for NexGen, including a contractor.

# 2.0 Plan

The *Plan* component of this Program includes processes that support a systematic, risk-based approach to prioritizing health and safety when planning Project activities. Elements of planning include:

- identifying and communicating health and safety hazards and assessing the associated risks;
- setting Program-specific objectives and targets to implement Program processes;
- verifying workers are competent and adequately trained to perform work safely;
- providing the appropriate parties with the information and resources necessary;
- managing change to process, personnel, design, facilities, and equipment; and
- preparing for emergencies.

## 2.1 Risk Management

The risk management process includes identifying Project-related hazards that could affect the health and safety of workers or the environment, assessing the significance of the associated risks, and managing the risks to acceptable levels through the application of controls as described in section 3.1. The multi-layered approach to routinely and effectively managing health and safety risks for personnel and the environment is outlined in the *Rook I Integrated Management System Manual (*IMS Manual).

Supplementary Program-specific risk management processes include, but are not limited to, job task observations, job hazard analyses (JHA), field level hazard assessments (FLHA), and periodic workplace inspections as described in section 4.2.

### 2.1.1 Hazard Identification

Health and safety hazards are circumstances, conditions, or characteristics of chemical, physical, biological, or psychosocial agents that can cause harm in the form of physical injury, illness, or disease. Examples of health and safety hazards are provided in Table 1. Hazards are identified, documented, and tracked in a manner that is appropriate for the type of risk assessment performed (e.g., FLHA, JHA).

Processes and procedures related to the identification, assessment, and control of ionizing radiation hazards are outside of the scope of this Program and are outlined in the *Rook I Radiation Protection Program.* Human factors considerations are identified and integrated in the design and development of Project facilities, systems, components, and processes.

Table 1: Types of Health and Safety Hazards

| Category | Type | Examples |
|---|---|---|
| Health | Chemical | Particulates (dust), gas, vapour, fume, mist, or liquid |
| | Physical | Noise and vibration, thermal stressors (hot/cold), non-ionizing and ionizing radiation, repetitive movements, awkward or static postures, vibration |
| | Biological | Bacteria, fungi, viruses derived from living organisms |
| | Psychosocial | Fatigue, stress, workplace violence/bullying |
| Safety | Physical | Pinch points, hazardous energy, working at heights, struck by material/equipment, dropped or falling objects, interaction with mobile equipment, confined space, combustible/explosive products, explosives handling, ground movement, water inflow, slips and trips, material handling, acute exposure to hazardous substances, animal attacks, insect bites and stings |

### 2.1.2 Risk Assessment

Following the identification of health and safety hazards, risks to worker health, safety, and the environment are assessed with consideration for a range of factors, including:

- who is affected;
- the potential injury or exposure;
- the severity of the risk exposure; and
- the frequency and duration of exposure to the hazard.

Health and safety risk criteria that correlates to the severity, frequency, and duration of injury or exposure is defined in a risk matrix appropriate for the type of assessment being performed.

Information from the risk assessment process is used to identify appropriate controls that effectively mitigate risk to acceptable levels. Controls are described in section 3.1.

### 2.1.3 Risk Register

Documented risk registers are maintained to record and track relevant information regarding health and safety, risks, and controls. Controls are implemented, monitored, and maintained to protect worker health and safety. Risk registers are periodically reviewed and updated (as necessary) to assist with decision-making, improvement opportunities, and changes to health and safety processes.

Risk registers are maintained in accordance with the requirements and frequency outlined in the IMS Manual.

## 2.2 Objectives and Targets

Program objectives and targets are established at regular intervals, linked to clear accountabilities, and tracked using key performance indicators (KPIs). Actions are formulated with the goal of achieving objectives and targets that result in improvements to health and safety processes and Program outcomes.

The process for setting and managing objectives and targets, including establishing KPIs, is outlined in the IMS Manual.

## 2.3 Resources

Rook I management is committed to providing the necessary resources to establish, implement, maintain, and continually improve this Program and its associated processes. In addition to providing the required financial resources necessary to achieve objectives and meet requirements, management provides the infrastructure, work environment, and competent personnel necessary to implement the Program and foster a strong health and safety culture.

### 2.3.1 Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Program. Workers are informed of their roles and responsibilities and are accountable for understanding and fulfilling them. The Project's prime contractor performs their role in accordance with the scope and requirements of this Program and its supporting information and as required in accordance with *The Saskatchewan Employment Act*.

Although NexGen maintains overall accountability for Project activities, the term Rook I is used in the following role descriptions to reinforce that the role is applicable and may be assigned to NexGen employees and contractors performing work on behalf of the Project.

## NexGen Executive

NexGen executive is accountable for:

- establishing the corporate direction, strategy, and policies;
- promoting behaviours that support a robust health and safety culture;
- promoting and encouraging the application of conservative decision making where health and safety risks are present;
- promoting the understanding that safety is a principal consideration guiding decisions and actions;
- communicating with external stakeholders as appropriate; and
- providing adequate resources to deliver the requirements of this Program.

## Rook I Management

Rook I management is accountable for:

- maintaining effectiveness of this Program;
- promoting a culture where safety is a principal consideration guiding decisions and actions at all levels of the Project;
- approving annual Program objectives and targets;
- promoting the integration of Program requirements into Project phases and processes;
- communicating the importance of effective management and of conforming to Program requirements;
- allocating adequate and appropriate resources to fulfill Program implementation;
- developing proper documentation and tools to implement this Program effectively;
- controlling health and safety incidents and deviations and directing corrective action when required;
- participating in the management review process;
- monitoring and reporting on Program performance and effectiveness to the NexGen executive;
- providing independent oversight of processes through monitoring and auditing activities; and
- identifying and pursuing opportunities to achieve continual improvement.

## Program Management

Program management is responsible for:

- overseeing the development, implementation, and adherence to this Program;
- demonstrating and promoting a positive health and safety culture;
- communicating with the applicable regulatory agencies (e.g., CNSC) on behalf of the Project;
- setting annual objectives and targets, monitoring performance, and preparing internal and external reports regarding Program activities and outcomes;
- confirming compliance with regulatory requirements and conformance with Program requirements;
- confirming workers have the necessary competence, training, and awareness of Program requirements;
- working with applicable departments to confirm that Program roles and responsibilities are identified and described and that those with specific responsibilities are qualified to fulfill their roles;
- communicating with external stakeholders, as appropriate;
- providing independent oversight of processes through monitoring and auditing activities;
- reporting on Program performance and effectiveness to Rook I management;
- facilitating management review of this Program; and
- promoting, identifying, and supporting continual improvement through Program evaluation.

## Program Coordination

The Program coordinator is responsible for:

- demonstrating and promoting a positive health and safety culture;
- leading the development, implementation of, and adherence to Program procedures and work instructions;
- providing subject matter expertise and health and safety-focused support;
- conducting health and safety incident investigations and initiating applicable regulatory reporting when assigned;
- maintaining Program-specific data and records in a secure and controlled manner;
- preparing and supporting management review and maintaining associated records, including tracking the decisions and actions stemming from the review;
- verifying monitoring processes are implemented in accordance with Program and regulatory requirements; and
- verifying department personnel meet and maintain required Program-specific training qualifications.

## Rook I Supervision

Rook I supervisors are responsible for:

- demonstrating and promoting a culture where safety is a principal consideration at all levels of the Project;
- understanding and following this Program and its requirements;
- overseeing department functions and supervising direct reports to verify conformance to Program requirements;
- supporting the achievement of Program objectives and targets;
- conforming to Program procedures and training;
- supervising direct reports regarding conformance to Program requirements;
- supporting direct reports in planning work activities to mitigate health and safety risks;
- communicating and coordinating with other departments to facilitate effective implementation of this Program;
- communicating with and directing contractors, as appropriate;
- participating in audits investigations, and inspections, as required;
- participating in management reviews, as required; and
- identifying and supporting opportunities for continual improvement.

## Rook I Workers

Workers are responsible for:

- demonstrating and promoting a positive health and safety culture;
- understanding and following health and safety processes and procedures;
- working towards achieving objectives and targets in areas of assigned responsibility;
- recognizing, identifying, and promptly communicating occupational health and safety hazards or opportunities for improvement to prevent injury, illness, and disease to themselves or other workers;
- adhering to established and applicable use, care, and maintenance procedures for occupational exposure and injury controls;
- using all equipment, devices, facilities that are intended for the protection of safety and health in accordance with procedures and training;

- adhering to Project-specific processes established to protect and promote health and safety;
- taking all reasonable precautions to maintain the health and safety of workers including immediately stopping any work deemed to be unsafe;
- participating in health and safety risk assessment processes, including but not limited to, occupational exposure monitoring programs, as required; and
- co-operating with auditors, regulators, investigators, and inspectors, as required.

#### Rook I Occupational Health Committee (OHC)

The Rook I Occupational Health Committee is responsible for:

- promoting a positive health and safety culture throughout all levels of the Project;
- representing the workforce in contributing to Program development, improvements, and implementation including, but not limited to, hazard identification, risk assessment, and control implementation;
- communicating worker health and safety concerns to promote general awareness and mitigation of hazards and associated risks;
- participating in incident investigations, as required; and
- collaborating with health and safety personnel and representatives to prevent occupational injury, illness, and disease.

### 2.3.2 Facilities and Equipment

Facilities are designed, constructed, operated, and maintained with consideration for worker health and safety. Facilities and equipment supporting the effective implementation of this Program and its associated processes are provided to workers (e.g., the facilities necessary to properly clean, store, and maintain personal protective equipment).

Appropriate fixed and portable equipment and personal protective equipment (PPE) used to prevent, eliminate, or reduce injury, illness, and disease are available at the Project. This includes, but is not limited to:

- fire suppression systems;
- safeguards;
- building and mine ventilation systems;
- dust suppression systems;
- area and personal air monitoring systems; and
- PPE.

Monitoring equipment used to collect, analyze, and quantify data regarding chemical, physical, and biological hazards is also available. Equipment is operated and maintained by competent personnel in accordance with the manufacturer's specifications and the applicable analytical methods.

Facilities and equipment meet or exceed applicable provincial and federal health and safety standards, codes, and regulations. Facilities and equipment design and construction is outlined in the *Rook I Construction Management Program* and the *Rook I Commissioning Management Program*. Facilities and equipment maintenance is outlined in the *Rook I Asset Management Program*.

### 2.3.3 Occupational Health Committee

The Occupational Health Committee consists of NexGen employees and management representatives who meet on a regular basis to consider and disposition health and safety issues. Management representatives are appointed or designated by NexGen, while worker members are elected by their peers as representatives of health and safety interests.

Contractors may establish their own Occupational Health Committee when the number of contractors and their time working on site meets or exceeds minimum thresholds established by *The Occupational Health and Safety Regulations, 2020*. Otherwise, the contractor may have management and worker representatives on the Project Occupational Health Committee.

The Occupational Health Committee is integral in identifying, assessing, and controlling workplace health and safety hazards. Members are considered valuable resources for establishing, promoting, and improving health and safety processes and practices.

The Occupational Health Committee collaborates with Project health and safety protection personnel on behalf of the workforce to maintain a healthy and safe workplace. Information regarding Project safety collaboration is outlined in the *Rook I Contractor Management Program*.

Further details of the organizational structure and responsibilities of the committee are described in the procedure *Occupational Health Committees.*

### 2.3.4 Legal and Other Requirements

NexGen is committed to conforming to internal processes and complying with applicable legal and other requirements. Health and safety procedures, safe work practices, and work instructions are developed with consideration for applicable legal requirements including the provincial and federal regulations referenced in section 6.2. Changes to applicable internal and external requirements are monitored and evaluated to identify whether updates to this Program or related health and safety processes are required. The process for managing legal and other requirements is outlined in the IMS Manual.

## 2.4 Training and Competence

Appropriate and timely training is integral to the use, care, and maintenance of controls applied to protect worker health and safety. The Project follows a systematic approach to training (SAT) to educate, train, and qualify employees and contractors to carry out the work assigned to them. Training requirements are monitored to verify all workers have the training they require, when they require it, to maintain competency and work safely. Program-specific training requirements, including tracking worker credentials and qualifications for expiry, are outlined in the *Rook I Training Program.*

All workers and visitors are required to participate in site orientation upon their arrival, which includes information on camp policies, and expectations of personal conduct while at the site. Site orientation is developed using the SAT process to confirm critical information for new personnel is included.

## 2.5 Documented Information

Information, including the identification of critical facilities and equipment, as well as documents and records generated for or as a result of licensed activities, are controlled to verify information is accurate, available when needed, and protected from uncontrolled alteration.

The processes for managing and maintaining facility and equipment identification are outlined in the *Rook I Asset Management Program.*

Documents include health and safety procedures, safe work practices, and work instructions. Records include completed inspection forms, work permits, and occupational health exposure monitoring data. Documents and records are readily accessible to those that require them. Occupational exposure and health records are managed in accordance with applicable privacy legislation.

The process for managing documents and records is outlined in the IMS Manual.

## 2.6 Communication

Effectively communicating health and safety information to workers is vital for updating safety issues that may affect them and maintaining a strong health and safety culture. Tools used to communicate health and safety information related to the Project include, but are not limited to:

- routine safety moments to be incorporated into formal meetings and training courses;
- safety-focused toolbox meetings;
- significant incident debriefings;
- workplace safety posters;
- health and safety bulletin boards; and
- town hall meetings.

Workers are made aware of their duties and responsibilities and changes to personnel, processes, facilities, or equipment are communicated to those who are affected as required.

Internal and external communication principles and processes are further outlined in the IMS Manual. Communication practices specific for local Indigenous groups, local communities, and the public are outlined in the *Rook I Indigenous and Public Engagement Program*.

## 2.7 Change Management

Change is managed to maintain protection of worker health and safety, the environment, facilities, and equipment, and to promote consistent and effective execution of Project processes. This includes changes to Project:

- design;
- facilities;
- equipment;
- management system processes;
- organizational structure;
- key roles and responsibilities;
- documentation; and
- legal and other requirements.

Changes are evaluated with consideration for impact to this Program and the related health and safety processes. This maintains that:

- change is clearly defined;
- risks associated with change are assessed and managed;
- change is communicated to those affected; and
- related documentation is updated.

The change management process is outlined in the IMS Manual. Changing conditions encountered during work execution affecting health and safety practices are managed through the *Job Hazard Analysis* and *Field Level Hazard Assessment* as described in the health and safety procedure *Hazard Management*.

## 2.8 Emergency Preparedness and Response

Preparing for and responding to emergency events and situations is critical to minimizing the potential impact on worker health and safety. The *Rook I Emergency Preparedness and Response Program* (EPRP) describes the framework, principles, and processes used to prevent, plan for, effectively and safely respond to, and mitigate the effects of emergency events and situations.

The framework outlined in the EPRP is further detailed in three supporting plans that outline requirements for preparing for and responding to emergencies:

- Project emergencies (surface and underground) are outlined in the *Emergency Response Plan.*
- Transportation emergencies are outlined in the *Ground Transportation Emergency Response Plan*.
- Crisis events are outlined in the *Crisis Management Plan*.

These plans have been developed in consultation with health and safety subject matter experts and include information for protecting personnel as well as the roles and responsibilities for health and safety subject matter experts.

# 3.0 Do

The *Do* component of the Program includes implementing controls to mitigate health and safety risks as described in section 2.1. This includes implementing risk management controls, equipment maintenance, contractor management, and reporting incidents and deviations.

## 3.1 Health and Safety Risk Controls

The controls identified during risk assessment are used to eliminate, prevent, or reduce the risk of injury, illness, or disease to workers. Controls appropriate for the hazard and corresponding level of risk are selected and implemented with consideration for the hierarchy of controls as outlined in Figure 2. Examples of controls include facilities, equipment, processes, products, safe work practices, and PPE.

Where practicable and advisable, controls are used in combination to effectively prevent or reduce worker risk. Controls are used, operated, and maintained in accordance with their design, limitations, and applicable training and documentation.

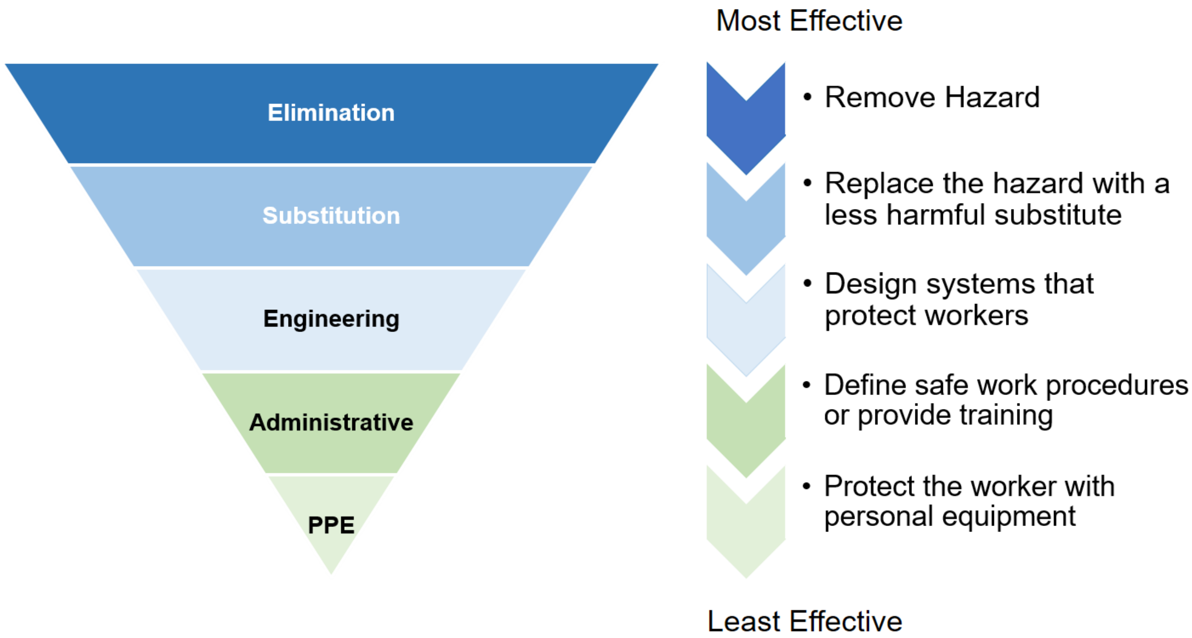



Figure 2: Hierarchy of Controls

### 3.1.1 Elimination

A hazard should be removed whenever practicable (e.g., working at heights can be eliminated by moving the piece being worked on to the ground).

### 3.1.2 Substitution

Consideration should be given to replacing an item which produces a hazard when it is not possible or practicable to eliminate the hazard (e.g., a toxic chemical can be replaced with a less toxic one).

### 3.1.3 Engineering Controls

Engineering controls may be used when completely removing or replacing a hazard is not possible or practicable. Engineering controls involve designing facilities, equipment, and systems in a manner that reduces hazard exposure (e.g., ventilation is the main engineering control for reducing occupational exposures to dust and other airborne contaminants while underground or in the mill at the Project).

Any design changes made to implement new or modify existing engineering controls are subject to the change management process outlined in the IMS Manual. Any changes to the Project licensing basis must receive regulatory approval.

### 3.1.4 Administrative Controls

Administrative controls are an essential component of risk mitigation and are typically used in combination with other types of controls. Administrative controls include training, supervision, and written policies, rules, and processes.

## Procedures, Safe Work Practices, and Work Instructions

Instructions for completing tasks associated with licensed activities may be documented in the form of plans, procedures, and work instructions if a risk assessment determines it to be appropriate. Work planning documentation is subject to the documented information process as outlined in the IMS Manual.

## Work Permits

Written work permits that detail controls in place to protect workers may be required for completing certain Project tasks. The requirement for a work permit depends on the risk of the associated activity. Work permit topics include:

- working in a confined space;
- performing welding and cutting (e.g., hot work);
- performing tasks with the potential for hazardous energy; and
- performing a critical lift.

Work permits are valid only for the tasks for which they are issued and are subject to review and revision if unplanned changes to scope or nature of work are encountered. Tasks requiring work permits are periodically checked by competent personnel to confirm task-specific work permit requirements are followed. The work permit process, including the frequency of performing checks, is further outlined in the health and safety procedure *High Potential Risk Control*.

The radiation work permit process is outlined in the *Rook I Radiation Protection Program*.

## Job Hazard Analysis

A JHA is completed for new or non-routine jobs that do not have supporting work instructions or safe work practices, or are classified as critical jobs (e.g., welding in a confined space). The JHA is completed in advance of the job start by supervision and competent workers, with assistance from qualified personnel when required. The JHA process breaks a task down into its steps, identifies hazards that may be present, and develops controls to maintain worker health and safety. Requirements for completing a JHA are described in the health and safety procedure *Hazard Management.*

## Field Level Hazard Assessment

An FLHA is completed by workers prior to performing licensed field activities. The FLHA involves conducting a simplified risk assessment for potential hazards observed by workers in their areas of work.

Hazards discovered while conducting an FLHA that pose significant risk to worker health and safety are documented, reported, and subject to risk management processes as outlined in the IMS Manual. The requirements for completing FLHAs are described in the health and safety procedure *Hazard Management.*

## Signage

Appropriate signage notifying workers of workplace hazards, restrictions, or requirements are posted throughout the Project. This includes signage at entrances to confined space and work areas or facilities that require specialized PPE. Signage is designed with consideration for applicable regulatory requirements, is legible and visible, and is removed when no longer required.

## Warning Systems

Where required or practicable, audible, visual, or smellable notification systems are installed to warn workers of a change in work environment or change in equipment function that could affect their health and safety. Warning systems include, but are not limited to, fire alarms and stench gas for underground workings. Warning systems are tested according to applicable requirements to confirm that they remain functional.

### 3.1.5 Personal Protective Equipment

PPE includes protective clothing, hard hats, safety glasses, gloves, or other garments or equipment (e.g., respirators) designed to protect from injury or infection. PPE is considered the last line of defense and is typically used in combination with other types of controls. PPE required to complete work safely is made available and is periodically inspected to verify it has not passed the date of expiry or become damaged during use.

The selection, provision, use, and maintenance of general PPE is outlined in the procedure *Personal Protective Equipment.* The selection, provision, use, and maintenance of respiratory equipment is outlined in the procedure *Respiratory Protection*. The selection, provision, use, and maintenance of hearing protection equipment is outlined in the procedure *Hearing Loss Prevention*.

## 3.2 Equipment Procurement and Maintenance

Equipment and material procured for implementation of this Program is subject to the requirements outlined in the IMS Manual. Equipment is stored, maintained, and calibrated with consideration of the frequency and type of use as well as the manufacturer or stated regulatory specifications as outlined in the *Rook I Asset Management Program*.

## 3.3 Contractor Management

Contractors performing work at the Project are subject to the requirements of this Program or an equivalent health and safety management system that has been formally authorized by NexGen for use at the Project. The process for verifying contractors adhere to requirements, including the process for vetting and authorizing contractor health and safety management systems, is outlined in the *Rook I Contractor Management Program.*

## 3.4 Incident and Deviation Reporting

All workers and visitors are required to report information regarding health, safety, and environmental incidents (including near-misses) and deviations. Near-misses are events or situations where an injury or occupational exposure could have occurred but was avoided.

Reported information is documented and tracked according to the IMS Manual. Incidents and deviations that meet or exceed applicable legislated reporting thresholds, including those that are reportable according to *The Occupational Health and Safety Regulations, 2020*, *The Mines Regulations, 2018*, and Section 29 of the *General Nuclear Safety and Control Regulations,* are reported to applicable regulatory representatives within legislated timelines.

The process for providing information regarding reportable events or situations to internal and external parties is outlined in the IMS Manual.

# 4.0 Check

The *Check* component of this Program consists of ongoing performance monitoring, periodic audits and inspections, reviews, and analysis of results to verify that the Program is operating effectively.

## 4.1 Monitoring and Measurement

Management system processes are continually monitored and measured to evaluate whether Project activities and outcomes meet internal and external requirements. Program-specific monitoring and measurement includes, but is not limited to, occupational health assessments and occupational exposure and workplace monitoring.

General monitoring and measurement processes and requirements are outlined in the IMS Manual.

### 4.1.1 Occupational Health

Occupational health assessments are performed as required to evaluate changes to worker health due to exposure to industrial hygiene or occupational health hazards. Changes in a worker's health status may indicate lack of exposure controls, inappropriate use of controls, or factors outside of the workplace that could be affecting the same areas of the body (e.g., noise exposure causing noise-induced hearing loss).

Occupational health assessments benefit the worker by providing knowledge of occupational health hazards and the appropriate protection from these hazards. Results from occupational health assessments are collected, maintained, stored, and communicated in alignment with the procedure *Occupational Health.*

### 4.1.2 Occupational Exposure and Workplace Monitoring

Where occupational exposure monitoring is required for chemical, physical, or biological agents, established sample collection and analysis methods are used to quantify exposure risk. Results from personal occupational exposure and workplace monitoring are collected, maintained, stored, and communicated in alignment with the procedure *Occupational Exposure Monitoring.*

Review and analysis of personal exposure and workplace monitoring results are performed on an established basis to identify trends or abnormal results and to take appropriate corrective actions. Any exceedances of established internal or external regulatory limits are reported in accordance with the processes outlined in the IMS Manual. Investigations are initiated and corrective actions implemented as required in accordance with the corrective action process outlined in the IMS Manual.

## 4.2 Inspections and Audits

The performance and effectiveness of this Program and its associated procedures are monitored and verified with regular conformance audits. Qualified personnel independent of the work being assessed conduct audits as outlined in the IMS Manual.

In addition to audits, routine internal inspections are conducted by workers as part of managing risks. Workplace inspections, including pre-mobilization and pre-use of equipment, are used to evaluate the work environment, equipment, and processes to determine existing and potential hazards.

Workplace inspections are also used to monitor the effective use of controls, including supervisor and contractor oversight. Workplace inspection scope, criteria, and frequency are discussed in relevant IMS programs and the supporting procedures and work instructions as applicable. Quarterly workplace inspections are conducted by the Project Occupational Health Committee. External audits and inspections are conducted by regulators as required.

Deviations, instances of regulatory noncompliance, or opportunities for improvement identified through audits or inspections are managed as outlined in the IMS Manual.

## 4.3 Management Review

This Program and supporting processes are subject to regular review and evaluation by Rook I management. In addition to the general topics outlined in the IMS Manual, inputs specific to health and safety include, but are not limited to:

- results of health and safety culture monitoring and assessments;
- status of health and safety objectives and targets;
- trends in injuries, exposures, or deviations;
- occupational exposure monitoring results;
- year-to-year comparison of injury rate;
- audit and inspection findings; and
- status of corrective actions.

The management review process is outlined in the IMS Manual.

# 5.0 Act

The *Act* component of this Program consists of facilitating continual improvement and verifying that, when required, appropriate corrective actions are taken and managed. The results of these program elements feed back into *Plan* to complete the Plan-Do-Check-Act cycle.

## 5.1 Corrective Action Process

Health and safety incidents, including near-misses and deviations to this Program, are evaluated and investigated as required. Appropriate actions are developed and implemented to correct and prevent reoccurrence. Corrective actions are planned, implemented, verified, and reviewed for effectiveness commensurate with the risk level. The corrective action process is outlined in the IMS Manual.

## 5.2 Continual Improvement

Continual improvement is an ongoing process to improve the suitability, adequacy, and effectiveness of the IMS. Workers continually seek out improvement opportunities for the IMS and Project processes through Program monitoring, auditing, and management review as well as maintaining awareness of changes in the business environment. Improvement may also involve benchmarking Project performance against other projects and facilities.

Use of experience gained during Project construction and commissioning, including information gathered from relevant external sources, informs improvement opportunities.

Potential sources of information include:

- worker experience;
- government and industry publications;
- industrial peer information exchange;
- professional associations;
- monitoring results;
- lessons learned; and
- incident investigations.

Continual improvement opportunities are identified, documented, evaluated, and implemented as required in accordance with the process outlined in the IMS Manual.

# 6.0 References

## 6.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-CHT-00001 | *Rook I Organizational Chart* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-RAD-PGM-00001 | *Rook I Radiation Protection Program* |
| ROOK-TRN-PGM-00001 | *Rook I Training Program* |
| ROOK-EMG-PGM-00001 | *Rook I Emergency Preparedness and Response Program* |
| ROOK-EMG-PLN-00001 | *Emergency Response Plan* |
| ROOK-EMG-PLN-00002 | *Ground Transportation Emergency Response Plan* |
| ROOK-EMG-PLN-00003 | *Crisis Management Plan* |
| ROOK-AST-PGM-00001 | *Rook I Asset Management Program* |
| ROOK-CON-PGM-00001 | *Rook I Contractor Management Program* |
| ROOK-CST-PGM-00001 | *Rook I Construction Management Program* |
| ROOK-COM-PGM-00001 | *Rook I Commissioning Management Program* |
| ROOK-HSF-PRO-00001 | *Hazard Management* |
| ROOK-HSF-PRO-00002 | *High Potential Risk Control* |
| ROOK-HSF-PRO-00003 | *Occupational Exposure Monitoring* |
| ROOK-HSF-PRO-00004 | *Personal Protective Equipment* |
| ROOK-HSF-PRO-00005 | *Respiratory Protection* |
| ROOK-HSF-PRO-00006 | *Hearing Loss Prevention* |
| ROOK-HSF-PRO-00007 | *Occupational Health* |
| ROOK-HSF-PRO-00008 | *Occupational Health Committees* |

## 6.2 External

- Federal
  - *Nuclear Safety and Control Act*
  - *General Nuclear Safety and Control Regulations*
  - *Canadian Nuclear Safety Commission. REGDOC-2.1.2, Safety Culture*
- Provincial
  - *The Saskatchewan Employment Act*
  - *The Occupational Health and Safety Regulations, 2020*
  - *The Mines Regulations, 2018*
- Other

- *Canadian Standards Association. N286-12 Management system requirements for nuclear facilities*

# Environmental Protection Program
# ROOK-ENV-PGM-00001

# Rook I Project

## Environmental Protection Program

ROOK-ENV-PGM-00001

June 2023

# Record of Revisions

| Version. No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| 0 | 21-Dec-2022 | Issued Final | A. Swerhone | J. Henderson<br>R. Paine | L. Moger |
| 1 | 29-Jun-2023 | Issued Final | A. Swerhone | J. Cooper<br>J. Henderson<br>R. Paine | L. Moger |

# Table of Contents

## List of Figures

# 1.0 Introduction

The *Rook I Environmental Protection Program* (Program) outlines the systematic and risk-based approach to environmental protection as part of the NexGen Energy Ltd. (NexGen) Rook I Project (Project). It provides the framework and describes the processes for maintaining compliance, enabling continual improvement, and fostering a culture where protecting workers and the environment is a principal consideration guiding decisions and actions.

This Program is part of the *Rook I Integrated Management System* (IMS). All aspects of the IMS are subject to the *Rook I Integrated Management System Policy* (Policy) which provides the foundation for NexGen's approach to environmental protection. The Program and its relationship to other IMS programs within the IMS hierarchy is shown in Figure 1. As a component of the IMS, this Program follows the Plan-Do-Check-Act cycle to identify, control, monitor, and continually improve environmental management processes for workers, the public, and the environment.

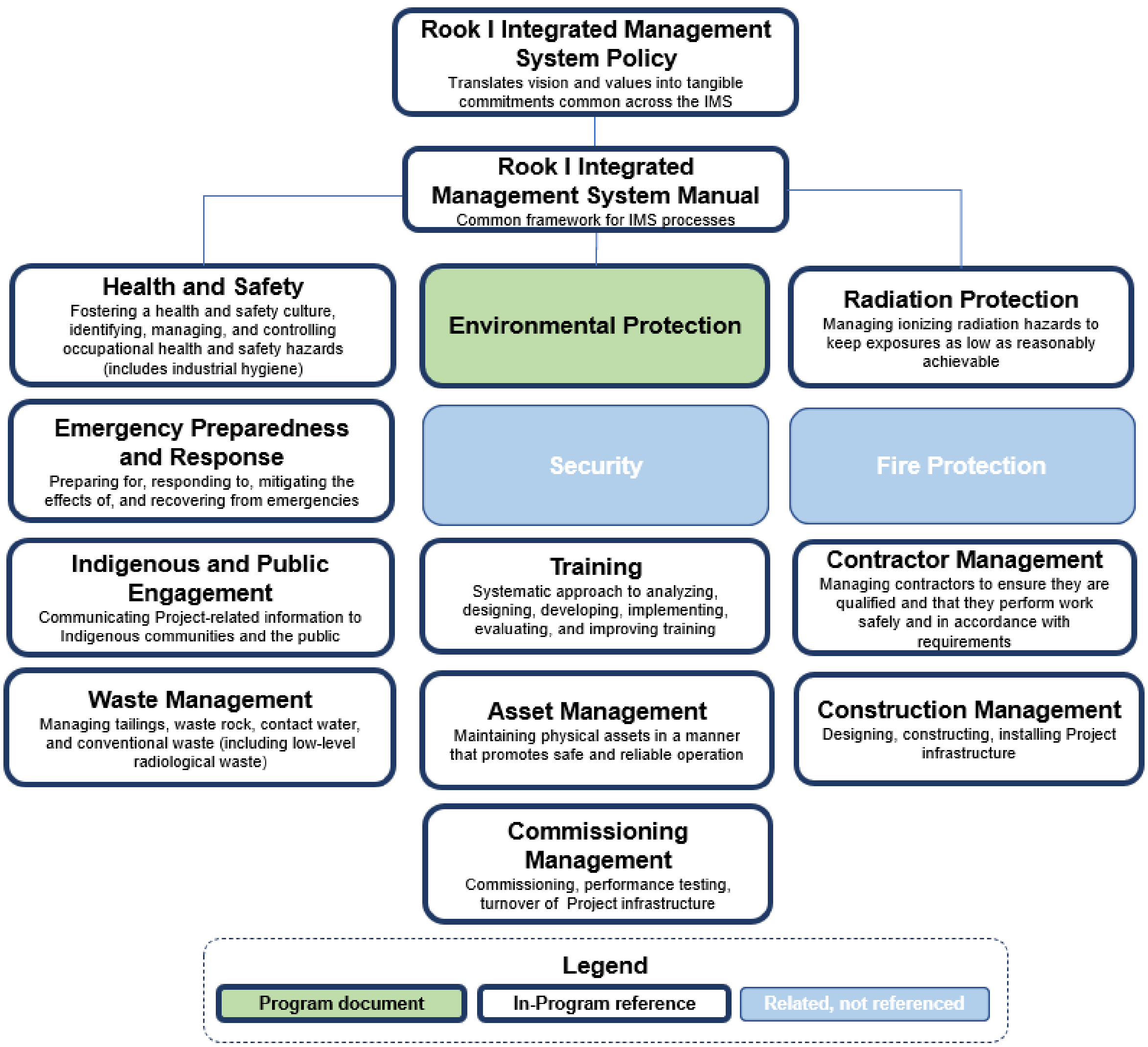



Figure 1: Program Context Within the IMS

## 1.1 Purpose

This Program describes the Project principles, processes, and framework for environmental protection. This Program aligns with and meets applicable requirements of the references outlined in section 6.0, including *The Environmental Management and Protection Act, 2010*, the *Canadian Environmental Protection Act, 1999,* and the Canadian Nuclear Safety Commission (CNSC) *REGDOC-2.9.1, Environmental Principles, Assessments and Protection Measures*.

## 1.2 Scope

The scope of this Program includes planning, delivering, evaluating, and improving Project processes for protecting the environment. This Program applies to Project-related licensed activities during the site preparation, construction, and commissioning phase of the Project and to all Project workers and visitors.

This Program uses a graded, risk-based approach to implementing environmental protection measures that is commensurate with the scale and complexity of potential influences on the environment associated with Project facilities, activities, and processes.

Mining uranium ore and the production of uranium concentrate are not within the scope of this Project phase; however, the processes described herein account for the possibility of encountering nuclear substances and establishing and maintaining effective environmental protection measures throughout the Project life cycle. This Program and its supporting plans and processes are subject to periodic review and will be revised as required to maintain measures necessary to effectively mitigate and monitor emissions and effluents to the environment.

This Program is implemented in an integrated manner with other programs as shown in Figure 1. Preparing for and responding to environmental emergencies is within the scope of the *Rook I Emergency Preparedness and Response Program.* Managing waste (e.g., contact water, conventional waste, waste rock) is within the scope of the *Rook I Waste Management Program*.

## 1.3 Program Principles

NexGen recognizes the importance of protecting and preserving the environment and biodiversity throughout the Project life cycle and for future generations. NexGen has always been and will continue to be committed to demonstrating responsible environmental stewardship and respecting diverse cultures and perspectives. The commitment and approach to environmental protection is reflected in the following principles:

- protecting and promoting the health, safety, and well-being of people and the environment through all aspects and phases of the Project;
- establishing a culture of environmental protection which is periodically assessed and continually improved;
- applying economically viable, best available technology and techniques;
- designing and planning for responsible closure;
- respecting the principle of pollution prevention;
- providing workers with the knowledge, skills, and tools to implement environmental protection processes;
- keeping releases to the environment as low as reasonably achievable (ALARA);
- maintaining diverse, open, and transparent two-way communication channels that build trust and confidence of local Indigenous groups and the public;
- monitoring and assessing against indicators and targets based on science and Indigenous and local knowledge;
- complying with applicable requirements; and
- continually improving Program performance.

## 1.4 Program Framework

The environmental protection framework outlined in this Program is further described in supporting plans, procedures, and work instructions. This includes three supporting environmental plans and the *Environmental Code of Practice* as shown in Figure 2 and briefly summarized in section 3.1.

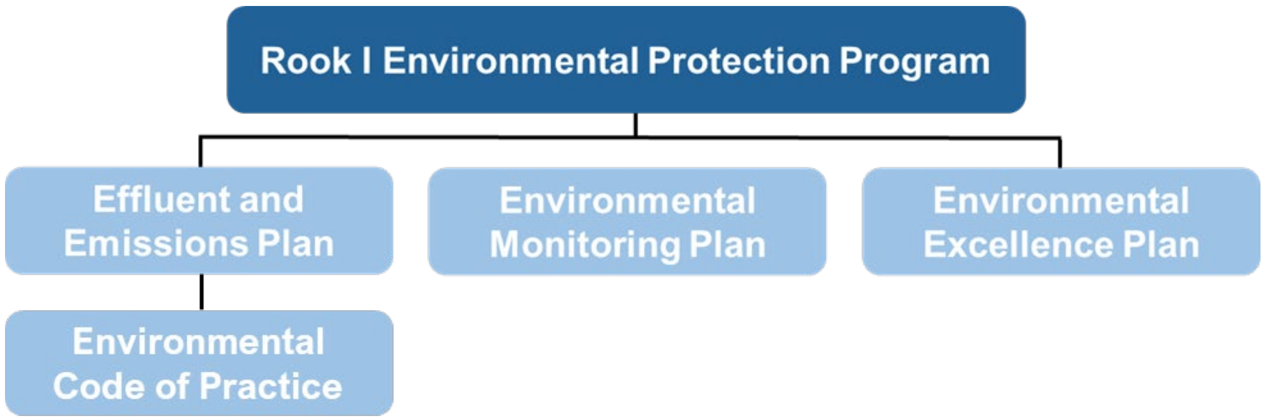



Figure 2: Program Framework and Supporting Plans

## 1.5 Terminology

Terminology introduced in this Program is provided in this section. A comprehensive list of common terms applicable to this Program and the IMS are available in the *Rook I Project Glossary.*

**as low as reasonably achievable (ALARA)** – Minimizing the risk of adverse health, safety, environmental, and radiological impacts to the lowest extent practicable, considering technical, legal, social, and economic factors.

**constituent of potential concern (COPC)** – Chemical constituents or physical stressors that have the potential to cause an adverse effect as identified in the most recently approved environmental risk assessment.

**discharge** – A discharge, drainage, deposit, release, or emission into the environment (*The Environmental Management and Protection Act, 2010*) that is covered under the provincial Discharge and Discovery Standard.

**effluent** – A waterborne release of a constituent or physical parameters to the environment (CSA N288.5).

**emission** – An airborne release of a constituent or physical parameters to the environment. An emission may include point sources or fugitive emissions (CSA N288.5).

**environment** – The surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelationships (ISO 14001).

**environmental aspects** – The interaction between a Project facility, activity, or process and the environment.

**Indigenous knowledge** – The unique and collective knowledge of Indigenous Peoples that has been built up over time and passed on through generations of living in close contact with the land and natural environment.

**influence** – When an environmental aspect is expected to result in a change to the environment, whether adverse or beneficial (e.g., no cause-effect linkages).

**local knowledge** – The knowledge of local people who may or may not be Indigenous and who hold knowledge that is based on personal and collective experiences of their local environments over time, without necessarily having generational connections to a place. Represents information from a local priority area citizen or representative, but without Indigenous group/Elder sanction, and is therefore not considered Indigenous knowledge.

**personal protective equipment (PPE)** – Includes equipment an individual may use to minimize hazards associated with performing a particular task. This includes, but is not limited to, safety glasses, gloves, hard hats, safety boots/shoes, coveralls, respirators, and harnesses.

**pollution prevention** – The use of processes, practices, materials, products, energy, or substances that avoid or minimize the creation of pollutants and waste and reduce the overall risk to the environment or to human health.

**prime contractor** – Entity responsible for overseeing the safe execution of all work on-site within the scope of a defined construction project, who is either the worksite owner or a contractor who has entered into a written agreement with the owner to perform the duties of prime contractor.

**Project site** – Term used to describe all property within the physical NexGen Rook I boundary.

**scientific knowledge** – The knowledge obtained and tested through use of the scientific method.

**stewardship** – Effective care and responsible management.

**worker** – Any person working for NexGen, including a contractor.

# 2.0 Plan

The *Plan* component of this Program includes processes that support a systematic, risk-based approach to environmental protection. Planning processes include:

- identifying and communicating environmental aspects (i.e., risks and opportunities) of Project facilities, activities, and processes that have potential to result in environmental influences;
- evaluating environmental aspects to determine which present the most significant risks and opportunities to the environment, and prioritizing those aspects for control;
- setting Program-specific objectives and targets to implement Program processes;
- providing the appropriate parties with the information and resources necessary;
- verifying workers are competent and adequately trained to perform work;
- managing change to process, personnel, design, facilities, and equipment; and
- preparing for emergencies.

As a component of planning for effective environmental protection, the Project has defined its organizational context including external considerations (e.g., legal, social, economic) and internal considerations (e.g., values, culture, knowledge), and the needs and expectations of interested parties. The process for defining organizational context is outlined in the *Rook I Integrated Management System Manual* (IMS Manual). Environmental conditions relevant to the Project are summarized in the *Rook I Environmental Impact Statement*.

## 2.1 Risk Management

The risk management process includes identifying Project-related environmental hazards that could affect the health and safety of workers or result in changes to the environment, assessing the significance of the associated risks, and managing risks to acceptable levels through application of controls as described in section 3.0.

The multi-layered approach to routinely and effectively managing risks for workers and the environment is outlined in the IMS Manual.

### 2.1.1 Aspect Identification

The interaction between a Project facility, activity, or process and the environment is referred to as an environmental aspect. Identifying environmental aspects and evaluating potential influences on the environment is foundational to achieving effective, risk-based environmental protection. Examples of environmental aspects include, but are not limited to:

- consuming raw materials and natural resources;
- releases to air, surface water, groundwater, or land;
- interacting with wildlife or occupying sensitive habitat; and
- emitting energy (e.g., heat, radiation, vibration, noise, light).

Environmental aspect identification consists of identifying Project facilities, activities, or processes that interact with or have potential to interact with the environment and potentially result in a change to the environment, whether adverse or beneficial. Project facilities, activities, or processes include those that are controlled or influenced by the Project, workers, or visitors. Environmental aspects may result from normal conditions, abnormal conditions, or reasonably foreseeable emergency situations.

The process for identifying environmental aspects and evaluating associated potential environmental influences is described in the environmental protection procedure *Environmental Aspects and Impacts*.

### 2.1.2 Evaluation

Risks to worker and public health and safety and the environment are evaluated accounting for the likelihood of occurrence and scale and severity of potential changes to the environment. Risks to worker health and safety are managed in accordance with the processes outlined in the *Rook I Health and Safety Program* and *Rook I Radiation Protection Program*.

The evaluation process identifies environmental aspects contributing to one or more significant environmental changes and prioritizes risk controls to mitigate risk to acceptable levels, as described in section 3.2

Environmental protection efforts and resource allocation focus on environmental aspects with the potential to cause significant changes to the environment. Environmental risk criteria correlating to the likelihood and severity of potential changes are defined in a risk matrix appropriate to the type of assessment being performed. The process for environmental aspect identification and associated evaluation is described in the environmental protection procedure *Environmental Aspects and Impacts*.

Environmental aspects are periodically reviewed and revised based on:

- effluent, emissions, and environmental monitoring results;
- supplementary studies conducted;
- developments in scientific knowledge, local Indigenous knowledge, and local knowledge;
- changes to legal and other requirements; or
- Project changes including planned, new, or modified facilities, activities, and processes as described in section 2.7.

### 2.1.3 Risk Registers

Documented risk registers are maintained to record and track relevant information regarding environmental risks and controls. Controls are implemented, monitored, and maintained to protect worker and environmental health and safety. Risk registers are reviewed and updated as required to assist with decision making, improvement opportunities, and changes to environmental protection processes.

Requirements for developing and maintaining risk registers are outlined in the IMS Manual.

### 2.1.4 Environmental Assessment and Environmental Risk Assessment

An environmental assessment is a planning tool used to predict the environmental, social, and economic effects of proposed initiatives or projects. The environmental assessment for the Project is documented in the *Rook I Environmental Impact Statement* and includes baseline characteristics of the Project area and an environmental risk assessment.

An environmental risk assessment is a systematic process used to:

- identify and prioritize the constituents and physical parameters of concern;
- identify and prioritize the sources or points of release of the constituents and physical parameters of concern;
- identify and prioritize the potential receptors (i.e., human and non-human biota) of concern;
- define a conceptual site model that represents the relationship between sources and receptors;
- assess the potential exposure to the constituents or physical parameters of concern;
- assess the environmental risk to receptors;
- identify and, if possible, quantify the uncertainties in the assessment of the environmental risk; and
- confirm the focus of the effluent, emissions, and environmental monitoring measures and provide recommendations for further action or assessment, as required.

Environmental risk assessments completed for the Project are separate and distinct from routine environmental risk management and protection processes described by this Program. Environmental risk assessments are conducted in accordance with *REGDOC-2.9.1, Environmental Principles, Assessments and Protection Measures* and *CSA N288.6, Environmental risk assessments at Class I Nuclear Facilities and Uranium Mines and Mills*.

The Project environmental risk assessment is updated at minimum every five years or when changes to Project facilities, activities, or processes result in sources, pathways, or receptors that are outside the basis of the most recent regulatory approved environmental risk assessments. Updates are based on accumulated site knowledge derived from operational experience, effluent, emissions, and environmental monitoring, special investigations, and incorporation of advances in scientific knowledge, local Indigenous knowledge, and local knowledge.

### 2.1.5 Adaptive Management

Adaptive management is a rigorous and systematic approach to learning from experience to address uncertainties, gain knowledge, and adapt planning. Adaptive management is typically used when systems are highly dynamic and when there are gaps in information or understanding, opportunities to learn and gain new information, and opportunities to adjust activities or practices to realize improvements. Uncertainties related to environmental interactions and potential influences are mitigated through adaptive management, where required.

Adaptive management reduces uncertainty over time through an iterative process that consists of the following sequential steps:

1. assess: formulate the problem;
2. design: develop a solution to address the problem;
3. implement: put the solution into practice;
4. monitor: collect information to understand outcomes and changes;
5. evaluate: compare monitoring results against established criteria; and
6. adjust: modify decisions with consideration for results.

Adaptive management measures can either be passive or active. Passive adaptive management typically involves selecting a single management approach considered most likely to succeed. Active adaptive management typically involves implementing and testing one or more alternatives and establishing clear criteria for determining the most desirable outcome. The decision to apply active or passive adaptive management depends on urgency and scale of the problem, quantity and quality of existing information, and number of variables or treatments available for experimentation.

Adaptive management is supplemental and complementary to the continual improvement processes outlined in the IMS Manual.

## 2.2 Objectives and Targets

Program objectives and targets are established at regular intervals, linked to clear accountabilities, and monitored for status to completion. Objectives and targets are tangible, documented actions that result in improvements to environmental protection processes and outcomes.

Setting and managing objectives and targets, including establishing effluent, emissions, and environmental monitoring measures, is outlined in the IMS Manual.

## 2.3 Resources

Rook I management is committed to providing the necessary resources to establish, implement, maintain, and continually improve this Program and its associated processes. In addition to providing the financial resources necessary to achieve objectives and meet requirements, management provides the infrastructure, work environment, and competent workers necessary to implement this Program and environmental protection processes.

### 2.3.1 Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Program. Workers are informed of their roles and responsibilities and are accountable for understanding and fulfilling them. The Project prime contractor performs their role in accordance with the scope and requirements of this Program and its supporting information and as required in accordance with *The Saskatchewan Employment Act*.

Although NexGen maintains overall accountability for Project activities, the term Rook I is used in the following role descriptions to reinforce that the role is applicable to the Project and may be assigned to NexGen employees and contractors performing work on behalf of the Project.

#### NexGen Executive

NexGen executive is accountable for:

- establishing the direction, strategy, and policies of the organization;
- promoting behaviours that support a robust health, safety, and environmental protection culture;
- promoting the understanding that health and safety, including environmental protection and stewardship, is a principal consideration guiding decisions and actions; and
- providing adequate resources to deliver the requirements of the Program.

#### Rook I Management

Rook I management is accountable for:

- demonstrating and promoting a culture where safety, including environmental protection and stewardship, is a principal consideration guiding decisions and actions at all levels of the Project;
- maintaining the effectiveness of this Program;

- approving annual Program objectives and targets;
- promoting the integration of Program requirements into Project processes;
- communicating the importance of effective management and of conforming to Program requirements;
- allocating adequate and appropriate resources to fulfill Program implementation;
- developing appropriate documentation and tools to implement this Program effectively;
- controlling environmental protection related incidents and deviations and directing corrective action when required;
- participating in the management review process;
- monitoring and reporting on Program performance and effectiveness to the NexGen executive;
- providing independent oversight of processes through monitoring and auditing activities; and
- identifying and pursuing opportunities to achieve continual improvement.

## Program Management

Program management is responsible for:

- demonstrating and promoting a positive health and safety culture that includes environmental protection and stewardship;
- overseeing the development, implementation, and adherence to this Program;
- communicating with the applicable regulatory agencies (e.g., Ministry of Environment, CNSC) and other external stakeholders on behalf of the Project, as appropriate;
- setting annual objectives and targets, monitoring performance, and preparing internal and external reports regarding Program activities and outcomes;
- managing resources to confirm legal compliance with regulatory requirements and conformance with Program requirements;
- confirming workers have the necessary competence, training, and awareness of Program requirements;
- overseeing Program coordination activities;
- working with applicable departments to confirm that Program roles and responsibilities are identified and described and that those with specific responsibilities are qualified to fulfill their roles;
- providing independent oversight of processes through monitoring and auditing activities;
- reporting on Program performance and effectiveness to Rook I management;
- facilitating management review of this Program; and
- promoting, identifying, and supporting continual improvement through Program evaluation.

## Program Coordination

The Program coordinator is responsible for:

- demonstrating and promoting a positive health and safety culture that includes environmental protection and stewardship;
- leading the development, implementation of, and adherence to Program-specific plans, procedures, and work instructions;
- providing environmental protection subject matter expertise;
- maintaining Program-specific data and records in a secure and controlled manner;
- verifying workers meet and maintain required Program-specific training qualifications;
- preparing and supporting management review;
- conducting environmental incident investigations and initiating applicable regulatory reporting when assigned; and

- verifying monitoring processes are implemented in accordance with Program and regulatory requirements.

### Rook I Supervision

Rook I supervisors are responsible for:

- demonstrating and promoting a positive health and safety culture that includes environmental protection and stewardship;
- understanding, encouraging, and following this Program and its requirements;
- overseeing department functions and supervising direct reports to confirm conformance to Program requirements;
- supporting the achievement of Program objectives and targets;
- conforming to Program-specific plans, procedures, and training;
- supervising direct reports regarding conformance to Program requirements;
- supporting direct reports in planning work activities to mitigate environmental protection risks;
- communicating and coordinating with other departments to facilitate effective implementation of the Program;
- participating in audits and inspections, as required;
- participating in management reviews, as needed; and
- identifying and supporting opportunities for continual improvement.

### Rook I Workers

Rook I workers are responsible for:

- demonstrating and promoting a positive health and safety culture that includes environmental protection and stewardship;
- understanding and following environmental protection processes and procedures;
- meeting and maintaining required Program-specific training qualifications;
- using all equipment, devices, facilities intended for the protection of health, safety, and the environment in accordance with procedures and training;
- recognizing and promptly communicating hazards or deviations that present a risk to the safety and health of workers, the public, and the environment, and if safe to do so, taking action to contain or control the hazard; and
- cooperating with auditors, regulators, investigators, and inspectors, as required.

## 2.3.2 Facilities and Equipment

Facilities and equipment to support the effective implementation of this Program and its associated processes are provided to workers. Facilities and equipment are designed, constructed, operated, and maintained with consideration for environmental protection, legal requirements, and worker health, safety, and well-being. Examples of facilities and equipment within this Program scope include, but are not limited to:

- pollution prevention systems and devices;
- secondary containment for chemicals, fuels, and other hazardous substances;
- effluent, emissions, and environmental sampling, monitoring, and analytical equipment; and
- spill kits.

Effluent, emissions, and environmental monitoring equipment used to collect, analyze, and quantify data is selected, tested, and calibrated for its intended use. Competent workers operate and maintain equipment with consideration for the manufacturers' specifications and the applicable sampling and analytical methods.

Changes to facilities and equipment are managed in accordance with the change management process described in section 2.7. Planned impairments of environmental protection structures, systems, and components are controlled to verify environmental objectives are achieved and that associated risks are adequately managed.

The processes for procuring equipment and materials are outlined in the IMS Manual. Facility and equipment maintenance is outlined in the *Rook I Asset Management Program*.

The processes for planning, documenting, and controlling the design, construction, installation, and commissioning of facilities and equipment are outlined in the *Rook I Construction Management Program* and *Rook I Commissioning Management Program*.

### 2.3.3 Legal and Other Requirements

NexGen is committed to conforming to internal processes and complying with applicable legal and other requirements. Program-specific plans, procedures, and work instructions are developed and documented with consideration for applicable legal requirements, including the laws and regulations referenced in section 6.2. Changes to relevant internal and external requirements are monitored and evaluated to identify whether updates to this Program or Program-specific plans, procedures, and work instructions are required.

Legal and other compliance obligations including, but not limited to, the establishment of environmental protection measures and monitoring and reporting are addressed through Program-specific plans, procedures, and work instructions as described in section 3.1.

The process for managing legal and other requirements is outlined in the IMS Manual.

## 2.4 Training and Competence

Appropriate and timely training is integral to the use, care, and maintenance of controls for protecting the environment. The Project follows a systematic approach to training (SAT) to educate, train, and qualify workers to carry out the work assigned to them. Training requirements are identified and monitored to confirm that workers receive the training they require, when they require it, to maintain competency and work safely. Program-specific training requirements are defined and managed as part of the *Rook I Training Program*.

### 2.4.1 Site Orientation

Project workers and visitors are required to participate in site orientation on their arrival, which includes information on camp policies, expectations of personal conduct while at the site, requirements for protecting workers and the environment, and important actions to follow during emergency events and situations. Site orientation is developed using the SAT process to verify critical information for new workers is included.

### 2.4.2 Environment Department

Workers are selected based on their ability to satisfy defined competencies and perform assigned tasks safely and competently. Environment department workers have prior training or relevant work experience in a related field and participate in ongoing professional development applicable to their role. Environment technicians participate in progression training specific to their duties under the supervision of senior environment department workers. Progression training is developed according to the requirements of the *Rook I Training Program*.

## 2.5 Document and Record Management

Documents and records are controlled to confirm information is accurate, available when needed, and protected from uncontrolled alteration. Documents include Program-specific plans, procedures, and work instructions. In addition to the common management system records outlined in the IMS Manual, records specific to this Program include, but are not limited to:

- effluent and emissions monitoring data;
- environmental monitoring data;
- inspection, maintenance, and calibration records for pollution prevention systems and devices and effluent, emissions, and environmental sampling, monitoring, and analytical equipment;
- field notes from monitoring events and inspections;
- environmental studies, reports, and environmental risk assessments;
- reports of unplanned or uncontrolled discharges; and
- communications with regulators and other stakeholders.

Documents and records are readily accessible to those that require them.

Effluent and emissions monitoring data and environmental monitoring data is managed using a database to protect data security and integrity. Database details including scheduling, data entry, storage, transmission, processing, retention, validation, criteria, and reporting are described in applicable Program-specific plans, procedures, and work instructions.

The period of retention for monitoring records directly related to the Program spans the Project life cycle and are sent to the responsible agencies at the initiation of institutional control. At minimum, monitoring records directly related to the Program include:

- documents informing Program design that are not included in the Program or supporting documents;
- records of sample location, collection date, and the results of the analysis; and
- results of data interpretation with summaries of information essential to data interpretation.

The process for managing documents and records is outlined in the IMS Manual.

## 2.6 Communication

Effective communication is an important element of this Program and the supporting processes and is vital for maintaining a culture of safety and environmental protection. Tools used to internally communicate environmental protection information related to the Project include, but are not limited to:

- routine environmental value shares to begin meetings or training courses;
- environmental protection-focused toolbox meetings;
- postings on progress towards objectives and targets and key performance indicators;
- workplace environmental protection posters;
- town hall meetings;
- posting information required by regulation;
- signage; and
- environmental committees.

Workers and visitors are informed of their duties and responsibilities and changes to personnel, processes, facilities, or equipment are communicated to those affected as required.

Internal and external communication principles and processes are further outlined in the IMS Manual. Communication practices specific for local Indigenous groups, local communities, and the public are outlined in the *Rook I Indigenous and Public Engagement Program.*

### 2.6.1 Availability of Oversight Documents

Information specific to the Program is posted at the Project site in a location accessible to all workers, and includes:

- the *Nuclear Safety and Control Act* and associated regulations that apply to the Project;
- the *Rook I Project Licence to Prepare Site and Construct*;
- provincial authorizations (where applicable); and
- the *Rook I Environmental Code of Practice*.

Additional information is posted as required.

### 2.6.2 Environmental Committees

Effective and transparent communication and collaboration contributes to upholding trust and meaningful engagement with local Indigenous groups, local communities, and members of the public with a direct interest in the Project. Environmental committees are one way NexGen achieves this for activities conducted under this Program.

Mechanisms exist for the establishment of environmental committees with each of the primary local Indigenous groups for the Project. Environmental committees are composed of representatives from the respective local Indigenous group and NexGen and act as an oversight committee to monitor the environmental performance of the Project and to verify the parties (i.e., NexGen and the local Indigenous group) are implementing the regulatory and environmental commitments made in respect of the Project. The environmental committees are fully funded by NexGen for the entire life of the Project (i.e., the committees end when the property is transferred to the Province of Saskatchewan's Institutional Control Registry).

In addition to the environmental committee, mechanisms exist for the funding of a full-time, independent Indigenous monitor chosen by each of the primary local Indigenous groups (i.e., one monitor per group). The intent of these positions is to provide unrestricted environmental monitoring opportunities, including independent environmental sampling, for the life of the Project. Information collected by the independent Indigenous monitor is shared with the environmental committee and used to inform future opportunities for continual improvement.

## 2.7 Change Management

Change is managed to protect worker health and safety, the environment, facilities, and equipment and to promote consistent and effective execution of Project processes. This includes changes to Project:

- design;
- facilities;
- equipment;
- management system processes;
- organizational structure;
- key roles and responsibilities;
- planned impairment of a critical environmental control feature;
- documentation; and
- legal and other requirements.

Changes are evaluated with consideration for the impact to the Program and its related processes. This maintains that:

- change is clearly defined;
- risks associated with change are assessed and managed;

- change is communicated to those affected; and
- the related documentation is updated.

The general change management process is outlined in the IMS Manual.

# 3.0 Do

The *Do* component of the Program includes implementing the Program elements described in section 2.0. This includes implementing supporting plans and procedures, risk controls, contractor management, and reporting incidents and deviations.

## 3.1 Supporting Plans and Procedures

The Program is supported by documented plans and procedures that describe actions to be taken as part of the Project approach to environmental protection.

### 3.1.1 Effluent and Emissions Plan

The *Effluent and Emissions Plan* is a risk-based set of integrated processes and activities to mitigate and monitor the constituents and physical parameters that are released to the environment. The spatial scope of the *Effluent and Emissions Plan* extends from the point of treatment, if required, to the final point of control to the environment before dilution or dispersion occurs.

The purpose of the *Effluent and Emissions Plan* is to:

- demonstrate adherence to internal thresholds set on release amounts, for the purposes of effluent and emission control;
- evaluate the effectiveness of effluent and emission control;
- indicate unusual or unforeseen conditions that might require corrective measures or adaptive management;
- provide data to verify the predictions made by the most recent regulatory-approved environmental risk assessment, refine models used in the environmental risk assessment, or reduce uncertainty identified in conducting the environmental risk assessment;
- demonstrate due diligence; and
- demonstrate compliance with legal and other requirements.

The *Effluent and Emissions Plan* describes effluent and emission monitoring activities, including monitoring targets and locations, frequencies, and analytes. The *Effluent and Emissions Plan* is prepared in accordance with applicable requirements which include, but are not limited to:

- *CSA N288.5 Effluent and emissions monitoring programs at nuclear facilities*;
- *CSA N288.0 Environmental management of nuclear facilities: Common requirements of the CSA N288 series of Standards*;
- *Metal and Diamond Mining Effluent Regulations*; and
- Project licences, approvals, and permits.

### 3.1.2 Environmental Monitoring Plan

The *Environmental Monitoring Plan* describes a risk-based set of integrated processes and activities to sample, measure, interpret, and report on constituents and physical parameters as well as meteorological conditions. The spatial scope of the *Environmental Monitoring Plan* is beyond the final points of control for airborne or waterborne releases and extends to the receiving environment and reference locations determined in the most recent regulatory-approved environmental assessment or environmental risk assessment. The purpose of the *Environmental Monitoring Plan* is to:

- provide data required to assess the level of risk to human health and the environment;
- characterize potential changes in the environment;
- indicate unusual or unforeseen conditions that might require corrective measures or adaptive management;
- provide data to verify the predictions made in the environmental risk assessment, refine models used in the environmental risk assessment, or reduce uncertainty identified in conducting the environmental risk assessment;
- verify, independently of effluent or emissions monitoring, the effectiveness of containment and effluent control, and provide public assurance of the effectiveness of containment and effluent control;
- demonstrate due diligence; and
- demonstrate compliance with legal and other requirements.

The *Environmental Monitoring Plan* describes environmental monitoring activities, including monitoring targets and locations, frequencies, and analytes. The *Environmental Monitoring Plan* is informed by scientific knowledge, local Indigenous knowledge, and local knowledge and is conducted in accordance with applicable requirements which include, but are not limited to:

- *CSA N288.4 Environmental monitoring programs at nuclear facilities and uranium mines and mills*;
- *CSA N288.7 Groundwater protection programs at Class I nuclear facilities and uranium mines and mills*;
- *CSA N288.0 Environmental management of nuclear facilities: Common requirements of the CSA N288 series of Standards*;
- *Metal and Diamond Mining Effluent Regulations*; and
- Project licences, approvals, and permits.

#### Groundwater

Groundwater protection and monitoring components are incorporated into the Program and *Environmental Monitoring Plan* to streamline documentation and in recognition of the interconnectedness of environmental components. General goals and objectives as noted in CSA 288.7 have been considered and integrated into the broader environmental protection principles and monitoring objectives. Where general goals and objectives noted in CSA 288.7 do not apply, justification is documented.

The conceptual site model as described in section 2.1.4 includes specific aspects related to groundwater including an assessment of groundwater vulnerability and end uses of groundwater. The *Environmental Monitoring Plan* includes groundwater monitoring, evaluation criteria, and the process for managing exceedances.

### 3.1.3 Environmental Excellence Plan

The *Environmental Excellence Plan* establishes objectives and processes supporting NexGen's commitment to environmental stewardship to optimize Project outcomes by continually evaluating environmental activities and developing effective, risk-based environmental stewardship solutions. The *Environmental Excellence Plan* describes mitigation and monitoring activities that include, but are not limited to:

- caribou mitigation and offsetting;
- energy conservation;
- progressive reclamation;
- climate adaptation; and
- biodiversity.

The *Environmental Excellence Plan* is informed by industry best practices, science, and Indigenous and local knowledge.

### 3.1.4 Discharge and Discovery Prevention and Management

Project processes include a variety of controls to prevent and detect uncontrolled discharges to air, land, groundwater, or surface water within and beyond the Project site.

In the event of an unplanned discharge to air, land, groundwater, or surface water or the discovery of a historical discharge, general response requirements are described in the environmental protection procedure *Discharge and Discovery Prevention and Management.* This procedure includes prevention measures and requirements for initial response (e.g., spill kit use), internal and external reporting, remediation, and disposal (as required).

Discharges and discoveries that trigger emergency response are managed in accordance with the *Emergency Response Plan* or *Ground Transportation Emergency Response Plan* for on-site and off-site events, respectively. These plans describe the framework, principles, and processes used to prevent, plan for, effectively and safely respond to, and mitigate the effects of environmental emergencies.

The process for managing safety data sheets for the hazardous substances or dangerous goods (e.g., fuels, oils, lubricants, reagents, cleaning products, paints) is outlined in the *Rook I Health and Safety Program*. Hazardous substances and waste dangerous goods are managed under the *Rook I Waste Management Program*.

### 3.1.5 Wildlife and Human Interactions

The Project site is located in wildlife habitat and the Project has the potential to result in interactions between wildlife and humans. Minimizing and managing interactions for the safety of wildlife and workers are described in the environmental protection procedure *Wildlife and Human Interactions.* This includes information on avoiding, minimizing, and documenting wildlife interactions, and requirements for documenting wildlife sightings.

Environmental controls related to wildlife and human interactions augment processes within the *Rook I Health and Safety Program.* Additional controls for woodland caribou and biodiversity are further described in the *Environmental Excellence Plan*.

### 3.1.6 Invasive Species

Project activities may result in the introduction or encroachment of designated invasive species. Project areas at greater risk of invasive species introduction include, but are not limited to:

- roadsides;
- airstrip;
- loading or staging areas; and
- Patterson Lake.

Processes to prevent, detect, and control prohibited, noxious, and nuisance weeds or invasive species are described in the environmental protection procedure *Invasive Species*.

## 3.2 Risk Control

Controls identified during environmental aspects identification and evaluation are used to address the risk of associated environmental changes. Controls are documented, tracked in a risk registry, and periodically evaluated for effectiveness. Controls appropriate for the hazard and corresponding level of risk are selected and implemented with consideration for the hierarchy of controls, as described in Figure 3. Where possible, controls are used in combination to effectively prevent or reduce the risk to the environment and keep releases ALARA. Controls are used, operated, and maintained according to their design, limitations, and applicable training. Adherence to procedures and training is critical in preserving the effectiveness of controls.

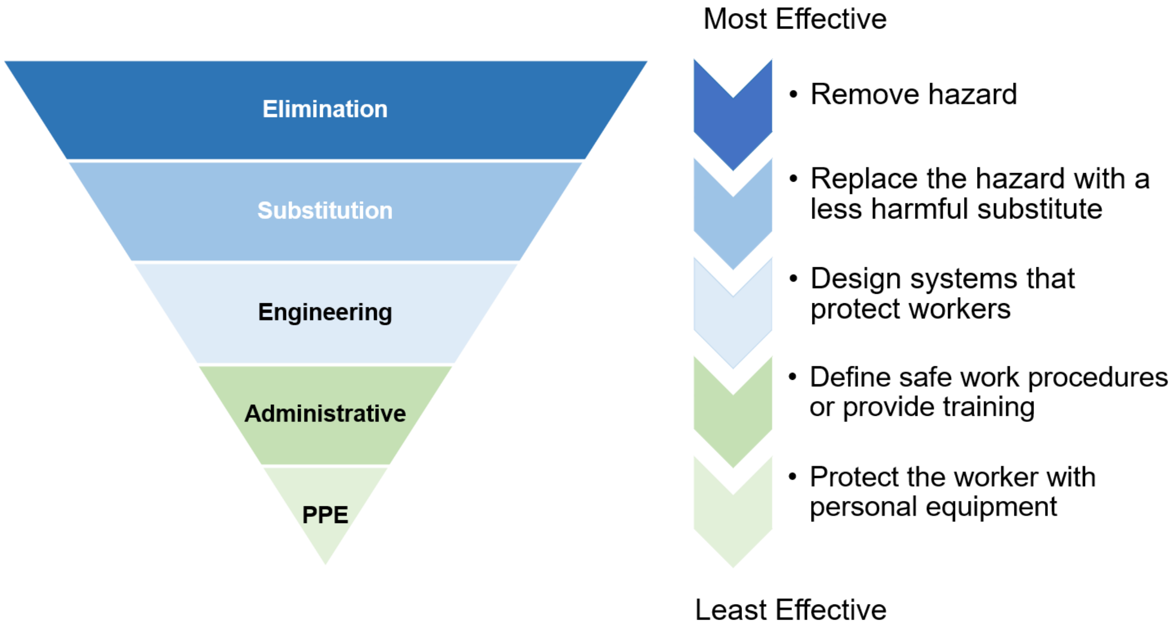



Figure 3: Hierarchy of Controls

### 3.2.1 Elimination and Substitution

The most effective measure to control environmental risk is to eliminate or substitute the hazard. Designing infrastructure or a process to remove environmental emissions is an example of hazard elimination. Replacing a hazardous chemical with a non-hazardous alternative is an example of hazard substitution. Whenever possible, eliminating or substituting hazards is conducted during design or modifications to infrastructure, equipment, ventilation systems, and other processes that reduce or eliminate the interaction with the environment.

Changes made to eliminate or substitute an existing hazard control are subject to the change management process as described in the IMS Manual.

### 3.2.2 Engineering Controls

Engineering controls may be used when completely removing or replacing a hazard is not practical or possible. Engineering controls involve designing facilities, equipment, and systems in a manner that reduces hazard exposure, and considers the best available technology or techniques economically achievable. Engineering controls are developed with the objective of eliminating or substituting the exposure pathway where possible. Secondary containment around a liquid fuel storage tank is an example of an engineering control for reducing the likelihood of an unplanned discharge to the environment.

Maintenance and inspection requirements including non-destructive testing as required, and storage tank and associated secondary containment and dispensing system alarms and controls are managed as described in the *Rook I Asset Management Program.*

Design changes that result in implementing new or modifying existing engineering controls are subject to the change management process as described in the IMS Manual.

### 3.2.3 Administrative Controls

Administrative controls are an important component of risk mitigation and are typically used in combination with other types of controls. Administrative controls include training and supervision, as well as written plans, procedures, work instructions, rules, and processes. Examples of common administrative controls related to environmental protection are described in this section.

#### Environmental Code of Practice

The *Rook I Environmental Code of Practice* identifies licensed release limits, action levels, and administrative levels for chemical and radiological parameters in treated effluent discharge that, if reached, may indicate a loss of control. It describes the corresponding actions to be taken by Project workers to maintain control and protect the receiving environment.

A copy of the *Rook I Environmental Code of Practice* is posted at locations accessible to workers.

#### Plans, Procedures, and Work Instructions

If required as an outcome of a risk assessment, instructions for completing tasks associated with licensed activities are documented in the form of plans, procedures, and work instructions. Documentation is managed according to the document management process outlined in the IMS Manual.

#### Procurement

Environmental considerations related to procurement are detailed in the procurement processes described in the IMS Manual.

#### Job Hazard Analysis

A job hazard analysis is performed to evaluate work when an activity or process has the potential to present a significant risk to the environment, and an established plan, procedure, or work instruction does not exist. A job hazard analysis is valid only for the task for which it is prepared and issued and is subject to review and revision if a change to scope or in nature of work is encountered. The requirements for completing a job hazard analysis are outlined in the *Rook I Health and Safety Program*.

#### Signage and Labelling

Appropriate signage notifying workers of workplace hazards, restrictions, or requirements are posted throughout the Project site. Signage may be used to identify hazardous substances or activities where deviations could result in an environmental or health and safety risk. Warning signage may also be used to identify sensitive receptors (e.g., particularly sensitive habitat, established wildlife routes). Signage is designed with consideration for applicable regulatory requirements, is legible and visible, and is removed when no longer required. Labelling is used to identify potential risks or hazards associated with contents or use (e.g., labelling on hazardous substance containers).

#### Warning Systems

Real-time monitors and alarms may be installed to inform workers of unplanned environmental interactions. These monitors and alarms, which may be audible or visual, identify potential upset or abnormal conditions and allow for prompt response and mitigation.

### 3.2.4 Personal Protective Equipment

Personal protective equipment (PPE) includes protective clothing and devices designed to protect workers from exposure to constituents. PPE is considered the last line of defence and is typically used in combination with other types of controls. PPE required to complete work safely is provided and periodically inspected to verify it has not passed its expiry date or become damaged during use. The selection, use, and maintenance of PPE is outlined in the *Rook I Health and Safety Program*.

## 3.3 Contractor Management

Contractors performing work at the Project site are subject to Program requirements. Contractors with specialized knowledge or training may be used to conduct various environmental surveys and studies, risk assessments, and monitoring events including, but not limited to:

- conducting maintenance and repairs on critical environmental control facilities and equipment;
- performing sampling and monitoring of environmental media, effluent, or emissions;
- providing specialist surveys and studies to evaluate Project or facility performance; and
- responding to environmental discharges and emergencies.

The process for verifying contractors adhere to Program requirements is outlined in the *Rook I Contractor Management Program*.

## 3.4 Incident and Deviation Reporting

Workers and visitors are required to report information regarding health, safety, and environmental incidents (including near-misses) and deviations. Environment-related near-misses are events or situations where an environmental influence could have occurred but was avoided.

Reported information is documented and tracked in accordance with the IMS Manual. Internal events that meet or exceed applicable legislated reporting thresholds, including those that are reportable in accordance with *The Environmental Management and Protection (Saskatchewan Environmental Code Adoption) Regulations* and the *General Nuclear Safety and Control Regulations*, are reported to applicable regulatory representatives within legislated timelines. The process for providing information regarding incidents and deviations to internal and external parties is outlined in the IMS Manual.

# 4.0 Check

The *Check* component of the Program consists of ongoing performance monitoring, periodic audits, inspections, reviews, and analysis of results to verify that the Program is operating effectively.

## 4.1 Monitoring and Measurement

Management system processes are continually monitored and measured to evaluate whether Project deliverables meet external and internal requirements. Program-specific monitoring and measurement includes:

- operational and facilities monitoring as described in section 4.1.1;
- processes in the *Effluent and Emissions Plan* as described in section 3.1.1;
- processes in the *Environmental Monitoring Plan* as described in section 3.1.2; and
- supplemental monitoring to verify the Program functions as expected as described in section 4.1.2.

Monitoring and measurement activities are subject to quality assurance and quality control processes to maintain accuracy and reliability of data. The activities and quality assurance and quality control processes are described in the *Effluent and Emissions Plan* and *Environmental Monitoring Plan* and further detailed in associated procedures and work instructions.

Monitoring and measurement activities are integrated so information obtained can be used to provide a comprehensive understanding of and complement the outcome from other monitoring and measurement activities.

General monitoring and measurement processes and requirements are outlined in the IMS Manual.

### 4.1.1 Operational and Facilities Monitoring

Operational and facilities monitoring assists in the day-to-day conduct of Project activities and focuses on:

- validating assumptions (e.g., expected flow rates or concentrations) that inform controls;
- verifying conformance to established environmental controls as described in section 3.0;
- monitoring and confirming the performance of systems and facilities; and
- detection of potential issues through visual inspections (e.g., failure of diversion, containment structures) and identification of adverse operating trends (e.g., pressure drops, excess chemical consumption).

Operational and facilities monitoring activities vary depending on related environmental protection aspects and are described in the *Effluent and Emission Plan*.

### 4.1.2 Supplemental Monitoring

Supplemental monitoring may take the form of additional operational monitoring, effluent and emission monitoring, environmental monitoring, or a combination thereof. The need for supplemental monitoring is determined on a case-by-case basis. Supplemental monitoring may be performed to achieve well-defined objectives such as:

- providing the data required to reduce uncertainty in the environmental risk assessment;
- increasing knowledge of the Project- and site-specific behaviour of constituents;
- investigating unanticipated environmental protection findings;
- follow-up monitoring of mitigation activities as identified during the environmental assessment process; and
- event-based monitoring during or at the time of unusual climate events such as heavy rain, rapid snowmelt, anomalous instrumentation readings, failures, or unusual observations.

Supplemental monitoring is performed in accordance with established scientific methods, industry best practices, and professional judgement. The results of supplemental monitoring are documented, tracked, and communicated to applicable regulatory agencies and other external stakeholders, as appropriate.

## 4.2 Inspections and Audits

The performance and effectiveness of this Program and its associated processes are monitored and verified with regular conformance audits. Qualified individuals independent of the work being assessed conduct audits as outlined in the IMS Manual. External compliance inspections and audits are conducted by regulators; conformance audits and inspections are conducted by third parties, as required. Deviations, instances of regulatory noncompliance, and opportunities for improvement identified through audits and inspections are managed as outlined in the IMS Manual.

### 4.2.1 Routine Inspections

Routine environmental inspections are completed by qualified workers to identify and report on any incidents or deviations identified during the inspection. Inspections may include follow-up with the intent of closing open incidents and deviations from previous inspections. Inspection items are completed on a frequency commensurate with the associated risk of the item or based on operational needs. Inspections may include the following facilities and equipment:

- automatic and manual sampling equipment;
- gas detection and monitoring devices;
- secondary containment for chemicals, fuels, and other hazardous substances;
- interlocked overfill protection devices and associated alarms;
- warning systems and audible and visual alarms on critical control devices;

- pond liners and embankments;
- water and wastewater treatment systems;
- drainage works and erosion controls;
- meteorology stations; and
- spill kits.

The process for completing and documenting environmental inspections is described in the environmental protection procedure *Environmental Inspections*.

### 4.2.2 Audits

Documented audits of the Program and supporting plans are conducted at a minimum of every five years and more frequently if conditions change. Audits are conducted in accordance with applicable internal and external requirements including those specified in section 4.2.

## 4.3 Reporting

Environmental reports to regulatory agencies and local Indigenous groups are required by applicable legal and other requirements, respectively. Routine reporting includes, but is not limited to:

- annual reports to the CNSC and Saskatchewan Ministry of Environment;
- annual national pollutant release inventory reports and greenhouse gas emissions reports; and
- semi-annual reports on halocarbon releases above a specified threshold.

NexGen also conducts routine non-regulatory environmental reporting and disclosure (e.g., environment, social, and governance). Monitoring and reporting obligations that are prescribed by licence, other regulatory approvals or regulations, and voluntary reporting obligations are summarized in a legal register and compliance task planner as described in the IMS Manual. Report contents and timelines vary depending on the report type and associated requirements or guidelines.

Reporting criteria, audiences, timelines, and required information to be communicated is outlined in the IMS Manual, *Effluent and Emissions Plan*, and *Environmental Monitoring Plan*.

## 4.4 Management Review

This Program and supporting processes are subject to review and evaluation by Rook I management. In addition to the general topics outlined in the IMS Manual, inputs specific to environmental protection include, but are not limited to:

- upcoming or new legislation or regulation related to the Program and plans to address these requirements;
- significant changes to the Program;
- changes in external and internal considerations relevant to the Program;
- changes in the needs and expectations of interested parties, including compliance obligations;
- significant environmental aspects of the Project;
- relevant communications from interested parties, including complaints;
- effluent, emissions, and environmental monitoring results;
- trends in environmental performance and deviations, and the status of related investigations and corrective actions;
- adequacy of resources;
- audit and inspection findings; and
- proposed continual improvement actions or their current status.

The management review process is outlined in the IMS Manual.

# 5.0 Act

The *Act* component of the Program consists of facilitating continual improvement and verifying that, when required, corrective actions are taken and appropriately managed. The results of these program elements feed back into *Plan* to complete the Plan-Do-Check-Act cycle.

## 5.1 Corrective Action Process

Environmental incidents including near-misses and deviations to the Program are evaluated and investigated as required. Appropriate actions are developed and implemented to correct and prevent reoccurrence. Corrective actions are planned, implemented, verified, and reviewed for effectiveness corresponding with the risk level. The corrective action process is outlined in the IMS Manual.

## 5.2 Continual Improvement

Continual improvement is an ongoing process to improve the suitability, adequacy, and effectiveness of the IMS to enhance environmental performance. Workers continually seek out improvement opportunities for the IMS and Project processes, which occur through Program monitoring, auditing, management review, and maintaining awareness of changes in the business environment. Improvement may also involve benchmarking Project performance against other similar projects and facilities.

Use of experience gained during Project construction and commissioning, including information gathered from relevant external sources, informs potential improvement opportunities. Potential sources of information include:

- worker experience;
- government and industry publications;
- industrial peer information exchange;
- professional associations.
- lessons learned;
- monitoring results;
- advances in science and technology; and
- incident investigations;

Continual improvement opportunities are identified, documented, evaluated, and implemented as required in accordance with the process outlined in the IMS Manual.

# 6.0 References

## 6.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-CHT-00001 | *Rook I Organizational Chart* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-AST-PGM-00001 | *Rook I Asset Management Program* |

| Document Number | Document Title |
|---|---|
| ROOK-COM-PGM-00001 | *Rook I Commissioning Management Program* |
| ROOK-CON-PGM-00001 | *Rook I Contractor Management Program* |
| ROOK-CST-PGM-00001 | *Rook I Construction Management Program* |
| ROOK-EMG-PGM-00001 | *Rook I Emergency Preparedness and Response Program* |
| ROOK-HSF-PGM-00001 | *Rook I Health and Safety Program* |
| ROOK-IPE-PGM-00001 | *Rook I Indigenous and Public Engagement Program* |
| ROOK-RAD-PGM-00001 | *Rook I Radiation Protection Program* |
| ROOK-TRN-PGM-00001 | *Rook I Training Program* |
| ROOK-WST-PGM-00001 | *Rook I Waste Management Program* |
| ROOK-EMG-PLN-00001 | *Emergency Response Plan* |
| ROOK-EMG-PLN-00002 | *Ground Transportation Emergency Response Plan* |
| ROOK-ENV-PLN-00001 | *Environmental Monitoring Plan* |
| ROOK-ENV-PLN-00002 | *Effluent and Emissions Plan* |
| ROOK-ENV-PLN-00003 | *Environmental Excellence Plan* |
| ROOK-ENV-COP-00001 | *Environmental Code of Practice* |
| ROOK-ENV-PRO-00001 | *Discharge and Discovery Prevention and Management* |
| ROOK-ENV-PRO-00002 | *Wildlife and Human Interactions* |
| ROOK-ENV-PRO-00003 | *Environmental Inspections* |
| ROOK-ENV-PRO-00004 | *Invasive Species* |
| ROOK-ENV-PRO-00005 | *Environmental Aspects and Impacts* |
| ROOK-ENV-RPT-00001 | *Rook I Environmental Impact Statement* |

## 6.2 External

- Federal
  - *Canadian Environmental Protection Act, 1999*
  - *Nuclear Safety and Control Act*
  - *General Nuclear Safety and Control Regulations*
  - *Uranium Mines and Mills Regulations*
  - *Canadian Nuclear Safety Commission. REGDOC-2.9.1, Environmental Principles, Assessments and Protection Measures*
  - *Metal and Diamond Mining Effluent Regulations*
  - *Canadian Standards Association. N288.0 Environmental management of nuclear facilities: Common requirements of the CSA N288 series of Standards*
  - *Canadian Standards Association. N288.4 Environmental monitoring programs at nuclear facilities and uranium mines and mills*
  - *Canadian Standards Association. N288.5 Effluent and emissions monitoring programs at nuclear facilities*
  - *Canadian Standards Association. N288.7 Groundwater protection programs at Class I nuclear facilities and uranium mines and mills*

- Provincial
  - *The Environmental Management and Protection Act, 2010*
  - *The Environmental Management and Protection (Saskatchewan Environmental Code Adoption) Regulations*
    - *Discharge and Discovery Reporting Standard*
  - *The Saskatchewan Employment Act*
- Other
  - *International Standards Organization. 14001 Environmental management systems — Requirements with guidance for use*

# Effluent and Emissions Plan
# ROOK-ENV-PLN-00002

# Rook I Project

## Effluent and Emissions Plan

ROOK-ENV-PLN-00002



August 2025

# Record of Revisions

| Revision No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| 0 | 27-Aug-2025 | Final | A. Swerhone | L. Moger | G. Johnson |

# Table of Contents

# List of Figures



# List of Tables

# 1.0 Introduction

The *Effluent and Emissions Plan* (Plan) describes a risk-based set of integrated facilities, processes, and activities used to mitigate and monitor the quantity and characteristics of constituents and physical parameters that are released to the environment as they relate to the NexGen Energy Ltd. (NexGen) Rook I Project (Project).

The Project is located adjacent to Patterson Lake, approximately 40 km east of the Saskatchewan-Alberta border, 130 km north of the Northern Village of La Loche, and 640 km northwest of the City of Saskatoon as shown in Figure 1.

The Plan reflects NexGen's commitment and approach to keeping the release of constituents of potential concern and physical parameters as low as reasonably achievable (ALARA) and to complying with applicable legal and other requirements (e.g., adhering to release criteria). Economically viable and best available technologies and techniques are applied. This approach is achieved by assessing performance against indicators and targets, and using ongoing monitoring to determine if pollution prevention processes and activities are functioning as intended.

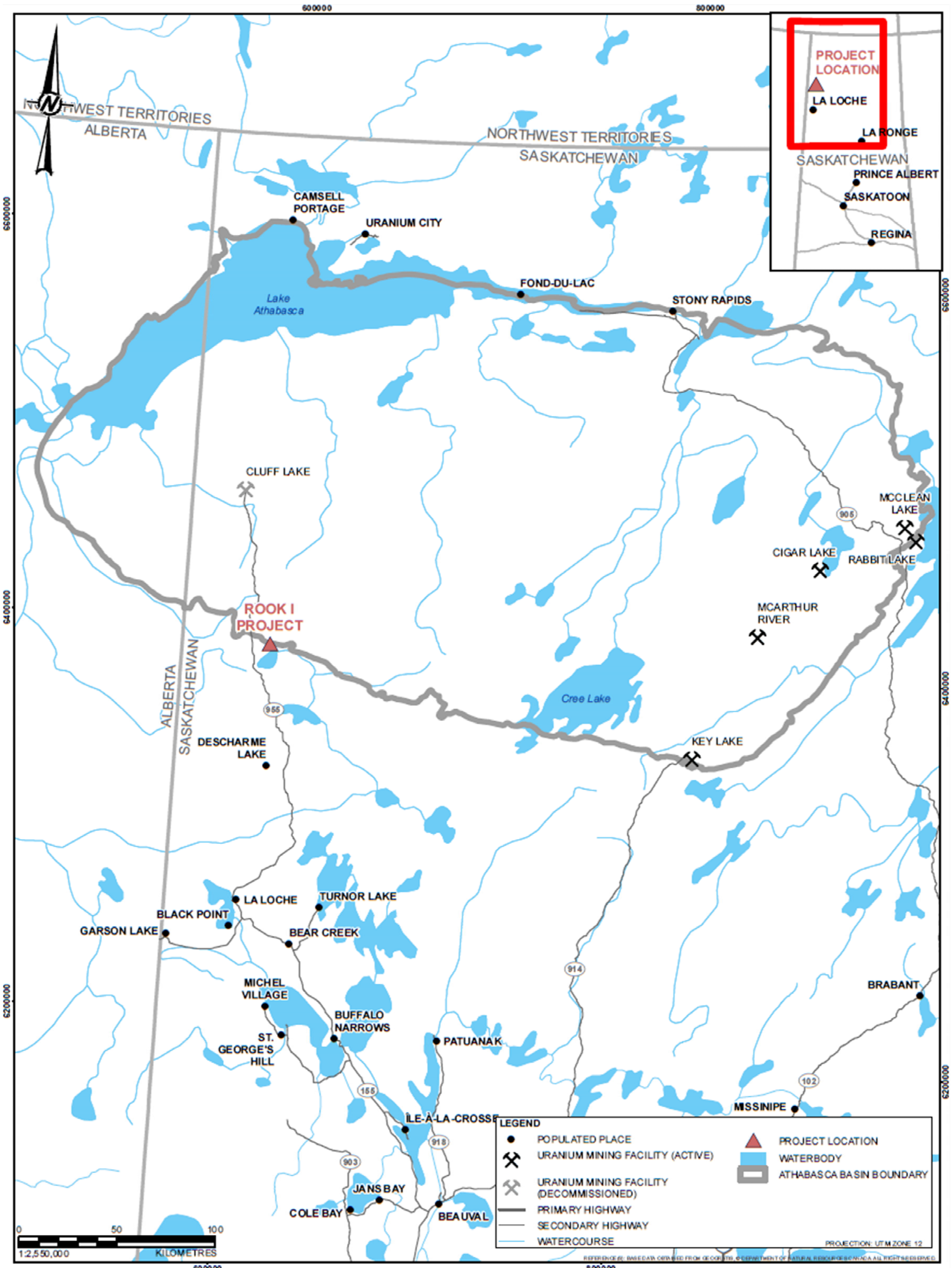



Figure 1: Rook I Project Location

## 1.1 Purpose

This Plan documents mitigation, monitoring, and reporting requirements for managing effluent (i.e., waterborne releases) and emissions (i.e., airborne releases) associated with the Project. The Plan meets applicable requirements of the references listed in section 7.0, including the Canadian Standards Association (CSA) N288.0 *Environmental management of nuclear facilities: Common requirements of the CSA N288 series of Standards* and CSA N288.5 *Effluent and emissions monitoring programs at nuclear facilities.*

## 1.2 Scope

The Plan applies to Project-related licensed activities during the Construction phase (i.e., site preparation, construction, and commissioning) of the Project and to Project workers and visitors. The nature and extent of effluent and emissions mitigation, monitoring, and reporting requirements will change during the Project life cycle.

This Plan describes effluents and emissions associated with facilities, activities, and processes throughout the full extent of the Construction phase. The actual effluent and emissions monitoring, mitigation, and reporting requirements at any given time during this phase are commensurate with the extent of surface and underground infrastructure and the stage of Project development. However, the methods described in this plan are adequate and appropriate to protect people and the environment, and to meet applicable legal and other requirements throughout the Construction phase.

The Plan applies to point source effluents, point source emissions, and fugitive emissions (e.g., greenhouse gases) that are released during routine Project activities. The spatial scope of the Plan extends from the point of treatment, if required, to the final point of control, before any dilution or dispersion occurs. The spatial boundaries are shown in Appendix A:.

Mining uranium ore and the production of uranium concentrate are not within the scope of the Construction phase. However, the processes described herein account for the possibility of encountering nuclear substances and establishing and maintaining effective environmental protection measures throughout the Project life cycle. This Plan and its supporting processes are subject to periodic review and are revised as required to maintain measures necessary to safely mitigate and monitor radiological effluent and emissions to the environment.

Monitoring the atmosphere, land, groundwater, and surface water beyond the final point of control is within the scope of the *Environmental Monitoring Plan*.

Managing uncontrolled discharges to the atmosphere, groundwater, surface water, and land is within the scope of the environmental protection procedure *Discharge and Discovery Prevention and Management*.

Uncontrolled discharges that trigger an emergency response are managed in accordance with the *Rook I Emergency Preparedness and Response Program* and its supporting plans.

Managing waste (e.g., untreated contact water, conventional waste, mine waste, treated effluent solid waste) is within the scope of the *Rook I Waste Management Program*.

## 1.3 Objectives

The Plan objectives are to:

- demonstrate adherence to internal release criteria;
- evaluate the effectiveness of effluent and emissions control measures;
- identify unusual or unforeseen conditions that may require corrective measures or adaptive management;
- provide data to verify predictions from the most recent regulatory-approved environmental risk assessment, refine the models used in the environmental risk assessment, and reduce uncertainty identified during the environmental risk assessment process;

- demonstrate due diligence; and
- demonstrate compliance with legal and other requirements.

These objectives form the basis for establishing a purpose-driven approach to managing effluent and emission mitigation activities, considering monitoring station types and monitoring frequencies.

## 1.4 Plan Framework

The Plan, along with the *Environmental Monitoring Plan* and the *Environmental Excellence Plan*, supports the *Rook I Environmental Protection Program* and is part of the overall *Rook I Integrated Management System* (IMS). As a component of the IMS, the Plan is subject to the *Rook I Integrated Management System Policy*, which provides the foundation for NexGen's approach to environmental protection. The Plan and its relationship to other IMS programs within the IMS hierarchy are shown in Figure 2.

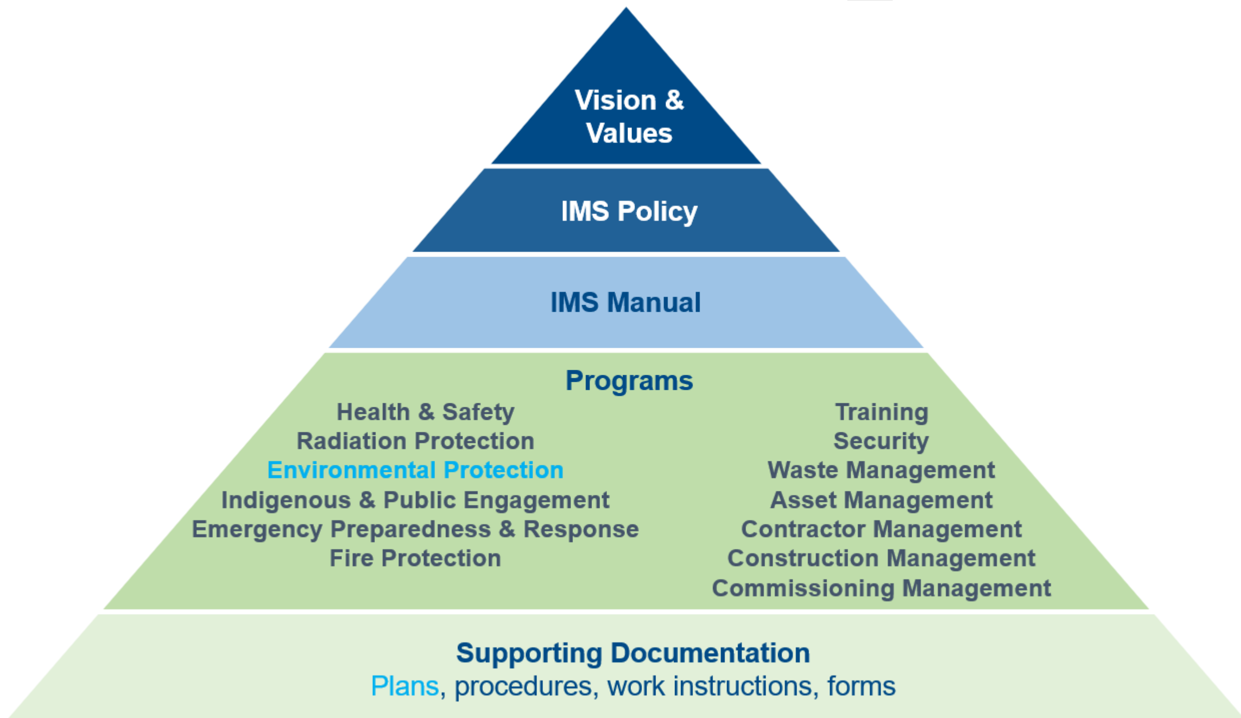



Figure 2: Plan Context Within the IMS

## 1.5 Plan Design Considerations

The Plan is designed to achieve the specific objectives described in section 1.3 and considers:

- environmental aspects associated with Project facilities, activities, and processes during the Construction phase;
- environmental effects monitoring programs in accordance with the *Metal and Diamond Mining Effluent Regulations*; and
- risks identified and commitments made in the *Rook I Environmental Impact Statement* and the most recent regulatory-approved environmental risk assessment.

### 1.5.1 Environmental Aspects

The Project operates year-round and includes Construction phase activities to establish the underground and surface facilities required to support the extraction of uranium ore and the production of uranium concentrate. A general schematic of primary Project infrastructure at the end of the Operations phase is shown in Figure 3 and includes:

- an underground mine accessed by two shafts;
- a surface uranium ore processing plant;
- mine rock management facilities;
- site water management facilities;
- an underground tailings management facility;
- an effluent treatment plant; and
- administration and accommodation complex facilities, utilities, an airstrip, and roads.

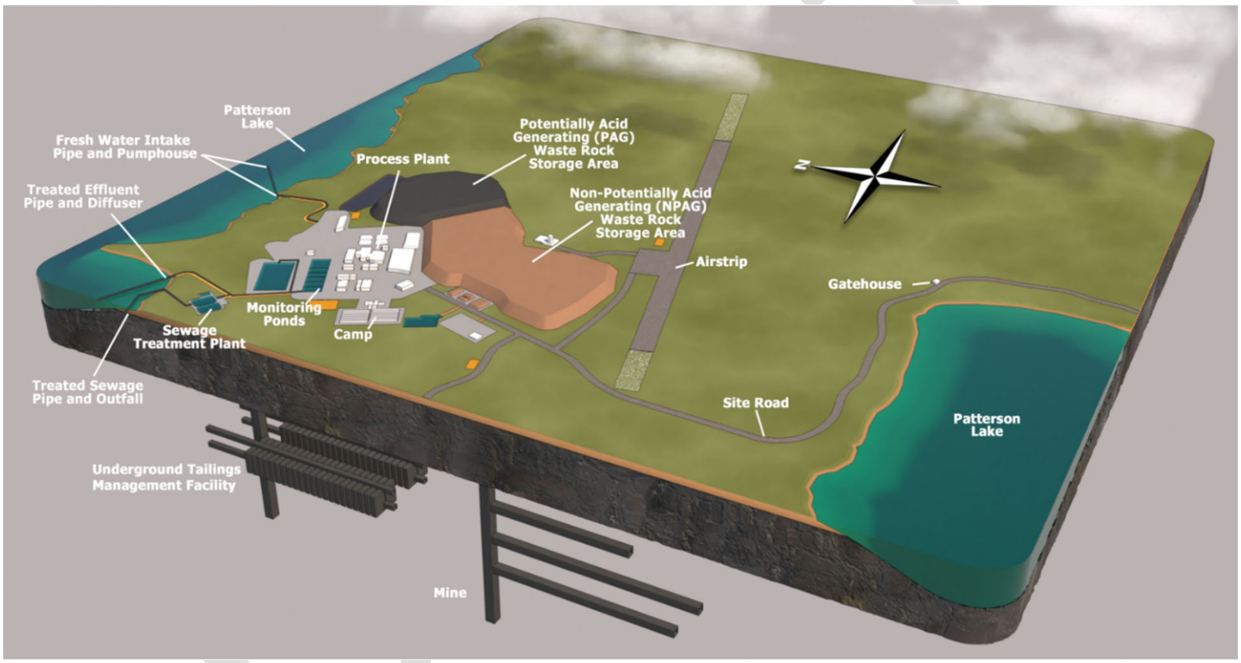



Figure 3: Schematic of Primary Project Infrastructure

Effluent and emissions associated with facilities, activities, and processes will vary over the Project life cycle. The Plan considers facilities anticipated to be present during the Construction phase, including temporary infrastructure that will be removed from service prior to the Operations phase.

The Project sources and pathways considered include:

- point source releases of treated contact water from the monitoring ponds to Patterson Lake;
- point source releases of treated sewage from the sewage treatment plant to Patterson Lake;
- diffuse terrestrial releases from site runoff pond #2 to the west bermed runoff collection area, with natural filtration to Patterson Lake;
- point source emissions to the atmosphere from stationary equipment (e.g., power plant, process heaters, incinerators); and

- fugitive emissions to the atmosphere from mobile equipment, space heaters, fuel storage and handling, and the temporary freeze plant as well as dust emissions from drilling and blasting, material handling, crushing, vehicle-generated road dust, and wind erosion from mine rock storage areas.

Effluents and emissions are documented in an environmental aspects and impacts register, which identifies the likelihood, significance, and residual risk associated with activities that could potentially influence the environment. For each effluent and emission, the register documents the environmental controls, including active and passive designs, implemented to mitigate the potential influence. Residual risks are assessed to help identify activities that require a higher priority for monitoring or mitigation on a continual or ad-hoc basis. These risks are considered in the development of the Plan objectives and monitoring rationale, which are listed in Appendix B:.

### 1.5.2 Environmental Effects Monitoring

Environmental effects monitoring (EEM) programs are prescribed by the *Metal and Diamond Mining Effluent Regulations* to detect and measure changes in aquatic ecosystems (i.e., receiving environments).

EEM consists of effluent, receiving water quality, and biological monitoring studies to examine the effectiveness of environmental protection measures directly in aquatic ecosystems. Potential long-term changes to environmental end points are assessed using regular cyclical monitoring and interpretation phases designed to investigate the changes on the same parameters and stations. In this way, both spatial and temporal characterizations are used to assess changes in receiving environments. Cycles occur at a minimum of every three years unless results suggest an alternate frequency is warranted.

EEM requirements for effluent monitoring are within the scope of this Plan. Approaches follow EEM Guidance (Environment Canada 2003, 2012), where practical. Biological and receiving water quality monitoring components are outlined in the *Environmental Monitoring Plan*. Both plans are considered in the design of the EEM program.

### 1.5.3 Environmental Risk Assessment and Follow-up Monitoring

Environmental risks at the site, for both current and future conditions, are quantitatively assessed in the *Rook I Environmental Impact Statement* and the most recent regulatory-approved environmental risk assessment, using integrated conceptual and numerical models that estimate and simulate the flow of materials from Project sources to human and ecological receptors. While the specific modelling software and platforms may change over the course of the Project life cycle, the general environmental risk assessment model suite includes:

- an air quality model that predicts the emission and dispersion of airborne constituents;
- a groundwater model that predicts the subsurface flow of water and constituents from the Project to the environment;
- surface water balance and mass balance models that predict effluent discharge rates and associated quality; and
- an ecological and human health risk assessment model that integrates effluent and emissions data to evaluate potential risks associated with constituents of potential concern.

Changes to specific modelling software and platforms are communicated to the Canadian Nuclear Safety Commission (CNSC) in writing, at a minimum as part of updates to the environmental risk assessment every five years or sooner if changes to Project facilities, activities, or processes result in sources, pathways, or receptors that are outside the basis of the most recent regulatory-approved environmental risk assessment.

The models provide the foundation for evaluating doses and risks to receptors as well as the means to design, test, and plan for additional controls, where necessary. For example, pathways considered for human health in the environmental risk assessment and pathways used to inform the Plan's mitigation and monitoring activities include:

- inhalation or ingestion via soil and surface water from the emission and deposition of fugitive dust (e.g., metals, radionuclides, radon, and other constituents of potential concern);
- indirect ingestion via surface water and sediment from the discharge of treated effluent into Patterson Lake and site runoff; and
- ingestion via groundwater and surface water from waste rock storage area seepage.

Environmental assessment follow-up monitoring is integrated into the Plan design to verify predictions and confirm that mitigation measures are effective and adaptive. Where applicable, the Plan specifically identifies monitoring components that have been included as direct commitments from the *Rook I Environmental Impact Statement*.

These components are referenced throughout Appendix B to promote purpose-driven monitoring and provide traceability of each monitoring activity back to its origin in the *Rook I Environmental Impact Statement* commitments. This approach confirms that the monitoring framework remains aligned with regulatory expectations and reflects NexGen's ongoing commitment to responsible environmental stewardship

Conceptual site models are also developed as part of the *Rook I Environmental Impact Statement* and environmental risk assessment to represent the Project conditions after the Construction phase is complete. A conceptual site model is used to help understand and visualize the sources, pathways, and receptors of constituents of potential concern identified for the Project by the *Rook I Environmental Impact Statement* and environmental risk assessment. Over time, conceptual site models are refined based on monitoring results.

Data collected as part of the Plan are used to iteratively verify and inform both conceptual and numerical models. Further details and a summary of results are provided in the *Rook I Environmental Impact Statement* and environmental risk assessment.

## 1.6 Terminology

Refer to the Rook I Project Glossary.

Reader is advised to refer to the Rook I Project Glossary for the most up to date terms in use.

**adaptive management (AM)** – A planned and systematic process for continually improving management practices (primarily environmental) by learning from their outcomes. For an environmental assessment (EA), it involves, among other things, the implementation of new or modified mitigation measures over the life of a project to address unanticipated environmental effects (CNSC 2021).

**as low as reasonably achievable (ALARA)** – A guiding principle aimed at minimizing the risk of adverse health, safety, environmental, and radiological impacts to the lowest extent practicable, considering technical, legal, social, and economic factors.

**batch release** – A release to the environment that occurs during time-limited events or processes.

**conceptual site model** – A working hypothesis of the relationships between the sources of the constituents or physical parameters and the endpoint receptors (CSA N288.0).

**constituent of potential concern (COPC)** – Chemical and radiological constituents or physical parameters that pose a potential risk to aquatic and terrestrial life and/or human health as identified in the most recent regulatory-approved environmental risk assessment and the *Rook I Environmental Impact Statement*.

**contact water** – Water that may have been physically, chemically, or radiologically altered by Project activities. This waste may be diverted and require management (e.g., treatment) before release to the environment.

**discharge** – A discharge, drainage, deposit, release, or emission into the environment (*The Environmental Management and Protection Act, 2010*) that is covered under the provincial Discharge and Discovery Standard.

**effluent** – A waterborne release of a constituent or physical parameter to the environment (CSA N288.5).

**emission** – An airborne release of a constituent or physical parameter to the environment. An emission may include point sources or fugitive emissions (CSA N288.5).

**environment** – The surroundings in which an organization operates including air, water, land, natural resources, flora, fauna, humans, and their interrelationships (ISO 14001).

**environmental aspect** – The interaction between a Project facility, activity, or process and the environment.

**environmental change** – An altered state and the positive and negative results. Changes may not be related to the Project (e.g., weather, reference locations).

**final discharge point –** With respect to an effluent, an identifiable discharge point of a mine and mill beyond which the operator of the mine no longer exercises control over the quality of the effluent (*Metal and Diamond Mining Effluent Regulations*).

**final point of control** – The location at which a measure can be reasonably implemented to manage or modify the risk associated with effluent or emissions. For example, the final point of control for effluent leaving the monitoring ponds is the monitoring pond outlet control infrastructure, not the point at which treated effluent enters Patterson Lake, as the latter is located underwater and does not allow for practical implementation of control measures.

**fugitive emission** – An emission that is not emitted from a fixed, point source such as a stack, and is generally not caught by a capture system.

**influence** – When an environmental aspect is expected to result in a change to the environment, whether adverse or beneficial (e.g., no statistical confirmation of cause-effect linkages).

**mitigation** – Specific to this Plan, measures aimed at eliminating, reducing, or controlling potential environmental influences from the Project.

**monitoring** – Determining the status of a system, process, product, service, or activity (ISO 9000).

**numerical model** – A combination of mathematical equations used to describe the physical conditions of various scenarios.

**physical parameter** – A measurable physical property of an environmental media (e.g., temperature).

**point source** – Effluent or emissions for water and air, respectively, that are released from a single, identifiable source (CSA N288.5).

**quality assurance (QA**) – Part of quality management focused on providing confidence that quality requirements will be fulfilled.

**quality control (QC)** – Part of quality management focused on fulfilling quality requirements.

**relative percent difference (RPD)** – Precision calculation for two duplicate values A and B, where A is larger than B, the RPD = 2*(A-B)/(A+B)*100%.

**sewage contact water** – Waste water generated from various sanitation and domestic facilities.

**supporting parameters** – Constituents or physical parameters that provide additional information about a constituent of potential concern, indicate an environmental change, or are monitored for due diligence purposes.

**systematic approach to training (SAT)** – A structured approach used to manage training modules, widely known as an instructional design model.

**worker** – Any person working for NexGen, including a contractor.

# 2.0 Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Plan. Workers are accountable for understanding and fulfilling their roles and responsibilities. Although NexGen maintains overall accountability for Project activities, the term *Rook I* is used in the following role descriptions to reinforce that the role is applicable and may be assigned to NexGen workers and contractors performing work on behalf of the Project.

Workers who are responsible for tasks and activities related to effluent and emissions are provided with the training and resources required to fulfill prescribed tasks as outlined in the *Rook I Training Program*.

Additional roles and responsibilities are further detailed as part of the supporting processes.

**Rook I Management** – is responsible for:

- providing resources to achieve Plan objectives and to fulfill the required roles, responsibilities, and processes of the Plan;
- providing support to maintain effective effluent and emissions mitigation and monitoring;
- controlling effluent and emissions incidents and deviations and directing corrective action;
- communicating with the applicable regulatory agencies and other external stakeholders on behalf of the Project, as appropriate; and
- identifying and pursuing opportunities to achieve continual improvement.

**Plan Oversight** – is responsible for:

- providing oversight regarding effluent and emissions mitigation and monitoring practices and data evaluation;
- developing release criteria for effluent and emissions in consultation with subject matter experts in water treatment and laboratory analysis;
- establishing and maintaining a monitoring system to assess the effectiveness of this Plan through activities such as tracking performance metrics, interpreting data, and supporting adaptive management and corrective actions;
- maintaining Plan-specific data and records in a controlled manner;
- addressing Plan deficiencies and deviations;
- communicating with the applicable regulatory agencies and other external stakeholders on behalf of the Project, as appropriate; and
- identifying and supporting opportunities to continually improve effluent and emissions mitigation and monitoring processes.

**Effluent Release Supervision** – is responsible for:

- confirming that criteria outlined in the *Rook I Environmental Code of Practice* have been met, and that the effluent is acceptable for release to the environment;
- overseeing the implementation of work activities in the field as described in the Plan;
- informing workers of their roles and responsibilities;
- verifying workers are aware of and able to execute specific tasks and activities related to effluent processes;
- verifying workers meet and maintain required Plan-specific training qualifications;
- identifying Plan deficiencies and deviations and consulting with Rook I management and the plan oversight as required to develop and implement remedial actions; and
- identifying and supporting opportunities to continually improve effluent and emissions mitigation and monitoring processes.

**Plan Implementation** – is responsible for:

- implementing resources and assigning appropriate workers to fulfill the required roles, responsibilities, and processes of the Plan and associated processes;
- confirming that workers meet and maintain required Plan-specific training and qualifications;
- maintaining Plan-specific data and records in a controlled manner and providing relevant effluent and emission data to the plan oversight;
- identifying and reporting Plan deficiencies and deviations to the plan oversight and supporting the implementation of remedial actions as required; and
- implementing opportunities to continually improve effluent and emissions mitigation and monitoring processes.

# 3.0 Mitigation

Effluent and emissions mitigation involves measures aimed at eliminating, reducing, or controlling potential influences of the Project. These measures are implemented by qualified workers in accordance with applicable processes and training.

A summary of mitigation measures specific to this Plan is documented in an environmental aspects and impacts register, which identifies the likelihood, significance, and residual risks associated with activities that could potentially influence the environment.

Adaptive management is applied as necessary to minimize effluent and emissions. The adaptive management process is outlined in the *Rook I Integrated Management System Manual* (IMS Manual).

## 3.1 Effluent

Effluent is a waterborne release of a constituent or physical parameter to the environment. Prior to being suitable for release to the environment, water that requires treatment is classified as mineralized contact water (i.e., water that has been physically, chemically, or radiologically altered by construction, mining and milling activities that include contact with surfaces that are expected to be mineralized or radiologically contaminated), non-mineralized contact water, or sewage contact water. This water requires mitigation measures including collection, treatment, and analysis to confirm that the quantity and characteristics of constituents and physical parameters are acceptable for release relative to release criteria.

Non-mineralized contact water (i.e., water that may have been physically altered by Project activities through contact with surfaces that are not expected to be mineralized or radiologically contaminated) that is tested and meets release criteria does not require treatment and subsequently is directed to the west bermed runoff collection area where it is released through a natural terrestrial filtration system that prevents suspended solids from entering Patterson Lake.

The effluent mitigation process, from the point of treatment, if applicable, until the effluent is confirmed acceptable for release, incorporates both engineering and administrative controls, and is described in the following subsections.

### 3.1.1 Contact Water

Contact water is water that may have been physically, chemically, or radiologically altered by construction, mining, or milling activities. Water that has contacted radiological or mineralized surfaces (i.e., mineralized contact water) requires collection and may require treatment prior to release to remove constituents of potential concern (i.e., engineering control). Treatment is required when constituents of potential concern are expected to be elevated compared to release criteria as outlined in the *Rook I Environmental Code of Practice* (i.e., an administrative control).

Contact water that requires treatment is collected and treated via the temporary or permanent effluent treatment plant (Project-stage dependent), which adheres to the requirements of REGDOC-2.9.2, *Controlling Releases to the Environment*. Following treatment, contact water is directed to the monitoring ponds.

There are four lined monitoring ponds and one lined contingency pond located north of the mill terrace, which receive treated effluent after treatment in the temporary or permanent effluent treatment plant (Project-stage dependent). Capacity and nominal fill rates are provided in the *Rook I Mining and Milling Facility Description Manual.*

A time-averaged composite sample is collected during the filling of each monitoring pond and sent for laboratory analysis prior to release to the receiving environment. Treated contact water is held in each monitoring pond until analyses confirm that criteria have been met as outlined in the *Rook I Environmental Code of Practice*, and the effluent is acceptable for release to the environment.

Batches (i.e., treated contact water volumes held in monitoring ponds prior to release) that do not meet acceptable release criteria are pumped to lined ponds and subsequently returned to the temporary or permanent effluent treatment plant (Project-stage dependent) for reprocessing or for contact water usages on site.

Batches that meet acceptable release criteria are deemed to be treated effluent. Treated effluent is released from the monitoring ponds and conveyed to Patterson Lake via a pipeline equipped with a diffuser, as shown in Figure 3. As there is no practical way to monitor effluent at the submerged end-of-pipe in Patterson Lake, samples representing the final point of control are collected at the outlet of the monitoring ponds.

The construction of the relevant facilities as well as associated monitoring and reporting is conducted in accordance with the conditions of the licence, the provincial Approval to Construct Pollutant Control Facilities, and other regulatory authorizations, which are considered in the development of the Plan and its supporting documents.

### 3.1.2 West Bermed Runoff Collection Area

The west bermed runoff collection area receives runoff from the local contributing area as well as water from site runoff pond #2 if the release criteria are met. The west bermed runoff collection area benefits from a naturally occurring low point, which provides significant storage capacity with the construction of a berm on the north side of the lower area. The collection area prevents suspended solids entrained in the runoff from entering Patterson Lake. The area is not lined, allowing for natural dissipation.

Non-mineralized contact water directed from site runoff pond #2 to the west bermed runoff collection area is tested to confirm that release criteria are met as outlined in the *Rook I Environmental Code of Practice*. If water in site runoff pond #2 does not meet release criteria, contents are pumped to the settling pond prior to treatment as described in section 3.1.1.

### 3.1.3 Sewage Contact Water

Sewage contact water requires treatment in the sewage treatment plant (i.e., engineering control) prior to release to the environment. Sewage contact water is treated to produce expected effluent quality produced by facilities treating typical sanitary sewage.

Sewage contact water is collected and stored before being transferred to the permanent sewage treatment plant (Project-stage dependent), where it is treated. At the final point of control, treated sewage is sampled to verify release criteria as outlined in the Saskatchewan *Waterworks and Sewage Works Regulations* and release objectives set out in the provincial authorizations (i.e., administrative control) before being released to Patterson Lake via the treated sewage outfall as shown in Figure 3. Facility construction, operations, monitoring, and reporting are conducted in accordance with the provincial Permit for Construction of Sewage Works and the Permit to Operate a Sewage Works (Project-stage dependent), respectively, which are considered in the development of the Plan and its supporting documents.

## 3.2 Emissions

Emissions refer to the airborne release of a constituent or physical parameter to the environment. Emissions can be classified as either point source or fugitive. Point source emissions are released from a single, identifiable source. Fugitive emissions, by contrast, are not emitted from a fixed, point source and are generally not captured by a control system. As a result, fugitive emissions are estimated using emission factors. For example, greenhouse gas emissions may be calculated based on combustion of one or more fuels in equipment (e.g., boilers, heaters, diesel-fired pumps, incinerators, waste oil burners) and other miscellaneous sources (e.g., explosives).

The Project generates point source (e.g., power plant, underground mine exhaust, conventional waste incinerators) and fugitive (e.g., dust from soil and overburden stockpiles, waste rock storage areas, and roads) air emissions. Industrial air source environmental protection measures are incorporated into the Plan to streamline documentation and in recognition of the interconnectedness of emission components. Objectives noted in the *Industrial Source (Air Quality)* chapter of the *Saskatchewan Environmental Code* have been considered and integrated into the broader components of the Plan. Additionally, the environmental procedure *Industrial Air Source* outlines processes to manage direct and passive contact with air emissions by taking reasonable and prudent measures, including:

- confirming the ambient air quality standards are met, as described in section 4.3; and
- calculating or measuring annual air constituents and physical parameters in a manner that is scientifically defensible and accurately determines the level of air constituents and physical parameters with sufficient detail to allow the determination to be verified.

The emissions mitigation process, designed to keep airborne releases ALARA, incorporates both engineering and administrative controls, and is described in the following subsections.

### 3.2.1 Point Sources

Appropriate pollution control techniques and technologies, preventative maintenance, and stack testing are applied to emission point sources such as incinerators with stacks.

Air quality monitoring stations outlined in the *Environmental Monitoring Plan* are used to verify predictions and confirm that emissions are not leading to exceedances of ground-level concentration standards. If exceedances are consistently recorded and potentially attributed to stacks or generator packages, manual stack sampling events are performed to confirm that emissions data used in the dispersion modelling exercise are sufficiently conservative to confirm the reliability of the model predictions.

#### Halocarbons

Halocarbon emissions are controlled through the management of inventory and the proper installation, maintenance (including leak tests), servicing, alteration, replacement, or repair of any equipment or components that contain or may contain halocarbons, in accordance with provisions of the *Federal Halocarbon Regulations, 2022* and the *Halocarbon Control* chapter of the *Saskatchewan Environmental Code*. The process for managing halocarbons is outlined in the environmental protection procedure *Halocarbon Control*.

### 3.2.2 Fugitive Sources

Fugitive sources and applicable mitigations are described in Table 1.

Table 1: Fugitive Sources and Applicable Mitigations

| Fugitive Sources | Mitigations |
|---|---|
| Site and access roads and traffic | • Where applicable, site road watering is conducted.<br>• In high-traffic areas, additional mitigation including chemical dust suppressants are used to further reduce dust generation. Only government-approved dust suppressants are applied.<br>• Vehicle speed limits mitigate dust generation and frozen winter conditions mitigate dust generation substantially. |
| Airstrip | • Airstrip watering and/or approved chemical dust suppressants. Only government-approved dust suppressants are applied.<br>• Frozen winter conditions mitigate dust generation substantially. |
| Vehicles | • Particulate emissions and nitrogen oxide from combustion of fuels in the mobile fleet underground and on the surface are mitigated through the use of Tier 4 engines, whenever practical.<br>• Ultra-low sulphur diesel with 15 parts per million or less elemental sulphur in the fuel is used to limit sulphur dioxide emissions.<br>• Limited vehicle idling and plug-in stations are used in cold conditions. |
| Blasting and underground operations | • Air quality is monitored underground to confirm that concentrations of constituents are within safe levels for human health as outlined in the *Rook I Health and Safety Program*. |

The *Environmental Excellence Plan* is implemented to reduce greenhouse gas emissions to the extent practicable and outlines methods used to evaluate the effectiveness of mitigation and tools used to implement a net-zero framework.

# 4.0 Monitoring

Effluent and emissions monitoring involves assessing the quantity and characteristics of waterborne and airborne releases from various sources. This includes point source monitoring (using methods such as grab or composite sampling), fugitive emissions monitoring (often based on consumption data or estimates), and ambient monitoring (such as ambient air quality monitoring from permanent stations). Effluent and emissions monitoring activities, including sampling and analytical processes, quality assurance and quality control (QA/QC), and data interpretation, are conducted by qualified workers in accordance with applicable processes and training. Additional details on monitoring types and methodologies are provided in Appendix B.

Fugitive emissions are not emitted from a fixed, point source and are generally not captured by a control system. As a result, fugitive emissions are estimated using emission factors. For example, greenhouse gas emissions may be calculated based on combustion of one or more fuels in equipment (e.g., boilers, heaters, diesel-fired pumps, incinerators, waste oil burners) and other miscellaneous sources (e.g., explosives). For this reason, the processes described in this document primarily focus on effluent and point source sampling and analytical processes. Methods used to estimate fugitive emissions are described in applicable modelling and risk assessment reports.

## 4.1 Sampling and Analytical Processes

The processes and information necessary to conduct sampling and generate analytical results are described in the following subsections.

### 4.1.1 Flow Rates

Flow rates of effluent and emissions (i.e., the rate at which water or air is drawn into a sampling device) are required for calculating the chemical and radiological loading of constituents in water and air. Flow rates are measured at effluent and emissions quality monitoring stations wherever feasible and are estimated when measuring flow rates or loading rates of the medium is not possible due to technical (e.g., fugitive emissions that are broadly distributed) or safety constraints.

Emission flow rates from stacks are measured during stack testing and may be reported as either the total flow rate or the instrument flow rate with an appropriate correction factor applied. The frequency of flow measurements for continuous emissions should be frequent enough to capture variations in flow rates and allow accurate calculation of flow-weighted loads. Accordingly, emissions with flow rates that vary by more than 20% from the mean flow rate should be equipped with automated flow measuring devices. The sample flow rate must be accurate to within ±10% and must not alter the total flow rate by more than 15%, in accordance with CSA N288.5.

Emissions such as greenhouse gases are typically estimated because they cannot be directly measured through flow monitoring. Methods for calculating estimates are outlined in the procedure *Greenhouse Gas Management*.

For effluent subject to the *Metal and Diamond Mining Effluent Regulations*, the flow measurement or estimation must be accurate to within ±15% to meet requirements, in accordance with CSA N288.5. This accuracy threshold applies to the total flow of the effluent. Under the *Metal and Diamond Mining Effluent Regulations*, flow-weighted averages are required to calculate monthly loadings.

### 4.1.2 Constituents and Physical Parameters

Constituents and physical parameters monitored to meet Plan objectives are categorized as either constituents of potential concern or supporting parameters.

Constituents of potential concern include a focused list of parameters, nutrients, major ions, metals, and radionuclides that have the potential to pose a risk to aquatic life, terrestrial life, or human health. The process for identifying constituents of potential concern is described in the most recent regulatory-approved environmental risk assessment and the *Rook I Environmental Impact Statement*.

Constituents of potential concern identified in the most recent regulatory-approved environmental risk assessment include:

- major ions: chloride and sulphate;
- total metals: arsenic, cobalt, copper, molybdenum, and uranium; and
- radionuclides: lead-210, polonium-210, radon-222, radium-226, thorium-230, uranium 234, and uranium-238.

Constituents of potential concern for surface water, as identified in the *Rook I Environmental Impact Statement*, include:

- major ions: chloride and sulphate;
- nutrients: total ammonia, nitrate, and phosphorus;
- total metals: aluminum, arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, strontium, thallium, uranium, vanadium, and zinc; and
- radionuclides: lead-210, polonium-210, radium-226, thorium-230, uranium-234, and uranium-238.

Supporting parameters provide additional information about a constituent of potential concern, may indicate environmental changes, and can be monitored to demonstrate due diligence. Supporting parameters are identified based on:

- results of the *Rook I Environmental Impact Statement*;

- results of the environmental risk assessments;
- professional judgement;
- laboratory packages;
- scientific knowledge;
- local Indigenous knowledge; and
- local knowledge.

The constituents of potential concern and supporting parameters analyzed are dependent on the specific environmental media being monitored, as identified in Appendix B:.

### 4.1.3 General Sample Collection

Sample collection methods are designed to obtain a representative sample of the media being sampled. This includes using applicable sample container types and processes to avoid altering the sample during and after it has been collected (e.g., minimizing headspace, maintaining cool temperatures, selecting the appropriate container for the analyte). Supporting documents include information such as:

- sample container types and volumes;
- preservatives used and sample hold times;
- sample handling and storage procedures; and
- chain of custody processes.

Ideally, samples are collected at the final discharge point where effluent and emissions are released to the environment. However, in some cases, this is not practical (e.g., from submerged diffuser ports). In such cases, effluent or emissions are monitored at the final point of control (e.g., monitoring pond outlet) located upstream of the release to the environment.

For batches of effluent planned for release (e.g., discharge of treated effluent from monitoring ponds), composite samples are collected from each pond prior to discharge. Composite samples meet the requirements of a composite sample as defined in the *Metal and Diamond Mining Effluent Regulations*.

Sampling methods are subject to health and safety controls as outlined in the *Rook I Health and Safety Program*. If a sample cannot be safely collected for any reason, sampling should be avoided, and the applicable procedure should be modified to enable safe collection while still meeting the objectives of the Plan. If regulatory compliance samples cannot be collected due to safety concerns or results cannot be reported due to technological issues (e.g., data security breaches), the regulatory authorities must be notified according to the communication processes outlined in the IMS Manual and applicable legal and other requirements. The samples should be collected as soon as it is safe and technologically feasible to do so, and regulatory authorities should be notified, where required.

The location of sampling stations are shown in Appendix A and listed in Appendix B.

### 4.1.4 Laboratory Analyses

Compliance samples are analyzed in a laboratory that is accredited to ISO 17025 standards by an accredited certification body such as the Canadian Association for Laboratory Accreditation (CALA) and adhere to *Metal and Diamond Mining Effluent Regulations* detection limits, when applicable.

An off-site accredited laboratory is used for regulatory compliance samples, where practical.

An on-site accredited laboratory is used for time-sensitive effluent analysis to reduce the risk of operational and environmental disruptions related to discharge availability and monitoring pond capacity, and to facilitate timely decision-making, where practical. The on-site laboratory is operated according to the *Laboratory Quality Plan*, which outlines overall laboratory program management protocols, including sample handling, analytical methods, QA/QC, and other aspects of laboratory operations.

In the event that on-site laboratory services are not available, samples are shipped to an off-site, ISO 17025 accredited third-party laboratory. Shipping is conducted with a level of priority commensurate with the type of sample analysis required, in order to maintain sample integrity.

## 4.2 Quality Assurance and Quality Control

QA/QC processes are conducted to maintain the accuracy and reliability of data collected as part of the Plan. Quality assurance is the system of activities designed to confirm that a product or service meets defined quality standards with a stated level of confidence. Quality control differs in that it is a system of activities designed to verify that a product or service complies with relevant legal and other requirements. The QA/QC processes and documentation are established for each applicable sample before collection and consider CSA N286 *Management system requirements for nuclear facilities* and ISO 9001 *Quality management systems – Requirements*.

The QA/QC processes focus on:

- field sampling equipment and activities (effluent and point sources);
- laboratory QA/QC (effluent and point sources);
- data validation (effluent, point sources, fugitive sources); and
- inspections and audits (effluent, point sources, fugitive sources).

As per CSA N288.5, 10% of composite samples should be designated as QA/QC samples across similar types of samples collected each year.

The QA/QC processes apply to all models and calculations (e.g., monthly loadings) used in the interpretation and reporting of data collected as part of the Plan. Project QA/QC records are maintained for the Project life cycle.

### 4.2.1 Sampling Equipment and Activities

Supporting procedures are available for each type of field sampling. In general, field measurements and instrument calibrations are conducted according to manufacturer specifications, including calibration frequency and standards. Sampling equipment meets the design, maintenance, and operational requirements in accordance with the applicable reference method used for sample collection and analysis. Equipment is appropriate for the media being sampled and is compatible with the analytical parameters to prevent the contamination or degradation of samples.

Work instructions provide details on how sampling equipment is handled to maintain the accuracy and reliability of data. Work instructions also include appropriate sample collection techniques, the selection and use of approved sample containers, and the application of required preservation and storage methods.

### 4.2.2 Laboratory Quality Assurance and Quality Control

Where a laboratory lacks registration to the appropriate compliance requirements, an evaluation of its management system, including QA/QC practices, is conducted.

Samples, whether sent to an off-site or analyzed in an on-site laboratory, are accompanied by a chain of custody specifying the sample identifier; sample name, date, and time; preferred method of analysis; required analytes; and preservatives. Once received by a laboratory, quality control measures, including the analysis of certified reference materials, control samples, duplicates, and sample spikes, are implemented to verify the validity of analytical results. Laboratory QA/QC processes determine the properties of each analysis as described in Table 2.

Table 2: Laboratory QA/QC Analysis Properties

| QA/QC Analysis Properties | Description |
|---|---|
| Precision | • the reproducibility and reliability of the test method; and<br>• determined by analyzing replicate samples (i.e., multiple containers that each contain subsets of a homogenized sample). |
| Accuracy | • the degree of closeness between a measured value and the analyte's true reference value; and<br>• determined by analyzing reference standards (i.e., solutions derived from certified commercial formulations). |
| Sample contamination | • determined by analyzing blank samples that are carried through the entire sampling process (i.e., distilled or deionized water blanks, method blanks, and trip blanks). |
| Detection limits | • the lowest concentration at which individual measured results for a specific analyte are statistically different from a blank sample at a specified confidence level for a given method and representative media; and<br>• vary among analytical methods for most analytes and are an important consideration when concentrations are expected to be very low (i.e., near detection limits). |

In addition to the internal QC procedures, laboratory splits may be analyzed periodically by sending replicate samples to external, accredited laboratories to confirm the accuracy of the analyses (i.e., duplicate samples).

### 4.2.3 Data Validation

Data validation is an essential element of data QA/QC. Data validation provides a set of criteria against which data are reviewed to confirm that the data of interest are adequate for their intended use. The validation process includes identification of questionable data and investigation of apparent anomalies. Data validation requires evaluation of QA/QC samples, and includes an assessment of:

- precision, which is determined by calculating the relative percent difference (RPD) of replicate samples to understand the analytical variability among samples of identical composition;
  - for two duplicate values A and B, where A is larger than B, the RPD = 2*(A-B)/(A+B)*100%;
- accuracy, which is determined by comparing the reported values of measured reference standards to the known value based on its progeny; and
- possible sample contamination, which is determined by screening for any values in blank samples that exceed five times the detection limit, and evaluating such exceedances using professional judgement and historical data.

The *Metal and Diamond Mining Effluent Regulations* include data validation requirements for precision, accuracy, and detection limits for applicable metals and total suspended solids. These requirements must be met for all effluent monitoring conducted under the *Metal and Diamond Mining Effluent Regulations* and are considered targets for monitoring activities that are not subject to the *Metal and Diamond Mining Effluent Regulations*.

Additional data validation steps are conducted on all samples to screen for outliers, which may be due to sample contamination, transcription errors, or laboratory errors. Reported values are compared to expected ranges based on previous sampling or professional judgement to identify values that appear to be too low or too high (relative to historical or expected levels), so that the cause can be investigated. When such values are reported, the first step is to re-analyze the original sample, if it is still available, or collect a new sample, if feasible. To increase the likelihood of having leftover sample material or the ability to re-sample, data validation is completed as soon as reasonably practical.

### 4.2.4 Inspections and Audits

The performance and effectiveness of the Plan and its associated procedures and work instructions are monitored and verified with regular inspections and audits. In addition, compliance with legal and other requirements is audited on a regular basis. The methodology and schedule for planning, preparation, performance, and reporting of Plan conformance audits are outlined in the IMS Manual.

Inspections and audits by regulatory bodies are conducted to verify compliance with requirements. These may include, but are not limited to, inspections focused on effluent discharge monitoring (e.g., sampling and analysis, flow measurement verification), emissions monitoring (e.g., stack testing, continuous emissions monitoring system data review, visible emissions checks), and review of the core elements of the Plan (e.g., sampling design, analytical processes, QA/QC procedures, data interpretation, reporting). Deviations, instances of regulatory noncompliance, or opportunities for improvement identified through inspections and audits are managed as outlined in the IMS Manual.

Further details regarding inspections and audits are outlined in the procedure *Environmental Inspections*,

## 4.3 Data Interpretation

Interpretation of data collected in accordance with the Plan varies by monitoring station, media, and the regulatory requirement that each type of monitoring may fulfil. Minimum levels of data interpretation are described in this section, and additional interpretation may be included to better understand how effectively Project activities, or potential influences from Project activities, are being controlled and mitigated in accordance with legal and other requirements (e.g., permits, approvals, licences).

Descriptive statistics (e.g., minimum, mean, maximum) and corresponding measures of variability, as required, are used to assess and compare data annually at a minimum. More detailed statistical and long-term trend analyses may be used to address specific questions and may vary depending on the monitoring station and media. At a minimum, the following criteria are used to interpret applicable data, which is noted in Appendix B:

- Air quality objectives and standards are provided in the procedure *Industrial Air Source* to confirm that ambient air quality standards and applicable emission limit standards set out in the *Saskatchewan Environmental Quality Standard* are met.
- Administrative levels are internal thresholds set by the Project that provide an early indication that an action level may be met or exceeded if administrative actions are not put in place to mitigate concentrations of applicable chemical and radiological constituents in treated effluent. These administrative levels (i.e., upper values of normal operation) are not externally reportable, and exceedances do not represent a loss in control. Details regarding administrative levels are outlined in the *Rook I Environmental Code of Practice*.
- Action levels correspond to treated effluent monitoring results that, if met or exceeded during routine conditions, may indicate a potential loss of control of the *Rook I Environmental Protection Program*. Action levels are derived according to CSA N288.8 *Establishing and implementing action levels for releases to the environment from nuclear facilities* and are set below licensed release limits so that action may be taken prior to licensed release limits being exceeded. Details regarding action levels are outlined in the *Rook I Environmental Code of Practice*.
- Licensed release limits are based on the expected maximum release (including a margin for operational flexibility) and any exceedance of these limits represents a release outside of the licensing basis and demonstrates a lack of compliance with the licence. Details regarding licensed release limits are outlined in the *Rook I Environmental Code of Practice*.
- *Metal and Diamond Mining Effluent Regulations* include limits of effluent concentrations in the form of maximum authorized concentrations for prescribed deleterious substances, pH, and acute lethality.
- Sewage criteria are outlined in the Saskatchewan *Waterworks and Sewage Works Regulations*.

Where applicable, measured values are compared to the predictions in the *Rook I Environmental Impact Statement* or the most recent regulatory-approved environmental risk assessment. Data interpretation includes, but is not limited to, the analysis of temporal trends. Spatial trends are typically not applicable to effluent and emissions, as the final point of control is a fixed location.

Detection limits and natural or seasonal variability are also considered when interpreting data. Standard deviation calculations, QA/QC procedures as described in section 4.2, and visual data assessments are used to identify outliers, deviations, or potentially erroneous data. Laboratory data are recorded and reported in an uncensored form.

Every five years, additional analysis is conducted to complete the environmental performance report, as described in section 5.0. This analysis is conducted by workers knowledgeable about the Plan and in accordance with regulatory guidance. Supplemental studies completed during the applicable timeframe are discussed in the environmental performance report, if appropriate.

# 5.0 Reporting

Environmental reports to regulatory agencies, local Indigenous Groups, and the public are required by applicable regulations, notices, agreements, licences, approvals, and permits. Mitigation, monitoring, and reporting obligations prescribed by licences and other regulatory approvals or regulations, as well as voluntary reporting obligations, are summarized in a legal register and compliance task planner as outlined in the IMS Manual.

Compliance reporting of effluent and emissions mitigation and monitoring results and management activities is required to meet internal writing standards and branding guidelines as well as external reporting obligations. Table 3 describes the reports that, at a minimum, are completed and, wherever possible, are streamlined (e.g., inclusion of the fourth-quarter report in the annual report).

A centralized environmental database is used to support data management and confirm reporting accuracy. This database consolidates monitoring results and compliance metrics, enabling efficient tracking, analysis, and generation of reports. It enhances data integrity and maintains up-to-date and consistent information that is readily accessible for both internal and external reporting needs.

While many environmental reporting activities are driven by regulatory requirements, the primary purpose of effluent and emissions reporting goes beyond compliance. These reports provide a transparent account of environmental performance, helping to identify trends, evaluate the effectiveness of control measures, and demonstrate environmental stewardship. Reporting also supports continual improvement, fosters public and Indigenous Group engagement, and reinforces NexGen's commitment to protecting the environment and meeting or exceeding expectations. In addition, environmental performance information is shared internally to support decision-making, promote accountability, and inform operational improvements across departments and levels of the organization.

Not all data collected are reported externally, as identified in Appendix B:. Some monitoring data are collected specifically to inform internal management decisions. This internal use of data plays a critical role in driving continual improvement and proactive environmental management.

Table 3: Applicable Reports

| Report | Description |
|---|---|
| Routine Update Reports | Monthly, quarterly, and other reports are completed at frequencies in accordance with the applicable provincial approval and the *Metal and Diamond Mining Effluent Regulations*. A monitoring report for all tests and effluent monitoring is submitted to the appropriate regulators each calendar quarter no later than 45 days after the end of each reporting quarter. |

| Report | Description |
|---|---|
| Annual Reports | Annual reports, based on the previous calendar year, are submitted to the appropriate regulators each year. Annual reports are completed in accordance with the applicable licence and provincial approval, standards, and the harmonized provincial and federal regulatory reporting requirements for the Project. The annual report is intended to, among other things, assess effluent and emissions mitigation and monitoring performance. |
| Mine Effluent Reporting System | In accordance with the *Metal and Diamond Mining Effluent Regulations*, quarterly and annual data reports are submitted through the federal mine effluent reporting system. Quarterly effluent monitoring reports include information on deleterious substances, pH, and acute lethality results. Annual reports include the same information compiled for each reporting year. |
| Environmental Effects Monitoring (EEM) Interpretive Report | The first interpretive report related to EEM is required to be submitted to the appropriate regulators no later than 36 months after the day on which the mine becomes subject to Section 7.0 of the *Metal and Diamond Mining Effluent Regulations*. Each subsequent interpretative report must be submitted to the appropriate regulators no later than 36 months after the day on which the previous interpretative report was required to be submitted. Supporting data are submitted to Environment and Climate Change Canada via the EEM electronic reporting system. |
| Environmental Performance Report | Every five years, an environmental performance report must be generated using the provincial *Environmental Performance Report Guideline*. This report includes a summary of compliance over the reporting period and a verification of models and assessments such as the *Rook I Environmental Impact Statement* and most recent regulatory-approved environmental risk assessment. The environmental performance report includes temporal trends to help understand Project effluent and emissions management performance over time. |
| Environmental Risk Assessment | The environmental risk assessment is updated at minimum every five years or when changes to Project facilities, processes, or activities result in environmental aspects and impacts that are outside the basis of the environmental risk assessment. With each update, effluent and emissions volumes, concentrations, and loads measured as part of the Plan must be compared to the most recent regulatory-approved environmental risk assessment to confirm or refine inputs to the environmental risk assessment and its underlying models. The environmental risk assessment is publicly available as outlined in the *Rook I Indigenous and Public Engagement Program*. |
| National Pollutant Release Inventory | The *National Pollutant Release Inventory* is Canada's inventory of pollutants released to air, water, and land that is administered by the Environment and Climate Change Canada under the *Canadian Environmental Protection Act, 1999*. It applies to effluent and emissions that are released, disposed of, and recycled. Inventory reports are submitted online and are due by June 1 each year and cover the previous calendar year. |
| Greenhouse Gas Emissions | The Environment and Climate Change Canada *Greenhouse Gas Reporting Program* collects information from individual facilities relating to their annual greenhouse gas emissions. Reports are submitted by June 1 for the previous calendar year. The Government of Saskatchewan has developed *The Management and Reduction of Greenhouse Gases (Standards and Compliance) Regulations* that also requires reporting annually on October 31 for the previous calendar year. |
| Supplemental Monitoring Report | Supplemental monitoring of effluent and emissions may be conducted to improve environmental performance and reduce knowledge gaps. Supplemental monitoring reporting requirements are determined on a case-by-case basis. |

| Report | Description |
|---|---|
| Ad-hoc Reporting | Ad-hoc reporting may be required in response to specific events or circumstances arising from Project activities. These reports are prepared and submitted to the appropriate regulatory agencies in accordance with applicable requirements, depending on the nature and significance of the event. As outlined in the IMS Manual, this may include, but is not limited to, incidents, deviations, unexpected conditions, or other situations requiring regulatory notification or documentation. |

# 6.0 Worker Training and Qualifications

Training and orientation programs for new workers entering Plan-related roles are identified in the *Rook I Training Program*. All workers, including contractors conducting work as part of the Plan, are qualified to conduct the associated roles. Workers responsible for effluent and emissions mitigation, monitoring, and sampling are qualified and trained on these tasks according to the appropriate work instructions. Workers conducting data evaluation and interpretation are trained in the applicable statistical methods. As outlined in the *Rook I Environmental Protection Program*, the Project follows a systematic approach to training (SAT) to educate, train, and qualify workers to carry out the work assigned to them. Training requirements are identified and monitored to confirm that workers receive the training they require, when they require it, to maintain competency and work safely. The provided education and training are intended to supplement the education and experience that are prerequisites appropriate for each position.

# 7.0 References

## 7.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-IMS-POL-00001 | Rook I Integrated Management System Policy |
| ROOK-IMS-MAN-00003 | Rook I Integrated Management System Manual |
| ROOK-IMS-MAN-00002 | Rook I Mining and Milling Facility Description Manual |
| | Rook I Environmental Impact Statement |
| ROOK-ADM-LST-00001 | Rook I Project Glossary |
| ROOK-HSF-PGM-00001 | Rook I Health and Safety Program |
| ROOK-ENV-PGM-00001 | Rook I Environmental Protection Program |
| ROOK-IPE-PGM-00001 | Rook I Indigenous and Public Engagement Program |
| ROOK-TRN-PGM-00001 | Rook I Training Program |
| ROOK-WST-PGM-00001 | Rook I Waste Management Program |
| ROOK-EMG-PGM-00001 | Rook I Emergency Preparedness and Response Program |
| ROOK-ENV-PLN-00001 | Environmental Monitoring Plan (to be developed) |
| ROOK-ENV-PLN-00003 | Environmental Excellence Plan (to be developed) |
| ROOK-ENV-COP-00001 | Environmental Code of Practice (to be developed) |
| ROOK-ENV-PRO-00001 | Discharge and Discovery Prevention and Management |
| ROOK-ENV-PRO-00007 | Industrial Air Source (to be developed) |
| ROOK-ENV-PRO-00013 | Greenhouse Gas Management (to be developed) |
| ROOK-LAB-PLN-00001 | Laboratory Quality Plan (to be developed) |

| Document Number | Document Title |
|---|---|
| ROOK-ENV-PRO-00015 | Halocarbon Control (to be developed) |
| ROOK-ENV-PRO-00003 | Environmental Inspections (to be developed) |

## 7.2 External

Federal

- *Canadian Environmental Protection Act*
- Canadian Nuclear Safety Commission. REGDOC-2.9.2, *Controlling Releases to the Environment*
- Environment Canada. 2003. *Revised Technical Guidance on How to Conduct Effluent Plume Delineation Studies*
- Environment Canada. 2012. *Metal Mining Technical Guidance for Environmental Effects Monitoring*
- *Federal Halocarbon Regulations*
- *Metal and Diamond Mining Effluent Regulations*

Provincial

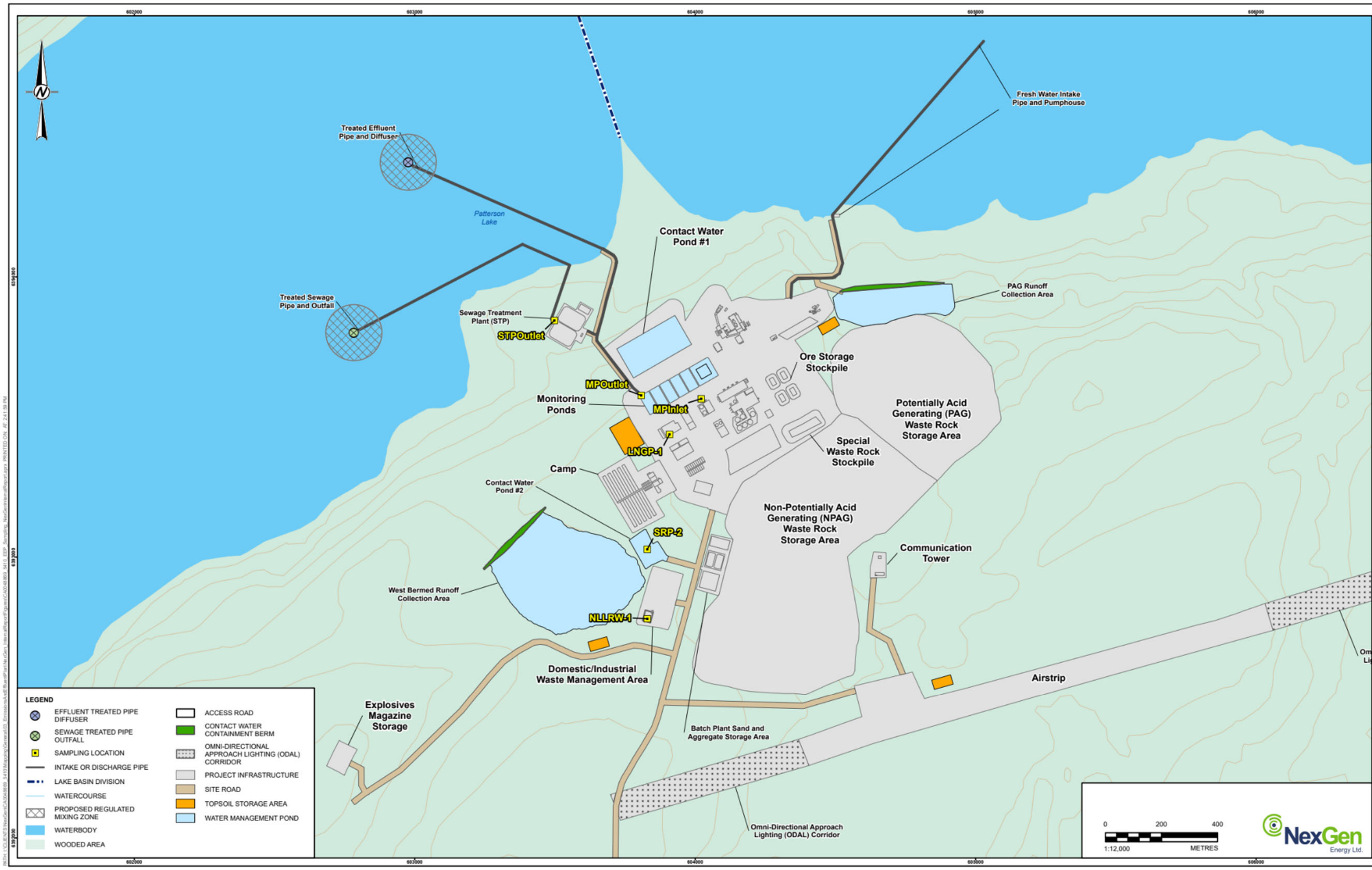
- *The Environmental Management and Protection Act*
- *Saskatchewan Environmental Code*
- *Environmental Performance Report Guideline*
- *The Management and Reduction of Greenhouse Gases (Standards and Compliance) Regulations*
- *Waterworks and Sewage Works Regulations*

Other

- Canadian Standards Association. N286 *Management system requirements for nuclear facilities*
- Canadian Standards Association. N288.0 *Environmental management of nuclear facilities: Common requirements of the CSA N288 series of Standards*
- Canadian Standards Association. N288.5 *Effluent and emissions monitoring programs at nuclear facilities*
- Canadian Standards Association. N288.8 *Establishing and implementing action levels for releases to the environment from nuclear facilities*
- International Standards Organization. 9001 *Quality management systems — Requirements*
- International Standards Organization. 14001 *Environmental management systems — Requirements with guidance for use*
- International Standards Organization. 17025 *General requirements for the competence of testing and calibration laboratories*

# Appendix A: Monitoring Stations Locations

FIGURE A-1: EFFLUENT AND EMISSIONS PLAN



## Appendix B: Monitoring Summary

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Release Type | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|---|
| Effluent | MPInlet | Monitoring ponds | • EIS commitment<br>• Evaluate effectiveness of controls to determine compliance prior to discharge by comparing to action levels, licensed release limits (with the exception of acute lethality which cannot be measured on-site) | 57.67229752, -109.25597256 | Batch | Each potential batch release | Composite[2] | On-site laboratory: pH, temperature, Cl, $SO_4$, $NH_3$ as N, $NO_3$ as N, TP, Al, As, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Sr, U, Zn, TSS, Ra-226<br>Calculation: $NH_3$ (unionized) | No |
| Effluent | MPOutlet | Monitoring pond outlet (final point of control) | • Compliance with action levels, licensed release limits, and MDMER limits<br>• EIS commitment<br>• Identify unusual or unforeseen conditions by comparing to upper values of normal operation<br>• Verify predictions made by the most recent regulatory-approved ERA<br>• Off-site, third-party laboratories are used when the time required for sample delivery and analyses does not impact the risk of exceeding release criteria and discharge decisions are effectively managed | 57.672514, -109.256686 | Batch | Continuous | Continuous[2] | In-situ: Flow, volume, pH, temperature, DO, specific conductivity, turbidity | Yes[3] |
| | | | | | | Each batch release | Composite[2] | On-site laboratory: pH, temperature, Cl, $SO_4$, $NH_3$ as N, $NO_3$ as N, TP, Al, As, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Sr, U, Zn, TSS, Ra-226<br>Calculation: $NH_3$ (unionized) | No |
| | | | | | | Each batch release | Composite[2] | Off-site laboratory: pH, DO, specific conductivity, hardness, turbidity, Cl, $SO_4$, $NH_3$ as N, $NH_3$ as N (unionized), $NO_3$ as N, TP, Al, As, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Sr, Tl, U, V, Zn, TDS, TSS, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |
| | | | | | | Weekly[4] | | | Yes |
| | | | | | | Monthly | Grab | Off-site laboratory: alkalinity, $HCO_3$, $CO_3$, pH, DO, specific conductivity, sum of ions, hardness, TDS, TSS, turbidity, TOC, DOC, Ca, Cl, F, Mg, K, Na, $SO_4$, TDS, $NH_3$ as N, $NH_3$ as N (unionized), $NO_3$ as N, $NO_2$ as N, $NO_3$ + $NO_2$ as N, TP, TN, TKN, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sn, Sr, Th, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238, TPH, BTEX, F1-F4 hydrocarbon compounds<br>Acute lethality tests – Rainbow trout and *Daphnia magna* | Yes |
| | | | | | | Semi-annual (first three years) | Grab | Off-site laboratory: Sublethal toxicity testing[5] | Yes |
| Effluent | STPOutlet | Sewage Treatment Plant outlet (final point of control) | • Compliance with the Saskatchewan *Waterworks and Sewage Works Regulations* and release objectives set out in the provincial authorization(s)<br>• EIS commitment<br>• Verify predictions made by the most recent regulatory-approved ERA | 57.674927, -109.264627 | Continuous | Continuous | Continuous | In-situ: Flow, volume, pH, temperature, DO, specific conductivity, turbidity | Yes |
| | | | | | | Monthly | Grab | Off-site laboratory: $NO_3$ as N, $NO_3$ + $NO_2$ as N, $NH_3$ as N (unionized), TP, TSS, fecal coliforms, BOD5, COD, total chlorine residual<br>Acute lethality tests – Rainbow trout and *Daphnia magna* | Yes |
| Effluent | SRP-2 | Site Runoff Pond #2 | • Compliance with licensed release limits and MDMER limits (except TSS)<br>• EIS commitment<br>• Identify unusual or unforeseen conditions by comparing to upper values of normal operation<br>• Verify predictions made by the most recent regulatory-approved ERA<br>• Off-site, third-party laboratories are used when the time required for sample delivery and analyses does not impact the risk of exceeding release criteria and discharge decisions are effectively managed | 57.667519, -109.259424 | Batch | Prior to each potential batch release, or once during spring freshet or during heavy rainfall | Grab | On-site laboratory: pH, temperature, Cl, $SO_4$, $NH_3$ as N, $NO_3$ as N, TP, Al, As, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Sr, U, Zn, Ra-226<br>Calculation: $NH_3$ (unionized) | No |
| | | | | | | | | In-situ: pH, temperature, DO, specific conductivity, turbidity<br>Off-site laboratory: alkalinity, $HCO_3$, $CO_3$, pH, DO, specific conductivity, sum of ions, hardness, TSS, turbidity, TOC, DOC, Ca, Cl, F, Mg, K, Na, $SO_4$, TDS, $NH_3$ as N, $NH_3$ as N (unionized), $NO_3$ as N, $NO_2$ as N, $NO_3$ + $NO_2$ as N, TP, TN, TKN, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238, TPH, BTEX, F1-F4 hydrocarbon compounds | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Release Type | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|---|
| Emission | NLLRW-1 | Non-Low Level Radioactive Waste incinerator | • EIS commitment<br>• Demonstrate adherence to Canada-wide standards for dioxins and furans and the Canada-wide standards for mercury emissions<br>• Refine models used in the ERA | 57.665295, -109.259529 | Continuous when in operation | Once every three years | Manual Stack Survey | In situ: $SO_2$, $NO_2$, TPM, Hg, dioxins, furans | Yes |
| Emission | LNGP-1 | Liquid Natural Gas power plant[6] | • EIS commitment<br>• Refine models used in the ERA | 57.671184, -109.257919 | Continuous | Once after commissioning | Manual Stack Survey | In situ: $NO_2$, $PM_{2.5}$ | Yes |

EIS = Environmental Impact Statement; ERA = Environmental Risk Assessment; ID = identification; MDMER = *Metal and Diamond Mining Effluent Regulations*; TBD = to be determined; UTM = Universal Transverse Mercator.
[1]Constituents and physical parameters are abbreviated to standard industry nomenclature.
[2]The sample collection for effluent entering the monitoring ponds or at the final point of control is either a continuous sample, collected using automatic sampling equipment or a composite sample consisting of samples collected at the following intervals during pond release: beginning discharge, 20% of pond emptied, 40% of pond emptied, 60% of pond emptied, 80% of pond emptied, and 99% of pond emptied.
[3]Raw data are summarized.
[4]Weekly samples must be 24 hours apart in accordance with the MDMER.
[5]Sublethal toxicity testing requirements are specified in MDMER Schedule 5, subparagraphs 5(1)(a) to 5(1)(d).
[6]Before the Liquid Natural Gas power plant comes online; six diesel generators will be used for specific purposes. Due to the temporary or intermittent use of diesel generators, monitoring was scoped to the Liquid Natural Gas power plant.

# Environmental Code of Practice
# ROOK-ENV-COP-00001

# Rook I Environmental Protection Program

## Environmental Code of Practice

ROOK-ENV-COP-00001



August 2025

# Record of Revisions

| Revision No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| A | 28-Aug-2025 | For approval | A. Swerhone | L. Moger<br>D. Merriman | G. Johnson |

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# 1.0 Introduction

The *Rook I Environmental Code of Practice* (ECOP) provides instructions to appropriately respond to release criteria exceedances and measured effluent concentrations. NexGen's Rook I Project (Project) follows a risk-based approach to planning for and responding to unusual or unexpected situations, mitigating elevated concentrations of chemical and radiological constituents to acceptable levels, and keeping all releases to the environment as low as reasonably achievable (ALARA). The release criteria and instructions for how to respond when criteria are met or exceeded, are the frameworks for this risk-based approach to environmental protection.

This document has been developed in accordance with the requirements of the *Canadian Nuclear Safety Commission (CNSC) Uranium Mines and Mills Regulations*, *The Environmental Management and Protection Act, 2010*, and *The Mineral Industry Environmental Protection Regulations, 1996*. The methods used to establish release criteria are aligned with the requirements of Canadian Standards Association (CSA) *N288.8 Establishing and implementing action levels for releases to the environment from nuclear facilities* and Canadian Nuclear Safety Commission (CNSC) *REGDOC-2.9.2, Controlling Releases to the Environment.*

As a component of the *Rook I Environmental Protection Program*, the ECOP directly supports the *Effluent and Emissions Plan* and is to be used in conjunction with the monitoring processes described therein for the Project site preparation and construction phase (Construction phase).

## 1.1 Purpose

The ECOP is a regulatory requirement as prescribed by the CNSC *Uranium Mines and Mills Regulations*. The ECOP directs the responses of a licensee under conditions that may indicate a loss of control of their environmental protection program, to:

- mitigate deviations from normal operating conditions and remain within the licensing basis;
- prevent pollution;
- protect health, safety, and well-being of people and the environment; and
- keep the release of constituents and physical parameters ALARA.

The ECOP includes action levels designed to prevent licensed release limit exceedances, as well as administrative levels which are intended to prevent action level exceedances.

The ECOP also describes assumptions regarding development of release criteria and actions taken within the framework of the ECOP.

The ECOP is subject to periodic review throughout the Construction phase and Project life cycle and will be revised (as required) to incorporate information gathered through project engineering design evolution, commissioning and operational monitoring, as a result of major modifications to facilities, or to maintain compliance with new or updated regulatory requirements. At a minimum, the ECOP will be reviewed and updated prior to the Operations phase for updated operation of facilities.

## 1.2 Scope

The ECOP applies to routine, batch point source releases of treated contact water from the monitoring ponds to Patterson Lake and from Site Runoff Pond #2 to the west bermed runoff collection area with natural filtration to Patterson Lake.

Treated sewage and air emissions are outside of the scope of the ECOP. Treated sewage is managed in accordance with *The Waterworks and Sewage Works Regulations* and air emissions are managed in accordance with the *E.1.2 Industrial Source (Air Quality) Chapter* of the Saskatchewan Environmental Code.

Monitoring the atmosphere, land, groundwater, and surface water beyond the final point of control is discussed in the *Environmental Monitoring Plan*.

A more detailed description of site water management infrastructure and processes to divert, convey, collect, and distribute water intercepted or influenced by the Project is discussed in the *Site Water Management Plan*.

## 1.3 Terminology

Refer to the Rook I Project Glossary.

Reader is advised to refer to the Rook I Project Glossary for the most up to date terms in use.

**action** – A step taken or tool used to achieve an objective or strategy.

**action level** – Effluent release criteria that, if met or exceeded during routine conditions, might indicate a loss of control of part of a licensee's program(s) and/or control measure(s). Exceeding an action level signals a potential reduction in effectiveness of the program and/or control measure(s) and may indicate a deviation from normal operation. Exceeding an action level is not a non-compliance but triggers a requirement for specific action to be taken (REGDOC-2.9.2). Action levels are operationally/performance-based and are set above the upper value of normal operation and lower than licensed release limits so that action may be taken before licensed release limits are exceeded.

**administrative level** – Internal levels that provide an early indication that an action level may be met or exceeded if actions are not put in place to mitigate the concentrations of applicable chemical and radiological constituents in treated effluent. Administrative levels are not externally reportable, and exceedances do not represent a loss of control.

**as low as reasonably achievable (ALARA)** – A guiding principle aimed at minimizing the risk of adverse health, safety, environmental, and radiological impacts to the lowest extent practicable, considering technical, legal, social, and economic factors.

**batch release** – A release to the environment that occurs during time-limited events or processes.

**best available technology and techniques economically achievable (BATEA)** – An assessment that applies to treatment and/or control technologies applied to untreated pollutant sources being released from a nuclear facility, but does not apply to nuclear facility technology. The BATEA assessment determines the design required of treatment and/or control technologies to ensure appropriate level of control and abatement for pollution prevention and to ensure that risks are mitigated to protect human health and the environment (REGDOC-2.9.2).

**constituent of potential concern (COPC)** – Chemical and radiological constituents or physical parameters that have the potential to cause an adverse effect as identified in the most recently approved environmental risk assessment.

**contact water** – Water that may have been physically, chemically, or radiologically altered by Project activities. This waste may be diverted and require management (e.g., treatment) before release to the environment.

**discharge** – A discharge, drainage, deposit, release, or emission into the environment (The Environmental Management and Protection Act, 2010) that is covered under the provincial Discharge and Discovery Standard.

**effluent** – A waterborne release of a constituent or physical parameter to the environment (CSA N288.5).

**effluent release targets** – Benchmarks that are protective of human health and the environment, including acute toxicity/lethality (REGDOC-2.9.2).

**environment** – The surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelationships (ISO 14001).

**final discharge point** – With respect to an effluent, an identifiable discharge point of a mine beyond which the operator of the mine no longer exercises control over the quality of the effluent (*Metal and Diamond Mining Effluent Regulations*).

**final point of control** – The location at which a measure could be reasonably implemented to manage or modify the risk associated with effluent or emissions. For example, the final point of control for effluent leaving the monitoring ponds is the monitoring pond outlet, not the point at which treated effluent enters Patterson Lake, as the latter is located under water and controls can not reasonably be put in place at that location.

**licensed release limit** – A limit, protective of human health and the environment, that represents the maximum on acceptable releases during normal operations. Any exceedance of this limit indicates a loss of control of part of the environmental protection program or control measure(s), and that the licensee is operating outside the licensing basis.

**loss of control** – An operational occurrence that is attributed to one or more failures within the *Rook I Environmental Protection Program* and generally results in a release that exceeds that defined as part of normal operations (CSA N288.8).

**non-mineralized contact water** – Water that may have been physically altered by Project activities through contact with surfaces that are not expected to be mineralized or radiologically contaminated.

**normal operations** – Normal operations for any nuclear facility, are those associated with the approved licensed activities. This includes the normal operation of any treatment system(s) during refurbishment or decommissioning, as defined by the approved licenced activities, and the specified operational limits and conditions documented within the facility's licensing basis (REGDOC-2.9.2).

**point source** – Effluent or emissions for water and air, respectively, that are released from a single, identifiable source (CSA N288.5).

**release criteria** – Collective term that includes administrative levels, action levels, and licensed release limits.

# 2.0 Release Criteria and Actions

The focus of this ECOP is on effluent planned to be batch released during the Construction phase. This section provides additional context and background information on the effluent treatment process and associated actions to be taken if limits are reached or exceeded. This process and applicable monitoring locations and frequencies are further detailed in the *Effluent and Emissions Plan*.

There are two final points of control, excluding the sewage treatment plant outlet: the monitoring pond outlet (station ID: MPOutlet) and Site Runoff Pond #2 (station ID: SRP-2).

Prior to the monitoring pond outlet (station ID: MPOutlet) there are four monitoring ponds that receive treated water from the temporary effluent treatment plant. These ponds act as a second control mechanism. As treated effluent is pumped to the monitoring ponds, samples are taken for testing at an accredited laboratory. These sample results (station ID: MPInlet) are compared to release criteria to inform resulting actions, as shown in Table 1, and allow for earlier deviance detection. This is an internal check to evaluate effectiveness and does not correspond to a risk to the environment as treated water remains contained in the monitoring ponds. For these reasons, no regulatory reporting of exceedances is required for the monitoring pond inlet (station ID: MPInlet). If concentrations meet the requirements of Table 1, treated effluent is pumped from the monitoring ponds to the treated effluent diffuser location in Patterson Lake North Arm – West Basin. Prior to reaching the diffuser location, samples are taken at the outlet of the monitoring ponds, which is the final point of control (station ID: MPOutlet). This is a batch release process, and a conceptual schematic of treated effluent discharge monitoring is shown in Figure 1.

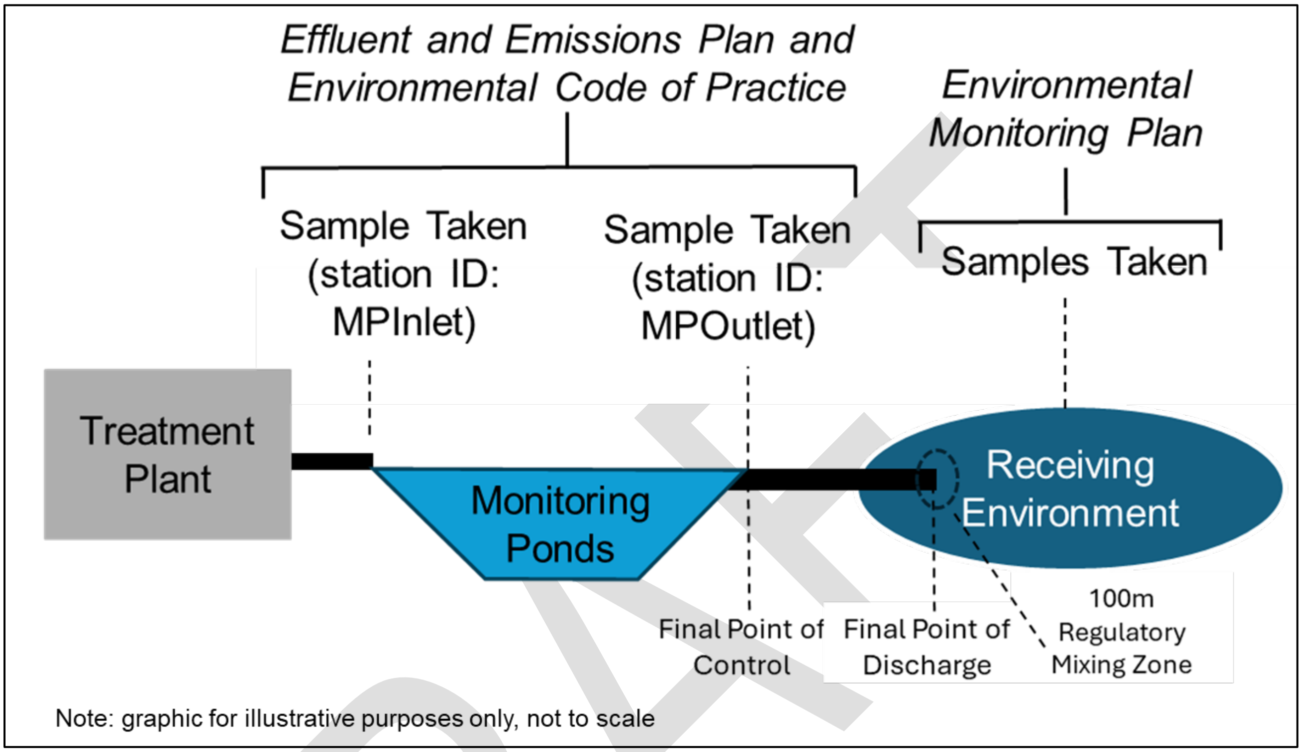


Figure 1: Schematic of Treated Effluent Discharge and Associated Monitoring

Non-mineralized contact water (i.e., water that has or may have been physically or chemically altered by Project activities and not in contact with mineralized and radiologically contaminated surfaces) collected in Site Runoff Pond #2 is sampled (station ID:SRP-2) for comparison to release criteria to inform resulting actions, as shown in Table 1. If concentrations meet the requirements of Table 1, non-mineralized contact water is released to the west bermed runoff collection area (WBRCA) to prevent suspended solids from entering Patterson Lake. This process is detailed in the *Effluent and Emissions Plan*.

Release criteria include maximum expected effluent concentration, administrative levels, action levels, and licensed release limits for constituents and physical parameters which are used as the basis for comparing results from the analysis of applicable composite and grab samples collected at and prior to the final points of control prior to batch release to the environment as defined in the *Effluent and Emissions Plan*.

Table 1 and Table 2 provide the release criteria and applicable actions, respectively, for effluent at the Project. Appendix A provides supplemental information related to the development of release criteria, which utilized a prospective approach from CSA N288.8-17 as the Project is a new facility without historical data. Predicted effluent data were based on a *Best Available Technology and Techniques Economically Achievable Assessment for Construction Phase Effluent Treatment* (BATEA study) conducted for the Project in accordance with REGDOC-2.9.2 (Hatch, 2025). As further described in Appendix A, it is expected that administrative and action levels will be refined during the commissioning phase of the Project. As operational data is collected, action levels and administrative levels will be further reviewed and may be updated using the retrospective approach, consistent with clause 7.4.3 in CSA N288.8-17.

Table 1: Release Criteria for Effluent During Construction Phase at the Rook I Project[A,B]

| | | Maximum Expected Effluent Concentration[C] | Administrative Level | Action Level | Licensed Release Limit[D] |
|---|---|---|---|---|---|
| **General Chemistry** | pH | Not required | Not required | Not required | <6.0 or >9.5[E] |
| | Total Suspended Solids (mg/L) | ≤5 | >7.5 | >10 | >15[E] |
| **Non-metals** | Ammonia (unionized) (mg-N/L) | ≤0.1 | >0.1 | >0.15 | >0.18[E] |
| | Total Ammonia (mg-N/L) | ≤12 | >18 | >24 | >29 |
| | Nitrate (mg-N/L) | ≤11 | >16 | >22 | >33 |
| | Chloride (mg/L) | ≤400 | >450 | >550 | >640 |
| | Phosphorus (mg/L) | ≤0.028 | >0.028 | >0.035 | >0.045 |
| **Metals** | Aluminum (mg/L) | ≤0.09 | >0.14 | >0.18 | >1.1 |
| | Arsenic (mg/L) | ≤0.01 | >0.015 | >0.020 | >0.057[E] |
| | Cadmium (mg/L) | ≤0.0002 | >0.0002 | >0.00025 | >0.00031 |
| | Cobalt (mg/L) | ≤0.006 | >0.006 | >0.007 | >0.0079 |
| | Copper (mg/L) | ≤0.005 | >0.010 | >0.015 | >0.018[E] |
| | Iron (mg/L) | ≤0.05 | >0.075 | >0.1 | >1 |
| | Lead (mg/L) | ≤0.001 | >0.0025 | >0.005 | >0.058[E] |
| | Manganese (mg/L) | ≤0.05 | >0.075 | >0.1 | >1.0 |
| | Molybdenum (mg/L) | ≤4.0 | >6.0 | >8.0 | >46.0 |
| | Selenium (mg/L) | ≤0.002 | >0.005 | >0.0075 | >0.011 |
| | Strontium (mg/L) | ≤20 | >20 | >25 | >29 |
| | Zinc (mg/L) | ≤0.015 | >0.015 | >0.018 | > 0.022[E] |
| **Radionuclides** | Radium-226 (Bq/L) | ≤0.01 | >0.015 | >0.04 | >0.37[E] |
| **Flow Rates** | Monthly Average Flow Rate ($m^3/h$) at MPOutlet only | ≤90 | >190 | Not required | Not required |
| | Instantaneous Flow Rate ($m^3/h$) at MPOutlet only | Not required | Not required | >850 | >977.5 |

Bq/L = Becquerels per litre; LRL = licensed release limit; $m^3/h$ = cubic metre per hour; mg/L = milligrams per litre (i.e., parts per million)
[A]Sample values are considered to meet their release criteria if they are equal to or less than the release criteria.
[B]Compare to weekly composites or batch release composites whichever is more frequent. For Site Runoff Pond 2# (station ID: SRP-2) compare to grab sample.
[C]Source: *Best Available Technology and Techniques Economically Achievable Assessment for Construction Phase Effluent Treatment* (Hatch, 2025).
[D]Source: *Environmental Release Targets for the Construction Phase Effluent Treatment Plant* (WSP, 2025).
[E]Applicable MDMER limits may be equal to or greater than the LRL.

Table 2: Applicable Actions if Release Criteria is Exceeded for Effluent During Construction Phase at the Rook I Project

| | Maximum Expected Effluent Concentration | Administrative Level | Action Level | Licensed Release Limit |
|---|---|---|---|---|
| Site Runoff Pond #2 (station ID: SRP-2) | Not applicable | 1. **No regulatory reporting required.**<br>2. Continue with release to the environment.<br>3. Initiate incident and deviation management process.<br>4. Communicate with site laboratory, operations, process, or site environmental personnel to confirm validity of exceedance.<br>5. Monitor for potential trends. | 1. Initiate incident and deviation management process.<br>2. Communicate with site laboratory, operations, process, or site environmental personnel to confirm validity of exceedance:<br>• If invalid, proceed with release and monitor for potential trends.<br>• If exceedance verified, direct Site Runoff Pond #2 water to the effluent treatment plant or evaluate compliance implications.<br>3. If released to the environment:<br>• Authorized personnel to report exceedance to regulators within 24 hours.<br>• Authorized personnel to report exceedance to Environmental Committees promptly.<br>• Note the exceedance in the next regulatory routine update report. | *Note that the total suspended solids and flow rate licensed release limits do not apply to this station.*<br>1. **Do not proceed with release to the environment.**<br>2. Initiate incident and deviation management process and mitigation.<br>3. Communicate with site laboratory, operations, process, or site environmental personnel to confirm validity of exceedance.<br>• If invalid, proceed with release and monitor for potential trends.<br>• If exceedance verified, direct remaining water to the effluent treatment plant for processing. |
| Monitoring Ponds (station ID: MPInlet) | 1. **No regulatory reporting required.**<br>2. Monitoring ponds can be released to the environment.<br>3. Monitor for a potential trend. | 1. **No regulatory reporting required.**<br>2. Monitoring ponds can be released to the environment.<br>3. Initiate incident and deviation management process.<br>4. Communicate with site laboratory, operations, process, or site environmental personnel to confirm validity of exceedance.<br>5. Monitor for potential trends. | 1. **No regulatory reporting required.**<br>2. Initiate incident and deviation management process.<br>3. Communicate with site laboratory, operations, process, or site environmental personnel to confirm validity of exceedance.<br>• If invalid, proceed with release and monitor for potential trends.<br>• If exceedance verified, direct treated effluent to the effluent treatment plant or evaluate compliance implications. | 1. **No regulatory reporting required.**<br>2. Initiate incident and deviation management process.<br>3. Communicate with site laboratory, operations, process, or site environmental personnel to confirm validity of exceedance.<br>• If invalid, proceed with release and monitor for potential trends.<br>• If exceedance verified, direct treated effluent to the effluent treatment plant. |
| Monitoring Pond Outlet (station ID: MPOutlet) | 1. **No regulatory reporting required.**<br>2. Monitoring ponds can be released to the environment.<br>3. Monitor for a potential trend. | 1. **No regulatory reporting required.**<br>2. Monitoring ponds can be released to the environment.<br>3. Initiate incident and deviation management process.<br>4. Communicate with site laboratory, operations, process, or site environmental personnel to confirm validity of exceedance.<br>5. Monitor for potential trends. | 1. **Immediately terminate release to the environment, if the release is ongoing.**<br>2. Initiate incident and deviation management process.<br>3. Communicate with site laboratory, operations, process, or site environmental personnel to confirm validity of exceedance.<br>• If invalid, proceed with release and monitor for potential trends.<br>• If exceedance verified, direct treated effluent to the effluent treatment plant or evaluate compliance implications.<br>4. Authorized personnel to report exceedance to regulators within 24 hours.<br>5. Authorized personnel to report exceedance to Environmental Committees promptly.<br>6. Note the exceedance in the next routine regulatory update report. | 1. **Immediately terminate release to the environment, if the release is ongoing.**<br>2. Initiate incident and deviation management process.<br>3. Communicate with site laboratory, operations, process, or site environmental personnel to confirm validity of exceedance.<br>• If invalid, proceed with release and monitor for potential trends.<br>• If exceedance verified, direct treated effluent to the effluent treatment plant.<br>4. Authorized personnel to report exceedance to regulators within 24 hours.<br>5. Authorized personnel to provide summary report to regulators within 21 days.<br>6. If treated effluent releases exceeds a *Metal and Diamond Mining Effluent Regulations* limit, notify Environment and Climate Change Canada within 21 days and note the exceedance in the next routine regulatory update report.<br>7. Authorized personnel to report exceedance to Environmental Committees promptly.<br>8. Note the exceedance in the next routine regulatory update report. |

# 3.0 References

## 3.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-ENV-PGM-00001 | *Rook I Environmental Protection Program* |
| ROOK-ENV-PLN-00001 | *Rook I Environmental Monitoring Plan* |
| ROOK-WST-PLN-00002 | *Site Water Management Plan* |
| ROOK-ENV-PLN-00002 | *Effluent and Emissions Plan* |
| | *Rook I Environmental Impact Statement* |
| ROOK-NXE-7320-21-066-0001 | *Best Available Technology and Techniques Economically Achievable Assessment for Construction Phase Effluent Treatment* (Hatch, 2025) |
| ROOK-NXE-2500-21-226-0003 | *Site Water and Mass Balance Model for the Construction Phase* |
| ROOK-NXE-5200-22-230-0002 Rev 1 | *NexGen Rook I Diffuser Design Concept Summary* (WSP, 2025) |
| ROOK-NXE-5200-84-230-0001 Rev 0 | *Environmental Release Targets for the Construction Phase Effluent Treatment Plant.* (WSP, 2025) |

## 3.2 External

- Federal
  - *Uranium Mines and Mills Regulations*
  - *Metal and Diamond Mining Effluent Regulations*
  - *Canadian Nuclear Safety Commission. REGDOC-2.9.2, Controlling Releases to the Environment*
- Provincial
  - *The Environmental Management and Protection Act, 2010*
  - *The Mineral Industry Environmental Protection Regulations, 1996*
  - *The Waterworks and Sewage Works Regulations*
- Other
  - *Canadian Standards Association. N288.8-17 Establishing and implementing action levels for releases to the environment from nuclear facilities.*
  - *Canadian Standards Association. N288.5 Effluent and emissions monitoring programs at nuclear facilities.*

# Appendix A: Supplemental Information

The development of release criteria followed the guidance in REGDOC 2.9.2 as well as CSA N288.8-17. The following information is provided to describe how release criteria were established including:

- identification of applicable monitoring points;
- selection of constituents and physical parameters; and
- application of a prospective approach.

Applicable monitoring points were identified from the CSA N288.5-compliant *Effluent and Emissions Plan*, including point source releases of treated contact water from the monitoring ponds to Patterson Lake and non-mineralized contact water from Site Runoff Pond #2 to the west bermed runoff collection area with natural filtration to Patterson Lake.

The selection of constituents (e.g., select metals and non-metals, Radium-226) and physical parameters (e.g., total suspended solids and flow rate) was conducted based on a screening assessment in the *Best Available Technology and Techniques Economically Achievable Assessment for Construction Phase Effluent Treatment* (BATEA study; Hatch, 2025). Maximum predicted influent concentrations (Hatch, 2025) prior to treatment were compared to screening criteria. The screening criteria are identified in Table 4-1 of Hatch (2025) and were based on the most conservative available water quality guidelines protective of chronic effects to human health and aquatic life and are below the acute guidelines for aquatic life.

Where maximum predicted influent concentrations exceeded the screening criteria, they were identified as constituents requiring further control and consideration in the BATEA study process. The BATEA study considered various treatment technologies for the temporary effluent treatment plant, by which several of the constituents identified through the process described above could be adequately controlled. Constituents that could not be adequately controlled were compared to the effluent release targets (Hatch, 2025), and those constituents that exceeded their respective effluent release targets were retained for the development of release criteria (shown in gray shaded rows in Table 3 and identified as ‘Y’ in the last column). Note that pH, radium-226 and effluent flow rate were not listed in Table 10-1 of the BATEA study as selected constituents or physical parameters. However, pH and radium-226 were retained as *Metal and Diamond Mining Effluent Regulations* (MDMER) parameters, and flow rate was identified as a physical parameter that would be important to control and required to calculate loadings. Other MDMER parameters (i.e., cyanide, nickel) were not included because they were not deemed to require control at the Project during the Construction phase in the screening completed for the BATEA study (Hatch 2025).

Table 3: Selection of Constituents and Physical Parameters Requiring Development of Release Criteria

| Constituent/ Physical Parameter | Exceeds MDMER Screening? | Exceeds Screening Criteria? | Exceeds ERT? | Retained for Development of Release Criteria? |
|---|---|---|---|---|
| **General Chemistry** | | | | |
| pH | - | N | N | N |
| Total Suspended Solids | N | **Y** | **Y** | **Y** |
| **Non-metals** | | | | |
| Un-ionized Ammonia-N | N | **Y** | N | **Y** |
| Ammonia-N | - | **Y** | N | **Y** |
| Chloride | - | **Y** | **Y** | **Y** |
| Nitrate-N | - | **Y** | N | **Y** |
| Phosphorous | - | **Y** | **Y** | **Y** |
| Sulphate | - | N | N | N |
| **Metals** | | | | |
| Aluminum | - | **Y** | N | **Y** |
| Arsenic | N | **Y** | N | **Y** |
| Cadmium | - | **Y** | **Y** | **Y** |
| Chromium | - | N | N | N |
| Cobalt | - | **Y** | **Y** | **Y** |
| Copper | N | **Y** | N | **Y** |
| Iron | - | **Y** | **Y** | **Y** |
| Lead | N | **Y** | N | **Y** |
| Manganese | - | **Y** | **Y** | **Y** |
| Mercury | - | N | N | N |
| Molybdenum | - | **Y** | N | **Y** |
| Nickel | N | N | N | N |
| Selenium | - | **Y** | **Y** | **Y** |
| Strontium | - | **Y** | **Y** | **Y** |
| Uranium | - | N | N | N |
| Vanadium | - | N | N | N |
| Zinc | N | **Y** | **Y** | **Y** |
| **Radionuclides** | | | | |
| Radium-226 | N | N | N | **Y** |

Note: Grey shading indicates constituent or physical parameter retained for the ECOP.
- = no MDMER value is available; ERT = Environmental Release Target; MDMER = *Metal and Diamond Mining Effluent Regulations*; N = No; Y = Yes.

A prospective approach from CSA N288.8-17 rather than the retrospective approach was selected to develop release criteria as the Project is a new facility, and historical data are not available. The prospective approach consisted of the following main steps:

- Determine if effluent information is available from design or operating experience.

- Determine the upper value of normal operational release.
- Determine the action level based on release magnitude or frequency (the release magnitude was selected).
- Multiply the upper value of normal operational release by a factor to obtain the action level.
- Compare the action level to the licensed release limit.
- Compare the action level to known loss of control events.
- Review data as available and refine the action level.

Predicted effluent data are available from *Best Available Technology and Techniques Economically Achievable Assessment for Construction Phase Effluent Treatment* (Hatch, 2025). The upper value of normal operational release for each constituent and physical parameter was determined to be the maximum expected effluent concentration selected for the temporary effluent treatment plant (Hatch 2025). The predicted maximum expected effluent concentrations are based on experience and test work completed at a similar effluent treatment system in the mining industry that used hydroxide and sulphide precipitation followed by an advanced filtration and reverse osmosis system. Variation in incoming influent quality can result in a variable range of efficiencies. The final selected vendor will also be required to confirm performance for the treatment system. Thus, final maximum expected effluent concentrations may vary slightly from what is presented herein and will be updated accordingly.

The action level and administrative level were determined based on the release magnitude. Clause 7.3.3.1 of CSA N288.8-17 requires that a user-defined factor be applied to the upper value of normal operational release to develop the action level. The specific user-defined factor is based on professional judgment to confirm that the action level (and administrative level) for each constituent is below the licensed release limit. The user-defined factor is not always consistent between constituents as the factor needs to be selected to confirm that the action level and administrative levels are above the laboratory detection limit. As well, some constituents have more room between the maximum expected effluent concentration and the licensed release limit than other constituents where there is limited difference between the various release criteria. As such, flexibility is needed while still remaining compliance with CSA N288.8-17. As operational data is collected, action levels and administrative levels will be reviewed and may be updated using the retrospective approach (see Clause 7.4.3 in N288.8-17). Table 4 below describes the rationale and calculations used to develop the release criteria.

During the Construction phase, there is adequate capacity in the settling pond to manage all inflows as well as capacity to handle large amounts of re-circulated flows, because the settling pond will generally operate at 35% to 40% of capacity by volume. Therefore, loss of control scenarios during the Construction phase, as indicated by measured water quality in the monitoring ponds, can be managed with no discharge to the environment (ROOK-NXE-2500-21-226-0003). Batch release further reduces the likelihood of loss of control scenarios.

Table 4: Rationale and Notes Related to the Development of Release Criteria for Effluent During Construction Phase at the Rook I Project

| | Maximum Expected Effluent Concentration[A] | Administrative Level | Action Level | Licensed Release Limit[B] | Rationale/Notes |
|---|---|---|---|---|---|
| **General Chemistry** | | | | | |
| pH | Not required | Not required | Not required | <6.0 or >9.5 [C] | • pH will be adjusted as part of the treatment process to maintain pH between 6.0 and 9.5. It has been included in this table with an associated LRL equal to the MDMER limit. |
| Total Suspended Solids (mg/L) | ≤5 | >7.5 | >10 | >15[C] | • The LRL is equal to the MDMER limit.<br>• Total suspended solids release criteria are only to be applied to the Monitoring ponds (station ID: MPInlet) and monitoring pond outlet (station ID: MPOutlet).<br>• Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor was applied to the maximum expected effluent concentration. In this case 1.5 for administrative level and 2 for action level. |
| **Non-metals** | | | | | |
| Ammonia (unionized) (mg-N/L) | ≤0.1 | >0.1 | >0.15 | >0.18[C] | • The MDMER limit is 0.5 mg-N/L.<br>• Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor. In this case, the administrative level was set as greater than maximum expected effluent concentration given there is a relatively small between maximum expected effluent concentration and LRL The action level is set approximately halfway between maximum expected effluent concentration and LRL due to the relatively small gap between maximum expected effluent concentration and LRL values. |
| Total Ammonia (mg-N/L) | ≤12 | >18 | >24 | >29 | • Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor was applied to the maximum expected effluent concentration. In this case 1.5 for administrative level and 2 for action level. |
| Nitrate (mg-N/L) | ≤11 | >16 | >22 | >33 | • Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor was applied to the maximum expected effluent concentration. In this case 1.5 for administrative level and 2 for action level. |
| Chloride (mg/L) | ≤400 | >450 | >550 | >640 | • Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor was applied to the maximum expected effluent concentration. In this case, the administrative level was set as greater than maximum expected effluent concentration given there is a relatively small gap between maximum expected effluent concentration and LRL. The action level is set approximately halfway between maximum expected effluent concentration and LRL due to the relatively small gap between maximum expected effluent concentration and LRL values. |
| Phosphorus (mg/L) | ≤0.028 | >0.028 | >0.035 | >0.045 | • Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor was applied to the maximum expected effluent concentration. In this case, the administrative level was set as greater than maximum expected effluent concentration given there is a relatively small gap between maximum expected effluent concentration and LRL. The action level is set approximately halfway between maximum expected effluent concentration and LRL due to the relatively small gap between maximum expected effluent concentration and LRL values. |

| Metals | | | | | |
|---|---|---|---|---|---|
| Aluminum (mg/L) | ≤0.09 | >0.14 | >0.18 | >1.1 | • Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor was applied to the maximum expected effluent concentration. In this case 1.5 for administrative level and 2 for action level. |
| Arsenic (mg/L) | ≤0.01 | >0.015 | >0.020 | >0.057[C] | • The MDMER limit is 0.1 mg/L.<br>• Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor was applied to the maximum expected effluent concentration. In this case 1.5 for administrative level and 2 for action level. |
| Cadmium (mg/L) | ≤0.0002 | >0.0002 | >0.00025 | >0.00031 | • Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor was applied to the maximum expected effluent concentration. In this case, the administrative level was set as greater than maximum expected effluent concentration given there is a relatively small gap between maximum expected effluent concentration and LRL. The action level is set approximately halfway between maximum expected effluent concentration and LRL due to the relatively small gap between maximum expected effluent concentration and LRL values. |
| Cobalt (mg/L) | ≤0.006 | >0.006 | >0.007 | >0.0079 | • Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor was applied to the maximum expected effluent concentration. In this case, the administrative level was set as greater than maximum expected effluent concentration given there is a relatively small gap between maximum expected effluent concentration and LRL. The action level is set approximately halfway between maximum expected effluent concentration and LRL due to the relatively small gap between maximum expected effluent concentration and LRL values. |
| Copper (mg/L) | ≤0.005 | >0.010 | >0.015 | >0.018[C] | • The MDMER limit is 0.1 mg/L.<br>• Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor was applied to the maximum expected effluent concentration. In this case 2 for administrative level and 3 for action level. |
| Iron (mg/L) | ≤0.05 | >0.075 | >0.1 | >1 | • Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor was applied to the maximum expected effluent concentration. In this case 1.5 for administrative level and 2 for action level. |
| Lead (mg/L) | ≤0.001 | >0.0025 | >0.005 | >0.058[C] | • The MDMER limit is 0.08 mg/L.<br>• Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor was applied to the maximum expected effluent concentration. In this case 2.5 for administrative level and 5 for action level to facilitate more reliable identification of an administrative level exceedance. |
| Manganese (mg/L) | ≤0.05 | >0.075 | >0.1 | >1.0 | • Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor was applied to the maximum expected effluent concentration. In this case 1.5 for administrative level and 2 for action level. |
| Molybdenum (mg/L) | ≤4.0 | >6.0 | >8.0 | >46.0 | • Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor was applied to the maximum expected effluent concentration. In this case 1.5 for administrative level and 2 for action level. |
| Selenium (mg/L) | ≤0.002 | >0.005 | >0.0075 | >0.011 | • Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor was applied to the maximum expected effluent concentration. In this case 2.5 for administrative level and 4 for action level. |
| Strontium (mg/L) | ≤20 | >20 | >25 | >29 | • Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor. In this case, the administrative level was set as greater than maximum expected effluent concentration given there is a relatively small gap between maximum expected effluent concentration and LRL The action level is set approximately halfway between maximum expected effluent concentration and LRL due to the relatively small gap between maximum expected effluent concentration and LRL values. |

| | | | | | |
|---|---|---|---|---|---|
| Zinc (mg/L) | ≤0.015 | >0.015 | >0.018 | > 0.022[C] | • The MDMER limit is 0.4 mg/L.<br>• Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor. In this case, the administrative level was set as greater than maximum expected effluent concentration given there is a relatively small gap between maximum expected effluent concentration and LRL The action level is set approximately halfway between maximum expected effluent concentration and LRL due to the relatively small gap between maximum expected effluent concentration and LRL values. |
| **Radionuclides** | | | | | |
| Radium-226 (Bq/L) | ≤0.01 | >0.015 | >0.04 | >0.37[C] | • The LRL is equal to the MDMER limit.<br>• Determined using the magnitude method (N288.8 clause 7.3.3.1), wherein a user-defined factor. In this case, Radium-226 is not expected to be elevated during the Construction phase; therefore, the action level was derived by applying a factor to the background level of Radium-226 in Patterson Lake (2018-2020). The action level for Radium-226 was derived using a factor of 4 since there is a large spread in concentration between the background level of Radium-226 in Patterson Lake (0.010 Bq/L) based on method detection limit, given that Construction activities will minimally intercept the mineralized zone and the MDMER limit. |
| **Flow Rates** | | | | | |
| Monthly Average Flow Rate ($m^3$/h) at MPOutlet only | ≤90 | >190 | Not required | Not required | • Informed by the monthly average flow of 90 $m^3$/h and the design inflow rate of 190 $m^3$/h from the BATEA study (Hatch 2025). |
| Instantaneous Flow Rate ($m^3$/h) at MPOutlet only | Not required | Not required | >850 | >977.5 | • The LRL is based on the action level of 850 $m^3$/h (the upper bound diffuser design flow in WSP, 2025) accounting for a 15% increase to account for uncertainty associated with flow monitoring devices. |

Bq/L = Becquerels per litre; LRL = licensed release limit; $m^3$/h = cubic metre per hour; MDMER = *Metal and Diamond Mining Effluent Regulations*; mg/L = milligrams per litre (i.e., parts per million).
[A]Source: *Best Available Technology and Techniques Economically Achievable Assessment for Construction Phase Effluent Treatment* (Hatch, 2025).
[B]Source: *Environmental Release Targets for the Construction Phase Effluent Treatment Plant* (WSP, 2025).
[C]Applicable MDMER limits that may be equal to or greater than the LRL.

# Environmental Monitoring Plan
# ROOK-ENV-PLN-00001

# Rook I Project

## Environmental Monitoring Plan

ROOK-ENV-PLN-00001



August 2025

# Record of Revisions

| Revision No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| 0 | 27-Aug-2025 | Final | A. Swerhone | L. Moger | G. Johnson |

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# 1.0 Introduction

The *Environmental Monitoring Plan* (Plan) describes a risk-based set of integrated facilities, processes, and activities used to monitor the quantity and characteristics of constituents and physical parameters of the receiving environment as well as the meteorological conditions as they relate to the NexGen Energy Ltd. (NexGen) Rook I Project (Project).

The Project is located adjacent to Patterson Lake, approximately 40 km east of the Saskatchewan-Alberta border, 130 km north of the Northern Village of La Loche, and 640 km northwest of the City of Saskatoon as shown in Figure 1.

The Plan reflects NexGen's commitment and approach to effective pollution prevention and demonstrating compliance with applicable legal and other requirements concerning environmental monitoring. This approach is achieved by monitoring and assessing performance against indicators and targets and equipping workers with the knowledge, skills, and tools necessary to implement effective environmental protection processes.

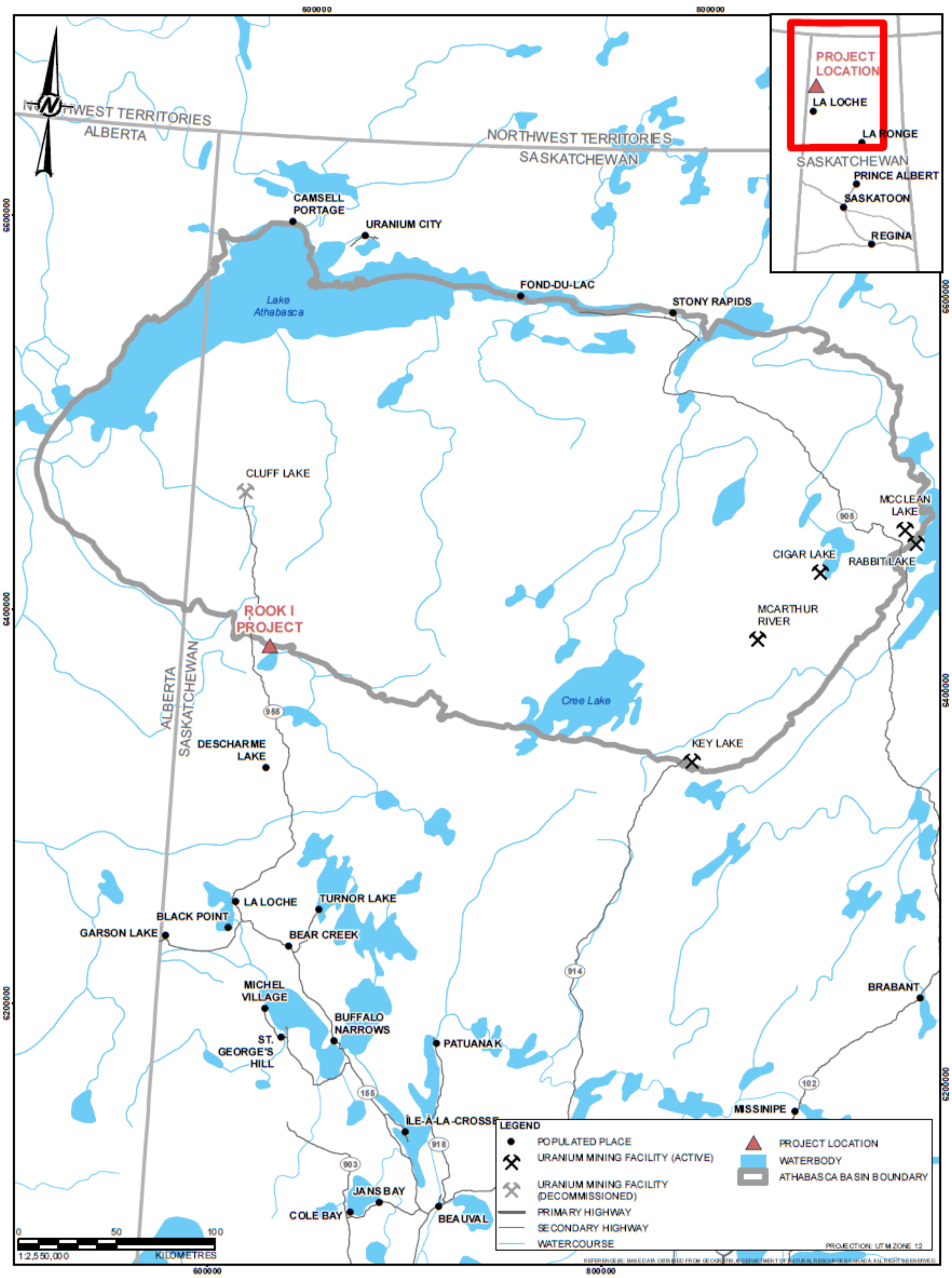



Figure 1: Rook I Project Location

## 1.1 Purpose

This Plan documents environmental monitoring and reporting requirements associated with the Project. The Plan meets applicable requirements of the references listed in section 6.0, including the Canadian Standards Association (CSA) N288.4 *Environmental monitoring programs at nuclear facilities and uranium mines and mills,* CSA N288.7 *Groundwater protection and monitoring programs for nuclear facilities and uranium mines and mills,* and CSA N288.0 *Environmental management of nuclear facilities: Common requirements of the CSA N288 series of Standards*.

## 1.2 Scope

The Plan applies to Project-related licensed activities conducted during the Construction phase (i.e., site preparation, construction, and commissioning) of the Project and to Project workers and visitors. The nature and extent of environmental monitoring and reporting requirements will change during the Project life cycle. Environmental elements considered in this Plan include atmosphere, water, land, and people.

The spatial scope of the Plan is beyond the final point of control for airborne and waterborne releases and includes the receiving environment and reference stations as identified in the most recent regulatory-approved environmental risk assessment and the *Rook I Environmental Impact Statement*. The spatial boundaries vary by environmental media and are shown in Appendix A.

Mitigation and monitoring of effluent (i.e., waterborne releases) and emissions (i.e., airborne releases) from the point of treatment, if required, to the final point of control are within the scope of the *Effluent and Emissions Plan*.

Managing uncontrolled discharges to the atmosphere, groundwater, surface water, and land is within the scope of the environmental protection procedure *Discharge and Discovery Prevention and Management*.

Uncontrolled discharges that trigger an emergency response are managed in accordance with the *Rook I Emergency Preparedness and Response Program* and its supporting plans.

Managing waste (e.g., untreated contact water, conventional waste, mine waste, treated effluent solid waste) is within the scope of the *Rook I Waste Management Program*.

## 1.3 Objectives

The Plan objectives are to:

- provide data required to assess the level of risk to human health and the environment;
- characterize potential changes in the environment;
- identify unusual or unforeseen conditions that may require corrective measures or adaptive management;
- provide data to verify predictions from the most recent regulatory-approved environmental risk assessment, refine the models used in the environmental risk assessment, or reduce uncertainty identified during the environmental risk assessment process;
- verify, independently of effluent or emissions monitoring, the effectiveness of containment and effluent control measures, and provide public assurance of the effectiveness of containment and effluent control;
- demonstrate due diligence; and
- demonstrate compliance with legal and other requirements.

These objectives form the basis for establishing a purpose-driven monitoring approach for the Project, considering the receiving environment, monitoring station types, and monitoring frequencies.

## 1.4 Plan Framework

The Plan, along with the *Effluent and Emissions Plan* and the *Environmental Excellence Plan,* supports the *Rook I Environmental Protection Program* and is part of the overall *Rook I Integrated Management System* (IMS). As a component of the IMS, the Plan is subject to the *Rook I Integrated Management System Policy*, which provides the foundation for NexGen's approach to environmental protection. The Plan and its relationship to other IMS programs within the IMS hierarchy are shown in Figure 2.

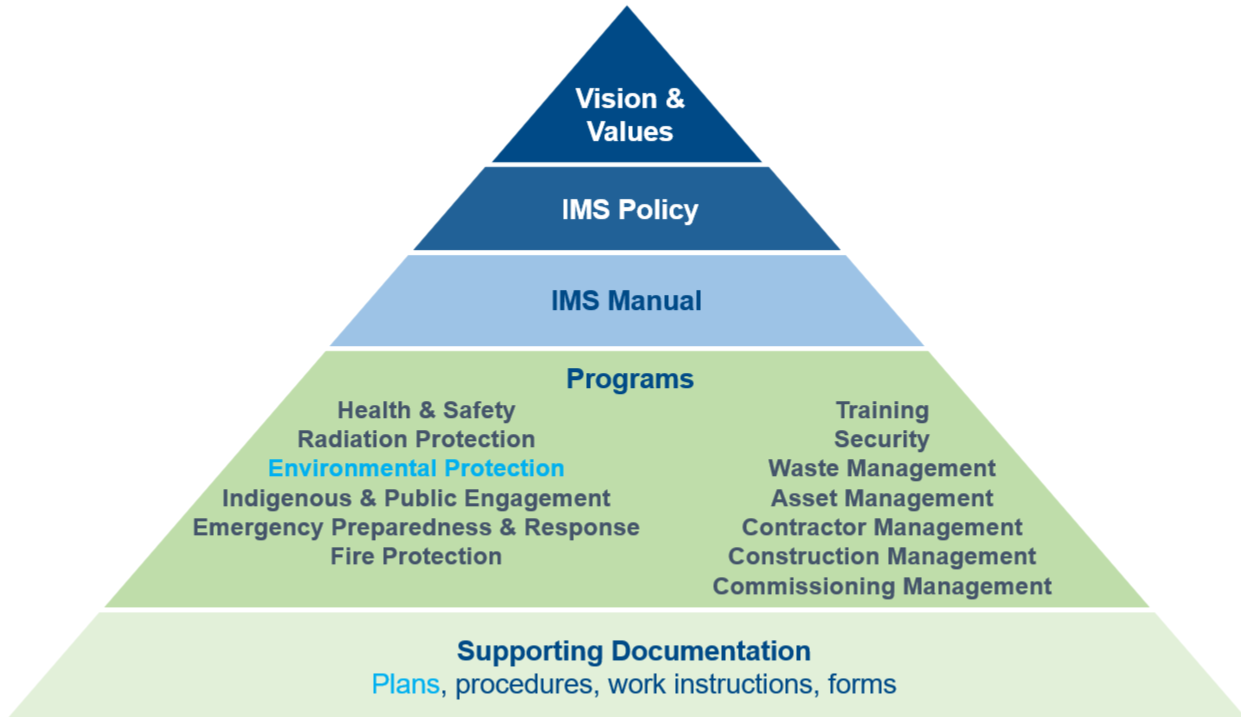



Figure 2: Plan Context Within the IMS

## 1.5 Plan Design Considerations

The Plan is designed to achieve the specific objectives described in section 1.3 and considers:

- environmental aspects associated with Project facilities, activities, and processes during the Construction phase;
- environmental effects monitoring programs in accordance with the *Metal and Diamond Mining Effluent Regulations*; and
- risks identified and commitments made in the *Rook I Environmental Impact Statement* and the most recent regulatory-approved environmental risk assessment.

### 1.5.1 Environmental Aspects

The Project operates year-round and includes Construction phase activities to establish the underground and surface facilities required to support the extraction of uranium ore and the production of uranium concentrate. A general schematic of primary Project infrastructure at the end of the Operations phase is shown in Figure 3 and includes:

- an underground mine accessed by two shafts;

- a surface uranium ore processing plant;
- mine rock management facilities;
- site water management facilities;
- an underground tailings management facility;
- an effluent treatment plant; and
- administration and accommodation complex facilities, utilities, an airstrip, and roads.

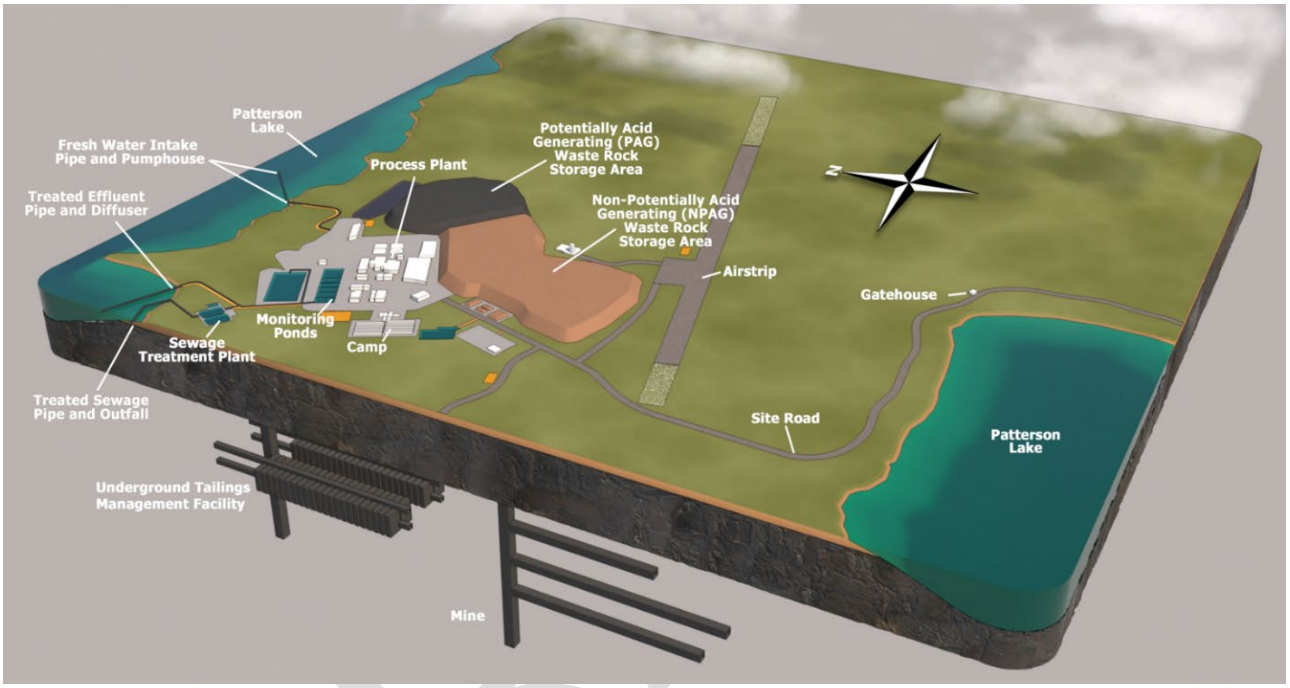



Figure 3: Schematic of Primary Project Infrastructure

Effluent and emissions associated with facilities, activities, and processes will vary over the Project life cycle. The Plan considers facilities anticipated to be present during the Construction phase, including temporary infrastructure that will be removed from service prior to the Operations phase.

The Project sources and pathways considered include:

- point source releases of treated contact water from the monitoring ponds to Patterson Lake;
- point source releases of treated sewage from the sewage treatment plant to Patterson Lake;
- diffuse terrestrial releases from site runoff pond #2 to the west bermed runoff collection area, with natural filtration to Patterson Lake;
- point source emissions to the atmosphere from stationary equipment (e.g., power plant, process heaters, incinerators); and
- fugitive emissions to the atmosphere from mobile equipment, space heaters, fuel storage and handling, and the temporary freeze plant as well as dust emissions from drilling and blasting, material handling, crushing, vehicle-generated road dust, and wind erosion from mine rock storage areas.

Effluent and emissions are documented in an environmental aspects and impacts register, which identifies the likelihood, significance, and residual risks associated with activities that could potentially influence the environment. For each effluent and emission, the register documents the environmental controls, including active and passive designs, implemented to mitigate the potential influence. Residual risks are assessed to help identify activities that require a higher priority for monitoring or mitigation on a continual or ad-hoc basis.

These risks are considered in the development of the Plan objectives and monitoring rationale, which are listed in Appendix B.

### 1.5.2 Environmental Effects Monitoring

Environmental effects monitoring (EEM) programs are prescribed by the *Metal and Diamond Mining Effluent Regulations* to detect and measure changes in aquatic ecosystems (i.e., receiving environments).

EEM consists of effluent, receiving water quality, and biological monitoring studies to examine the effectiveness of environmental protection measures directly in aquatic ecosystems. Potential long-term changes to environmental end points are assessed using regular cyclical monitoring and interpretation phases designed to investigate the changes on the same parameters and stations. In this way, both spatial and temporal characterizations are used to assess changes in receiving environments. Cycles occur at a minimum of every three years unless results suggest an alternate frequency is warranted. Far-field waterbodies are included as well as reference waterbodies located outside the area of influence of the treated effluent plume.

Effluent monitoring is within the scope of the *Effluent and Emissions Plan,* whereas the biological and receiving water quality monitoring components are described in this Plan. Both plans are considered in the design of the EEM program.

Biological monitoring requirements are dependent on the results of studies from previous phases and may include fish population, fish tissue, and benthic invertebrate community studies. Potential studies that may be triggered in accordance with the *Metal and Diamond Mining Effluent Regulations* include:

- a fish population survey is required if the concentration of effluent in the exposure area is greater than 1% at a distance of 250 metres (m) from the final discharge point;
- a fish tissue mercury study is required if the annual mean concentration of total mercury in effluent is equal to or greater than 0.10 µg/L, unless:
  - the results of the previous two biological monitoring studies indicate no effect on fish tissue from mercury, or the method detection limit used in respect of mercury for the analysis of at least two of four treated effluent samples in a year is equal to or greater than 0.10 µg/L.
- a fish tissue selenium survey is required if:
  - effluent characterization reveals a concentration of total selenium in the effluent that is equal to or greater than 10 µg/L;
  - effluent characterization reveals an annual mean concentration of total selenium in the effluent that is equal to or greater than 5 µg/L, based on a calendar year; or
  - the method detection limit used in respect of selenium for the analysis of any effluent sample is equal to or greater than 10 µg/L, or the method detection limit used in respect of selenium for the analysis of at least two of four treated effluent samples in a calendar year is equal to or greater than 5 µg/L, and if the cause of any effect on the fish population, fish tissue from mercury, or the benthic invertebrate community is not known.
- a benthic invertebrate community survey is required if the concentration of treated effluent in the exposure area is greater than 1% at a distance of 100 m from the final discharge point.

Samples for water quality monitoring are collected from the exposure area surrounding the point of entry of the treated effluent into the waterbody, from the discharge point and associated reference areas, as well as from sampling locations selected for biological monitoring. Wherever possible, EEM stations should align with stations sampled for other monitoring purposes.

The first study design for the EEM program is submitted to regulators no later than 12 months after the day on which the Project becomes subject to the *Metal and Diamond Mining Effluent Regulations*. A site characterization is completed as part of the first study design, which includes a plume delineation as specified in Environment Canada (2012) *Metal Mining Technical Guidance for Environmental Effects*

*Monitoring* and is further detailed in Environment Canada (2003) *Revised Technical Guidance on How to Conduct Effluent Plume Delineation Studies*. The study design for the first, second, or subsequent EEM programs is submitted at least six months before the EEM program is conducted. EEM is consistent with the *Metal and Diamond Mining Effluent Regulations* EEM program developed and agreed upon with regulators.

The general EEM program design is integrated into Appendix A and Appendix B and considers the following:

- EEM stations align with baseline sampling locations, to the extent practical;
- EEM stations are co-located with water and sediment quality monitoring stations to the extent possible;
- replicate stations are spaced a minimum of 20 m apart; and
- every effort is made to sample similar depths and sediment characteristics across reference and exposure areas and stations, to minimize confounding factors.

### 1.5.3 Environmental Risk Assessment and Follow-up Monitoring

Environmental risks at the site, for both current and future conditions, are quantitatively assessed in the *Rook I Environmental Impact Statement* and the most recent regulatory-approved environmental risk assessment, using integrated conceptual and numerical models that estimate and simulate the flow of materials from Project sources to human and ecological receptors. While the specific modelling software and platforms may change over the course of the Project life cycle, the general environmental risk assessment model suite includes:

- an air quality model that predicts the emission and dispersion of airborne constituents;
- a groundwater model that predicts the subsurface flow of water and constituents from the Project to the environment;
- surface water balance and mass balance models that predict effluent discharge rates and associated quality; and
- an ecological and human health risk assessment model that integrates all effluent and emissions data to evaluate potential risks associated with constituents of potential concern.

Changes to specific modelling software and platforms are communicated to the Canadian Nuclear Safety Commission (CNSC) in writing, at a minimum as part of updates to the environmental risk assessment every five years or sooner if changes to Project facilities, activities, or processes result in sources, pathways, or receptors that are outside the basis of the most recent regulatory-approved environmental risk assessment.

The models provide the foundation for evaluating doses and risks to receptors as well as the means to design, test, and plan for additional controls, where necessary. For example, pathways considered for human health in the environmental risk assessment, and used to inform the Plan's monitoring activities, include:

- inhalation or ingestion via soil and surface water from the emission and deposition of fugitive dust (i.e., metals, radionuclides, radon, and other constituents of potential concern);
- indirect ingestion via surface water and sediment from the discharge of treated effluent into Patterson Lake and site runoff; and
- ingestion via groundwater and surface water from waste rock storage area seepage.

Environmental assessment follow-up monitoring is integrated into the Plan design to verify predictions and confirm that mitigation measures are effective and adaptive. Where applicable, the Plan specifically identifies monitoring components that have been included as direct commitments from the *Rook I Environmental Impact Statement*.

These components are referenced throughout Appendix B to promote purpose-driven monitoring and provide traceability of each monitoring activity back to its origin in the *Rook I Environmental Impact Statement* commitments. This approach confirms that the monitoring framework remains aligned with regulatory expectations and reflects NexGen's ongoing commitment to responsible environmental stewardship.

Conceptual site models are also developed as part of the *Rook I Environmental Impact Statement* and environmental risk assessment to represent the Project conditions after the Construction phase is complete. A conceptual site model is used to help understand and visualize the sources, pathways, and receptors of constituents of potential concern identified for the Project by the *Rook I Environmental Impact Statement* and environmental risk assessment. Over time, conceptual site models are refined based on the monitoring results.

Data collected as part of the Plan are used to iteratively verify and inform both conceptual and numerical models. Further details and a summary of results are provided in the *Rook I Environmental Impact Statement* and environmental risk assessment.

## 1.6 Terminology

Terminology introduced in the Plan is provided below. A comprehensive list of common terms applicable to the Plan and the IMS are available in the *Rook I Project Glossary.*

**adaptive management** – A planned and systematic process for continually improving management practices (primarily environmental) by learning from their outcomes. For an environmental assessment (EA), it involves, among other things, the implementation of new or modified mitigation measures over the life of a project to address unanticipated environmental effects (CNSC 2021).

**conceptual site model** – A working hypothesis of the relationships between the sources of the constituents or physical parameters and the endpoint receptors (CSA N288.0).

**constituent of potential concern (COPC)** – Chemical and radiological constituents or physical parameters that pose a potential risk to aquatic and terrestrial life and/or human health as identified in the most recent regulatory-approved environmental risk assessment and the *Rook I Environmental Impact Statement*.

**environment** – The surroundings in which an organization operates including air, water, land, natural resources, flora, fauna, humans, and their interrelationships (ISO 14001).

**environmental aspect** – The interaction between a Project facility, activity, or process and the environment.

**environmental change** – An altered state and the positive and negative results. Changes may not be related to the Project (e.g., weather, reference locations).

**influence** – When an environmental aspect is expected to result in a change to the environment, whether adverse or beneficial (e.g., no statistical confirmation of cause-effect linkages).

**monitoring** – Determining the status of a system, process, product, service, or activity (ISO 9000).

**numerical model** – A combination of mathematical equations used to describe the physical conditions of various scenarios.

**physical parameter** – A measurable physical property of an environmental media (e.g., temperature).

**quality assurance (QA**) – Part of quality management focused on providing confidence that quality requirements will be fulfilled.

**quality control (QC)** – Part of quality management focused on fulfilling quality requirements.

**relative percent difference (RPD)** – Precision calculation for two duplicate values A and B, where A is larger than B, the RPD = 2*(A-B)/(A+B)*100%.

**supporting parameters** – Constituents or physical parameters that provide additional information about a constituent of potential concern, indicate an environmental change, or are monitored for due diligence purposes.

**systematic approach to training (SAT)** – A structured approach used to manage training modules, widely known as an instructional design model.

**worker** – Any person working for NexGen, including a contractor.

# 2.0 Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Plan. Workers are accountable for understanding and fulfilling their roles and responsibilities. Although NexGen maintains overall accountability for Project activities, the term *Rook I* is used in the following role descriptions to reinforce that the role is applicable and may be assigned to NexGen workers and contractors performing work on behalf of the Project.

Workers who are responsible for tasks and activities related to environmental monitoring are provided with the training and resources required to fulfill prescribed tasks as outlined in the *Rook I Training Program*.

Additional roles and responsibilities are further detailed as part of the supporting processes.

**Rook I Management** – is responsible for:

- providing resources to achieve Plan objectives and to fulfill the required roles, responsibilities, and processes of the Plan;
- providing support to maintain effective environmental monitoring;
- controlling environmental monitoring incidents and deviations and directing corrective action;
- communicating with the applicable regulatory agencies and other external stakeholders on behalf of the Project, as appropriate; and
- identifying and pursuing opportunities to achieve continual improvement.

**Plan Oversight** – is responsible for:

- providing oversight regarding environmental monitoring practices and data evaluation;
- managing activities under environmental monitoring contracts and communicating regularly with the environmental consultants;
- establishing and maintaining a monitoring system to assess the effectiveness of this Plan through activities such as tracking performance metrics, interpreting data, and supporting adaptive management and corrective actions;
- maintaining Plan-specific data and records in a controlled manner;
- addressing Plan deficiencies and deviations;
- communicating with the applicable regulatory agencies and other external stakeholders on behalf of the Project, as appropriate; and
- identifying and supporting opportunities to continually improve environmental monitoring processes.

**Plan Implementation** – is responsible for:

- implementing all aspects of this Plan and related processes including effectively performing environmental monitoring duties and responsibilities, as appropriate, and providing relevant environmental monitoring data and reports to the plan oversight;
- implementing resources and assigning appropriate workers to fulfill the required roles, responsibilities, and processes of the Plan and associated processes;
- confirming that workers meet and maintain required Plan-specific training and qualifications;
- providing day-to-day oversight of Project environmental consultants and contractors conducting field activities;
- maintaining Plan-specific data and records in a controlled manner;
- identifying and reporting Plan deficiencies and deviations to the plan oversight and supporting the implementation of remedial actions as required; and

- implementing opportunities to continually improve environmental monitoring processes.

**Environmental Consultants** – are responsible for:

- providing appropriately trained workers to effectively perform environmental monitoring duties and responsibilities, as appropriate;
- providing relevant environmental monitoring data and reports to the plan oversight; and
- identifying and reporting Plan deficiencies and deviations to the plan oversight or plan implementation.

# 3.0 Monitoring

Environmental monitoring is conducted by qualified workers in accordance with the following environmental media and associated supporting processes in the work instructions *Meteorological Station Data Collection, Air Sampling, Surface Water Sampling, Hydrometric Sampling, Groundwater Sampling, Snow Surveys, Sediment Sampling, Soil Sampling, Vegetation Sampling, Aquatic Biota Sampling, Wildlife Monitoring* listed in section 6.0:

- atmospheric environment (e.g., meteorological monitoring, air sampling);
- aquatic environment (e.g., surface water sampling, hydrometric sampling, groundwater sampling, snow surveys, sediment sampling);
- terrestrial environment (e.g., soil sampling, vegetation sampling); and
- biological environment (e.g., aquatic biota sampling, wildlife monitoring).

## 3.1 Sampling and Analytical Processes

Various methods are used to collect data from these environmental media, including sample collection, field data collection, and analyses. The processes and information necessary to conduct sampling and generate analytical results are described in the following subsections.

### 3.1.1 Constituents and Physical Parameters

Constituents and physical parameters monitored to meet Plan objectives are categorized as either constituents of potential concern or supporting parameters.

Constituents of potential concern include a focused list of parameters, nutrients, major ions, metals, and radionuclides that have the potential to pose a risk to aquatic life, terrestrial life, or human health. The process for identifying constituents of potential concern is described in the most recent regulatory-approved environmental risk assessment and the *Rook I Environmental Impact Statement*.

Constituents of potential concern identified in the most recent regulatory-approved environmental risk assessment include:

- major ions: chloride and sulphate;
- total metals: arsenic, cobalt, copper, molybdenum, and uranium; and
- radionuclides: lead-210, polonium-210, radon-222, radium-226, thorium-230, uranium 234, and uranium-238.

Constituents of potential concern for surface water and sediment, as identified in the *Rook I Environmental Impact Statement*, include:

- surface water quality:
  - major ions: chloride and sulphate;
  - nutrients: total ammonia, nitrate, and phosphorus;

- total metals: aluminum, arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, strontium, thallium, uranium, vanadium, and zinc; and
  - radionuclides: lead-210, polonium-210, radium-226, thorium-230, uranium-234 and uranium-238.
- sediment quality:
  - total metals: arsenic, cadmium, cobalt, copper, lead, molybdenum, nickel, selenium, uranium, and zinc; and
  - radionuclides: lead-210, polonium-210, radium-226, thorium-230, uranium-234, and uranium-238.

Supporting parameters provide additional information about constituents of potential concern, may indicate environmental changes, and can be monitored to demonstrate due diligence. Supporting parameters are identified based on:

- results of the *Rook I Environmental Impact Statement*;
- results of the environmental risk assessments;
- professional judgement;
- laboratory packages;
- scientific knowledge;
- local Indigenous knowledge; and
- local knowledge.

The constituents of potential concern and supporting parameters analyzed are dependent on the specific environmental media being monitored, as identified in Appendix B.

### 3.1.2 General Sample Collection

Sample collection methods are designed to obtain a representative sample of the environmental media being sampled. This includes using applicable sample container types and processes to avoid altering the sample during and after it has been collected (e.g., minimizing headspace, maintaining cool temperatures, selecting the appropriate container for the analyte). Supporting documents include information such as:

- sample container types and volumes;
- preservatives used and sample hold times;
- sample handling and storage procedures; and
- chain of custody processes.

Sampling methods are subject to health and safety controls as outlined in the *Rook I Health and Safety Program*. If a sample cannot be safely collected for any reason, sampling should be avoided, and the applicable procedure should be modified to enable safe collection while still meeting the objectives of the Plan. If regulatory compliance samples cannot be collected due to safety concerns or results cannot be reported due to technological issues (e.g., data security breaches), the regulatory authorities must be notified according to the communication processes outlined in the *Rook I Integrated Management System Manual* (IMS Manual) and applicable legal and other requirements. The samples should be collected as soon as it is safe and technologically feasible to do so, and regulatory authorities should be notified, where required.

In all cases, care is taken to avoid disturbing the environmental media being measured during and through the act of measurement. Field data collection procedures are developed for each type of environmental media.

The locations of sampling stations are shown in Appendix A and listed in Appendix B.

### 3.1.3 Laboratory Analyses

An off-site laboratory accredited by a certification body such as the Canadian Association for Laboratory Accreditation (CALA) is used for all regulatory compliance samples, where practical. For certain types of environmental media, direct measurements are taken in the field rather than sent to a laboratory for analysis.

## 3.2 Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) processes are conducted to maintain the accuracy and reliability of data collected as part of the Plan. Quality assurance is the system of activities designed to confirm that a product or service meets defined quality standards with a stated level of confidence. Quality control differs in that it is a system of activities designed to verify that a product or service complies with relevant legal and other requirements. The QA/QC processes and documentation are established each applicable sample before collection and consider CSA N286 *Management system requirements for nuclear facilities* and ISO 9001 *Quality management systems – Requirements*.

The QA/QC processes focus on:

- field sampling equipment and activities;
- laboratory QA/QC;
- data validation; and
- inspections and audits.

The QA/QC processes apply to all models and calculations (e.g., monthly loadings) used in the interpretation and reporting of data collected as part of the Plan. Project QA/QC records are maintained for the Project life cycle.

### 3.2.1 Field Sampling Equipment and Activities

Supporting procedures are available for each type of field sampling. In general, field measurements and instrument calibrations are conducted according to manufacturer specifications, including calibration frequency and standards. Sampling equipment meets the design, maintenance, and operational requirements in accordance with the applicable reference method used for sample collection and analysis. Equipment is appropriate for the environmental media being sampled and is compatible with the analytical parameters to prevent the contamination or degradation of samples.

Work instructions provide details on how sampling equipment is handled to maintain the accuracy and reliability of data. Work instructions also include appropriate sample collection techniques, the selection and use of approved sample containers, and the application of required preservation and storage methods.

In accordance with CSA N288.5 *Effluent and emissions monitoring programs at nuclear facilities*, 10% of regulatory compliance samples should be designated as QA/QC samples across similar types of field samples collected each year. The types of QA/QC samples to be collected and analyzed for field sampling are detailed in Table 1.

Table 1: Sample Types

| Type of Sample Collected | Description |
|---|---|
| Blind | • a separate sample collected at the same time or in rapid succession from the same station as a regulatory compliance sample<br>• the separate sample is treated the same as the regulatory compliance sample but labelled with an identifier that makes the field sample association unknown to the analytical laboratory to assess potential laboratory variability |
| Duplicate | • a separate sample collected at the same time or in rapid succession from the same station as a field sample<br>• used to assess overall variability in environmental media, sampling, and analytical methods<br>• cannot be used to assess laboratory variability |
| Field and laboratory parallel analyses | • variables such as pH and conductivity measured in the laboratory and field using different instruments<br>• provides an indication of whether conditions have changed between field sampling and laboratory analysis<br>• may also identify systematic errors in field instruments |
| Field blank | • empty sample containers filled in the field with pure water that was provided by the laboratory and transported to the field<br>• handled identically to genuine samples except for the water used to fill containers<br>• a test of whether sampling conditions, reagents, instruments, or containers may contaminate samples |
| Trip blank | • sample containers filled with pure water in the laboratory and transported into the field, then shipped back to the laboratory<br>• the seal remains unbroken during the entire process<br>• a test of contamination that can occur through sample containers during sampling and transport<br>• mainly applicable to volatile substances that can permeate containers |

### 3.2.2 Laboratory Quality Assurance and Quality Control

Environmental monitoring samples should be sent to off-site laboratories. Where a laboratory lacks registration to the appropriate compliance requirements, an evaluation of its management system, including QA/QC practices, is conducted.

Samples are accompanied by a chain of custody specifying the sample identifier; sample name, date, and time; preferred method of analysis; required analytes; and preservatives. Once received by a laboratory, quality control measures, including the analysis of certified reference materials, control samples, duplicates, and sample spikes, are implemented to verify the validity of analytical results. Laboratory QA/QC processes determine the properties of each analysis as described in Table 2.

Table 2: Laboratory QA/QC Analysis Properties

| QA/QC Analysis Properties | Description |
|---|---|
| Precision | • the reproducibility and reliability of the test method<br>• determined by analyzing replicate samples (i.e., multiple containers that each contain subsets of a homogenized sample) |
| Accuracy | • the degree of closeness between a measured value and the analyte's true reference value<br>• determined by analyzing reference standards (i.e., solutions derived from certified commercial formulations) |
| Sample contamination | • determined by analyzing blank samples that are carried through the entire sampling process (i.e., distilled or deionized water blanks, method blanks, and trip blanks) |
| Detection limits | • the lowest concentration at which individual measured results for a specific analyte are statistically different from a blank sample at a specified confidence level for a given method and representative environmental media<br>• vary among analytical methods for most analytes and are an important consideration when concentrations are expected to be very low (i.e., near detection limits) |

### 3.2.3 Data Validation

Data validation is an essential element of data QA/QC. Data validation provides a set of criteria against which data are reviewed to confirm that the data of interest are adequate for their intended use. The validation process includes identification of questionable data and investigation of apparent anomalies. Data validation requires evaluation of QA/QC samples, and includes an assessment of:

- precision, which is determined by calculating the relative percent difference (RPD) of replicate samples to understand the analytical variability among samples of identical composition:
    - for two duplicate values A and B, where A is larger than B, the RPD = 2*(A-B)/(A+B)*100%;
- accuracy, which is determined by comparing the reported values of measured reference standards to the known value based on its progeny; and
- possible sample contamination, which is determined by screening for any values in blank samples that exceed five times the detection limit, and evaluating such exceedances using professional judgement and historical data.

The *Metal and Diamond Mining Effluent Regulations* include data validation requirements for precision, accuracy, and detection limits for applicable metals and total suspended solids. These requirements must be met for all effluent monitoring conducted under the *Metal and Diamond Mining Effluent Regulations* and are considered targets for environmental monitoring activities that are not subject to the *Metal and Diamond Mining Effluent Regulations*.

Additional data validation steps are conducted on all samples to screen for outliers, which may be caused by sample contamination, transcription errors, or laboratory errors. Reported values are compared to expected ranges based on previous sampling or professional judgement to identify values that appear to be too low or too high (relative to historical or expected levels), so that the cause can be investigated. When such values are reported, the first step is to re-analyze the original sample, if it is still available, or collect a new sample, if feasible. To increase the likelihood of having leftover sample material or the ability to re-sample, data validation is completed as soon as reasonably practical.

### 3.2.4 Inspections and Audits

The performance and effectiveness of the Plan and its associated procedures and work instructions are monitored and verified with regular inspections and audits. In addition, compliance with legal and other requirements is audited on a regular basis. The methodology and schedule for planning, preparation, performance, and reporting of Plan conformance audits are outlined in the IMS Manual.

Inspections and audits by regulatory bodies are conducted to verify compliance with requirements. These may include, but are not limited to, in-situ measurement verification, data review, visible emission checks, and review of the core elements of the Plan (e.g., sampling design, analytical processes, QA/QC processes, data interpretation, reporting). Deviations, instances of regulatory noncompliance, or opportunities for improvement identified through inspections and audits are managed as outlined in the IMS Manual.

Further details regarding inspections and audits are outlined in the procedure *Environmental Inspections.*

## 3.3 Data Interpretation

Interpretation of data collected in accordance with the Plan varies by monitoring station, environmental media, and the regulatory requirement that each type of monitoring may fulfil. Minimum levels of data interpretation are described in this section, and additional interpretation may be included to better understand how effectively Project activities, or potential influences from Project activities, are being controlled and mitigated in accordance with legal and other requirements (e.g., permits, approvals, licences).

Descriptive statistics (e.g., minimum, mean, maximum) and corresponding measures of variability, as required, are used to assess and compare data annually at a minimum. More detailed statistical and long-term trend analyses may be used to address specific questions and may vary depending on the monitoring station and environmental media. At a minimum, the following criteria are used to interpret applicable data, which is noted in Appendix B:

- Guidelines and standards (i.e., generic thresholds) exist for air quality, surface water quality, sediment quality, and soil quality. These values represent expected environmental quality within a region and are not indicative of an adverse effect. For this reason, these guidelines and standards are used for illustrative purposes only. The methods used to develop the guidelines (e.g., physical setting) and their applicability (e.g., industrial spill) are vetted prior to comparison to confirm the comparisons remain appropriate.
- Baseline data were collected prior to construction and are available for each environmental media presented in the Plan. Comparisons to baseline data help to inform the understanding of the degree of change since construction.
- Reference data are collected upstream or upwind of the receiving environment and help differentiate between potential Project-related interactions and natural or other external sources of change.
- Site-specific thresholds for constituents and physical parameters may be developed for the Project, considering the local environmental conditions, available data, and the results of the most recent regulatory-approved environmental risk assessment. These thresholds may be adopted or approved as compliance limits in the receiving environment.

Where applicable, measured values are compared to the predictions in the *Rook I Environmental Impact Statement* or the most recent regulatory-approved environmental risk assessment. Data interpretation includes, but is not limited to, identifying correlations between parameters or conducting an analysis of temporal and spatial trends.

Detection limits and natural or seasonal variability are also considered when interpreting data. Standard deviation calculations, QA/QC processes as described in section 3.2, and visual data assessments are used to identify outliers, deviations, or potentially erroneous data. Laboratory data are recorded and reported in an uncensored form.

Every five years, additional analysis is conducted to complete the environmental performance report, as described in section 4.0. This analysis is conducted by workers knowledgeable about the Plan and in accordance with regulatory guidance. Supplemental studies completed during the applicable timeframe are discussed in the environmental performance report, if appropriate.

# 4.0 Reporting

Environmental reports to regulatory agencies, local Indigenous Groups, and the public are required by applicable regulations, notices, agreements, licences, approvals, and permits. Monitoring and reporting obligations prescribed by licences and other regulatory approvals or regulations, as well as voluntary reporting obligations, are summarized in a legal register and compliance task planner as outlined in the IMS Manual.

Compliance reporting of environmental monitoring results is required to meet internal writing standards and branding guidelines as well as external reporting obligations. Table 3 describes the reports that, at a minimum, are completed and, wherever possible, are streamlined (e.g., inclusion of the fourth-quarter report in the annual report).

A centralized environmental database is used to support data management and confirm reporting accuracy. This database consolidates monitoring results and compliance metrics, enabling efficient tracking, analysis, and generation of reports. It enhances data integrity and maintains up-to-date and consistent information that is readily accessible for both internal and external reporting needs.

While many environmental reporting activities are driven by regulatory requirements, the primary purpose of environmental reporting goes beyond compliance. These reports provide a transparent account of environmental performance, helping to identify trends, evaluate the effectiveness of control measures, and demonstrate environmental stewardship. Reporting also supports continual improvement, fosters public and Indigenous Group engagement, and reinforces NexGen's commitment to protecting the environment and meeting or exceeding expectations. In addition, environmental performance information is shared internally to support decision-making, promote accountability, and inform operational improvements across departments and levels of the organization.

Not all data collected are reported externally, as identified in Appendix B. Some monitoring data are collected specifically to inform internal management decisions. This internal use of data plays a critical role in driving continual improvement and proactive environmental management.

Table 3: Applicable Environmental Reports

| Report | Description |
|---|---|
| Annual Reports | Annual reports, based on the previous calendar year, are submitted to the appropriate regulators each year. Annual reports are completed in accordance with the applicable licence and provincial approval, standards, and the harmonized provincial and federal regulatory reporting requirements for the Project. The annual report is intended to, among other things, assess environmental management performance independently of measurements from the final point of control. |
| Environmental Effects Monitoring (EEM) Interpretive Report | The first interpretive report related to EEM is required to be submitted to the appropriate regulators no later than 36 months after the day on which the mine becomes subject to Section 7.0 of the *Metal and Diamond Mining Effluent Regulations*. Each subsequent interpretative report must be submitted to the appropriate regulators no later than 36 months after the day on which the previous interpretative report was required to be submitted. Supporting data are submitted to Environment and Climate Change Canada via the EEM electronic reporting system. |
| Environmental Performance Report | Every five years, an environmental performance report must be generated using the provincial *Environmental Performance Report Guideline*. This report includes a summary of compliance over the reporting period and a verification of models and assessments such as the *Rook I Environmental Impact Statement* and most recent regulatory-approved environmental risk assessment. The environmental performance report includes temporal trends to help understand Project environmental performance over time. |
| Environmental Risk Assessment | The environmental risk assessment is updated at a minimum every five years or when changes to Project facilities, processes, or activities result in environmental aspects and impacts that are outside the basis of the environmental risk assessment. With each update, effluent and emissions volumes, concentrations, and loads measured as part of the Plan must be compared to the most recent regulatory-approved environmental risk assessment to confirm or refine inputs to the environmental risk assessment and its underlying models. |
| Supplemental Monitoring Report | Supplemental environmental monitoring may be conducted to improve environmental performance and reduce knowledge gaps. Supplemental monitoring reporting requirements are determined on a case-by-case basis. |
| Ad-hoc Reporting | As outlined in the *Emergency Response Plan* and the incident and deviation management process described in the IMS Manual, incidents and deviations related to Project activities are reported to appropriate regulatory agencies, depending on the nature of the incident and in accordance with applicable regulatory requirements. |



# 5.0 Worker Training and Qualifications

Training and orientation programs for new workers entering Plan-related roles are identified in the *Rook I Training Program*. All workers, including contractors conducting work as part of the Plan, are qualified to conduct the associated roles. Workers responsible for environmental monitoring and sampling are qualified and trained on these tasks according to the appropriate work instructions. Workers conducting data evaluation and interpretation are trained in the applicable statistical methods. As outlined in the *Rook I Environmental Protection Program*, the Project follows a systematic approach to training (SAT) to educate, train, and qualify workers to carry out the work assigned to them. Training requirements are identified and monitored to confirm that workers receive the training they require, when they require it, to maintain competency and work safely. The provided education and training are intended to supplement the education and experience that are prerequisites appropriate for each position.

# 6.0 References

## 6.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-EMG-PGM-00001 | *Rook I Emergency Preparedness and Response Program* |
| ROOK-HSF-PGM-00001 | *Rook I Health and Safety Program* |
| ROOK-ENV-PGM-00001 | *Rook I Environmental Protection Program* |
| ROOK-TRN-PGM-00001 | *Rook I Training Program* |
| ROOK-WST-PGM-00001 | *Rook I Waste Management Program* |
| ROOK-EMG-PLN-00001 | *Rook I Emergency Response Plan* |
| ROOK-ENV-PLN-00004 | *Caribou Mitigation and Offsetting Plan* |
| ROOK-ENV-PLN-00003 | *Environmental Excellence Plan (to be developed)* |
| ROOK-ENV-PLN-00002 | *Effluent and Emissions Plan* |
| ROOK-ENV-PRO-00001 | *Discharge and Discovery Prevention and Management* |
| ROOK-ENV-PRO-00019 | *Vegetation Clearing* |
| ROOK-ENV-PRO-00003 | *Environmental Inspections* |
| ROOK-ENV-PRO-00002 | *Wildlife and Human Interactions* |
| | *Rook I Environmental Impact Statement* |
| ROOK-ENV-WIN-00002 | *Meteorological Station Data Collection and Maintenance (to be developed)* |
| ROOK-ENV-WIN-00003 | *Surface Water Sampling (to be developed)* |
| ROOK-ENV-WIN-00004 | *Hydrometric Sampling (to be developed)* |
| ROOK-ENV-WIN-00005 | *Snow Surveys (to be developed)* |
| ROOK-ENV-WIN-00006 | *Groundwater Sampling (to be developed)* |
| ROOK-ENV-WIN-00007 | *Air Sampling (air quality monitoring (to be developed)* |
| ROOK-ENV-WIN-00008 | *Wildlife Monitoring (to be developed)* |
| ROOK-ENV-WIN-00009 | *Soil Sampling (to be developed)* |
| ROOK-ENV-WIN-00010 | *Sediment Sampling (to be developed)* |
| ROOK-ENV-WIN-00011 | *Vegetation Sampling (to be developed)* |
| ROOK-ENV-WIN-00012 | *Aquatic Biota Sampling (to be developed)* |

## 6.2 External

Federal


- *Metal and Diamond Mining Effluent Regulations*
- Environment Canada. 2003. *Revised Technical Guidance on How to Conduct Effluent Plume Delineation Studies*
- Environment Canada. 2012. *Metal Mining Technical Guidance for Environmental Effects Monitoring*

Provincial

- *Environmental Performance Report Guideline*

Other

- Canadian Standards Association. N286 *Management system requirements for nuclear facilities*
- Canadian Standards Association. N288.0 *Environmental management of nuclear facilities: Common requirements of the CSA N288 series of Standards*
- Canadian Standards Association. N288.4 *Environmental monitoring programs at nuclear facilities and uranium mines and mills*
- Canadian Standards Association. N288.5 *Effluent and emissions monitoring programs at nuclear facilities*
- Canadian Standards Association. N288.7 *Groundwater protection and monitoring programs for nuclear facilities and uranium mines and mills*
- International Standards Organization. 9001 *Quality management systems – Requirements*
- International Standards Organization. 14001 *Environmental management systems — Requirements with guidance for use*

# Appendix A: Monitoring Stations Locations

Figure A-1: Noise, atmosphere, meteorological, and snow stations.

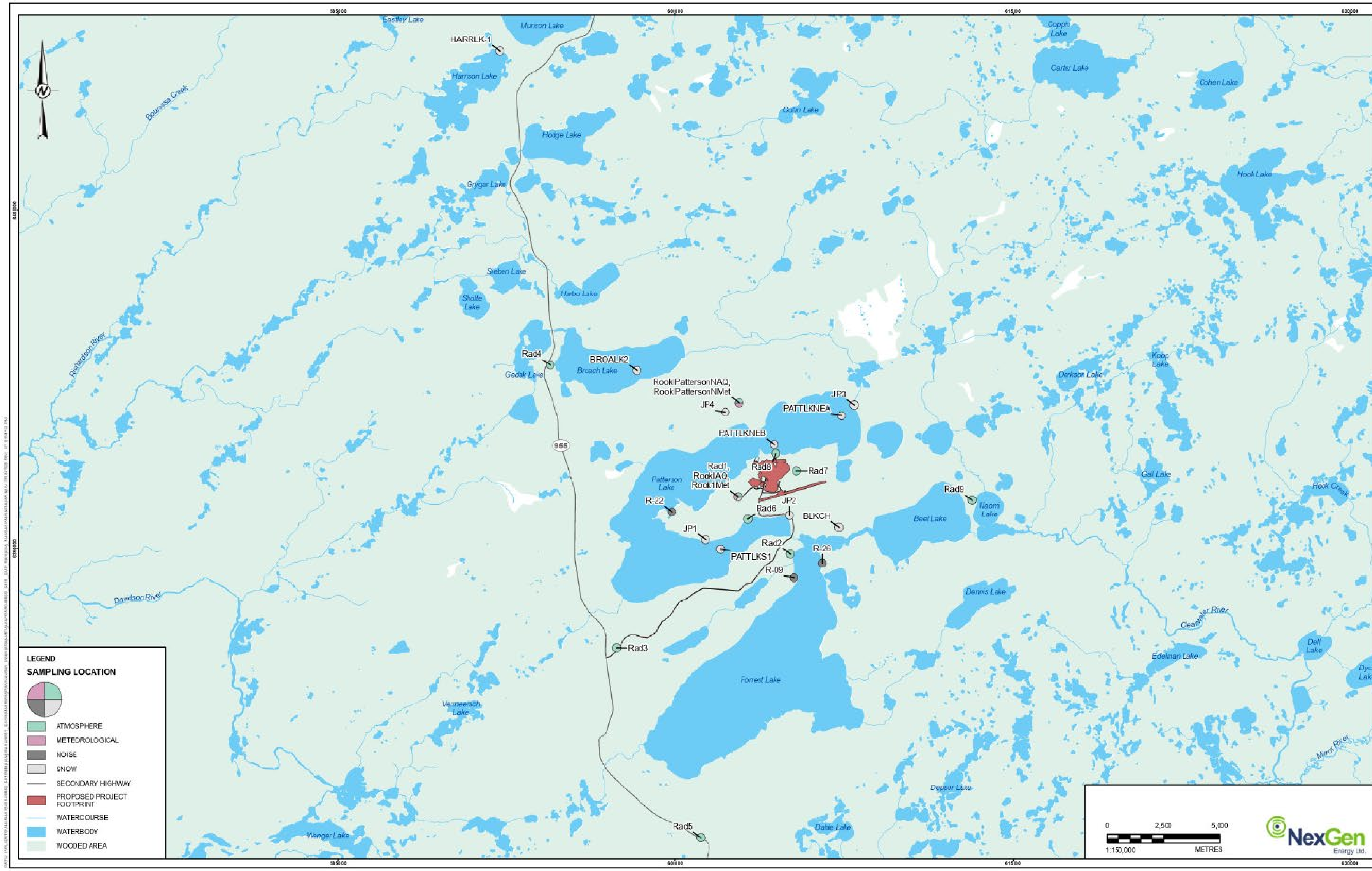


Figure A-2: Wetland stations.

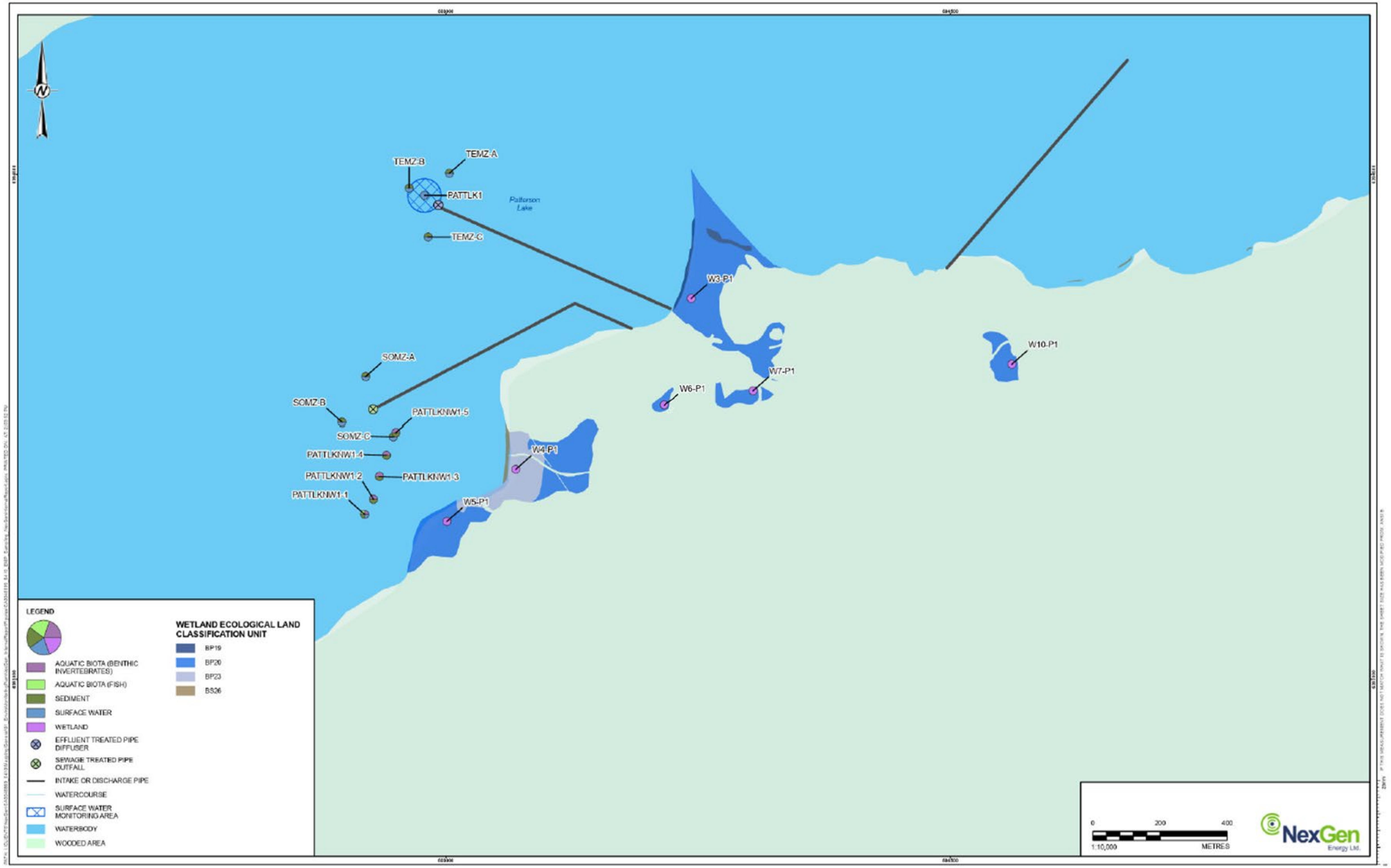


Figure A-3: Aquatic biota, sediment, hydrology, wetland, surface water, soil, and vegetation stations.

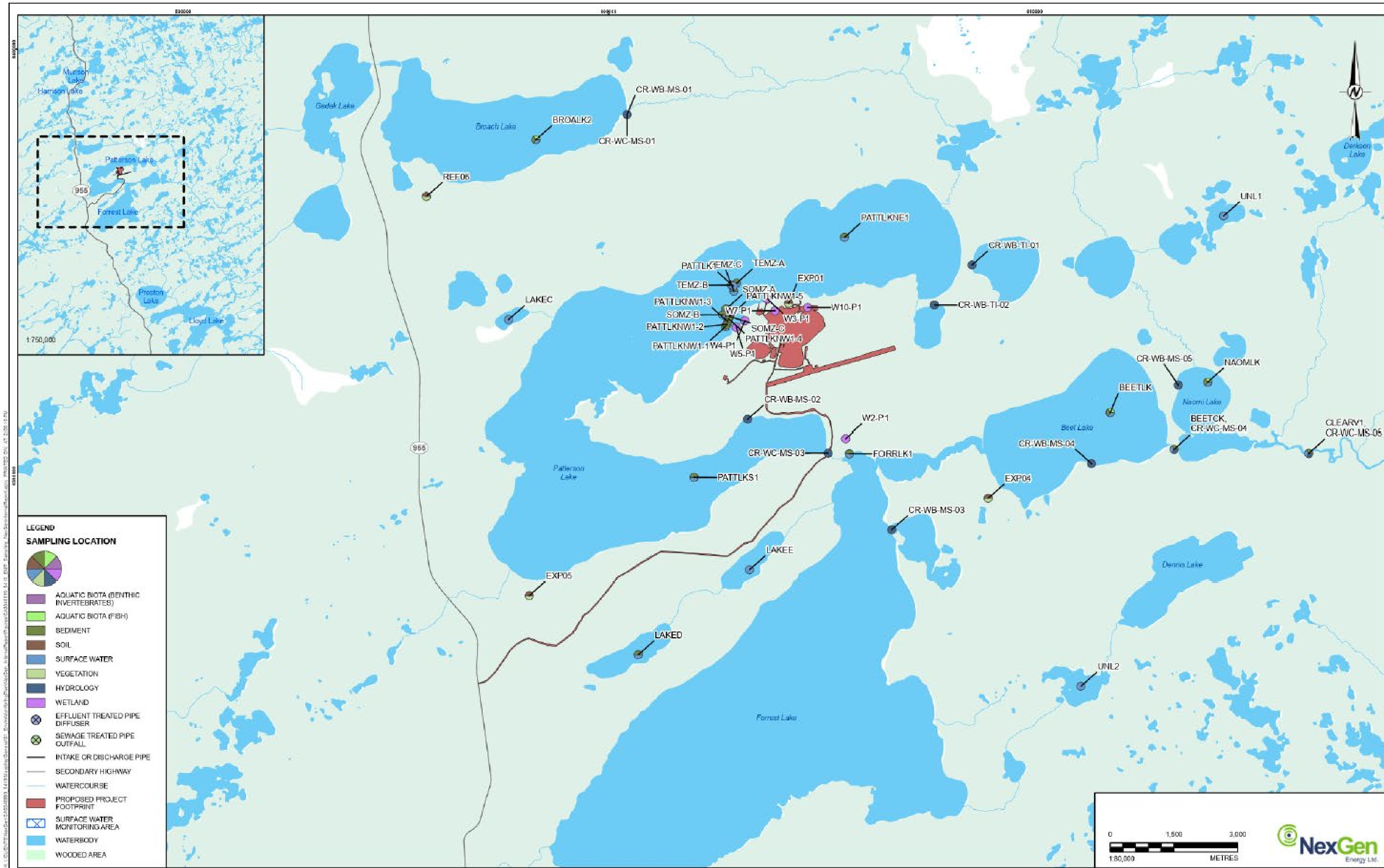


Figure A-4: Aquatic biota, sediment, hydrology, wetland, surface water, soil, and vegetation stations.

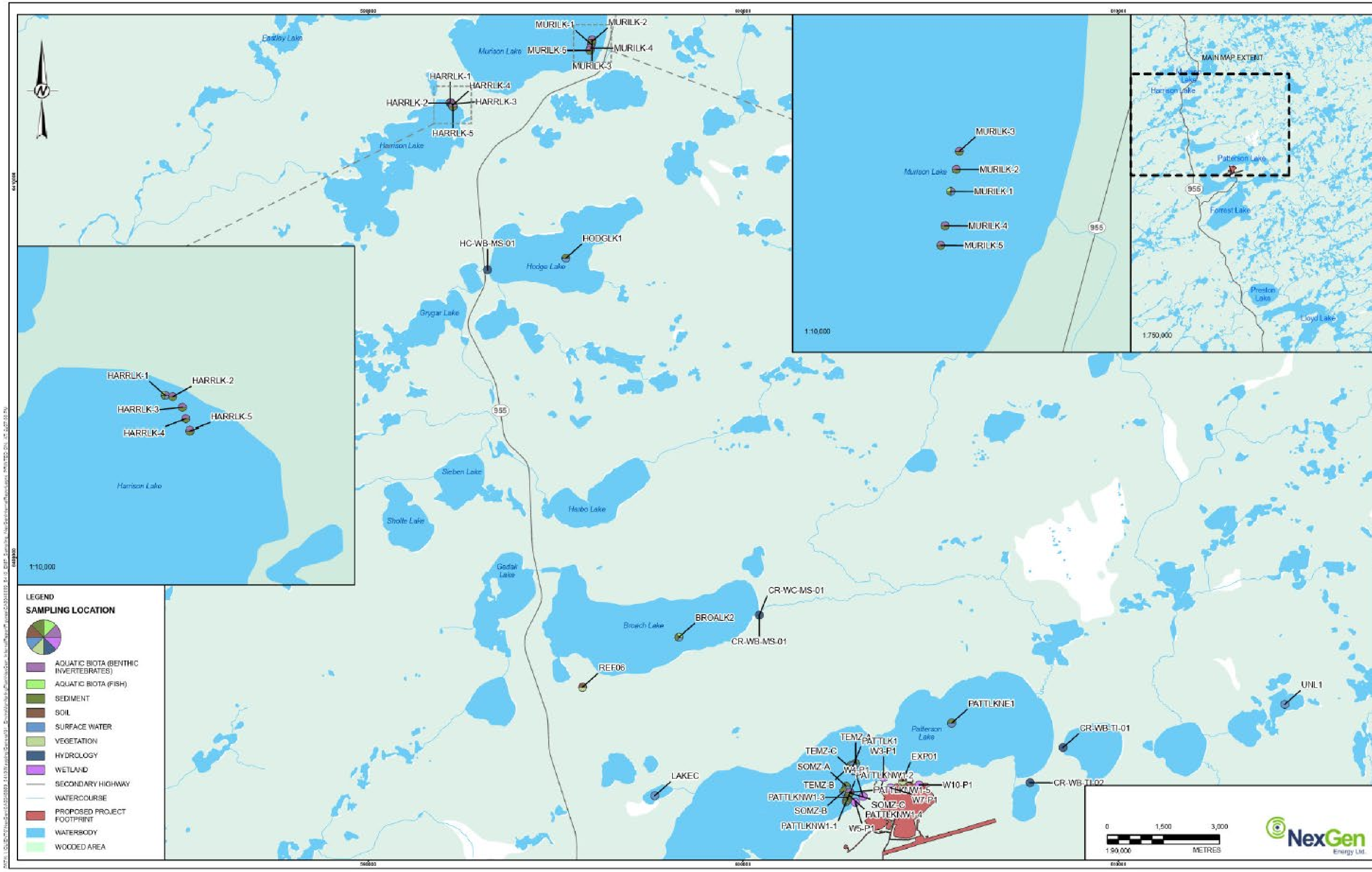


Figure A-5: Aquatic biota, sediment, surface water, soil, and vegetation stations.

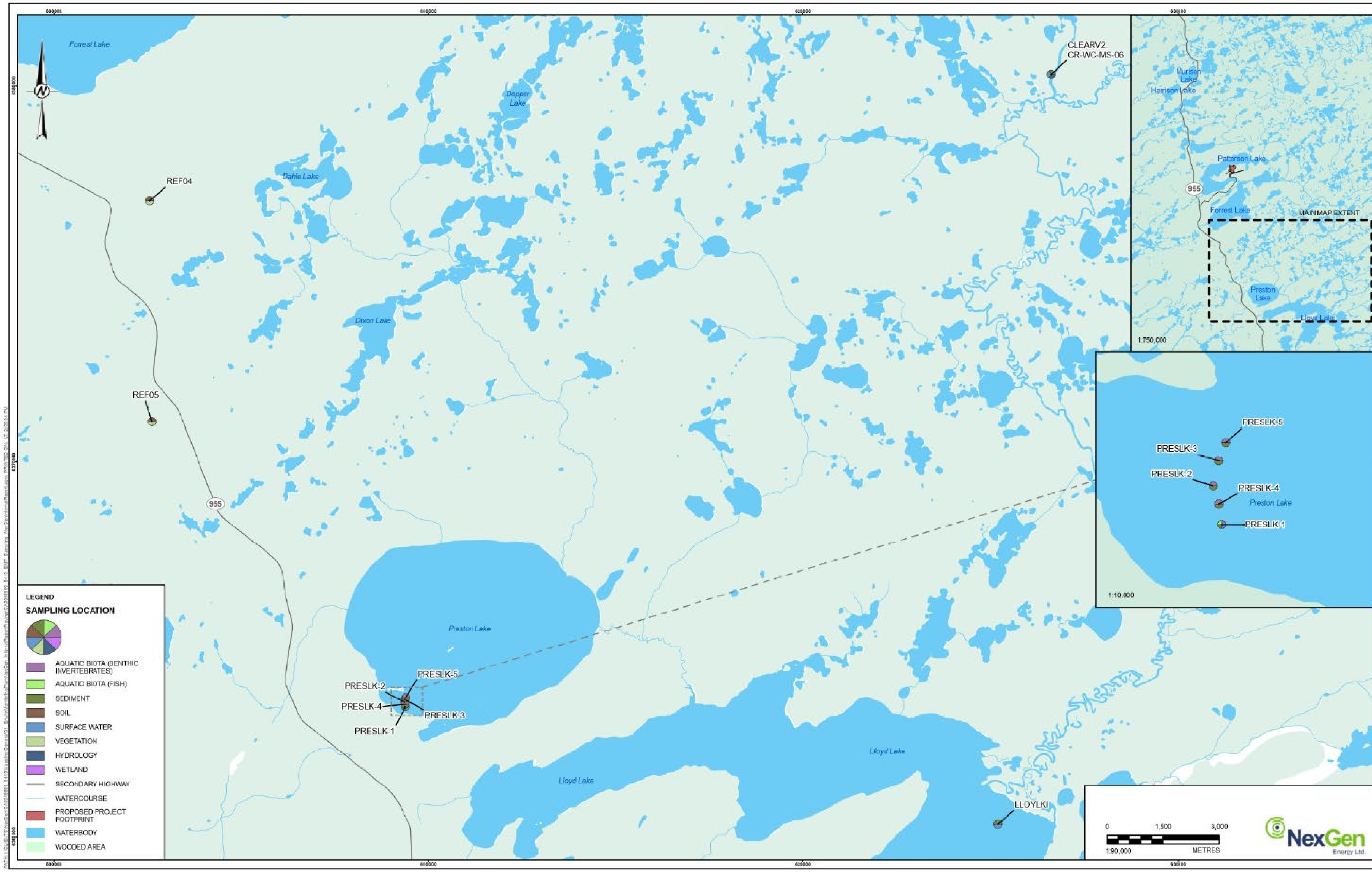
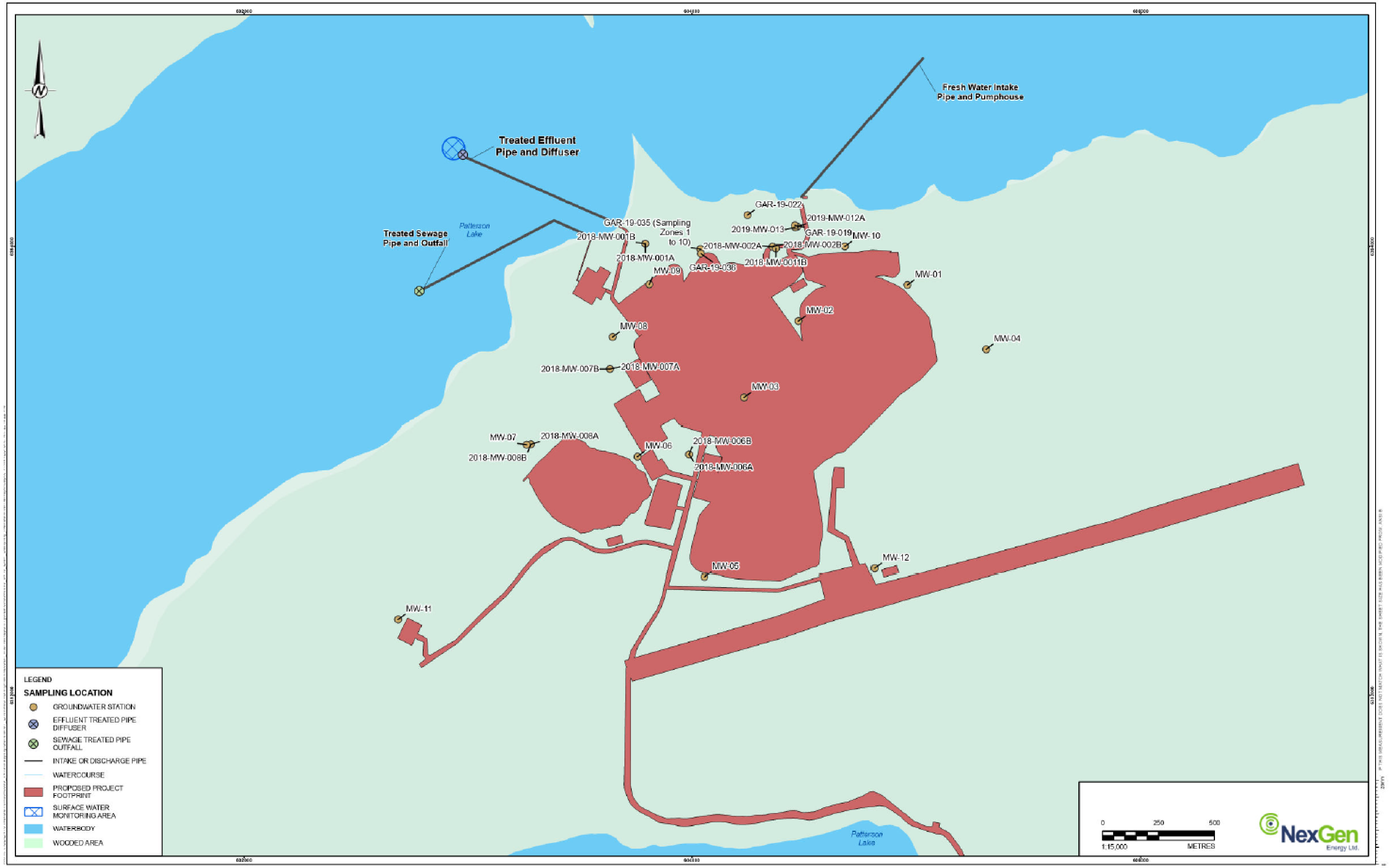


Figure A-6: Groundwater stations.



# Appendix B: Monitoring Summary

| Total Monitoring Stations | Noise | Atmosphere | Meteorological | Snow | Surface Water | Wetland | Hydrology | Groundwater | Sediment | Aquatic Biota | Soil | Vegetation | Wildlife |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3 | 11 | 2 | 11 | 27 | 6 | 13 | 29 | 38 | 28 | 6 | 6 | N/A |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Noise | R-09 | South of Rook I on the west shore of Forrest Lake | • Exposure location<br>• Demonstrate compliance with regulatory thresholds (AER 2007; Environment Canada 2009; Health Canada 2017)<br>• Demonstrate absence of clear tonal components at exposure locations<br>• EIS commitment<br>• Verify predictions made by the most recent regulatory-approved ERA<br>• Compare to the AER Directive 038 (AER 2007), Environmental Code of Practice for Metal Mines (EC 2009), and Guidance for Evaluating Human Health Impacts in Environmental Assessment – Noise (Health Canada 2017) | 57.6283789, -109.2368971[2] | Once during construction for a period not less than 24 hours in the summer. | Integrating sound level meters[3] | Energy equivalent sound level for the daytime period ($L_{eq,day}$); energy equivalent sound level for the nighttime period ($L_{eq,night}$); combined day-night sound level ($L_{dn}$) | Yes |
| Noise | R-22 | West of Rook I on the shore of Patterson Lake | | 57.65586864, -109.32665749[2] | | | | Yes |
| Noise | R-26 | South of Rook I on the east shore of Forrest Lake | | 57.63386572, -109.21557555[2] | | | | Yes |
| Atmosphere | Rad1 | Project Access Road at 1.5 km | • Exposure locations<br>• Refine models used in the ERA<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA and the Saskatchewan Ambient Air Quality Standards (GC 2015a), Alberta Environment and Parks dust fall guidelines (AEMP 2019), and Saskatchewan Air Quality Model Guideline (ENV 2012) | 57.66120585, -109.27717882 | Deployed and retrieved on an approximately six-month interval. | Composite | Radon | Yes |
| Atmosphere | Rad2 | Forrest Lake Access Road at 10 km | | 57.63781933, -109.23932086 | | | | Yes |
| Atmosphere | Rad3 | Access Road at 0.5 km | | 57.60211249, -109.37038148 | | | | Yes |
| Atmosphere | Rad4 | Broach Lake Access Road | | 57.71529253, -109.4148384 | | | | Yes |
| Atmosphere | Rad5 | Hwy 955 143 km Turnout | | 57.52536298, -109.31113036 | | | | Yes |
| Atmosphere | Rad6 | Exploration Camp Dock | | 57.65215995, -109.27003258 | | | | Yes |
| Atmosphere | Rad7 | Northeast of Repeater Station | | 57.67089162, -109.23293912 | | | | Yes |
| Atmosphere | Rad8 | Beach Near Pump Station | | 57.67811049, -109.24811779 | | | | Yes |
| Atmosphere | Rad9 | East of Beet Lake | | 57.65734117, -109.1031584 | | | | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Atmosphere | RookIPattersonNAQ | Patterson Lake North | • Exposure location<br>• Refine models used in the ERA<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA and the Saskatchewan Ambient Air Quality Standards (GC 2015a) | 57.66119596, -109.27711223 | Hourly data for the continuous monitors ($PM_1$, $PM_{2.5}$ and $PM_{10}$, collected in spring, summer and fall months) and 30-day composite samples for [5] | | $PM_1$, $PM_{2.5}$, $PM_{10}$, $NO_2$ | Yes |
| Atmosphere | RookIAQ | Project Access Road at 1.5 km | | 57.69830165, -109.27452837 | Hourly data for the continuous monitors ($PM_{2.5}$ and TSP collected in spring, summer and fall months) and nominal 30-day composite samples for $NO_2$, $SO_2$, VOC, and metals (in rainfall for spring, summer and fall months) | | $PM_{2.5}$, TSP, $NO_2$, $SO_2$, VOC, Al, Sb, As, Ba, Be, Bi, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Li, Mg, Mn, Mo, Ni, P, K, Se, Si, Ag, Na, Sr, Tl, V, U, Zn | Yes |
| Meteorological | RookIMet | Project Access Road at 1.5 km | • Refine models used in the ERA<br>• Compare to baseline data | 57.66119596, -109.27711223 | Continuous | Data | Wind speed and direction, temperature, relative humidity, total precipitation, rainfall, barometric pressure, net, and total solar radiation | Yes |
| Meteorological | RookIPattersonNMet | Patterson Lake North | • Refine models used in the ERA<br>• Compare to baseline data | 57.69830165, -109.27452837 | Continuous | Data | Wind speed and direction, temperature, relative humidity, total precipitation, rainfall, barometric pressure | Yes |
| Snow | JP1 | Jack Pine Area 1 | • Exposure stations<br>• Due diligence (monitor the quality and quantity of dust fall [i.e., rate of particulate deposition])<br>• Snow depth and snow water equivalent collected in accordance with WMO-No.8 Guide to Instruments and Methods of Observation - Volume II – Measurement of Cryospheric Variables (WMO 2024)<br>• Compare to baseline data | 57.64441037, -109.30213587 | Annually<br>(before snow melt) | In-situ: measurement<br>Snow chemistry: Composite | In-situ: Depth, density, snow water equivalent<br>Laboratory snow chemistry: Alkalinity, $HCO_3$, $CO_3$, pH, specific conductivity, sum of ions, hardness, TSS, TOC, DOC, Ca, Cl, F, Mg, K, Na, $SO_4$, TDS, $NH_3$ as N, $NO_3$ as N, $NO_2$ as N, $NO_3$ + $NO_2$ as N, TP, DP, TN, TKN, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |
| Snow | JP2 | Jack Pine Area 2 | | 57.65328057, -109.23925906 | | | | |
| Snow | JP3 | Old Burn Jack Pine | | 57.69627439, -109.18859651 | | | | |
| Snow | JP4 | Mature Jack Pine | | 57.69481384, -109.28496272 | | | | |
| Snow | PATTLKS1 | Patterson Lake South Arm Area 1 | | 57.64043595, -109.29121392 | | | | |
| Snow | PATTLKNEA | Paterson Lake North Arm – East Basin Area A | | 57.69218264, -109.19839761 | | | | |
| Snow | PATTLKNEB | Patterson Lake North Arm – East Basin Area B | | 57.68174383, -109.24903269 | | | | |
| Snow | BLKCH | Near Beet Lake Channel | | 57.64801043, -109.20248091 | | | | |
| Snow | BROALK2 | Broach Lake | | 57.71225722, -109.35024315 | | | | |
| Snow | Rook1Met | Rook 1 Meteorological Station – Project Access Road at 1.5 km | | 57.66119596, -109.27711223 | | | | |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Snow | HARRLK-1 | Harrison Lake | • Reference station<br>• Due diligence (monitor the quality and quantity of dust fall [i.e., rate of particulate deposition])<br>• Snow depth and snow water equivalent collected in accordance with WMO-No.8 Guide to Instruments and Methods of Observation - Volume II – Measurement of Cryospheric Variables (WMO 2024)<br>• Compare to baseline data | 57.84127772, -109.4471777 | Annually (before snow melt) | In-situ: measurement<br>Snow chemistry: Composite | In-situ: Depth, density, snow water equivalent<br>Laboratory snow chemistry: Alkalinity, $HCO_3$, $CO_3$, pH, specific conductivity, sum of ions, hardness, TSS, TOC, DOC, Ca, Cl, F, Mg, K, Na, $SO_4$, TDS, $NH_3$ as N, $NO_3$ as N, $NO_2$ as N, $NO_3$ + $NO_2$ as N, TP, DP, TN, TKN, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Surface water | PATTLKNE1 | Patterson Lake North Arm – East Basin Area 1 | • Exposure locations (treated effluent)<br>• Cumulative effects monitoring<br>• EIS commitment<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA and water quality chronic (long-term) thresholds based on the Canadian Environmental Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME 1999) or Saskatchewan Environmental Quality Guidelines (GS 2025). If the latter is unavailable, compare to British Columbia (BC MWLAP 2004; BC MWLRS 2025), Ontario (MOEE 1994), and the Federal Environmental Quality Guidelines (GOC 2025). | 57.69004319, -109.22950705 | Quarterly[5] | In-situ: depth profile<br>Water chemistry: composite or discrete[6] | In-situ: pH, temperature, DO, specific conductivity, turbidity, Secchi depth (open-water only), ice depth, snow depth<br>Laboratory water chemistry: alkalinity, $HCO_3$, $CO_3$, pH, specific conductivity, sum of ions, hardness, TSS, turbidity, TOC, DOC, Ca, Cl, F, Mg, K, Na, $SO_4$, TDS, $NH_3$ as N, $NO_3$ as N, $NO_3$ + $NO_2$ as N, TP, DP, TN, TKN, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |
| Surface water | PATTLKNW1-1 | Patterson Lake North Arm – West Basin Area 1 | | 57.671924, -109.27717347 | Quarterly[5] | In-situ: depth profile<br>Water chemistry: composite or discrete[6] | In-situ: pH, temperature, DO, specific conductivity, turbidity, Secchi depth (open-water only), ice depth, snow depth<br>Laboratory water chemistry: alkalinity, $HCO_3$, $CO_3$, pH, specific conductivity, sum of ions, hardness, TSS, turbidity, TOC, DOC, Ca, Cl, F, Mg, K, Na, $SO_4$, TDS, $NH_3$ as N, $NO_3$ as N, $NO_3$ + $NO_2$ as N, TP, DP, TN, TKN, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238<br>Chlorophyll a (for EEM only) | Yes |
| | | | | | Annual | Composite or discrete[6] | Methylmercury | Yes |
| Surface water | PATTLKS1 | Patterson Lake South Arm Area 1 | | 57.64043595, -109.29121392 | Quarterly[5] | In-situ: depth profile<br>Water chemistry: composite or discrete[6] | In-situ: pH, temperature, DO, specific conductivity, turbidity, Secchi depth (open-water only), ice depth, snow depth<br>Laboratory water chemistry: alkalinity, $HCO_3$, $CO_3$, pH, specific conductivity, sum of ions, hardness, TSS, turbidity, TOC, DOC, Ca, Cl, F, Mg, K, Na, $SO_4$, TDS, $NH_3$ as N, $NO_3$ as N, $NO_3$ + $NO_2$ as N, TP, DP, TN, TKN, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |
| | | | | | Annual | Composite or discrete[6] | Methylmercury | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Surface water | HARRLK1 | Harrison Lake | • Reference locations<br>• Baseline EEM locations<br>• Compliance with MDMER (EEM stations[4])<br>• Cumulative effects monitoring<br>• Compare to baseline data and water quality chronic (long-term) thresholds based on the Canadian Environmental Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME 1999) or Saskatchewan Environmental Quality Guidelines (GS 2025). If the latter is unavailable, compare to British Columbia (BC MWLAP 2004; BC MWLRS 2025), Ontario (MOEE 1994), and the Federal Environmental Quality Guidelines (GOC 2025). | 57.84127772, -109.4471777 | Quarterly[5] | In-situ: depth profile<br>Water chemistry: composite or discrete[6] | In-situ: pH, temperature, DO, specific conductivity, turbidity, Secchi depth (open-water only), ice depth, snow depth<br>Laboratory water chemistry: alkalinity, $HCO_3$, $CO_3$, pH, specific conductivity, sum of ions, hardness, TSS, turbidity, TOC, DOC, Ca, Cl, F, Mg, K, Na, $SO_4$, TDS, $NH_3$ as N, $NO_3$ as N, $NO_3$ + $NO_2$ as N, TP, DP, TN, TKN, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238<br>Chlorophyll a (for EEM only) | Yes |
| Surface water | MURILK1 | Murrison Lake | | 57.85446654, -109.38321143 | | | | Yes |
| Surface water | PRESLK1 | Preston Lake | | 57.40082107, -109.17961837 | | | | Yes |
| Surface water | HODGLK1 | Hodge Lake | • Reference locations<br>• EIS commitment<br>• Compare to baseline data and water quality chronic (long-term) thresholds based on the Canadian Environmental Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME 1999) or Saskatchewan Environmental Quality Guidelines (GS 2025). If the latter is unavailable, compare to British Columbia (BC MWLAP 2004; BC MWLRS 2025), Ontario (MOEE 1994), and the Federal Environmental Quality Guidelines (GOC 2025). | 57.80343998, -109.39678711 | Quarterly[5] | In-situ: depth profile<br>Water chemistry: composite or discrete[6] | In-situ: pH, temperature, DO, specific conductivity, turbidity, Secchi depth (open-water only), ice depth, snow depth<br>Laboratory water chemistry: alkalinity, $HCO_3$, $CO_3$, pH, specific conductivity, sum of ions, hardness, TSS, turbidity, TOC, DOC, Ca, Cl, F, Mg, K, Na, $SO_4$, TDS, $NH_3$ as N, $NO_3$ as N, $NO_3$ + $NO_2$ as N, TP, DP, TN, TKN, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |
| Surface water | LAKED | Lake D | | 57.6033254, -109.31489698 | | | | Yes |
| Surface water | BROALK2 | Broach Lake | • Exposure location (potential aerial deposition)<br>• EIS commitment<br>• Compare to baseline data and water quality chronic (long-term) thresholds based on the Canadian Environmental Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME 1999) or Saskatchewan Environmental Quality Guidelines (GS 2025). If the latter is unavailable, compare to British Columbia (BC MWLAP 2004; BC MWLRS 2025), Ontario (MOEE 1994), and the Federal Environmental Quality Guidelines (GOC 2025). | 57.71225722, -109.35024315 | Quarterly[5] | In-situ: depth profile<br>Water chemistry: composite or discrete[6] | In-situ: pH, temperature, DO, specific conductivity, turbidity, Secchi depth (open-water only), ice depth, snow depth<br>Laboratory water chemistry: alkalinity, $HCO_3$, $CO_3$, pH, specific conductivity, sum of ions, hardness, TSS, turbidity, TOC, DOC, Ca, Cl, F, Mg, K, Na, $SO_4$, TDS, $NH_3$ as N, $NO_3$ as N, $NO_3$ + $NO_2$ as N, TP, DP, TN, TKN, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238<br>Chlorophyll a (for EEM only) | Yes |
| Surface water | LAKEE | Lake E | | 57.62067321, -109.27027383 | Biannual (spring and fall)[5] | In-situ: depth profile<br>Water chemistry: composite or discrete[6] | In-situ: pH, temperature, DO, specific conductivity, turbidity, Secchi depth (open-water only), ice depth, snow depth<br>Laboratory water chemistry: TSS, turbidity, Cl, $SO_4$, TDS, $NH_3$ as N, $NO_3$ as N, $NO_3$ + $NO_2$ as N, TP, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Surface water | LAKEC | Lake C | • Exposure location (potential aerial deposition)<br>• EIS commitment<br>• Frequency is based on the year at which air emissions are predicted to be the highest during Construction. Low frequency is proposed due to access challenges.<br>• Compare to baseline data and water quality chronic (long-term) thresholds based on the Canadian Environmental Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME 1999) or Saskatchewan Environmental Quality Guidelines (GS 2025). If the latter is unavailable, compare to British Columbia (BC MWLAP 2004; BC MWLRS 2025), Ontario (MOEE 1994), and the Federal Environmental Quality Guidelines (GOC 2025). | 57.67446161, -109.3627261 | Year 3 of Construction | In-situ: depth profile<br>Water chemistry: composite or discrete[6] | In-situ: pH, temperature, DO, specific conductivity, turbidity, Secchi depth (open-water only), ice depth, snow depth<br>Laboratory water chemistry: TSS, turbidity, Cl, $SO_4$, TDS, $NH_3$ as N, $NO_3$ as N, $NO_3$ + $NO_2$ as N, TP, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |
| Surface water | UNL1 | Unnamed Lake 1 | | 57.69238519, -109.08018639 | | | | Yes |
| Surface water | UNL2 | Unnamed Lake 2 | | 57.59425448, - 109.14150004 | | | | Yes |
| Surface water | FORRLK1 | Forrest Lake Area 1 | • Exposure location (treated effluent)<br>• EIS commitment<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA and water quality chronic (long-term) thresholds based on the Canadian Environmental Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME 1999) or Saskatchewan Environmental Quality Guidelines (GS 2025). If the latter is unavailable, compare to British Columbia (BC MWLAP 2004; BC MWLRS 2025), Ontario (MOEE 1994), and the Federal Environmental Quality Guidelines (GOC 2025). | 57.64455963, -109.22981241 | Quarterly[5] | In-situ: depth profile<br>Water chemistry: composite or discrete[6] | In-situ: pH, temperature, DO, specific conductivity, turbidity, Secchi depth (open-water only), ice depth, snow depth<br>Laboratory water chemistry: alkalinity, $HCO_3$, $CO_3$, pH, specific conductivity, sum of ions, hardness, TSS, turbidity, TOC, DOC, Ca, Cl, F, Mg, K, Na, $SO_4$, TDS, $NH_3$ as N, $NO_3$ as N, $NO_3$ + $NO_2$ as N, TP, DP, TN, TKN, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |
| Surface water | BEETLK | Beet Lake | | 57.65160525, -109.12702132 | Quarterly[5] | | | Yes |
| Surface water | BEETCK | Clearwater River below Beet Lake (Beet Creek) | | 57.64365335, -109.10228081 | Quarterly[5] | | | Yes |
| Surface water | NAOMLK | Naomi Lake | | 57.65742272, -109.08828621 | Quarterly[5] | | | Yes |
| Surface water | LLOYLKI | Lloyd Lake Inlet | | 57.3685352, -108.9185273 | Biannual (spring and fall)[5] | | | Yes |
| Surface water | CLEARV1 | Clearwater River below Naomi Lake | | 57.64198385, -109.04925456 | Biannual (spring and fall)[5] | | | Yes |
| Surface water | CLEARV2 | Clearwater River above Mirror River | • Exposure location (primary source: treated effluent and potential cumulative effects)<br>• EIS commitment<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA and water quality chronic (long-term) thresholds based on the Canadian Environmental Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME 1999) or Saskatchewan Environmental Quality Guidelines (GS 2025). If the latter is unavailable, compare to British Columbia (BC MWLAP 2004; BC MWLRS 2025), Ontario (MOEE 1994), and the Federal Environmental Quality Guidelines (GOC 2025). | 57.54748927, -108.88461458 | Annual | In-situ: depth profile<br>Water chemistry: composite or discrete[6] | In-situ: pH, temperature, DO, specific conductivity, turbidity, Secchi depth (open-water only), ice depth, snow depth<br>Laboratory water chemistry: alkalinity, $HCO_3$, $CO_3$, pH, specific conductivity, sum of ions, hardness, TSS, turbidity, TOC, DOC, Ca, Cl, F, Mg, K, Na, $SO_4$, TDS, $NH_3$ as N, $NO_3$ as N, $NO_3$ + $NO_2$ as N, TP, DP, TN, TKN, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |
| Surface water | PATTLK1 | Patterson Lake in the immediate vicinity of the treated effluent discharge location | • Compliance with MDMER (Plume Delineation Study and support EEM site characterization requirements[4])<br>• Exposure location<br>• Verify predictions made by the most recent regulatory-approved ERA | 57.680955, -109.27251253[2] | Completed to support first EEM study design | Approach would follow EEM Guidance (Environment Canada 2003, 2012) | | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Surface water | TEMZ-A | Edge of 100 m Regulatory Mixing Zone for the treated effluent diffuser in Patterson Lake | • Exposure location<br>• Due diligence (Regulatory Mixing Zone Study and confirm that the diffuser is working as designed)<br>• EIS commitment<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA and water quality chronic (long-term) thresholds based on the Canadian Environmental Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME 1999) or Saskatchewan Environmental Quality Guidelines (GS 2025). If the latter is unavailable, compare to British Columbia (BC MWLAP 2004; BC MWLRS 2025), Ontario (MOEE 1994), and the Federal Environmental Quality Guidelines (GOC 2025). | 57.680955, -109.27251253 | Every five years (align first one with Plume Delineation Study) | In-situ: depth profile<br>Water chemistry: composite or discrete[6] | In-situ: pH, temperature, DO, specific conductivity, turbidity, Secchi depth (open-water only), ice depth, snow depth<br>Laboratory water chemistry: alkalinity, $HCO_3$, $CO_3$, pH, specific conductivity, sum of ions, hardness, TSS, turbidity, TOC, DOC, Ca, Cl, F, Mg, K, Na, $SO_4$, TDS, $NH_3$ as N, $NO_3$ as N, $NO_3$ + $NO_2$ as N, TP, DP, TN, TKN, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |
| Surface water | TEMZ-B | | | 57.6805849, -109.2745419457 | | | | |
| Surface water | TEMZ-C | | | 57.67926715, -109.2736585 | | | | |
| Surface water | SOMZ-A | Edge of 100 m Regulatory Mixing Zone for the treated sewage outfall in Patterson Lake | • Exposure location<br>• Due diligence (Regulatory Mixing Zone Study and confirm that the diffuser is working as designed)<br>• EIS commitment<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA and water quality chronic (long-term) thresholds based on the Canadian Environmental Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME 1999) or Saskatchewan Environmental Quality Guidelines (GS 2025). If the latter is unavailable, compare to British Columbia (BC MWLAP 2004; BC MWLRS 2025), Ontario (MOEE 1994), and the Federal Environmental Quality Guidelines (GOC 2025). | 57.67558302, -109.27694455 | Every five years (align first one with Plume Delineation Study) | In-situ: depth profile<br>Water chemistry: composite or discrete[6] | In-situ: pH, temperature, DO, specific conductivity, turbidity, Secchi depth (open-water only), ice depth, snow depth<br>Laboratory water chemistry: TSS, $NH_3$ as N, $NO_3$ as N, $NO_3$ + $NO_2$ as N, TP, TN, TKN, BOD, CBOD, E.coli, fecal coliform, total coliform | Yes |
| Surface water | SOMZ-B | | | 57.67438271, -109.2781896 | | | | |
| Surface water | SOMZ-C | | | 57.67397189, -109.27564519 | | | | |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Wetland | W3-P1 | Riparian wetland adjacent to Patterson Lake downgradient of Site Runoff Pond #1, Topsoil Stockpile, Intake Mine Vent Pad and adjacent to the treated effluent pipe | • Exposure location (seepage from waste rock piles)<br>• EIS commitment (confirm no net loss of wetland function)<br>• Baseline studies show that wetlands adjacent to the Project are classified as bogs or fens and have no to little standing water; these wetlands are not considered aquatic habitat (i.e., capable of supporting fish)<br>• Compare to baseline data | 57.67744708, -109.26059363 | Biannual (summer and fall)[5] and<br>Triannual (spring, summer, and fall)[5] | In-situ: measurement<br>Water chemistry: discrete | Biannual:<br>In-situ: pH, temperature, specific conductivity, turbidity<br>Laboratory water chemistry: $NH_3$ as N, P, alkalinity, $HCO_3$, $CO_3$, colour, OH, sum of ions, hardness, TSS, TOC, DOC, Ca, Cl, F, Mg, K, Na, $SO_4$, TDS, $NO_3 + NO_2$, $NO_3$ as N, TKN, dissolved metals (Al, As, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Sr, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230<br>Triannual:<br>Water surface elevation, soil moisture content | Yes |
| Wetland | W4-P1 | Riparian wetland adjacent to Patterson Lake downgradient of Site Runoff Pond #1 | | 57.6730242, -109.26957543 | | | | Yes |
| Wetland | W5-P1 | Riparian wetland adjacent to Patterson Lake downgradient of the west bermed runoff collection area and Site Runoff Pond #2 | | 57.67167948, -109.27307692 | | | | Yes |
| Wetland | W6-P1 | Upland wetland proximal to Project footprint including roads and the Site Runoff Pond #1 | | 57.67470937, -109.26208308 | | | | Yes |
| Wetland | W7-P1 | Upland wetland proximal to Project footprint including Site Runoff Pond #1, Intake Mine Vent, and Mine Terrace | | 57.674936, -109.257628 | | | | Yes |
| Wetland | W10-P1 | Perched wetland proximal to the Potentially-Acid Generating Pond | | 57.675467, -109.244724 | | | | Yes |
| Hydrology | CR-WC-MS-01 | Clearwater River below Broach Lake | • EIS commitment<br>• Refine models used in the ERA<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA<br>• Flow rate and water yield measured in accordance with WMO-No.168 Guide to Hydrological Practice Volume I Hydrology – From Measurement to Hydrological Information (WMO 2008) and the Water Survey of Canada Hydrometric Field Manual (ECCC 2023) | 57.71710806, -109.31398713 | Triannual (spring, summer, and fall)[5] | Data and measurement | Flow rate, annual water yield | Yes |
| Hydrology | CR-WC-MS-03 | Clearwater River below Patterson Lake | | 57.6448344, -109.2380998 | Once in the spring, summer, and fall; monthly for winter (December to March) | Data and measurement | Flow rate, annual water yield | Yes |
| Hydrology | CR-WC-MS-04 | Clearwater River below Beet Lake | • Co-located with surface water quality station<br>• EIS commitment<br>• Refine models used in the ERA<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA<br>• Flow rate and water yield measured in accordance with WMO-No.168 Guide to Hydrological Practice Volume I Hydrology – From Measurement to Hydrological Information (WMO 2008) and the Water Survey of Canada Hydrometric Field Manual (ECCC 2023) | 57.64360646, -109.10238882 | Triannual (spring, summer, fall) [5] | Data and measurement | Flow rate, annual water yield | Yes |
| Hydrology | CR-WC-MS-05 | Clearwater River below Naomi Lake | | 57.64190158, -109.04916347 | Triannual (spring, summer, fall) [5] | Data and measurement | Flow rate, annual water yield | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Hydrology | CR-WC-MS-06 | Clearwater River above Mirror River Confluence | • Co-located with surface water quality station<br>• EIS commitment<br>• Compare to baseline data<br>• Flow rate and water yield measured in accordance with WMO-No.168 Guide to Hydrological Practice Volume I Hydrology – From Measurement to Hydrological Information (WMO 2008) and the Water Survey of Canada Hydrometric Field Manual (ECCC 2023) | 57.54748927, -108.88461458 | Triannual (spring, summer, and fall)[5] | Data and measurement | Flow rate, annual water yield | Yes |
| Hydrology | HC-WB-MS-01 | Hodge Lake | • Co-located with surface water quality station<br>• Compare to baseline data<br>• Water surface elevation measured in accordance with WMO-No.168 Guide to Hydrological Practice Volume I Hydrology – From Measurement to Hydrological Information (WMO 2008) and the Water Survey of Canada Hydrometric Field Manual (ECCC 2023) | 57.80104528, -109.43216526 | Triannual (spring, summer, and fall)[5] | Data and measurement | Water surface elevation | Yes |
| Hydrology | CR-WB-MS-01 | Broach Lake | | 57.71710806, -109.31398713 | Triannual (spring, summer, and fall)[5] | Data and measurement | Water surface elevation | Yes |
| Hydrology | CR-WB-MS-02 | Patterson Lake | | 57.65222199, -109.2695101 | Triannual (spring, summer, and fall)[5] | Data and measurement | Water surface elevation | Yes |
| Hydrology | CR-WB-MS-03 | Forrest Lake | | 57.62833092, -109.21427606 | Triannual (spring, summer, and fall[5]) | Data and measurement | Water surface elevation | Yes |
| Hydrology | CR-WB-MS-04 | Beet Lake | | 57.64115468, -109.13494502 | Triannual (spring, summer, and fall[5]) | Data and measurement | Water surface elevation | Yes |
| Hydrology | CR-WB-MS-05 | Naomi Lake | | 57.65697715, -109.09991723 | Triannual (spring, summer, and fall[5]) | Data and measurement | Water surface elevation | Yes |
| Hydrology | CR-WB-TI-01 | Lake H | • Refine models used in the ERA<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA<br>• Water surface elevation measured in accordance with WMO-No.168 Guide to Hydrological Practice Volume I Hydrology – From Measurement to Hydrological Information (WMO 2008) and the Water Survey of Canada Hydrometric Field Manual (ECCC 2023) | 57.68349911, -109.179933 | Triannual (spring, summer, and fall[5]) | Data and measurement | Water surface elevation | Yes |
| Hydrology | CR-WB-TI-02 | Lake G | | 57.67529837, -109.19512842 | Triannual (spring, summer, and fall[5]) | Data and measurement | Water surface elevation | Yes |
| Groundwater | 2018-MW-001A | Monitoring well between Mill Terrace/Site Runoff Pond #1 and Patterson Lake<br><br>Approximate Depth: 4.9 mbgs (Glacial Drift) | • Exposure location (Mill Terrace/Site Runoff Pond #1)<br>• Co-located with 2018-MW-001B to allow vertical gradient to be measured<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.6763646, -109.2596225 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br><br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br><br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3$ + $NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Groundwater | 2018-MW-001B | Monitoring well between Mill Terrace/Site Runoff Pond #1 and Patterson Lake<br><br>Approximate Depth: 9.5 mbgs (Glacial Drift) | • Exposure location (Mill Terrace/Site Runoff Pond #1)<br>• Co-located with 2018-MW-001A to allow vertical gradient to be measured<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.6763646, -109.2596225 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br><br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br><br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | 2018-MW-006A | Monitoring Well between WRSAs and Patterson Lake<br><br>Approximate Depth: 21.9 mbgs (Glacial Drift) | • Exposure location (WRSAs)<br>• Co-located with 2018-MW-006B to allow vertical gradient to be measured<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.66791585, -109.2567579 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br><br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br><br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | 2018-MW-006B | Monitoring Well between WRSA and Patterson Lake<br><br>Approximate Depth: 33.8 mbgs (Glacial Drift) | • Exposure location (WRSA)<br>• Co-located with 2018-MW-006A to allow vertical gradient to be measured<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.66791585, -109.2567579 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br><br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br><br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | 2018-MW-007A | Monitoring well between Mill Terrace and Patterson Lake<br><br>Approximate Depth 11.2 mbgs (Glacial Drift) | • Exposure location (Mill Terrace)<br>• Co-located with 2018-MW-007B to allow vertical gradient to be measured<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.67138207, -109.26251058 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br><br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br><br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Groundwater | 2018-MW-007B | Monitoring well between Mill Terrace and Patterson Lake<br>Approximate Depth 25 mbgs (Glacial Drift) | • Exposure location (Mill Terrace)<br>• Co-located with 2018-MW-007B to allow vertical gradient to be measured<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.67138207, -109.26251058 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | 2018-MW-008A | Monitoring well between West Bermed Runoff Collection Area and Patterson Lake<br>Approximate Depth: 9.8 mbgs (Glacial Drift) | • Exposure location (West Bermed Collection Area)<br>• Co-located with 2018-MW-008B to allow vertical gradient to be measured<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.66848234, -109.26856785 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | 2018-MW-008B | Monitoring well between West Bermed Runoff Collection Area and Patterson Lake<br>Approximate Depth: 41.2 mbgs (Glacial Drift) | • Exposure location (West Bermed Collection Area)<br>• Co-located with 2018-MW-008A to allow vertical gradient to be measured<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.66848234, -109.26856785 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | 2019-MW-012A | Monitoring well between Mill Terrace / PAG Runoff Collection Area and Patterson Lake<br>Approximate Depth: 44.1 mbgs (Glacial Drift) | • Exposure location (Mill Terrace/PAG Runoff Collection Area)<br>• Co-located with 2019-MW-013 to allow vertical gradient to be measured<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.67689888, -109.24820978 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Groundwater | 2019-MW-013 | Monitoring well between Mill Terrace / PAG Runoff Collection Area and Patterson Lake<br><br>Approximate Depth: 17.3 mbgs (Glacial Drift) | • Exposure location (Mill Terrace / PAG Runoff Collection Area)<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.67687427, -109.24837867 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | 2018-MW-002A | Monitoring well between Mill Terrace and Patterson Lake<br><br>Approximate Depth: 6.9 mbgs (Glacial Drift) | • Exposure location (Mill Terrace)<br>• Co-located with 2018-MW-002B to allow vertical gradient to be measured<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.67611287, -109.25010725 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | 2018-MW-002B | Monitoring well between Mill Terrace and Patterson Lake<br><br>Approximate Depth: 12.3 mbgs (Glacial Drift) | • Exposure location (Mill Terrace)<br>• Co-located with 2018-MW-002B to allow vertical gradient to be measured<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.67611287, -109.25010725 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | 2018-MW-0011B | Monitoring well between Mill Terrace and Patterson Lake<br><br>Approximate Depth: 59.6 mbgs (Glacial Drift) | • Exposure location (Mill Terrace)<br>• Co-located with 2018-MW-002A and 2018-MW-002B to allow vertical gradient to be measured<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.67604576, -109.24986651 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Groundwater | GAR-19-035 (Sampling Zones 1 to 10) | Westbay Monitoring Well near Pump Station<br>Sample Depths:<br>Port 1 – 646.0 m<br>Port 2 – 288.0 m<br>Port 3 – 530.0 m<br>Port 4 – 472.05 m<br>Port 5 – 412.55 m<br>Port 6 – 353.0 m<br>Port 7 – 301.2 m<br>Port 8 – 255.5 m<br>Port 9 – 211.3 m<br>Port 10 – 167.1 m | • Exposure location (future water quality at closure from underground tailings management facility and underground workings)<br>• Measures vertical gradient<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.67609234, -109.25551012 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3$ + $NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | MW-01 | Monitoring well between WRSA and Patterson Lake<br>Approximate Depth: 25 mbgs (target water table) | • Exposure location (WRSA)<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to predictions made by the most recent regulatory-approved ERA | 57.67444229, -109.24016163 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3$ + $NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | MW-02 | Monitoring well between WRSA and Patterson Lake<br>Approximate Depth: 40 m (target water table) | • Exposure location (WRSA)<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to predictions made by the most recent regulatory-approved ERA | 57.67310887, -109.24830876 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3$ + $NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | MW-03 | Monitoring well between WRSA and Patterson Lake<br>Approximate Depth: 25 mbgs (target water table) | • Exposure location (WRSA)<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to predictions made by the most recent regulatory-approved ERA | 57.67010357, -109.25252815 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3$ + $NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Groundwater | MW-04 | Monitoring well up-gradient of mine and mill<br>Approximate Depth: 45 mbgs (target water table) | • Background location (up-gradient of mine and mill)<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to predictions made by the most recent regulatory-approved ERA | 57.66784885, -109.25645932 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | MW-05 | Monitoring well between WRSA and Patterson Lake<br><br>Approximate Depth: 20 mbgs (target water table) | • Exposure location (WRSA)<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to predictions made by the most recent regulatory-approved ERA | 57.66298875, -109.2558376 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | MW-06 | Monitoring well between Site Runoff Pond #2 and Patterson Lake<br><br>Approximate Depth: 20 mbgs (target water table) | • Exposure location (Site Runoff Pond #2)<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to predictions made by the most recent regulatory-approved ERA | 57.667879, -109.26061589 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | MW-07 | Monitoring well up-gradient of WRSA<br>Approximate Depth: 45 mbgs (target water table) | • Background location (up-gradient of WRSA)<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to predictions made by the most recent regulatory-approved ERA | 57.66846874, -109.26888706 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Groundwater | MW-08 | Monitoring well between Monitoring Ponds and Patterson Lake<br>Approximate Depth: 6 mbgs (target water table) | • Exposure location (Monitoring Ponds)<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to predictions made by the most recent regulatory-approved ERA | 57.67266322, -109.26224807 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | MW-09 | Monitoring well between Site Runoff Pond #1 and Patterson Lake<br>Approximate Depth: 5 mbgs (target water table) | • Exposure location (Site Runoff Pond #1)<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to predictions made by the most recent regulatory-approved ERA | 57.67473536, -109.25939873 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | MW-10 | Monitoring well between PAG Runoff Collection Area and Patterson Lake<br>Approximate Depth: 5 mbgs (target water table) | • Exposure location (PAG Runoff Collection Area)<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to predictions made by the most recent regulatory-approved ERA | 57.67484703, -109.24861061 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | MW-11 | Monitoring well between Explosives Magazine Storage and Patterson Lake<br>Approximate Depth: 40 mbgs (target water table) | • Exposure location (Explosives Magazine Storage)<br>• EIS commitment<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to predictions made by the most recent regulatory-approved ERA | 57.67605057, -109.24469546 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Groundwater | MW-12 | Monitoring well between Airstrip Fuel Storage and Patterson Lake<br>Approximate Depth: 20 m (target water table) | • Exposure location (Airstrip Fuel Storage)<br>• Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering, seepage migration pathway)<br>• Compare to predictions made by the most recent regulatory-approved ERA | 57.66316368, -109.24315114 | Quarterly | Measurement | Water Level | Yes |
| | | | | | Biannual (spring and fall) | In-situ: measurement<br>Groundwater chemistry: discrete | In-situ: pH, temperature, specific conductivity and turbidity<br>Laboratory groundwater chemistry: alkalinity, $HCO_3$, $HCO_3$, $NH_3$ as N, $NO_3 + NO_2$, $NO_3$ as N, TKN, TN, Cl, $SO_4$, sum of ions, hardness, TOC, DOC, Ca, F, P, Na, TDS, dissolved metals (Al, Ag , As, Ba, Be, B, Ca, Cr, Co, Cu, Fe, Hg, Mn, Mo, Pb, Ni, Se, Sb, Sr, Tl, U, V, Zn), Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Groundwater | GAR-19-022 | Vibrating wire piezometer south of Patterson Lake shoreline | • Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.67740949, -109.25192702 | Quarterly | Measurement | Water Level | Yes |
| Groundwater | GAR-19-036 | Vibrating wire piezometer south of Patterson Lake shoreline | • Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.67591489, -109.2554786 | Quarterly | Measurement | Water Level | Yes |
| Groundwater | GAR-19-019 | Vibrating wire piezometer south of Patterson Lake shoreline | • Reduce uncertainty identified in conducting the ERA (magnitude of drawdown from underground dewatering)<br>• Compare to baseline data and predictions made by the most recent regulatory-approved ERA | 57.67694453, -109.24839046 | Quarterly | Measurement | Water Level | Yes |
| Sediment | TEMZ-A | Edge of 100 m Regulatory Mixing Zone for the treated effluent diffuser in Patterson Lake | • EIS commitment<br>• Co-located with surface water quality station<br>• Exposure location<br>• Refine models used in the ERA<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA and Saskatchewan reference values for uranium operations (Burnett-Seidel and Liber 2013), reference values for uranium mining and milling industry in Canada (Thompson et al. 2005), and CCME sediment quality guidelines (CCME 1999) | 57.680955, -109.27251253 | Annual (fall) | Core | Loss on ignition, percent moisture, particle size, TOC, TP, TN, Al, Ag, As, Ba, Be, B, Ca, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Mo, Na, Ni, K, Se, Sb, St, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |
| Sediment | TEMZ-B | | | 57.6805849, -109.27454194 | Annual (fall) | Core | | Yes |
| Sediment | TEMZ-C | | | 57.67926715, -109.2736585 | Annual (fall) | Core | | Yes |
| Sediment | SOMZ-A | Edge of 100 m Regulatory Mixing Zone for the treated sewage outfall in Patterson Lake | | 57.67558302, -109.27694455 | Annual (fall) | Core | | Yes |
| Sediment | SOMZ-B | | | 57.67438271, -109.2781896 | Annual (fall) | Core | | Yes |
| Sediment | SOMZ-C | | | 57.67397189, -109.27564519 | Annual (fall) | Core | | Yes |
| Sediment | BROALK2 | Broach Lake | • Exposure location (potential aerial deposition)<br>• EIS commitment<br>• Co-located with surface water quality station<br>• Refine models used in the ERA<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA and Saskatchewan reference values for uranium operations (Burnett-Seidel and Liber 2013), reference values for uranium mining and milling industry in Canada (Thompson et al. 2005), and CCME sediment quality guidelines (CCME 1999) | 57.71225722, -109.35024315 | Annual (fall) | Core | Loss on ignition, percent moisture, particle size, TOC, TP, TN, Al, Ag, As, Ba, Be, B, Ca, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Mo, Na, Ni, K, Se, Sb, St, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Sediment | PATTLKNW1-1 | Patterson Lake North Arm – West Basin Area 1 | • Exposure location (treated effluent)<br>• Compliance with MDMER (support EEM site characterization requirements[4])<br>• EIS commitment<br>• Five replicate stations<br>• Refine models used in the ERA<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA and Saskatchewan reference values for uranium operations (Burnett-Seidel and Liber 2013), reference values for uranium mining and milling industry in Canada (Thompson et al. 2005), and CCME sediment quality guidelines (CCME 1999) | 57.671924, -109.27717347 | Annual (fall) | Core | Loss on ignition, percent moisture, particle size, TOC, TP, TN, Al, Ag, As, Ba, Be, B, Ca, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Mo, Na, Ni, K, Se, Sb, St, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |
| Sediment | PATTLKNW1-2 | | | 57.6723221, -109.27671861 | | | | Yes |
| Sediment | PATTLKNW1-3 | | | 57.67292853, -109.276388 | | | | Yes |
| Sediment | PATTLKNW1-4 | | | 57.67348937, -109.27600924 | | | | Yes |
| Sediment | PATTLKNW1-5 | | | 57.67408454, -109.27551145 | | | | Yes |
| Sediment | PATTLKNE1 | Patterson Lake North Arm – East Basin Area 1 | • Exposure location (treated effluent)<br>• EIS commitment<br>• Co-located with surface water quality station<br>• Refine models used in the ERA<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA and Saskatchewan reference values for uranium operations (Burnett-Seidel and Liber 2013), reference values for uranium mining and milling industry in Canada (Thompson et al. 2005), and CCME sediment quality guidelines (CCME 1999) | 57.69004319, -109.22950705 | Annual (fall) | Core | Loss on ignition, percent moisture, particle size, TOC, TP, TN, Al, Ag, As, Ba, Be, B, Ca, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Mo, Na, Ni, K, Se, Sb, St, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |
| Sediment | PATTLKS1 | Patterson Lake South Arm Area 1 | | 57.64043595, -109.29121392 | Annual (fall) | Core | Loss on ignition, percent moisture, particle size, TOC, TP, TN, Al, Ag, As, Ba, Be, B, Ca, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Mo, Na, Ni, K, Se, Sb, St, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Sediment | HARRLK-1 | Harrison Lake | • Reference location<br>• Baseline EEM location<br>• Compliance with MDMER (support EEM site characterization requirements[4])<br>• EIS commitment<br>• Five replicate stations<br>• Refine models used in the ERA<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA and Saskatchewan reference values for uranium operations (Burnett-Seidel and Liber 2013), reference values for uranium mining and milling industry in Canada (Thompson et al. 2005), and CCME sediment quality guidelines (CCME 1999) | 57.84127772, -109.4471777 | Annual (fall) | Core | Loss on ignition, percent moisture, particle size, TOC, TP, TN, Al, Ag, As, Ba, Be, B, Ca, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Mo, Na, Ni, K, Se, Sb, St, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |
| Sediment | HARRLK-2 | | | 57.84123727, -109.44680883 | | | | Yes |
| Sediment | HARRLK-3 | | | 57.84095294, -109.44633253 | | | | Yes |
| Sediment | HARRLK-4 | | | 57.8406456, -109.44617731 | | | | Yes |
| Sediment | HARRLK-5 | | | 57.84033784, -109.44598842 | | | | Yes |
| Sediment | MURILK-1 | Murrison Lake | | 57.85446654, -109.38321143 | | | | Yes |
| Sediment | MURILK-2 | | | 57.85504672, -109.38291578 | | | | Yes |
| Sediment | MURILK-3 | | | 57.85552964, -109.38274244 | | | | Yes |
| Sediment | MURILK-4 | | | 57.85355436, -109.38353881 | | | | Yes |
| Sediment | MURILK-5 | | | 57.85303638, -109.38378109 | | | | Yes |
| Sediment | PRESLK-1 | Preston Lake | | 57.40082107, -109.17961837 | | | | Yes |
| Sediment | PRESLK-2 | | | 57.40185959, -109.17998298 | | | | Yes |
| Sediment | PRESLK-3 | | | 57.40252015, -109.1796839 | | | | Yes |
| Sediment | PRESLK-4 | | | 57.40137067, -109.17972427 | | | | Yes |
| Sediment | PRESLK-5 | | | 57.40299095, -109.17931099 | | | | Yes |
| Sediment | HODGLK1 | Hodge Lake | • Reference location<br>• Baseline location<br>• EIS commitment<br>• Co-located with surface water quality station<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA and Saskatchewan reference values for uranium operations (Burnett-Seidel and Liber 2013), reference values for uranium mining and milling industry in Canada (Thompson et al. 2005), and CCME sediment quality guidelines (CCME 1999) | 57.80343998, -109.39678711 | Annual (fall) | Core | Loss on ignition, percent moisture, particle size, TOC, TP, TN, Al, Ag, As, Ba, Be, B, Ca, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Mo, Na, Ni, K, Se, Sb, St, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |
| Sediment | LAKED | Lake D | | 57.6033254, -109.31489698 | | | | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Sediment | FORRLK1 | Forrest Lake | • Exposure location<br>• Baseline location<br>• EIS commitment<br>• Co-located with surface water quality station<br>• Refine models used in the ERA<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA and Saskatchewan reference values for uranium operations (Burnett-Seidel and Liber 2013), reference values for uranium mining and milling industry in Canada (Thompson et al. 2005), and CCME sediment quality guidelines (CCME 1999) | 57.64455963, -109.22981241 | Annual (fall) | Core | Loss on ignition, percent moisture, particle size, TOC, TP, TN, Al, Ag, As, Ba, Be, B, Ca, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Mo, Na, Ni, K, Se, Sb, St, Tl, U, V, Zn, Pb-210, Po-210, Ra-226, Th-230, U-234, U-238 | Yes |
| Sediment | BEETLK | Beet Lake | | 57.65160525, -109.12702132 | | | | Yes |
| Sediment | BEETCK | Clearwater River below Beet Lake (Beet Creek) | | 57.64365335, -109.10228081 | | | | Yes |
| Sediment | NAOMLK | Naomi Lake | | 57.65742272, -109.08828621 | | | | Yes |
| Sediment | LLOYLKI | Lloyd Lake Inlet | | 57.3685352, -108.9185273 | | | | Yes |
| Sediment | CLEARV1 | Clearwater River below Naomi Lake | | 57.64198385, -109.04925456 | | | | Yes |
| Sediment | CLEARV2 | Clearwater River above Mirror River Confluence | | 57.54748927, -108.88461458 | | | | Yes |
| Aquatic biota (benthic invertebrates) | PATTLKNW1-1 | Patterson Lake North Arm – West Basin Area 1 | • Exposure location<br>• Baseline location<br>• Compliance with MDMER (if MDMER trigger is met during construction[4])<br>• Five replicate stations | 57.671924, -109.27717347 | As required under MDMER/EEM[4] | Composite | Total benthic invertebrate density, Simpson's evenness, number of taxa, Bray-Curtis index | Yes |
| Aquatic biota (benthic invertebrates) | PATTLKNW1-2 | | | 57.6723221, -109.27671861 | | | | Yes |
| Aquatic biota (benthic invertebrates) | PATTLKNW1-3 | | | 57.67292853, -109.276388 | | | | Yes |
| Aquatic biota (benthic invertebrates) | PATTLKNW1-4 | | | 57.67348937, -109.27600924 | | | | Yes |
| Aquatic biota (benthic invertebrates) | PATTLKNW1-5 | | | 57.67408454, -109.27551145 | | | | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Aquatic biota (benthic invertebrates) | HARRLK-1 | Harrison Lake | • Reference location<br>• Baseline EEM location<br>• Compliance with MDMER (if MDMER trigger is met during construction[4])<br>• Five replicate stations | 57.84127772, -109.4471777 | As required under MDMER/EEM[4] | Composite | Total benthic invertebrate density, Simpson's evenness, number of taxa, Bray-Curtis index | Yes |
| Aquatic biota (benthic invertebrates) | HARRLK-2 | | | 57.84123727, -109.44680883 | | | | Yes |
| Aquatic biota (benthic invertebrates) | HARRLK-3 | | | 57.84095294, -109.44633253 | | | | Yes |
| Aquatic biota (benthic invertebrates) | HARRLK-4 | | | 57.8406456, -109.44617731 | | | | Yes |
| Aquatic biota (benthic invertebrates) | HARRLK-5 | | | 57.84033784, -109.44598842 | | | | Yes |
| Aquatic biota (benthic invertebrates) | MURILK-1 | Murrison Lake | | 57.85446654, -109.38321143 | | | | Yes |
| Aquatic biota (benthic invertebrates) | MURILK-2 | | | 57.85504672, -109.38291578 | | | | Yes |
| Aquatic biota (benthic invertebrates) | MURILK-3 | | | 57.85552964, -109.38274244 | | | | Yes |
| Aquatic biota (benthic invertebrates) | MURILK-4 | | | 57.85355436, -109.38353881 | | | | Yes |
| Aquatic biota (benthic invertebrates) | MURILK-5 | | | 57.85303638, -109.38378109 | | | | Yes |
| Aquatic biota (benthic invertebrates) | PRESLK-1 | Preston Lake | | 57.40082107, -109.17961837 | | | | Yes |
| Aquatic biota (benthic invertebrates) | PRESLK-2 | | | 57.40185959, -109.17998298 | | | | Yes |
| Aquatic biota (benthic invertebrates) | PRESLK-3 | | | 57.40252015, -109.1796839 | | | | Yes |
| Aquatic biota (benthic invertebrates) | PRESLK-4 | | | 57.40137067, -109.17972427 | | | | Yes |
| Aquatic biota (benthic invertebrates) | PRESLK-5 | | | 57.40299095, -109.17931099 | | | | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Aquatic biota (fish) | PATTLKNW1-1 | Patterson Lake North Arm – West Basin Area 1 | • Exposure location<br>• Compliance with MDMER (if MDMER trigger is met during construction[4])<br>• Compare to baseline data, US EPA selenium criteria for fish muscle (flesh) (US EPA 2016) and Health Canada recommended value for mercury (GS 2015b) | 57.671924, -109.27717347 | As required under MDMER/EEM[4] | Non-lethal and/or lethal fish survey (2 sentinel species) | Growth (energy use): size-at-age<br>Reproduction (energy use): gonad weight to body weight*<br>Condition (energy storage): body weight to length and liver weight to body weight*<br>Survival: age<br>*Endpoint would be assessed only if lethal surveys are completed<br>Discrete fish tissue chemistry: Hg and/or Se (as required) | Yes |
| Aquatic biota (fish) | HARRLK-1 | Harrison Lake | • Reference location<br>• Baseline EEM location<br>• Compliance with MDMER (if MDMER trigger is met during construction[4]) | 57.84127772, -109.4471777 | As required under MDMER/EEM[4] | Non-lethal and/or lethal fish survey (2 sentinel species) | Growth (energy use): size-at-age<br>Reproduction (energy use): gonad weight to body weight*<br>Condition (energy storage): body weight to length and liver weight to body weight*<br>Survival: age<br>*Endpoint would be assessed only if lethal surveys are completed<br>Discrete fish tissue chemistry: Hg and/or Se (as required) | Yes |
| Aquatic biota (fish) | MURILK-1 | Murrison Lake | | 57.85446654, -109.38321143 | | | | Yes |
| Aquatic biota (fish) | PRESLK-1 | Preston Lake | | 57.40082107, -109.17961837 | | | | Yes |
| Aquatic biota (fish) | PATTLKNW1-1 | Patterson Lake North Arm – West Basin Area 1 | • Exposure location<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA, US EPA selenium criteria for fish muscle (flesh) (US EPA 2016) and Health Canada recommended value for mercury (GS 2015b) | 57.671924, -109.27717347 | Once during construction (fall) | Discrete (lake whitefish, northern pike) | Fish tissue chemistry: Al, As, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, St, U, V, Z, Pb-210, Po-210, Ra-226, Th-230, % moisture | Yes |
| Aquatic biota (fish) | BEETLK | Beet Lake | | 57.65160525, -109.12702132 | Once during construction (fall) | Discrete (lake whitefish, northern pike) | Fish tissue chemistry: Al, As, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, St, U, V, Z, Pb-210, Po-210, Ra-226, Th-230, % moisture | Yes |
| Aquatic biota (fish) | NAOMLK | Naomi Lake | | 57.65742272, -109.08828621 | Once during construction (fall) | Discrete (lake whitefish, northern pike) | Fish tissue chemistry: Al, As, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, St, U, V, Z, Pb-210, Po-210, Ra-226, Th-230, % moisture | Yes |
| Aquatic biota (fish) | BROALK2 | Broach Lake | | 57.71225722, -109.35024315 | Once during construction (fall) | Discrete (lake whitefish, northern pike) | Fish tissue chemistry: Al, As, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, St, U, V, Z, Pb-210, Po-210, Ra-226, Th-230, % moisture | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Soil | EXP01 | Near Patterson Lake North Arm – West Basin Area 1 | • Exposure location<br>• EIS commitment (monitor for dust deposition)<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA, Soil Quality Guidelines for the Protection of Environmental and Human Health defined for agricultural or residential/parkland uses (CCME 2014) and Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (Canadian NORM Working Group 2013) | 57.67645057, -109.25217241 | Once every 3 years | Composite consisting of 3 subsamples of the topsoil horizons (surface organic and A horizons) | pH, electrical conductivity, sodium absorption ratio, Ca, Mg, Na, K, cation exchange capacity (A horizon only), base saturation, Al, Sb, As, Ba, Be, B, Bi, Ca, Cd, Cr, Co, Cu, Fe, Pb, Li, Mg, Mn, Hg, Mo, Ni, Se, Ag, Sr, U, V, Zn, Zr, Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Soil | EXP04 | Near Patterson Lake South Arm Area 1 | | 57.634424, -109.17599895 | | | | Yes |
| Soil | EXP05 | Near Beet Lake | | 57.61637024, -109.35718661 | | | | Yes |
| Soil | REF04 | Near South of Forrest Lake | • Reference location (5 km beyond the Project footprint and 750 m from Highway 955 to limit the effect of dust deposition from the highway)<br>• EIS commitment (monitor for dust deposition)<br>• Compare to baseline data, predictions made by the most recent regulatory-approved ERA, *Soil Quality Guidelines for the Protection of Environmental and Human Health* defined for agricultural or residential/parkland uses (CCME 2014) and *Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials* (Canadian NORM Working Group 2013) | 57.52330151, -109.28749547 | Once every 3 years | Composite consisting of 3 subsamples of the topsoil horizons (surface organic and A horizons) | pH, electrical conductivity, sodium absorption ratio, Ca, Mg, Na, K, cation exchange capacity (A horizon only), base saturation, Al, Sb, As, Ba, Be, B, Bi, Ca, Cd, Cr, Co, Cu, Fe, Pb, Li, Mg, Mn, Hg, Mo, Ni, Se, Ag, Sr, U, V, Zn, Zr, Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Soil | REF05 | Near Far South of Forrest Lake | | 57.47042053, -109.28893638 | | | | Yes |
| Soil | REF06 | Near Broach Lake | | 57.70085263, -109.39395621 | | | | Yes |
| Vegetation | N/A | Surface Lease | • EIS commitment | N/A | Risk-based as outlined in the *Vegetation Clearing* procedure. | Survey | Presence of rare plants | No |
| Vegetation | N/A | Access road, airstrip and loading or staging areas | • Compliance with *The Weed Control Act*<br>• EIS commitment | N/A | Annual | Survey | Presence of noxious and nuisance weeds/invasive species | No |
| Vegetation | EXP01 | Near Patterson Lake North Arm – West Basin Area 1 | • Exposure location<br>• Co-located with soil chemistry samples<br>• EIS commitment (i.e., monitor for country foods)<br>• Refine models used in the ERA | 57.67645057, -109.25217241 | Once every 3 years | Survey | Moisture content, Al, Sb, As, Ba, Be, B, Bi, Ca, Cd, Cr, Co, Cu, Fe, Pb, Li, Mg, Mn, Hg, Mo, Ni, Se, Ag, Sr, U, V, Zn, Zr, Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Vegetation | EXP04 | Near Patterson Lake South Arm Area 1 | | 57.634424, -109.17599895 | | | | Yes |
| Vegetation | EXP05 | Near Beet Lake | | 57.61637024, -109.35718661 | | | | Yes |
| Vegetation | REF04 | Near South of Forrest Lake | • Reference location (5 km beyond the Project footprint and 750 m from Highway 955 to limit the effect of dust deposition from the highway)<br>• Co-located with soil chemistry samples<br>• EIS commitment (i.e., monitor for country foods)<br>• Refine models used in the ERA | 57.52330151, -109.28749547 | Once every 3 years | Survey | Moisture content, Al, Sb, As, Ba, Be, B, Bi, Ca, Cd, Cr, Co, Cu, Fe, Pb, Li, Mg, Mn, Hg, Mo, Ni, Se, Ag, Sr, U, V, Zn, Zr, Pb-210, Po-210, Ra-226, Th-230 | Yes |
| Vegetation | REF05 | Near Far South of Forrest Lake | | 57.47042053, -109.28893638 | | | | Yes |
| Vegetation | REF06 | Near Broach Lake | | 57.70085263, -109.39395621 | | | | Yes |
| Wildlife | N/A | Surface lease | • Compliance with the *Migratory Birds Convention Act* and *Species at Risk Act*<br>• EIS commitment | N/A | Risk-based as outlined in the *Vegetation Clearing* procedure. | Survey | Presence of migratory birds, pileated woodpecker, raptors, breeding amphibians, and black bear dens. | No |
| Wildlife | N/A | Site Water Management Ponds | • EIS commitment | N/A | 3 times per week during peak nesting periods (May 24 to July 21), once per week during migration periods (ice-out to May 23 and July 22 to September 30) | Visual Inspection | Presence of waterbirds and other wildlife | No |
| Wildlife | Survey as per the *Environmental Excellence Plan* (including the *Caribou Mitigation and Offsetting Plan*) | | | | | | | Yes |

| Environmental Media | Station ID | Station Description | Rationale and Applicable Criteria | Coordinates | Frequency | Sample Type | Constituents and Physical Parameters[1] | Externally Reported |
|---|---|---|---|---|---|---|---|---|
| Wildlife | N/A | N/A | • Compliance with the *Wildlife and Human Interactions* procedure<br>• EIS commitment | N/A | Ongoing | Visual sighting | Type of animal, number of animals observed, the general location with coordinates provided if known, and any relevant information (e.g., markings, behaviour) | No |

AER = Alberta Energy Regulator; CCME = Canadian Council Ministry of Environment; EEM = Environmental Effects Monitoring; EIS = Environmental Impact Statement; ERA = environmental risk assessment; ID = identifier; MDMER = Metal and Diamond Mining Effluent Regulations; PAG = Potentially Acid Generating; WMO = World Meteorological Organization; WRSA = waste rock storage areas; N/A = not applicable.
[1]Constituents and physical parameters are abbreviated to standard industry nomenclature.
[2]Specific monitoring stations may need to be adjusted depending to accessibility and further evaluation.
[3]Noise monitoring is conducted using methods from Alberta Energy Regulator Directive 038: Noise Control (2007).
[4]Environmental Effects Monitoring (EEM) stations are identified under guidance of MDMER, Saskatchewan Ministry of Environment, and Canadian Nuclear Safety Commission within the licensing process, and are co-located with water and sediment quality sampling stations. The final study design for the EEM is determined through the permitting process and detailed planning, which would include engagement with regulatory agencies and local Indigenous communities. The EEM program will occur on a three-year cycle, generally.
[5]Fall and winter sampling may be adjusted up to one month in either direction, to allow for incremental weather and/or ice conditions.
[6]At stations less than 1 m deep, a surface sample will be collected via hand grab. For station locations less than 2 m in depth, a single discrete sample is taken. For station locations greater than 2 m in depth, composite water samples consisting of water from top, middle, and bottom of the water column is taken when no thermocline is present. In instances where a thermocline is present, discrete samples are collected from both above and below the thermocline.
[7]Sediment and benthic invertebrate community samples consist of five replicate samples for each station.

# B-1.0 References

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# Emergency Preparedness and Response Program
# ROOK-EMG-PGM-00001

# Rook I Project

## Emergency Preparedness and Response Program

ROOK-EMG-PGM-00001

December 2022

# Record of Revisions

| Version. No. | Date | Description | Originator | Reviewer | Approver |
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| 0 | 15-Dec-2021 | Issued Final | Jon Henderson | Kevin Oakes | Tony George |
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# 1.0 Introduction

The *Rook I Emergency Preparedness and Response Program* (Program) outlines the systematic and risk-based approach to preventing, preparing for, responding to, and mitigating the effects of emergency events and situations associated with the NexGen Energy Ltd. (NexGen) Rook I Project (Project). It provides the framework and describes the processes to maintain compliance, enable continual improvement, support effective emergency management, and foster a culture where protecting workers and the environment is a principal consideration guiding decisions and actions.

This Program is part of the *Rook I Integrated Management System* (IMS). All aspects of the IMS are subject to the *Rook I Integrated Management System Policy* which provides the foundation for NexGen's approach to emergency preparedness and response. The Program and its relationship to other IMS programs within the IMS hierarchy is shown in Figure 1. As a component of the IMS, this Program follows the Plan-Do-Check-Act cycle to identify, control, monitor, and continually improve emergency preparedness and response processes for workers, the public, and the environment.

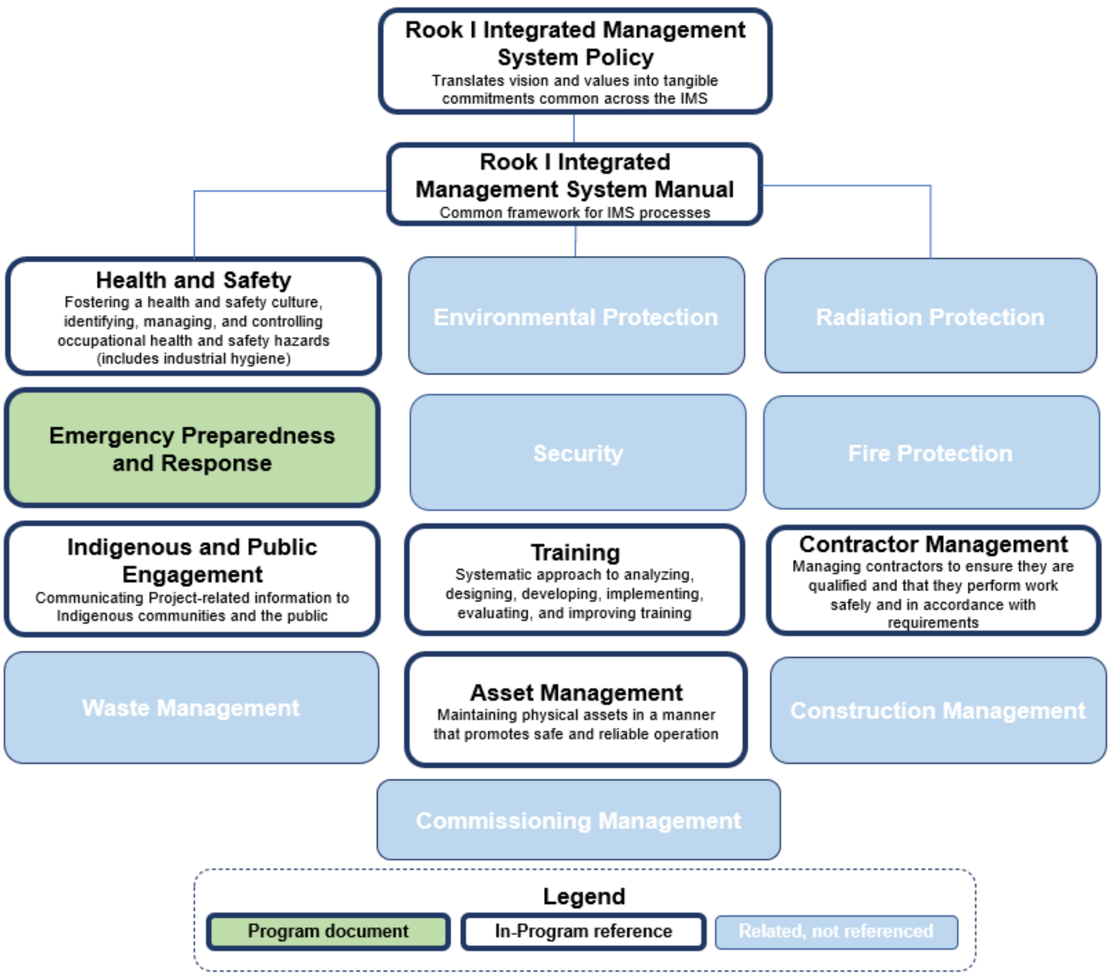


Figure 1: Program Context Within the IMS

## 1.1 Purpose

This Program describes the Project's framework, principles, and processes used to prevent, plan for, effectively and safely respond to, and mitigate the effects of emergency events and situations. This Program was prepared in accordance with the references as described in section 6.0, including the Canadian Nuclear Safety Commission (CNSC) *REGDOC 2.10.1 Nuclear Emergency Preparedness and Response.*

## 1.2 Scope

The scope of this Program includes planning, delivering, evaluating, and improving processes for effective emergency prevention, preparedness, response, and mitigation. It includes emergency events and situations (e.g., fires, floods, accidents, structural failures) that threaten the health and safety of workers, local Indigenous groups, local communities, the public, the environment, or Project infrastructure. The processes outlined in this Program apply to all Project workers and visitors during the site preparation, construction, and commissioning phase of the Project.

The mining of uranium ore and the production of uranium concentrate are not within the scope of this Project phase. This Program and its supporting processes are subject to periodic review and will be revised (as required) to maintain measures necessary to manage uranium ore and uranium concentrate safely and securely.

This Program uses a graded, risk-based approach to implementing processes related to emergency management that accounts for the apparent level of risk, safety significance, and complexity of an activity.

## 1.3 Program Principles

NexGen recognizes the importance of effective emergency management as a means of minimizing the impact of emergency events or situations on the health and safety of workers, local Indigenous groups, local communities, the public, the environment, and Project infrastructure. This approach to emergency prevention, preparedness, response, and mitigation is reflected in the following principles:

- protecting and promoting the health, safety, and well-being of people and the environment through all aspects and phases of the Project;
- establishing a strong health, safety, and environment culture which is periodically assessed and continually improved;
- providing workers and emergency response team members with the knowledge and skills necessary to respond to emergency events and situations safely and successfully;
- identifying, assessing, and managing emergency risks such that exposures to workers are as low as reasonably achievable;
- communicating the necessary information to relevant internal stakeholders, emergency services, local Indigenous groups, local communities, the public, and legal authorities;
- establishing effective communication for the coordination of human and material resources;
- minimizing the impact of emergency situations on workers' families and communities;
- complying with applicable legal and other requirements; and
- continually improving Program performance.

## 1.4 Program Framework

The emergency management framework outlined in this Program is further described in supporting plans, procedures, and work instructions. This includes three plans as shown in Figure 2 that outline specific requirements for preparing for and responding to:

- Project emergencies  that occur on surface and within the underground mine;
- ground transportation emergencies involving injury or hazardous substances and dangerous goods; and
- crisis events that present broad risks to the Project, draw widespread media attention, or could threaten public trust.

The plans are further described in section 3.2.

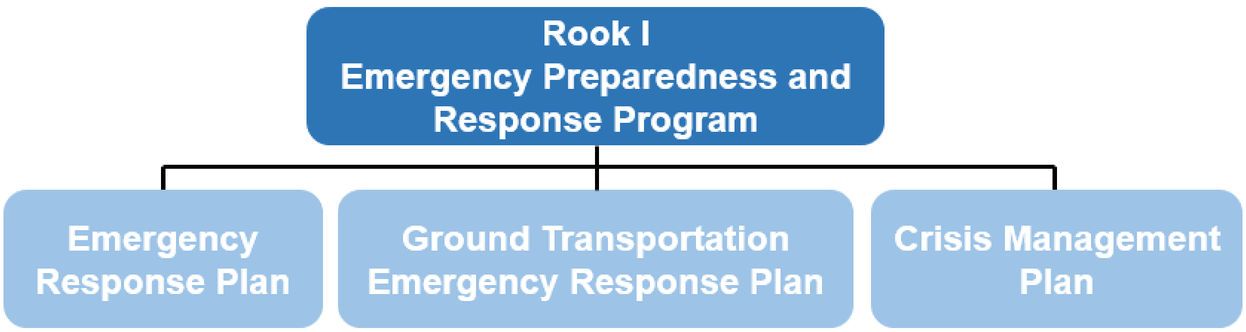


Figure 2: Program Framework and Supporting Plans

## 1.5 Terminology

Terminology introduced in this Program is provided below. A comprehensive list of common terms applicable to this Program and the IMS are available in the *Rook I Project Glossary*.

**abnormal event** – An occurrence that may have significant cause and/or lead to more serious consequence.

**emergency drill** – Supervised instruction intended to test, develop, maintain, and practise the skills required in a particular emergency response activity. A drill may be a component of an exercise.

**emergency response** – The integrated set of equipment, procedures, and personnel necessary to provide the capability for performing a specified function or task required in order to prevent, mitigate, or control the effects of an emergency.

**emergency response assistance plan (ERAP)** – Describes what to do in the event of a release or anticipated release of certain higher-risk dangerous goods while they are in transport.

**integrated management system (IMS)** – A common framework of programs, plans, procedures, work instructions, and other supporting documentation describing management system processes for achieving Project objectives and completing work safety, reliably, and consistently while conforming to internal requirements and complying with legal requirements.

**licensed activities** – Project activities within the scope of CNSC licensing. Project site-based activities that may be outside the scope of CNSC licensed conditions are subject to the integrated management system on a risk-informed basis (i.e., where the consequence of human error poses a risk to the environment, the health and safety of people, or to the security of Project facilities).

**prime contractor** – Entity responsible for overseeing the safe execution of all work on site within the scope of a defined construction project, who is either the owner of the worksite or a contractor who has entered into a written agreement with the owner to perform the duties of prime contractor.

**Project site** – Term used to describe all property within the physical NexGen Rook I boundary.

**recovery** – The period during which activities focus on restoration of quality of life, social systems, economies, community infrastructures, and the environment. Recovery may begin during the response phase.

**systematic approach to training (SAT)** – A structured approach used to manage training modules widely known as an instructional design model.

**worker** – Any person working for NexGen, including a contractor.

# 2.0 Plan

The *Plan* component of this Program includes processes that support a systematic, risk-based approach to preparing for emergencies when planning Project activities. Elements of planning include:

- identifying and communicating hazards that may result in emergency situations and assessing the associated risks;
- setting Program objectives and targets to implement Program processes;
- preparing for emergency situations;
- providing the resources necessary to manage emergency events or situations;
- verifying workers are competent and properly trained to perform assigned work;
- communicating relevant information about emergency preparedness and response to appropriate parties; and
- managing change to process, personnel, design, facilities, and equipment.

## 2.1 Risk Management

The risk management process includes identifying Project-related hazards that could result in emergency situations, assessing the significance of the associated risks, and managing the risks to appropriate levels through the application of controls. The general risk management methodology and hierarchy of controls are outlined in the *Rook I Integrated Management System Manual* (IMS Manual).

### 2.1.1 Hazard Identification

Preparing for emergencies begins with identifying natural or human-made hazards that could result in emergency events or situations.

Examples of natural hazards include:

- lightning strikes;
- winter storms;
- forest fire;
- flooding;
- ground failure; and
- sudden medical distress of worker (e.g., heart attack).

Examples of human-made hazards include:

- chemical, biohazard, or radiological release;
- structural collapse;
- fire or explosion;
- transport accident;
- intentional violence or threats; and
- technological acts or failures.

Hazards are identified, documented, and tracked in a risk register which is periodically reviewed and revised (as necessary) to verify it remains up-to-date and accurate as described in section 2.1.3.

### 2.1.2 Risk Assessment

Following the identification of hazards, emergency risks are assessed with consideration for a range of factors, including:

- who or what could be impacted;
- the nature of the impact;
- the severity of the emergency; and
- the frequency and duration of the emergency.

Information from the risk assessment process is used to identify appropriate controls that effectively mitigate emergency risks. Controls are documented, tracked in a risk register, and are periodically evaluated for effectiveness as described in section 3.1.

### 2.1.3 Risk Register

A documented emergency risk register is maintained to record and track relevant information regarding emergency risks and controls. This information is used in planning for the effective management of emergency events and situations. The emergency risk register is periodically reviewed and updated to assist with decision-making, improvement opportunities, and changes to emergency management processes.

The emergency risk register is maintained in accordance with the requirements and frequency outlined in the IMS Manual.

## 2.2 Objectives and Targets

Program objectives and targets are established at regular intervals, linked to clear accountabilities, and monitored for status to completion. Objectives and targets are tangible, documented actions that result in improvements to emergency prevention, preparedness, response, and mitigation processes and outcomes.

Setting and managing objectives and targets, including establishing monitoring measures, is outlined in the IMS Manual.

## 2.3 Resources

Rook I management is committed to providing the necessary resources to establish, implement, maintain, and continually improve this Program and its supporting plans and associated processes. In addition to providing financial resources necessary to achieve objectives and meet requirements, management provides the infrastructure, work environment, and the competent workers necessary to implement this Program.

### 2.3.1 Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Program. Workers are informed of their roles and responsibilities and are accountable for understanding and fulfilling them. The Project prime contractor performs their role in accordance with the scope and requirements of this Program and its supporting information and as required in accordance with *The Saskatchewan Employment Act*.

Although NexGen maintains overall accountability for Project activities, the term Rook I is used in the following role descriptions to reinforce that the role is applicable and may be assigned to NexGen employees and contractors performing work on behalf of the Project.

#### NexGen Executive

NexGen executive is accountable for:

- establishing the direction, strategy, and policies of the organization;
- promoting behaviours that support a robust health and safety culture;
- promoting the understanding that safety, including emergency preparedness and response safety, is a principal consideration guiding decisions and actions;
- communicating with external stakeholders during emergency and crisis situations, as appropriate; and
- providing adequate resources to deliver the requirements of this Program.

#### Rook I Management

Rook I management is accountable for:

- maintaining effectiveness of this Program;
- demonstrating and promoting a culture where health and safety, including emergency preparedness and response safety, is a principal consideration guiding decisions and actions at all levels of the Project;
- approving annual Program objectives and targets;
- promoting the integration of the Program requirements into Project processes;
- communicating the importance of effective management and conforming to Program requirements;
- allocating adequate and appropriate resources to fulfill Program implementation;
- developing proper documentation and tools to implement this Program effectively;
- controlling emergency management incidents and deviations and directing corrective action when required;
- participating in the management review process;
- monitoring and reporting on Program performance and effectiveness to the NexGen executive;
- providing independent oversight of processes through monitoring and auditing activities; and
- identifying and pursuing opportunities to achieve continual improvement.

#### Program Management

Program management is responsible for:

- demonstrating and promoting a culture where health and safety, including emergency preparedness and response safety, is a principal consideration guiding decisions and actions at all levels of the Project;
- overseeing the development, implementation, and adherence to this Program;
- communicating with the applicable regulatory agencies (e.g., CNSC) on behalf of the Project;

- setting annual objectives and targets, monitoring performance, and preparing internal and external reports regarding Program activities and outcomes;
- managing resources to confirm legal compliance with regulatory requirements and conformance with Program requirements;
- confirming workers have the necessary competence, training, and awareness of Program requirements;
- overseeing Program coordination activities;
- working with applicable departments to confirm that Program roles and responsibilities are identified and described and that those with specific responsibilities are qualified to fulfill their roles;
- communicating with external stakeholders, as appropriate;
- providing independent oversight of processes through monitoring and auditing activities;
- reporting on Program performance and effectiveness to Rook I management;
- facilitating management review of this Program; and
- promoting, identifying, and supporting continual improvement through Program evaluation.

## Program Coordination

The Program coordinator is responsible for:

- demonstrating and promoting a positive health and safety culture that includes emergency preparedness and response safety;
- leading the development, implementation of, and adherence to Program plans, procedures, and work instructions;
- verifying 24-hour emergency response coverage is provided;
- providing subject matter expertise and support;
- maintaining Program-specific data and records in a secure and controlled manner;
- preparing and supporting management review and maintaining associated records including tracking the decisions and actions stemming from the review;
- verifying monitoring processes are implemented in accordance with Program and regulatory requirements; and
- verifying workers meet and maintain required Program-specific training qualifications

## Rook I Supervision

Rook I supervisors are responsible for:

- demonstrating and promoting a culture where safety, including emergency preparedness and response safety, is a principal consideration at all levels of the Project;
- understanding and following this Program and its requirements;
- overseeing department functions and supervising direct reports to verify conformance to Program requirements;
- supporting the achievement of Program objectives and targets;
- conforming to Program procedures and training;
- supervising direct reports to mitigate emergency preparedness risks;
- communicating and coordinating with other departments to facilitate effective implementation of this Program;
- participating in audits and inspections, as required;
- participating in management reviews, as required; and
- identifying and supporting opportunities for continual improvement.

### Rook I Workers

Workers are responsible for:

- demonstrating and promoting a positive health and safety culture that includes emergency preparedness and response safety;
- understanding and following Program processes and procedures;
- working toward achievement of objectives and targets in assigned areas of responsibility;
- recognizing, identifying, and promptly communicating hazards or deviations that present a risk to the safety and health of workers, the environment, or the public, and if safe to do so, taking action to contain or control the hazard to mitigate the impact;
- identifying opportunities for improvement in the workplace;
- meeting and maintaining required Program-specific training qualifications;
- using equipment, devices, facilities, and equipment that are intended for the protection of health, safety, and the environment in accordance with procedures and training;
- complying with measures established by the Project to protecting worker health and safety, and the environment;
- promptly informing supervisors, the occupational health committee, or the health and safety department of any situation that poses a significant increase in risk to the health and safety of workers, the environment, or the public;
- taking all reasonable precautions to maintain the health and safety of workers, the environment, and the public; and
- co-operating with auditors, regulators, and inspectors, as required.

## 2.3.2 Facilities and Equipment

Facilities and equipment used to effectively prevent, prepare for, respond to, and mitigate emergency events and situations are provided and maintained. Facilities are designed, constructed, operated, and maintained with consideration for worker health, safety, well-being, and in compliance with legal requirements.

NexGen provides facilities to support the effective implementation of this Program and its associated processes. Examples include, but are not limited to:

- an emergency operations centre equipped with communication devices and administration aids (e.g., tus boards, reference materials);
- storage facilities for emergency response vehicles, equipment, and tools;
- underground refuge stations;
- an on-site medical center;
- marked muster stations;
- alarm systems;
- stench gas;
- emergency lighting and power;
- means of escape;
- communication equipment;
- mine rescue equipment, including self-contained breathing apparatus and mine rescue vehicle;
- hazardous material response equipment and trailer;
- fire suppression infrastructure (e.g., sprinklers, fire extinguishers); and
- emergency response vehicles (e.g., ambulance, fire truck).

Facilities and equipment meet or exceed applicable provincial and federal health and safety standards, codes, and regulations. Additional information on the specific facilities and equipment used for emergency management are described in the supporting the *Emergency Response Plan*, *Ground Transportation Emergency Response Plan*, and *Crisis Management Plan*.

The process for procuring facilities and equipment is outlined in the IMS Manual. Facilities and equipment maintenance is outlined in the *Rook I Asset Management Program*.

### 2.3.3 External Resources

In addition to using Project workers, facilities, and equipment, external resources may be used to effectively manage emergency events and situations. Examples include, but are not limited to:

- establishing documented mutual aid agreements with neighbouring communities;
- using the Saskatchewan Air Ambulance for transporting patients for medical treatment; and
- coordinating wildfire response with the Saskatchewan Public Safety Agency.

A list of potential external resources along with their contact information and the processes for engaging them, are further described in the *Emergency Response Plan*, *Ground Transportation Emergency Response Plan*, and *Crisis Management Plan*.

### 2.3.4 Legal and Other Requirements

NexGen is committed to conforming to internal processes and to complying with applicable legal and other requirements. Emergency management plans, procedures, and work instructions are developed with consideration for applicable legal and other requirements, including the provincial and federal regulations referenced in section 6.0. Changes to applicable internal and external requirements are monitored and evaluated to identify whether changes to this Program or related emergency management processes are required.

The process for managing legal and other requirements is outlined in the IMS Manual.

## 2.4 Training and Competence

Appropriate and timely training is integral to the use, care, and maintenance of controls used to prevent, prepare for, respond to, and mitigate the effects of emergencies. The Project follows a systematic approach to training (SAT) to educate, train, and qualify workers to prepare for and safely respond to emergency events and situations. Training requirements are monitored as a means of providing workers with the training they require when they require it to maintain competence and work safely. Program-specific training requirements are defined and managed as part of the *Rook I Training Program.*

### 2.4.1 Site Orientation

Project workers and visitors are required to participate in site orientation upon their arrival. Site orientation includes information on Project policies, expectations of personal conduct while at the site, general requirements for protecting workers and the environment, as well as important actions to follow during emergency events and situations. Topics specific to emergency events and situations include:

- emergency response protocols and individual responsibilities for ensuring personal safety;
- communication processes including contact information for reporting emergency events or situations;
- awareness of site alarm systems;
- evacuation plans; and
- locations of muster points.

Site orientation is developed using the SAT process to verify all critical information for new workers is included.

### 2.4.2 Emergency Response Team

Workers who direct, coordinate, support, or respond to emergency events and situations require specialized skills and knowledge to fulfill their roles and responsibilities safely and successfully. Role-specific training and competency details are described in the *Emergency Response Plan*, *Ground Transportation Emergency Response Plan*, and *Crisis Management Plan*. Training is developed, delivered, and maintained in accordance with the SAT process and with consideration for applicable provincial and federal regulatory requirements.

## 2.5 Documented Information

Information, including identification of critical facilities and equipment, and any documents and records generated for or as a result of emergency events and situations, is managed to verify the information is accurate, available when needed, and protected from uncontrolled alteration.

Identification of critical facilities and equipment required for safe and effective emergency management includes, but is not limited to:

- labelling tanks that store hazardous substances and waste; and
- dangerous goods and emergency response equipment identification numbers.

The processes for managing and maintaining facility and equipment identification are outlined in the *Rook I Asset Management Program*.

Documents include Program-specific plans, procedures, and work instructions. In addition to the common management system records as outlined in the IMS Manual, records specific to this Program include, but are not limited to:

- scheduled drills;
- emergency response action logs;
- emergency drill or response debriefs; and
- records of inspection, maintenance, and calibration of emergency response equipment.

Information is readily accessible to those that require it. Occupational exposure and health records associated with emergency response activities (e.g., radiation doses to workers during a response) are managed in accordance with applicable privacy legislation.

The processes for managing documents and records are outlined within the IMS Manual.

## 2.6 Communication

Effectively communicating information about emergency events and situations to internal and external parties is vital for maintaining a strong health and safety culture and is an important element of this Program and the supporting plans. Tools used to communicate emergency preparedness information related to the Project include, but are not limited to:

- routine safety moments to begin meetings or training courses;
- emergency preparedness-focused toolbox meetings;
- workplace emergency preparedness safety posters (if applicable);
- town hall meetings;
- posted information required by regulation; and
- signage.

Workers are informed of their duties and responsibilities, and changes to personnel, processes, facilities, or equipment are communicated to those affected as required.

During and following emergency events and situations, information is communicated to and among various internal and external parties affected by, involved in, and interested in emergency events and situations. This includes, but is not limited to:

- workers;
- emergency response teams;
- regulatory agencies; and
- local Indigenous groups, local communities, and the public (as required).

Internal and external communication processes specific to emergency events and situations are further described in the *Emergency Response Plan*, *Ground Transportation Emergency Response Plan*, and *Crisis Management Plan.*

Only people authorized by NexGen may communicate on behalf of the Project. This includes communication with the media, regulators, customers, shareholders, suppliers, and the general public. Internal and external communication principles and processes are further outlined in the IMS Manual. Communication practices specific for local Indigenous communities, local communities, and the public are outlined in the *Rook I Indigenous and Public Engagement Program*.

## 2.7 Change Management

Change is managed to protect worker health and safety, the environment, facilities, and equipment, and to promote consistent and effective execution of Project processes. This includes changes to Project:

- design;
- facilities;
- equipment;
- management system processes;
- organizational structure;
- key roles and responsibilities;
- documentation; and
- legal and other requirements.

Changes are evaluated with consideration for the impact to this Program and the related emergency preparedness and response plans and processes. This maintains that:

- change is clearly defined;
- risks associated with the change are assessed and managed;
- change is communicated to those affected; and
- related documentation is updated.

The change management process is outlined in the IMS Manual.

# 3.0 Do

The *Do* component of this Program includes implementing Program elements described in section 2.0 to mitigate emergency risks and safely and effectively prepare for and respond to emergency events and situations. This includes implementing risk management controls, a description of documented response plans, equipment procurement and maintenance, contractor management as it relates to emergency management, and reporting of incidents related to emergency events or situations.

## 3.1 Emergency Risk Controls

Controls are used to eliminate, prevent, or reduce the risk of harm to workers, the public, the environment, and property during emergency events and situations. Controls are documented, tracked in a risk register, and periodically evaluated for effectiveness. Emergency risk controls include, but are not limited to:

- emergency response teams;
- emergency response equipment;
- fire suppression systems and equipment;
- fire guards;
- ventilation systems;
- proper segregation and storage of hazardous goods;
- administrative controls such as emergency and crisis management plans, work instructions, training, and supervision;
- mutual aid agreements; and
- personal protective equipment.

Controls appropriate for the emergency hazard and corresponding level of risk are selected and implemented with consideration for the hierarchy of controls as described in Figure 3.

Controls are used, operated, and maintained in accordance with their design, limitations, and applicable training. Following appropriate procedures and training is critical in maintaining the effectiveness of controls.

The general process for identifying and applying controls is outlined in the IMS Manual.

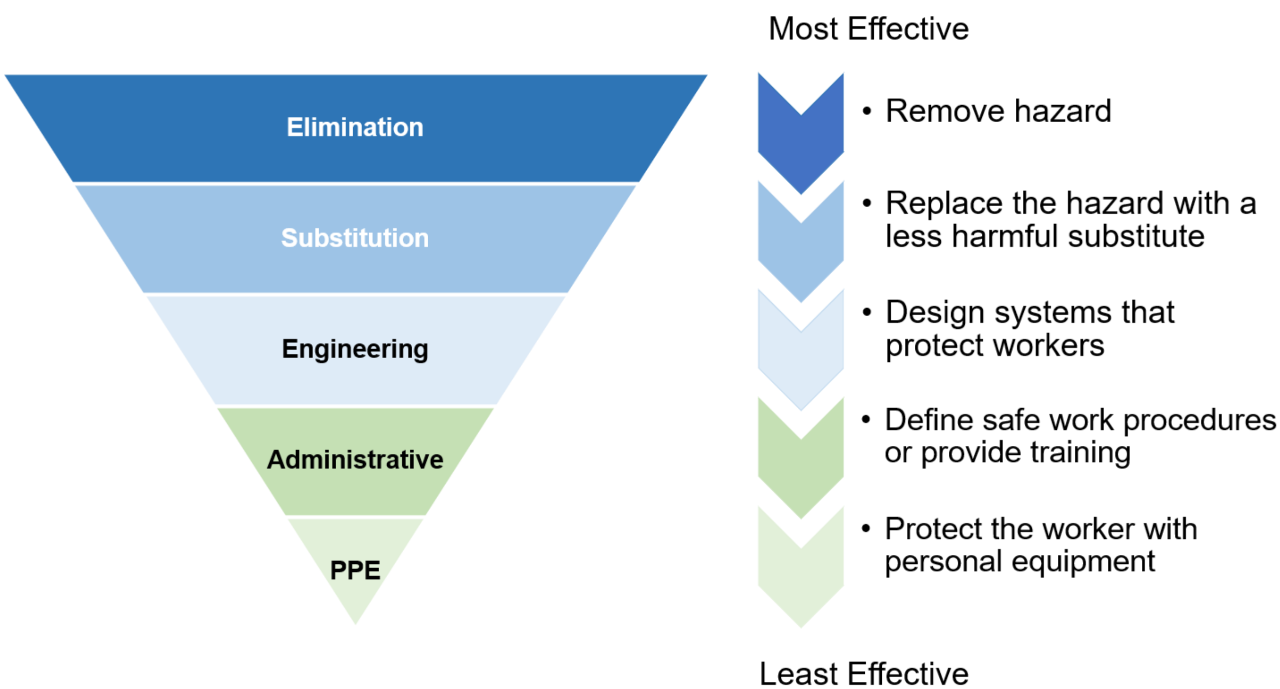


Figure 3: Hierarchy of Controls

## 3.2 Supporting Response Plans

This Program is supported by documented plans that describe actions to be taken in the event of an emergency or crisis. Each plan includes the following details:

- criteria and conditions that trigger the activation of response activities;
- details of actions to be taken during the emergency or crisis including methods for continually assessing the emergency;
- measures to protect workers during an emergency or crisis;
- incident command structure and delegation of authority to effectively manage both short-term and complex, lengthy, and large-scale emergencies and crises;
- responsibilities and duties during an emergency or crisis, including delegation of primary authority;
- emergency response services, equipment, supplies, and facilities;
- emergency radiation protection measures;
- evacuation procedures, including muster points;
- availability of vital information during an emergency (e.g., Project drawings, information on hazardous substances and their locations);
- response interface with external emergency services;
- communication protocols (including timelines) with regulatory agencies, local Indigenous groups, local communities, and the public;
- protection of vital records and equipment;
- recovery steps to restore the site to normal operations; and
- mechanisms for evaluating the effectiveness of the plan.

These plans and the supporting procedures are controlled documents. They are reviewed, updated, and maintained in accordance with the document management process outlined in the IMS Manual.

### 3.2.1 Emergency Response Plan

The *Emergency Response Plan* documents the approach for rapidly and efficiently responding to, controlling, and minimizing the effects of emergency events and situations that occur within the boundary of the Project site, including those that occur within the underground mine workings. Emergency events or situations that occur beyond the boundary of the Project site, but threaten Project safety or security, are also discussed. Examples of emergency events and situations covered by the *Emergency Response Plan* include, but are not limited to:

- serious medical emergencies;
- surface and underground fires;
- fall of ground underground;
- wildfire threatening the Project; and
- major chemical or radiological release.

The *Emergency Response Plan* describes the resources available and accessible for emergency response operation, specific roles and responsibilities for incident command and emergency response team members, and protocols for responding to foreseeable emergency events and situations. It outlines the actions to be taken during emergency events or situations, including actions taken in coordination with the *Ground Transportation Emergency Response Plan* and *Crisis Management Plan.*

### 3.2.2 Ground Transportation Emergency Response Plan

The *Ground Transportation Emergency Response Plan* provides direction to Project emergency responders concerning ground transportation emergencies that occur along the Project site access road or along Highway 955. The spatial extent and scope of response activities is further described within the plan.

Project emergency responders may assist as first responders or in a technical advisory capacity. The decision to provide support depends on several factors, including the nature of the transportation emergency, weather conditions, capacity and ability of team members to respond safely, and proximity of the emergency to the Project site. Response activities may include, but are not limited to:

- providing first aid for injuries suffered at an accident scene;
- controlling and containing dangerous goods;
- controlling access to the accident scene;
- removing debris from the accident scene; and
- supporting transportation logistics.

Assistance is provided in coordination with applicable authorities (e.g., Royal Canadian Mounted Police, Saskatchewan Ministry of Environment) and transport carriers. Dangerous goods transported to the Project site are the sole responsibility of the transport carrier and the manufacturer of the dangerous good until they reach the boundary of the Project site.

Additional detail regarding managing response to transportation emergencies is described in the *Ground Transportation Emergency Response Plan.*

The *Ground Transportation Emergency Response Plan* is not a substitute for an *Emergency Response Assistance Plan* (ERAP) which is a regulatory requirement for transporting certain high-risk dangerous goods, including uranium ore concentrate. Transporting uranium ore concentrate beyond the boundary of the Project site is not within the scope of this Program or the construction and commissioning phase of the Project; however, an ERAP developed in accordance with the *Transportation of Dangerous Goods Regulations* and approved by Transport Canada will be developed prior to commencement of Project operations.

### 3.2.3 Crisis Management Plan

The purpose of the *Crisis Management Plan* is to provide an organized response to crisis events and situations involving Project workers or assets and to provide a framework for maintaining, resuming, or recovering critical activities after a crisis is resolved.

A crisis is an abnormal event or situation which presents a significant risk to the Project, draws media attention, or could threaten public trust. Crises can be situations that are unexpected, unstructured, and outside the typical operational framework. Examples include, but are not limited to:

- multiple serious injuries;
- a fatality;
- significant security breach of the Project site;
- significant breach of information technology system;
- receipt of a bomb threat;
- serious civil disturbance on or adjacent to the Project site or NexGen property;
- pandemic;
- disruption to business continuity; or
- a situation which poses an immediate threat to life or serious injury to people at the Project site.

The *Crisis Management Plan* includes crisis assessment criteria that is used to activate crisis response measures and the contact information for key personnel responsible for activating the plan if required. Additional detail regarding managing crisis situations is found in the *Crisis Management Plan.*

## 3.3 Equipment Procurement and Maintenance

Equipment procured for emergency preparedness and response and its supporting plans is subject to the requirements outlined in the IMS Manual. Equipment is required to be in working condition and is maintained in accordance with manufacturers' specifications, including stated calibration requirements.

Breathing, resuscitating, testing apparatus, and rescue equipment designated for emergency response are examined on a scheduled basis and maintained by qualified individuals. Where regulatory requirements exist for maintenance of equipment (e.g., fit test schedule, calibration schedule) these requirements supersede manufacturer's requirements unless otherwise approved.

The process for selecting, providing, using, and maintaining respiratory equipment is outlined in the *Rook I Health and Safety Program*.

The process for maintaining equipment is outlined in the *Rook I Asset Management Program*.

## 3.4 Contractor Management

Contractors performing work at the Project are subject to the requirements of this Program. Contractors with specialized knowledge or training may be used to prepare for or respond to emergency events and situations. The processes for obtaining contractor services and overseeing contractors during work are outlined in the IMS Manual and *Rook I Contractor Management Program*, respectively.

## 3.5 Incident and Deviation Reporting

A debrief is held following emergency response drills, exercises, events, and situations to evaluate response performance, outcomes, and identify any deviations, incidents, or near-misses. Any incidents, near-misses, and deviations observed during an emergency event or situation must be reported, documented, and tracked in accordance with the IMS Manual.

Emergency events and situations that meet or exceed applicable legislated reporting thresholds, including those that are reportable under *The Mines Regulations, 2018*, *The Occupational Health and Safety Regulations, 2020*, and Section 29 of the *General Nuclear Safety and Control Regulations*, are reported to applicable regulatory representatives within legislated timelines.

The process for providing information on reportable events or situations to internal and external parties is outlined in the IMS Manual.

# 4.0 Check

The *Check* component of this Program consists of ongoing performance monitoring, periodic audits and inspections, reviews, and analysis of results to verify that the Program is operating effectively.

## 4.1 Monitoring and Measurement

Management system processes are continually monitored and measured to evaluate whether Project deliverables meet external and internal requirements. Program-specific monitoring and measurement includes conducting tests or drills of emergency response situations to verify the Program functions as expected.

General monitoring and measurement processes and requirements are outlined in the IMS Manual.

### 4.1.1 Plan Testing

Procedural or physical elements of the *Emergency Response Plan*, *Ground Transportation Emergency Response Plan*, and *Crisis Management Plan* are periodically tested to reinforce emergency requirements and processes. Testing frequency is outlined within each plan and is established based on risk and with consideration for applicable regulatory requirements.

Testing consists of tabletop and field-based exercises or drills and includes, but is not limited to:

- fire drills;
- tabletop exercises;
- emergency drills;
- underground emergency alert system tests; and
- full-scale, complex enactments involving elements of this Program and the supporting plans.

Following the completion of a test, response effectiveness is evaluated against expected measures and, where necessary, deviations are reported or opportunities for improvement are recommended and actioned.

As required, external resources (e.g., local communities) and regulatory representatives are notified in advance of planned full-scale exercises and may attend to participate in and observe response and recovery to evaluate exercise performance and identify opportunities for continual improvement.

## 4.2 Inspections and Audits

The performance and effectiveness of this Program and its associated procedures are monitored and verified with regular conformance audits. Qualified individuals independent of the work being assessed conduct audits as outlined in the IMS Manual.

External compliance inspections and audits are conducted by regulators; conformance audits and inspections are conducted by third parties, as required.

In addition to audits, routine internal inspections of emergency response facilities and equipment are conducted by competent workers to verify controls are functioning and effective. This includes, but is not limited to, inspections of:

- emergency response equipment and alarms;
- fire suppression systems and equipment;
- fire guards;
- refuge stations;
- ventilation systems;
- proper segregation and storage of hazardous goods; and
- personal protective equipment.

Deviations, instances of regulatory noncompliance, or opportunities for improvement identified through audits and inspections are managed as outlined in the IMS Manual.

## 4.3 Management Review

This Program and supporting plans and processes are subject to review and evaluation by Rook I management. In addition to the general topics outlined in the IMS Manual, inputs specific to the review of this Program include, but are not limited to:

- status of emergency preparedness and response objectives and targets;
- status of training objectives for emergency responders;

- trends in injuries, incidents, and deviations;
- audit and inspection findings;
- status of corrective actions;
- results of emergency preparedness and response plan testing;
- upcoming or new legislation or regulation related to the Program and plans to address these requirements;
- significant changes to the Program; and
- status of corrective actions.

The management review process is outlined in the IMS Manual.

# 5.0 Act

The *Act* component of this Program consists of facilitating continual improvement and verifying that, when required, adequate corrective actions are taken and appropriately managed. The results of these program elements feed back into *Plan* to complete the Plan-Do-Check-Act cycle.

## 5.1 Corrective Action Process

Incidents (including near-misses) and deviations that occur as a result of emergency prevention, preparation, response, and mitigation are evaluated and, if required, are investigated and appropriate actions to correct and prevent reoccurrence are developed. Corrective actions are planned, implemented, verified, and reviewed for effectiveness commensurate with the level of risk.

The corrective action process is detailed in the IMS Manual.

## 5.2 Continual Improvement

Continual improvement is an ongoing process to improve the suitability, adequacy, and effectiveness of the IMS. Workers continually seek out improvement opportunities for the IMS and Project processes through Program monitoring, auditing, and management review as well as maintaining awareness of changes in the business environment. Improvement may also involve benchmarking Project performance against other projects and facilities.

Use of experience gained during Project site preparation, construction, and commissioning, including information collected from relevant external sources, informs improvement opportunities.

Potential sources of information include:

- worker experience;
- government and industry publications;
- industrial peer information exchange;
- professional associations;
- monitoring results;
- lessons learned; and
- incident investigations.

Continual improvement opportunities are identified, documented, evaluated, and implemented as required in accordance with the process outlined in the IMS Manual.

# 6.0 References

## 6.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-CHT-00001 | *Rook I Organizational Chart* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-TRN-PGM-00001 | *Rook I Training Program* |
| ROOK-AST-PGM-00001 | *Rook I Asset Management Program* |
| ROOK-CON-PGM-00001 | *Rook I Contractor Management Program* |
| ROOK-HSF-PGM-00001 | *Rook I Health and Safety Program* |
| ROOK-IPE-PGM-00001 | *Rook I Indigenous and Public Engagement Program* |
| ROOK-EMG-PLN-00001 | *Emergency Response Plan* |
| ROOK-EMG-PLN-00002 | *Ground Transportation Emergency Response Plan* |
| ROOK-EMG-PLN-00003 | *Crisis Management Plan* |

## 6.2 External

- Federal
  - *Nuclear Safety and Control Act*
  - *Uranium Mines and Mills Regulations*
  - *General Nuclear Safety and Control Regulations*
  - *Canadian Nuclear Safety Commission. REGDOC 2.10.1 Nuclear Emergency Preparedness and Response*
  - *Canadian Nuclear Safety Commission. REGDOC 2.10.2 Fire Protection (in draft)*
- Provincial
  - *The Saskatchewan Employment Act*
  - *The Occupational Health and Safety Regulations, 2020*
  - *The Mines Regulations, 2018*
- Other
  - *Canadian Standards Association. N393, Fire protection for facilities that process, handle or store nuclear substances*
  - *National Fire Protection Association (NFPA) 600 – Standard on Facility Fire Brigades*
  - *National Fire Protection Association (NFPA) 1561 – Standard on Emergency Services Incident Management System and Command Safety*
  - *Mining Association of Canada. Towards Sustainable Mining Crisis Management and Communications Protocol*

# Emergency Response Plan
# ROOK-EMG-PLN-00001

# Rook I Project

## Emergency Response Plan

ROOK-EMG-PLN-00001



June 2023

# Record of Revisions

| Version No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| A | 30-Jun-2021 | Initial working draft issued to the CNSC for early review and feedback | J. Henderson | R. Paine<br>K. Oakes<br>L. Moger<br>T. George | - |
| B | 22-Dec-2022 | Updated to improve clarity and address CNSC feedback | J. Henderson | L. Moger | - |
| C | 22-Jun-2023 | Revised to address feedback from regulatory review | J. Henderson | W. Anderson<br>L. Moger | - |

## IN AN EMERGENCY, CALL:

**SITE EMERGENCY RESPONSE NUMBER: *To be confirmed***

**or**

**SITE EMERGENCY RESPONSE RADIO CHANNEL: *To be confirmed***

**or**

**ACTIVATE A PULL STATION**

***Note: All emergencies are reported by one or more of these methods.***

## ROSTER OF EMERGENCY RESPONSE PERSONNEL

The roster of emergency response personnel rotates as workers complete their shift rotation. An up-to-date list of on-site emergency response personnel is maintained by (*department to be confirmed)* or designate. A current roster is maintained and posted *(location to be confirmed*).

## KEY INTERNAL CONTACTS

An up-to-date list of internal emergency telephone numbers for key contacts is maintained by *(position to be confirmed)* or designate using the emergency response form *Key Internal Contact Callout List*. A current roster is maintained *(location to be confirmed).*

| NexGen Energy Ltd. | | |
|---|---|---|
| **Name** | **Service** | **Phone Number** |
| Office – Satellite Phone | Rook I | 8816-315-65847 |
| Site Radio Channel | Rook I | TBD |
| Saskatoon Office – Main | Saskatoon | 1-306-954-2275 |

## KEY EXTERNAL CONTACTS

| Medical Emergency | | |
|---|---|---|
| **Name** | **Service** | **Phone Number** |
| STARS Emergency Link Centre | Alberta and Saskatchewan Emergency Services (STARS Air Ambulance) | 1-888-888-4567 (ref#: 7643) |
| Fort McMurray 911 Dispatch | HERO Flight | 1-780-790-3912 |

| Other Emergency Services | | |
|---|---|---|
| **Name** | **Service** | **Phone Number** |
| RCMP | Police | 911 |
| La Loche Emergency Services | RCMP | 1-306-822-2010 |

| Provincial Regulatory Agencies | | |
|---|---|---|
| **Name** | **Service** | **Phone Number** |
| Labour Relations and Workplace Safety | Chief Mines Inspector | N/A |
| Labour Relations and Workplace Safety | Mines Inspector | TBD |
| Labour Relations and Workplace Safety | Mine Rescue Coordinator | TBD |
| Ministry of Environment | Site Project Officer | TBD |

| Federal Regulatory Agencies | | |
|---|---|---|
| **Name** | **Service** | **Phone Number** |
| Canadian Nuclear Safety Commission | Duty Officer | TBD |
| Environment and Climate Change Canada | Project Officer | TBD |
| Canutec (Canada) | Emergency Call Centre | 1-613-996-6666 |
| Chemtrec (USA) | Emergency Call Centre | 1-800-424-9300 |

| Fire Services | | |
|---|---|---|
| **Name** | **Service** | **Phone Number** |
| La Loche Emergency Services | RCMP | 911 |
| Saskatchewan Forest Fire Report | Forest Fire Reporting | 1-800-667-9660 |
| Fire Report – La Loche and Area | Forest Fire Reporting | 1-306-822-2400 |
| Buffalo Narrows Fire Base | Forest Fire Assistance | 1-306-235-1804 |
| La Loche Fire Base | Forest Fire Assistance | 1-306-822-1702 |

| Environmental Services | | |
|---|---|---|
| **Name** | **Service** | **Phone Number** |
| SaskSpills – Spill Control | Environmental Reporting | 1-800-667-7525 |
| Envirotec | Spill Response | 1-877-244-9500 |
| Canutec | TDG Radiological | 1-613-996-6666 |
| Environment Canada | Transportation Dangerous Goods | 1-604-666-6100 |
| Transport Canada | Transportation Dangerous Goods | 1-604-666-2955 |

| Transportation Assets | | |
|---|---|---|
| **Name** | **Service** | **Phone Number** |
| TBD | Ground Evacuation | 1-306-235-7899 |
| TBD | Air Evacuation | TBD |
| Rise Air (West Wind) | Scheduled Flights | 1-306-221-0204 |
| Contract Trucking Company (e.g., NRT) | Ground Transport | 1-800-667-1145 Dispatch<br>1-800-669-6634 Freight |

| Service and Utilities | | |
|---|---|---|
| **Name** | **Service** | **Phone Number** |
| SaskTel | 1-800-Sasktel | 611 |
| Propane Supplier | TBD | TBD |
| Liquified Natural Gas Supplier | TBD | TBD |
| Gasoline Supplier | TBD | TBD |
| Diesel Supplier | TBD | TBD |

| Non - Emergency Medical | | |
|---|---|---|
| **Name** | **Service** | **Phone Number** |
| La Loche Health Centre | Hospital | 1-306-822-3200 |
| | Medical Clinic | 1-306-822-3201 |
| Government of Saskatchewan Health Line | 24-Hour Health Information/ Advice from Registered Nurse | 811 |
| Poison Control | Poison Control | 1-866-454-1212 |

| Mutual Aid Assistance (TBD) | | |
|---|---|---|
| **Name** | **Service** | **Phone Number** |
| TBD | TBD | TBD |

| Local Priority Area Community Contacts | | |
|---|---|---|
| **Name** | **Service** | **Phone Number** |
| Clearwater River Dene Nation Band Office | TBD | TBD |
| Birch Narrow Dene Nation Band Office | TBD | TBD |
| Buffalo River Dene Nation Band Office | TBD | TBD |
| Métis Nation-Saskatchewan (MN-S), Northern Region 2 | TBD | TBD |
| Northern Village of La Loche | TBD | TBD |
| Northern Village of Buffalo Narrows | TBD | TBD |

| Other | | |
|---|---|---|
| **Name** | **Service** | **Phone Number** |
| TBD | Local Cabin Owners | TBD |
| TBD | Commercial Lodge Owner | TBD |
| Big Bear Camp | Local Service | 1-780-665-1569 |
| PurePoint Exploration | Local Camp | TBD |

## Emergency Response Decision Criteria – Quick Reference Guide

The following tables provide criteria commensurate with the nature and severity of the emergency to assist the Incident Commander (or designate) in making decisions to enable effective and timely response. This information is provided as initial guidance only. Each emergency is unique, and the Incident Commander (or designate) must rely on their judgement to determine the most appropriate course of action.

| LEVEL III | |
|---|---|
| **Level III Emergency**: An urgent situation that threatens workers, the entire facility, the environment, the public, or local communities. Response requirements may exceed the resources of the Project. | |
| **Decision Criteria** | |
| Health and Safety | • There has been a loss of life.<br>• There has been life threatening, serious, or multiple injuries.<br>• Underground event having the potential to strand workers underground for an extended period.<br>• Aircraft accident at or near the Project airport.<br>• Catastrophic failure of underground mine ventilation system.<br>• Bomb threat received at the Project. |
| Environment | • There is potential for a significant release of a hazardous material.<br>• There has been an unplanned discharge to sensitive habitat (e.g., waterway).<br>• There has been a release with impacts that are or may become widespread within or beyond the immediate extent of the developed area of the Project. |
| Property | • A structural fire of critical infrastructure.<br>• A fire underground threatening the mine, excluding immediately extinguished highly localized fires (e.g., electrical panel).<br>• A vehicle fire underground.<br>• A structural collapse on surface or underground of critical infrastructure.<br>• An uncontrolled explosion or potential for explosion.<br>• An uncontrolled in-flow underground or potential for a flood.<br>• An off-site fire which is uncontrolled and is threatening the Project. |
| **Immediate Actions for a Level III Emergency** | |
| Actions | • Temporarily suspend work during emergency response activities, as required, in consideration of the nature of the emergency and response needs.<br>• Activate Emergency Operations Centre.<br>• Activate Emergency Response Team and/or Mine Rescue Team.<br>• Activate Technical Resources (as required).<br>• Notify Organizational Resources.<br>• Notify External Support (as required).<br>• Notify regulatory agencies.<br>• Implement shutdown procedures and muster in some or all areas of the operation, as required. |

| LEVEL II | |
|---|---|
| **Level II Emergency:** A situation that has the potential to threaten workers or the environment in a large area of the Project. Response requirements do not exceed the resources of the Project. | |
| **Decision Criteria** | |
| Health and Safety | • Confined space rescue.<br>• High angle rescue.<br>• Worker requires extraction (e.g., entanglement in machinery).<br>• In-field medical aid or rescue requiring air ambulance.<br>• Emergency that requires workers to report to underground refuge station (excludes routine blasting).<br>• Emergency that requires workers to evacuate any area on surface.<br>• Activation of surface fire alarm.<br>• Unplanned contact with energized conductor that results in electrocution hazard.<br>• Abnormal accumulation of hazardous gas in designated work areas. |
| Environment | • Moderate release, impact contained within the immediate extent of the developed area of the Project. |
| Property | • Localized structural fire on surface or underground.<br>• Non-life-threatening structural failure. |
| **Immediate Actions for a Level II Emergency** | |
| Actions | • Temporarily suspend work during emergency response activities, as required, in consideration of the nature of the emergency and response needs.<br>• Activate Emergency Operations Centre.<br>• Activate Emergency Response Team and/or Mine Rescue Team.<br>• Activate Technical Resources (as required).<br>• Notify Organizational Resources (as required).<br>• Notify regulatory agencies.<br>• Implement shutdown procedures and muster in some or all areas of the operation, as required. |

| LEVEL I | |
|---|---|
| **Level I Emergency:** A situation that threatens workers in a specific area of the Project. There is no immediate danger of serious injury to workers or other areas of the operation, potential for off-site impact, or requirements for off-site assistance. The problem cannot be managed using normal operating procedures and does not meet Level II or Level III criteria. | |
| **Decision Criteria** | |
| Health and Safety | • Vehicle incident involving minor worker injury.<br>• Event requiring non-critical off-site medical treatment. |
| Environment | • Minor, localized release to a disturbed area within the immediate extent of the developed area of the Project.<br>• An on-site transportation incident with no loss of but potential for loss of containment. |
| Property | • Immediately extinguished highly localized fires (e.g., electrical panel).<br>• Vehicle incident requiring assistance. |
| **Immediate Actions for a Level I Emergency** | |
| Actions | • Activate in-field resources.<br>• Place Emergency Operations Centre on stand-by.<br>• Place Emergency Response Team and/or Mine Response Team on stand-by. |

## Emergency Response Organization

The Emergency Response Organization establishes clear roles and responsibilities for those involved in directly coordinating, supporting, or responding to emergencies. It provides a consistent, clear, and predictable command structure that enables continued control over emergencies. The Emergency Response Organization consists of the site-based Incident Command and field teams supported by organizational and external resources as required, as illustrated in Figure 1. The Emergency Response Organization is adaptable and flexible to manage emergencies as conditions change.

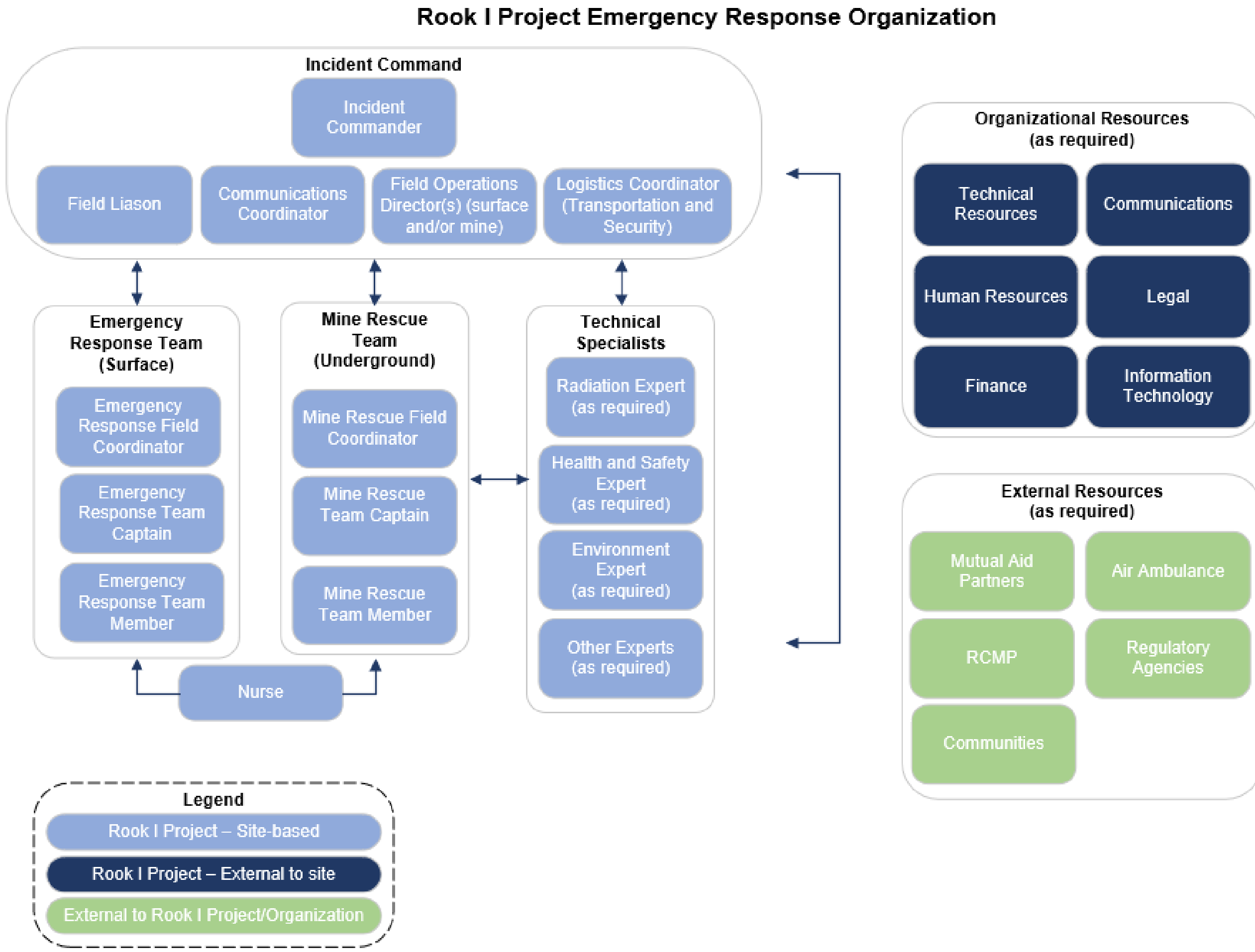


Figure 1: Emergency Response Organization

## Quick Response Guide to Site Level Emergency Response Roles

The following tables provide a high-level overview of site emergency response roles and responsibilities. A more detailed listing of roles and responsibilities is provided in section 4.2. The development of position checklists to assist in executing these roles is described in the emergency response plan work instruction *Positions Checklists*.

**At all times during the emergency, the ultimate decision-making authority resides with the Incident Commander and is delegated as appropriate to Field Directors, to Field Coordinators, to Team Captains, and then to team members.**

| EMERGENCY OPERATIONS CENTRE | |
|---|---|
| **Position** | **Key Roles and Responsibilities** |
| **Incident Commander** | • Provides overall control of the Project during an emergency.<br>• Determines whether to temporarily suspend high-risk work during emergency response activities with consideration of the nature of the emergency.<br>• Defines the emergency response objectives.<br>• Liaises with organizational resources. |
| **Communications Coordinator** | • Serves as primary contact to regulatory agencies during emergencies.<br>• Monitors incident to identify inter-organizational issues and communicates them to Incident Commander.<br>• Documents (in chronological order) events, actions taken, and assignments as they occur during the emergency.<br>• Gathers, verifies, coordinates, and disseminates information about the incident for internal and external audiences. |
| **Field Operations Director**<br>**(Surface or Mine)** | • Evaluates the emergency.<br>• Communicates needs and updates to Incident Commander.<br>• Mobilizes overall control of field operations or mine rescue effort. |
| **Logistics Coordinator (Transportation and Security)** | • Mobilizes resources as directed by Incident Commander (e.g., heavy equipment, buses, and temporary shelters and heating for winter emergencies).<br>• Manages inbound and outbound airport and ground traffic.<br>• Manages off-site transport for injured workers. |
| **Field Liaison** | • Delivers information to critical emergency response stations on surface (e.g., "running" between the emergency scene and Incident Command to provide condition status). |
| **Health and Safety Expert** | • Advises on emergency response health and safety hazards.<br>• Provides input to Incident Commander on what monitoring should be considered. |
| **Environment Expert** | • Provides guidance on minimizing environmental impacts.<br>• Confirms safety of the Emergency Response Team for unplanned (environmental) release. |

| EMERGENCY OPERATIONS CENTRE | |
|---|---|
| **Position** | **Key Roles and Responsibilities** |
| **Radiation Expert** | • Assists in assessing radiation hazards.<br>• Provides guidance on managing radiation protection concerns, including monitoring plans and equipment. |
| **Other Subject Matter Experts** | • Provide guidance on managing response activities within their areas of expertise (e.g., heavy equipment operation, mine ventilation), as required by Incident Commander. |

| EMERGENCY ON SURFACE | |
|---|---|
| **Position** | **Key Roles and Responsibilities** |
| **Emergency Response Field Coordinator** | • Reports to the *Emergency Response Team* (ERT) *Facility* on notification of a surface emergency.<br>• Serves as primary authority for all surface field operations in an emergency.<br>• Maintains direct communication with both the Field Operations Director and the Emergency Response Team. |
| **Emergency Response Team Captain** | • Reports to the *ERT Facility* on notification of a surface emergency.<br>• Mobilizes Emergency Response Team as instructed by the Field Coordinator.<br>• Leads and coordinates immediate in field resource requirements.<br>• Verifies health and safety of the Emergency Response Team. |
| **Emergency Response Team** | • Reports to the *ERT Facility* on notification of a surface emergency.<br>• Provides hands-on emergency response (e.g., first aid, firefighting), within their areas of competency, as assigned by Emergency Response Team Captain. |

| EMERGENCY UNDERGROUND | |
|---|---|
| **Position** | **Key Roles and Responsibilities** |
| **Mine Rescue Field Coordinator** | • Reports to the mine rescue room on notification of an underground emergency.<br>• Serves as primary authority for all underground field operations in an emergency.<br>• Maintains direct communication with both the Field Operations Director(s) and Mine Rescue Team.<br>• Verifies teams are properly checked out, equipped, and well-briefed before leaving the fresh air base. |

| EMERGENCY UNDERGROUND | |
|---|---|
| **Position** | **Key Roles and Responsibilities** |
| **Mine Rescue Team Captain** | • Reports to the mine rescue room on notification of an underground emergency.<br>• Mobilizes the Mine Rescue Team as instructed by the Field Coordinator.<br>• Verifies health and safety of the Emergency Response Team. |
| **Mine Rescue Team Members** | • Reports to the mine rescue room on notification of an underground emergency.<br>• Perform duties (e.g., first aid, firefighting), within their areas of competency, as assigned by Mine Rescue Team Captain. |

| HEALTH CENTRE | |
|---|---|
| **Position** | **Key Roles and Responsibilities** |
| **Nurse** | • For underground emergencies, reports to mine rescue room to monitor vitals of Mine Rescue Team after they don breathing apparatus.<br>• Reports to the health centre unless otherwise directed by the Field Coordinator.<br>• Provides medical support. |

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# 1.0 Introduction

The *Emergency Response Plan* (Plan) details the systematic and risk-based approach to preventing, preparing for, responding to, and recovering from emergencies at the NexGen Energy Ltd. (NexGen) Rook I Project (Project). This Plan was developed to maintain regulatory compliance, enable continual improvement, and foster a culture where worker and environmental protection and local Indigenous groups, local communities, and the public engagement are principal considerations guiding decisions and actions.

This Plan, along with the *Ground Transportation Emergency Response Plan* and *Crisis Management Plan* support the *Rook I Emergency Preparedness and Response Program* and *Rook I Fire Protection Program* and are part of the overall *Rook I Integrated Management System* (IMS). As a component of the IMS, this Plan is subject to the *Rook I Integrated Management System Policy* which provides the foundation for NexGen's approach to emergency management. This Plan and its relationship to the other IMS programs within the IMS hierarchy is shown in Figure 2.

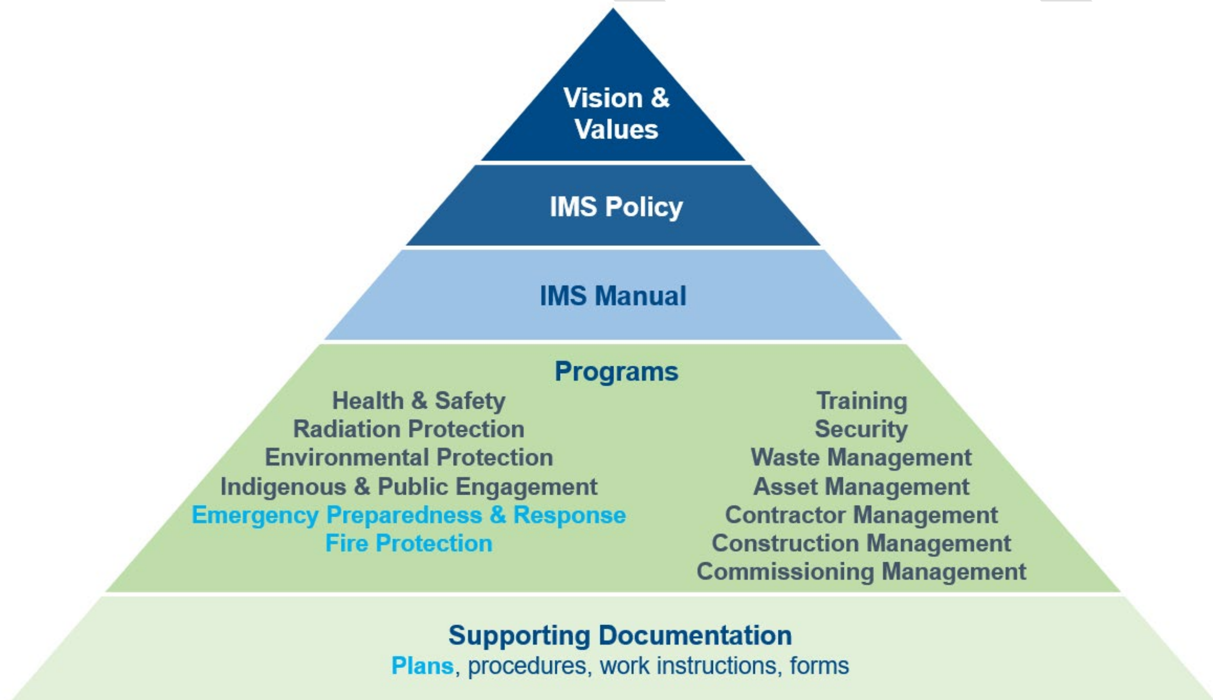



Figure 2: IMS Hierarchy

## 1.1 Purpose

This Plan describes the processes, roles and responsibilities, and resources (e.g., suitably trained and qualified personnel, equipment) necessary to prevent, prepare for, respond to, and recover from emergencies at the Project site. It includes measures to prevent and prepare for emergencies, perform initial assessment and emergency level classification, activate, and deactivate the Emergency Response Team and Mine Rescue Team, and return the Project to routine conditions.

This Plan has been developed to reflect the following principles, in priority order:

- the protection of human life;
- the protection of the environment; and
- the protection of property.

The health and safety of the Emergency Response Team, Mine Rescue Team, and in-field support resources is of the utmost importance.

## 1.2 Scope

The scope of this Plan includes all surface and underground facilities and activities at the Project. The Plan addresses injuries, environmental emergency response, emergencies requiring protection of property, and wildfire threat to the Project. Any transportation emergency occurring beyond the Project gatehouse (regardless of proximity to the Project) is managed in accordance with the *Ground Transportation Emergency Response Plan*.

This Plan is site-based and intended for workers and visitors, with off-site organizational support provided as required. This Plan is designed to interface with external regulators, agencies, emergency response support, and local communities. This Plan cannot provide all necessary details for all possible emergency situations. Therefore, personnel with the appropriate level of authority and competence are expected to make and execute decisions to react effectively to emergencies. The planning and resource identification provided herein is designed to provide important and useful guidance in any emergency.

This Plan considers a range of emergencies as a consequence of natural events such as extreme weather, naturally occurring wildfires, or fall of ground, and those arising from human-made events such as fires, explosions, chemical releases, and radiation releases.

The processes for managing crises are outlined in the *Crisis Management Plan* as described in section 1.3.1

## 1.3 Framework

This Plan directly supports the *Rook I Emergency Preparedness and Response Program* and *Rook I Fire Protection Program* and is used in conjunction with the related emergency response documents referenced and described herein (e.g., procedures, work instructions, forms). The relationship between emergency response and fire protection documents is shown in Figure 3.

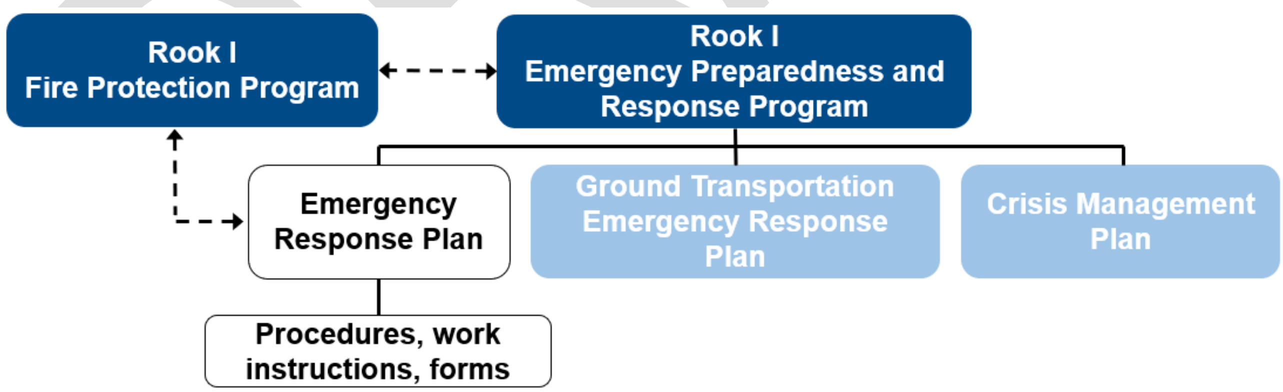



Figure 3: Emergency Preparedness Framework

### 1.3.1 Crisis Management Plan

This Plan is implemented in an integrated manner with the *Crisis Management Plan* as required and according to the unique characteristics of the emergency.

A crisis is an abnormal event or situation which presents a significant risk to the Project, draws media attention, or could threaten public trust. Crises can be situations that are unexpected, unstructured, or outside the typical operational framework. Examples include, but are not limited to:

- multiple serious injuries;
- a fatality;
- significant security breach of the Project site;
- significant breach of information technology system;
- receipt of a bomb threat;
- serious civil disturbance on or adjacent to Project site or NexGen property;
- pandemic;
- disruption to business continuity; or
- a situation which poses an immediate threat to life or serious injury to persons at the Project site.

If an emergency results in or has the potential to result in a crisis, the Incident Commander notifies NexGen Saskatoon to activate crisis response measures in accordance with the *Crisis Management Plan*. Additional detail regarding managing crisis situations is found in the *Crisis Management Plan.*

## 1.4 Structure

This Plan adopts a structure in accordance with the four pillars of emergency management which make up a cycle of planning and action to reduce the impact of emergencies. These four pillars are:

- prevention – actions taken to prevent or reduce the cause, impact, and consequences of any emergency;
- preparedness – a cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective actions;
- response – coordinating and managing resources using the incident command system in reaction to the occurrence of an emergency; and
- recovery – those activities that continue beyond the emergency to stabilize and restore critical functions and Project site conditions, and to manage post-emergency activities including, but not limited to, investigation, corrective action, and other impacts to workers and the Project. The objective is to bring the affected area back to normalcy and address impacts of the emergency on workers, the public, the environment, and the Project.

## 1.5 Terminology

A comprehensive list of common terms applicable to this Plan and the IMS are available in the *Rook I Project Glossary*.

**as low as reasonably achievable (ALARA) –** Minimizing the risk of adverse health, safety, environmental, and radiological impacts to the lowest extent practicable, considering technical, legal, social, and economic factors.

**emergency** – A serious situation or occurrence that happens unexpectedly and demands immediate attention.

**emergency response organization** – A structure that assigns specific duties and responsibilities to personnel involved in emergency operations.

**event** – Occurrence or change of a particular set of circumstances (ISO 31000). Events can have one or more occurrences and can have several causes and several consequences. Events can be an expected occurrence or scenario which does not happen or an unexpected occurrence or scenario which does happen. For the purposes of this Plan, also see *Incident*.

**incident** – An occurrence that results in or has the reasonable potential to result in an adverse effect such as, but not limited to, an injury, spill, radiation exposure, or procedural noncompliance. An event in which a hazard manifests and causes or has the potential to cause loss of productivity, time, or money. Loss may include injury to people, damage to property or the environment, or loss of process. Incidents may escalate into emergencies.

**integrated management system (IMS)** – A common framework of programs, plans, procedures, work instructions, and other supporting documentation describing management system processes for achieving Project objectives and completing work safety, reliably, and consistently while conforming to internal requirements and complying with legal requirements.

**mitigation** – To make an emergency less intense, serious, or severe.

**pre-incident plan** – A plan prepared in advance for emergency response to various structures and locations on the Project to avoid little or no knowledge of that area.

**Project site –** term used to describe all property within the physical NexGen Rook I boundary.

**resources** – In the context of this Plan, workers, materials, equipment, or supplies used in emergency operations. Includes the skills and abilities of the workers who will carry out emergency operations.

**systematic approach to training (SAT)** – A structured approach used to manage training programs widely known as an instructional design model.

**stand down order** – To withdraw from a state of alert or readiness and not be required to perform further action.

**vital record** – A record containing information critical to the continued operation or survival of an organization during or immediately following a crisis. Such records are necessary to continue operations without delay under abnormal conditions.

**work instruction** – A document that sets out the sequential steps for completing a particular task in a safe manner.

**worker** – Any person working for NexGen, including a contractor.

# 2.0 Hazard Identification

## 2.1 Site Context

The Project is a uranium mining and milling operation located in northwestern Saskatchewan, approximately 40 km east of the Saskatchewan-Alberta border, 130 km north of the town of La Loche, and 640 km northwest of the city of Saskatoon as shown in Appendix A. The Project resides within Treaty 8 territory and the Métis Homeland. At a regional scale, the Project is situated within the Patterson Lake watershed, which is part of the larger Clearwater River watershed. The Project is bordered by Patterson Lake and Forrest Lake, which are part of the headwaters of the Clearwater River watershed.

The area surrounding the Project consists of burns with residual stands of jack pine and some black spruce, with shrub and lichen as ground cover. Provincial wildfire data indicate large areas in the region have burned between 1980 and 2020.

The broader regional area surrounding the Project is largely undisturbed by human activities and infrastructure. Most human-related disturbances in this regional area include linear features such as Highway 955, cutlines, seismic lines, and trails with some cleared areas. Many mammal and bird species occupy the region annually or seasonally including, but not limited to, moose, boreal (woodland) caribou, Canada lynx, black bear, and grey wolf. Woodland caribou is listed as a federal species at risk.

Four provincial parks are located within 150 km (by air) of the Project: Marguerite River Wildland Provincial Park (38 km west; Alberta), Clearwater River Provincial Park (41 km south, Saskatchewan), Richardson River Dunes Wildland Provincial Park (51 km northwest, Alberta), and Athabasca Sand Dunes Provincial Park (141 km north, Saskatchewan).

The Project includes underground and surface facilities to support the extraction and processing of uranium ore from the Arrow deposit. The Project layout at the end of construction is illustrated in Appendix A and includes:

- mine workings, supporting infrastructure, and mining process;
- mill facilities, supporting infrastructure, and milling process;
- a paste plant for processing mill waste (tailings) and paste distribution system;
- an underground tailings management facility (UGTMF);
- special waste rock and ore storage stockpiles;
- water management infrastructure and effluent and sewage treatment plants;
- contact water ponds;
- a maintenance shop and warehouse building;
- an administration building and camp;
- access road, site roads, and airstrip; and
- fuel storage and transfer facilities.

Vehicle and heavy equipment access to the Project is via an all-season access road from Highway 955. The access road is used to transport equipment, materials, and supplies to and from the Project. Project staff and contractors are transported to and from site on aircraft. Electricity for both the surface and underground is provided by liquified natural gas. The freshwater distribution system draws water from a single location at Patterson Lake. The anticipated physical footprint of the mine site and access road is approximately 230 ha.

A map of the local area, access road, and a site plan are shown in Appendix A.

## 2.2 Emergency Hazards

The Project risk management process outlined in the *Rook I Integrated Management System Manual* (IMS Manual) includes identifying Project-related hazards that could result in emergency situations, assessing the significance of the associated risks, and managing the risks to appropriate levels through the application of controls. For emergency situations, the identification of accidents and malfunctions is documented in the 2021 Ecometrix Incorporated report *Hazard Identification for the Accidents and Malfunctions Assessment – NexGen Rook I Project*.

The emergency hazards listed below in Table 1 are representative of the range of emergencies encountered on a mine site construction and commissioning project and are inclusive of potential emergencies identified in the Project accidents and malfunctions assessment. The accidents and malfunctions assessment are used as a bounding scenario for establishing emergency response resource requirements in section 4.0.

Table 1: Emergency Hazards

| Accident Scenario | Details |
|---|---|
| Air Transport/Bus Transport Event | Personnel are transported to and from site by charter commercial aircraft. An aircraft accident could occur which could result in a multiple casualty and fire scenario.<br>Employees are also transported by bus from the airstrip to the camp and administration building. A multiple-casualty accident could occur. |
| Arc Flash | Flashover of electric current as it leaves its intended path and travels through the air from one conductor to another, or to ground may be violent and when a human is in close proximity to the arc flash, serious injury and even death can occur. |
| Bomb Threat | Genuine or fabricated bomb threats (e.g., telephone, mail, suspicious package) could be received. |
| Explosion | Uncontrolled explosions could occur in transformers, turbines, or generators or due to explosives used and stored on site. Significant property damage and a multiple casualty accident could result. |
| Fall of Ground | Unanticipated fall of ground is typically a high-risk threat to underground mining activities. Fall of ground could occur even though the mine is designed to reduce this risk. Fall of ground could result in trapped or seriously injured workers requiring assistance. |
| Fire – Chemical | A fire or explosion could occur in bulk chemicals storage and transport systems (e.g., gasoline, diesel, liquified natural gas) at the Project site. |
| Fire – Structural | Large or small exterior and interior structural fires could occur. |
| Fire – Underground | The presence of mechanical shops, electrical substations, combustible materials, and underground diesel equipment containing fuel and hydraulic fluids could result in an underground fire. |
| Fire – Wildfire | Forest fires are common in northern Saskatchewan. The Project could be threatened by wildfire during the life of the Project. |
| Inflow of Water | A potential for an uncontrolled inflow of water exceeding pumping or water treatment capacity. |
| Major Medical Incident, Injury, or Fatality | A major emergency involving serious injury or illness could occur at the Project due to the high-risk nature of construction and mining. |
| Lightning Strike | Lightning strikes near the Project site are common occurrences during the short summer season and can cause wildfires and structural fires or strike cranes or workers at height. |

| Accident Scenario | Details |
|---|---|
| Rescue or Extraction | Confined space, high angle rescue, and structural collapse (excluding ground fall) hazards exist due to construction and commissioning activities. |
| Structural Failure or Collapse | Structural collapse at the Project site could occur due to failure of load bearing structural elements, fire, or explosion. |
| Unplanned Discharges – Major | An unplanned discharge could occur from bulk chemical storage facilities (e.g., gasoline, diesel, liquified natural gas) or from water management infrastructure. |
| Vehicle Accident | On-site vehicles accidents could occur resulting in injuries, environmental discharges, or property damage requiring emergency response. |

## 2.3 Unauthorized Deposits of Deleterious Substances

This section supplements the Plan with specific hazard information required for deposits of deleterious substance within the meaning of subsection 34(1) of the *Fisheries Act* under the federal *Metal and Diamond Mine Effluent Regulations.*

The following deposits of deleterious substances outside of the normal course of events could potentially occur at the Project, and can reasonably be expected to result in damage or danger to fish habitat, fish, or the use of fish by humans:

- release of untreated contact water which could enter Patterson Lake and the Clearwater River watershed;
- release of hydrocarbons from equipment working or located near fish habitat; and
- transportation incidents involving a release of fuels and chemicals into fish habitat.

There is no commercial or sport fishing within the boundaries of the Project surface lease.

## 2.4 Environmental Emergency Regulations

This section supplements the Plan with specific hazard information required for under the federal *Environmental Emergencies Regulations, 2019.*

### 2.4.1 Liquified Natural Gas (CAS 74-82-8, UN1972)

**Use**: Liquified natural gas (LNG) is used as the primary fuel source at the Project and is stored as a liquid under pressure in tanks *(location to be confirmed).*

**Maximum Expected Quantity of LNG On-site**: *To be confirmed*

**Capacity of Largest LNG Container**: *To be confirmed*

**Characteristics**: LNG is natural gas that has been cooled to minus 160ºC at atmospheric pressure and reduced to a liquid state that is 1/600$^{th}$ its original volume. LNG is a cryogenic liquid that is odourless by nature, and is clear, non-corrosive, and non-toxic. The atmospheric boiling point of LNG is -163ºC to -160ºC.

**Hazards**: The potential hazards of LNG are the result of its basic properties including its cryogenic nature and dispersion and flammability characteristics. Due to its cryogenic nature, LNG will freeze any material it contacts which causes the material to become brittle and break without warning. As a liquid, LNG cannot explode and is not flammable. Only when LNG is warmed and returns to its gaseous state (i.e., natural gas), is mixed with air, and comes into contact with an ignition source, does the mixture become flammable or explosive in a confined environment. In a release, the gas can form explosive mixtures with air and is easily ignited by heat, sparks, or flames. Vapors from LNG are initially heavier than air and spread along ground leading to the potential of a pool fire.

Due to the low temperature of the compressed liquid form, LNG can cause frostbite on skin contact, and can cause severe damage on contact with the eyes with possible loss of sight. In the gas form, LNG is non-corrosive, and is non-irritating to the eyes and is a simple asphyxiant.

**Potential Emergency Situations**: The three main hazards from a leak from the LNG storage and transfer systems are:

- gas exposure;
- fire and explosion (including pool fires from pooled liquid, jet fires from pipe leaks or breaks, and vapour cloud fires and explosions); and
- frostbite.

The initial isolation distance for an LNG leak or spill is defined by the *North American Emergency Response Guidebook* as at least 100 meters in all directions. For large spills, an initial downwind evacuation for at least 800 meters is recommended. If a tank is involved in a fire, an initial evacuation for 1,600 meters in all directions should be considered. A release due to a pipe leak or break, especially during transfer operations, is the most likely mode of accidental release.

**Off-site Impacts**: Any compromises at storage or transfer locations will result in the pressure being released and the liquid vaporizing or pooling. Soil contamination may be possible in the immediate location as a result of an emergency in these locations; however, the larger environmental impact will be to the atmosphere, which would be relatively insignificant. Fires may cause localized damage.

**Response Precautions**: Response precautions include:

- pool fires are possible with an LNG release, DO NOT USE water or regular or alcohol-resistant foam directly on spill;
- use dry chemical or high-expansion foam if available to reduce vapors;
- prevent spreading of vapors through sewers, ventilation systems, and confined areas; and
- isolate area until gas has dispersed.

# 3.0 Prevention

Emergency prevention outlines actions taken to prevent or reduce the cause, impact, and consequences of an emergency. Prevention can be accomplished through the application of administrative controls, operational controls, and the installation and operation of facilities and equipment designed to prevent detect or contain emergencies. Lessons learned from emergencies are identified and tracked during team debriefs as described in section 5.11.2 and are used to inform measures to prevent recurrence.

## 3.1 Design Controls

### 3.1.1 Fire Hazard Assessments

Fire hazard assessments encompass an evaluation of potential fire hazards (e.g., combustion and ignition sources) and the controls that are in place to mitigate potential effects. Fire hazard assessments provide inputs to Project design and confirm that a facility and the established protocols, processes, and practices are adequate to maintain protection of human health and safety, the environment, and Project infrastructure. Fire hazard assessments are prepared, reviewed, and updated by a qualified individual on a regular basis.

Fire hazard assessments are outlined in the *Rook I Fire Protection Program*.

### 3.1.2 Facilities and Equipment

Structures, systems, and components are designed, constructed, installed, commissioned, and turned over with consideration to minimizing the risk of adverse health, safety, environmental, and radiation impacts, including the prevention of emergencies, to the lowest extent practicable, considering social and economic factors (i.e., as low as reasonably achievable [ALARA]). Design requirements are based on applicable industry standards and regulations and are approved by competent personnel.

Facilities and equipment (including structures, systems, and components) relevant to the prevention of environmental emergencies include, but are not limited to:

- level, flow, and pressure sensors and alarms on equipment to indicate operational status and potential upset conditions;
- berms, secondary containment, and other containment structures for liquid storage;
- surface water diversion and containment structures;
- fire detection and suppression systems and equipment;
- diesel-fired electrical generators and pumps; and
- emergency response facilities.

Specific structures, systems, and components relevant to the prevention of health and safety emergencies include, but are not limited to:

- engineering controls;
- alarms on equipment to indicate operational status and potential upset conditions to operators;
- mine refuge room;
- fire detection and suppression systems and equipment;
- standby power systems; and
- emergency response and medical aid facilities.

The routine maintenance of assets, including mobile construction equipment, further aids in the prevention of emergencies by maintaining equipment in good condition and allowing for the effective response to emergencies that may occur. The Project asset maintenance strategy uses a risk-based approach to identify maintenance methodologies based on asset importance rankings. Asset-specific maintenance requirements and frequencies are defined, documented, periodically reviewed, and revised (as required) according to the asset maintenance strategy as outlined in the *Rook I Asset Management Program*.

## 3.2 Administrative Controls

Administrative controls are an essential component of emergency prevention and are typically used in combination with other types of controls. Administrative controls include hazard identification, risk assessment, plans, procedures, work instructions, safe work procedures, work permits, and training.

The Project operates under the umbrella of the IMS Manual which provides a common framework for the management system processes that support the Project. This unified framework includes processes for implementing compliance measures, enabling continual improvement, and fostering a culture wherein protecting the health and safety of workers and preserving the environment are principal considerations guiding decisions and actions.

### 3.2.1 Hazard Identification and Risk Assessments

The routine completion of hazard identification and risk assessments, including *Job Hazard Analysis* (JHA) and *Field Level Hazard Assessment* (FLHA), assists in identifying potentially hazardous situations that may result in an emergency and identifying controls to prevent these emergencies from occurring.

JHAs are used to identify hazards at each job task and controls required to mitigate associated risk including the risk of emergencies occurring. JHAs are completed for new or non-routine jobs that do not have supporting work instructions, safe work practices, or are classified as critical jobs (e.g., welding in a confined space).

FLHAs are completed is to verify field level hazards are identified and controlled before beginning work. FLHAs are completed at the worksite immediately prior to each task start by all personnel involved and are continuously developed throughout the day.

The JHA and FLHA processes are outlined in the *Rook I Health and Safety Program*.

### 3.2.2 Plans, Procedures, Work Instructions, and Safe Work Procedures

Emergencies and their consequences are prevented through the development and implementation of plans, procedures, work instructions, and safe work procedures which outline instructions for completing tasks associated with licensed activities. The process for developing this work planning documentation is subject to the documented information process as outlined in the IMS Manual.

### 3.2.3 Work Permits

Written work permits help prevent emergencies from developing by detailing controls required to protect workers and the environment during high-risk activities include, but are not limited to:

- working in a confined space;
- performing welding and cutting (e.g., hot work);
- performing tasks with the potential for hazardous energy; and
- performing a critical lift.

The requirement for a work permit depends on the risk of the associated activity. The work permit process is outlined in the *Rook I Health and Safety Program.*

### 3.2.4 Training

Competent and trained workers reduce the risk of emergencies occurring and the consequences of those that do occur. A systematic approach to training (SAT) has been implemented which provides for a structured approach to the analysis, design, development, implementation, and evaluation of training and competency needs. SAT is used to define, deliver, and verify competency of the minimum training and qualification requirements for workers based on assigned tasks and functions, including safety-related functions. The SAT process is outlined in the *Rook I Training Program*.

Training specific to emergency prevention and response is described in section 4.4.5.

### 3.2.5 Facility Condition Inspections

Facility condition inspections are conducted to confirm compliance with operational requirements of the applicable fire codes and standards. Additional details on these inspections are outlined in the *Rook I Fire Protection Program*.

### 3.2.6 Thunderstorm and Lightning Management

Lightning strikes present a particular hazard to construction activities due the presence of mobile cranes, elevated work on open structures, and exposed structural steel.

The tracking of and response to thunderstorms and lightening is described in the work instruction *Monitoring and Responding to Lightning Risks*.

### 3.2.7 Wildfire Monitoring

Wildfires present a unique risk to the Project, as large wildfires may require the shutdown, securing, and evacuation of the Project site.

Requirements for monitoring wildfire risks, preparing the Project for these risks, and evacuating workers are described in the work instruction *Wildfire Monitoring and Planning*.

## 3.3 Operational Controls

Operational controls help in the early detection of and response to emergencies that may occur.

Operational controls that help prevent and mitigate consequences of environmental emergencies include, but are not limited to:

- storage of chemicals on spill pallets or within spill containment;
- supervision of loading and unloading activities;
- routine visual inspections of storage facilities, outfalls, process lines, and operating equipment;
- routine security rounds; and
- routine sampling of surface water storage and discharge points.

Environmental controls are described in the *Rook I Environmental Protection Program*.

Operational controls that help prevent and mitigate consequences of health and safety emergencies include, but are not limited to:

- use of aerial work platforms for work at heights;
- confined space entry permits;
- hot work permits;
- use of personal protective equipment;
- routine security rounds; and
- use of stench gas underground.

Health and safety controls are outlined in the *Rook I Health and Safety Program*.

Operational controls to reduce the impact and consequences of emergencies on the health and safety of workers and the public, the environment, and property are implemented during emergency response by the Emergency Response Team and Mine Rescue Team in accordance with their training and experience, and as directed by the Emergency Operations Centre.

# 4.0 Preparedness

## 4.1 Emergency Response Organization

The Emergency Response Organization establishes clear roles and responsibilities for those directly involved in coordinating, supporting, or responding to the emergencies. It provides a consistent, clear, and predictable command structure that enables continued control over emergencies. The Emergency Response Organization consists of the site-based Incident Command, subject matter experts, and field teams supported by organizational resources and external resources, as required. The Emergency Response Organization is adaptable and flexible to manage emergencies as conditions change. The Incident Commander activates various roles within the emergency response organization as required, depending on the nature, size, and characteristics of the emergency.

The overall structure of the Emergency Response Organization is shown in Figure 4.

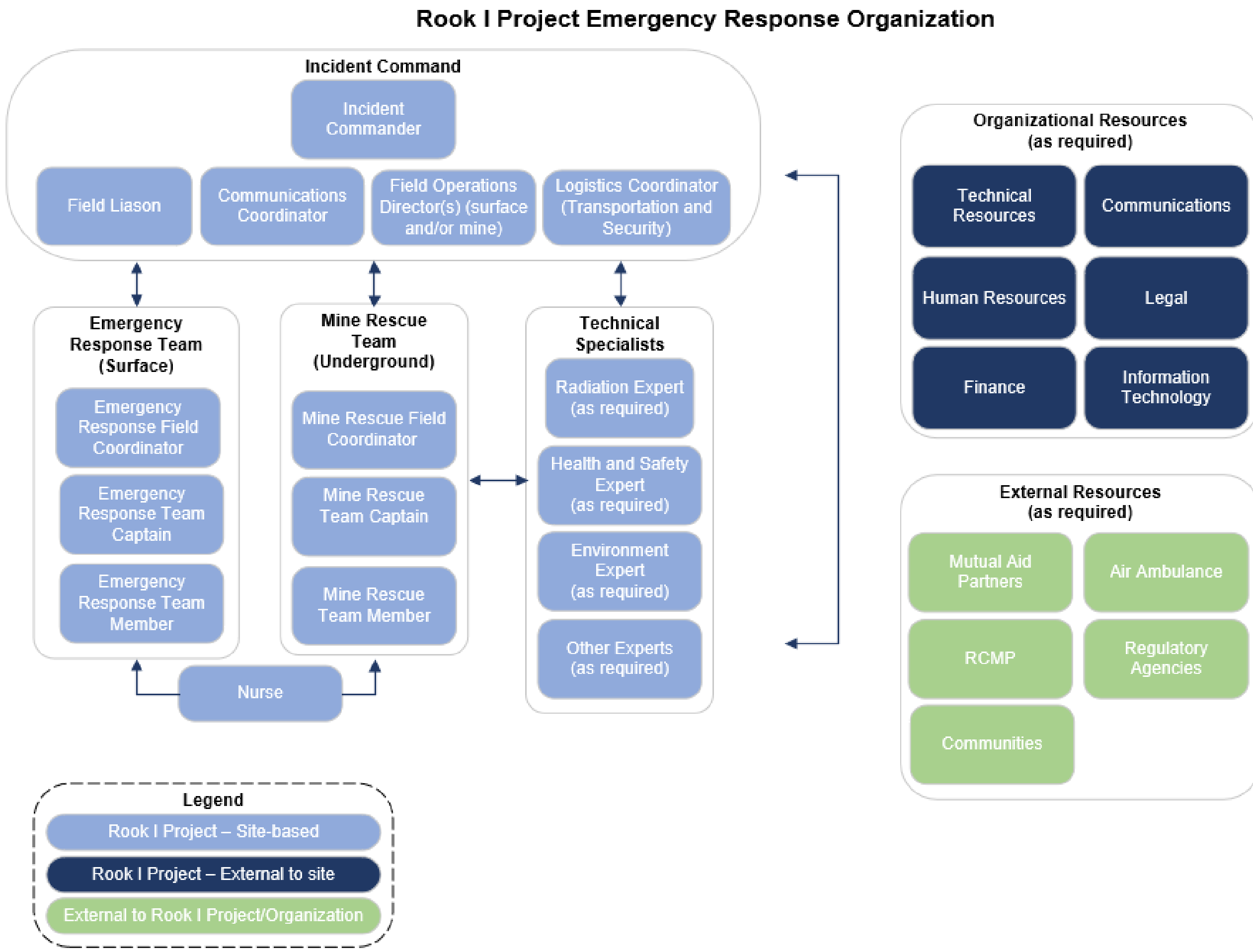



Figure 4: Emergency Response Organization

The Emergency Response Organization is organized into five broadly based role groupings described below.

### 4.1.1 Incident Command

Incident Command comprises the system framework and has overall site authority during an emergency. Incident Command is responsible for controlling the site during an emergency and developing, directing, and maintaining communication and collaboration between site personnel, responders, local officials, the public, and organizational resources.

Incident command personnel are appointed to and trained in their respective command roles and practice these roles through periodic drills and exercises. Incident command personnel are activated to these roles during an emergency if the incident command structure is activated.

### 4.1.2 Emergency Response Team and Mine Rescue Team

The Emergency Response Team and Mine Rescue Teams handle tactical operations, coordinate the command objectives, and organize and direct all resources at the emergency scene. The Emergency Response Team responds to emergencies on surface. The Mine Rescue Team have additional competencies and qualifications which allow them to respond to emergencies underground. Individuals may serve as members of both the Emergency Response Team and the Mine Rescue Team if appropriately qualified.

Team members are drawn from the Project workforce and receive specific training related to membership on the team. Team members are activated from their usual roles during an emergency, either as an entire team or a partial team depending on the nature and severity of the emergency.

### 4.1.3 Technical Specialists

Technical specialists provide subject matter knowledge and expertise to the Emergency Operations Centre personnel, Emergency Response Team, and Mine Rescue Teams. Technical specialists include health, safety, environment, and radiation personnel who provide advice in their respective areas of expertise as a continuation of their normal role on the Project. Technical specialists may also include functional specialists (e.g., mine ventilation, site services) who may be called upon for advice on resources and tactics. Technical specialists provide their services as required.

### 4.1.4 Organizational Resources

Off-site, organizational subject matter experts may be asked to support the Project during an emergency by assisting from an off-site location (e.g., Saskatoon) or at the Project. Assistance could include, but is not limited to, personnel with technical and operations expertise related to:

- health;
- safety;
- radiation protection;
- environmental protection;
- communications;
- human resources;
- law;
- finance; and
- information technology.

### 4.1.5 External Resources

External resources may include the RCMP, air ambulance, Saskatchewan Wildfire Management, regulatory agencies, local communities, local response resources, and mutual aid partners.

External resources do not require Project-specific emergency response training. However, mutual aid partners may familiarize themselves with the Project through periodic site tours, review of the Plan, and participation in training activities, joint drills, or exercises.

## 4.2 Emergency Response Roles and Responsibilities

### 4.2.1 Incident Commander

Table 2: Incident Commander Roles and Responsibilities

| | |
|---|---|
| **ROLE OVERVIEW:** | Controls and coordinates the Project's response to emergencies on or near the site. |
| **LOCATION:** | Emergency Operations Centre |
| **RESPONSIBILITIES:** | • Maintains overall control of the Project during the emergency.<br>• Determines, in consultation with the Field Operations Director, the need for appropriate response.<br>• Assesses the complexity of emergency and delegates authority for command roles and activities as Emergency Operations Centre members arrive.<br>• Evaluates broad impacts of emergency on:<br>  o health and safety;<br>  o environment;<br>  o company property; and<br>  o company image.<br>• Develops strategic planning in relation to emergency.<br>• Confirms planning takes protection or isolation of utility services into account.<br>• Directs that the following resources be notified and dispatched:<br>  o radiation, environment, and safety experts;<br>  o logistics coordinator; and<br>  o other subject matter experts.<br>• Provides first-line communications with organizational resources, as required.<br>• In the event of an off-site emergency, determines if site personnel are to be made available to assist with the response. Verifies responders who attend the off-site emergency are briefed to "assist" rather than "take control" of the emergency.<br>• Mobilizes other resources as warranted by the emergency (e.g., maintenance personnel to assess continued operation of site utilities).<br>• In consultation with the Field Operations Director or radiation, safety, and environment technical experts, determines and directs termination of emergency response operations when emergency has been rendered safe and any recovery to be undertaken by the responders. |

### 4.2.2 Communications Coordinator

Table 3: Communications Coordinator Roles and Responsibilities

| | |
|---|---|
| **ROLE OVERVIEW:** | Directs all telephone, internet, air traffic, and radio communications at the Project during an emergency. |
| **LOCATION:** | Emergency Operations Centre |
| **RESPONSIBILITIES:** | • Sets up Emergency Operations Centre as directed by Incident Commander.<br>• Upon confirmation of an emergency, the communication director broadcasts over the two-way radio system that **"this is an emergency please refrain from unnecessary radio communication."**<br>• Documents, in chronological order, events as they occur during the emergency (uses digital photos as necessary).<br>• Interfaces with off-site organizations and representatives for regulatory agencies as directed by Incident Commander.<br>• Gathers, verifies, coordinates, and disseminates information about the emergency for internal and external audiences.<br>• Verifies office supplies are replenished in Emergency Operations Centre as they are consumed.<br>• Maintains a written record of all activities on the emergency response form *Time and Event Log*.<br>• Collects all records and *Time and Event Log* forms for the purpose of post-emergency review and debrief. |

### 4.2.3 Field Operations Director (Surface)

Table 4: Field Operations Director (Surface)

| | |
|---|---|
| **ROLE OVERVIEW:** | Directs the Emergency Response Team to protect human life, the environment, and property, and restore the Project to a safe condition so operations can resume. |
| **LOCATION:** | Emergency Operations Centre |
| **RESPONSIBILITIES:** | • Evaluates the emergency.<br>• Maintains overall coordination of the emergency response.<br>• Contacts Emergency Response Team Captain and coordinates immediate resource requirements.<br>• Communicates needs and updated information to the Incident Commander.<br>• Mobilizes response to the degree necessary.<br>• Maintains overall control of field operations.<br>• Delegates duties and responsibilities to handle the emergencies such spill response, triage, and firefighting.<br>• Requests or initiates evacuation in consultation with Incident Commander. |

| | |
|---|---|
| | • Contacts, with assistance from the Communications Coordinator, neighboring mines for assistance and suppliers for material that could be made available, as required. |

### 4.2.4 Field Operations Director (Mine)

Table 5: Field Operations Director Roles and Responsibilities

| | |
|---|---|
| **ROLE OVERVIEW:** | Directs the Mine Rescue Team to protect human life, the environment, and property, and restore the Project to a safe condition so operations can resume. |
| **LOCATION:** | Emergency Operations Centre |
| **RESPONSIBILITIES:** | • Evaluates the emergency.<br>• Maintains overall coordination of the mine rescue effort.<br>• Gathers information from tag boards to account for mine workers and provides the Mine Rescue Coordinator any briefing information including active mine areas, personnel underground, and equipment with its locations.<br>• Verifies all refuge stations are contacted to account for personnel underground.<br>• Arranges for latest mine plans with locations of emergency first aid equipment and refuge stations and ventilation survey to be delivered to the fresh air base and/or Emergency Operations Centre.<br>• Mobilizes and directs technical support personnel as required to provide advice on ventilation, ground conditions, electrical distribution systems, equipment, or any other relevant information as required.<br>• Communicates needs and updated information to the Incident Commander.<br>• Maintains awareness of team capabilities, limitations of their breathing apparatus, and atmospheric testing equipment.<br>• Maintains information on locations of possible hazardous areas (e.g., fuel and oil storage areas), telephone, and other communication equipment underground.<br>• Assesses the details and facts provided by the individuals involved in the incident and probable conditions in the part of the mine to be explored, as known from information received.<br>• Contacts (with assistance from the Communications Coordinator) neighboring mines for assistance and suppliers for material that could be made available, as required.<br>• Verifies rescue equipment and alert systems, including stench gas, are in ready state prior to resuming routine activities. |

### 4.2.5 Logistics Coordinator

Table 6: Logistics Coordinator Roles and Responsibilities

| | |
|---|---|
| **ROLE OVERVIEW:** | Provides equipment, services, and support to assist the response effort.<br>(Can be released by Incident Commander if not required.) |
| **LOCATION:** | Emergency Operations Centre |
| **RESPONSIBILITIES:** | • Mobilizes resources necessary as directed by Incident Commander in consultation with the Field Coordinator to assist in emergency response, which may include heavy equipment, water tanker, buses, temporary shelters, and heating for winter emergencies.<br>• Decides whether Project airport air traffic inbound and outbound ground traffic inbound and outbound is to be scheduled or suspended.<br>• Establishes emergency security perimeter if required by Field Operations Director or Incident Commander. |

### 4.2.6 Field Liaison

Table 7: Field Liaison Roles and Responsibilities

| | |
|---|---|
| **ROLE OVERVIEW:** | Delivers information to critical emergency response stations on surface (e.g., “running” between the emergency scene and Incident Command to provide condition). |
| **LOCATION:** | Emergency Operations Centre<br>Proceeds to other locations as directed by Incident Commander. |
| **RESPONSIBILITIES:** | • In the event of a communications failure or at the request of the Incident Commander, provides communication backup by physically obtaining firsthand information from sections actively involved in the emergency.<br>• Passes information or requests to other designated locations.<br>• Performs other duties as assigned by the Incident Commander. |

### 4.2.7 Health and Safety Expert

Table 8: Health and Safety Expert Roles and Responsibilities

| | |
|---|---|
| **ROLE OVERVIEW:** | Provides input to Incident Commander on what monitoring should be considered and advises on emergency response health and safety hazards. |
| **LOCATION:** | Emergency Operations Centre and/or field emergency scene (as directed by Incident Commander) |
| **RESPONSIBILITIES:** | • Provides assistance for monitoring and provides input to the Incident Commander on what monitoring should be considered related to the emergency. |

| | |
|---|---|
| | • Advises Incident Commander of safety issues related to emergency operations itself.<br>• Provides direction and assistance to security activities to support the Logistics Coordinator.<br>• Verifies all rescue equipment and alert systems, including stench gas, are in ready state prior to resuming routine activities. |

### 4.2.8 Environment Expert

Table 9: Environment Expert Roles and Responsibilities

| | |
|---|---|
| **ROLE OVERVIEW:** | Provides environmental monitoring support and technical expertise for emergencies.<br>(Can be released by Incident Commander if not required.) |
| **LOCATION:** | Emergency Operations Centre and/or field emergency scene (as directed by Incident Command). |
| **RESPONSIBILITIES:** | • Provides off-site monitoring for environmental impact under the direction of the Incident Commander.<br>• Provides monitoring within the boundary of the Project site as requested by the Incident Commander.<br>• Advises Incident Commander of monitoring results and the potential impacts.<br>• Confirms safety of spill response team for either an on-site or off-site spill.<br>• Confirms hazards associated with materials involved in emergency response. Utilizes safety data sheets or Emergency Response Guidebook to inform personal protective equipment requirements and handling instructions.<br>• Verifies impacts are minimized from on-site spills and that contaminated material is disposed of in accordance with appropriate environmental procedures. |

### 4.2.9 Radiation Expert

Table 10: Radiation Expert Roles and Responsibilities

| | |
|---|---|
| **ROLE OVERVIEW:** | Provides radiation monitoring and technical expertise for emergencies.<br>(Can be released by Incident Commander if not required.) |
| **LOCATION:** | Emergency Operations Centre and/or field emergency scene (as directed by Incident Commander). |
| **RESPONSIBILITIES:** | • Provides technical information to Emergency Response Organization regarding potential radiation hazards, appropriate radiation hazard analyses, monitoring equipment, and use of radiation work permits.<br>• Provides radiation protection support to the Incident Commander. |

| | |
|---|---|
| | • Advises Incident Commander of technical issues that may affect emergency response or mine and process operations.<br>• Dispatches technical resources to Incident Commander and Field Operations Director.<br>• Requests additional security requirements around a source contamination “hot zone”, as necessary.<br>• Obtains resources to establish a controlled perimeter around the radiation contaminated “hot zone”.<br>• Maintains a log record of first responders entering and exiting the “hot zone” and time in the zone.<br>• Coordinates resources for radiological decontamination activities.<br>• When evacuating a contaminated casualty, arranges for radiation contamination check of the air ambulance and hospital emergency department by contacting the radiation safety officer, if applicable; or by briefing the Incident Commander to activate organizational resources to intercept air ambulance and continue with appropriate response.<br>• Advises the Incident Commander of radiation information to be forwarded to regulators, as required.<br>• Provides radiation protection-related information to Emergency Response Team and Mine Rescue Team. |

### 4.2.10 Other Subject Matter Experts

Table 11: Other Subject Matter Experts Roles and Responsibilities

| | |
|---|---|
| **ROLE OVERVIEW:** | Provides guidance on managing response activities within their areas of expertise (e.g., heavy equipment operation), as required by Incident Command.<br><br>Activated at request of Incident Commander. |
| **LOCATION:** | Emergency Operations Centre and/or field emergency scene (as directed by Incident Commander). |
| **RESPONSIBILITIES:** | • Provides technical information to Emergency Response Organization regarding radiation, environment, purchasing, logistics, security, and other information, as required. |

### 4.2.11 Emergency Response Field Coordinator

Table 12: Emergency Response Field Coordinator Roles and Responsibilities

| | |
|---|---|
| **ROLE OVERVIEW:** | Serves as primary authority for all surface field operations in an emergency and maintains direct communication with both the Field Operations Director and the Emergency Response Team. |
| **LOCATION:** | Field emergency scene |

| | |
|---|---|
| **RESPONSIBILITIES:** | • Locates and evaluates emergency.<br>• Contacts Incident Commander, Emergency Response Team Captain, and nurse, as applicable.<br>• Coordinates immediate resource requirements.<br>• Communicates needs and updates to Incident Commander.<br>• Mobilizes overall control of field operations.<br>• Coordinates field activities between the Emergency Response Team and off-site resources.<br>• Delegates duties and responsibilities to Emergency Response Team members to handle emergencies such as spill response, triage, and firefighting.<br>• Requests or initiates evacuation in consultation with the Incident Commander.<br>• Controls access to the emergency scene. |

### 4.2.12 Emergency Response Team Captain

Table 13: Emergency Response Team Captain Roles and Responsibilities

| | |
|---|---|
| **ROLE OVERVIEW:** | Provides leadership to the Emergency Response Team in emergency situations, maintains safety of the team, and provides effective response to an emergency. |
| **LOCATION:** | Field emergency scene |
| **RESPONSIBILITIES:** | • Meets at *ERT Facility* (*to be confirmed*) and mobilizes team as instructed by the Emergency Response Field Coordinator.<br>• Reports to the scene and reports to the Emergency Response Field Coordinator for briefing and information required to effectively respond.<br>• Coordinates immediate resource requirements.<br>• Communicates needs and updates to the Emergency Response Field Coordinator.<br>• Maintains safety of the Emergency Response Team at the scene, as well as to and from the scene.<br>• Supervises and assigns duties of the Emergency Response Team at the scene including safety, triage, patient care, security, and transportation in consultation with the Emergency Response Field Coordinator.<br>• Coordinates firefighting effort (as required).<br>• Provides fire-related technical support for the Emergency Response Team in the event of a fire.<br>• Monitors operator use of fire equipment to verify safe usage.<br>• Coordinates confined space rescue and hazardous material spill response (as required). |

### 4.2.13 Emergency Response Team Members

Table 14: Emergency Response Team Roles and Responsibilities

| | |
|---|---|
| **ROLE OVERVIEW:** | Provides hands-on emergency response (e.g., first aid, firefighting), within their areas of competency, as assigned by Emergency Response Team Captain. |
| **LOCATION:** | Field emergency scene |
| **RESPONSIBILITIES:** | • Meets at *ERT Facility* and mobilizes as instructed by the Emergency Response Team Captain.<br>• Reports to the scene and Emergency Response Field Coordinator for briefing and information required to effectively respond.<br>• Maintains involvement and engagement as a team during team briefings.<br>• Follows orders of Emergency Response Team Captain.<br>• Participates in team debrief at the end of the emergency. |

### 4.2.14 Mine Rescue Field Coordinator

Table 15: Mine Rescue Field Coordinator Roles and Responsibilities

| | |
|---|---|
| **ROLE OVERVIEW:** | Serves as primary authority for all underground field operations in an emergency and maintains direct communication with both the Field Operations Director and the Mine Rescue Team. |
| **LOCATION:** | Mine Rescue Room or established fresh air base |
| **RESPONSIBILITIES:** | • Confirms only personnel necessary for the operation are admitted in the mine rescue room.<br>• Coordinates and oversees the activities of all personnel who are at the fresh air base.<br>• Assigns team list of 1st, 2nd, and 3rd Mine Rescue Teams.<br>• Confirms teams are properly checked out, equipped, and well-briefed before leaving the fresh air base.<br>• Equips, briefs, and checks standby Mine Rescue Teams, as required.<br>• Follows team progress on the mine plan to verify team safety and records the findings as the team reports.<br>• Maintains communication with the Mine Rescue Team and Director of Mine Rescue Operations.<br>• Maintains final control of permitted activities of the Mine Rescue Team. |

### 4.2.15 Mine Rescue Team Captain

Table 16: Mine Rescue Team Captain Roles and Responsibilities

| | |
|---|---|
| **ROLE OVERVIEW:** | Provides leadership to the Mine Rescue Team Emergency as they travel through the mine, maintains the safety of the team, and provides effective response to an emergency. |

| | |
|---|---|
| **LOCATION:** | Field emergency scene |
| **RESPONSIBILITIES:** | • Reports to the mine rescue room.<br>• Provides leadership and confirms safety of the Mine Rescue Team during assigned emergency response.<br>• Confirms all members of the team have been deemed fit to undertake the mission.<br>• Establishes communication with Mine Rescue Team Coordinator.<br>• Discusses instructions with the team to make sure each member understands the directive and their job.<br>• Maintains regular communication with the Mine Rescue Team Coordinator.<br>• Maintains resource status information on personnel assigned to the emergency.<br>• Verifies response gear, supplies, and equipment are restored to readiness state and team is debriefed at the end of the mission. |

### 4.2.16 Mine Rescue Team Members

Table 17: Mine Rescue Team Roles and Responsibilities

| | |
|---|---|
| **ROLE OVERVIEW:** | Performs duties (e.g., first aid, firefighting), within their areas of competency, as assigned by Mine Rescue Team Captain. |
| **LOCATION:** | Emergency scene |
| **RESPONSIBILITIES:** | • Reports to the mine rescue room.<br>• Prepares self-contained breathing apparatus (SCBA) and equipment to take underground.<br>• Follows instructions of Mine Rescue Team Captain and confirms mine rescue mission is understood.<br>• Participates in team debrief at the end of the emergency. |

### 4.2.17 Nurse

Table 18: Nurse Roles and Responsibilities

| | |
|---|---|
| **ROLE OVERVIEW:** | Provides Medical Aid support to injured personnel, as required. |
| **LOCATION:** | Health Centre (unless otherwise directed) |
| **RESPONSIBILITIES:** | • Reports to the mine rescue room (during mine rescue operations) and monitors vitals of Mine Rescue Team under oxygen before being deployed.<br>• Responds to the health centre unless otherwise directed by the Emergency Response Field Coordinator.<br>• Prepares health centre as warranted by emergency.<br>• Requests more first aid assistance, if needed.<br>• Contacts company doctors, if warranted.<br>• Arranges for air ambulance if required and notifies Logistics Coordinator of estimated time of arrival.<br>• Arranges for safety data sheets to accompany medivac patients or faxes to hospital, if required.<br>• Notifies the injured or ill employee's supervisor of the situation.<br>• Briefs Field Director on status of injured personnel in order that the next of kin and family can be contacted, as necessary.<br>• Arranges for cleanup of biomedical waste at the emergency scene and health centre after care for injured has been provided. |

## 4.3 Staffing the Emergency Response Organization

The Project confirms, on a daily basis, the number and composition of Emergency Response Organization personnel available on-site and maintains this information on the Emergency Response Team and Mine Rescue Team incident command on-duty flow chart board. The flow chart is posted in the *administration office (location to be confirmed)*, providing easy access to this information.

As per the provincial (Saskatchewan) requirements identified in *The Mines Regulations, 2018*:

- If reasonably practicable, the Project will confirm that at least 15 workers are trained as mine rescue workers, at least one mine rescue worker works underground on each shift, and at least 10 mine rescue workers do not work underground on the same shift.
- If an emergency response operation requires the use of SCBA, an employer or contractor shall confirm that a Mine Rescue Team of at least five mine rescue workers responds to the emergency incident, unless permitted by the Saskatchewan Labour Relations and Workplace Safety Chief Mines Inspector.

Incident command roles have one trained primary and two trained backups for each position. The process for maintaining information on the current complement of Emergency Response Organization personnel on-site is described in the emergency response work instruction *Maintaining the Emergency Response Roster*.

# 4.4 Training and Qualifications

## 4.4.1 Overview

The Project follows an SAT to educate, train, and qualify workers to carry out the work assigned to them, including responding to emergencies. Training requirements are monitored as a means of providing workers with the training they require when they require it to maintain competency and work safely. Specific training requirements, including tracking worker credentials and qualifications for expiry, are defined and managed as outlined the *Rook I Training Program*. Emergency response training is developed, delivered, and tracked within the SAT framework.

## 4.4.2 Incident Command

Workers or management who have serve as part of Incident Command are trained to a level at which they can effectively carry out duties as described in section 4.2.

## 4.4.3 Mine Rescue Team

Mine Rescue Team members are trained and certified in accordance with requirements of *The Mines Regulations, 2018*. Training is provided by a mine rescue instructor certified in accordance with requirements of *The Mines Regulations, 2018* and continues to meet the ongoing requirements.

Mine Rescue Team members must hold a valid Class A qualification in first aid that meets the requirements of *The Occupational Health and Safety Regulations, 2020*.

Mine Rescue Team members must have passed a comprehensive medical examination within the previous 12 months and be certified by a duly qualified medical practitioner to be free of any medical condition that would prohibit the worker from using a respiratory protective device under arduous work conditions.

The Mine Rescue Team are trained regularly throughout the year to maintain certification. Team members are trained in mine rescue to a minimum of 40 hours per year. Training includes firefighting, rescue, emergency medical response, hazardous material (HAZMAT) response, and mine rescue. Training is specific to products, materials, processes, and response equipment found at the Project site. Mine rescue-specific training includes all requirements set in the *Saskatchewan Mine Emergency Response Program*, *Saskatchewan Mine Rescue Manual*.

Mine Rescue Training includes, but is not limited to:

- mine gases;
- airborne hazards;
- respiratory protection;
- ventilation;
- mine fires;
- mine rescue procedures; and
- survival program.

Ongoing training is planned, scheduled, and completed in accordance with the emergency response work instruction *Mine Rescue Training.*

Workers qualified as both mine rescue and emergency response can apply training hours common to both teams towards the minimum 40 hours per year of mine rescue training.

### 4.4.4 Mine Rescue Instructor

People serving as a mine rescue instructor must have training and experience approved by the Chief Mines Inspector and be certified as a mine rescue instructor in accordance with requirements of *The Mines Regulations, 2018.* Mine rescue instructors must hold a valid Class A qualification in first aid that meets the requirements of *The Occupational Health and Safety Regulations, 2020* and participate in delivery of a minimum of 40 hours of mine rescue training in each calendar year.

### 4.4.5 Emergency Response Team

Emergency Response Team members are trained to International Fire Service Training Association training certification for fires and hazardous materials response meeting the intent of National Fire Protection Association (*NFPA) 600 Standard on Facility Fire Brigade.* Emergency Response Team members must also hold a valid Class A qualification in first aid that meets the requirements of *The Occupational Health and Safety Regulations, 2020.*

The Emergency Response Team trains regularly throughout the year to maintain competency. Team members train to a minimum of 40 hours per year. Training includes firefighting rescue, emergency medical response, and HAZMAT response. Training is specific to products, materials, processes, and response equipment found at the Project site.

Surface emergency response training includes, but is not limited to:

- airborne hazards;
- firefighter orientation and safety;
- fire behavior;
- personal protective equipment;
- portable fire extinguishers;
- rescue and extrication;
- ground ladders;
- ventilation;
- water supply;
- fire hose;
- fire streams;
- fire control;
- fire truck pumper operation;
- rapid intervention team training; and
- self-rescue and mayday training.

Training for Emergency Response Team members is based on a variety of scenarios including vehicle incident, vehicle extrication, and hazardous materials response training.

Ongoing training is planned, scheduled, and completed in accordance with the emergency response work instruction *Emergency Response Team Training.*

Members of the Emergency Response Team not fully trained may participate in emergency response as commensurate with their training progression.

Workers qualified as both mine rescue and emergency response can apply training hours common to both teams towards the minimum 40 hours per year of emergency response training.

### 4.4.6 Technical Specialists

Technical specialists require no additional training other than training for health, safety, environment, and radiation specialists on their roles and responsibilities under the *Emergency Response Plan*.

### 4.4.7 Workers

Workers not directly involved in response operations receive an orientation session on basic elements of the Plan as it applies to them.

Site orientation includes general requirements for protecting personnel and the environment as well as important details actions to follow during emergency events and situations. Topics specific to emergency events and situations include, but are not limited to:

- emergency response protocols and individual responsibilities for maintaining personal safety;
- awareness of site alarm systems;
- fire equipment availability and appropriate use;
- basic spill prevention and response training;
- communication processes, including contact information for reporting emergency events or situations;
- general evacuation plans;
- camp evacuation procedures; and
- locations of muster points.

Workers receive additional emergency prevention and response training specific to their assigned work activities (e.g., confined space, working at heights, hot work).

### 4.4.8 Short-term Contractor and Visitors

Visitors at the Project site are escorted while on-site. Short-term contractors receive orientation with appropriate emergency response training, but not to the same level as a Project worker.

Short-term contractors and visitors are required to participate in site orientation upon their arrival. Site orientation includes general requirements for protecting personnel and the environment, as well as important detailed actions to follow during emergency events and situations. Topics specific to emergency events and situations include, but not limited to:

- emergency response protocols and individual responsibilities for maintaining personal safety;
- awareness of site alarm systems;
- communication processes, including contact information for reporting emergency events or situations;
- general evacuation plans;
- camp evacuation procedures; and
- locations of muster points.

### 4.4.9 Off-site Resources

Joint training with off-site resources includes periodic tours, review of the Plan, and participation in training activities and joint drills and exercises.

Information about the facility layout and methods of conducting response operations is shared with off-site resources deemed applicable to this Plan.

The capabilities of any mutual aid or contracted service providers are assessed when mutual aid agreements are negotiated.

## 4.5 Plan Testing

Plan testing is the periodic activation of select emergency response functions and processes using prepared scenarios and controlled conditions to determine the readiness of emergency responders, assess the adequacy of the Plan, and provide opportunities for the Emergency Response Team and Mine Rescue Team members to train with external resources.

Scenarios are designed to mimic real-world emergencies and can vary in scope and scale depending on the desired outcome. Exercises are scheduled with consideration for Project needs and regulatory requirements.

Testing methods include:

- tabletop exercises;
- field drills including fire response drills;
- full-scale complex exercises; and
- evacuation drills.

Each test of the Plan is documented, timed (i.e., alarm and response), reviewed, and evaluated for effectiveness, and the Plan modified as required based on the results of the test. A planned test may be deferred in the event of an actual emergency.

Testing of all requirements identified in this Plan will be conducted over a five-year period, with a full-scale complex exercise held every three years.

The process for Plan testing is further described in the emergency response work instruction *Testing the Emergency Response Plan*. This work instruction will include full-scale exercise evaluator duties, evaluator interactions with participants, and evaluator-specific checklist templates.

The process for Plan testing is further described in the emergency response work instruction *Testing the Emergency Response Plan.*

### 4.5.1 Tabletop Exercises

Tabletop exercises are round-table discussions of a potential emergency. They are developed to practice elements of the Plan and structured to meet specific predetermined objectives. Tabletop exercises are conducted a minimum of once per year for each operating shift at the Project.

### 4.5.2 Field Drills

Field drills are hands-on activities that test a certain element of the emergency response system, such as fire evacuation, underground census taking, fire response, or firefighting. Drills are based on realistic scenarios that could impact the Project. These drills may be coordinated with a full-scale exercise.

### 4.5.3 Full-scale Complex Exercises

Full-scale exercises test the key components of the Emergency Response Organization. An actual emergency is staged that requires complete Emergency Response Organization mobilization and response. A full-scale simulation exercise is held at a minimum of once every three years. External resources (e.g., local communities) and regulatory representatives are notified a minimum of 20 days in advance of planned full-scale exercises and may attend to participate in and observe response and recovery to evaluate exercise performance and identify opportunities for continual improvement.

Full-scale exercises take place over several hours to test integrated emergency response performance. Typical elements of a full-scale exercise include, but are not limited to:

- mobilization of the Emergency Response Organization as though actual emergency conditions are present over an extended period;

- mobilization and integration of both the Emergency Response Team and Mine Rescue Team, if necessary, during an emergency;
- demonstration of inter-agency cooperation;
- testing of communication systems;
- testing of emergency facilities and equipment readiness;
- changing event conditions (e.g., weather, wind direction, smoke direction); and
- returning the site to a safe condition so operations can resume.

Full-scale exercises are to be complex, realistic settings encompassing a combination of selected hazards including environmental and radiation release scenarios as described in section 2.2.

### 4.5.4 Evacuation Drills

Annual testing of evacuation processes is important for verifying alarm systems are detectable (e.g., heard, seen, smelled) where workers are located, and that workers and those with supervisor management roles in the evacuation process are aware of and properly complete their roles and responsibilities.

The process for scheduling, completing, and documenting surface evacuation drills including camp drills are described in the emergency response work instruction *Evacuation Drills*.

The process for scheduling, completing, and documenting stench gas evacuation drills is described in the emergency response work instruction *Testing the Underground Alarm System*.

## 4.6 Emergency Response Facilities, Equipment, and Vital Records

The Project provides emergency response facilities, equipment, and materials suitable and adequate for required responses. Emergency response facilities, equipment, and materials are operated and maintained in a state of readiness at all times by competent and trained Emergency Response Team members.

Facilities, equipment, and material procured to enable the implementation of this Plan are subject to the requirements as outlined in the *Rook I Asset Management Program*. Equipment is stored, maintained, and calibrated with consideration of the frequency and type of use and the manufacturers' or stated regulatory specifications. These provisions include regular inspection, calibration, testing, and maintenance or replacement as required within formal systems of maintenance, quality, inventory control, and accounting.

Test, inspection, and maintenance results are documented and retained as outlined in the IMS Manual.

### 4.6.1 Facilities

#### Emergency Operations Centre

The Emergency Operations Centre serves as the main administrative location for managing the emergency and coordinating the response and is the primary assembly point for Incident Command. The Emergency Operations Centre is located in the *main conference room in the administration building (location to be confirmed)*. Communication resources and vital records (e.g., this Plan, pre-incident plans, ventilation mine plans) and administration aids (e.g., status boards, reference materials) are readily accessible in the Emergency Operations Centre.

Emergency Operations Centre resources are also located at the alternate location should it be necessary to establish an alternative to the primary Emergency Operations Centre due to an emergency preventing the use of the *main conference room in the administration building (location to be confirmed)*.

The readiness of the Emergency Operations Centre and associated supplies is maintained as described in the emergency response work instruction *Emergency Operations Centre*.

### ERT Facility

The *ERT Facility* houses the fire truck, ambulance, and emergency response trailer and serves as the primary assembly point for the Emergency Response Team. The *ERT Facility* also houses firefighting equipment including, but not limited to, turnout gear, SCBAs, gas detection monitors, and portable radios.

### Mine Rescue Room

The mine rescue room is the primary surface area for the storage, testing, and maintenance of equipment used by the Mine Rescue Team and provides an area for training for underground emergency response. The mine rescue room is the primary assembly point for the Mine Rescue Team. The mine rescue room includes storage for SCBAs and mine rescue equipment to be transported with the team. *The mine rescue room location is to be confirmed*.

### Underground Refuge Stations

Underground refuge stations provide a safe area for underground workers in the event of an emergency. Primary and auxiliary refuge stations are provided in accordance with *The Mines Regulations, 2018* and are clearly identified in mine plans, training materials, and by signage in the mine.

### Health Centre

The health centre is located in the *camp (to be confirmed)* provides treatment and care facilities for injured workers and is the primary assembly area for the nurse. Commonly used medical supplies and medications are located in the health centre. Medical supplies and medication inventories are maintained by Project site nursing staff.

### Power Supply

Electricity for both surface and underground operations is provided by LNG generators. During construction (while building the LNG plant), diesel generators will provide power to the Project site.

### Fire Water Supply

Fire water will be sourced from Patterson Lake, either through a permanent intake or *at a designated location* (for fire truck to refill, or pumps to be deployed) (*to be confirmed*).

## 4.6.2 Equipment and Materials

Minimum emergency response equipment and material requirements are described in the emergency response work instructions:

- *Fire Fighting Equipment Inventory and Inspections;*
- *High Angle Rope and Confined Space Rescue Equipment Inventory and Inspections;*
- *Emergency Response Trailer Inventory and Inspections;*
- *Hazardous Materials Response/Spill Kits Inventory and Inspections;*
- *Mine Rescue Team Inventory and Inspections;*
- *Maintaining Refuge Stations;*
- *Ambulance Inventory and Inspections;* and
- *First Aid Kit Inventory and Inspections* (responsibility for managing first aid kits to be confirmed).

Routine inspections on the quantity and quality of equipment and supplies are completed in accordance with the inspection schedules and checklists established in these work instructions.

## Fire Fighting Equipment

Firefighting equipment is housed on-site in the *ERT Facility (location to be confirmed)* and includes, but is not limited to:

- a foaming-capable fire truck;
- a 10,000-gallon water tanker (multi-purpose by availability to the Emergency Response Team);
- shovels;
- fire hose;
- fire water pumps;
- assorted valves and adapters;
- gas detection monitors;
- portable radios;
- turnout gear; and
- SCBAs.

Emergency response equipment including firefighting equipment is inspected, tested, and maintained to minimize the risk of inadequate performance according to applicable legal and other requirements (e.g., NFPA 600 and manufacturer requirements).

Fire hoses and portable fire extinguishers are also located around the Project and are available for use.

## Emergency Response Trailer

An emergency response trailer housed in the *ERT Facility* is stocked with various response resources and equipment including, but not limited to:

- pre-incident plans;
- power equipment;
- personal protective equipment;
- pneumatic lifting bags;
- identification signage;
- hand tools; and
- miscellaneous gear.

The emergency response trailer includes HAZMAT, confined space rescue, and high angle rescue capabilities.

## Hazardous Materials Response and Spill Kits

A supply of hazardous materials response equipment is provided on-site. Spill kits contain absorbent materials (e.g., socks, pads, wipes), chemical-specific response supplies, and personal protective equipment. Locations are described in the emergency response work instruction *Hazardous Materials Response/Spill Kits Inventory and Inspections* and include:

- airport fuel tanks;
- fuel farms;
- diesel genset building;
- warehouse yard; and
- underground (various locations).

### Mine Rescue

Mine Rescue Team personal protective equipment and equipment requiring calibration is stored on surface in the mine rescue room. Underground mine rescue equipment stored underground includes, at a minimum, a mine rescue vehicle, foam generator, diesel generator, equipment, and supplies required by *The Mines Regulations, 2018*.

### Underground Refuge Stations

Primary and auxiliary refuge stations are stocked and inspected at least monthly in accordance with *The Mines Regulations, 2018*. The inspection and maintenance of refuge station is further described in the emergency response work instruction *Management of Refuge Stations.*

### Medical Treatment and First Aid

First aid supplies (e.g., stretchers, blankets) are located throughout the Project site on surface and in the refuge stations underground. Additional first aid supplies are located in the camp and health centre. The nursing staff is responsible for maintaining medical supplies at the health centre.

An ambulance is located in the *ERT Facility*.

### Communications Radios

Emergency Operations Centre personnel, Emergency Response Team members, Mine Rescue Team members, and nurses carry pagers or two-way handheld radios while on-site. Vehicles are also equipped with two-way radios. Designated emergency response radios are maintained in the *ERT Facility* for team members. The surface and underground emergency response teams are equipped with a voice intelligible, two-way communication system including the wearing of a SBCA facepiece.

### Refuge Station Communications

*To be confirmed.*

### Radiation Safety Monitoring Equipment

Portable radiation safety monitoring equipment is located in the radiation Office and is available for emergency response use.

### Mobile and Heavy Equipment

Aerial work platforms, graders, loaders, mobile cranes, and other heavy equipment in use on the Project site are available to support the Emergency Response Team.

### Light Vehicles

The Emergency Response Team has access to several light vehicles that can be deployed for use in an emergency to transport the Emergency Response Team and the emergency response trailer. The Mine Rescue Team has a dedicated vehicle underground.

### Mobile Generators and Lighting

Mobile generators and lighting are available to provide power and lighting at the emergency scene.

## 4.6.3 Vital Records

Vital records provide information used by the Emergency Operations Centre, the Emergency Response Team, and the Mine Rescue Team to effectively plan and execute emergency response. Vital records supporting emergency response include Project drawings, pre-incident plans, hazardous substance inventories and locations, emergency call-out lists, and current state of construction drawings.

Vital records relevant to their activities are readily accessible in either electronic or hardcopy form to the Emergency Operations Centre, the Emergency Response Team, and the Mine Rescue Team. Hardcopies of vital records used for emergency response are safely stored in a secure location to protect from damage.

More information on managing vital records is outlined in the IMS Manual.

### 4.6.4 Pre-incident Planning

Pre-incident planning includes systematically evaluating Project infrastructure and Project site layout to identify attributes that could cause the start or spread of emergencies and influence effective response.

Pre-incident planning includes evaluating the following factors under emergency conditions:

- building location, construction, complexity, size, and occupancy;
- type, quantity, and location of hazardous and nuclear substances;
- susceptibility to natural disasters;
- protection of safety-related systems and equipment;
- fire protection systems and water supply;
- capability and availability of the Emergency Response Team;
- manual fire suppression priorities; and
- backup system requirements.

Pre-incident plans are documented and provided to Emergency Response Team members. Pre-incident plans are readily available during fire emergencies to tailor response, control, and mitigation measures to the unique conditions of the fire setting and surrounding area. Pre-incident plans are developed for critical and vital Project site buildings and structures. Copies of the pre-incident plans are kept in the Emergency Operations Centre, fire truck, and emergency response trailer.

Pre-incident plans inform the planning of emergency response and training requirements and the equipment required to execute these responses. Pre-incident plans are updated as required to reflect changes in facility configuration, hazards, and systems. In addition, pre-incident plans are reviewed according to the frequency defined by the associated process documentation for accuracy and are managed in accordance with the document management process as outlined in the IMS Manual.

The process for preparing and updating pre-incident plans is outlined in the *Rook I Fire Protection Program*.

## 4.7 Plan Maintenance and Review

Changes to the Plan can be triggered by:

- changes in hazards;
- changes in resources;
- training and exercises;
- actual emergencies; and
- changes to the emergency response contact lists.

At a minimum, the Plan is reviewed once a year to confirm that it continues to meet regulatory requirements and the requirements of the Project, including its continued suitability, adequacy, and effectiveness. The dates of these reviews are documented even if no revisions to the Plan are required.

Any changes identified in reviews are incorporated into the Plan, with changes to training, exercise planning, and resources made as required. Changes to the Plan are made in accordance with requirements as outlined in the IMS Manual. Changes to training are made as outlined in the *Rook I Training Program*.

All other changes are managed to protect worker health, safety, the environment, and property to promote consistent and effective execution of Project processes. This includes changes to:

- facilities;
- equipment;
- management system processes;
- organizational structure;
- key roles and responsibilities;
- documentation; and
- legal and other requirements.

The general change management process is outlined in the IMS Manual.

## 4.8 Plan Distribution List

Four controlled hardcopies copies of the Plan are distributed as follows:

- Emergency Operations Centre – primary location;
- Emergency Operations Centre – secondary location;
- Health Centre; and
- Saskatoon Office.

Additional copies of the Plan are considered uncontrolled documents and as such, are not considered to be accurate.

# 5.0 Response

## 5.1 Taking Immediate Action

Employee health and safety is the highest priority. Workers are responsible for their own safety as well as others and must be prepared to take appropriate action when an incident occurs.

The worker(s) at the emergency scene assess the situation and, if safe to do so, take steps to control the situation, minimize harm or damage, and provide aid while controlling the scene for potential future investigation.

If it is not safe to continue or proceed, the worker must leave the scene and call *central control or security - (to be confirmed)* immediately.

Workers are required to immediately report an incident to their supervisor. If the situation cannot be controlled, the supervisor triggers the emergency response process by calling *central control or security (to be confirmed)*.

Further details of the initial response to an incident are provided in IMS procedure *Incident and Deviation Management.*

## 5.2 Notifying Central Control or Security – TBD

All site emergencies are reported through the site emergency response contact number ###-###-#### *(to be confirmed)* or by calling on Channel ## *(to be confirmed)* on the radio. Emergencies can also be activated by pull stations located *in the (locations to be confirmed*) which notify the *central control or security (to be confirmed)*.

*Central control or security (to be confirmed)* receives and logs emergency assistance calls received via phone, radio, or pull station activations.

The *central control or security (to be confirmed)* logs the call and immediately contacts the Incident Commander (or alternate, if required) as identified in the up-to-date roster of emergency response personnel and provides details of the emergency.

The *central control or security (to be confirmed)*, through the radio system, places Emergency Response Organization personnel, the nurse, and for underground emergencies, the hoist operator, on standby pending further direction from the Incident Commander. This can occur through the same announcement made to the Incident Commander.

Further details on the role of the *central control or security (to be confirmed)* in receiving, documenting, and responding to emergency calls is described in the emergency response work instruction *Managing Emergency Calls.*

## 5.3 Immediate Actions Decision Tree

The Incident Commander (or alternate), as identified in the up-to-date roster of emergency response personnel, assesses the emergency situation to determine appropriate response and sends out emergency organization resources to provide field reconnaissance as required.

Based on the *Initial Emergency Response Decision Criteria – Quick Reference Guide* located at the front of this Plan, the Incident Commander activates Plan components and teams as required.

Depending on the severity of the emergency, the Incident Commander will order, either directly or through the *central control or security (to be confirmed)*:

- activation of a localized surface alarm, a site-wide surface alarm, or underground stench gas system;
- activation of all or a portion of Emergency Response Organization personnel;
- evacuation of all or a portion of the Project site;
- any required temporary suspension of high-risk work during emergency response activities, in consideration of the nature of the emergency and response needs;
- immediate implementation of shutdown procedures in some or all areas of the operation; and
- activation of other in-field resources.

### 5.3.1 Special Considerations for Wildfires

In the event of a wildfire, the Incident Commander refers to the emergency response work instructions *Wildfire Response* to guide decision making regarding offensive operations and *Wildfire Monitoring and Planning* for guidance on evacuation decisions and procedures.

Offensive operations are only conducted if the appropriate personnel with proper training are on-site and severe risk to personnel exists at the Project site. Offensive operations are only conducted within the boundary of the Project site unless NexGen management has directed the Incident Coordinator to assist local organizations in taking offensive actions.

## 5.4 Activating the Emergency Response Organization

The Incident Commander notifies responding individuals in the event activation is required, either directly through the radio system or indirectly by the *central control or security (to be confirmed)*. Notified individuals respond according to emergency level, as indicated below.

Timely response is an important feature of effective emergency management. Response times vary according to the location, nature, and severity of the emergency; however, the Project targets a minimum of

15 minutes from the time of activation to arrival at the scene. Response times for emergencies and exercises as described in section 4.5 are documented, tracked, and evaluated to optimize response effectiveness.

### 5.4.1 Level II or III Emergency

#### Emergency Operations Centre Personnel

Upon receiving a notification regarding a Level II or III emergency or hearing an emergency alarm, all personnel assigned to Emergency Operations Centre roles respond to the Emergency Operations Centre or alternate if the primary centre is affected by the emergency.

Activities at the Emergency Operations Centre are logged in the emergency response form *Time and Event Log*.

#### Emergency Response Team

Upon receiving a notification regarding a Level II or III surface emergency or hearing an emergency alarm, Emergency Response Team members report to the *ERT Facility*, don turnout gear, and await further instructions from the Emergency Operations Centre.

#### Mine Rescue Team

Upon receiving a notification regarding a Level II or III underground emergency, Mine Rescue Team members report to the mine rescue room, don gear, prepare SCBA for deployment, and await further instructions from the Emergency Operations Centre.

#### Hoist Room Operator

Upon receiving a notification regarding a Level II or III underground emergency, the hoist room operator remains in the hoist room pending further instructions from the Emergency Operations Centre.

Hoist room operator duties during an emergency are further detailed in the emergency response work instruction *Hoist Room Operator Emergency Response Duties*.

#### Nurse

Upon receiving a notification regarding a Level II or III surface emergency or hearing an emergency alarm, the nurse proceeds to the health centre unless otherwise directed by the Emergency Response Field Coordinator.

In the event of a Level II or III underground emergency, the nurse reports to the mine rescue room to monitor the vitals of Mine Rescue Team members under oxygen before being deployed.

#### Security

Upon activation of a surface alarm or notification of a Level II or III, security reports to the gatehouse and strictly controls site access as directed by the Logistics Coordinator.

### 5.4.2 Level I Emergency

#### Emergency Response Organization Personnel

Upon receiving a notification regarding a Level I emergency, unless otherwise activated by the Incident Commander, all Emergency Response Organization personnel remain on standby until the stand down order is issued by the Incident Commander.

### Hoist Room Operator

Upon receiving a call regarding a Level I underground emergency, the hoist room operator remains in the hoist room until the stand down order is issued by the Incident Commander.

Hoist room operator duties during an emergency are further detailed in the emergency response work instruction *Hoist Room Operator Emergency Response Duties*.

### Nurse

Upon receiving any standby or Level I emergency notification, the nurse proceeds to the health centre and remains there until the stand down order is issued by the Incident Commander, unless otherwise directed by the Incident Commander.

### In-field Resources

In-field resources are activated as required by the Incident Commander.

Note: For Level I emergencies, further implementation of the Plan is not required as long as the response remains at Level I. Resources respond as directed by the Incident Commander and the incident is documented and assessed in accordance with the IMS procedure *Incident and Deviation Management*.

## 5.5 Actions on Alarm Activation

Activation of an emergency siren or alarm or an announced emergency on surface alerts surface workers to a potential emergency. The administration building, permanent residence, and commissioned surface buildings are also equipped with standard fire bell alarms.

Stench gas systems deployed into the mine ventilation system alert underground workers of an emergency. Activation of the stench gas system is described in the emergency response work instruction *Stench Gas Injection*.

Camp alarms alert camp residences and staff to an emergency in the camp.

Required responses to alarm activations and stench gas release are summarized below.

### 5.5.1 Surface Workers

Upon activation of a surface alarm or emergency announcement, non-emergency response workers and visitors are to shut down any equipment they are operating if safe to do so and proceed to their designated muster point. Muster points are identified by signage posted in the area. Muster points may be subject to change based on construction requirements. Contractors are responsible for establishing muster points for their employees and immediately notifying NexGen of any changes to the muster points. Each muster point must have an alternative location in the event there is a danger associated with designated ones.

Workers or their designate in charge of short-term contractors or visitors accompany these individuals to their designated or alternate muster station. In camp, workers or their designate in charge of short-term contractors or visitors confirm the presence of the short-term contractors or visitors at the assigned muster point.

Muster points are established and posted, and head counts are completed during emergencies and reported to the Emergency Operations Centre as describe in the emergency response work instruction *Muster Points*.

### 5.5.2 Underground Workers

Upon activation of an underground alarm (e.g., stench gas release), all workers and visitors are to shut down any equipment they are operating if safe to do so and to proceed to the primary refuge station. If the primary refuge station is not accessible, the nearest auxiliary refuge station should be used. Workers or their designate in charge of short-term contractors or visitors accompany these individuals to a refuge station.

Underground head counts are completed and reported to the Emergency Operations Centre as described in the emergency response work instruction *Tag Board Reconciliation*.

The process for reporting to and managing a refuge station during an underground emergency are described in the emergency response work instruction *Refuge Stations*.

### 5.5.3 Camp Residences and Staff

Upon activation of the camp alarm system, all residences and staff are to shut down any equipment they are operating if safe to do so and proceed to their assigned camp muster station.

Further details on camp evacuation requirements for residences are provided on the emergency response guideline *What to do in the Event of an Alarm* posted *on the inside of each bedroom room door (to be confirmed)*.

Coordination of camp evacuations and completion of room sweeps and head counts is described in the emergency response work instruction *Camp Evacuation Procedures.*

Evacuation route maps are posted throughout the camp.

## 5.6 Site Evacuation

Evacuations are conducted:

- in the event of a fire, hazardous substance spill, or other event that forces abandonment of the buildings;
- at the direction of the Incident Commander; and
- at the direction of the Forest Fire Control Centre or RCMP.

The process for organizing and executing a site evacuation is described in the emergency response work instruction *Site Evacuation*.

## 5.7 External Reporting of Emergencies

Depending on the nature of the emergency, immediate regulatory reporting may be required.

The CNSC Duty Officer is notified of **all** events involving the activation of the Emergency Response Team or Mine Rescue Team as soon as it is considered safe and practical to do so.

The process for determining reporting requirements and associated reporting timeframes and for initiating and managing this reporting is outlined in the IMS procedure *Incident and Deviation Management*.

The Communications Coordinator is responsible for making external reports and notifications within prescribed reporting timeframes during the emergency.

## 5.8 Responding to Emergencies

The Emergency Response Team deploys to surface emergencies and the Mine Rescue Team deploys to underground emergencies as directed by their respective Field Operations Director.

The Emergency Response Team and/or the Mine Rescue Team assumes control from first on the scene, secures the emergency location, completes an on-scene assessment, assesses risks, and develops and implements a tactical response plan based on their training and knowledge.

For emergencies with a radiation exposure hazard, the Emergency Response Team and/or the Mine Rescue Team and the Emergency Operations Centre rely on radiation subject matter experts to effectively coordinate the radiation protection aspects of an emergency to verify exposures to responders, workers, and the public (if applicable) are kept ALARA, and that the radiation protection processes are followed as outlined in the *Rook I Radiation Protection Program* and *Rook I Radiation Code of Practice*.

Throughout the tactical response, the Emergency Response Team and the Mine Rescue Team maintains ongoing communications (e.g., radio, phone, in-person) between the field and the Emergency Operations Centre through their respective Field Coordinator and Field Operations Director.

The process for communicating with members of the public and the media during the emergency are outlined in section 7.0 of this Plan.

Emergency Response Team and the Mine Rescue Team members are expected to make tactical-level field decisions subject to oversight by their Team Captain acting under the direction of their respective Field Coordinator.

At all times during the emergency, the ultimate decision-making authority resides with the Incident Commander and is delegated as appropriate to Field Operations Directors, to Field Coordinators, to Team Captains, and then to team members.

Following an emergency where a fatality or a serious injury has occurred, government agency representatives may decide to carry out an investigation into the extent or cause of the injury or fatality. For emergencies involving serious injuries of fatalities, the Emergency Response Team or Mine Rescue Team disturbs the scene on a restricted basis only to facilitate rescue operations, or where failure to take further action may endanger the lives of others (e.g., stabilize structures, control a fire) or the environment.

Emergency Response Team and Mines Rescue Team activities are logged in the emergency response form *Time and Event Log*.

## 5.9 Stand Down Order

Upon completion of emergency response activities, the Incident Commander, in consultation with Field Operations Director, orders the Emergency Response Team and Mine Rescue Team stand down.

Upon receiving the stand down order, the Emergency Response Team and Mine Rescue Team terminates response activities, demobilizes response equipment, and returns equipment to the *ERT Facility* or mine rescue room as applicable.

Prior to standing down, the Incident Commander may direct the Emergency Response Team and Mine Rescue Team to secure and preserve the scene for post-incident investigation. Once the scene is secured, control of the scene is transferred to security or as directed by the Incident Commander.

Should preservation on the scene be required, particular care must be exercised to verify all evidence is preserved in its original state.

## 5.10 Stand Down Order

Upon completion of emergency response activities, the Incident Commander, in consultation with Field Operations Director, initiates the stand down order.

Upon receiving a stand down order, workers can resume normal activities and camp residents and staff can return to camp, subject to any announced restrictions.

Cleanup of the emergency site should begin as soon as possible under the direction of the Incident Commander.

# 5.11 Post-emergency Notifications, Debriefs, and Investigations

Timely post-emergency follow-up is necessary to capture and preserve critical response information, notify regulatory agencies within the prescribed timeframes, and evaluate response effectiveness to:

- identify lessons learned;
- inform opportunities to improve response and prevent emergencies from recurring; and
- inform Plan review and revision.

Following any response to an emergency, the Incident Commander is responsible for verifying required initial notifications were made and the response is subject to documented reviews.

## 5.11.1 Regulatory Notifications

In addition to notifying the CNSC Duty Officer as described in section 5.7, additional post-emergency notifications and follow-ups with regulatory agencies may be required depending on the nature of the emergency. Requirements for post-emergency notification and follow-up and the process for making these are described in the IMS procedure *Incident and Deviation Management*.

## 5.11.2 Team Debriefs

Following the stand down order, the Emergency Response Team and the Mine Rescue Team conduct a debrief of the emergency as soon as reasonably practical (within 24 hours, if possible). The debrief should discuss:

- review of the response;
- what went well;
- opportunities for improvement; and
- lessons learned.

Team debriefs are documented on the emergency response *Emergency Debrief Form*.

## 5.11.3 Emergency Operations Centre Debriefs

Following the stand down order that the emergency is over, the Incident Commander conducts a debrief of the emergency as soon as reasonably practical and if possible, within 24 hours. The debrief should discuss:

- review of the response;
- what went well;
- opportunities for improvement; and
- lessons learned.

These debriefs are to be documented on the emergency response *Emergency Debrief Form*.

## 5.11.4 Investigation of the Emergency

Activation of the Plan requires a post-emergency investigation. Appropriate actions to correct and prevent reoccurrence of the emergency are developed. Corrective actions are planned, implemented, verified, and reviewed for effectiveness commensurate with the level of risk.

The investigation and corrective action processes are triggered as outlined in the IMS procedure *Incident and Deviation Management* and completed in accordance with the IMS procedure *Investigation and Corrective Action.*

### 5.11.5 Government and Insurance Investigations

Following an emergency where a fatality, serious injury, chemical exposure, or dangerous occurrence as defined in the *Occupational Health and Safety Regulations, 2020* or *The Mines Regulations, 2018* has occurred, government agency representatives may decide to carry out an investigation into the extent or cause of emergency. After presenting their credentials, the representatives are to be afforded full co-operation in the performance of their duties.

Work at the scene of an injury or fatality may not be resumed until permission has been obtained from the Coroner's Office, the RCMP, and any provincial or federal government agency required to provide approval to resume work.

Insurance companies may wish to conduct investigations of their own into an emergency. Project personnel must accompany any insurance representatives attending the Project site.

# 6.0 Recovery

Post-emergency recovery activities are initiated as soon as possible. The Emergency Operations Centre remains functional until such time as the Project begins the process of restoration of facilities and routine operations.

The process of evaluating recovery requirements begins at the time of the emergency or crisis.

Action taken during response operations should be decided, whenever possible, with post-emergency recovery in mind.

Recovery operations include:

- resumption of business;
- site remediation and restoration;
- worker assistance; and
- litigation management.

Where fatalities or loss or damage to company property has occurred, the scene is not be disturbed until permission has been received from any government agencies involved and the insurance company adjuster. Resumption of work may be permitted on a restricted basis when failure to resume operations may endanger the lives of others or further harm the environment.

## 6.1 Resumption of Business

An emergency may adversely affect construction and commissioning activities. This effect may be felt for an extended period of time depending on the severity of the emergency. Impairment may be a result of injury to personnel, harm to the environment, damage to the facilities, or government regulatory action.

Resumption of normal operations requires, as necessary:

- repair of damaged structures;
- restoration of services such as power, heat, and communications;
- clearance of access routes; and
- restoration of damaged units to operation.

Specific requirements for the resumption of business are specific to the nature of the emergency and the nature and extent of damage.

The Incident Commander, in consultation with organizational resources commence with plans to restore the Project to normal operations as soon possible after the emergency. Some planning and implementation activities may commence while the emergency is still under response.

## 6.2 Site Remediation

Remediation of the emergency site should begin as soon as possible under the direction of the Incident Commander.

If immediate cleanup is not possible, areas with chemical or radiological contamination are to be managed pending remediation to minimize precipitation impacts and spreading of contamination.

Contaminated liquids are recovered to a sump or proper storage container. If contaminated material has entered secondary containment structures, then the containment structures and interconnecting piping must be cleaned if deemed necessary by the Incident Commander.

Contaminated soils are excavated and recovered into proper storage containers.

In the event of fire or release involving radioactive materials, appropriate steps are taken to control the spread of contamination and to recover any contaminated material. The control and recovery of radioactive materials during and after a fire or release are specific to each situation. The radiation department determines the appropriate plan of action to control and recover radioactive materials while keeping doses to worker and the public ALARA.

Contaminated materials recovered and wastes generated during site remediation are managed as described in the *Rook I Environmental Protection Program*.

## 6.3 Worker Assistance

Workers affected by the emergency may experience delayed or long-term reactions. These effects may include loss of employment due to interruption of Project activities or critical incident stress.

Worker meetings can be used to inform workers about the long-term implications of the emergency. It is necessary to establish NexGen's position on the issue of job loss and employee retention as early in the recovery phase of the operation as possible.

Critical incident stress debriefings are offered for affected workers and their families or as recommended by human resources.

Critical incident stress debriefings for contractors are the responsibility of the engineering, procurement, construction management firm or individual contractor.

## 6.4 Litigation

Any post-emergency litigation is initiated through and managed by organizational resources as soon as possible following an emergency.

# 7.0 Communications

## 7.1 Pre-emergency Consultation

Information on public emergency preparedness is incorporated into *the Rook I Indigenous and Public Engagement Program* to confirm emergency preparedness and response information is communicated to surrounding communities and stakeholders.

Additional details are outlined in the *Rook I Indigenous and Public Engagement Program.*

## 7.2 Emergency Response Organization Communications

Effective emergency response requires timely and accurate communications between the Emergency Operations Centre, Emergency Response Team, and Mine Rescue Team. An incident command structure is implemented to facilitate these communications in a controlled manner.

Hand-held, portable, two-way radios are the primary means of communications within the Emergency Response Organization. These radios are for local area communications within the facility and the immediate area.

Field Liaisons may also be positioned in the Emergency Operations Centre to transport information to critical emergency response stations on surface (e.g., "running" between the health centre and Emergency Operations Centre to provide condition status of injured employees).

## 7.3 Regulatory Reporting

During a Project emergency, regulatory notification occurs within the regulated reporting timeframes.

The process for determining reporting requirements and associated reporting windows and for initiating and managing this reporting is described in the IMS procedure *Incident and Deviation Management*.

The Communications Coordinator makes regulatory notifications within the prescribed reporting windows.

Depending on the nature of the emergency, additional post-emergency notifications and follow-ups with regulatory agencies may be required. Requirements for post-emergency notification and follow-up and the process for making these are described in the IMS procedure *Incident and Deviation Management*.

## 7.4 Internal, External Communication, and Social Media

An integral part of emergency response is the timely development and release of internal and external communications that convey care and concern for the situation and provide relevant information. Communications are to be consistent to protect Project reputation and license approvals.

Internal communications assure employees receive appropriate and accurate information that is consistent with public statements. Consistent with external communications, internal communications should convey care and concern for the situation while providing factual information.

For external communications, the emergency description and Project response must be conveyed as appropriate to those directly affected, government authorities, and the general public.

Social media should be monitored to prevent incorrect or malicious information from hindering response efforts as information can spread quickly on social media. To allow for the timely dissemination of accurate information via social media and traditional communication mediums, the Incident Commander, through the Communication Coordinator coordinates external communications with organizational resources.

Overall communication management communicates a clear and consistent message that underscores Project concern, commitment, and cooperation. Such communications are not just intended for the media, but also apply to:

- workers;
- vendors;
- government authorities;
- other stakeholders;
- nongovernmental organizations; and
- the general public.

Additional information on the accepted process for internal and external communication practices during an emergency is outlined in the IMS Manual.

# 8.0 Records

Records associated with activities in the *Emergency Response Plan* are managed as outlined in the IMS Manual.

# 9.0 Documents and References

## 9.1 Internal References

| Document Number | Document Title |
|---|---|
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-IMS-PRO-00011 | *Communication* |
| ROOK-IMS-PRO-00008 | *Incident and Deviation Management* |
| ROOK-IMS-PRO-00009 | *Investigation and Corrective Action* |
| ROOK-EMG-PGM-00001 | *Rook I Emergency Preparedness and Response Program* |
| ROOK-EMG-PLN-00002 | *Ground Transportation Emergency Response Plan* |
| ROOK-EMG-PLN-00003 | *Crisis Management Plan* |
| ROOK-EMG-WIN-00001 | *Monitoring and Responding to Lightening Risks Work Instruction* |
| ROOK-EMG-WIN-00002 | *Testing the Emergency Response Plan Work Instruction* |
| ROOK-EMG-WIN-00003 | *Testing the Underground Alarm System Work Instruction* |
| ROOK-EMG-WIN-00004 | *Hazardous Materials Response/Spill Kits Inventory and Inspections Work Instruction* |
| ROOK-EMG-WIN-00005 | *Management of Refuge Stations Work Instruction* |
| ROOK-EMG-WIN-00006 | *Maintaining the Emergency Response Roster Work Instruction* |
| ROOK-EMG-WIN-00007 | *Wildfire Monitoring and Planning Work Instruction* |
| ROOK-EMG-WIN-00008 | *Wildfire Response Work Instruction* |
| ROOK-EMG-WIN-00009 | *Mine Rescue Training Work Instruction* |
| ROOK-EMG-WIN-00010 | *Fire Fighting Equipment Inventory and Inspections Work Instruction* |
| ROOK-EMG-WIN-00011 | *Emergency Response Trailer Inventory and Inspections Work Instruction* |
| ROOK-EMG-WIN-00012 | *Mine Rescue Team Inventory and Inspections Work Instruction* |
| ROOK-EMG-WIN-00013 | *Maintaining Refuge Stations Work Instruction* |
| ROOK-EMG-WIN-00014 | *Ambulance Inventory and Inspections Work Instruction* |
| ROOK-EMG-WIN-00015 | *First Aid Kit Inventory and Inspections Work Instruction* |
| ROOK-EMG-WIN-00016 | *Site Evacuation Work Instruction* |

| Document Number | Document Title |
|---|---|
| ROOK-EMG-WIN-00017 | *Emergency Response Team Training Work Instruction* |
| ROOK-EMG-WIN-00018 | *Emergency Operations Centre Work Instruction* |
| ROOK-EMG-WIN-00019 | *Managing Emergency Calls Work Instruction* |
| ROOK-EMG-WIN-00020 | *Hoist Room Operator Emergency Response Duties Work Instruction* |
| ROOK-EMG-WIN-00021 | *Stench Gas Injection Work Instruction* |
| ROOK-EMG-WIN-00022 | *Tag Board Reconciliation Work Instruction* |
| ROOK-EMG-WIN-00023 | *Refuge Stations Work Instruction* |
| ROOK-EMG-WIN-00024 | *Camp Evacuation Procedures Work Instruction* |
| ROOK-EMG-WIN-00025 | *Evacuation Drills Work Instruction* |
| ROOK-EMG-WIN-00026 | *Muster Points Work Instruction* |
| ROOK-EMG-WIN-00027 | *Positions Checklists* |
| ROOK-EMG-WIN-00028 | *High Angle Rope and Confined Space Rescue Equipment Inventory and Inspections* |
| ROOK-EMG-GDE-00001 | *What to do in the Event of an Alarm Guideline* |
| ROOK-EMG-FRM-00001 | *Time and Event Log* |
| ROOK-EMG-FRM-00002 | *Emergency Debrief Form* |
| ROOK-IPE-PGM-00001 | *Rook I Indigenous and Public Engagement Program* |
| ROOK-HSF-PGM-00001 | *Rook I Health and Safety Program* |
| ROOK-ENV-PGM-00001 | *Rook I Environmental Protection Program* |
| ROOK-TRN-PGM-00001 | *Rook I Training Program* |
| ROOK-AST-PGM-00001 | *Rook I Asset Management Program* |
| ROOK-FIR-PGM-00001 | *Rook I Fire Protection Program* |
| ROOK-RAD-PGM-00001 | *Rook I Radiation Protection Program* |
| ROOK-RAD-COP-00001 | *Rook I Radiation Code of Practice* |

## 9.2 External References

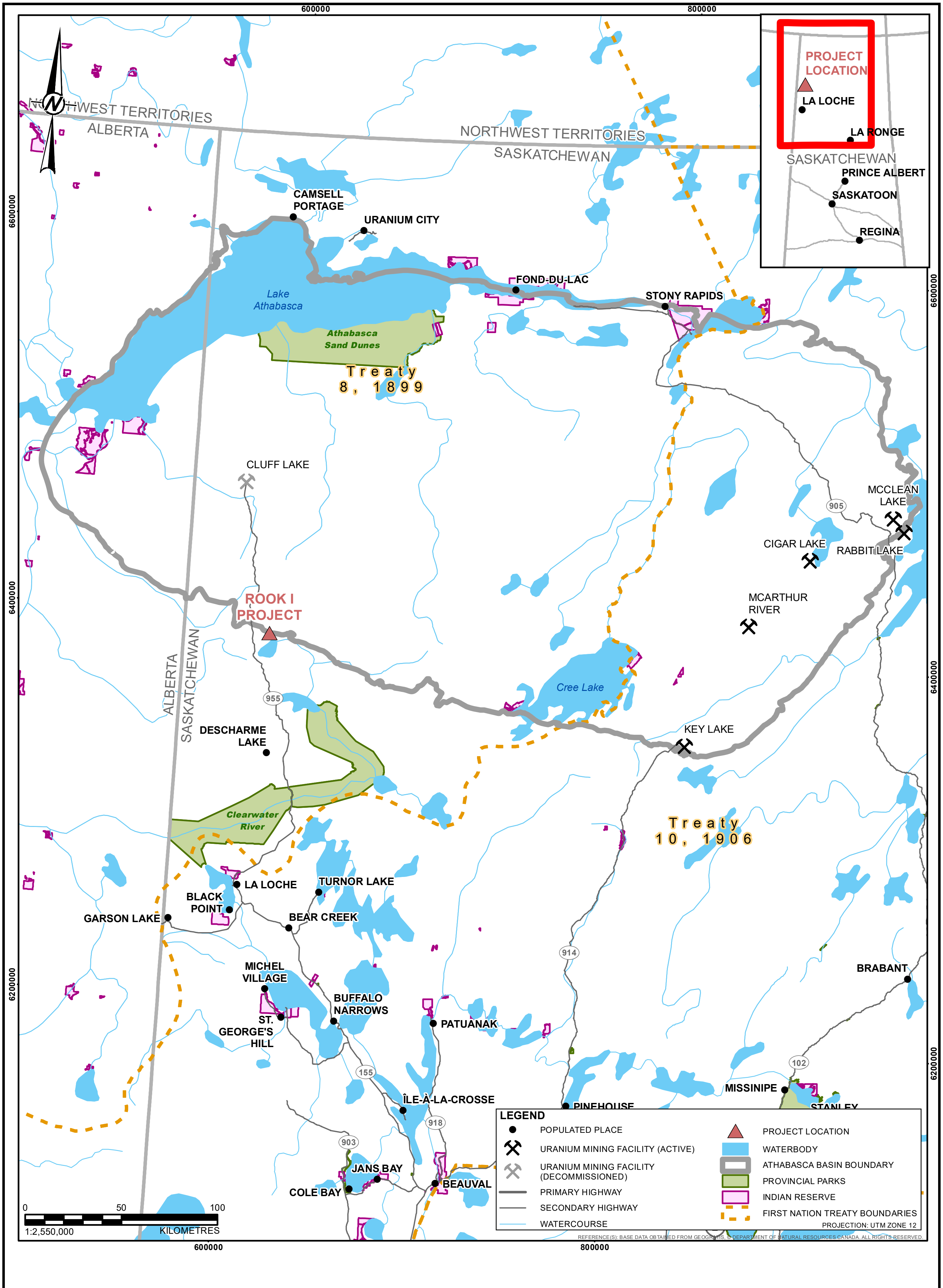
| Document Number | Document Title |
|---|---|
| REGDOC 2.10.1 | Nuclear Emergency Preparedness and Response, Version 2. |
| SOR/2000-202 | General Nuclear Safety and Control Regulations |
| SOR/2000-203 | Radiation Protection Regulations |
| N/A | Saskatchewan Environmental Code |
| R.S.C., 1985, c. F-14 | *Fisheries Act* |
| SOR/2002-222 | Metal and Diamond Mining Effluent Regulations |
| S.C. 1999, c. 33 | Canada Environmental Protection Act,1999 |
| SOR/2019-51 | Environmental Emergency Regulations, 2019 |
| RRS c S-15.1 Reg 8 | The Mines Regulations, 2018 |

| | |
|---|---|
| RRS c S-15.1 Reg 10 | The Occupational Health and Safety Regulations, 2020 |
| N/A | Saskatchewan Mine Emergency Response Program |
| N/A | Saskatchewan Mine Rescue Manual |
| N/A | North American Emergency Response Guidebook |

## 9.3 Supporting Studies

| Document Number | Document Title |
|---|---|
| N/A | *Hazard Identification for the Accidents and Malfunctions Assessment – NexGen Rook I Project,* 2021 |

# Appendix A: Access Map and Site Plans



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800000
NORTHWEST TERRITORIES
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SASKATCHEWAN
PROJECT LOCATION
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SASKATCHEWAN
PRINCE ALBERT
SASKATOON
REGINA
6600000
CAMSELL PORTAGE
URANIUM CITY
Lake Athabasca
FOND-DU-LAC
STONY RAPIDS
Athabasca Sand Dunes
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CLUFF LAKE
MCCLEAN LAKE
905
CIGAR LAKE
RABBIT LAKE
MCARTHUR RIVER
ROOK I PROJECT
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ALBERTA
SASKATCHEWAN
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Cree Lake
DESCHARME LAKE
KEY LAKE
Clearwater River
Treaty 10, 1906
LA LOCHE
TURNOR LAKE
BLACK POINT
GARSON LAKE
BEAR CREEK
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MICHEL VILLAGE
BRABANT
BUFFALO NARROWS
ST. GEORGE'S HILL
PATUANAK
6200000
155
102
MISSINIPE
ÎLE-À-LA-CROSSE
PINEHOUSE
STANLEY
918
903
JANS BAY
COLE BAY
BEAUVAL
0
50
100
1:2,550,000
KILOMETRES
LEGEND
POPULATED PLACE
URANIUM MINING FACILITY (ACTIVE)
URANIUM MINING FACILITY (DECOMMISSIONED)
PRIMARY HIGHWAY
SECONDARY HIGHWAY
WATERCOURSE
PROJECT LOCATION
WATERBODY
ATHABASCA BASIN BOUNDARY
PROVINCIAL PARKS
INDIAN RESERVE
FIRST NATION TREATY BOUNDARIES
PROJECTION: UTM ZONE 12


NOTES:

1. FOR NOTES SEE DRAWING H366614-2000-220-260-0001.
2. CONTRACTOR TO READ DRAWINGS IN CONJUNCTION WITH PROJECT SPECIFICATIONS.
3. ALL UNITS ARE IN METRIC, COORDINATES AND DIMENSIONS ARE IN METERS, UNLESS NOTED OTHERWISE.
4. TOPOGRAPHY, UTM NAD83 ZONE 12N
5. CONTOURS ARE IN 5M INTERVALS

C:\Users\jeighs\OneDrive - JDSEM\NEXR0001C - EPCM\Drawings\Layout Optimization 21.03.2023.dwg Apr 24, 2023 - 2:26pm

REFERENCE DRAWINGS

| NO. | DWG NO. | TITLE |
|---|---|---|
| | | |

NOTES:

1. Figure reflects the maximum extents of the Project site at the end of the Construction phase.

DRAWING REVISION

| NO. | DESCRIPTION | DATE |
|---|---|---|
| IP | FIGURE FOR PERMITTING | 2023.04.17 |

| | NAME | DATE |
|---|---|---|
| DRAWN BY: | J.J | 14 NOV 2022 |
| DESIGNED BY: | A.S | 14 NOV 2022 |
| CHECKED BY: | | |
| APPROVED BY: | | |

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NexGen

JDS Energy & Mining Inc.

NEXGEN ENERGY LTD
ROOK I PROJECT

MINE SITE DEVELOPMENT
CONSTRUCTION PHASE
OVERALL SITE LAYOUT

DWG NO.

REV. IP

# Ground Transportation Emergency Response Plan
# ROOK-EMG-PLN-00002

NexGen Energy Ltd.

# Rook I Project

## Ground Transportation Emergency Response Plan

ROOK-EMG-PLN-00002



December 2022

# Record of Revisions

| Version. No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| A | 30-Jun-2021 | Initial working draft issued to the CNSC for early review and feedback | J. Henderson | R. Paine<br>K. Oakes<br>L. Moger<br>T. George | - |
| B | 22-Dec-2022 | Updated to improve clarity and address CNSC feedback | J. Henderson | L. Moger | - |

# Table of Contents

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# 1.0 Introduction

The *Ground Transportation Emergency Response Plan* (Plan) details the systematic and risk-based approach to preventing, preparing for, responding to, and recovering from ground transportation emergencies directly related to or in proximity to the NexGen Energy Ltd. (NexGen) Rook I Project (Project). The Plan was developed to maintain regulatory compliance, enable continual improvement, and foster a culture where worker and environmental protection and local public and Indigenous community engagement are principal considerations guiding decisions and actions.

This Plan, along with the *Emergency Response Plan* and *Crisis Management Plan*, support the *Rook I Emergency Preparedness and Response Program* and are part of the overall *Rook I Integrated Management System* (IMS). As a component of the IMS, this Plan is subject to the *Rook I Integrated Management System Policy* which provides the foundation for NexGen's approach to emergency management. This Plan and its relationship to the other IMS programs within the IMS hierarchy is shown in Figure 1.

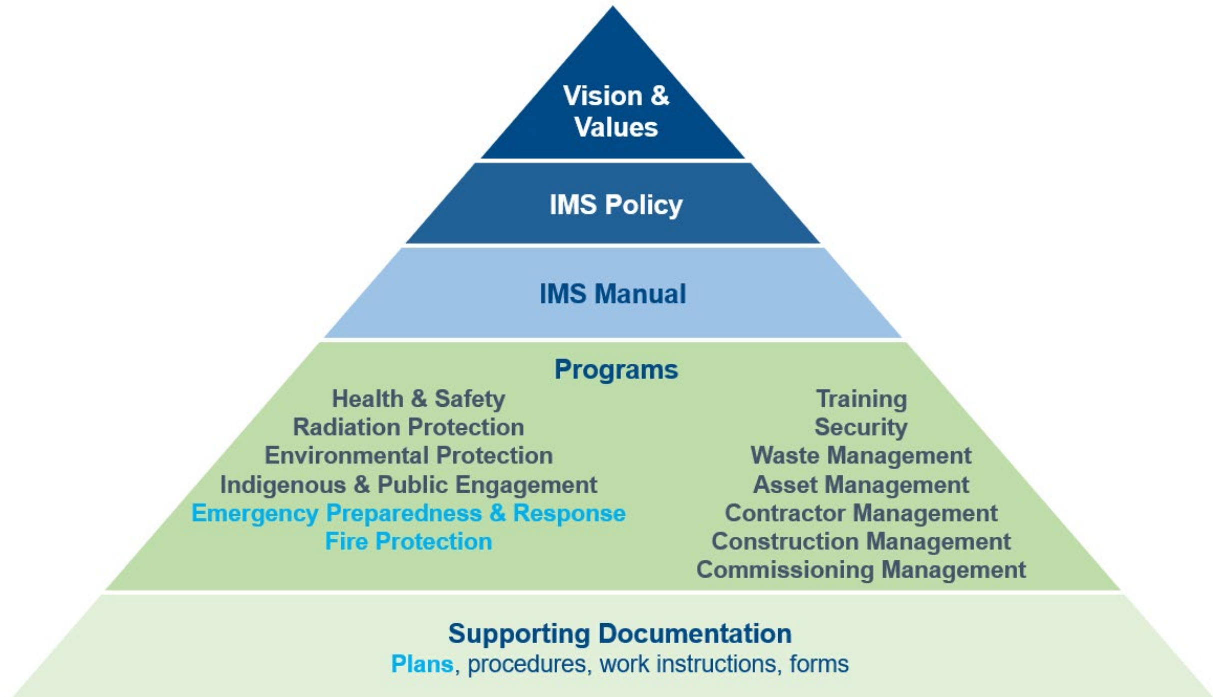


Figure 1: Integrated Management System Hierarchy

## 1.1 Purpose

This Plan describes the processes, roles and responsibilities, and resources (e.g., equipment) necessary to prevent, prepare for, respond to, and recover from ground transportation emergencies to and from the Project site. It includes measures to prevent and prepare for ground transportation emergencies, initial assessment, transportation emergency level classification, and measures to activate and deactivate emergency response resources.

This Plan has been developed to reflect the following principles, in priority order:

- the protection of human life;
- the protection of the environment; and
- the continued safe operation of the Project.

The health and safety of the Emergency Response Team and in-field support resources is of the utmost importance.

The Project is located in a remote area of northern Saskatchewan and exposed to adverse winter weather conditions, gravel roads, and regular vehicular traffic supplying the Project with goods, hazardous material, and services. This Plan reflects the Project's commitment to providing transportation emergency response support to protect human life, the environment, and property. The Plan also fulfills commitments to local communities when assistance requests do not adversely compromise the safety of Project or Emergency Response Team members.

## 1.2 Scope

The scope of this Plan applies to ground transportation emergencies that occur beyond the boundary of the Project site along the Project access road, Highway 955, and Highway 155.

The Plan accounts for the logistical challenges for responding to transportation incidents in remote areas. The Plan provides guidance on Project response to emergencies involving company vehicles as well as, on a discretionary basis, vehicles belonging to contractors, transport carriers, and the general public. The Plan also accounts for interfacing with private and local emergency response providers, suppliers, and local, provincial, and federal authorities.

As a component of the *Rook I Emergency Preparedness and Response Program*, this Plan is implemented in an integrated manner with the *Emergency Response Plan* and adopts common elements such as emergency response structures, roles and responsibilities, training, and equipment.

The Plan recognizes the primary responsibility of contractors, transport carriers, and suppliers for responding to traffic emergencies involving their fleet and managing their own products while in transport.

This Plan cannot provide all necessary details for all possible emergency situations. Therefore, personnel with the appropriate level of authority and competence are expected to make and execute decisions to react effectively to emergencies. The planning and resource identification provided herein is designed to provide important and useful guidance in any emergency.

Emergencies related to inbound or outbound aircraft are excluded from the scope of this Plan and are covered within the scope of the *Emergency Response Plan*.

The Plan is not a substitute for an *Emergency Response Assistance Plan* (ERAP). Transporting uranium concentrate beyond the boundary of the Project site is not within the scope of this Plan or the site preparation, construction, and commissioning phases of the Project. An ERAP developed in accordance with the *Transportation of Dangerous Goods* (TDG) *Regulations* and approved by Transport Canada will be in place prior to commencement of Project operations.

## 1.3 Framework

The Plan directly supports the *Rook I Emergency Preparedness and Response Program* and is used in conjunction with the related emergency response documents referenced and described herein (e.g., procedures, work instructions, forms).

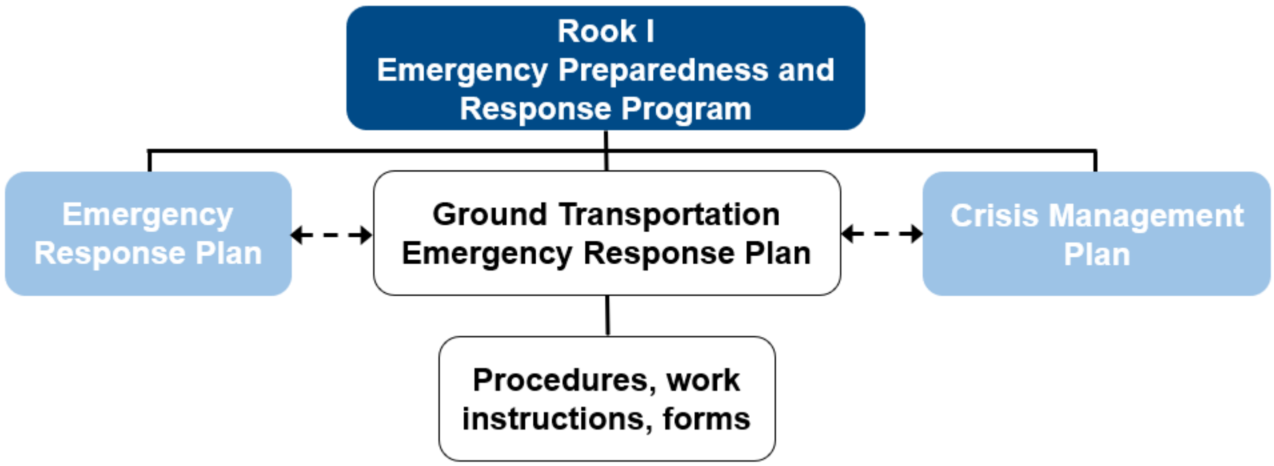


Figure 2: Emergency Preparedness Framework

### 1.3.1 Crisis Management Plan

This Plan is implemented in an integrated manner with the *Crisis Management Plan* as required and according to the unique characteristics of the transportation emergency.

A crisis is an abnormal event or situation which presents a significant risk to the Project, draws media attention, or could threaten public trust. Crises can be situations that are unexpected, unstructured, or outside the typical operational framework. Examples include, but are not limited to:

- multiple serious injuries;
- a fatality;
- significant security breach of the Project site;
- significant breach of information technology system;
- receipt of a bomb threat;
- serious civil disturbance on or adjacent to Project site or NexGen property;
- pandemic;
- disruption to business continuity; or
- a situation which poses an immediate threat to life or serious injury to persons at the Project site.

If a transportation emergency results in or has the potential to result in a crisis, the Incident Commander activates crisis response measures in accordance with the *Crisis Management Plan*. Additional detail regarding managing crisis situations is found in the *Crisis Management Plan.*

## 1.4 Structure

This Plan adopts a structure in accordance with the four phases or pillars of emergency management. The four phases or pillars make up a cycle of planning and action undertaken to reduce the impact of emergency situations. These four phases or pillars are:

- Prevention – actions taken to prevent or reduce the cause, impact, and consequences of any emergency that the site has control over, such as the Project access road and maintenance of company vehicles;
- Preparedness – a continual cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective actions;
- Response – coordinating and managing resources using the incident command system in reaction to the occurrence of a crisis or emergency; and
- Recovery – those activities that continue beyond the emergency to stabilize and restore critical functions with the objective of bringing the affected area back to normalcy.

## 1.5 Terminology

Terminology introduced in this Plan is provided below. A comprehensive list of common terms applicable to this Plan and the IMS are available in the *Rook I Project Glossary*.

**emergency** – A serious situation or occurrence that happens unexpectedly and demands immediate attention.

**emergency response organization** – A structure that assigns specific duties and responsibilities to all personnel involved in emergency operations.

**integrated management system (IMS)** – A common framework of programs, plans, procedures, work instructions, and other supporting documentation describing management system processes for achieving Project objectives and completing work safety, reliably, and consistently while conforming to internal requirements and complying with legal requirements.

**Project site** – Term used to describe all property within the physical NexGen Rook I boundary.

**systematic approach to training (SAT)** – A structured approach used to manage training programs widely known as an instructional design model.

**stand down order** – To withdraw from a state of alert or readiness and not be required to perform further action.

**vital record** – A record containing information critical to the continued operation or survival of an organization during or immediately following a crisis. Such records are necessary to continue operations without delay under abnormal conditions.

**work instruction** – A document that sets out the sequential steps for completing a particular task in a safe manner.

**worker** – Any person working for NexGen, including a contractor.

# 2.0 Hazard Identification

## 2.1 Transportation Hazards

The Project risk management process as outlined in the *Rook I Integrated Management System Manual* (IMS Manual) includes identifying Project-related hazards that could result in emergency situations, assessing the significance of the associated risks, and managing the risks to appropriate levels through the application of controls.

The emergencies listed below in Table 1 are representative of the range of ground transportation emergencies anticipated to be encountered.

Table 1: Emergency Hazards

| Accident Scenario | Details |
| --- | --- |
| Transportation Road Accident – Non-dangerous Goods | A road accident can involve inbound or outbound road traffic carrying non-dangerous goods where vehicle and/or medical assistance is required. |
| Transportation Road Accident – Dangerous Goods | A road accident can involve inbound or outbound road traffic carrying dangerous goods and/or requiring the containment of the dangerous good and/or medical assistance for those involved. |
| Transportation Road Accident – Passenger Vehicle | A road accident involving passenger vehicle(s) that may require an emergency response for medical assistance and/or to stabilize the accident scene until additional support arrives. |

# 3.0 Prevention

Emergency prevention outlines actions taken to prevent or reduce the cause, impact, and consequences of an emergency. Prevention of transportation accidents can be accomplished through the application of a variety of controls.

## 3.1 Design Controls

To reduce serious injury and environmental or property damage, safety features are built into the Project access road. The all-weather access road is constructed to meet width, weight, and speed limit requirements as set by the Project, and designed to accommodate approaching oncoming vehicles (e.g., visibility), right-of-way, and road dust.

## 3.2 Administrative Controls

The Project operates under the umbrella of the IMS Manual which provides a common framework for the management system processes that support the Project. This unified framework includes processes for implementing compliance measures, enabling continual improvement, and fostering a culture wherein protecting the health and safety of workers and preserving the environment are principal considerations guiding decisions and actions.

Administrative controls are an essential component of emergency prevention and are typically used in combination with other types of controls.

Administrative controls specific to the prevention of transportation accidents are detailed in following sub-sections.

### 3.2.1 Controlled Access to Access Road

The Project requires that all traffic entering or leaving the Project site check in with security at the gatehouse.

Road maintenance equipment notifies *security (to be confirmed)* when working on the access road, and the presence of this equipment is reported to any other traffic proceeding onto the access road. Road travellers departing the Project (e.g., NexGen, transport firms, private vehicles) will be advised by security at the gatehouse of road and weather conditions (i.e., snow, fog, ice).

Project staff are educated on traffic safety including considerations of the safety of other non-Project users of the access road. Local resource users (e.g., trappers, lodge and outfitting service providers) are notified (e.g., signage, verbal communication) that they are travelling near an industrial site and may be escorted when driving personal vehicles on the access road (as required).

### 3.2.2 Road Traffic Restrictions on the Access Road

Events such as an accident, road maintenance, inclement weather, or poor road conditions may result in issuance of a traffic restriction on the Project access road. The Project's *site services department or designate (to be confirmed)* is responsible for evaluating such events or conditions and issuing traffic restrictions such as speed limits, vehicle size limits, or road traffic interruption.

### 3.2.3 Emergency Response Assistance Plan (ERAP)

Certain high-risk dangerous goods shipped to site are to have an applicable *Emergency Response Assistance Plan* (ERAP) approved by Transport Canada.

The ERAP describes what to do in the event of an actual or anticipated release of certain higher-risk dangerous goods above the quantity specified in the TDG regulations while in transport. Each ERAP is specific to certain:

- dangerous goods;
- modes of transport (e.g., air, rail, road, marine);
- means of containment (e.g., containers, packaging) used to hold the dangerous goods; and
- geographical area in which the dangerous goods will be transported.

### 3.2.4 Contracting Transportation Providers

To identify and retain qualified contractors with a strong commitment to safety, a controlled processes for selecting and contracting services (including transportation services) is implemented for the Project.

Where dangerous goods are to be transported, the contractor selection process includes verification that carriers have established adequate emergency response capabilities, including a registered ERAP, when required under federal TDG regulations.

The process for procuring contracted transportation services is outlined in the IMS Manual.

### 3.2.5 Audits of Contracted Ground Transportation Providers

Regular audits are completed to evaluate fleet safety-related policies, programs, practices, procedures, vehicle maintenance standards, and driver training and qualifications to verify that the selected carriers continue to operate safely.

The process for completing these audits is outlined in the IMS Manual.

### 3.2.6 Driver Abstract and Commercial Driver Abstract

Transportation safety is dependent on qualified drivers operating vehicles in a safe manner. Driver abstracts are obtained as part of the onboarding process for all NexGen workers who may operate Project vehicles off-site to verify applicable driver qualifications and detect potential concerns with driver records.

Periodic validation of driver qualifications and the maintenance of an acceptable driving record is tracked as outlined in the *Rook I Training Management Program*.

Verification of acceptable driver abstracts for contractors and commercial driver abstracts for contract carriers is managed as outlined in the *Rook I Contractor Management Program*.

### 3.2.7 Communications

Company vehicles travelling off-site are provided with equipment allowing two-way communications with the Project. Drivers report to security at regular intervals *between the Project and (location to be confirmed)* or when operating on local roads around the Project site. Two-way radio access provides communication for transport carriers enroute to site in the event of a road accident.

Contractors and contract carriers are provided site contact information to be used when notifying the site of transport movements to and from the Project site, for obtaining current weather and road conditions, and in the event of a transportation emergency. It is the responsibility of contractors and contract carriers to communicate this information to their personnel and drivers, as appropriate. This information is described in the emergency response guideline *In-transit Notification and Communication Process* and outlined in the *Rook I Contractor Management Program*.

## 3.3 Operational Controls

Operational controls help in the prevention, early detection, and response to transportation emergencies that may occur. Operational controls are detailed in following sub-sections.

### 3.3.1 Road Inspection, Maintenance, and Repair

Proper inspection, maintenance, and repair of roadways reduces the risk of transportation emergencies by maintaining roadways to their safe design standards, and are completed in consideration for keeping worker health, safety, and well-being and in compliance with legal requirements.

The Project *site services department or designate (to be confirmed)* has responsibility for the regular inspection, maintenance (including dust control and winter maintenance such as snow clearing), and repair of the Project access road in accordance with defined plans. Further details on the approach to planning and completing maintenance activities on Project infrastructure including the access road are outlined in the *Rook I Asset Management Program*.

The Saskatchewan Ministry of Highways is responsible for the inspection, maintenance (including winter maintenance), and repair of provincial highways. These activities are outside of the control of the Project. Hazardous road conditions requiring attention can be communicated by the Project to the Saskatchewan Ministry of Highways.

### 3.3.2 Preventative Maintenance

Project passenger and heavy-duty vehicles are maintained in accordance with an asset maintenance strategy which uses a risk-based approach based on asset importance rankings to identify maintenance methodologies. Asset-specific maintenance requirements and frequencies are defined, documented, periodically reviewed, and revised (as required) according to the asset maintenance strategy. Vehicle maintenance work planning enables safe and consistent work to be performed to specified requirements. Further details on the approach to vehicle maintenance strategies are outlined in the *Rook I Asset Management Program*.

Pre-use inspections are required for all company vehicles prior to leaving the Project site.

Inspection and maintenance programs for contractor vehicles and contracted carriers are assessed as outlined in the *Rook I Contractor Management Program*.

### 3.3.3 Emergency Equipment

Company vehicles travelling off site are provided with emergency equipment (e.g., fire extinguisher, first aid kit, tire repair kit, booster cables) and supplies (e.g., candles, blankets, food), as appropriate.

### 3.3.4 Transport of Hazardous Materials

Transport shipments of hazardous material travel frequently to the Project site and less frequently from the Project site. These shipments include, but are not limited to:

- fuels;
- explosives;
- paints and solvents;
- lubricants;
- used oil;
- oxygen; and
- acetylene.

A contracted carrier (or other carriers as needed) transports these shipments from external suppliers or to external receivers (e.g., used oil). NexGen requires drivers to be trained and qualified in the materials they are transporting. As required, shipments of certain high-risk dangerous goods have an approved ERAP as described in section 3.2.3.

### 3.3.5 Regulatory Requirements

Project vehicles comply with relevant regulatory requirements of the Saskatchewan *Highways and Transportation Act, 1997* and associated regulations and the federal *Transportation of Dangerous Goods Act and Regulations,* as applicable. These include, but are not limited to:

- requiring dangerous goods training for shippers, truck drivers, and receivers;
- requiring a Transport Canada approved ERAP for the transportation of certain higher-risk dangerous goods to the Project;
- placarding of transport truck and trailers carrying dangerous goods;
- adhering to load restrictions and load securing requirements; and
- maintaining shipping documentation.

Naturally occurring radioactive material (e.g., mineralized core samples) are packaged and shipped in accordance with the requirements of the *Transportation of Dangerous Goods Act and Regulations* and the *Packaging and Transport of Nuclear Substances Regulations.*

Contractor vehicle and contracted carrier adherence to these requirements is assessed as outlined in the *Rook I Contractor Management Program*.

# 4.0 Preparedness

## 4.1 Emergency Response Organization

The Emergency Response Organization establishes clear roles and responsibilities for those involved in directing, coordinating, supporting, or responding to emergencies. It provides a consistent, clear, and predictable command structure that enables continued control over emergencies. The Emergency Response Organization consists of the site-based Incident Commander, subject matter experts, and field teams supported by organizational and external resources, as required. The Emergency Response Organization is adaptable and flexible to manage emergencies as conditions change. The Incident Commander activates various roles within the emergency response as required depending on the nature and size of the emergency.

It is recognized that an emergency, as it develops, will dictate personnel and equipment needs for an off-site transportation emergency response or mutual aid to another mine. The Incident Commander will assess the site circumstances, risks, and site coverage before committing personnel and equipment to assist with an off-site transportation event or assist another mine through mutual aid.

The Emergency Response Organization established for site-based emergencies is activated for transportation emergencies. Details of this structure and associated roles and responsibilities are outlined in the *Emergency Response Plan*.

Responsibility for in-field response to a transportation emergency rests with the Emergency Response Team. Subject matter experts such as environmental specialists, equipment operators, and maintenance personnel provide support where appropriate.

In a transportation emergency, as illustrated in Figure 3, the Emergency Response Team Captain reports to the Emergency Response Field Coordinator who, in turn, reports to the Field Operations Director at the Emergency Operations Centre. The Incident Commander retains overall responsibility for the response.

If the scene is or comes under the control of the RCMP, other regulatory authority, the carrier, or the carrier's emergency response provider, then the Emergency Response Team immediately notifies the Emergency Operations Centre and assumes a support role, providing support as agreed to between the Emergency Operations Centre and the controlling authority.

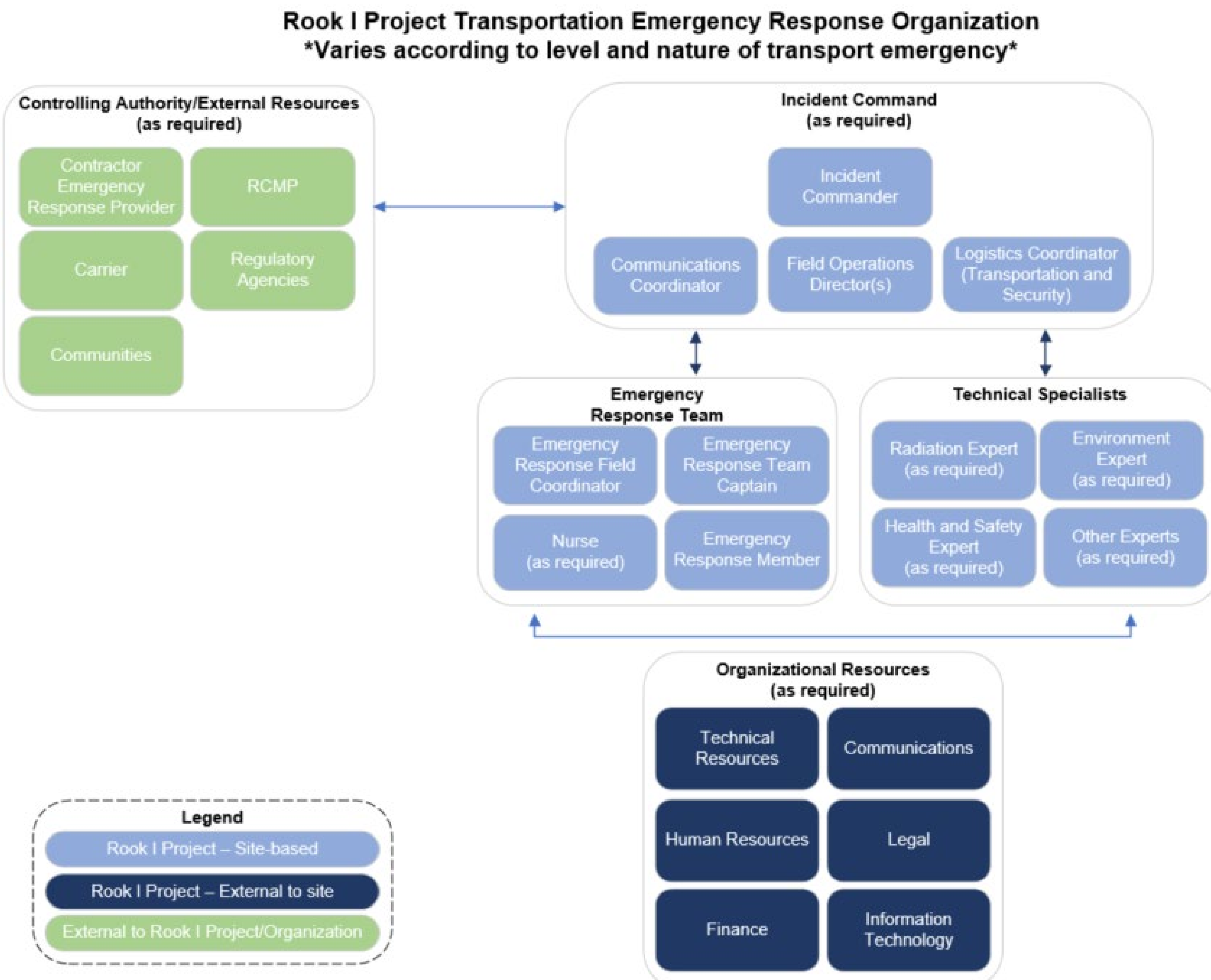


Figure 3 Transportation Emergency Response Organization

## 4.2 Training and Qualifications

The Project follows a systematic approach to training (SAT) to educate, train, and qualify workers to carry out the work assigned to them, including responding to emergencies. Training requirements are monitored as a means of providing workers with the training they require when they require it to maintain competency and work safely. Specific training requirements, including tracking worker credentials and qualifications for expiry, are defined and managed as outlined in the *Rook I Training Program*. Emergency response training is developed, delivered, and tracked within the SAT framework.

Incident Command and Emergency Response Team training developed for on-site emergencies also applies to transportation emergencies. Training for Emergency Response Team members is based on a variety of scenarios including vehicle accident, vehicle extrication, and hazardous materials response training.

## 4.3 Plan Testing

Plan testing is the periodic activation of select emergency response functions and processes using prepared scenarios and controlled conditions to determine the readiness of emergency responders, assess the adequacy of the Plan, and provide opportunities for the Emergency Response Team members to train with external resources.

Testing of response to ground transportation emergencies is incorporated into the scheduled plan of tabletop exercises, field drills, and full-scale complex exercises as outlined in the *Emergency Response Plan*.

External resources (e.g., local communities) and regulatory representatives are notified in advance of planned full-scale exercises and may attend to participate in and observe response and recovery to evaluate exercise performance and identify opportunities for continual improvement.

## 4.4 Transportation Emergency Response Facilities, Equipment, and Vital Records

The Project provides emergency response facilities, equipment, and materials suitable and adequate for required responses. Emergency response facilities, equipment, and materials are operated and maintained in a state of readiness at all times by competent and trained Emergency Response Team members.

Facilities, equipment, and material procured to enable Plan implementation are subject to the requirements outlined in the *Rook I Asset Management Program*. Equipment is stored, maintained, and calibrated with consideration of the frequency and type of use and the manufacturers' or stated regulatory specifications. These provisions include regular inspection, calibration, testing, maintenance, and replacement as required within formal systems of maintenance, quality, inventory control, and accounting.

Test, inspection, and maintenance results are documented and retained as outlined in the IMS Manual.

### 4.4.1 Facilities

Facilities established for on-site emergencies are outlined in the *Emergency Response Plan*.

No additional facilities are required for responding to ground transportation emergencies.

### 4.4.2 Equipment and Materials

Minimum emergency response equipment and material requirements for on-site emergency response are outlined in the *Emergency Response Plan*.

No additional facilities are required for responding to ground transportation emergencies.

The emergency response trailer, hazardous materials response materials, communications equipment, and heavy equipment are the primary resources used for ground transportation emergencies.

### 4.4.3 Vital Records

Vital records provide information used by the Emergency Operations Centre and the Emergency Response Team to effectively plan and execute emergency response. Vital records supporting emergency response include the latest version of *Transport Canada's Emergency Response Guidebook* and emergency call out lists.

Transport Canada's Emergency Response Guidebook provides first responders with a go-to manual to assist in dealing with hazardous materials transportation accidents during the critical first 30 minutes.

## 4.5 Plan Maintenance and Review

Changes to the Plan can be triggered by:

- changes in hazards;
- changes in resources;
- training and exercises;
- actual emergencies; and
- updates to emergency response contact lists.

At a minimum, the Plan is reviewed once a year to confirm it continues to meet regulatory requirements and Project requirements including continued suitability, adequacy, and effectiveness. The dates of these reviews are documented, even if no revisions to the Plan are required.

Changes identified in reviews are incorporated into the Plan, with changes to training, exercise planning, and resources made as required. All other changes are managed to protect worker health, safety, the environment, and property to promote consistent and effective Project process execution. This includes changes to:

- facilities;
- equipment;
- management system processes;
- organizational structure;
- key roles and responsibilities;
- documentation; and
- legal and other requirements.

Changes to the Plan are made in accordance with the general change management process as outlined in the IMS Manual. Changes to training are made as outlined in the *Rook I Training Program*.

## 4.6 Plan Distribution List

Controlled hard copies of the Plan are distributed as follows:

- Emergency Operations Centre – primary location;
- Emergency Operations Centre – secondary location;
- Security Gatehouse; and
- Saskatoon Office.

Additional copies of the Plan are considered uncontrolled documents, and as such, are not considered to be accurate.

# 5.0 Initiation

## 5.1 In-transit Missing Worker

Notification of an in-transit missing worker (e.g., failure to verify a routine check in) may be initiated or received by *security (to be confirmed)* or received by the *central control (to be confirmed).* All reports of in-transit missing workers are directed to the Incident Commander. The Incident Commander initiates the emergency response work instruction *In-transit Missing Worker*, which outlines requirements for additional attempts at establishing communications and procedures to initiate and implement search and rescue operations.

## 5.2 Notification of a Transportation Incident

The Project is notified of a ground transportation incident through *central control or security (to be confirmed) in* one of two ways:

- direct notification of a transport incident and assistance is requested (e.g., by radio, cell phone); or
- authorities (either local or through the carrier ERAP) are notified of a transport incident and the Project is notified and/or assistance is requested.

The *central control or security (to be confirmed)* logs the call and immediately contacts the Incident Commander (or alternate, if required) as identified in the up-to-date roster of emergency response personnel and provides details of the ground transportation emergency.

Further details on the role of *central control or security (to be confirmed)* in receiving, documenting, and responding to transportation incident calls is described in the emergency response work instruction *Managing Emergency Calls.*

# 6.0 Response

## 6.1 Immediate Action Decision Tree

The Incident Commander reviews information provided by the *central control or security (to be confirmed)* and completes a three-step decision process for determining the type of emergency response to provide which considers:

- location and distance from the site;
- severity of the emergency;
- parties involved; and
- requirements for the continued safe operation of the Project.

The Incident Commander decides the appropriate response level to provide while prioritizing Emergency Response Team health and safety and maintaining sufficient resources to support on-site emergency response coverage.

### 6.1.1 Location and Distance from the Site

Location and distance requirements are established in consideration of primary responsibility for the transportation corridor, ownership of and responsibility for the load, and the capabilities and location of alternate emergency response.

The following distance criteria are used as a first level screening of response to a transportation emergency.

## Access Road

- Respond to any ground transportation emergency requiring emergency response or the provision of in-field support.

A determination of parties involved is not required as the Project assumes responsibility for all traffic on the access road.

## Highway 955

- Respond to all ground transportation emergencies involving NexGen personnel.
- Respond to ground transportation accidents involving releases of hazardous materials carried by contractors or carriers working on behalf of the Project that require emergency response or in-field support.
- All other ground transportation incidents are subject to further review.

While contractors and carriers have primary responsibility for responding to transportation emergencies involving hazardous materials, NexGen has adopted a stewardship approach by providing initial tactical response and/or technical support for hazardous material emergencies, pending arrival of the contractor or carrier's emergency response service provider.

## Highway 155

Initiating response along Highway 155 is at the discretion of the Incident Commander with consideration for the nature, severity, and unique characteristics of the transportation emergency and the ability for other service providers to respond in a timely and effective fashion.

- Respond to all ground transportation emergencies involving NexGen personnel.
- Respond to ground transportation accidents involving releases of hazardous materials carried by contractors or carriers working on behalf of the Project that require emergency response or in-field support.
- All other ground transportation incidents are subject to further review.

While contractors and carriers have primary responsibility for responding to transportation emergencies involving hazardous materials, NexGen has adopted a stewardship approach by providing initial tactical response and/or technical support for hazardous material emergencies, pending arrival of the contractor or carrier's emergency response service provider.

## 6.1.2 Severity of Emergency

The following tables provide decision criteria to assist the Incident Commander in assessing the nature and severity of a ground transportation emergency and provide guidance on initial emergency response decisions. The Incident Commander is to also use these tables for transportation emergencies comparable but not specifically listed.

Table 2: Level III Transportation Emergency Response Level

| LEVEL III | |
|---|---|
| **Level III** – A serious emergency that could potentially escalate into a local or provincial emergency situation. Carrier and consignor ERAP has been activated, as applicable. | |
| **Decision Criteria** | |
| Health and Safety | • There has been loss of life.<br>• There has been life threatening, serious, and/or multiple injuries. |
| Environment | • Transportation spill or accident that poses a threat to public safety and/or the environment.<br>• There has been an unplanned discharge to sensitive habitat (e.g., water way). |
| **Immediate Actions for a Level III Emergency** | |
| Actions | • Activate Emergency Operations Centre.<br>• Activate Emergency Response Team.<br>• Activate Technical Resources (as required).<br>• Notify Organizational Resources.<br>• Notify External Support (as required) and regulatory agencies. |

Table 3: Level II Transportation Emergency Response Level

| LEVEL II | |
|---|---|
| **Level II** – A transport emergency with damage to tractor and/or trailer, with one or both inoperative, or a vehicle collision with minor first aid type injuries or potential for a release to the environment. The emergency can be controlled between the Project and the carrier/driver without assistance from the authorities or public emergency services. | |
| **Decision Criteria** | |
| Health and Safety | • Transportation accident requiring medical treatment and/or vehicle rescue.<br>• Stranded driver threatened by weather conditions. |
| Environment | • A transportation accident with loss of containment. |
| **Immediate Actions for a Level II Emergency** | |
| Actions | • Activate Emergency Operations Center.<br>• Activate Emergency Response Team.<br>• Activate Technical Resource (as required).<br>• Notify Organizational Resources (as required). |

Table 4: Level I Transportation Incident Response Level

| LEVEL I | |
|---|---|
| **Level I** – Minor road accident where there is no damage or minimal damage, and the situation is unlikely to escalate into a major transport emergency. Limited in-field support is required but there is no need to deploy the Emergency Response Team. | |
| **Decision Criteria** | |
| Health and Safety | • A transportation accident requiring assistance, no injuries. |
| Environment | • A transportation accident with no loss of containment of hazardous spill. |
| **Immediate Actions for a Level I Emergency** | |
| Actions | • Activate in-field resources.<br>• Place Emergency Operations Center on stand-by.<br>• Place Emergency Response Team on stand-by. |

### 6.1.3 Parties Involved

#### Response Initiated Irrespective of Parties Involved

In accordance with the location limitations in section 6.1.1, the Incident Commander initiates a response for the following ground transportation emergencies:

- for any Level III emergency involving NexGen, contractor, or carrier vehicles;
- for any emergency on the access road;
- when a NexGen worker is involved; and
- for transportation accidents involving releases of hazardous materials carried by contractors or carriers working on behalf of the Project that require emergency response or in-field support.

Response is initiated commensurate with the level of emergency. In the case of hazardous materials carried by contractors or carriers working on behalf of the Project, the carrier or contractor representative is notified to verify activation of their response and any tactical response implemented under this Plan is adjusted accordingly.

#### Project Contractors or Carriers

The Incident Commander contacts the contractor or carrier representative to determine the level of support required or requested. The Incident Commander determines the immediate level of response that can be provided by the contractor or carrier. Resources are deployed at the discretion of the Incident Commander in consideration of:

- requirements for the continued safe operation of the Project;
- the safety of the Emergency Response Team;
- the location limitations in section 6.1.1;

- the level of immediate response that can be provided by the contractor, carrier, or other emergency response providers; and
- the level of response required to safely secure the emergency scene pending further response by the contractor or carrier.

Emergency response support to contractors and carriers is provided with the understanding that the contractor or carrier has ultimate responsibility for these functions and NexGen is providing initial support to minimize the immediate impacts of the emergency.

### Third Parties

Third party (i.e., those with no direct relationship to the Project) requests may be received directly from the RCMP, potentially affected communities, drivers, or bystanders.

The Incident Commander will assess the request taking in consideration requirements for the continued safe operation of the Project, the safety of the Emergency Response Team, and NexGen's commitment to support the local communities. In these situations, resources are deployed at the discretion of the Incident Commander.

## 6.2 Activating the Emergency Response Organization

The Incident Commander contacts the *central control or security (to be confirmed)* to provide instructions on the resources to be activated. The *central control or security (to be confirmed)* notifies the required resources which respond in accordance with the requirements established and outlined in the *Emergency Response Plan*.

Note: For Level I incident, further implementation of the Plan is not required as long as the response remains at Level I. Resources respond as directed by the Incident Commander.

## 6.3 External Reporting of Emergencies

As soon as possible after receiving initial notification of a significant hazardous materials transportation accident or an accident involving serious injury or death, organizational resources are advised of the accident and thereafter are kept appraised of all subsequent activities related to the accident, response, cleanup, and impact. These notifications are the responsibility of the Incident Commander. Additional information on the accepted process for internal and external communication practices during emergencies and crises is outlined in the IMS Manual.

Depending on the nature of the emergency, regulatory reporting may be required.

The process for determining reporting requirements and associated reporting timeframes and for initiating and managing this reporting is outlined in the IMS Manual.

The Canadian Nuclear Safety Commission (CNSC) Duty Officer is notified of **all** events involving the activation of the Emergency Response Team as soon as it is considered safe and practical to do so.

The Communications Coordinator is responsible for making external report and notifications within prescribed reporting windows during the emergency.

If the Emergency Response Team is assisting the RCMP or a private citizen, a formal call to regulators other than the CNSC Duty Officer is not required. The RCMP maintain protocols to notify the appropriate authorities.

## 6.4 Responding to Emergencies

The Emergency Response Team assesses the emergency, develops, and implements a tactical response plan based on their training and knowledge which determines team resources, equipment, and materials required for response.

While the Emergency Response Team is loading response equipment in preparation for departure, the Emergency Response Field Coordinator reaffirms the information available regarding the reported emergency. The Emergency Response Field Coordinator and Field Operations Director discuss necessary response equipment including heavy duty equipment, and specific personnel such as environment specialists and equipment operator(s).

In preparation for the Emergency Response Team to leave site, weather and road conditions are reviewed to determine appropriate precautions to take prior to and during travel to the emergency site.

The Emergency Response Team will establish frequent and planned communication during travel to the emergency scene reporting back to the Emergency Operations Centre.

Emergency Response Team safety is the first priority and this is emphasized at the team safety briefing at the scene before the work is undertaken.

Throughout the tactical response, the Emergency Response Team maintains ongoing communications (e.g., radio, phone) between the field and the Emergency Operations Centre through the Emergency Response Field Coordinator and Field Operations Director.

Upon arrival at the accident scene and from a safe distance, an assessment is made of the accident to determine:

- the need to rescue anyone from the vehicle(s) and provide medical assistance (e.g., health and safety);
- the dangerous goods being transported by the vehicle(s) (e.g., environmental hazards); and
- any other immediate hazards which must be dealt with (i.e., traffic control, site-specific hazards, weather conditions).

Results of this assessment, along with information on other parties present, are communicated to the Emergency Operations Centre by the Emergency Response Field Coordinator or designate and may result in a request for additional response equipment (e.g., ambulance, fire truck, heavy equipment, local resources). Well-taken pictures help to provide clear and graphic evidence of vehicle positioning and damage, and extent of any spills. Photos provide critical visual communication to the Emergency Operations Centre, contractor or carrier, and other interested parties (e.g., provincial regulators) on the visual the extent of damage and required equipment and cleanup. Recording of all activities, monitoring, and sampling continues and includes taking appropriate photos.

Responsibility for directing the tactical response of the Emergency Response Team is dependent on the party in control of the scene at a given point in time.

### 6.4.1 Authorities in Control of Scene

If the scene is or comes under the control of the RCMP or other regulatory authority, the Emergency Response Team immediately notifies the Emergency Operations Centre and assumes a support role, providing support as agreed to between the Emergency Operations Centre and the controlling authority.

The Emergency Response Team stands down when directed by the controlling authority.

Site cleanup and vehicle recovery is the responsibility of the authorities unless agreed upon by the Incident Commander, Field Operations Director, and the authorities.

### 6.4.2 Carrier or Contractor Responders in Control of Scene

For emergencies involving contractor or carrier vehicles, if the scene is or comes under the control of the carrier or contractor emergency response providers, the Emergency Response Team immediately notifies the Emergency Operations Centre and assumes a support role, providing support as agreed between the Emergency Operations Centre and contractor or carrier emergency response provider.

The Emergency Response Team stands down when directed by the contractor or carrier emergency response provider.

Site cleanup and vehicle recovery is the responsibility of the contractor or carrier response provider unless agreed upon by the Incident Commander, Field Operations Director, and the authorities.

### 6.4.3 Emergency Response Team in Control of Scene

If the Emergency Response Team has control of the scene, they secure the emergency location (e.g., traffic controls), complete an on-scene assessment, assess risks, and develop and implement a tactical response plan based on their training and knowledge with the goal to treat injuries and prevent further deterioration at the scene.

As appropriate for the accident vehicle(s) and the response vehicles, warning devices such as barricades are placed on the road to alert approaching vehicles of the activities on or near the road. This may also involve the need for security or others acting as a flag person. Consideration is also given to stopping traffic prior to reaching the accident scene and/or stopping traffic from entering the Project access road.

For emergencies with a radiation exposure hazard, the Emergency Response Team, and the Emergency Operations Centre rely on radiation subject matter experts to effectively coordinate the radiation protection aspects of an emergency. Exposures to responders, persons directly involved in the emergency, and the public (if applicable) are kept as low as reasonably achievable (ALARA), and radiation protection processes outlined in the *Rook I Radiation Protection Program* and *Rook I Radiation Code of Practice* are followed.

Emergency Response Team members are expected to make tactical-level field decisions, subject to oversight by their Team Captain acting under the direction of the Emergency Response Field Coordinator.

At all times during the emergency, the ultimate decision-making authority resides with the Incident Commander and is delegated as appropriate to Field Directors, to Field Coordinators, to Team Captains, and then to team members.

After the immediate priorities are dealt with, cleanup of any spilled material will be undertaken.

For emergencies on the access road and those involving company vehicles and product, site cleanup, and recovery of company vehicles is the responsibility of NexGen.

Cleanup activities are under the supervision of the environment expert. The Emergency Response Team may continue this work or may be replaced by other personnel including transport carrier personnel.

The environment expert is assigned to carry out monitoring and sampling and to verify that specific cleanup activities are sufficient to return the impacted areas to either their pre-accident condition or to some agreed to criteria.

For third party contractor or carrier vehicle emergencies, site cleanup and vehicle recovery are the responsibility of the authorities or contractor carrier vehicle, respectively, unless agreed upon by the Incident Commander, Field Operations Director, and authorities. The authorities and contractor carrier are notified in these circumstances if they have not arrived at the scene prior to departure of the Emergency Response Team.

Upon completion of emergency response activities, the Incident Commander, in consultation with Field Operations Director, orders the Emergency Response Team to stand down.

## 6.5 Stand Down

Upon receiving the stand down order, the Emergency Response Team terminates response activities, demobilizes response equipment, returns to the Project site, and returns equipment to the *Emergency Response Team (ERT) Facility*.

Prior to standing down, the Incident Commander, or the controlling authority or contractor or carrier emergency response provider if agreed to by the Incident Commander, may direct the Emergency Response Team to assist in securing and preserving the scene for post-accident investigation. For scenes under the control of a controlling authority or contractor or carrier emergency response provider, control of the scene is relinquished by the Emergency Response Team. If the scene is controlled by the Emergency Response Team, control of the scene is managed as directed by the Incident Commander.

Should preservation on the scene be required, particular care must be exercised to preserve evidence in its original state.

## 6.6 Post-Emergency Notifications, Debriefs and Investigations

Timely post-emergency follow-up is necessary to capture and preserve critical response information, notify regulatory agencies within the prescribed timeframes, and evaluate response effectiveness to:

- identify lessons learned;
- inform opportunities to improve response and prevent emergencies from recurring; and
- inform Plan review and revision.

Following any response to a ground transportation emergency, the Incident Commander is responsible for verifying required initial notifications were made and the response is subject to documented reviews.

### 6.6.1 Regulatory Notifications

Depending on the nature of the emergency, additional post-emergency notifications and follow-ups with regulatory agencies may be required.

Requirements for post-emergency notification and follow-up and the process for making these are outlined in the IMS Manual.

### 6.6.2 Team Debriefs

The Emergency Response Team conducts a debrief of the emergency as soon as reasonably practical, but within 24 hours following the stand down order, if possible. The debrief should discuss:

- review of the response;
- what went well;
- what needs to improve; and
- what lessons were learned.

Team debriefs are to be documented on the emergency response *Emergency Debrief Form*.

### 6.6.3 Emergency Operations Centre Debriefs

The Incident Commander conducts a debrief of the emergency as soon as reasonably practical but within 24 hours, if possible, following return to the Project site. The debrief should discuss:

- review of the response;
- what went well;
- opportunities for improvement; and
- lessons learned.

These debriefs are to be documented on the emergency response *Emergency Debrief Form*.

### 6.6.4 Investigation of the Emergency

The need for a post-accident investigation depends on the circumstances of the emergency.

Emergencies on the access road and any emergency involving a company vehicle or worker on a public highway are investigated.

Responsibility for investigating emergencies on a public highway involving a contractor vehicle, transport carrier enroute to or from the Project, or private vehicle rests with the RCMP and contractor or transport carrier. The Incident Commander can decide to complete an investigation of an emergency on a public highway involving a contractor vehicle or transport carrier.

The investigation and corrective action processes are triggered and complete as outlined in the IMS Manual.

Contractors or transport carriers provide copies of any investigations they complete to the Project to review during lessons learned.

Activation of the Plan triggers a review of the Plan as detailed in section 4.5.

## 7.0 Recovery

Post-emergency recovery activities are initiated as soon as practical. The Emergency Operations Centre remains functional until such time as the Emergency Response Team departs the scene. Additional recovery and remediation may be required after this point.

The process of evaluating recovery requirements begins at the time of the emergency or crisis.

Action taken during response operations should be decided, whenever possible, with post-emergency recovery in mind.

Recovery operations include:

- resumption of business;
- site remediation and restoration;
- worker assistance; and
- litigation management.

## 7.1 Resumption of Business

An emergency may adversely affect construction and commissioning activities. This effect may be felt for an extended period of time, depending on the severity of the emergency. Impairment to business under the direct control of the Project in a ground transportation emergency is generally limited to damage to the access road. Resumption of normal operations requires clearance and restoration of this road.

The Incident Commander, in consultation with organizational resources commence with plans to restore the Project to normal operations as soon as possible after the emergency. Some planning and implementation activities can commence while the emergency is still being responded to, depending on the situation.

## 7.2 Site Remediation

Remediation of the emergency site should begin as soon as possible under the direction of authorities in control of the scene.

If immediate cleanup is not possible, areas with chemical or radiological contamination are managed if possible, pending remediation to minimize precipitation impacts and spreading of contamination.

Cleanup activities are under the supervision of the environment expert. The Emergency Response Team may continue this work or may be replaced by other personnel including transport carrier personnel or other resources under the direction of a regulatory authority. The environment expert is assigned to carry out monitoring and sampling and to ensure that specific cleanup activities are sufficient to return the impacted areas to either their pre-accident condition or to established criteria.

Contaminated materials and wastes generated during site remediation that are the responsibility of the Project are managed as outlined in the *Rook I Environmental Protection Program* and *Rook I Waste Management Program*, respectively.

## 7.3 Worker Assistance

Worker assistance processes established for an on-site emergency apply to ground transportation emergencies and are outlined in the *Emergency Response Plan*.

## 7.4 Litigation

Litigation processes established for an on-site emergency apply to ground transportation emergencies and are outlined in the *Emergency Response Plan*.

# 8.0 Communications

Communication processes established for an on-site emergency apply to ground transportation emergencies and are outlined in the *Emergency Response Plan*.

# 9.0 Records

Records associated with activities in this Plan are managed as outlined in the IMS Manual.

# 10.0 Documents and References

## 10.1 Internal References

| Document Number | Document Title |
|---|---|
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-EMG-PGM-00001 | *Rook I Emergency Preparedness and Response Program* |
| ROOK-EMG-PLN-00001 | *Emergency Response Plan* |
| ROOK-EMG-PLN-00003 | *Crisis Management Plan* |
| ROOK-EMG-WIN-00029 | *In-transit Missing Worker* |
| ROOK-EMG-WIN-00019 | *Managing Emergency Calls* |
| ROOK-EMG-GDE-00003 | *In-transit Notification and Communication Process* |
| ROOK-EMG-FRM-00002 | *Emergency Debrief Form* |
| ROOK-TRN-PGM-00001 | *Rook I Training Management Program* |
| ROOK-CON-PGM-00001 | *Rook I Contractor Management Program* |
| ROOK-AST-PGM-00001 | *Rook I Asset Management Program* |
| ROOK-RAD-PGM-00001 | *Rook I Radiation Protection Program* |
| ROOK-ENV-PGM-00001 | *Rook I Environmental Protection Program* |
| ROOK-WST-PGM-00001 | *Rook I Waste Management Program* |
| ROOK-RAD-COP-00001 | *Rook I Radiation Code of Practice* |

## 10.2 External References

| Document Number | Document Title |
|---|---|
| REGDOC 2.10.1 | *Nuclear Emergency Preparedness and Response, Version 2.* |
| SOR/2000-202 | *General Nuclear Safety and Control Regulations* |
| SOR/2000-203 | *Radiation Protection Regulations* |
| S.C. 1992, c. 34 | *Transportation of Dangerous Goods Act, 1992* |
| SOR /2001-286 | *Transportation of Dangerous Goods Regulations* |
| N/A | *Saskatchewan Environmental Code* |
| R.S.C., 1985, c. F-14 | *Fisheries Act* |
| SC 1999, c. 33 | *Canada Environmental Protection Act, 1999* |
| H-3.01 | *Highways and Transportation Act, 1997* |

# Fire Protection Program

# ROOK-FIR-PGM-00001

NexGen Energy Ltd.

# Rook I Project

## Fire Protection Program

ROOK-FIR-PGM-00001

December 2022

# Record of Revisions

| Version. No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| 0 | 15-Dec-2021 | Issued Final | Jon Henderson | Kevin Oakes | Tony George |
| 1 | 21-Dec-2022 | Issued Final | Jon Henderson | Rob Paine | Luke Moger |

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# 1.0 Introduction

The *Rook I Fire Protection Program* (Program) outlines the systematic and risk-based approach to fire protection at the NexGen Energy Ltd. (NexGen) Rook I Project (Project). It provides the framework and describes the processes for maintaining compliance, enabling continual improvement, and supporting effective fire prevention, control, and mitigation.

This Program is part of the *Rook I Integrated Management System* (IMS) and is subject to the *Rook I Integrated Management System Policy* which provides the foundation for NexGen's approach to fire protection. The Program and its relationship to other IMS programs within the IMS hierarchy is shown in Figure 1. As a component of the IMS, this Program follows the Plan-Do-Check-Act cycle to identify, control, monitor, and continually improve fire protection processes.

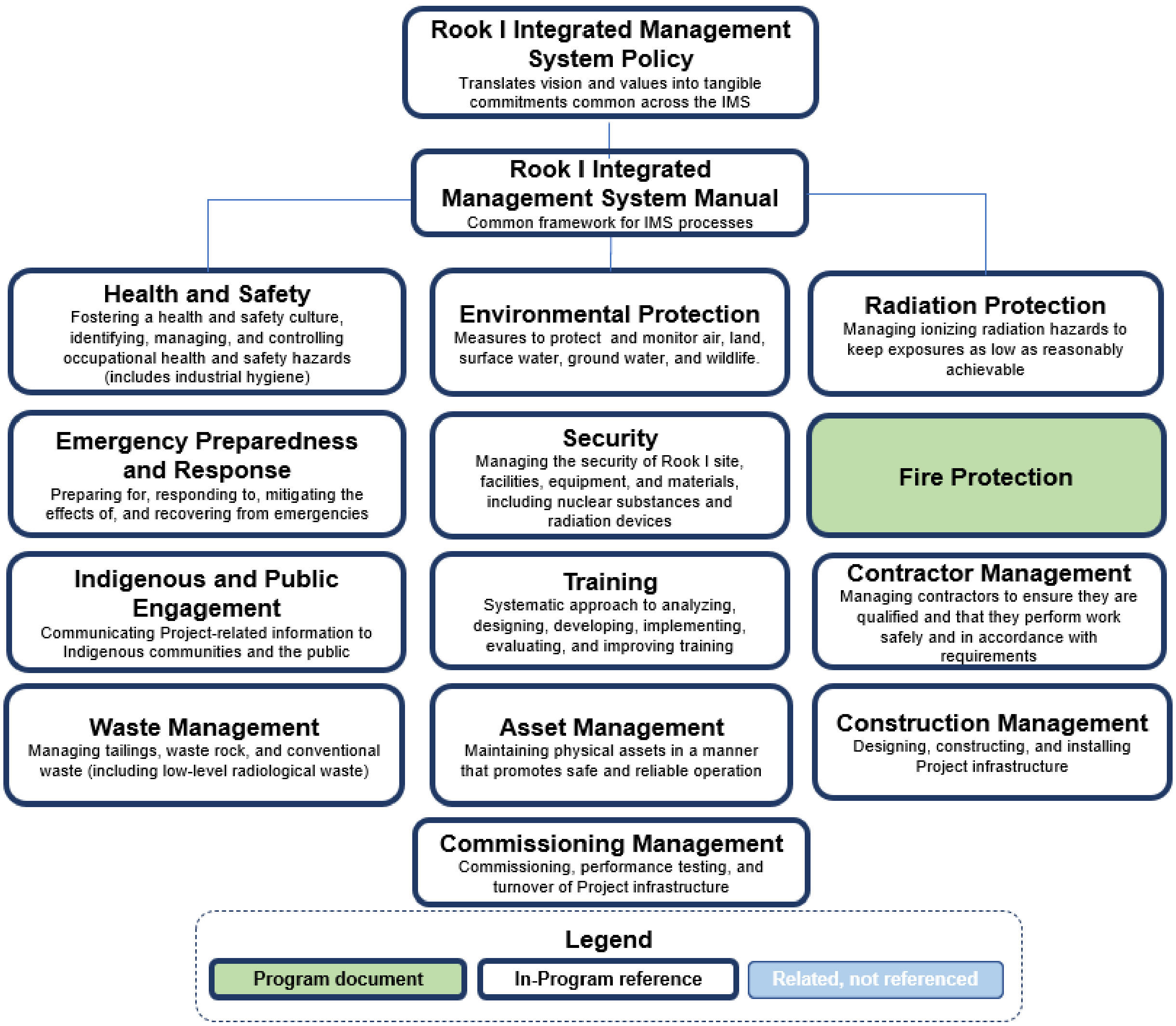


Figure 1: Program Context Within the IMS

## 1.1 Purpose

This Program describes the principles, processes, and framework used to effectively achieve and enhance fire safety, and to maintain protection of human health and safety, the environment, and Project infrastructure before, during, and after fire emergencies. It includes measures for fire prevention, planning, detection, control, and mitigation.

This Program aligns with and meets all requirements of the references outlined in section 6.0, including the *Nuclear Safety and Control Act* and associated regulations, the Canadian Nuclear Safety Commission (CNSC) *REGDOC 2.10.2 Fire Protection*, and CSA *N393 Fire protection for facilities that process, handle, or store nuclear substances*.

## 1.2 Scope

The scope of this Program includes planning, delivering, evaluating, and improving Project processes for effectively managing and continually improving fire prevention, protection, and response for on-site -Project related licensed activities during the site preparation, construction, and commissioning phase of the Project. The processes outlined in this Program apply to all Project workers, and visitors.

This Program uses a graded, risk-based approach to implementing fire protection processes that account for the level of risk, safety significance, and complexity of the activity.

This Program is implemented in an integrated manner with the *Rook I Emergency Preparedness and Response Program* which outlines measures to prevent, plan for, respond to, and recover from surface and underground emergencies including fire emergencies associated with the Project as described in section 2.3. Responding to wildfires that threaten the Project is addressed under the *Emergency Response Plan* and is not included in this Program.

The mining of uranium ore and the production of uranium concentrate are not within the scope of this Project phase. This Program and its supporting processes are subject to periodic review and will be revised (as required) to maintain measures necessary to manage uranium ore and uranium concentrate safely and securely.

## 1.3 Program Principles

NexGen recognizes the importance of effective fire protection in minimizing the impact of fire on the health and safety of workers, the environment, and Project infrastructure. NexGen’s approach to fire protection is reflected in the following principles:

- promoting fire safety to minimize, to the extent practical, the frequency of fire emergencies as well as their potential impacts;
- protecting and promoting the health, safety, and well-being of people, the environment, and property through all aspects and phases of the Project;
- establishing a strong health, safety, and environment culture which is periodically assessed and continually improved;
- verifying workers have the knowledge, skills, and tools to safely perform their duties;
- keeping the risk of radiological or hazardous material releases and adverse impacts as low as reasonably achievable;
- complying with applicable requirements; and
- continually improving Program performance.

## 1.4 Defence in Depth

This Program adopts a defence in depth approach to fire protection through a combination of engineered (e.g., facility design, fire detection, suppression systems) and administrative (e.g., combustible material management, inspections, training) controls. As shown in Figure 2, this philosophy consists of the following levels:

- I: Preventing fire
- II: Fire detection and suppression
- III: Limiting the effects of fire
- IV: Controlling and mitigating fire events
- V: Mitigating of fire consequences

Defence in depth provides redundancy, diversity, and balance in fire protection measures to verify that human health and safety, the environment, and Project infrastructure remain protected from fire emergencies throughout the Project life cycle. Defence in depth controls are further discussed in section 3.1.

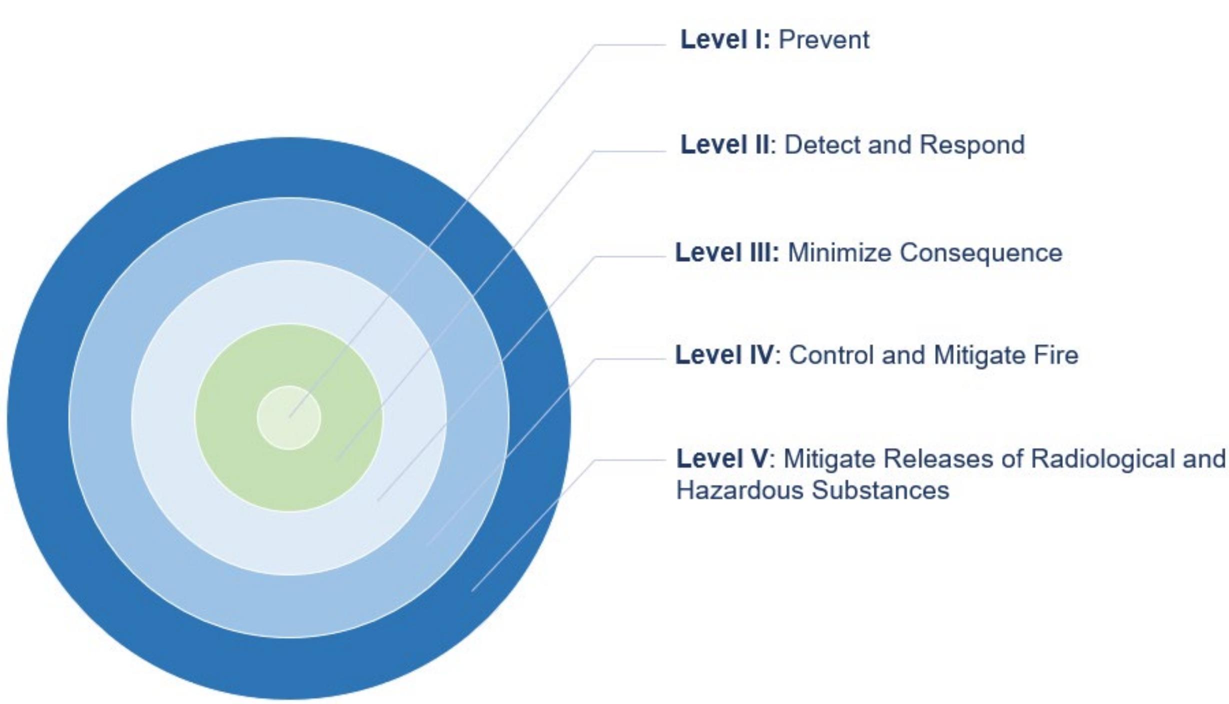


Figure 2: Defence In Depth Approach to Fire Protection

## 1.5 Terminology

Terminology introduced in this Program is provided below. A comprehensive list of common terms applicable to this Program and the IMS are available in the *Rook I Project Glossary*.

**audit** – Systematic, independent, and documented process for obtaining objective evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled (ISO 19011).

**combustible material** – A material that, in the form and under the conditions in which it is likely to be used, will ignite, support combustion, or release flammable vapours when subjected to fire and heat.

**fire prevention** – Measures directed toward avoiding the inception of fire.

**fire protection** – Methods of providing for fire control or fire extinguishment.

**integrated management system (IMS)** – A common framework of programs, plans, procedures, work instructions, and other supporting documentation describing management system processes for achieving Project objectives and completing work safety, reliably, and consistently while conforming to internal requirements and complying with legal requirements.

**licensed activities** – Project activities within the scope of CNSC licensing. Project site-based activities that may be outside the scope of CNSC licensed conditions are subject to the integrated management system on a risk-informed basis (i.e., where the consequence of human error poses a risk to the environment, the health and safety of people, or to the security of Project facilities).

**prime contractor** – Entity responsible for overseeing the safe execution of all work on site within the scope of a defined construction project, who is either the owner of the worksite or a contractor who has entered into a written agreement with the owner to perform the duties of prime contractor.

**Project site** – Term used to describe all property within the physical NexGen Rook I boundary.

**systematic approach to training (SAT)** – A structured approach used to manage training modules widely known as an instructional design model.

**technical change** – Any modification that alters the physical arrangement, process function, or operational procedure of an asset from its original design in terms of configuration, capacity, operation, or function, or is determined to be a technical change by Rook I management.

**worker** – Any person working for NexGen, including a contractor.

# 2.0 Plan

The *Plan* component of this Program includes processes that support a systematic, risk-based approach to preparing for fire emergencies when planning Project activities. Planning processes include:

- identifying and communicating hazards that may result in fire emergencies and assessing the associated risks;
- identifying methods for the early detection of fire emergencies;
- setting Program-specific objectives and targets to implement Program processes;
- preparing for fire emergencies;
- providing the appropriate parties with the information and resources necessary for responding to fire emergencies;
- verifying workers are competent and adequately trained to perform work and support fire response;
- communicating relevant information about fire prevention, protection, and response to appropriate parties; and
- managing change to process, personnel, design, facilities, and equipment.

## 2.1 Risk Management

The risk management process includes identifying Project-related hazards that could result in fire emergencies, assessing the significance of the associated risks, and managing the risks to acceptable levels through the application of controls as described in section 3.1.

The multi-layered approach to routinely and effectively managing risks of fire protection for workers and the environment is outlined in the *Rook I Integrated Management System Manual* (IMS Manual). Program-specific risk assessment methodologies (e.g., fire hazard assessment) are described in section 2.1.1.

### 2.1.1 Fire Hazard Assessments

A fire hazard assessment is an evaluation of potential fire hazards (e.g., combustion, ignition sources) and the controls that are in place to mitigate their effects. Fire hazard assessments provide inputs to Project design and confirm that a facility and the established protocols, processes, and practices are adequate to maintain protection of human health and safety, the environment, and Project infrastructure.

The fire hazard assessment covers all Project surface infrastructure and locations, including those that handle, process, and store nuclear substances. Topics of interest include:

- Project layout;
- inventories, storage configurations, and control measures for hazardous, combustible, toxic, radioactive, and explosive materials;
- fire barriers and separations;
- fire detection and mitigation measures;
- fire response equipment and infrastructure; and
- the effectiveness, appropriateness, and reliability of the fire protection measures in meeting the goals and safety performance criteria of this Program.

Fire hazard assessments are prepared, reviewed, and updated by a qualified individual at least once every five years or as a result of significant changes to surface facilities and infrastructure that may impact fire hazards and fire protection systems as described in section 2.9. The results of fire hazard assessments are documented and submitted to the CNSC.

### 2.1.2 Code Compliance Review

A code compliance review is a third-party assessment of Project design and operation against applicable codes and standards (e.g., the National Building Code of Canada) to confirm whether requirements are met.

This includes reviewing fire protection structures, systems, and components such as:

- suppression systems (e.g., water supply reticulation and pumps);
- detection systems;
- manual fire suppression equipment (e.g., portable fire extinguishers, hose stations, fire hydrants);
- storage, supply and use of flammable liquids and gases; and
- fire protection features (e.g., fire separations, fire doors, penetration seals).

Code compliance reviews are prepared, reviewed, and updated by a qualified individual as required or as a result of significant changes to surface facilities and infrastructure that may impact fire hazards and fire protection systems as described in section 2.9.1. The results of code compliance reviews are documented and submitted to the CNSC.

## 2.2 Pre-Incident Planning

Pre-incident planning includes systematically evaluating Project infrastructure and Project to identify attributes that could cause the start of or spread fire emergencies and influence effective response.

Pre-incident planning includes evaluating the following factors under emergency conditions:

- building location, construction, complexity, size, and occupancy;
- type, quantity, and location of hazardous and nuclear substances;
- susceptibility to natural disasters;
- protection of safety-related systems and equipment;
- fire protection systems and water supply;

- capability and availability of the emergency response team;
- manual fire suppression priorities; and
- backup system requirements.

Pre-incident plans are documented and provided to emergency response team members. Pre-incident plans are readily available during fire emergencies to tailor response, control, and mitigation measures to the unique conditions of the fire's setting and the surrounding area.

Pre-incident plans are updated as required to reflect changes in facility configuration, hazards, and systems. In addition, pre-incident plans are reviewed according to the frequency defined by the associated process documentation for accuracy and are managed in accordance with the document management process outlined in the IMS Manual.

The process for preparing and updating pre-incident plans is described in the fire protection procedure *Pre-Incident Planning*.

## 2.3 Emergency Preparedness and Response

The *Rook I Emergency Preparedness and Response Program* describes the framework, principles, and processes used to prevent, plan for, effectively and safely respond to, and mitigate the effects of emergencies associated with the Project. Emergencies include fires resulting from both natural (e.g., lightning strikes) and human-made causes (e.g., accidental ignition, equipment malfunction).

The framework described in the *Rook I Emergency Preparedness and Response Program* is further detailed in three supporting plans that outline actions to be taken in the event of an emergency or crisis:

- The *Emergency Response Plan* describes Project emergencies that occur on surface (including wildfire emergencies) and within the underground mine.
- The *Ground Transportation Emergency Response Plan* describes ground transportation emergencies that involve injury or hazardous substances and dangerous goods.
- The *Crisis Management Plan* describes crisis events that present broad risks to the Project, draw widespread media attention, or could threaten public trust.

These plans have been developed with consideration for the requirements of this Program and are essential components of effective fire protection as described in Figure 3.

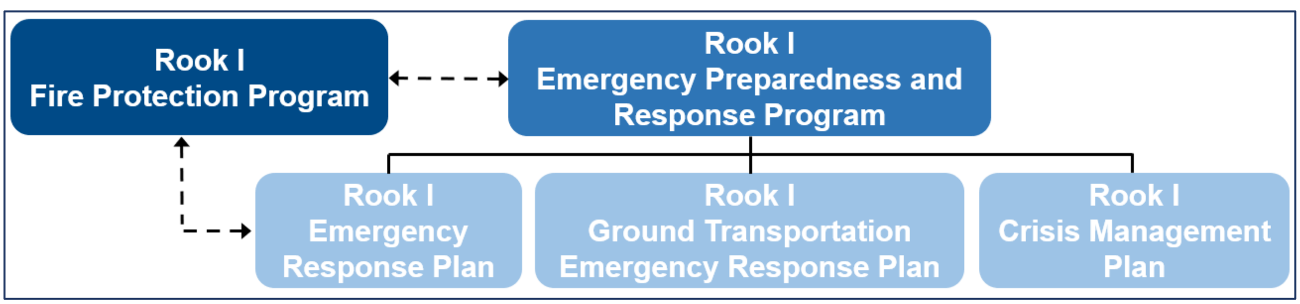


Figure 3: Fire Protection and Emergency Response Plans

The plans are an important source of information for preventing, detecting, responding to, controlling, and mitigating the effects of fire, including:

- measures to protect workers, and visitors;
- emergency response team composition and training requirements;
- criteria and mechanisms (e.g., alarms) for triggering the activation of response activities;
- details of actions to be taken to effectively respond to and control emergencies;

- emergency response resources and facilities, equipment, and supplies (e.g., fire equipment, fire truck);
- incident command structure, delegation of authority, and roles and responsibilities;
- availability of vital information during an emergency (e.g., Project drawings, pre-incident plans);
- response interface with external emergency services;
- communication protocols (including timelines) with regulatory agencies, local Indigenous groups, local communities, and the public;
- recovery steps to restore the Project site to normal operations;
- testing requirements (e.g., tabletop and full-scale exercises);
- protection of vital records and equipment; and
- mechanisms for evaluating the effectiveness of the plan.

### 2.3.1 Fire Response Needs Analysis

A fire response needs analysis confirms that the Project has the capability and resources required to effectively respond to fire emergencies. It is a documented evaluation that includes determining credible fire scenarios (e.g., type, size, location), estimating the potential impacts, and identifying the workers and equipment necessary to control and mitigate the effects of a fire. It includes, but is not limited to, an evaluation of:

- fire risks;
- pre-incident plans;
- response capability;
- firefighting equipment;
- training and qualifications;
- incident management; and
- emergency response exercises.

The results of the fire response needs analysis are documented and submitted to the CNSC. The process for performing a fire response needs analysis is further described in the fire protection guideline *Fire Response Needs Analysis*.

## 2.4 Objectives and Targets

Program objectives and targets are established at regular intervals, linked to clear accountabilities, and monitored for status to completion. Objectives and targets are tangible, documented actions that result in improvements to fire prevention, preparedness, response, and mitigation processes and Program outcomes.

Setting and managing objectives and targets, including establishing monitoring measures, is outlined in the IMS Manual.

## 2.5 Resources

Rook I management is committed to providing the necessary resources to establish, implement, maintain, and continually improve this Program and its supporting plans and associated processes. In addition to providing the required financial resources to achieve objectives and meet requirements, management provides the infrastructure, work environment, and competent workers necessary to implement this Program's fire protection processes. Necessary support services are provided as required.

### 2.5.1 Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Program. Workers are informed of their roles and responsibilities and are accountable for understanding and fulfilling them. The Project prime contractor performs their role in accordance with the scope and requirements of this Program and its supporting information and as required in accordance with *The Saskatchewan Employment Act*.

Although NexGen maintains overall accountability for Project activities, the term Rook I is used in the following role descriptions to reinforce that the role is applicable and may be assigned to NexGen employees and contractors performing work on behalf of the Project.

#### NexGen Executive

NexGen executive is accountable for:

- establishing the direction, strategy, and policies of the organization;
- promoting behaviours that support a robust health and safety culture;
- promoting the understanding that safety, including fire protection safety, is a principal consideration guiding decisions and actions;
- communicating with external stakeholders during emergencies and crises situations, as appropriate; and
- providing adequate resources to deliver the requirements of this Program.

#### Rook I Management

Rook I management is accountable for:

- demonstrating and promoting a culture where health and safety, including fire protection safety, is a principal consideration guiding decisions and actions at all levels of the Project;
- maintaining effectiveness of this Program;
- approving annual Program objectives and targets;
- promoting the integration of Program requirements into Project processes;
- communicating the importance of effective management and of conforming to Program requirements;
- allocating adequate and appropriate resources to fulfill Program implementation;
- developing proper documentation and tools to implement this Program effectively;
- controlling fire protection management incidents and deviations and directing corrective action when required;
- participating in the management review process;
- monitoring and reporting on Program performance and effectiveness to the NexGen executive;
- providing independent oversight of processes through monitoring and auditing activities; and
- identifying and pursuing opportunities to achieve continual improvement.

#### Program Management

Program management is responsible for:

- demonstrating and promoting a culture where health and safety, including fire protection safety, is a principal consideration guiding decisions and actions at all levels of the Project;
- overseeing the development, implementation, and adherence to this Program;
- communicating with the applicable regulatory agencies (e.g., CNSC) and other external stakeholders, as appropriate;
- setting annual objectives and targets, monitoring performance, and preparing internal and external reports regarding Program activities and outcomes;

- managing resources to confirm legal compliance with regulatory requirements and conformance with Program requirements;
- confirming workers have the necessary competence, training, and awareness of Program requirements;
- overseeing Program coordination activities;
- working with applicable departments to confirm that Program roles and responsibilities are identified and described and that those with specific responsibilities are qualified to fulfill their roles;
- reporting on Program performance and effectiveness to Rook I management;
- facilitating management review of the Program; and
- promoting, identifying, and supporting continual improvement through Program evaluation.

## Program Coordination

The Program coordinator is responsible for:

- demonstrating and promoting a culture where health and safety, including fire protection safety, is a principal consideration guiding decisions and actions at all levels of the Project;
- leading the development, implementation of, and adherence to Program procedures and work instructions;
- verifying Program-related inspections, testing, and maintenance is performed and recorded and meets all applicable codes;
- verifying 24-hour emergency response coverage is provided;
- maintaining Program-specific data and records in a secure and controlled manner;
- providing subject matter expertise and support;
- preparing and supporting management review and maintaining associated records including tracking the decisions and actions stemming from the review;
- verifying workers meet and maintain required Program-specific training qualifications; and
- verifying that monitoring processes are implemented in accordance with Program and regulatory requirements.

## Rook I Supervision

Rook I supervisors are responsible for:

- demonstrating and promoting a culture where health and safety, including fire protection safety, is a principal consideration guiding decisions and actions at all levels of the Project;
- understanding, encouraging, and following this Program and its requirements;
- overseeing department functions and supervising direct reports to confirm conformance to Program requirements;
- supporting the achievement of Program objectives and targets;
- conforming to Program procedures and training;
- supervising direct reports regarding conformance to Program requirements;
- communicating and coordinating with other departments to facilitate effective implementation of the Program;
- participating in audits and inspections, as required;
- participating in the management reviews, as needed; and
- identifying and supporting opportunities for continual improvement.

### Rook I Workers

Workers are responsible for:

- demonstrating and promoting a positive health and safety culture that includes fire protection safety;
- cooperating with auditors, regulators, and inspectors, as needed;
- understanding and following Program processes and procedures;
- working toward achievement of objectives and targets in assigned areas of responsibility;
- recognizing and promptly communicating hazards or deviations that present a risk to the safety and health of workers, the environment, or the public, and if safe to do so, taking action to contain or control the hazard to mitigate the impact;
- identifying and reporting fire hazards and opportunities for improvement in the workplace;
- meeting and maintaining required Program-specific training qualifications;
- using all devices, facilities, and equipment intended for protection of health, safety, and the environment;
- complying with the measures established by the Project for the protection of safety, health, and environment and control of releases of radioactive substances and hazardous substances into the environment;
- promptly informing supervisors, the occupational health committee, or the health and safety department of any situation that poses a significant increase in risk to the health and safety of workers, the environment, or the public; and
- taking all reasonable precautions to maintain the health and safety of workers, the environment, and the public.

## 2.5.2 Facilities and Equipment

Facilities and equipment supporting the effective implementation of this Program and its associated processes are provided to workers. Facilities are designed, constructed, operated, and maintained to protect worker health, safety, and well-being, to prevent fire, and to maintain compliance with legal and other requirements. The layout and separation of fire protection systems, structures, or components are identified and incorporated in the early stages of Project design to minimize the impact of a fire.

Facilities and equipment are maintained to support the effective implementation of this Program and to prepare for, respond to, and mitigate fire emergencies. Examples include:

- alarm systems;
- stench gas;
- an incident command centre equipped with communication devices and administration aids (e.g., status boards, reference materials);
- storage facilities for emergency response vehicles, equipment, and tools;
- underground refuge stations;
- marked muster stations;
- emergency lighting and power;
- means of escape;
- communication equipment;
- mine rescue equipment, including self-contained breathing apparatus;
- hazardous material response equipment and trailer;
- fire suppression infrastructure (e.g., sprinklers, fire extinguishers, fire hydrants, fire alarms, water supply for fire protection);
- an on-site medical center; and
- emergency response vehicles (e.g., ambulance, fire truck).

Facilities and equipment meet or exceed applicable provincial and federal health and safety standards, codes, and regulations. These requirements apply to all buildings, infrastructure, and equipment throughout their life cycle. Changes to facility and equipment are managed in accordance with the change management process described in section 2.9.

Additional information on maintaining adequate fire protection measures during construction, commissioning, demolition, and renovation is described in the fire protection guideline *Fire Protection during Construction, Commissioning, Demolition, and Renovation*.

The processes for planning, documenting, and controlling the design, construction, installation of facilities and equipment are outlined in the *Rook I Construction Management Program.* Commissioning, performance testing, and turnover of structures, systems, components, and documents are within the scope of the *Rook I Commissioning Management Program*.

The process for procuring facilities and equipment is outlined in the IMS Manual. Facilities and equipment maintenance is outlined in the *Rook I Asset Management Program*.

Additional information on the specific facilities and equipment used for fire emergency management are outlined in the supporting *Emergency Response Plan* and in pre-incident plans.

#### Impairment

Planned and unplanned impairments of fire protection structures, systems, and components are controlled to verify fire protection objectives at the facility are achieved and that the associated risks are adequately managed. This process is described in the fire protection program procedure *Fire Systems Impairment and Disabling of Detection Devices*. Impairments that result from planned or unplanned change are managed in accordance with the change management process outlined in section 2.9.

### 2.5.3 External Resources

In addition to using Project workers, facilities, and equipment, external resources may be used to manage fire emergencies effectively. Examples include the following:

- establishing documented mutual aid agreements with other regional emergency responders;
- using the Saskatchewan Air Ambulance for transporting patients for medical treatment; and
- coordinating wildfire response with the Saskatchewan Public Safety Agency.

A list of potential external resources, their contact information, and the processes for engaging them are outlined in the *Emergency Response Plan*.

### 2.5.4 Legal and Other Requirements

NexGen is committed to conforming to internal processes and complying with applicable legal and other requirements. This Program and its associated process documentation are developed with consideration for applicable legal requirements, including the provincial and federal regulations, codes, standards, and regulatory documents referenced in section 6.0. Activities that assist in identifying and maintaining compliance include:

- fire hazard assessment as described in section 2.1.1;
- independent third-party design modification review as described in section 2.9.1;
- independent third-party facility condition inspections as described in section 4.3.1; and
- independent third-party Program audits as described in section 4.2.1.

Changes to relevant internal and external requirements are monitored and evaluated to identify whether updates to this Program or related fire protection processes are required.

The process for managing legal and other requirements is outlined in the IMS Manual.

## 2.6 Training and Competence

Appropriate and timely training is integral to the use and maintenance of controls used to prevent, prepare for, respond to, and mitigate the effects of fire emergencies. The Project follows a systematic approach to training (SAT) to educate, train, and qualify workers to prepare for and safely respond to fire emergencies. Training requirements are monitored as a means of providing workers with the training they require, when they require it, to maintain competency and manage fire emergencies safely and successfully. Program-specific training requirements are defined and managed as part of the *Rook I Training Program*.

### 2.6.1 Site Orientation

Project workers and visitors are required to participate in site orientation upon their arrival, which includes information on camp policies, expectations of personal conduct while at the site, requirements for protecting workers and the environment, and important actions to follow during emergency events and situations.

Topics specific to fire emergencies include:

- emergency response protocols and individual responsibilities for maintaining personal safety;
- reporting and communication processes including contact information for reporting emergency events or situations;
- fire equipment availability and appropriate use;
- awareness of site alarm systems;
- evacuation plans; and
- locations of muster points.

Site orientation is developed using the SAT process to confirm all critical information for new workers is included.

### 2.6.2 Emergency Response Team

Workers who direct, coordinate, support, or respond to emergency events and situations, including fire emergencies, require specialized skills and knowledge to fulfill their roles and responsibilities safely and successfully. Role-specific training and competency details are outlined in the *Emergency Response Plan*, *Ground Transportation Emergency Response Plan*, and *Crisis Management Plan*. Training is developed, delivered, and maintained in accordance with the SAT process and with consideration for applicable provincial and federal regulatory requirements.

Training and competency required for surface industrial firefighting and mine rescue personnel is maintained in accordance with applicable requirements, including prevailing National Fire Protection Associations standards and *The Mines Regulations, 2018*.

## 2.7 Documented Information

Information, including identification of critical facilities and equipment, and any documents and records generated for or as a result of emergency events and situations, is managed to verify the information is accurate, available when needed, and protected from uncontrolled alteration.

Identification of critical facilities and equipment required for safe and effective fire protection includes, but is not limited to:

- labelling tanks that store hazardous substances and waste; and
- dangerous goods and emergency response equipment identification numbers.

The processes for managing and maintaining facility and equipment identification are outlined in the *Rook I Asset Management Program*.

Documents and records, including the identification of critical facilities and equipment and any documents and records generated for or due to fire emergencies, are controlled to verify the information is accurate, available when needed, and protected from uncontrolled alteration. Documents include Program procedures, work instructions, and other information pertinent to fire emergency response activities (e.g., pre-incident plans).

In addition to the common management system records outlined in the IMS Manual, records specific to this Program include, but are not limited to:

- design modification reviews;
- facility hazard assessment;
- third-party review of design and modifications with the potential to impact protection from fire;
- scheduled drills;
- emergency response action logs;
- emergency drill or response debriefs;
- records of inspection, maintenance, and calibration of fire detection, alarm, suppression, and emergency response equipment;
- independent third-party facility condition inspections; and
- independent third-party Program audits.

Documents and records are readily accessible to those that require them.

The processes for managing documents and records are outlined within the IMS Manual.

## 2.8 Communication

Effectively communicating about fire emergencies to internal and external parties is an essential element of this Program and the supporting plans and is vital for maintaining a strong health and safety culture. During and following fire and other emergency events and situations, information (e.g., fire emergency status, cause of fire, associated injuries, property damage) is communicated to and among various internal and external parties affected by, involved in, and interested in fire emergencies. This includes the following:

- the site general manager or designate;
- command center;
- emergency response teams;
- employees and contractors;
- security staff;
- local Indigenous groups and communities;
- the public; and
- regulatory agencies.

Internal and external communication processes and requirements specific to fire emergencies (e.g., maintaining two-way communication, recording critical information) are further outlined in the *Emergency Response Plan*, *Ground Transportation Emergency Response Plan*, and *Crisis Management Plan*.

Tools used to communicate fire protection information related to the Project include, but are not limited to:

- routine safety moments to begin meetings or training courses;
- Program-focused toolbox meetings;
- workplace fire protection safety posters (if applicable);
- town hall meetings;

- posted information required by regulation; and
- signage.

Workers are informed of their duties and responsibilities, and changes to personnel, processes, facilities, or equipment are communicated to those affected as required.

Internal and external communication principles and processes are further outlined in the IMS Manual. Communication practices specific for local Indigenous groups, local communities, and the public are described in the *Rook I Indigenous and Public Engagement Program*.

## 2.9 Change Management

Change is managed to protect worker health and safety, the environment, and property, and to promote consistent and effective execution of Project processes. This includes changes to Project:

- design;
- facilities;
- equipment;
- management system processes;
- organizational structure;
- key roles and responsibilities;
- documentation; and
- legal and other requirements.

Changes are evaluated with consideration for the impact to this Program and its related processes. This maintains that:

- change is clearly defined;
- risks associated with change are assessed and managed;
- change is communicated to those affected; and
- related documentation is updated.

The general change management process is outlined in the IMS Manual.

### 2.9.1 Design Modification Reviews

Temporary or permanent modifications to active fire protection systems (e.g., sprinklers, alarms) and features (e.g., egress, building modifications, fire loads) that have the potential to affect protection from fire are subject to third-party design modification reviews when technical change screening determines that there is a potential for the change to affect the established fire protection design basis.

Third-party design modification reviews include a review of fire protection structures, systems, and components such as:

- fire suppression systems (e.g., water supply reticulation and pumps);
- fire detection systems;
- manual fire suppression equipment (e.g., portable fire extinguishers, hose stations, fire hydrants);
- storage, supply and use of flammable liquids and gases; and
- fire protection features (e.g., fire separations, fire doors, penetration seals).

Third-party design modification reviews are submitted to the CNSC before implementation of the modification.

The design modification process is further described as part of the change management process as outlined in the IMS Manual.

# 3.0 Do

The *Do* component of this Program includes implementing Program elements developed in section 1.5. This includes implementing controls to mitigate health and safety risks, manage fire risks, and safely and effectively prepare for and respond to fire emergency events and situations. This also includes procuring equipment, managing contractors related to fire management, and reporting incidents related to fire events or situations.

## 3.1 Fire Safety Controls

Controls eliminate, prevent, or reduce the risk of harm to workers, the public, the environment, and property during fire emergencies. Controls are documented in a fire hazard assessment as described in section 2.1.1 according to the frequency defined by the associated process documentation and are evaluated for effectiveness.

Controls are used, operated, and maintained according to their design, limitations, and appropriate training. Following appropriate procedures and training is critical in maintaining the effectiveness of controls.

This Program adopts the defence in depth approach to fire protection as described in section 1.4. Examples of defence in depth fire risk controls and the associated Programs which govern the associated processes are provided in Table 1.

Table 1: Defence in Depth Controls

| Level | Description | Examples | Associated Documents |
|---|---|---|---|
| I | Preventing fire | a) Fire Hazard Assessment<br>b) Hot work permit and fire watch<br>c) Housekeeping<br>d) Proper segregation, storage, and control of combustibles<br>e) Proper segregation, storage, and control of hazardous substances and waste dangerous goods<br>f) Employee orientation<br>g) Annual facility condition inspections<br>h) Preventing access to restricted areas<br>i) Impairment procedures<br>j) Design modification review | a) See section 2.1.1<br>b) *Rook I Health and Safety Program*<br>c) *Rook I Health and Safety Program*<br>d) *Rook I Health and Safety Program*<br>e) *Rook I Environmental Protection Program, Rook I Waste Management Program*<br>f) *Rook I Training Program*<br>g) See section 4.3.1<br>h) *Rook I Security Program*<br>i) See section 2.5.2<br>j) See section 2.9.1 |

| Level | Description | Examples | Associated Documents |
|---|---|---|---|
| II | Fire detection and suppression | a) Designing, installing, inspecting, and maintaining fire detection, alarm, and suppression systems<br>b) Pre-incident planning<br>c) Impairment procedures<br>d) Employee orientation<br>e) Adequately trained and resourced emergency response team<br>f) Emergency response processes and equipment | a) *Rook I Construction Management Program, Rook I Asset Management Program*<br>b) See section 2.2<br>c) See section 2.5.2<br>d) *Rook I Training Program*<br>e) *Rook I Training Program*<br>f) *Emergency Response Plan* |
| III | Limiting the effects of fire | a) Fire Hazard Assessment<br>b) Designing and constructing adequate fire separations, barriers, and fire stops<br>c) Proper segregation, storage, and control of combustibles<br>d) Proper segregation, storage, and control of hazardous substances and waste dangerous goods<br>e) Design modification review | a) See section 2.9.1<br>b) *Rook I Construction Management Program*<br>c) *Rook I Health and Safety Program*<br>d) *Rook I Environmental Protection Program, Rook I Waste Management Program*<br>e) See section 2.9.1 |
| IV | Controlling and mitigating fire events | a) Designing and constructing adequate fire separations, barriers, and fire stops<br>b) Proper segregation, storage, and control of combustibles<br>c) Proper segregation, storage, and control of hazardous substances and waste dangerous goods<br>d) Adequately trained and resourced emergency response team<br>e) Pre-incident planning<br>f) Emergency response processes and equipment<br>g) Designing, installing, inspecting, and maintaining fire detection, alarm, and suppression systems | a) *Rook I Construction Management Program*<br>b) *Rook I Health and Safety Program*<br>c) *Rook I Environmental Protection Program, Rook I Waste Management Program*<br>d) *Rook I Training Program*<br>e) See section 2.2<br>f) *Emergency Response Plan*<br>g) *Rook I Construction Management Program, Rook I Asset Management Program* |
| V | Mitigating the fire consequences | a) Proper storage and control of nuclear substances<br>b) Emergency responses processes and equipment<br>c) Agreements with other off-site, regional emergency responders | a) *Rook I Radiation Protection Program*<br>b) *Emergency Response Plan*<br>c) *Emergency Response Plan* |

## 3.2 Equipment Procurement and Maintenance

Fire prevention, detection, alarm, and suppression and emergency response equipment is procured to meet applicable standards as outlined in the IMS Manual. Equipment is routinely inspected, tested, and maintained in accordance with applicable codes and standard requirements to verify it remain functional and effective during a fire emergency.

Breathing, resuscitation, testing apparatus, and rescue equipment designated for fire and emergency response is examined on a scheduled basis and maintained by qualified individuals. Where regulatory requirements exist for equipment (e.g., fit test schedule, calibration schedule), these requirements supersede manufacturer requirements unless otherwise approved.

The process for selecting, providing, using, and maintaining respiratory equipment is outlined in the *Rook I Health and Safety Program*.

The process for maintaining fire prevention, detection, alarm, suppression, and response equipment is outlined in the *Rook I Asset Management Program*.

Equipment inspections are carried out as described in section 4.3.

Results of tests and inspections are documented and retained as outlined in the IMS Manual.

## 3.3 Contractor Management

Contractors performing work at the Project are subject to the requirements of this Program. Contractors with specialized knowledge or training may be used to prepare for or respond to fire emergencies. The process for verifying contractors adhere to requirements is outlined in the *Rook I Contractor Management Program*.

## 3.4 Incident and Deviation Reporting

Workers and visitors are required to report information regarding health, safety, and environmental incidents (including near-misses) and deviations. Fire-related near-misses are events or situations where a fire emergency could have occurred but was avoided. Debriefs are held following fire response drills, exercises, and emergencies to evaluate response performance, outcomes, and identify any deviations, incidents, or near-misses.

Fire emergencies that meet or exceed applicable legislated reporting thresholds, including those that are reportable under *The Mines Regulations, 2018, The Occupational Health and Safety Regulations 2020*, and Section 29 of the *General Nuclear Safety and Control Regulations*, are reported to applicable regulatory representatives within legislated timelines. All fire emergencies are reported to the CNSC.

The process for providing information regarding reportable events or situations to internal and external parties is outlined in the IMS Manual.

# 4.0 Check

The *Check* component of this Program consists of ongoing performance monitoring, periodic audits and inspections, reviews, and analysis of results to verify that the Program is operating effectively.

## 4.1 Monitoring and Measurement

Management system processes are continually monitored and measured to evaluate whether Project deliverables meet internal and external requirements. Program-specific monitoring and measurement confirms that work activities are performed and managed in accordance with Program requirements.

General monitoring and measurement processes and requirements are outlined in the IMS Manual.

### 4.1.1 Plan Testing

Procedural or physical elements of the *Emergency Response Plan*, *Ground Transportation Emergency Response Plan*, and *Crisis Management Plan* are tested according to the frequency defined by the associated process documentation to reinforce emergency requirements and processes. Testing frequency and performance criteria is outlined within each plan and is established based on risk and with consideration for applicable regulatory requirements.

Testing consists of tabletop and field-based exercises or drills and includes, but is not limited to:

- fire drills;
- tabletop exercises;
- emergency drills including fire response drills;
- underground emergency alert system tests; and
- full-scale complex enactments involving elements of this Program and the supporting plans.

As required, external resources (e.g., local communities) and regulatory representatives are notified in advance of planned full-scale exercises and may attend to participate in and observe response to evaluate exercise performance and identify opportunities for continual improvement.

Fire drills are conducted annually to demonstrate fire response capability and response times and may involve mutual aid partners as required. Fire drills are based on the scenarios postulated as part of the fire hazard assessments.

Following the completion of a test, response effectiveness is evaluated against expected performance. Deviations are reported and opportunities for improvement are recommended and actioned as outlined in the IMS Manual.

## 4.2 Audits

The performance and effectiveness of this Program and its associated procedures are monitored and verified with regular conformance audits. Qualified individuals who are independent of the work being assessed conduct audits as outlined in the IMS Manual.

### 4.2.1 Fire Protection Program Audits

Independent third-party Program audits are completed at least every three years to evaluate response capability, assess the implementation and effectiveness of each Program element, and to confirm compliance with applicable codes, standards, and industry best practices.

## 4.3 Inspections

In addition to audits, routine internal inspections of fire protection and emergency response facilities and equipment are conducted by competent individuals to verify that controls, including safety controls and interlocks, are functioning and effective in accordance with the frequency requirements established by applicable codes and standards. This includes inspections of the following:

- emergency response equipment and alarms;
- integrity of fire detection, alarm, and suppression systems and equipment;
- integrity of fire separations and barriers;
- general housekeeping;
- access to fire equipment;
- egress paths and exits;
- refuge stations;

- ventilation systems;
- proper segregation and storage of combustible materials and hazardous goods;
- control of transient materials; and
- personal protective equipment.

External compliance inspections and audits are conducted by regulators; conformance audits and inspections are conducted by third parties, as required.

Deviations, instances of regulatory noncompliance, and opportunities for improvement identified through audits and inspections are managed as outlined in the IMS Manual.

### 4.3.1 Facility Condition Inspections

Facility condition inspections are conducted and documented by a qualified person at least once per year to confirm compliance with operational requirements of the applicable codes and standards. The scope of the visual inspection includes, but may not be limited to:

- building and occupant safety (e.g., fire separation, fire hazards, firefighting requirements, means of egress);
- indoor and outdoor storage of flammable and combustible liquids;
- hazardous process and operations (e.g., hot work); and
- fire protection equipment (e.g., portable fire extinguishers, fire detection, alarm and voice communication systems, water-based fire protection systems, special fire protection systems, emergency power systems, emergency lighting, exit signs).

## 4.4 Management Review

This Program and its supporting processes are subject to review and evaluation by Rook I management. Management review information includes:

- proposed Program-specific objectives and targets or current status;
- upcoming or new legislation or regulation related to the Program and plans to address these requirements;
- significant changes in fire protection risks;
- significant changes to the Program;
- status of training objectives for the emergency response team;
- audit and inspection findings;
- results of fire preparedness and response plan testing;
- trends in fire protection incidents, injuries and deviations, and the status of related investigations and corrective actions; and
- proposed continual improvement actions or their current status.

The management review process is outlined in the IMS Manual.

# 5.0 Act

The *Act* component of this Program consists of facilitating continual improvement and verifying that, when required, corrective actions are taken and appropriately managed. The results of these Program elements feed back into *Plan* to complete the Plan-Do-Check-Act cycle.

## 5.1 Corrective Action Process

Fire protection incidents (including near-misses) and deviations to this Program due to fire prevention, planning, detection, control, and mitigation are evaluated and investigated as required. Appropriate actions are developed and implemented to correct and prevent reoccurrence. Corrective actions are planned, implemented, verified, and reviewed for effectiveness commensurate with the risk level.

Investigations into fire emergencies are conducted by qualified persons and include information required by *REGDOC-2.10.2: Fire Protection*.

The corrective action process is outlined in the IMS Manual.

## 5.2 Continual Improvement

Continual improvement is an ongoing process to improve the suitability, adequacy, and effectiveness of the IMS. Workers continually seek out improvement opportunities for the IMS and Project processes, which occur through Program monitoring, auditing, management review, and maintaining awareness of changes in the business environment. Improvement may also involve benchmarking Project performance against other similar projects and facilities.

Use of experience gained during Project construction and commissioning, including information gathered from relevant external sources, informs potential improvement opportunities.

Potential sources of information include:

- incident investigations;
- lessons learned;
- worker experience;
- government and industry publications;
- industrial peer information exchange;
- professional associations; and
- monitoring results.

Continual improvement opportunities are identified, documented, evaluated, and implemented as required in accordance with the process outlined in the IMS Manual.

# 6.0 References

## 6.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-CHT-00001 | *Rook I Organizational Chart* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-IMS-POL-00001 | *Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-RAD-PGM-00001 | *Rook I Radiation Protection Program* |
| ROOK-TRN-PGM-00001 | *Rook I Training Program* |
| ROOK-EMG-PGM-00001 | *Rook I Emergency Preparedness and Response Program* |
| ROOK-EMG-PLN-00001 | *Emergency Response Plan* |
| ROOK-EMG-PLN-00002 | *Ground Transportation Emergency Response Plan* |
| ROOK-EMG-PLN-00003 | *Crisis Management Plan* |
| ROOK-AST-PGM-00001 | *Rook I Asset Management Program* |
| ROOK-CON-PGM-00001 | *Rook I Contractor Management Program* |
| ROOK-CST-PGM-00001 | *Rook I Construction Management Program* |
| ROOK-COM-PGM-00001 | *Rook I Commissioning Management Program* |
| ROOK-HSF-PGM-00001 | *Rook I Health and Safety Program* |
| ROOK-IPE-PGM-00001 | *Rook I Indigenous and Public Engagement Program* |
| ROOK-ENV-PGM-00001 | *Rook I Environmental Protection Program* |
| ROOK-SEC-PGM-00001 | *Rook I Security Program* |
| ROOK-WST-PGM-00001 | *Rook I Waste Management Program* |
| ROOK-FIR-PRO-00001 | *Pre-Incident Planning* |
| ROOK-FIR-PRO-00002 | *Fire Systems Impairment and Disabling of Detection Devices* |
| ROOK-FIR-GDE-00001 | *Fire Protection during Construction, Commissioning, Demolition, and Renovation* |
| ROOK-FIR-GDE-00002 | *Fire Response Needs Analysis* |

## 6.2 External

- Federal
  - *Nuclear Safety and Control Act*
    - *Uranium Mines and Mills Regulations*
    - *Radiation Protection Regulations*
    - *Nuclear Substances and Radioactive Devices Regulations*
    - *General Nuclear Safety and Control Regulations*
  - *Canadian Nuclear Safety Commission. REGDOC 2.10.1 Nuclear Emergency Preparedness and Response*
  - *Canadian Nuclear Safety Commission. REGDOC 2.10.2 Fire Protection (in draft)*
  - *National Building Code of Canada*
  - *National Fire Code of Canada*

  - *CSA N393, Fire protection for facilities that process and handle or store nuclear substances.*
- Provincial
  - *The Saskatchewan Employment Act*
  - *The Occupational Health and Safety Regulations, 2020*
  - *The Mines Regulations, 2018*
  - *Saskatchewan Mine Rescue Manual*
  - *The Fire Safety Act*
    - *The Fire Safety Regulations*
  - *The Wildfire Act*
    - *The Wildfire Regulations*

# Waste Management Program
# ROOK-WST-PGM-00001

NexGen Energy Ltd.

# Rook I Project

## Waste Management Program

ROOK-WST-PGM-00001

June 2023

# Record of Revisions

| Version. No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| 0 | 21-Dec-2022 | Issued Final | J. Henderson | R. Paine | L. Moger |
| 1 | 29-Jun-2023 | Issued Final | J. Henderson | J. Cooper<br>R. Paine | L. Moger |

# Table of Contents

## List of Figures

# 1.0 Introduction

The *Rook I Waste Management Program* (Program) outlines the systematic and risk-based approach to managing waste as part of the NexGen Energy Ltd. (NexGen) Rook I Project (Project). It describes processes for maintaining compliance, enabling continual improvement, and fostering a culture where protecting workers, the public, and the environment are principal considerations guiding decisions and actions.

This Program is part of the *Rook I Integrated Management System* (IMS). All aspects of the IMS are subject to the *Rook I Integrated Management System Policy* which provides the foundation for NexGen's approach to waste management. The Program and its relationship to other IMS programs within the IMS hierarchy is shown in Figure 1. As a component of the IMS, this Program follows the Plan-Do-Check-Act cycle to identify, control, monitor, and continually improve management processes for protecting workers, the public, and the environment.

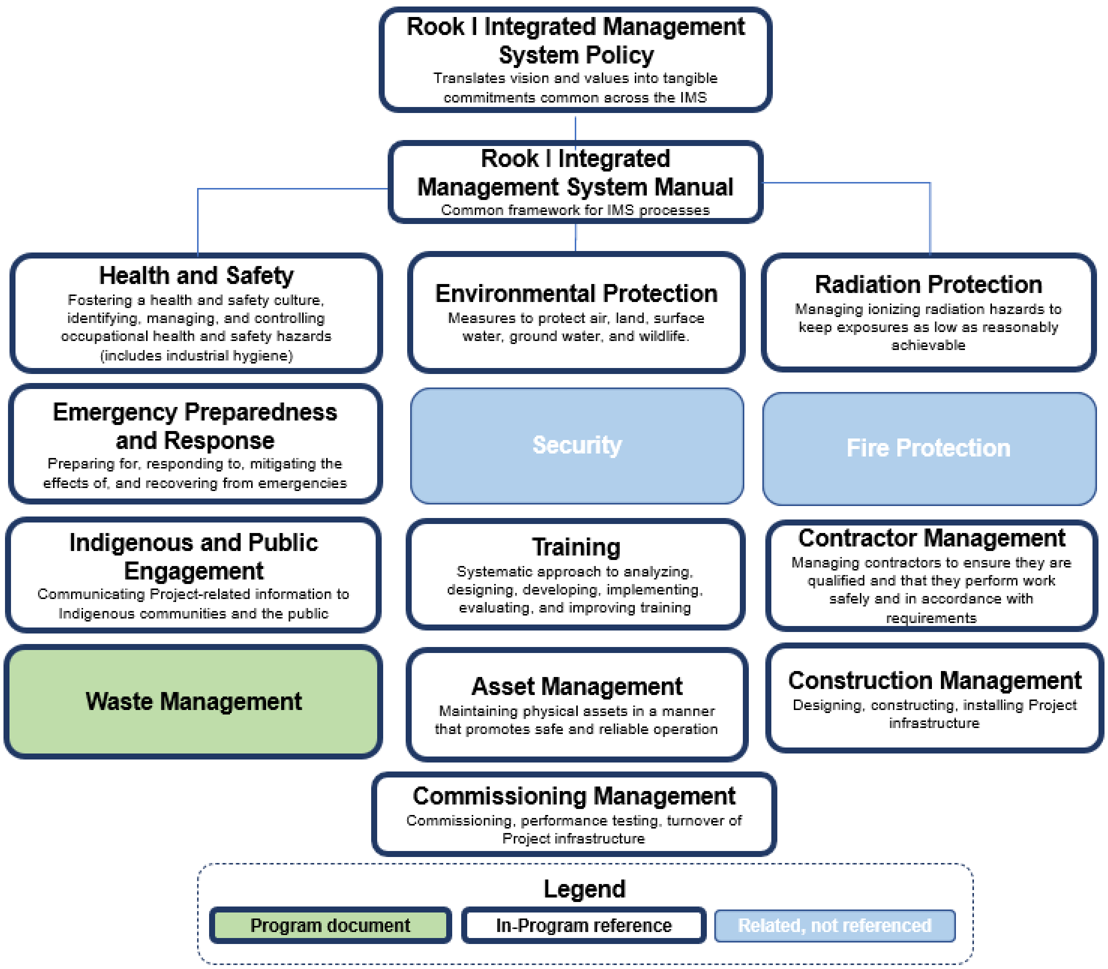


Figure 1: Program Context Within the IMS

## 1.1 Purpose

This Program describes the Project principles, processes, and framework for waste management. The Program aligns with and meets applicable requirements of the references outlined in section 6.0, including the *Nuclear Safety and Control Act* and *REGDOC-2.11.1, Waste Management (Volumes I, II, and III).*

## 1.2 Scope

The scope of this Program includes planning, delivering, evaluating, and improving Project processes for safe, secure, and environmentally responsible waste management. The processes outlined as part of this Program apply to all workers during the site preparation, construction, and commissioning phase of the Project.

This Program applies to the generation, handling, processing, and long-term disposal of solid and liquid wastes resulting from Project-related licensed activities. This Program uses a graded, risk-based approach to waste management that is commensurate with waste characteristics (e.g., radiological, chemical, geochemical, geotechnical, biological, and physical hazards) and accounts for the level of risk, safety significance, and complexity of waste management activities and facilities.

The mining of uranium ore, the production of uranium concentrate, and the generation of tailings are not within the scope of this Project phase; however, the processes described herein account for the possibility of encountering mineralized mine rock and for establishing and maintaining effective waste management measures throughout the Project life cycle. The Program and its supporting processes are subject to periodic review and will be revised as required to maintain measures necessary to safely manage mineralized mine rock and radiologically contaminated waste.

This Program is implemented in an integrated manner with other programs as shown in Figure 1. Measures to protect workers and the public from conventional and radiological health and safety hazards are outlined in the *Rook I Health and Safety Program* and *Rook I Radiation Protection Program*, respectively. Measures to maintain environmental protection are outlined in the *Rook I Environmental Protection Program*.

## 1.3 Program Principles

NexGen recognizes the importance of safe, secure, and environmentally responsible waste management to achieve Project outcomes of protecting people and the environment throughout the Project life cycle and for future generations.

This approach to waste management is reflected in the following principles:

- protecting and promoting the health, safety, and well-being of people and the environment through all aspects and phases of the Project;
- establishing a strong health and safety culture, including responsible waste management, which is periodically assessed and continually improved;
- minimizing the generation of waste to the extent practicable with consideration for the waste hierarchy and by adopting measures to reduce, reuse, recycle, and rethink;
- applying economically viable best available technology and techniques;
- designing and planning for responsible closure;
- respecting the principle of pollution prevention;
- employing an integrated approach that accounts for interdependencies of effective waste management with related Project activities and processes;
- providing workers with the knowledge, skills, and tools to implement risk management processes and perform their duties safely;
- managing tailings and waste facilities responsibly throughout the Project life cycle;

- keeping all releases and adverse impacts as low as reasonably achievable (ALARA);
- proactively engaging with local Indigenous groups and the public;
- monitoring and assessing against indicators and targets based on sound science and in consideration of Indigenous and local knowledge;
- complying with applicable requirements; and
- continually improving Program performance.

## 1.4 Program Framework

The Project framework for waste management is based on three supporting waste management plans which together outline specific requirements for safely and effectively generating, handling, processing, and disposing of waste materials as illustrated in Figure 2. These plans are described further in section 3.2.

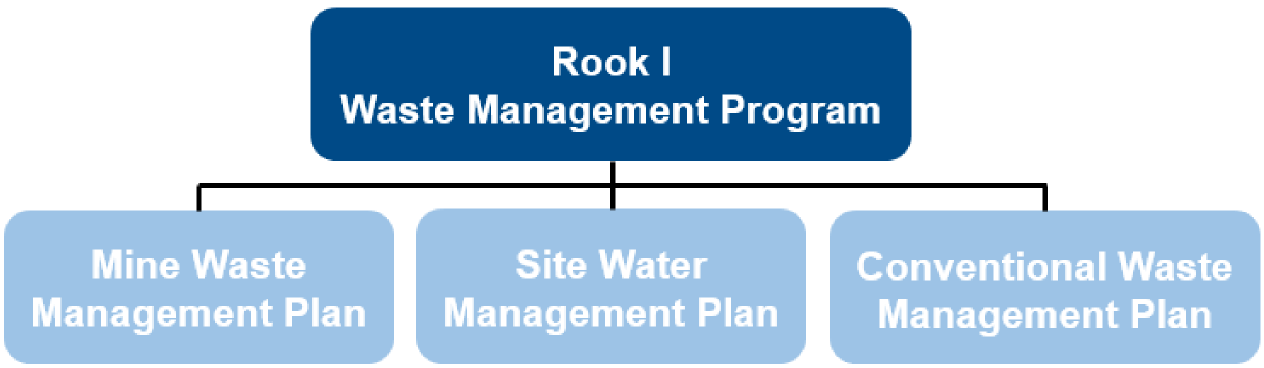


Figure 2: Program Framework and Supporting Plans

## 1.5 Terminology

Terminology introduced in this Program is provided in this section. A comprehensive list of common terms applicable to this Program and the IMS are available in the *Rook I Project Glossary*.

**as low as reasonably achievable (ALARA)** – Minimizing the risk of adverse health, safety, environmental, and radiological impacts to the lowest extent practicable considering technical, legal, social, and economic factors.

**constituent of potential concern (COPC)** – Chemical constituents or physical stressors that have the potential to cause an adverse effect as identified in the most recently regulatory-approved environmental risk assessment.

**contact water** – Water that may have been physically or chemically altered by Project activities. This water may be diverted and require management (e.g., treatment) before release to the environment.

**conventional waste** – Domestic, industrial, low-level radioactive, and hazardous waste generated during the construction and commissioning, and operations phases of the Project.

**domestic waste** – Non-industrial, non-hazardous, and non-low-level radioactive waste generated from the camp and office areas, including living quarters; coffee rooms; and kitchen, food preparation, and eating areas. Domestic waste for the Project will be composed of recyclables and non-recyclable materials, including food scraps; plastic, glass, paper, cardboard, and metal food containers; and electronics.

**hazardous waste** – Waste containing any amount of a hazardous product or in the context of regulatory requirements, a waste that is prescribed or is set out in *The Environmental Management and Protection Act, 2010*.

**Indigenous knowledge** – The unique and collective knowledge of Indigenous Peoples that has been built up over time and passed on through generations of living in close contact with the land and natural environment.

**industrial waste** – Non-domestic, non-hazardous, and non-low-level radioactive waste generated from construction, commissioning, operation, and maintenance activities associated with the underground mine and process plant. Industrial waste for the Project will be composed of recyclable and non-recyclable materials, including cardboard (e.g., packaging), wood (e.g., pallets), metal (e.g., metal drums and containers), used tires, and plastics (e.g., piping).

**integrated management system (IMS)** – A common framework of programs, plans, procedures, work instructions, and other supporting documentation describing management system processes for achieving Project objectives and completing work safety, reliably, and consistently while conforming to internal requirements and complying with legal requirements.

**licensed activities** – Project activities within the scope of Canadian Nuclear Safety Commission (CNSC) licensing. Project site-based activities that may be outside the scope of CNSC licensed conditions are subject to the integrated management system on a risk-informed basis (i.e., where the consequence of human error poses a risk to the environment, the health and safety of people, or to the security of Project facilities).

**local knowledge** – The knowledge of local people who may or may not be Indigenous and who hold knowledge that is based on personal and collective experiences of their local environments over time, without necessarily having generational connections to a place. Represents information from a local priority area citizen or representative, but without Indigenous group/Elder sanction, and is therefore not considered Indigenous knowledge.

**low-level radioactive waste** – Waste with radionuclide content above established unconditional clearance levels and exemption quantities but generally has limited amounts of long-lived radionuclides. Does not include ore, special waste, waste rock, or tailings.

**mine waste** – General term that includes soil, overburden, non-potentially acid generating waste rock, potentially acid generating waste rock, special waste rock, and effluent precipitates.

**non-contact water** – Water that has not been physically, chemically, or radiologically altered by Project activities.

**non-potentially acid generating** – Mine rock with less than 0.03% $U_3O_8$ and less than 0.1% sulphur.

**personal protective equipment (PPE)** – Includes equipment an individual may use to minimize hazards associated with performing a particular task. This includes, but is not limited to, safety glasses, gloves, hard hats, safety boots/shoes, coveralls, respirators, and harnesses.

**potentially acid generating** – Mine rock with less than 0.03% $U_3O_8$ and greater than or equal to 0.1% sulphur.

**prime contractor** – Entity responsible for overseeing the safe execution of all work on site within the scope of a defined construction project, who is either the owner of the worksite or a contractor who has entered into a written agreement with the owner to perform the duties of prime contractor.

**Project site** – Term used to describe all property within the physical NexGen Rook I boundary.

**worker** – Any person working for NexGen, including a contractor.

# 2.0 Plan

The *Plan* component of this Program includes processes that support a systematic, risk-based approach to waste management.

Planning processes include:

- identifying and communicating waste management hazards and assessing the associated risks;
- setting Program-specific objectives and targets;
- providing the appropriate parties with the information and resources necessary;
- verifying workers are competent and adequately trained to perform work;
- managing change to process, personnel, design, facilities, and equipment; and
- preparing for emergencies.

## 2.1 Risk Management

The risk management process includes identifying Project-related waste management hazards that could affect the health and safety of workers, the public, or the environment, assessing the significance of associated risks, and managing risks to acceptable levels through application of controls as discussed in section 3.1. This Program uses a graded, risk-based approach to implementing processes that accounts for the level of risk, safety significance, and complexity of the activity. The multi-layered approach to routinely and effectively managing risks for workers, the public, and the environment is outlined in the *Rook I Integrated Management System Manual* (IMS Manual).

Effective waste management begins during Project design and continues through to Project decommissioning and reclamation. The risk-based approach to waste management considers both routine and non-routine Project conditions and is periodically re-evaluated (e.g., significant changes to mine waste production schedule) throughout the Project life cycle to adapt to best available and achievable technology and techniques and feedback from ongoing engagement with local Indigenous groups, regulators, and the public.

### 2.1.1 Waste Types

Identifying waste sources, characterizing waste types, and classifying risks by defining the nature, scale, and scope of hazards associated with waste-related activities, processes, and facilities is fundamental to effective, risk-based waste management.

Project activities and processes that generate waste include, but are not limited to:

- preparing the site, including clearing and grubbing (e.g., removal of stumps, roots, and downed vegetation);
- constructing facilities;
- excavating clean, non-potentially acid generating waste rock and overburden;
- excavating potentially acid generating waste rock;
- operating and maintaining facilities and equipment (e.g., collecting contact water and diverting non-contact water);
- maintaining retention structures, including ponds (e.g., periodic removal of accumulated sediments);
- managing effluent treatment waste (i.e., precipitates);
- using raw materials, chemicals, and products; and
- domestic activities, including operating and maintaining the camp and administrative offices.

As noted in section 1.2, mining uranium ore, producing uranium concentrate, and generating tailings are not within the scope of the Construction phase of the Project and radiological contamination is not anticipated. However, if radiologically contaminated material (e.g., low-level radioactive waste) is encountered, it will be segregated and temporarily stored in a dedicated facility until the material can be processed (e.g., incinerated) and permanently disposed underground.

### 2.1.2 Waste Management Design Basis

Waste management activities, processes, and facilities are designed using a systematic and risk-based evaluation of information related to waste characteristics and technically and economically viable options that enable safe, secure, and environmentally responsible waste generation, handling, processing, and disposal throughout the Project life cycle.

Risk evaluation relies on a comprehensive understanding of various waste, Project, and Project site characteristics including, but not limited to, a review of**:**

- physical, radiological, mechanical, chemical, biological, and thermal properties of waste materials using both quantitative and qualitative analysis (e.g., laboratory analysis, site-specific monitoring data, published information for other industrial sites or from literature);
- waste quantities and generation rates predicted across Project phases and conditions (e.g., water balance models, wire frame model); and
- Project site characteristics (e.g., geochemical, geotechnical, and geological stability; climate, aquatic and terrestrial environment; surface water hydrology).

Following source characterization for waste materials that may result in mobilization of constituents of potential concern (COPCs) (e.g., mine rock), potential pathways for COPCs to reach receptors are evaluated and viable alternatives for waste management activities and facilities are identified that minimize COPC loadings (e.g., through a multiple account analysis). Feedback received from engagement with local Indigenous groups, regulators, and the public is considered, and safety assessments are performed on the selected waste management option (e.g., failure modes effects analysis) to identify mitigation measures required to establish an acceptable level of performance.

The design basis for waste management activities, processes, and facilities is confirmed and documented as part of the *Rook I Environmental Impact Statement*. Changes to the design basis are evaluated using a risk-based approach in accordance with the change management process described in section 2.8 and as outlined in the IMS Manual.

Risk controls are described in section 3.1 and detailed in the supporting waste management plans as described in section 3.2. The processes for identifying, assessing, and mitigating health and safety, radiological, and environmental risks are further outlined in the *Rook I Health and Safety Program*, *Rook I Radiation Protection Program*, and *Rook I Environmental Protection Program,* respectively.

## 2.2 Mine Waste Safety Case

A safety case is a process prescribed by the Canadian Nuclear Safety Commission (CNSC) that is applicable to uranium mine and mill waste (i.e., mine waste) management. The safety case is an integrated collection of arguments and evidence to demonstrate that the mine waste management facilities (i.e., disposal systems) will adequately protect people and the environment and meet applicable regulatory requirements throughout the Project life cycle, including after completion of decommissioning and reclamation (i.e., post-closure).

The safety case presents a structured framework for documenting and presenting safety-related arguments and evidence for mine waste facilities and is progressively updated in preparation for decommissioning and reclamation. In addition to being used as a tool to communicate with local Indigenous groups and the public throughout the Project life cycle, the safety case is used to inform monitoring requirements, guide operation, plan for decommissioning and closure, and prioritize research and development programs.

The safety case presents and summarizes:

- site characterization and selection;
- descriptions of disposal systems and systematic evaluation of alternate disposal options with consideration for environmental, technical, economic, and socio-economic factors;
- identified risks (e.g., potential failure modes and accidents);
- performance assessment and demonstration of safety features in the post-closure phase;
- design optimizations;
- integrated safety arguments; and
- established limits, controls, and conditions.

The safety case for mine waste management is documented in the *Rook I Mine Waste Safety Case* which is developed with reference to *REGDOC 2.11.1 Volume III: Safety Case for Long-Term Radioactive Waste Management* and is periodically reviewed and revised (as required) at key stages throughout the Project life cycle (e.g., licence renewals) using an iterative approach. Updates to the safety case take into account comments from technical and regulatory reviews, increased knowledge (e.g., industry, scientific, technical, Indigenous, local), operational experience, and results from monitoring programs and research activities.

## 2.3 Objectives and Targets

Program objectives and targets are established at regular intervals, linked to clear accountabilities, and monitored for status to completion. Objectives and targets are tangible, documented actions that result in improvements to waste management processes and Program outcomes. Setting and managing objectives and targets, including establishing monitoring measures, is outlined in the IMS Manual.

## 2.4 Resources

Rook I management is committed to providing the necessary resources to establish, implement, maintain, and continually improve this Program and its associated processes. In addition to providing the required financial resources to achieve objectives and meet requirements, management provides the infrastructure, work environment, and the competent workers necessary to implement the Program and waste management processes.

### 2.4.1 Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Program. Workers are informed of their roles and responsibilities and are accountable for understanding and fulfilling them. The Project prime contractor performs their role in accordance with the scope and requirements of this Program and its supporting information and as required in accordance with *The Saskatchewan Employment Act*.

Although NexGen maintains overall accountability for Project activities, the term Rook I is used in the following role descriptions to reinforce that the role is applicable and may be assigned to NexGen employees and contractors performing work on behalf of the Project.

#### NexGen Executive

NexGen executive is accountable for:

- establishing the direction, strategy, and policies of the organization;
- promoting behaviours that support a robust health and safety culture;
- promoting the understanding that health and safety, including waste minimization and responsible stewardship, is a principal consideration guiding decisions and actions; and

- providing adequate resources to deliver the requirements of this Program.

## Rook I Management

Rook I management is accountable for:

- demonstrating and promoting a culture where health and safety, including waste minimization and responsible stewardship, is a principal consideration guiding decisions and actions at all levels of the Project;
- maintaining the effectiveness of this Program;
- approving annual Program objectives and targets;
- promoting the integration of Program requirements into Project processes;
- communicating the importance of effective management and of conforming to Program requirements;
- allocating adequate and appropriate resources to fulfill Program implementation;
- developing appropriate documentation and tools to implement this Program effectively;
- controlling waste management related incidents and deviations and directing corrective action when required;
- participating in the management review process;
- monitoring and reporting on Program performance and effectiveness to the NexGen executive;
- providing independent oversight of processes through monitoring and auditing activities; and
- identifying and pursuing opportunities to achieve continual improvement.

## Program Management

Program management is responsible for:

- demonstrating and promoting a culture where health and safety, including waste minimization and responsible stewardship, is a principal consideration guiding decisions and actions at all levels of the Project;
- overseeing the development and implementation of, and adherence to, this Program;
- communicating with the applicable regulatory agencies and other external stakeholders on behalf of the Project, as appropriate;
- setting annual objectives and targets, monitoring performance, and preparing internal and external reports regarding Program activities and outcomes;
- managing resources to confirm legal compliance with regulatory requirements and conformance with Program requirements;
- confirming workers have the necessary competence, training, and awareness of Program requirements;
- overseeing Program coordination activities;
- working with applicable departments to confirm that Program roles and responsibilities are identified and described and that those with specific responsibilities are qualified to fulfill their roles;
- providing independent oversight of processes through monitoring and auditing activities;
- reporting on Program performance and effectiveness to Rook I management;
- facilitating management review of this Program; and
- promoting, identifying, and supporting continual improvement through Program evaluation.

## Program Coordination

The Program coordinator is responsible for:

- demonstrating and promoting a culture where health and safety, including waste minimization and responsible stewardship, is a principal consideration at all levels of the Project;
- leading the development and implementation of, and adherence to, Program plans, procedures, and work instructions;
- providing subject matter expertise and waste management support;
- conducting waste management incident investigations and initiating applicable regulatory reporting when assigned;
- maintaining Program-specific data and records in a secure and controlled manner;
- verifying workers meet and maintain required Program-specific training qualifications;
- preparing and supporting management review and maintaining associated records including tracking the decisions and actions stemming from the review; and
- verifying monitoring processes are implemented in accordance with Program and regulatory requirements.

## Rook I Supervisors

Rook I supervisors are responsible for:

- demonstrating and promoting a culture where health and safety, including waste minimization and responsible stewardship, is a principal consideration at all levels of the Project;
- understanding, encouraging, and following this Program and its requirements;
- overseeing department functions and supervising direct reports to verify conformance to Program requirements;
- supporting the achievement of Program objectives and targets;
- conforming to Program plans, procedures, and training;
- supervising direct reports regarding conformance to Program requirements;
- supporting direct reports in planning work activities to mitigate waste management risks;
- communicating and coordinating with other departments to facilitate effective implementation of the Program;
- participating in audits and inspections, as required;
- participating in management review, as needed; and
- identifying and supporting opportunities for continual improvement.

## Rook I Workers

Rook I workers are responsible for:

- demonstrating and promoting a positive health and safety culture that includes waste minimization and responsible stewardship;
- understanding and following waste management processes and procedures;
- meeting and maintaining required Program-specific training qualifications;
- using all equipment, devices, facilities, and equipment that are intended for the protection of safety and health and environment in accordance with procedures and training;
- recognizing and promptly communicating hazards or deviations that present a risk to the health and safety of workers, the public, or the environment, and if safe to do so, taking action to contain or control the hazard to mitigate the impact;

- taking all reasonable precautions to maintain the health and safety of workers, the public, and the environment, including immediately stopping any work deemed to be unsafe; and
- cooperating with auditors, regulators, and inspectors, as needed.

### 2.4.2 Facilities and Equipment

Facilities and equipment to support the effective implementation of this Program and its associated processes are provided to workers. Facilities and equipment used to store, transport, handle, process, and dispose of waste materials are designed, constructed, operated, and maintained with consideration for worker health and safety, public health and safety, environmental protection, and applicable legal requirements.

Examples of waste management facilities and equipment include, but are not limited to:

- waste collection (e.g., contact water ponds, conventional waste storage bins);
- conveyance structures (e.g., ditches, pipelines, culverts);
- waste processing and treatment technologies (e.g., incinerators);
- waste disposal (e.g., waste rock storage areas); and
- contact water processing and treatment technologies (e.g., effluent treatment plant).

Waste management performance monitoring equipment used to collect, analyze, and quantify data is selected, tested, and calibrated for its intended use. Competent workers operate and maintain equipment with consideration for manufacturers' specifications and applicable analytical methods.

Changes to facilities and equipment are managed in accordance with the change management process as described in section 2.8. Planned impairments of waste management structures, systems, and components relied on for control or monitoring of waste related activities, processes, and facilities are managed to verify health, safety, and environmental protection objectives are achieved, security maintained, and associated risks adequately managed.

The processes for procuring facilities and equipment are outlined in the IMS Manual. Facility and equipment maintenance is outlined in the *Rook I Asset Management Program*. The processes for planning, documenting, and controlling the design, construction, installation, and commissioning of facilities and equipment are outlined in the *Rook I Construction Management Program* and *Rook I Commissioning Management Program*.

### 2.4.3 Legal and Other Requirements

NexGen is committed to conforming to internal processes and complying with applicable legal and other requirements. Waste management plans, procedures, and work instructions are developed and documented with consideration for applicable legal requirements, including regulations referenced in section 6.2. Changes to relevant internal and external requirements are monitored and evaluated to identify whether updates to this Program or related waste management plans are required.

Legal and other compliance obligations, including but not limited to the establishment of waste management processes and waste management performance monitoring and reporting, are addressed through waste management plans as described in section 3.2. This Program and accompanying plans are written to conform with control measures and international obligations to which the Government of Canada has agreed.

The process for managing legal and other requirements is outlined in the IMS Manual.

## 2.5 Training and Competence

The Project follows a systematic approach to training (SAT) to educate, train, and qualify workers to carry out assigned work. Training requirements are monitored as a means of providing workers with the training they require, when they require it, to maintain competency and work safely. Program-specific training requirements are defined and managed as part of the *Rook I Training Program*.

### 2.5.1 Site Orientation

Project workers and visitors are required to participate in site orientation on their arrival, which includes information on camp policies, expectations of personal conduct while at the site, relevant practices for managing waste, and general requirements for protecting workers and the environment. Site orientation is developed using the SAT process to confirm critical information for new workers is included.

## 2.6 Document and Record Management

Documents and records are controlled to verify the information is accurate, available when needed, and protected from uncontrolled alteration. Documents include Program-specific plans, procedures, and work instructions. In addition to the common management system records outlined in the IMS Manual, records specific to this Program include, but are not limited to:

- waste studies and reports;
- waste analysis reports;
- waste inventories and on-site waste disposal records;
- shipping documents or manifests for off-site waste disposal;
- inspection, maintenance, and calibration records for waste management controls and monitoring equipment; and
- field notes from waste monitoring events and inspections.

Documents and records are readily accessible to those that require them. The process for managing documents and records is outlined in the IMS Manual.

## 2.7 Communication

Effective communication is an important element of this Program and the supporting plans and is vital for maintaining a culture of safety, environmental protection, and responsible waste management. Communication allows the organization to provide and obtain information relevant to this Program, including information related to significant waste management risks, waste management performance, compliance obligations, and recommendations for continual improvement. Tools used to communicate waste management information related to the Project include, but are not limited to:

- routine safety moments to begin meetings or training courses;
- safety and environment-focused toolbox meetings;
- town hall meetings;
- posted information required by regulation; and
- signage and labelling.

Workers are informed of their duties and responsibilities and changes to personnel, processes, facilities, or equipment are communicated to those affected as required. Internal and external communication principles and processes are further outlined in the IMS Manual. Communication practices specific for local Indigenous communities, local communities, and the public are described in the *Rook I Indigenous and Public Engagement Program*.

## 2.8 Change Management

Change is managed to protect worker health and safety, the environment, facilities, and equipment and to promote consistent and effective execution of site processes. This includes changes to Project:

- design;
- facilities;
- equipment;
- management system processes;
- organizational structure;
- operations;
- planned impairment of a critical waste management control features;
- information related to waste management risks, impacts, and controls;
- key roles and responsibilities;
- documentation; and
- legal and other requirements.

Changes are evaluated with consideration for the impact to this Program and its related processes. This maintains that:

- change is clearly defined;
- risks associated with the change are assessed and managed;
- change is communicated to those affected; and
- related documentation is updated.

The general change management process is outlined in the IMS Manual.

## 2.9 Environmental Protection

Implementing measures to protect the environment is an important aspect of effective waste management. This Program is implemented in an integrated manner with the *Rook I Environmental Protection Program*. The *Rook I Environmental Protection Program* describes the framework, principles, and processes used to prevent, manage, mitigate (as required), and monitor potential interactions between waste management activities, processes, and facilities and the natural environment.

## 2.10 Emergency Preparedness and Response

Preparing for and responding to emergency events and situations is critical to minimizing potential impacts on worker health, safety, and the environment. Preparation and response measures account for potential to encounter hazards associated with waste materials and controls required to protect workers, the public, and the environment. The *Rook I Emergency Preparedness and Response Program* describes the framework, principles, and processes used to prevent, plan for, effectively and safely respond to, and mitigate the effects of emergency events and situations.

The framework outlined in the *Rook I Emergency Preparedness and Response Program* is further detailed in three supporting plans that outline requirements for preparing for and responding to emergencies:

- Project emergencies (surface and underground) are described in the *Emergency Response Plan*.
- Transportation emergencies are described in the *Ground Transportation Emergency Response Plan*.
- Crisis events are described in the *Crisis Management Plan*.

These plans have been developed in consultation with waste subject matter experts and include information for protecting workers, the public, and the environment, as well as the roles and responsibilities for environmental and safety subject matter experts.

## 2.11 Decommissioning and Reclamation

NexGen is committed to designing and operating waste management facilities for responsible closure by recognizing and valuing the importance of protecting and preserving the environment throughout the Project life cycle. Waste rock and tailings management facilities and systems are designed in a manner that minimizes the reliance on active institutional controls following decommissioning and reclamation.

The *Rook I Preliminary Decommissioning and Reclamation Plan* provides a high-level overview of proposed decommissioning and reclamation objectives, methods, measures, and monitoring requirements. It is sufficiently detailed to assure the proposed approach is technically and financially feasible, protects worker and public health and safety, protects the environment, and maintains security. The *Rook I Preliminary Decommissioning and Reclamation Plan* forms the strategic basis for establishing financial guarantees and provides the structural outline of subsequent detailed decommissioning plans.

The *Rook I Preliminary Decommissioning and Reclamation Plan* is updated using best available information throughout the Project life cycle at a minimum of every five years or when there is a change that prompts a revision.

# 3.0 Do

The *Do* component of this Program includes implementing Program elements described in section 2.0. This includes the implementation of waste management controls, equipment maintenance, contractor management, and reporting incidents and deviations.

## 3.1 Risk Control

Controls identified during risk assessment are used to eliminate, prevent, or reduce risk associated with waste management facilities, processes, and activities. Controls appropriate for the hazard and corresponding level of risk are selected and implemented with consideration for the hierarchy of controls, as illustrated in Figure 3. Control examples include facilities, equipment, processes, products, work practices, and personal protective equipment (PPE).

Where possible, controls are used in combination to effectively prevent or reduce risk ALARA. Controls are used, operated, and maintained according to their design, limitations, and applicable training. Adherence to procedures and training are critical in preserving the effectiveness of controls.

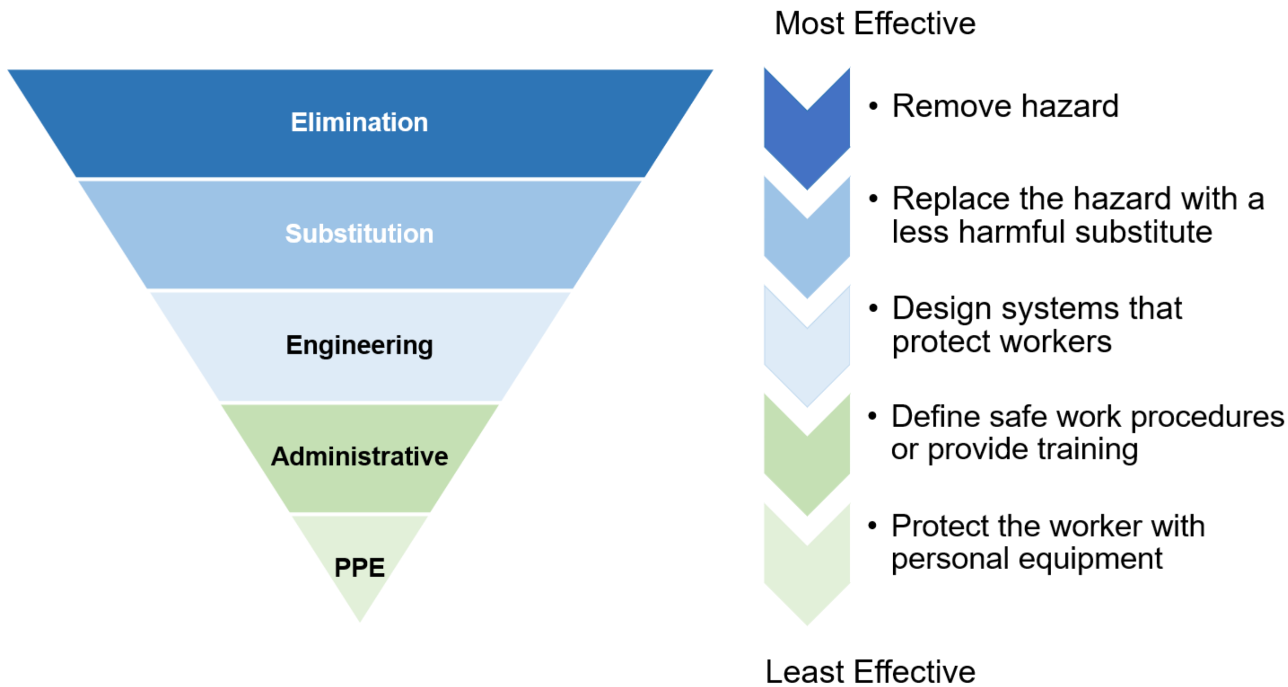


Figure 3: Hierarchy of Controls

### 3.1.1 Elimination and Substitution

The most effective measure to control risk is by eliminating or substituting the hazard. Designing infrastructure or a process to remove a waste stream is an example of hazard elimination. Replacing a toxic chemical with a non-toxic alternative to reduce the hazard of the resulting waste is an example of hazard substitution.

Whenever possible, eliminating or substituting hazards is conducted during design or modifications to infrastructure, equipment, and other processes to reduce or eliminate the interaction with workers, the public, and the environment.

Changes made to eliminate or substitute an existing hazard control are subject to the change management process as described in section 2.8 and outlined in the IMS Manual.

### 3.1.2 Engineering Controls

Engineering controls may be used when completely removing or replacing a hazard is not possible or practicable. Engineering controls involve designing facilities, equipment, and systems in a manner that reduces hazard exposure. Engineering controls are developed with the goal of eliminating or substituting the exposure pathway where possible. The effluent treatment plant and secondary containment around a hazardous waste storage area are examples of engineering controls employed to prevent or minimize harm to workers, the public, and the environment.

Design changes that result in implementing new or modifying existing engineering controls are subject to the change management process outlined in section 2.8 of this Program and the IMS Manual.

### 3.1.3 Administrative Controls

Administrative controls are an essential component of risk mitigation and are typically used in combination with other types of controls. Administrative controls include training, supervision, and written policies, plans, procedures, and work instructions.

#### Plans, Procedures, and Work Instructions

Instructions for completing tasks associated with licensed activities may be documented in the form of plans, procedures, and work instructions if risk assessment determines it to be appropriate. Work planning documentation is subject to the document management process outlined in the IMS Manual.

The most significant waste-related risks of the Project are controlled through measures detailed in a series of waste management plans as described in section 3.2.

#### Job Hazard Analysis

A job hazard analysis is performed to evaluate work when an activity or process has the potential to present a significant risk to the health, safety, security, or the environment but a plan, procedure, or work instruction does not exist. A job hazard analysis is an important tool for keeping potential impacts ALARA.

A job hazard analysis is valid only for the task for which it is prepared and issued and is subject to review and revision if a change to scope or in nature of work is encountered.

The requirements for completing a job hazard analysis are outlined in the *Rook I Health and Safety Program*.

#### Signage and Labelling

Appropriate signage notifying workers of workplace hazards, restrictions, or requirements are posted throughout the Project site (e.g., areas used for the storage of waste dangerous goods or radiological waste). Labelling is used to identify potential risks or hazards associated with contents or their use (e.g., labelling on hazardous waste containers). Signage is designed with consideration for applicable regulatory requirements, is legible and visible, and is removed when no longer required.

#### Warning Systems

Where required or practicable, audible and visual notification systems are installed to inform workers of potential upset or abnormal conditions that could affect their health and safety or environment and allow for prompt response and mitigation.

### 3.1.4 Personal Protective Equipment

PPE includes protective clothing, hard hats, safety glasses, gloves, or other garments or equipment (e.g., respirators) designed to protect workers from injury or exposure to contaminants. PPE is considered the last line of defence and is typically used in combination with other types of controls. PPE required to complete work safely is made available and is periodically inspected to verify it has not passed the date of expiry or become damaged during use.

The selection, use, and maintenance of PPE is outlined in the *Rook I Health and Safety Program*.

## 3.2 Waste Management Plans

This Program is supported by documented plans that describe measures to reduce or eliminate potential environmental impacts or workplace incidents associated with waste generation, handling, and processing. The plans are scoped to focus on distinct elements of Project waste management:

- soil, overburden, potentially acid generating waste rock, and non-potentially acid generating waste rock management is outlined in the *Mine Waste Management Plan;*

- contact and non-contact water management is outlined in the *Site Water Management Plan;* and
- domestic, industrial, low-level radioactive, and hazardous waste management is outlined in the *Conventional Waste Management Plan.*

Each plan includes the following details (as applicable):

- physical Project setting and baseline conditions;
- descriptions of key Project activities and processes including infrastructure and equipment associated with conveying, handling, tracking, storing, processing, transporting, and disposing of waste and their associated risks;
- general and specific risk management performance requirements, with reference to internal and external commitments and obligations;
- operational limits and conditions derived from hazard assessments;
- mitigation and control measures (e.g., primary and secondary containment, liners, inspections);
- measures to enable the timely detection and mitigation of aging effects (as appropriate);
- compliance criteria;
- monitoring performance of the various activities and processes established for waste management;
- measures to incorporate Indigenous and local knowledge and involve representatives from local Indigenous groups and communities in performing monitoring activities;
- performance indicators;
- routine and non-routine reporting requirements; and
- adaptive management measures (as applicable).

Plans and associated controls align with and refer to applicable provincial and federal regulatory requirements including *REGDOC-2.11.1, Waste Management (Volumes I, II, and III)* as well as applicable international standards. These plans are reviewed, updated, and maintained in accordance with the document management process outlined in the IMS Manual.

## 3.3 Equipment Procurement and Maintenance

Equipment and material procured for implementation of this Program are subject to the requirements outlined in the IMS Manual. Equipment is stored, maintained, and calibrated with consideration of the frequency and type of use as well as the manufacturer or stated regulatory specifications as outlined in the *Rook I Asset Management Program*.

## 3.4 Contractor Management

Contractors performing work at the Project site are subject to the requirements of this Program. Contractors with specialized knowledge or training may be used to support waste management activities and processes. This includes, but is not limited to:

- collecting, handling, processing, and disposing of waste materials;
- maintaining and repairing waste management facilities and equipment;
- monitoring facilities and equipment;
- performing waste management surveys and studies to evaluate Project performance; and
- responding to abnormal situations including, but not limited to, discharges and emergencies related to waste.

The process for verifying contractors adhere to requirements, including the process for verifying and authorizing contractor waste management systems, is outlined in the *Rook I Contractor Management Program*.

## 3.5 Incident and Deviation Reporting

Workers and visitors are required to report information regarding incidents (including near-misses) and deviations. Near-misses are events or situations where an incident, environmental discharge, or emergency event could have occurred but was avoided.

Reported information is documented and tracked in accordance with the IMS Manual. Internal events that meet or exceed applicable legislated reporting thresholds, including those that are reportable in accordance with *The Environmental Management and Protection (Saskatchewan Environmental Code Adoption) Regulations* and the *General Nuclear Safety and Control Regulations*, are reported to applicable regulatory representatives within legislated timelines.

The process for providing information regarding reportable events or situations to internal and external parties is outlined in the IMS Manual.

# 4.0 Check

The *Check* component of this Program consists of ongoing performance monitoring, periodic audits and inspections, reviews, and analysis of results to verify that the Program is operating effectively.

## 4.1 Monitoring and Measurement

Management system processes are continually monitored and measured to evaluate whether Project activities meet external and internal requirements. Monitoring and measurement are conducted to evaluate the appropriateness of controls and to determine whether waste management facilities, processes, and activities are performing in accordance with predictions and design intent requirements and within established limits. Waste management monitoring and measuring activities include, but are not limited to:

- evaluating waste characteristics and properties (e.g., chemical, radiological, physical);
- monitoring the integrity of waste-related structures, systems, and components (e.g., containment);
- tracking waste types and quantities (e.g., generation rates, disposal or recycling volumes); and
- confirming that activities, processes, and facilities are within operating limits (e.g., pond freeboard, available capacity).

Monitoring and measurement are subject to quality assurance and quality control processes to maintain accuracy and reliability of data. Monitoring and measurement methods, locations, and frequencies are further described in the supporting waste management plans described in section 3.2. General monitoring and measurement processes and requirements are outlined in the IMS Manual.

## 4.2 Inspections and Audits

The performance and effectiveness of this Program and its associated plans, procedures, and work instructions are monitored and verified with regular conformance audits. Qualified individuals independent of the work being assessed conduct audits as outlined in the IMS Manual.

External compliance inspections and audits are conducted by regulators; conformance audits and inspections are conducted by third parties, as required. Deviations, instances of regulatory noncompliance, and opportunities for improvement identified through audits or inspections are managed as outlined in the IMS Manual.

### 4.2.1 Facility and Equipment Inspections

Facilities and equipment required for effective waste management are regularly inspected, tested, calibrated, and maintained by competent workers to verify controls are functioning and effective in accordance with requirements established by applicable codes and standards, and in accordance with the design intent of the facility. Inspections may be conducted on the following facilities and equipment:

- storage facilities;
- containment structures for wastes and contact water;
- water diversion structures;
- automatic and manual sampling equipment;
- discharge monitoring devices and associated alarms; and
- spill and environmental emergency response equipment.

The processes for inspecting facilities and equipment to protect human health and the environment are described in the waste management plans described in section 3.2.

## 4.3 Management Review

This Program and supporting processes are subject to review and evaluation by Rook I management. In addition to the general topics outlined in the IMS Manual, inputs specific to waste management include, but are not limited to:

- proposed Program-specific objectives and targets or current status;
- upcoming or new legislation or regulation related to the Program and plans to address these requirements;
- significant changes to the Program;
- waste management monitoring results;
- progressive decommissioning and reclamation activities; and
- proposed continual improvement actions or current status.

The management review process is outlined in the IMS Manual*.*

# 5.0 Act

The *Act* component of this Program consists of facilitating continual improvement and verifying that, when required, corrective actions are taken and managed. The results of these Program elements feed back into *Plan* to complete the Plan-Do-Check-Act cycle.

## 5.1 Corrective Action Process

Waste management incidents (including near-misses), and deviations related to this Program are evaluated and investigated as required. Appropriate actions are developed and implemented to correct and prevent reoccurrence. Corrective actions are planned, implemented, verified, and reviewed for effectiveness corresponding with the risk level.

The corrective action process is outlined in the IMS Manual.

## 5.2 Continual Improvement

Continual improvement is an ongoing process to improve the suitability, adequacy, and effectiveness of the IMS. Workers continually seek out improvement opportunities for the IMS and Project processes through Program monitoring, auditing, management review, and maintaining awareness of changes in the business environment. Improvement may also involve benchmarking Project performance against other similar projects and facilities.

The use of experience gained during Project site preparation, construction, and commissioning, including information collected from relevant external sources, informs potential improvement opportunities. Potential sources of information include:

- worker experience;
- government and industry publications;
- industrial peer information exchange;
- professional associations;
- lessons learned;
- advances in science and technology; and
- incident investigations.

Continual improvement opportunities are identified, documented, evaluated, and implemented as outlined in the IMS Manual.

# 6.0 References

## 6.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-CHT-00001 | *Rook I Organizational Chart* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-AST-PGM-00001 | *Rook I Asset Management Program* |
| ROOK-COM-PGM-00001 | *Rook I Commissioning Management Program* |
| ROOK-CON-PGM-00001 | *Rook I Contractor Management Program* |
| ROOK-CST-PGM-00001 | *Rook I Construction Management Program* |
| ROOK-EMG-PGM-00001 | *Rook I Emergency Preparedness and Response Program* |
| ROOK-ENV-PGM-00001 | *Rook I Environmental Protection Program* |
| ROOK-HSF-PGM-00001 | *Rook I Health and Safety Program* |
| ROOK-IPE-PGM-00001 | *Rook I Indigenous and Public Engagement Program* |
| ROOK-RAD-PGM-00001 | *Rook I Radiation Protection Program* |
| ROOK-TRN-PGM-00001 | *Rook I Training Program* |
| ROOK-EMG-PLN-00001 | *Emergency Response Plan* |
| ROOK-EMG-PLN-00002 | *Ground Transportation Emergency Response Plan* |
| ROOK-EMG-PLN-00003 | *Crisis Management Plan* |

| Document Number | Document Title |
|---|---|
| ROOK-WST-PLN-00001 | *Mine Waste Management Plan* |
| ROOK-WST-PLN-00002 | *Site Water Management Plan* |
| ROOK-WST-PLN-00003 | *Conventional Waste Management Plan* |
| ROOK-WST-RPT-00001 | *Rook I Mine Waste Safety Case* |
| ROOK-DEC-PLN-00001 | *Rook I Preliminary Decommissioning and Reclamation Plan* |
| ROOK-ENV-RPT-00001 | *Rook I Environmental Impact Statement* |

## 6.2 External

- Federal
  - *Nuclear Safety and Control Act*
  - *General Nuclear Safety and Control Regulations*
  - *Uranium Mines and Mills Regulations*
  - *REGDOC-2.9.1, Environmental Principles, Assessments and Protection Measures*
  - *REGDOC-2.11, Framework for Radioactive Waste Management and Decommissioning in Canada, Version 2*
  - *REGDOC-2.11.1, Volume I: Management of Radioactive Waste*
  - *REGDOC-2.11.1, Volume II: Management of Uranium Mine Waste Rock and Mill Tailings*
  - *REGDOC-2.11.1, Volume III: Safety Case for the Disposal of Radioactive Waste, Version 2*
- Provincial
  - *The Environmental Management and Protection Act, 2010*
  - *The Environmental Management and Protection (Saskatchewan Environmental Code Adoption) Regulations*
  - *The Hazardous Substances and Waste Dangerous Goods Regulations*
  - *The Saskatchewan Employment Act*

# Mine Waste Management Plan
# ROOK-WST-PLN-00001

# Rook I Project

## Mine Waste Management Plan

ROOK-WST-PLN-00001



June 2023

# Record of Revisions

| Version No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| A | 23-Jun-2023 | Issued for initial CNSC review and feedback | K. Bonstrom | L. Moger<br>J. Cooper<br>J. Henderson<br>B. Martel | - |

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# 1.0 Introduction

This *Mine Waste Management Plan* (Plan) details the systematic and risk-based approach to the management of mine waste generated at the NexGen Energy Ltd. (NexGen) Rook I Project (Project). The Plan describes processes to characterize, segregate, store, and monitor soils, overburden, waste rock, and effluent precipitates generated during the Project site preparation, construction, and commissioning (i.e., Construction) phase in a manner that protects people and the environment and maintains regulatory compliance.

This Plan, along with the *Site Water Management Plan* and *Conventional Waste Management Plan*, supports the *Rook I Waste Management Program* and is part of the overall *Rook I Integrated Management System* (IMS). As a component of the IMS, this Plan is subject to the *Rook I Integrated Management System Policy* (Policy) which provides the foundation for NexGen's approach to waste management. This Plan and its relationship to the other IMS programs within the IMS hierarchy is shown in Figure 1.

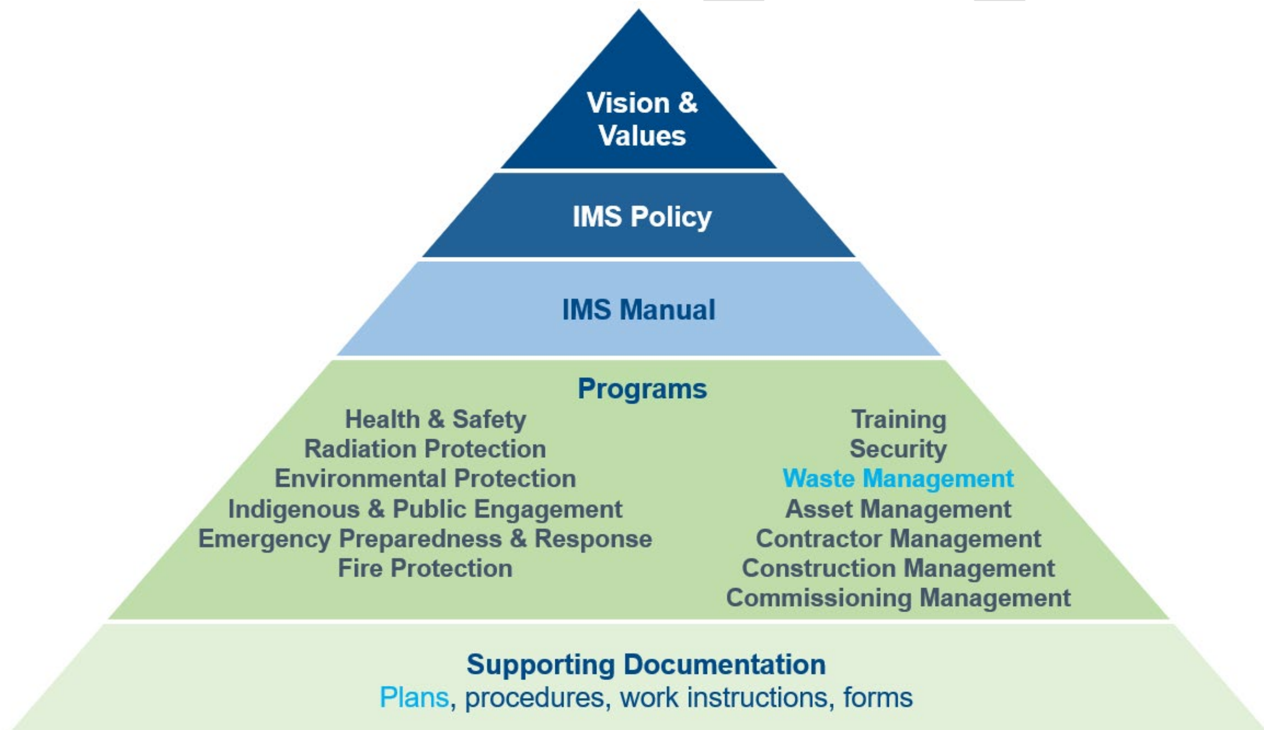


Figure 1: Plan Context Within the IMS

## 1.1 Purpose

The Plan describes management philosophies, processes, roles, responsibilities, infrastructure, and monitoring necessary to effectively characterize, segregate, and store mine waste in a manner that minimizes the generation of waste to the extent practicable, prevents pollution, enables responsible closure, and protects people and the environment. This Plan addresses applicable regulatory requirements, as detailed in section 9.2.

## 1.2 Scope

The Plan applies to the characterization, segregation, storage, and monitoring of soils, overburden, waste rock, and effluent precipitates generated during the Project site preparation, construction, and commissioning (i.e., Construction) phase.

The processes outlined as part of the Plan apply to all Project workers responsible for generating, transporting, and disposing of mine waste under routine and non-routine (e.g., extreme precipitation) conditions.

This Plan uses a graded, risk-based approach to mine waste management that is commensurate with waste characteristics (e.g., radiological, chemical, geochemical, geotechnical, biological, and physical hazards) and accounts for the level of risk, safety significance, and complexity of waste management activities and facilities.

The mining of uranium ore, the production of uranium concentrate, and the generation of tailings are not within the scope of the Construction phase of the Project; however, the processes described herein account for the possibility of encountering radiologically contaminated mine rock and for establishing and maintaining safe and reliable mine waste management measures throughout the Project life cycle. The Plan is periodically reviewed and revised as required and will be updated prior to transition to the Operations phase.

The Plan is not intended to provide all necessary details for all possible factors influencing mine waste management decisions; workers with the appropriate level of authority and competence are expected to make and perform decisions to manage mine waste safely and effectively. The planning and resource identification included herein is designed to provide important and appropriate guidance for mine waste management personnel.

Additional information on the design and expected operating performance of mine waste management facilities, systems, and components is provided in the *Rook I Mining and Milling Facility Description Manual.*

Processes for designing and constructing mine waste management infrastructure are outlined in the *Rook I Construction Management Program*. Processes for commissioning mine waste management infrastructure are outlined in the *Rook I Commissioning Management Program.*

Mitigation and monitoring of effluent (i.e., waterborne releases) and emissions (i.e., airborne releases) prior to the final point of control is within the scope of the *Effluent and Emissions Plan*. Monitoring the atmosphere, land, groundwater, and surface water beyond final point of control is within the scope of the *Environmental Monitoring Plan*.

Mine waste management during Project decommissioning, reclamation, and post-closure monitoring is within the scope of the *Rook I Preliminary Decommissioning and Reclamation Plan.*

## 1.3 Mine Waste Management Framework

This Plan directly supports the *Rook I Waste Management Program* and is used in conjunction with the *Rook I Environmental Protection Program* and related waste management documents (e.g., plans, procedures, work instructions, forms) as shown in Figure 2.

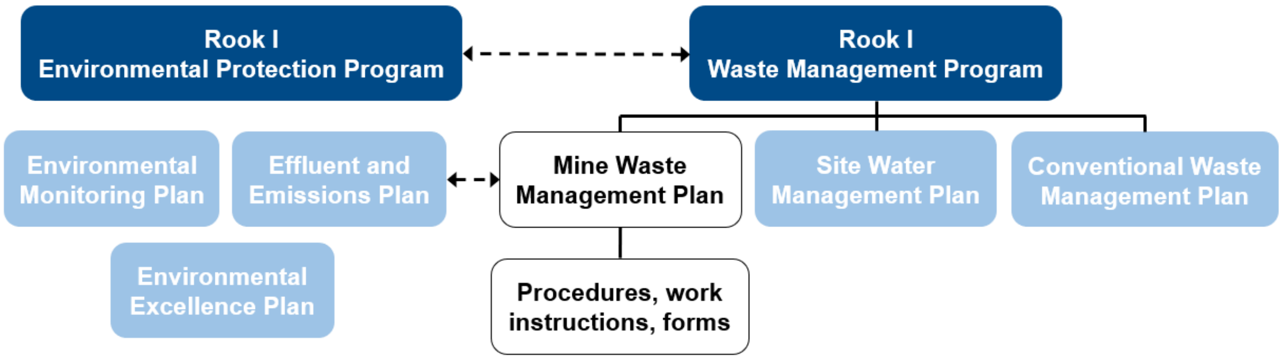


Figure 2: Waste Management Framework

## 1.4 Mine Waste Management Philosophy

NexGen adopts an integrated, risk-based approach to mine waste management throughout the Project life cycle that accounts for Project activities and processes that are interdependent with mine waste management, incorporates industry-proven best available techniques and technologies, and is informed by ongoing engagement with local Indigenous groups, local communities, and regulators.

Mine waste management facilities and systems are designed, constructed, and operated in a manner that:

- protects and promotes the health, safety, and well-being of people and the environment during routine and non-routine Project conditions;
- minimizes the generation of waste to the extent practicable;
- prevents pollution by reducing generation of constituent mass loadings at the source when possible;
- uses a fit-for-purpose approach that accounts for the unique characteristics and hazards of each waste stream;
- accounts for the influence that waste management practices have on effective site water management;
- is practical and executable;
- incorporates progressive reclamation and minimizes reliance on active institutional controls following closure;
- complies with applicable legal and other requirements; and
- allows flexibility for adaptive management and continual improvement.

## 1.5 Terminology

Terminology introduced in this Plan is provided in this section. A comprehensive list of common terms applicable to this Plan and the IMS are available in the *Rook I Project Glossary*.

**acid-base accounting (ABA)** – Estimation of the potential for acid generation based on the balance between acid-producing and acid-neutralizing minerals as determined using standard static geochemical index testing methods and calculation procedures (International Network for Acid Prevention [INAP, 2017]).

**acid rock drainage (ARD)** – Low pH, metal-laden, sulfate-rich drainage that is derived from water in contact with rock that is undergoing sulfide oxidation and has insufficient capacity to neutralize generated acidity resulting in lowered pH and elevated metal and sulfate concentrations (International Network for Acid Prevention [INAP, 2017]).

**acid potential** – Maximum potential acid generation from a rock mass that is estimated using mineralogy and geochemistry of representative samples.

**bins** – Location for underground storage of waste awaiting treatment or shipment.

**cross-cut** – Horizontal opening from the shaft to the orebody at right-angles.

**drift** – Horizontal or sub-horizontal openings in the mine that follows the orebody.

**effluent precipitates** – Waste produced by settling of suspended solids through the treatment process in the effluent treatment plant**.**

**geotube** – Large, tube-shaped bags made of porous, weather-resistant geotextiles that can be used for dewatering effluent precipitates.

**high density polyethylene (HDPE)** – Thermoplastic with a high strength to density ratio. HDPE is a versatile plastic that has a wide range of applications.

**internal diameter (ID)** – The diameter of an opening which has a liner installed, resulting in a smaller final diameter than the original excavation.

**load-haul-dump machine** – Equipment in underground mines to load and transport ore and waste rock after blasting.

**metal** – Describes all metallic (e.g., Copper [Cu], iron [Fe], zinc [Zn]) or metalloid (e.g., arsenic [As], boron [B], antimony [Sb]) parameters.

**metal leaching (ML)** – Dissolution of soluble minerals not related to sulfide oxidation resulting in elevated metal concentrations at near-neutral pH values produced as seepage or drainage from underground workings, pits, ore piles, waste rock, tailings, and overburden potentially leading to the release of metals to groundwater and surface water during the life of the mine and after mine closure (INAP, 2017).

**mine rock** – Material produced by means of drilling and blasting rock.

**mine waste** – General term that includes soil, overburden, non-potentially acid generating (NPAG) waste rock, potentially acid generating (PAG) waste rock, special waste rock, and effluent precipitates.

**mineralized waste rock** – Waste rock that contains greater than 0.03% triuranium octoxide ($U_3O_8$).

**neutralization potential** – Capacity of carbonate and silicate minerals to consume acidity.

**non-potentially acid generating (NPAG)** – Mine rock with less than or equal to 0.03% $U_3O_8$ and less than 0.1% total sulphur.

**ore** – Mine rock sourced from underground with greater than or equal to 0.26% $U_3O_8$.

**ore drive** – Underground lateral development through the ore body**.**

**overburden** – Glacial till deposits that overlay Athabasca sandstone units and will be removed to develop the shafts.

**pass** – Mine raise used to transfer ore and waste from the mine.

**potentially acid generating (PAG)** – Mine rock with less than or equal to 0.03% $U_3O_8$ and greater than or equal to 0.1% sulphur.

**Project site** – Term used to describe all property within the physical NexGen Rook I boundary.

**quality assurance (QA**) – Part of quality management focused on providing confidence that quality requirements will be fulfilled.

**quality control (QC)** – Part of quality management focused on fulfilling quality requirements.

**raise** – Vertical or near-vertical underground excavation.

**ramp** – Tunnel connecting levels of the underground mine.

**soil** – Surficial layer of earth in which plants grow. Typically black or dark-brown material with a mixture of organic material, clay, and rock particles.

**special waste rock** – Mine rock with insufficient grade to be considered ore (i.e., greater than 0.03% of triuranium octoxide [$U_3O_8$] uranium concentrate and less than 0.26% $U_3O_8$). All special waste is temporarily stored in the special waste rock stockpile, used to blend high grade ore in the process plant, and deposited in the underground tailings management facility (UGTMF) or mined stopes.

**subject matter expert (SME)** – Person providing the knowledge and expertise in a specific subject for a project. An SME verifies content is accurate.

**sulfide** – An inorganic compound characterized by the linkage of disulfide ($S_2^{2-}$) and sulphur ($S^{2-}$) with a metal or metalloid (e.g., pyrite [$FeS_2$] or arsenopyrite [FeAsS]).

**total sulphur** – All the sulphur in a sample. One in a series of analyses that are a part of acid-base accounting. Expressed as %S.

**underground tailings management facility (UGTMF)** – Purpose-built, underground facility with chambers dedicated to the permanent storage and progressive decommissioning for tailings and other waste streams generated through mining and milling.

**waste rock** – Mine rock generated from the development of the shafts, mine area, and underground tailings management facility (UGTMF) that is less than or equal to 0.03% $U_3O_8$. Includes non-potentially acid generating (NPAG) waste rock and potentially acid generating (PAG) waste rock.

**waste rock storage area (WRSA)** – Area that permanently stores non-potentially acid generating (NPAG) or potentially acid generating (PAG) waste rock at surface.

**worker** – Any person working for NexGen, including a contractor.

# 2.0 Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Plan. Workers are informed of their roles and responsibilities and are accountable for understanding and fulfilling them.

Although NexGen maintains overall accountability for Project activities, the term Rook I is used in the following role descriptions to reinforce that the role is applicable and may be assigned to NexGen employees and contractors performing work on behalf of the Project.

Workers with responsibilities for tasks and activities related to mine waste management are provided with the training and resources required to fulfill prescribed tasks as outlined in the *Rook I Training Program*.

Additional roles and responsibilities are further detailed as part of the supporting processes.

**Rook I management** – is responsible for:

- providing resources to achieve Plan objectives and to fulfill the required roles, responsibilities, and processes of the Plan;
- providing support to maintain effective mine waste management practices;

- controlling mine waste management incidents and deviations and directing corrective action when required;
- communicating with the applicable regulatory agencies and other external stakeholders on behalf of the Project, as appropriate; and
- identifying and pursuing opportunities to achieve continual improvement.

**Plan coordinator** – is responsible for:

- implementing all aspects of this Plan and related processes;
- providing oversight and direction to workers regarding mine waste management practices;
- implementing resources and assigning appropriate workers to fulfill the required roles, responsibilities, and processes of the Plan and associated processes;
- confirming that workers meet and maintain required Plan-specific training and qualifications;
- providing day-to-day oversight of Project mine waste management activities;
- establishing and maintaining a monitoring system to evaluate and track the effectiveness of this Plan;
- maintaining Plan-specific data and records in a controlled manner;
- addressing Plan deficiencies and deviations; and
- implementing opportunities to continually improve mine waste management processes

**Supervisors** – are responsible for:

- overseeing the implementation of work activities in the field in accordance with the Plan;
- informing workers of their roles and responsibilities;
- verifying workers are aware of and able to execute specific tasks and activities related to mine waste management processes;
- verifying workers meet and maintain required Plan-specific training qualifications; and
- identifying Plan deficiencies and deviations and consulting with Rook I management and the Plan coordinator as required to develop and implement remedial actions.

**Workers** – are responsible for:

- implementing mine waste management processes in accordance with applicable training;
- managing mine waste in accordance with Plan processes; and
- identifying and reporting Plan deficiencies and deviations to the Plan coordinator and supporting the implementation of remedial actions as required.

# 3.0 Project Context

This section provides an overview of the Project; a summary of primary baseline features and characteristics that may influence development and operation of mine waste management infrastructure; and a description of construction activities that generate mine waste.

## 3.1 Project Overview

The Project operates year-round and includes construction activities to establish permanent underground and surface facilities required to support extraction of uranium ore and production of uranium concentrate including:

- an underground mine accessed by two shafts (i.e., production and exhaust shafts);
- mine waste management facilities;
- site water management facilities;

- a surface uranium ore process plant;
- a surface paste backfill plant;
- an underground tailings management facility (UGTMF);
- an effluent treatment plant; and
- an administration and accommodation complex, utilities, an airstrip, and roads.

For illustrative purposes, a general schematic of primary Project infrastructure at the end of the Operations phase is shown in Figure 3.

The infrastructure required to manage mine waste generated during the Construction phase is commensurate with the actual extent of surface and underground development and is described in section 5.0 and section 6.0.

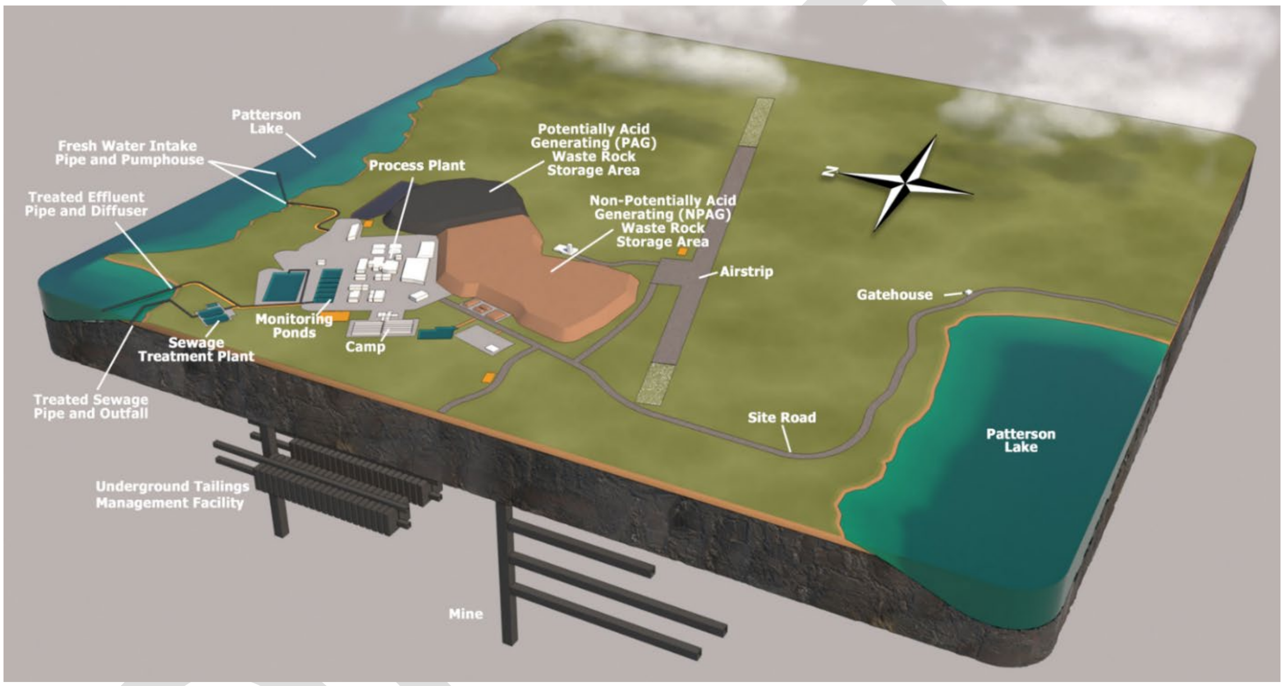


Figure 3: Schematic of Primary Project Infrastructure (End of Operations Phase)

## 3.2 Project Setting and Baseline Conditions

This section provides an overview of the physical features and characteristics of the region in which the Project is located and their potential influences on development and operation of mine waste management infrastructure. Physical features and regional characteristics are obtained from baseline studies conducted for the Project. Additional details are outlined in the *Rook I Environmental Impact Statement*.

### 3.2.1 Climate

The Project is situated in a subarctic region where temperatures range from warmer than 30°C in summer to colder than -40°C in winter. Winters are long and cold, with mean monthly temperatures below freezing from October to April. Annual precipitation is approximately 0.53 m, with approximately 70% of annual precipitation occurring as rain during summer and the remainder as snow during winter. Ice formation on water bodies typically begins in October, with break-up starting on small waterbodies in April during the spring freshet and continuing into late May for larger waterbodies.

Climate influences mine waste geochemical reactions that may require management including, but not limited to:

- sulfide oxidation and potential development of acid rock drainage (ARD) that may be retarded under freezing conditions during the winter months, as water does not infiltrate to the waste mass from the surface under freezing conditions (i.e., hydraulic conductivity of waste is reduced in winter compared to hydraulic conductivity in summer);
- precipitation that can generate erosion of waste materials and interact with mine waste to mobilize and transport constituents along flow pathways; and
- prevailing wind directions and intensities that can result in wind erosion and deposition downwind from a given storage facility.

Climate also influences mine waste geotechnical stability. Freeze and thaw cycles that may increase hydraulic conductivity of surficial waste material and precipitation and wind can generate erosion of material and lead to slope instability.

Additional information on climate is outlined in the *Rook I Environmental Impact Statement*.

### 3.2.2 Topography

The Project is situated on a peninsula next to Patterson Lake with the highest local point at approximately 583 metres above sea level (masl) sloping towards Patterson Lake to the north, west, and south. The shoreline elevation is approximately 500 masl.

The variable topography of the Project site influences the configuration and location of mine waste management infrastructure, transport and placement practices, and site water management as outlined in the *Site Water Management Plan*.

Topography of the Project area is outlined in the *Rook I Environmental Impact Statement* and the *Rook I Mining and Milling Facility Description Manual*.

### 3.2.3 Soils

Terrain in most of the site (i.e., 65%) comprises undulating to hummocky upland landscape with high relief and dominant surface stoniness class of Very Stony (i.e., 3% to 15% of ground surface covered). The site consists of loamy sand textured soils formed from glaciofluvial parent material and outwash depositional settings. Some soils require management as they are not suitable for reclamation. Reclamation suitability of soils is provided in the *Rook I Preliminary Decommissioning and Reclamation Plan*.

Wind erosion ratings for dominant mineral soil subgroups in all soil map units (SMUs) are generally high in the Project site, based on either sandy-textured mineral upper soil horizons or disturbed upper soil horizons.

Additional information on the soils is outlined in the *Rook I Environmental Impact Statement*.

### 3.2.4 Geology

Local and deposit geology primarily influences mine waste rock classification, segregation, and storage practices. The Project is focused on development of the Arrow Deposit, a high-grade uranium deposit hosted chiefly in semi-pelitic gneiss. The Arrow Deposit is overlain by sedimentary units and glacial till overburden in descending order from surface as described in Table 1 and shown in Figure 4.

Table 1: Summary of Geology in Project Area

| Geology | Formation | Characteristics |
|---|---|---|
| Overburden | Upper glacial till | • Predominantly sand and bounder content<br>• Generally located above the water table |

| Geology | Formation | Characteristics |
|---|---|---|
| | Lower glacial till | • Moderately consolidated, weakly lithified, clay-rich, and silty sand<br>• Generally located below the water table |
| Cover Deposits | Cretaceous Manneville group (CRET) | • Defined by sandstone interbedded with mudstone<br>• Bitumen saturated units may be found |
| | Devonian La Loche formation (DEVO) | • Identified by breccias and conglomerates that grade to sandstone with carbonate cement in upper elevations |
| | Athabasca sandstone (ASST) | • Unmetamorphosed siliciclastic sedimentary rocks that are predominantly sandstones |
| Crystalline Basement | Arrow Deposit | • Variably altered mafic to ultramafic, intermediate, and local alkaline rock types<br>• Uranium mineralization |

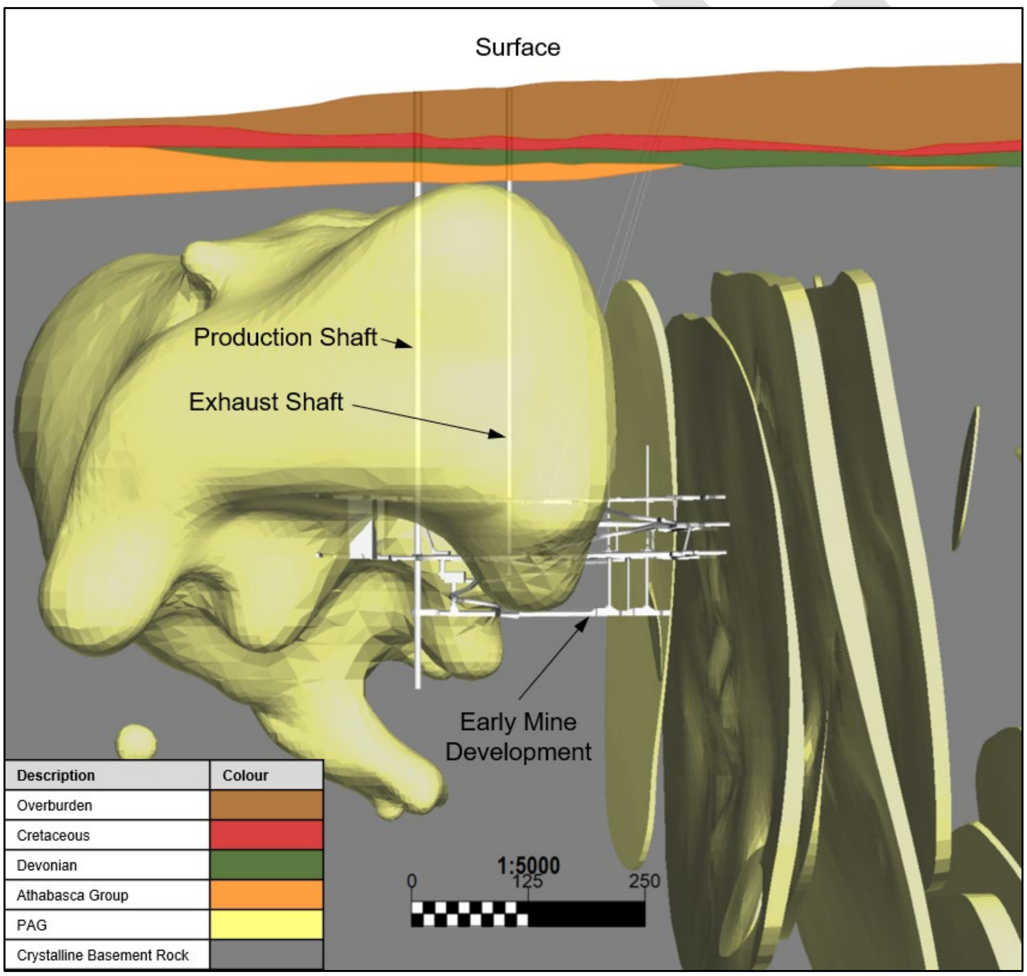


Figure 4: Cross Section of Geological Setting

The presence of sulfidic minerals (e.g., pyrite [$FeS_2$]) in waste rock is related to the Arrow Deposit and are identified through mine block models prior to development and geochemical testing and identification shaft sinking and early mine development.

Sulfidic minerals are at risk of oxidizing when exposed to air and water after blasting, which can lead to the generation of ARD/metal leaching (ML) as described in section 4.3.1. Mine waste management practices are designed to minimize these risks as described in section 5.2. The primary source for waste rock during the Construction phase is the crystalline basement, which is composed of:

- semi-pelitic gneiss (SPGN; principal ore host or country rock);
  - faulted semi-pelitic gneiss (SPGN/FLT);
- granitic intrusive bodies (INT; intrusive); and
- quartz veins and breccias.

Project geology influences the size and configuration of mine waste management infrastructure, mine waste segregation and disposal practices, and the ability to reuse excavated materials as construction borrow sources.

Additional information on deposit geology can be found in the *Rook I Environmental Impact Statement*.

### 3.2.5 Vegetation

The Project overlaps the Boreal Plain Ecozone and consists of closed-crown mixed wood and coniferous species (e.g., trembling aspen, balsam poplar, white spruce). Understanding local vegetation present prior to disturbance helps predict the quantity of woody debris available for stockpiling and informs the selection of revegetation species suitable for the reclaimed landscape that support the desired end land uses.

Additional information on the existing vegetation ecosystems and traditional use plants can be found in the *Rook I Environmental Impact Statement*.

### 3.2.6 Radioactivity

Radioactivity is the spontaneous emission of radiation in the form of particles or high energy photons. Understanding baseline radioactivity on surface and in areas of early mine development informs mine waste characterization and segregation practices to verify proper handling and storage practices are applied to keep risks to workers and the environment as low as reasonably achievable, social and economic factors taken into account.

A baseline gamma survey of the site and two sections of Highway 955 was performed in 2022 to characterize the natural variability in baseline gamma radiation levels above ground (CanNorth, 2022). Overall, the baseline gamma radiation levels across the Project site and the surveyed portions of Highway 955 were low, with the highest hectare average recorded being 0.26 micro sieverts per hour (μSv/hr). Average baseline gamma radiation levels across the Project site, access road, and Highway 955 sections were 0.021 μSv/hr, 0.014 μSv/hr, and 0.025 μSv/hr, respectively.

Delineation drilling at the Project site and geochemical testing (SRK, 2023) predicts that mine rock encountered during shaft sinking and early mine development would be below the % $U_3O_8$ thresholds established for ore and special waste.

## 3.3 Mine Waste Sources During Construction

Construction activities resulting in generation of mine waste are summarized in Table 2.

Table 2: Summary of Mine Waste Sources and Characteristics during the Construction Phase

| Activity | Description | Mine Waste Type |
|---|---|---|
| Site surface preparation | • Clearing, grubbing, and stripping<br>• Cut, fill, and grading of prepared surface for surface infrastructure and facilities | • Woody debris<br>• Soils<br>• Overburden |
| Shaft sinking | • Construction of production and exhaust shafts | • Overburden<br>• Cover deposits<br>• Crystalline basement (PAG and NPAG) |
| Early mine development | • Development of early mine workings, including the UGTMF | • Crystalline basement (PAG and NPAG) |
| Effluent treatment | • Treating water that has been physically, chemically, or radiologically altered by construction activities | • Effluent precipitates |

### 3.3.1 Shaft Sinking

Shafts are sunk using conventional shaft sinking methods (i.e., drilling and blasting) through frozen overburden and sedimentary units, with crystalline basement waste rock extracted below an approximate depth of 90 m in the production shaft and 95 m in the exhaust shaft. Both shafts are constructed using temporary ground freezing in conjunction with a hydrostatic liner for the upper portion of the shafts to a depth of 175 m below surface for the production shaft and 220 m for the exhaust shaft.

Shaft sinking commences once initial site surface preparation (i.e., clearing, grubbing, pad preparation activities) and sufficient ground freeze is established. Until shaft sinking is completed, shaft sinking is the primary source of mine waste generation for the Project.

### 3.3.2 Early Mine Development

Early mine development includes shaft station excavations and both lateral and vertical development in crystalline basement rock. Shaft stations are developed adjacent to the shafts to provide access from the shafts to the underground mine workings, route services, and distribute ventilation air underground.

Once these stations are complete, lateral development (i.e., the process of excavating horizontal tunnels) is completed to access key underground mine workings such as the orebody, UGTMF, and other infrastructure. These lateral excavations are developed using drill and blast methods. The size of the excavation depends on excavation purpose, ventilation constraints, utilities, dewatering, applicable regulations, and clearances for mobile equipment operating within the excavation.

Vertical development is also utilized in early mine development. Vertical excavations include ventilation raises, ore and waste passes, ore and waste bins, and secondary egress raises. These vertical excavations are developed using of a combination of raise boring, drilling, and blasting.

The maximum extent of early mine development during the Construction phase is shown in Figure 5.

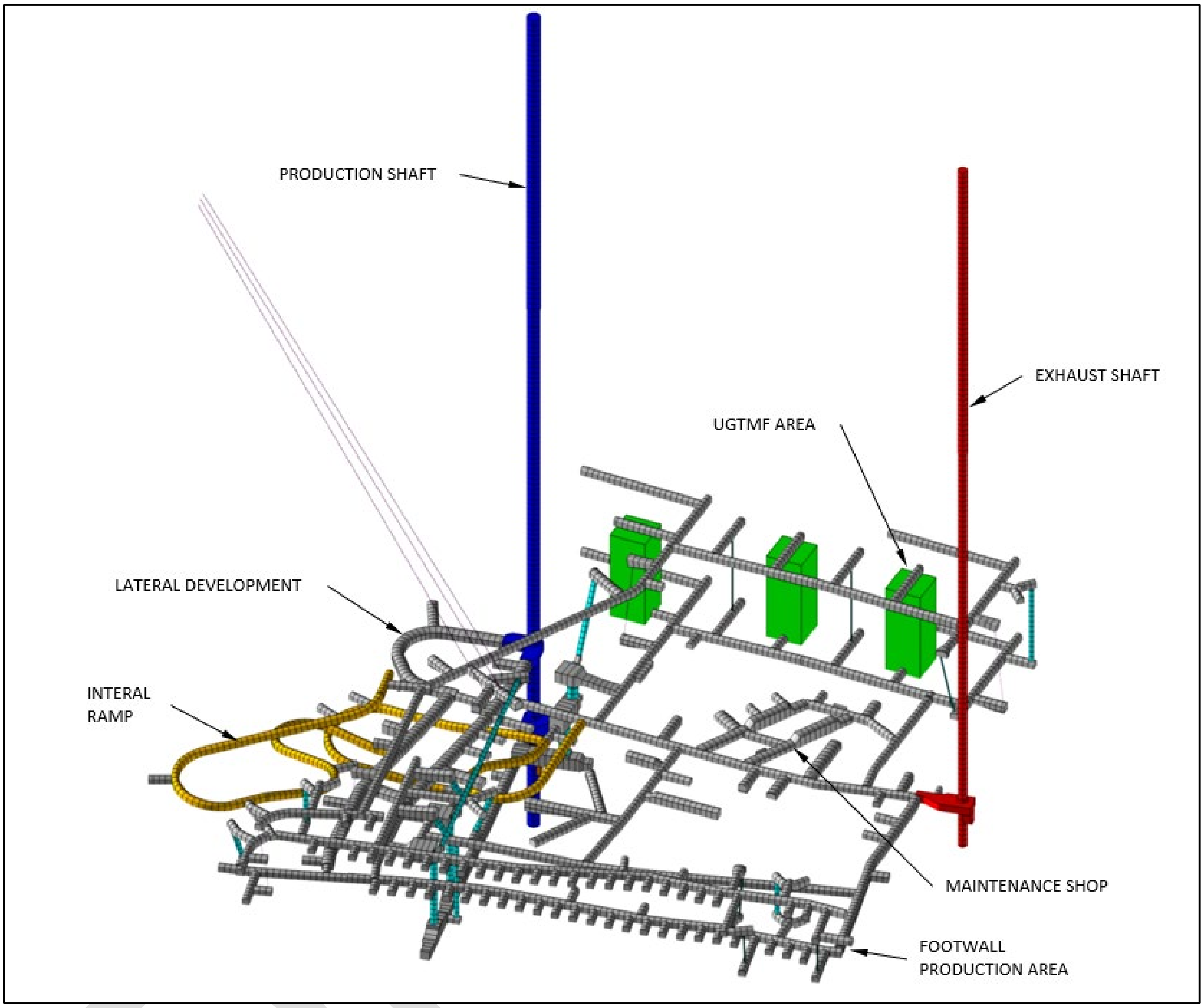


Figure 5: Schematic of Early Mine Development at the End of the Construction Phase

### 3.3.3 Effluent Treatment

A temporary effluent treatment plant (TETP) will be required during the Construction phase to treat water that has been physically, chemically, or radiologically altered by construction activities, including:

- groundwater generated from dewatering during shaft sinking and early mine development:
- runoff and seepage from overburden and cover deposit storage; and
- runoff and seepage from the potentially acid generating (PAG) waste rock storage area (WRSA).

The generation of mineralized contact water and the need for effluent treatment will begin after shaft sinking starts. Effluent precipitates generated by settling suspended solids through the effluent treatment process are sent to geotubes for dewatering.

# 4.0 Mine Waste Characterization

Mine waste characterization is the differentiation of mine waste materials considering a range of characteristics (e.g., geotechnical, radiological, geochemical) to identify and define the required level of control commensurate with risks to people and the environment.

Geochemical characteristics of mine wastes, specifically the risk of ARD and radiological contamination of the surrounding environment, are the primary drivers for the design of facilities, processes, and activities that enable safe, secure, and environmentally responsible mine waste management. Mine wastes with acceptable geotechnical and geochemical properties are used as fill and aggregates for construction activities. Mine waste characterization criteria and anticipated mine waste quantities are summarized in Table 3. The processes for tracking quantities are described in section 8.1.2.

Characterization methods and defined characteristics for each mine waste type are outlined in *Borrow Material Geochemical Analysis Memorandum* (Okane, 2023) and *Geochemical Characterization of Waste Rock* (SRK, 2023). Mine waste geochemistry is described in section 4.2 and section 4.3.

Table 3: Mine Waste Criteria and Quantities Generated during the Construction Phase

| **Waste Material** | | **Criteria** | **Disposal Location** | **Estimated Quantity (tonnes)** |
|---|---|---|---|---|
| **Mine Waste Type** | **Geologic Unit** | | | |
| Woody Debris, Soils, and Overburden | Woody debris | • Trees, Shrubs | Wood debris, soils and overburden stockpiles | To be confirmed |
| | Soil | • Upper 0.05 m to 0.30 m of surficial deposits consisting of vegetation mats, mineral substances, and organic material | | 310,000 |
| | Overburden | • Unconsolidated sandy till units approximately 45 m to 55 m thick<br>• Variable characteristics (i.e., rocks, boulders, sands and fines) | | 12,100 |
| Cover Deposits (Waste Rock) | Cretaceous rocks (CRET) | • Sandstone interbedded with mudstones often bitumen saturated units | PAG WRSA | 3,200 |
| | Devonian rocks (DEVO) | • Breccias and conglomerates grading to sandstones with carbonate cement in the upper elevations | PAG WRSA | 4,700 |
| | Athabasca Supergroup (ASST) | • Predominantly sandstone | PAG WRSA | 5,400 |
| Crystalline Basement (Waste Rock) | PAG | • Quartz-feldspar-garnet-biotite semi-pelitic gneiss (SPGN) and orthogneiss intermediate intrusive (INT) which is described as quartz monzodiorite to quartz diorite encountered at a 134 m depth in the production shaft.<br>• Containing less than 0.03% $U_3O_8$ and greater than or equal to 0.1%wt. total sulphur | PAG WRSA | 600,000 |

| Waste Material | | Criteria | Disposal Location | Estimated Quantity (tonnes) |
|---|---|---|---|---|
| Mine Waste Type | Geologic Unit | | | |
| | NPAG | • SPGN and INT<br>• Containing less than 0.03% $U_3O_8$ and less than 0.1%wt. total sulphur<br>• Suitable for reuse as construction material (e.g., fill, revetment) | NPAG WRSA | 539,800 |
| Effluent Treatment Precipitates | Not applicable | • Solids removed during effluent treatment<br>• Mostly contain metal hydroxides, including iron precipitates | PAG WRSA<br>Paste processing plant[1] | To be confirmed |

[1]During the initial Operations phase

## 4.1 Woody Debris, Soils, and Overburden

Tree stands at the Project site are comprised of jack pine and black spruce. Logs, branches, stumps, and root wads from these tree stands are described as woody debris.

Soils at the Project site are in the upper 5 cm to 30 cm of the upper glacial till unit. Soils support vegetation growth and are an important resource for progressive reclamation during the Construction and Operations phases and reclamation during the Closure phase.

Overburden at the Project site is mainly unconsolidated sandy tills. Overburden deposits are likely related to early glacial events and are spatially variable in thickness ranging approximately from 25 m to 100 m below ground surface. The lower glacial till is composed of moderately consolidated, weakly lithified, clay-rich, and silty sand matrix hosting cobbles and boulders of various lithologies including Athabasca sandstone, Phanerozoic rocks, and carbonaceous material.

Soils and overburden do not pose a risk of ARD/ML due to the weathering processes that give rise to their formation as confirmed through sampling and geochemical testing of surficial soils and underlying overburden. Testing results show negligible risk of ARD/ML (Okane, 2023).

Soils and overburden are considered geochemically inert and do not pose a radiological risk based on mineralogical and geochemical assessments (Okane, 2023).

## 4.2 Waste Rock

Waste rock consists of cover deposits and crystalline basement deposits excavated from shaft and early mine development. During the Construction phase, the risk of ARD and metal leaching (ML) is the primary factor driving waste rock management strategies.

### 4.2.1 Acid Rock Drainage and Metal Leaching

The risk of ARD/ML typically relates to the presence of sulfide minerals such as pyrite and arsenopyrite. Sulfide minerals can oxidize in the presence of oxygen and generate acidity in the presence of water through the dissolution of residual acidic sulfide oxidation products. Acid potential (AP) is the maximum potential acid generation from a rock mass estimated using mineralogy and geochemistry of representative samples. The capacity of carbonate and silicate minerals to consume acidity is the basis for the neutralization potential (NP) of a rock mass. The NP is based on minerology and geochemistry of representative samples.

AP and NP are essential components of acid base accounting (ABA), which is an estimation of the potential for acid generation based on the balance between acid producing and acid neutralizing minerals as determined using standard static geochemical index testing methods and calculation procedures. ABA is a fundamental component used to determine the risk of ARD.

A 0.1%wt. total sulphur criterion is adopted to segregate crystalline basement waste rock into PAG (S >0.1%wt.) and NPAG (S ≤ 0.1%wt.) (SRK, 2023). The threshold is based on results of the static and kinetic geochemical testing program including ABA and is considered conservative (SRK, 2023). The threshold is used to develop a wireframe sulphur model for the mine and UGTMF based on the 0.1%wt. total sulphur, which designates areas within the underground expected to contain primarily PAG or NPAG rock, as illustrated in Figure 4.

The total sulphur criterion applies to waste rock generated from underground development. Suitability of the 0.1%wt. total sulphur criterion is reviewed on an ongoing basis as additional data are collected from the ARD monitoring program. In addition, the wireframe sulphur model is refined and updated continually when more samples are collected and tested.

Mine waste types, characteristics, and estimated quantities generated during the Construction phase are summarized in Table 3.

## 4.3 Effluent Precipitates

Effluent precipitates are solids generated by the temporary effluent treatment plant during a flocculation and clarification stage where suspended solids are contained in a slurry. The slurry is pumped and dewatered to consolidate the effluent precipitates within the geotubes. Based on influent sources (i.e., contact water from shaft and early mine dewatering), effluent precipitates consist mostly of metal hydroxides, including iron precipitates. Effluent precipitates do not pose an ARD/ML or radiological risk. Dewatered seepage from the geotubes is managed as outlined in the *Site Water Management Plan*.

# 5.0 Woody Debris, Soils, and Overburden Management

Woody debris, soils and overburden management includes:

- minimizing quantities generated by limiting the extent of the Project disturbance area beyond the planned infrastructure;
- properly segregating, transporting, and storing materials;
- reusing materials as construction borrow sources where suitable;
- locating stockpiles in away from waterbodies, watercourses, and wetlands in areas that minimize handling requirements during the Construction and Operations phases; and
- minimizing the potential for and influence of erosion by:
  - avoiding excavating and disturbing sites when the weather is likely to involve heavy precipitation or high surface runoff;
  - minimizing the duration of exposure of disturbed soils by implementing interim revegetation pending final landform development;
  - creating rough surfaces on the stockpiles and provide a seed bed for revegetation;
  - installing drainage ditches, berms, sediment fencing, straw bales, or erosion control cloths to protect the surrounding area from sedimentation, where required.
  - where applicable, leaving 150 m vegetated buffer strips around water bodies to provide supplementary runoff filtering of sediment from surface runoff; and
  - inspecting soil stockpiled areas after heavy precipitation or a high runoff events.

Additional information on erosion control measures is described in the mine waste management procedure *Sediment and Erosion Control*.

## 5.1 Segregation

Woody debris, including logs, branches, and any other woody materials are segregated from other materials by collecting the logs and slash (e.g., branches) generated during clearing. Where possible, stumps and root wads are removed with surface soil to minimize disturbance of the surficial soil layer.

Topsoil is salvaged to a depth of approximately 30 cm, except where the removal of stumps and root wads brings up deeper materials. Salvage is performed using an excavator or small dozer (e.g., D6) with a minimal cut to specified depths. Materials are pushed to central locations and then loaded or moved. Surface soil materials are mixed during salvage and transport.

Subsoil consists of the weathered soil material directly underlying surface soil, to a depth below the original ground surface of approximately 50 cm. In general, subsoil is bulk handled with deeper surficial materials including overburden.

## 5.2 Transport and Storage

Woody debris and soils are directly hauled and placed at available disturbed areas for progressive reclamation purposes where possible. Woody debris and soils not used for progressive reclamation are relocated to temporary stockpiles using excavators, dozers, and haul trucks. Stockpiles are developed in a way such that the material is accessible for construction activities.

Residual overburden that is not suitable for fill or other construction purposes are temporarily stockpiled prior to transport to and placement within the overburden stockpile.

# 6.0 Waste Rock Management

Waste rock is screened, segregated, transported, and disposed in a manner that maintains effective separation of PAG and NPAG waste rock and is commensurate with geochemical and radiological risks.

## 6.1 Sources and Quantities

Waste rock sources, types, and quantities are estimated as part of mine planning and developing a detailed mine design and activity schedule.

During shaft sinking and early mine development, mine planning provides adequate lead time to safely extract waste rock, perform required analysis, and verify the ability to move waste rock to the appropriate storage location.

A schedule outlining predicted generation rates for each mine waste type, construction activity, and year of the Construction phase is provided in Appendix A. The schedule is developed based on the most recent iteration of the mine plan which is updated as construction progresses, and mine planning assumptions and material volumes are refined.

### 6.1.1 Shaft Sinking

Estimated waste rock tonnages associated with sinking the production shaft and exhaust shaft are provided in Table 4. Sinking of the two shafts takes place simultaneously with a total of two blasts every 24 hours (i.e., one per shaft). Shaft sinking activities are further described in section 3.3.1.

Table 4: Estimated Waste Rock Generation from Shaft Sinking

| Area | Depth x Diameter | Estimate | | | |
|---|---|---|---|---|---|
| | | Tonnes per Blast | Advancement per Blast | Total Tonnage | Volume ($m^3$) |
| Exhaust Shaft | 533 m x 5.5 m (ID) | 150 tonnes - 300 tonnes | 2 m - 3 m | 48,500 tonnes | 30,000 |
| Production Shaft | 568 m x 8.0 m (ID) | 300 tonnes - 500 tonnes | 2 m – 3 m | 99,700 tonnes | 57,000 |

Notes:
Estimated tonnages based on in-situ waste rock density of 2.469 t/$m^3$ ; Volumes based on 50% swell factor and dry moisture content.

### 6.1.2 Early Mine Development

Estimated waste rock tonnages associated with underground development are provided in Table 5. Each blast advances approximately 4 m. During initial mine development, a single blast occurs every 24 hours. The frequency increases up to 8 blasts every 24 hours as multiple faces are simultaneously advanced.

Table 5: Estimated Waste Rock Generation from Underground Development

| Area | Dimensions | Estimated | | | |
|---|---|---|---|---|---|
| | | Tonnes per Blast | Advancement per Blast | Total Tonnage | Volume ($m^3$) |
| Typical Lateral Development | 5.0 m W x 5.0 m H | 250 - 300 | 4.0 m | 340,000 | 213,000 |
| | 5.0 m W x 5.5 m H | 250 - 300 | 4.0 m | 110,000 | 69,000 |
| | 6.0 m W x 5.0 m H | 250 - 300 | 4.0 m | 30,000 | 19,000 |
| | 6.0 m W x 6.0 m H | 250 - 300 | 4.0 m | 18,000 | 11,000 |
| | 6.5 m W x 6.5 m H | 250 - 300 | 4.0 m | 45,000 | 28,000 |
| | 7.0 m W x 5.0 m H | 250 - 300 | 4.0 m | 28,000 | 18,000 |
| | 8.0 m W x 6.0 m H | 250 - 300 | 4.0 m | 90,000 | 56,000 |
| Mass Excavations | Varies | Varies | 4.0 m | 64,000 | 40,000 |
| Typical Vertical Development | 3.0 m W x 3.0 m H | 50 - 60 | 2.4 m | 7,000 | 4,500 |
| | 1.2 m D | Raise bored | Not applicable | 1,000 | 600 |
| | 3.5 m D | Raise bored | Not applicable | 5,500 | 3,500 |
| | 6.0 m D | Raise bored | Not applicable | 8,500 | 5,400 |
| | | | **Estimated Total** | **747,000** | **468,000** |

Notes: W: width; H: height; D: diameter

## 6.2 Screening

### 6.2.1 Geochemical and ABA Testing

Screening of crystalline basement waste rock for acid generation risk is required to confirm PAG or NPAG status before the material is used for construction activities.

#### On-site Screening

On-site geochemical characterization based on the established total sulphur criteria is used to classify waste rock as PAG or NPAG.

A sample of waste rock is collected after each blast and submitted for total sulphur analysis at the on-site analytical laboratory equipped with a Leco-type induction furnace for rapid determination of total sulphur concentrations. Total sulphur results are available within a few hours, allowing for classification of the waste rock as PAG or NPAG prior to completion of each cycle of blasting and mucking-out.

Details related to waste rock sampling and analysis are described in the mine waste management procedure *Mine Waste Monitoring and Measurement*.

### Confirmatory Testing

Off-site analysis for additional parameters (e.g., ABA), are completed at an accredited analytical laboratory for every 10 blasts during shaft sinking and every 5 blasts during underground development as part of QA/QC, as described in section 7.1.

Key details include:

- sampling is routinely carried out when workings are being advanced in the NPAG zone to confirm the NPAG status of waste rock potentially used for construction activities;
- sampling is not routinely carried out within the PAG zone, as waste rock from this zone is conservatively classified as PAG and disposed of in the PAG WRSA;
- when approaching or leaving the PAG zone, the sampling frequency increases to account for possible transition in sulphur values between PAG and NPAG zones as described in the mine waste management procedure *Mine Waste Monitoring and Measurement*; and
- more intensive sampling within the PAG zone is optional if trying to source additional NPAG waste rock that may be present.

Nominal sample numbers collected during the Construction phase are estimated in Table 6. Actual sample numbers may vary based on the variables identified in this section.

Table 6: Estimated Number of Samples during the Construction Phase

| Area | Estimated Sample Numbers | |
|---|---|---|
| | **Total Sulphur (on-site)** | **ABA (off-site)** |
| Exhaust Shaft | 53[D)] | 21[E)] |
| Production Shaft | 127[A)B)] | 22[A)C)] |
| Underground Development | 500[F)] | 639[G)] |
| **Total** | **680** | **682** |

ABA: acid base accounting

A) Assumes all waste rock classified as PAG based on Total Sulphur model. Sampling may be carried out to identify potential NPAG material.

B) 638 m deep / 2.5 m advancement per blast / total analysis every 2 blasts = 127

C) As above but analysis every 10 blasts.

D) 534 m deep / 2.5 m advancement per blast / total analysis every 4 blasts = 53

E) As above but analysis every 10 blasts.

F) 748,000 t NPAG / 234 t per blast / total analysis every 7 blasts = 500

G) As above but analysis every 5 blasts.

Estimated sample numbers exclude limited sampling occurring in PAG zone. Estimated waste rock tonnages are provided in Table 3.

## 6.2.2 Radioactivity

Radioactive mine rock (i.e., ore or special waste) is not anticipated to be encountered during the Construction phase. If ore or special waste is suspected, material is scanned using handheld monitors to confirm characterization. Ore and special waste rock is managed in accordance with the mine waste management procedure *Radioactive Mine Rock Management*. Permanent radiometric scanners will be installed at the exhaust shaft and rock breaker stockpiles underground during the Operations phase.

## 6.3 Segregation

PAG and NPAG waste rock generated during shaft sinking and early mine development are segregated to minimize mixing during transportation using a combination of techniques that include, but are not limited to:

- mine planning;
- coordinating blasting activities;
- managing horizontal storage (e.g., remucks);
- managing waste bin storage;
- sampling and testing as described in the mine waste management procedure *Mine Waste Monitoring and Measurement*; and
- tagging.

Although cover deposits are expected to have low acid generating potential, cover deposit material is stored on the PAG WRSA as a conservative environmental protection measure and to minimize testing requirements and simplify shaft sinking logistics.

## 6.4 Transportation

### 6.4.1 Shaft Sinking

Shaft excavators muck blasted material from the shaft advancement. Mucked material is placed in a bucket and moved to surface via a cable and pulley system. Once the round is completely mucked out, pilot holes are drilled for blasting.

At surface, material is loaded into truck loadouts for transportation to the appropriate storage location as described in section 6.5.

### 6.4.2 Early Mine Development

Load-haul-dump equipment (e.g., a loader) mucks blasted material from the drift face to the nearest remuck bay. Once the round is completely mucked out, the load-haul-dump equipment rehandles the material and hauls it directly to the nearest ore or waste pass and associated rock breaker.

From the orebody side waste passes, the waste rock passes through the rock breaker and to the loadout conveyor via a vibratory feeder as shown in Figure 6. The loadout conveyor delivers waste rock to the loading pocket where it is dumped into skips for hauling up the shaft to surface and into the surface headframe waste bin.

From the UGTMF area, waste rock is placed on a grizzly feeding into a coarse waste bin. The coarse waste bin feeds into a vibratory feeder which feeds a jaw crusher. The jaw crusher feeds into a fine waste bin where material is stored. The fine waste bin feeds a conveyor which dumps onto the loadout conveyor. Finally, the fine waste is dumped into skips for hauling up the shaft to the surface and into the surface headframe waste bin.

The waste bin discharges into truck loadouts for transportation to the appropriate location as described in section 6.5.

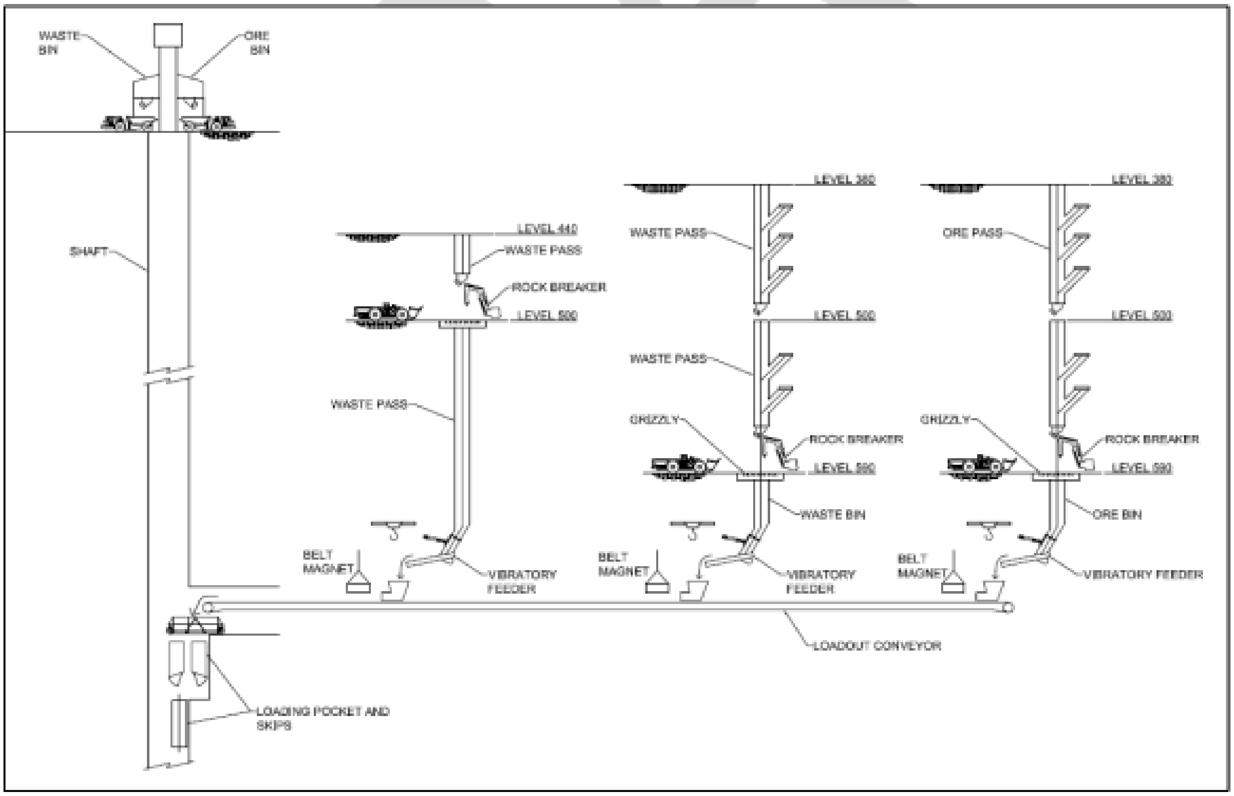


Figure 6: Schematic of Ore and Waste Rock Handling Systems

## 6.5 Storage and Disposal

### 6.5.1 PAG WRSA

The PAG WRSA is designed to permanently store PAG extracted though all Project phases in accordance with the design basis described in the *Rook I Mining and Milling Facility Description Manual*. Closure considerations are included in the design. General design and construction details for the PAG WRSA include:

- construction on a high-density polyethylene (HDPE) liner to minimize seepage to groundwater;
- construction from the bottom up with waste rock placed in 5 m lifts to minimize textural material segregation and reduce preferential flow paths, and with a 0.5 m lift of borrow material to reduce air inflow between lifts to lower rates of sulfide mineral oxidation;
- construction with 4H:1V side slopes to minimize erosion and allow progressive reclamation; and
- consideration for surface water management, including diversion of non-contact water and retention of the 24-hour probable maximum precipitation event.

Placing PAG WRSA in lifts is an important form of source control that minimizes the development of ARD/ML. PAG waste rock placement includes, but are not limited to:

- waste rock deposited by haul trucks in a paddock-dumped pattern whereby each load is placed adjacent to each sequential load creating a hummocky pattern;
- hummock tops leveled by a dozer to create a waste rock layer with increased material texture heterogeneity and reduced preferential flow paths;

- each waste rock layer leveled to approximately 2 m to 3 m thick, based on size of haul trucks used; and
- waste rock lifts of approximately 5 m thick (i.e., two hummock layers placed and leveled).

Some compaction of PAG waste rock occurs from haul truck and dozer equipment traffic. However, specifications for compaction for PAG waste rock layers and lifts are not developed and performance of the PAG WRSA is not contingent on a specified density other than particle size distribution and bulk density. PAG placement methods are further described in the mine waste management procedure *Waste Rock Storage and Disposal.* The location and maximum extent of the PAG WRSA at the end of the Construction phase is illustrated in Appendix B.

### 6.5.2 NPAG WRSA

The NPAG WRSA is designed to permanently store NPAG extracted though all Project phases in accordance with the design basis described in the *Rook I Mining and Milling Facility Description Manual*. Closure considerations are included in the design. General design and construction details for the NPAG WRSA include:

- NPAG WRSA will be unlined because it is not expected to produce substantial geochemical loadings to the receiving environment;
- construction will be from the bottom up with waste rock placed in lifts to minimize textural material segregation and reduce preferential flow paths;
- the perimeter of the NPAG WRSA will include a combination of berm, collection ditching and diversion ditching that would capture a 1:100 year 24-hour precipitation event.

NPAG generated during the Construction phase may be used as supplemental fill material. NPAG is temporarily stockpiled in the NPAG WRSA until ABA characterization testing is completed and suitability for construction is confirmed. The NPAG WRSA location and extent at the end of Construction phase is illustrated in Appendix B.

## 7.0 Effluent Precipitate Management

Effluent precipitates within a slurry are contained in geotubes and stored temporarily to dewater and consolidate the precipitates. Geotubes are large, tube-shaped bags made of porous, weather-resistant geotextiles used for effluent precipitate dewatering, as shown in Figure 7. Slurry is pumped into the geotubes, where excess water drains out of the geotextile layer while solids dry and densify inside the geotubes. When dewatering is complete, the geotubes are cut open and the solid waste is either transferred to the PAG WRSA for permanent disposal or transferred to the paste plant at the start of the Operations phase for disposal in cemented paste tailings or cemented paste backfill . Additional information on effluent precipitate management is described in the site water management procedure *Effluent Precipitate Management.*

Figure 7: Example Geotube Used for Effluent Precipitate Dewatering

# 8.0 Monitoring

Mine waste monitoring includes sample collection and analysis, quality assurance (QA) and quality control (QC), and audits and inspections. Mine waste monitoring is conducted by qualified staff in accordance with the processes described in the mine waste management procedures *Waste Rock Storage and Disposal* and *Mine Waste Monitoring and Measurement*.

## 8.1 Sample Collection and Analysis

Monitoring the movement and placement of mine wastes during the Construction phase is required to confirm the storage facility is constructed as designed and meets performance objectives.

### 8.1.1 Shaft Sink and Early Mine Development

During shaft sinking and early mine development, sample material from the drilled pilot holes (i.e., drill hole cuttings) is tested for PAG and NPAG material. Collecting composite samples from drilling activities is preferred over single grab samples from the drill holes. Duplicate samples are periodically sent to an off-site laboratory for total sulphur and ABA analysis.

The process is described in the mine waste management procedure *Mine Waste Monitoring and Measurement.*

### 8.1.2 Material Tracking

Soil and overburden, PAG waste rock, and NPAG waste rock quantities are tracked using a combination of haul truck logs and surveys. Surveys reduces uncertainty in hauled volumes due to haul truck loading variances.

Mine waste material tracking is used to confirm that material quantities remain within established limits of respective storage facilities, assist in the identification and relocation of misclassified PAG/NPAG waste rock, and estimate quantities available for construction or reclamation activities.

The process for tracking materials is described in the mine waste management procedure *Mine Waste Monitoring and Measurement.*

### 8.1.3 Waste Rock Placement

Monitoring focuses on placement of waste in the WRSA. General monitoring activities during PAG WRSA construction and include, but are not limited to:

- waste rock sampling for confirmatory ARD/ML classification testing;
- waste placement monitoring including in situ density measurements and visual inspections; and
- source control layer placement monitoring including in situ density and layer thickness measurements and visual inspection.

The process for monitoring waste rock placement is described in the mine waste management procedure *Waste Rock Storage and Disposal.*

### 8.1.4 Waste Rock Performance Monitoring

Monitoring waste rock after placement in the respective storage areas focusses on detecting the ARD/ML and assists in assessing facility performance. Waste rock monitoring includes, but is not limited to, periodic sampling and analysis of water from:

- groundwater monitoring wells;
- collection ponds; and
- toe seepage.

The process for sampling and analyzing groundwater quality is outlined in the *Environmental Monitoring Plan*. The process for sampling and analyzing water from collection ponds and toe seepage is outlined in the *Site Water Management Plan*.

## 8.2 Quality Assurance and Quality Control

QA/QC processes are conducted to maintain accuracy and reliability of data collected as part of this Plan. QA is the system of activities that assures end users of a product or service that defined standards of quality and stated level of confidence are met. QC is an overall system of activities that controls the quality of a product of service so that relevant legal and other requirements are met.

QA/QC processes focus on:

- sampling equipment;
- laboratory QA/QC;
- data validation; and
- inspections and audits.

QA/QC processes and documentation are in place for each applicable sample before the sample is collected and consider CSA N286 and ISO 9001 requirements.

QA/QC processes apply to models and calculations (e.g., monthly loadings) that are part of the interpretation and reporting of data collected as part of the Plan. QA/QC records are maintained for the Project life cycle.

### 8.2.1 Sampling Equipment

Sampling equipment meets design, maintenance, and operating requirements in accordance with the applicable reference method used for sample collection and analysis. Sampling equipment is capable of collecting bulk samples of material. Information on handling sampling equipment to maintain data accuracy and reliability is provided in the mine waste management procedure *Mine Waste Monitoring and Measurement.*

### 8.2.2 Laboratory Quality Assurance/Quality Control

QA laboratory testing is completed by an on-site laboratory that follows industry-standard QA/QC protocols. Qualified workers collect samples and perform testing in accordance with industry standards. QA/QC protocols and procedures are described in the mine waste management procedure *Mine Waste Monitoring and Measurement.*

All samples, whether sent to an off-site laboratory or analyzed at an on-site laboratory, are accompanied by a chain of custody that specifies:

- the sample identifier;
- sampler name;
- date and time;
- method of analysis;
- analytes; and
- preservatives, if applicable.

For both on-site and off-site laboratories, the laboratory QA/QC procedures determine the properties of each analysis as described in Table 7.

Table 7: Laboratory Quality Assurance and Quality Control Analysis Properties

| QA/QC Analysis Properties | Description |
|---|---|
| Precision | • Defined as the reproducibility and reliability of the test method<br>• Determined by analyzing replicate samples (i.e., multiple containers that each contain subsets of a homogenized sample) |
| Accuracy | • Defined as the degree of closeness of measurements to the analyte's true value<br>• Determined by analyzing reference standards (i.e., solutions derived from accurately known commercial formulations) |
| Sample contamination | • Determined by analyzing blank samples (i.e., reference materials) |
| Detection limits or sensitivity | • Defined as the lowest concentration at which individual measurement results for a specific analyte are statistically different from a blank sample with a specified confidence level for a given method and representative media<br>• Detection limits vary among methods for most analytes and are an important consideration when concentrations are likely to be very low (i.e., near detection limits) |

## 8.3 Audit and Inspection

Audits and inspections check compliance with internal and external reporting requirements specific to mine waste management.

Audits are less frequent than regular monitoring and may need to be completed by a third party. Audits can also be used to verify internal reporting requirements.

Inspections are a set of regular activities to check and verify on-site compliance mine waste management performance and include, but are not limited to:

- inspections for erosion and general integrity following periods of significant rainfall, including inspection of diversion and sediment control structures to verify function in accordance with design;
- inspections following significant seismic events; and
- inspections for signs of instability such as:
  - increased rates of deformation, cracking, or settlement of the platform;
  - bulging of the face, bulging of the toe, or bulging or heaving of the foundation in front of the toe;
  - seepage on the face; and
  - increased pore pressures in the foundation or embankment.

Deviations, instances of regulatory noncompliance, and opportunities for improvement and adaptive management identified through audits and inspections are managed as outlined in the *Rook I Integrated Management System Manual* (IMS Manual).

## 8.4 Plan Maintenance and Review

The Plan is subject to periodic review and update to confirm compliance with regulations, permits, and relevant legislation in accordance with requirements outlined in the IMS Manual.

# 9.0 References

## 9.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-ADM-CHT-00001 | *Rook I Organizational Chart* |
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-ENG-MAN-00001 | *Rook I Mining and Milling Facility Description Manual* |
| ROOK-CMT-PGM-00001 | *Rook I Construction Management Program* |
| ROOK-COM-PGM-00001 | *Rook I Commissioning Management Program* |
| ROOK-ENV-PGM-00001 | *Rook I Environmental Protection Program* |
| ROOK-ENV-PLN-00001 | *Environmental Monitoring Plan* |
| ROOK-WST-PGM-00001 | *Rook I Waste Management Program* |
| ROOK-DEC-PLN-00001 | *Rook I Preliminary Decommissioning and Reclamation Plan* |
| ROOK-WST-PLN-00002 | *Site Water Management Plan* |
| ROOK-WST-PLN-00003 | *Conventional Waste Management Plan* |
| ROOK-WST-PRO-00001 | *Waste Rock Storage and Disposal* |
| ROOK-WST-PRO-00002 | *Mine Waste Monitoring and Measurement* |
| ROOK-WST-PRO-00003 | *Effluent Precipitate Management* |
| ROOK-WST-PRO-00004 | *Radioactive Mine Rock Management* |
| ROOK-WST-PRO-00005 | *Sediment and Erosion Control* |
| ROOK-ENV-RPT-00001 | *Rook I Environmental Impact Statement* |

## 9.2 External


- Other
  - *CanNorth (Canada North Environmental Services). 2022. NexGen Rook I Project Baseline Gamma Radiation Survey. Draft Report – Revision 1. December 2022. 234 p.*
  - *OKane (M.A. OKane Consultants Inc). 2023. Rook I Project – Borrow Material Geochemical Characterization. Draft Memorandum – February 2023.*
  - *SRK (SRK Consulting). 2023. Rook I Project – Geochemical Characterization of Waste Rock. Final Report – January 2023*
  - *Canadian Standards Association. N286 Management system requirements for nuclear facilities*
  - *International Standards Organization. 9001 Quality management systems – Requirements*

# Appendix A: Waste Rock Generation Schedule

Table 8: Waste Rock Generation Schedule during the Construction Phase

| Waste Type | Source | Quantity (tonnes) | | | | |
|---|---|---|---|---|---|---|
| | | Year 1 | Year 2 | Year 3 | Year 4 | Total |
| Overburden | Production Shaft | 7,200 | 0 | 0 | 0 | 7,200 |
| | Exhaust Shaft | 4,900 | 0 | 0 | 0 | 4,900 |
| | **Sub-total** | **12,100** | **0** | **0** | **0** | **12,100** |
| Athabasca Group | Production Shaft | 0 | 3,300 | 0 | 0 | 3,300 |
| | Exhaust Shaft | 0 | 2,100 | 0 | 0 | 2,100 |
| | **Sub-total** | **0** | **5,400** | **0** | **0** | **5,400** |
| Devonian | Production Shaft | 0 | 2,600 | 0 | 0 | 2,600 |
| | Exhaust Shaft | 0 | 2,100 | 0 | 0 | 2,100 |
| | **Sub-total** | **0** | **4,700** | **0** | **0** | **4,700** |
| Cretaceous | Production Shaft | 2,600 | 0 | 0 | 0 | 2,600 |
| | Exhaust Shaft | 300 | 300 | 0 | 0 | 600 |
| | **Sub-total** | **2,900** | **300** | **0** | **0** | **3,200** |
| NPAG | Production Shaft | 0 | 5,900 | 30,900 | 12,500 | 49,300 |
| | Exhaust Shaft | 0 | 28,400 | 0 | 0 | 28,400 |
| | Lateral Development | 0 | 0 | 175,100 | 267,800 | 442,900 |
| | Vertical Development | 0 | 0 | 4,700 | 14,400 | 19,100 |
| | UGTMF Stope | 0 | 0 | 0 | 0 | 0 |
| | Borehole Development | 0 | 0 | 0 | 100 | 100 |
| | **Sub-total** | **0** | **34,300** | **210,700** | **294,800** | **539,800** |
| PAG | Production Shaft | 0 | 12,800 | 21,900 | 0 | 34,700 |
| | Exhaust Shaft | 0 | 4,400 | 6,000 | 0 | 10,400 |
| | Lateral Development | 0 | 0 | 105,400 | 176,700 | 282,100 |
| | Vertical Development | 0 | 0 | 0 | 2,900 | 2,900 |
| | UGTMF Stope | 0 | 0 | 0 | 269,800 | 269,800 |
| | Borehole Development | 0 | 0 | 0 | 100 | 100 |
| | **Sub-total** | **0** | **17,200** | **133,300** | **449,500** | **600,000** |

# Appendix B: Drawings


NOTES:
1. FOR NOTES SEE DRAWING H366614-2000-220-260-0001.
2. CONTRACTOR TO READ DRAWINGS IN CONJUNCTION WITH PROJECT SPECIFICATIONS.
3. ALL UNITS ARE IN METRIC, COORDINATES AND DIMENSIONS ARE IN METERS, UNLESS NOTED OTHERWISE.
4. TOPOGRAPHY, UTM NAD83 ZONE 12N
5. CONTOURS ARE IN 5M INTERVALS

**PRELIMINARY**
NOT TO BE USED FOR CONSTRUCTION

C:\Users\jeighs\OneDrive - JDSEM\NEXR0001C - EPCM\Drawings\Layout Optimization 21.03.2023.dwg Apr 24, 2023 - 2:28pm

REFERENCE DRAWINGS

| NO. | DWG NO. | TITLE |
|---|---|---|

NOTES:
1. Figure reflects the maximum extents of the Project site at the end of the Construction phase.

DRAWING REVISION

| NO. | DESCRIPTION | DATE |
|---|---|---|
| IP | FIGURE FOR PERMITTING | 2023.04.17 |

| | NAME | DATE |
|---|---|---|
| DRAWN BY: | J.J | 14 NOV 2022 |
| DESIGNED BY: | A.S | 14 NOV 2022 |
| CHECKED BY: | | |
| APPROVED BY: | | |

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NexGen
JDS Energy & Mining Inc.

NEXGEN ENERGY LTD
ROOK I PROJECT

MINE SITE DEVELOPMENT
CONSTRUCTION PHASE
OVERALL SITE LAYOUT

DWG NO.
REV. IP

# Site Water Management Plan
# ROOK-WST-PLN-00002

# Rook I Project

## Site Water Management Plan

ROOK-WST-PLN-00002



June 2023

# Record of Revisions

| Version No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| A | 23-Jun-2023 | Issued for initial CNSC review and feedback | K. Bonstrom | L. Moger<br>J. Cooper<br>A. Swerhone<br>J. Henderson | - |

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# 1.0 Introduction

The *Site Water Management Plan* (Plan) details the systematic and risk-based approach to the management of site water generated at the NexGen Energy Ltd. (NexGen) Rook I Project (Project). The Plan describes the processes to divert, convey, collect, and distribute water intercepted or influenced by the Project during Project site preparation, construction, and commissioning activities (i.e., Construction) in a manner that protects people and the environment and maintains regulatory compliance.

The Plan, along with the *Mine Waste Management Plan* and *Conventional Waste Management Plan*, supports the *Rook I Waste Management Program* and is part of the overall *Rook I Integrated Management System* (IMS). As a component of the IMS, this Plan is subject to the *Rook I Integrated Management System Policy* (Policy) which provides the foundation for NexGen's approach to waste management. The Plan and its relationship to the other IMS programs within the IMS hierarchy is shown in Figure 1.

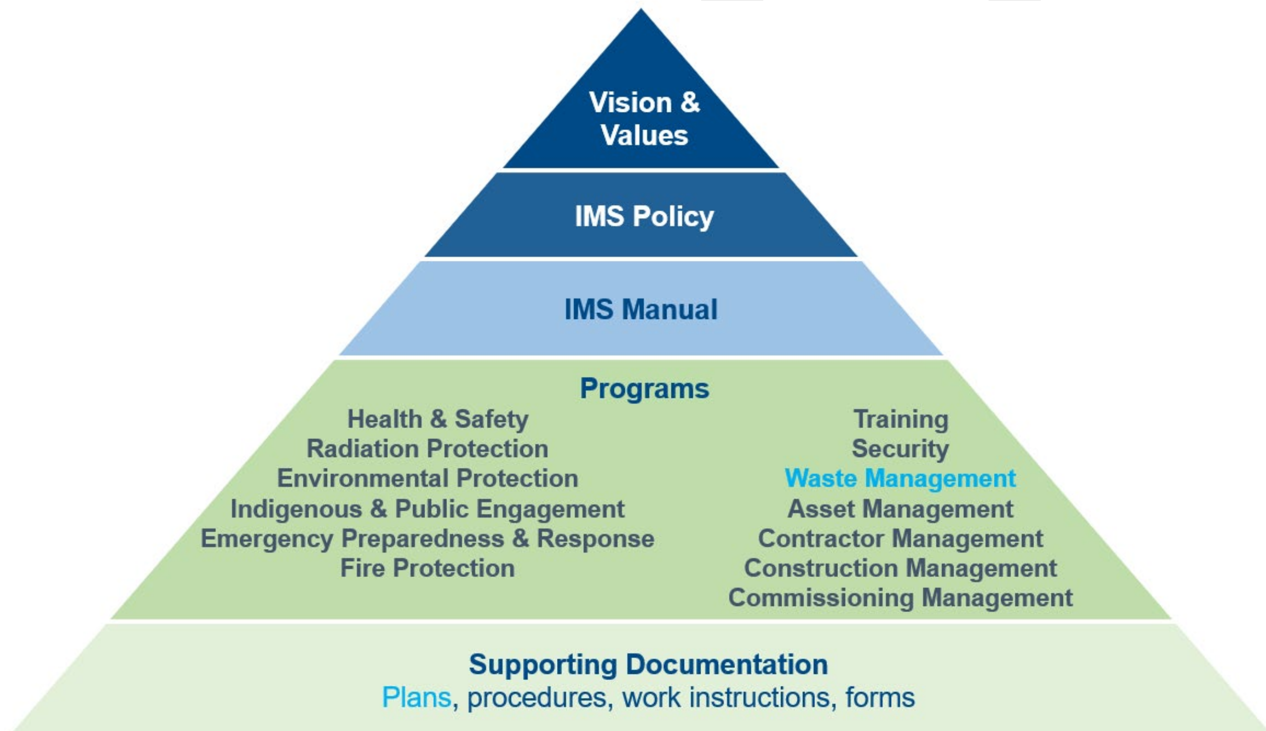


Figure 1: Plan Context Within the IMS

## 1.1 Purpose

The Plan describes management philosophies, processes, roles, responsibilities, infrastructure, and monitoring necessary to effectively divert, convey, collect, and distribute water in a manner that protects people and the environment and maintains regulatory compliance. This Plan addresses applicable regulatory requirements, as detailed in section 8.2.

## 1.2 Scope

The Plan applies to the diversion, conveyance, collection, and distribution of groundwater, surface water, and sewage during Project site preparation, construction, and commissioning (i.e., Construction phase).

The processes outlined in the Plan apply to workers responsible for managing and maintaining site water management infrastructure under routine and non-routine (e.g., extreme precipitation) conditions.

This Plan uses a graded, risk-based approach to site water management that is commensurate with mine water characteristics and accounts for the level of risk, safety significance, and complexity of water management activities and facilities.

The mining of uranium ore, the production of uranium concentrate, and the generation of tailings are not within the scope of the Construction phase of the Project; however, the processes described herein account for the possibility of encountering radiologically contaminated material and for establishing and maintaining safe and reliable site water management measures throughout the Project life cycle. The Plan is periodically reviewed and revised as required and will be updated prior to transition to the Operations phase.

The Plan is not intended to provide all necessary details for all possible factors influencing site water management decisions; workers with the appropriate level of authority and competence are expected to make and perform decisions to manage water safely and effectively. The planning and resource identification included herein is designed to provide important and appropriate guidance for water management personnel.

Additional information on the design and expected operating performance of site water management facilities, systems, and components is provided in the *Rook I Mining and Milling Facility Description Manual*.

Processes for designing and constructing site water management infrastructure are outlined in the *Rook I Construction Management Program*. Processes for commissioning site water management infrastructure are outlined in the *Rook I Commissioning Management Program.*

Managing unplanned discharges to atmosphere, groundwater, surface water, and land are not within the scope of the Plan and are outlined in the *Rook I Environmental Protection Program.* Mitigation and monitoring of effluent (i.e., waterborne releases) and emissions (i.e., airborne releases) prior to the final point of control is within the scope of the *Effluent and Emissions Plan*. Monitoring the atmosphere, land, groundwater, and surface water beyond final point of control is within the scope of the *Environmental Monitoring Plan*.

## 1.3 Site Water Management Framework

The Plan directly supports the *Rook I Waste Management Program* and is used in conjunction with the *Rook I Environmental Protection Program* and related waste management documents (e.g., plans, procedures, work instructions, forms) as shown in Figure 2.

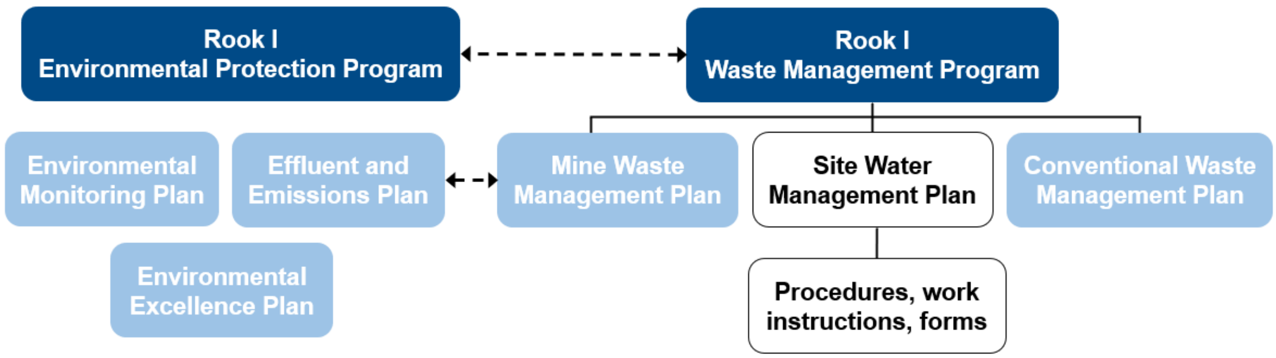


Figure 2: Waste Management Framework

## 1.4 Site Water Management Philosophy

NexGen adopts an integrated, risk-based approach to site water management throughout the Project life cycle that accounts for Project activities and processes that are interdependent with site water management, incorporates industry-proven best available techniques and technologies, and is informed by ongoing engagement with local Indigenous groups, local communities, and regulators.

Site water management facilities and systems are designed, constructed, and operated in a manner that:

- protects and promotes the health, safety, and well-being of people and the environment during routine and non-routine Project conditions;
- maximizes diversion of non-contact water surface runoff away from Project infrastructure;
- maintains control of contact water from the point of collection to release;
- accounts for the influence that mine waste management practices can have on effective site water management;
- minimizes fresh water intake through water reuse and recycling wherever possible;
- is practical and executable;
- complies with applicable legal and other requirements; and
- allows flexibility for adaptive management and continual improvement.

## 1.5 Terminology

Terminology introduced in this Plan is provided in this section. A comprehensive list of common terms applicable to this Plan and the IMS are available in the *Rook I Project Glossary*.

**acid rock drainage (ARD)** – Low pH, metal-laden, sulfate-rich drainage that is derived from water in contact with rock that is undergoing sulfide oxidation and has insufficient capacity to neutralize generated acidity resulting in lowered pH and elevated metal and sulfate concentrations (International Network for Acid Prevention [INAP, 2017]).

**contact water** – Water that may have been physically, chemically, or radiologically altered by Project activities. This water may be diverted and require management (e.g., treatment) before release to the environment.

**effluent** – For the purposes of this Plan, Project-influenced water that is suitable for release to the environment. Release water includes contact water, treated or untreated, that has been confirmed to be acceptable for release relative to release criteria. Also, a waterborne release of a constituent or physical parameters to the environment (CSA N288.5).

**effluent treatment plant (ETP)** – The Project facility that treats mineralized contact water from the Project. Treated effluent is pumped to monitoring ponds, tested, and batch discharged to the environment after meeting release criteria.

**fresh water** – Water sources from Patterson Lake for use by the Project.

**geotube** – Large, tube-shaped bags made of porous, weather-resistant geotextiles that can be used for dewatering effluent precipitates.

**high density polyethylene (HDPE)** – Thermoplastic with a high strength to density ratio. HDPE is a versatile plastic that has a wide range of applications.

**metal** – Describes all metallic (e.g., Copper [Cu], iron [Fe], zinc [Zn]) or metalloid (e.g., arsenic [As], boron [B], antimony [Sb]) parameters.

**metal leaching (ML)** – Dissolution of soluble minerals not related to sulfide oxidation resulting in elevated metal concentrations at near-neutral pH values produced as seepage or drainage from underground workings, pits, ore piles, waste rock, tailings, and overburden potentially leading to the release of metals to groundwater and surface water during the life of the mine and after mine closure (INAP, 2017).

**mine waste** – General term that includes soil, overburden, non-potentially acid generating (NPAG) waste rock, potentially acid generating (PAG) waste rock, special waste rock, and effluent precipitates.

**mine water** – Groundwater generated from dewatering activities required during mine development and directed to the site water management infrastructure.

**mineralized contact water** – Water that has been physically, chemically, or radiologically altered by Project activities through contact with surfaces expected to be mineralized or radiologically contaminated.

**monitoring** – Determining the status of a system, process, product, service, or activity (ISO 9000).

**non-contact water** – Water that has not been physically, chemically, or radiologically altered by Project activities.

**non-mineralized contact water** – Water that may have been physically altered by Project activities through contact with surfaces that are not expected to be mineralized or radiologically contaminated.

**non-potentially acid generating (NPAG)** – Mine rock with less than or equal to 0.03% $U_3O_8$ and less than 0.1% sulphur.

**ore** – Mine rock sourced from underground with greater than or equal to 0.26% $U_3O_8$.

**overburden** – Glacial till deposits that overlay Athabasca sandstone units and will be removed to develop the shafts.

**potable water** – Fresh water that is treated to applicable standards for human consumption.

**potentially acid generating (PAG)** – Mine rock with less than or equal to 0.03% $U_3O_8$ and greater than or equal to 0.1% sulphur.

**probable maximum precipitation (PMP)** – The greatest depth of precipitation for a given duration meteorologically possible for a given size storm area at a particular location at a particular time of year, with no allowance made for long-time climatic trends.

**Project site** – Term used to describe all property within the physical NexGen Rook I boundary.

**quality assurance (QA)** – Part of quality management focused on providing confidence that quality requirements will be fulfilled.

**quality control (QC)** – Part of quality management focused on fulfilling quality requirements.

**radiologically contaminated** – Deposition of, or presence of, radioactive substances on surfaces or within solids, liquids, or gases including the human body, where their presence is unintended or undesirable.

**sewage** – Waste water generated from various sanitation and domestic facilities.

**site water** – Any water that interacts with the Project, including precipitation falling onto the Project site (i.e., precipitation), water intercepted by the Project as runoff, and water that is generated through mine development activities and other Project activities, such as dewatering.

**special waste rock –** Mine rock with insufficient grade to be considered ore (i.e., greater than 0.03% of triuranium octoxide [$U_3O_8$] uranium concentrate and less than 0.26% $U_3O_8$). All special waste is temporarily stored in the special waste rock stockpile, used to blend high grade ore in the process plant, and deposited in the underground tailings management facility (UGTMF) or mined stopes.

**swale** – Low-lying or shallow channel with gentle slopes that directs intercepted precipitation and runoff towards conveyance and containment facilities.

**waste rock** – Mine rock generated from the development of the shafts, mine area, and underground tailings management facility (UGTMF) that is less than or equal to 0.03% $U_3O_8$. Includes non-potentially acid generating (NPAG) waste rock and potentially acid generating (PAG) waste rock.

**waste rock storage area (WRSA)** – Area that permanently stores non-potentially acid generating (NPAG) or potentially acid generating (PAG) waste rock at surface.

**worker** – Any person working for NexGen, including a contractor.

# 2.0 Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Plan. Workers are informed of their roles and responsibilities and are accountable for understanding and fulfilling them.

Although NexGen maintains overall accountability for Project activities, the term Rook I is used in the following role descriptions to reinforce that the role is applicable and may be assigned to NexGen employees and contractors performing work on behalf of the Project.

Workers with responsibilities for tasks and activities related to site water management are provided with the training and resources required to fulfill prescribed tasks as outlined in the *Rook I Training Program*.

Additional roles and responsibilities are further detailed as part of the supporting procedures.

**Rook I management** – is responsible for:

- providing resources to achieve Plan objectives and to fulfill the required roles, responsibilities, and processes of the Plan;
- providing support to maintain effective site water management practices;

- controlling site water management incidents and deviations and directing corrective action when required;
- communicating with the applicable regulatory agencies and other external stakeholders on behalf of the Project, as appropriate; and
- identifying and pursuing opportunities to achieve continual improvement.

**Plan coordinator** – is responsible for:

- implementing all aspects of this Plan and related processes;
- providing oversight and direction to workers regarding site water management practices;
- implementing resources and assigning appropriate workers to fulfill the required roles, responsibilities, and processes of the Plan and associated processes;
- confirming that workers meet and maintain required Plan-specific training and qualifications;
- providing day-to-day oversight of site water management activities;
- establishing and maintaining a monitoring system to evaluate and track the effectiveness of this Plan;
- maintaining Plan-specific data and records in a controlled manner;
- addressing Plan deficiencies and deviations; and
- implementing opportunities to continually improve site water management processes

**Supervisors** – are responsible for:

- overseeing the implementation of work activities in the field in accordance with the Plan;
- informing workers of their roles and responsibilities;
- verifying workers are aware of and able to execute specific tasks and activities related to site water management processes;
- verifying workers meet and maintain required Plan-specific training qualifications; and
- identifying Plan deficiencies and deviations and consulting with Rook I management and the Plan coordinator as required to develop and implement remedial actions.

**Workers** – are responsible for:

- implementing site water management processes in accordance with applicable training;
- managing site water in accordance with Plan processes; and
- identifying and reporting Plan deficiencies and deviations to the Plan coordinator and supporting the implementation of remedial actions as required.

# 3.0 Project Context

This section provides an overview of the Project and a summary of primary baseline features and characteristics that may influence site water management infrastructure development and operation.

## 3.1 Project Overview

The Project operates year-round and includes construction activities to establish permanent underground and surface infrastructure required to support extraction of uranium ore and production of uranium concentrate, including:

- an underground mine accessed by shafts (i.e., production and exhaust shafts);
- mine waste management facilities;
- site water management facilities;

- a surface uranium ore process plant;
- a surface paste backfill plant;
- an underground tailings management facility (UGTMF);
- an effluent treatment plant (ETP); and
- an administration and accommodation complex facilities, utilities, an airstrip, and roads.

For illustrative purposes, a general schematic of primary Project infrastructure at the end of the Operations phase is shown in Figure 3.

The infrastructure required to manage site water generated during the Construction phase is commensurate with the actual extent of surface and underground development and is described in section 5.3.

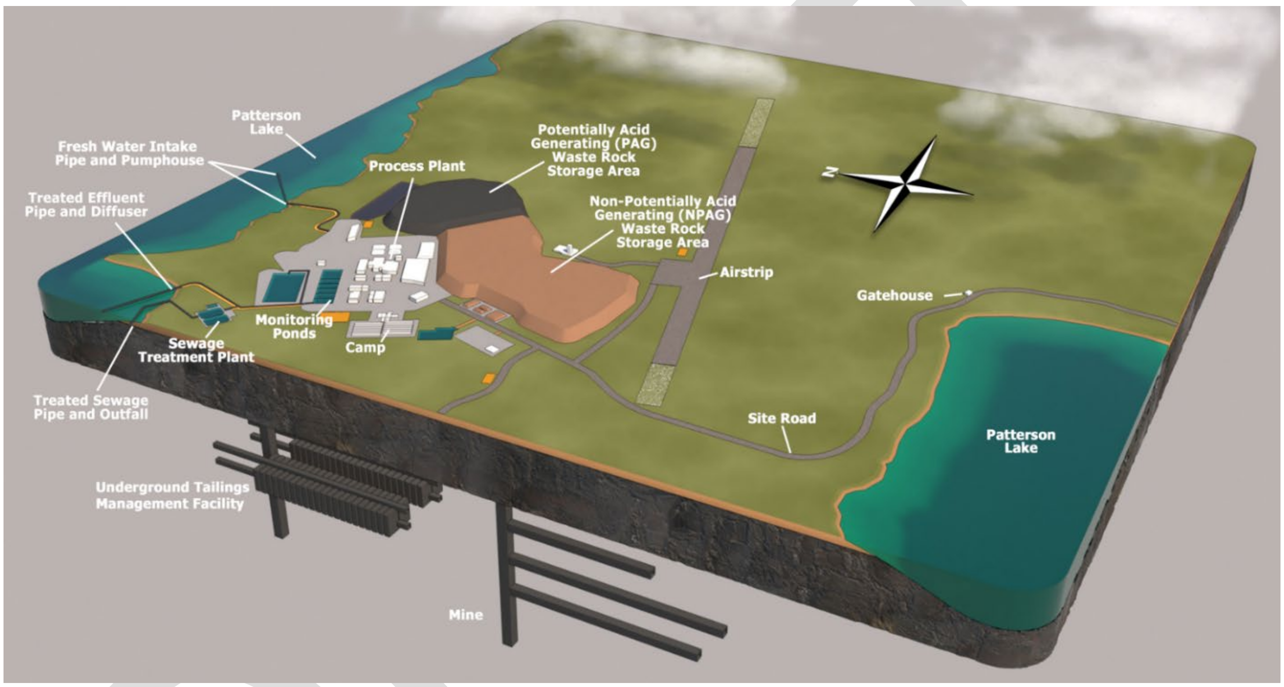


Figure 3: Schematic of Primary Project Infrastructure (End of Operations Phase)

## 3.2 Project Setting and Baseline Conditions

This section provides an overview of the physical features and characteristics of the region in which the Project is located and their potential influences on development and operation of site water management infrastructure. Physical features and regional characteristics are obtained from baseline studies conducted for the Project. Additional details are outlined in the *Rook I Environmental Impact Statement*.

### 3.2.1 Climate

The Project is situated in a subarctic region where temperatures range from warmer than 30°C in summer to colder than -40°C in winter. Winters are long and cold, with mean monthly temperatures below freezing from October to April. Annual precipitation is approximately 0.53 m with approximately 70% of annual precipitation occurring as rain during summer and the remainder as snow during winter. Ice formation on water bodies typically begins in October, with break-up starting on small waterbodies in April during the spring freshet and continuing into late May for larger waterbodies.

Climate influences on site water management infrastructure and processes include:

- requiring selection of materials and equipment that can withstand extreme temperatures and temperature changes;
- designing infrastructure using appropriate rainfall intensities that account for climate change;
- designing ponds to account for wind direction and speed to prevent overtopping of structures; and
- developing maintenance and monitoring processes to address potential structural and seasonal issues (e.g., glaciation of conveyance structures, spring freshet management) that occur in a subarctic climate.

Additional information on climate is outlined in the *Rook I Environmental Impact Statement.*

### 3.2.2 Topography

The Project is situated on a peninsula next to Patterson Lake with the local topographic high at approximately 583 metres above sea level (masl) sloping towards Patterson Lake to the north, west, and south. The shoreline elevation is approximately 500 masl.

The variable topography of the Project site influences:

- flow paths for contact and non-contact water,
- diversion and collection rates; and
- configuration and location of site water management infrastructure.

The topography of the Project area is outlined in the *Rook I Environmental Impact Statement* and *Rook I Mining and Milling Facility Description Manual*.

### 3.2.3 Groundwater

The depth to groundwater in the glacial till deposits varies across areas of the Project, including:

- 10 metres below ground surface (mbgs) to 25 mbgs in the mine terrace
- 10 mbgs in the mill terrace
- 3 mbgs to 42 mbgs within the WRSA footprints (BGC, 2020).

In the area of the mine surface infrastructure, lateral groundwater flow direction in the glacial till is towards Patterson Lake. In the basement rock local to the mine and UGTMF, lateral groundwater flow direction is to Patterson Lake to the north.

The vertical groundwater flow direction is downwards within the surficial glacial till deposits in the area of the topographic high located to the south of the mine, transitioning to upwards in the area of the underground mine and UGTMF.

Shears and faults in the basement rock are more conductive than the crystalline host material and represent the primary groundwater flow path for inflows during mine and UGTMF development.

Groundwater conditions influences the quantity of volume and quality of contact water requiring management during shaft sinking and early mine development. Additional information on groundwater is outlined in the *Rook I Environmental Impact Statement.*

### 3.2.4 Surface Water

The Project is located within the Patterson Lake sub-watershed, which is part of the larger Clearwater River watershed. The ground surface is highly permeable, and water moves to waterbodies or watercourses by subsurface pathways. These waterbodies and watercourses are primarily fed by precipitation with seasonal patterns of higher water levels during spring freshet (i.e., following snow and ice thaw) and lower levels the remainder of the year.

Surface water characteristics influence decisions regarding the collection, treatment (as required), and release of site water to Patterson Lake. Effluent management is outlined in the *Effluent and Emissions Plan*.

Additional information on surface water is outlined in the *Rook I Environmental Impact Statement.*

### 3.2.5 Radioactivity

Radioactivity is the spontaneous emission of radiation in the form of particles or high energy photons. Understanding baseline radioactivity on surface and in areas of early mine development informs site water collection, storage, and treatment practices to keep risks to workers and the environment as low as reasonably achievable, social and economic factors taken into account.

A baseline gamma survey of the site and two sections of Highway 955 was performed in 2022 to characterize the natural variability in baseline gamma radiation levels above ground (CanNorth, 2022). Overall, the baseline gamma radiation levels across the Project site and the surveyed portions of Highway 955 were low, with the highest hectare average recorded being 0.26 micro sieverts per hour (μSv/hr). Average baseline gamma radiation levels across the Project site, access road, and Highway 955 sections were 0.021 μSv/hr, 0.014 μSv/hr, and 0.025 μSv/hr, respectively.

Delineation drilling at the Project site and geochemical testing (SRK, 2023) predicts that mine rock encountered during shaft sinking and early mine development would be below the % $U_3O_8$ thresholds established for ore and special waste.

## 4.0 Site Water Classification

Site water is classified according to a range of predicted and tested chemical characteristics (e.g., chemical, radiological) used to identify and define the required level of control commensurate with risks to people and the environment. Site water characteristics inform the design of site water management facilities, processes, and activities that enable safe, secure, and environmentally responsible site water management throughout the Project life cycle.

Site water classification and sources are described in Table 1.

Table 1: Site Water Classification and Sources

| Site Water Classification | Description | Sources |
|---|---|---|
| Fresh Water | Water sourced from Patterson Lake for use by the Project | • Patterson Lake north arm – east basin |
| Potable Water | Fresh water that is treated to applicable standards for human consumption | • Fresh water storage facilities |
| Sewage | Waste water generated from various domestic and sanitation facilities | • Food preparation<br>• Laundry<br>• Bathroom facilities |
| Non-contact Water | Water that has not been physically, chemically, or radiologically altered by Project activities | • Runoff from undisturbed catchments adjacent to and outside of areas disturbed by Project activities |

| Site Water Classification | Description | Sources |
|---|---|---|
| Non-mineralized Contact Water | Water that may have been physically or chemically altered by Project activities through contact with surfaces that are not expected to be mineralized or radiologically contaminated | • Runoff from disturbed areas that are not expected to be mineralized or radiologically contaminated (e.g., pad preparation, accommodation complex) |
| Mineralized Contact Water | Water that has been physically, chemically, or radiologically altered by Project activities through contact with surfaces expected to be mineralized or radiologically contaminated | • Dewatering of shaft and early mine development<br>• Runoff from PAG WRSA |
| Effluent | Project-influenced water that is suitable for release to the environment (i.e., Patterson Lake) | • Treated or untreated contact water that is confirmed to meet criteria prior to release |

# 5.0 Site Water Management

Site water management infrastructure consists of a facilities and equipment used to:

- collect and distribute fresh water;
- treat and distribute potable water;
- collect and treat sewage; and
- direct, divert, collect, and retain non-contact, non-mineralized, and mineralized contact water.

A summary of the overall general site water management approach and key site water management infrastructure associated with each site water classification is provided in Table 2. Block flow diagrams showing primary water management infrastructure components are included in Appendix B.

Site water management requirements are commensurate with the nature and extent of surface and underground infrastructure and development. Site water management methods described in this Plan are considered adequate and appropriate to protect people and the environment and satisfy applicable external legal and other requirements during the Construction phase.

Descriptions of key infrastructure are provided in section 5.2 and 5.3.

Table 2: Site Water Management Approach and Key Infrastructure

| Site Water Classification | General Management Approach | Key Infrastructure – Temporary | Key Infrastructure – Permanent |
|---|---|---|---|
| Fresh Water | • As required for use in construction activities | • Fresh water intake facility<br>• Storage tanks<br>• Lift station | • Fresh water intake facility<br>• Storage tanks<br>• Distribution network |
| Potable Water | • As required for domestic uses | • Treatment at temporary camp facilities | • Potable water treatment plant<br>• Distribute potable water using trucks |
| Sewage | • Transport to sewage treatment plant using trucks | • Treatment at temporary camp facilities | • Sewage treatment plant |

| Site Water Classification | General Management Approach | Key Infrastructure – Temporary | Key Infrastructure – Permanent |
|---|---|---|---|
| Non-contact Water | • Divert non-contact water when practicable and allow for release directly to the receiving environment (i.e., Patterson Lake)<br>• Manage non-contact water not diverted away as contact water | • Temporary drainage collection and dewatering systems (e.g., swales, ditches, culverts)<br>• Sediment traps and settling basins | • Collection and diversion ditching<br>• Culverts<br>• East perimeter diversion<br>• South perimeter diversion<br>• West perimeter diversion |
| Non-mineralized Contact Water | • Collect, capture, and contain contact water<br>• Reuse contact water where possible<br>• Treat and manage water quality relative to release criteria as required before release to the environment<br>• Test and release in accordance with the *Rook I Environmental Code of Practice* | • Swales<br>• Ditching<br>• Culverts | • Swales<br>• Ditching<br>• Culverts<br>• Site runoff pond #1[a]<br>• Site runoff pond #2<br>• West bermed runoff collection area |
| Mineralized Contact Water | • Collect, capture, and contain contact water<br>• Reuse contact water where possible<br>• Treat and manage water quality relative to release criteria as required before release to the environment<br>• Test and release in accordance with the *Rook I Environmental Code of Practice* as required. | • Swales<br>• Ditching<br>• Culverts<br>• Temporary shaft and early mine development de-watering infrastructure<br>• Temporary effluent treatment plant | • Swales<br>• Ditching<br>• Culverts<br>• Permanent underground de-watering<br>• PAG collection area<br>• Settling pond |
| Effluent | • Test and release as per *Effluent and Emissions Monitoring Plan* | • Temporary effluent treatment plant | • Monitoring ponds<br>• Site runoff pond #1<br>• Site runoff pond #2 |

[a] Site runoff pond #1 will capture and contain mineralized contact water during the Operations phase.

## 5.1 Contact Water Management

During the Construction phase, contact water is managed as five distinct development areas, including:

- non-mineralized contact water and non-contact ancillary facilities;
- non-mineralized contact water south;
- non-mineralized contact water north;

- mineralized contact water; and
- mine dewatering.

Additional information on the development areas is provided in Table 3. The maximum extent of the development areas is shown in the drawings included in Appendix A.

Table 3: Site Water Infrastructure Development During Construction

| Development Area | Contributing Areas | Construction Activity | Water Management Approach |
|---|---|---|---|
| Non-mineralized contact water and non-contact ancillary facilities | • Airstrip<br>• West bermed runoff collection<br>• Explosives magazine storage facility<br>• Ditches<br>• Roads | Initial Earthworks and Surface Infrastructure | • Directed to site runoff pond #1 and site runoff pond #2<br>• Tested before batch discharge |
| Non-mineralized contact water south | • NPAG WRSA<br>• Borrow pit<br>• Accommodation complex<br>• Concrete batch plant/aggregate storage<br>• Liquified natural gas (LNG)/waste management area<br>• Ditches<br>• Roads | Initial Earthworks and Surface Infrastructure | • Directed to site runoff pond #1 and site runoff pond #2<br>• Tested before batch discharge |
| Non-mineralized contact water north | • Ore storage stockpile<br>• Mill terrace<br>• Mine terrace<br>• Ditches<br>• Roads | Initial Earthworks and Surface Infrastructure | • Directed to site runoff pond #1 and site runoff pond #2<br>• Tested before batch discharge |
| Mineralized contact water[1] | • PAG WRSA | • Surface Infrastructure Construction | • Directed to the settling pond and onto the temporary effluent treatment plant |
| Mine dewatering | • Shaft sinking and underground development | • Shaft Sinking and Early Mine Development | • Directed to the settling pond and onto treatment |

[1]Mineralized contact water is not anticipated until Year 2 of Construction

# 6.0 Site Water Management Infrastructure

Site water management infrastructure during the Construction phase consists of both temporary and permanent facilities, systems, and components. Site water management infrastructure is developed progressively in coordination with the construction management team who ensures that infrastructure is available when required.

Temporary site water management infrastructure is used initially to control runoff during site clearing, grading, and earthworks activities. Permanent site water management infrastructure is constructed to align, where possible, with development of the specific area (e.g., mine terrace, mill terrace) for which it functions.

For illustrative purposes, a general schematic of primary Project infrastructure at the end of the Construction phase is shown in Figure 4 and the drawings included in Appendix A. The anticipated physical footprint of the Project site (not including the main site access road) at the end of the Construction phase is approximately 180 ha. Additional information is available in the *Rook I Mining and Milling Facility Description Manual*.

Maintenance strategies for site water management infrastructure are outlined in the *Rook I Asset Management Program*.

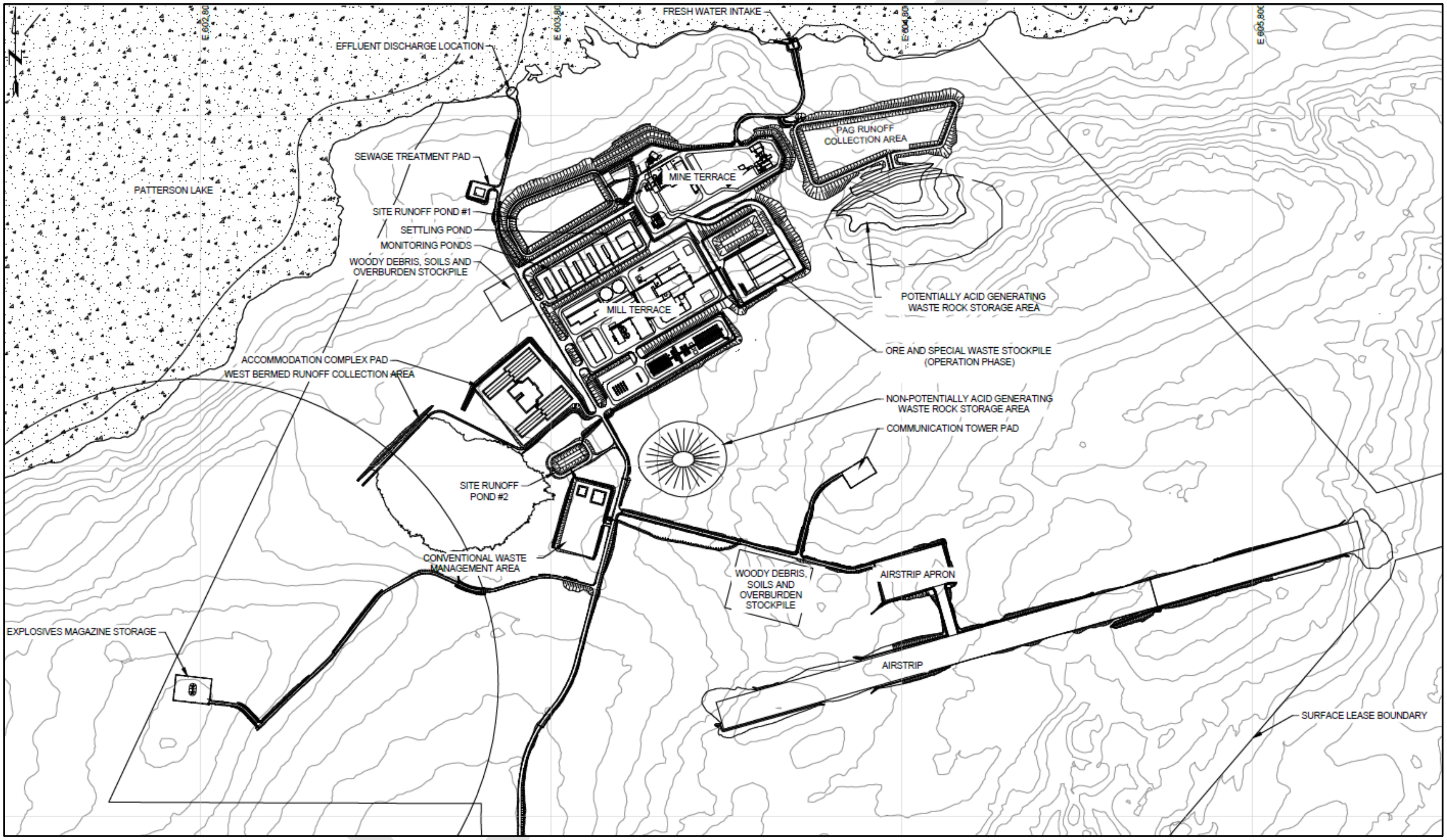


Figure 4: Project Surface Infrastructure (End of Construction Phase)

## 6.1 Fresh Water Intake and Distribution

A temporary fresh water intake is utilized in the early stages of the Construction phase due to the reduced fresh water requirements as compared to the Operations phase. The temporary fresh water intake is located in Patterson Lake north arm – east basin. It is located in a manner that does not interfere with the construction of the permanent intake.

A lift station is required to draw water from the lake and pump it into holding tanks located adjacent to the shoreline. The storage and distribution facility is located adjacent to the lift station, near the lake shoreline. The distribution facility draws water from the storage tanks and intermittently fills water trucks. Fresh water is distributed for use in the fire water, potable water, and underground facilities.

The permanent fresh water intake is located at a single point on the east basin of the north arm of Patterson Lake. Fresh water is distributed for use in the fire water, potable water, and underground facilities.

## 6.2 Potable Water Treatment

Potable water is trucked to Project site in the early stages of the Construction phase prior to the construction of the permanent potable water treatment plant. Temporary potable water tanks are required until permanent tanks are in place as construction advances. Potable water from the potable water treatment plant is pumped to support use across the site. A bottle filling station is installed to fill trucks that service remote users (e.g., gatehouse).

## 6.3 Sewage Treatment

Temporary sewage treatment is utilized in the early stages of the Construction phase prior to the completion of permanent camp facilities. Sewage is contained at point sources in storage tanks. This water is transported to the permanent sewage treatment plant using trucks after the permanent camp is constructed.

Permanent sewage collection systems are in place as the Project advances through the Construction phase. In general, piping uses gravity to convey sewage to holding tanks (e.g., at the mill and mine terrace), which is subsequently trucked to the sewage treatment plant. Sewage collection from the permanent camp is through gravity drainage via pipes to a lift station that pumps contact sewage water to the sewage treatment plant.

Treated sewage that meets release criteria is released to Patterson Lake through a permanent treated sewage outfall as outlined in the *Effluent and Emissions Plan*.

## 6.4 Shaft and Underground Dewatering

Each shaft contains a temporary dewatering system which consists of pump boxes that cascade up to surface. These temporary dewatering systems operate for the duration of shaft sinking.

Approximately the upper 200 m of the overburden and cover deposits that host the exhaust and production shafts are temporarily frozen during shaft sinking and lined to mitigate groundwater inflows. Groundwater inflow dewatering is achieved through a series of piping, sump, and pumping systems.

Lateral development within early mine development commences from the exhaust shaft at approximately 500 m depth from surface. A sump is constructed at this level and used as a collection point for groundwater inflows and water used during lateral development activities. Mineralized contact mine water is conveyed up the exhaust shaft temporary system established during shaft sinking.

As the lateral development advances closer to the production shaft, a second temporary level sump is created to convey additional lateral development contact mine water up the production shaft. This sump is repurposed for the permanent dewatering system required during the Operations phase.

The temporary system is decommissioned when the main dewatering pump station and water sumps are constructed and commissioned.

The permanent dewatering system consists of two types of systems to facilitate conveyance of mine water to surface. For upper mining levels, mining progresses in a bottom-up methodology which allows the use of borehole sumps to direct mine water (i.e., mineralized contact water) to a level sump below. Level sumps are used to pump water from the mine and UGTMF areas above 500 m depth into the north mine water filter sumps where the water will decant before being pumped to a pump station at the same level.

For the mining levels below 500 m below surface, the dewatering system consists of a cascading system of pumps. The level sumps are used to pump the water into the south mine water filter sumps where the water will decant before being pumped to the pump station at 500 m depth.

The north and south mine water filter sumps each consist of two mine water sumps and one intermediate clean water sump.

The main pump station, containing of a water reservoir, pumps the mine water up the production shaft to the settling pond on surface.

## 6.5 Piping

During the Construction phase, trucking is preferred rather than temporary piping and pumps to convey mineralized contact, non-mineralized contact, and effluent) between site runoff ponds, collection areas, and water management facilities. Where trucking is not feasible due to high volumes or short distances, skid pumps, and dual contained hose-work is used in locations including, but not limited to:

- PAG runoff collection area to the settling pond
- Settling pond to the temporary effluent treatment plant;
- Site runoff pond #1 to the TETP;
- TETP to the monitoring ponds;
- monitoring ponds to the permanent treated effluent pipeline including diffuser; and
- Site runoff pond #2 outfall to the west bermed runoff collection area.

## 6.6 Diversion Ditches and Berms

Diversion ditches and berms around the site (e.g., east perimeter diversion, west perimeter diversion, and south perimeter diversion) segregate non-contact water from contact water and convey it around the perimeter of the site to Patterson Lake. This infrastructure prevents runoff from entering disturbed Project areas and carrying sediment to undisturbed areas.

## 6.7 Swales, Ditching, and Culverts

Swales, ditching, and culverts are used to convey contact water to the associated ponds or collection areas. A combination of temporary and permanent swales, ditching, and culverts are used during the Construction phase.

Swales, ditches, and culverts are designed to collect, segregate, and retain mineralized contact water separately from non-mineralized contact water.

Swales are designed to convey contact water from the graded and sloped pads to the ditches.

Ditches are designed for:

- a 1:100 year, 24-hour event for diversion ditches adjacent to non-mineralized disturbed areas;
- a 24-hour probable maximum precipitation (PMP) event for diversion ditches adjacent to mineralized disturbed areas; and
- HDPE-lined ditches to convey mineralized contact water.

Culverts are sized for:

- a 1:100 year, 24-hour event for catchments that intercept non-mineralized contact water; and
- a 24-hr PMP event for catchments that intercept mineralized contact water.

## 6.8 Ponds and Collection Areas

Several permanent ponds are constructed and commissioned at strategic points to collect and contain runoff from areas under construction. Permanent pond locations are shown Figure 4 and on the drawings included in Appendix A.

### 6.8.1 Site Runoff Pond #1

Site runoff pond #1 is a permanent pond located north of the site between the mine and mill terrace and Patterson Lake. Site runoff pond #1 is dual HDPE-lined pond with a primary liner and secondary liner containment and has a capacity of 147,000 $m^3$ which is based on a 24-hour PMP event plus 1 m freeboard;

During the Construction phase, site runoff pond #1 collects and retains non-mineralized contact water from includes the mine terrace, fresh air intake area, haul road, and mill terrace. During the Operations phase, site runoff pond #1 captures mineralized contact water.

### 6.8.2 Site Runoff Pond #2

Site runoff pond #2 is a permanent pond located southwest of the mine and mill area terraces and south of the accommodation complex. Site runoff pond # 2 is dual HDPE-lined with a primary liner and secondary liner containment and has a capacity of 14,700 $m^3$ which is based on a 24-hour, 1:100-year event plus 1 m freeboard.

During the Construction phase and the Operations phases, site runoff pond #2 collects and retains non-mineralized contact water from areas without any potential contact with mineralized or radiologically contaminated materials (e.g., NPAG WRSA, accommodation complex, administration offices, and mine terrace). Water reporting to site runoff pond #2 is tested and either released to the west bermed runoff collection area (if discharge criteria is met) or pumped to the settling pond for treatment.

### 6.8.3 Potentially Acid Generating Runoff Collection Area

The PAG runoff collection area is a permanent facility located north of the PAG WRSA. The PAG runoff collection area is lined with a single HDPE liner and has a capacity of 141, 670 $m^3$ which is sufficient to retain a 24-hour PMP event.

During the Construction phase and the Operations phases, the PAG runoff collection area collects and retains mineralized contact water from the PAG WRSA runoff and seepage. Water is conveyed to the settling pond for treatment.

### 6.8.4 Settling Pond

The settling pond is a permanent pond located north of the TETP and adjacent to the monitoring ponds. The settling pond is dual HDPE lined with leak detection and has a capacity of 16,162 $m^3$ which is based on peak inflows from all contributing sources plus incidental rainfall from a 24-hour PMP event plus 1 m freeboard.

During the Construction phase, the settling pond retains mineralized contact water from the PAG runoff collection area, mine water, and seepage from geotubes used as part of the effluent treatment process. During the Operations phase, the settling pond receives mineralized contact water from the PAG runoff collection area, mine water, special waste and ore stockpile storage, and various surface industrial uses (e.g., the concrete batch plant).

### 6.8.5 West Bermed Runoff Collection Area

The west bermed runoff collection area is located west of the permanent camp and site runoff pond #2 in a topographic low. The west bermed runoff collection area is unlined and designed with a capacity based on peak inflows from all contributing sources plus incidental rainfall from a 24-hour PMP event plus 1 m freeboard.

During the Construction and Operations phases, the west bermed runoff collection area receives non-mineralized contact water from site runoff pond #2 that meets discharge criteria and is considered suitable for release to the environment.

### 6.8.6 Monitoring Ponds

Four monitoring ponds are located west of the settling pond. Each pond is dual HDPE lined with leak detection and has a capacity of 6,786 $m^3$ which is based on and eight-hour retention of peak flow from permanent ETP.

During the Construction and Operations phases, the monitoring ponds receive treated effluent from the effluent treatment plant. Treated effluent that meets release criteria is batch released to Patterson Lake via a permanent pipeline with diffuser.

Mitigation and monitoring of effluent prior to the final point of control is outlined in the *Effluent and Emissions Plan*.

# 7.0 Monitoring

Site water monitoring includes sample collection and analysis, quality assurance (QA) and quality control (QC), and performing audits and inspections. Site water monitoring is conducted by qualified staff in accordance with the processes described in the site water management procedure *Site Water Monitoring and Measurement*.

## 7.1 Sample Collection and Analysis

Regular monitoring and visual inspections of the integrity of both temporary and permanent water management infrastructure is carried out during the Construction phase. A summary of the required verification inspections, testing, and sampling to be conducted are summarized in Table 4.

Table 4: Site Water Monitoring

| Water | Location | Type | Frequency | Criteria |
|---|---|---|---|---|
| Fresh water | Fresh water intake | As per permit conditions | As per permit conditions | As per permit conditions |
| Potable water | Potable water treatment plant | As per permit conditions | As per permit conditions | As per permit conditions |
| Sewage | Sewage treatment plant | As per permit conditions | As per permit conditions | As per permit conditions |
| Non-mineralized Contact Water | Site runoff pond #1 | Freeboard | Continual | Water level |
| | | Water quality testing | To be confirmed | To be confirmed |
| Non-mineralized Contact Water | Site runoff pond #2 | Freeboard | Continual | Water level |
| | | As per *Effluent and Emissions Plan* | As per *Effluent and Emissions Plan* | As per *Effluent and Emissions Plan* |
| Mineralized contact water | PAG runoff collection area | Water quality testing | To be confirmed | To be confirmed |
| | Settling pond | Freeboard | Continual | Water Level |
| Effluent | Temporary effluent treatment plant | As per the *Effluent and Emissions Plan* | As per the *Effluent and Emissions Plan* | As per the *Effluent and Emissions Plan* |

## 7.2 Quality Assurance and Quality Control

QA/QC processes are conducted to maintain accuracy and reliability of data collected as part of this Plan. QA is the system of activities that assures end users of a product or service that defined standards of quality and stated level of confidence are met. QC is an overall system of activities that controls the quality of a product of service so that relevant legal and other requirements are met.

QA/QC processes focus on:

- sampling equipment;
- laboratory QA/QC;
- data validation; and
- inspections and audits.

QA/QC processes and documentation are in place for each applicable sample before the sample is collected and consider CSA N286 and ISO 9001 requirements.

QA/QC processes apply to models and calculations (e.g., monthly loadings) that are part of the interpretation and reporting of data collected as part of the Plan. QA/QC records are maintained for the Project life cycle

### 7.2.1 Sampling Equipment

Sampling equipment meets design, maintenance, and operating requirements in accordance with the applicable reference method used for sample collection and analysis. Information on handling sampling equipment to maintain data accuracy and reliability is provided in the site waste management procedure *Site Water Monitoring and Measurement.*

### 7.2.2 Laboratory Quality Assurance/Quality Control

QA laboratory testing is completed by an on-site laboratory that follows industry-standard QA/QC protocols. Qualified workers collect samples and perform testing in accordance with industry standards. QA/QC protocols and procedures are described in the site waste management procedure *Site Water Monitoring and Measurement.*

All samples, whether sent to an off-site laboratory or analyzed at an on-site laboratory, are accompanied by a chain of custody that specifies:

- the sample identifier;
- sampler name;
- date and time;
- method of analysis;
- analytes; and
- preservatives, if applicable.

For both on-site and off-site laboratories, the laboratory QA/QC procedures determine the properties of each analysis as described in Table 5.

Table 5: Laboratory Quality Assurance and Quality Control Analysis Properties

| QA/QC Analysis Properties | Description |
|---|---|
| Precision | • Defined as the reproducibility and reliability of the test method<br>• Determined by analyzing replicate samples (i.e., multiple containers that each contain subsets of a homogenized sample) |
| Accuracy | • Defined as the degree of closeness of measurements to the analyte's true value<br>• Determined by analyzing reference standards (i.e., solutions derived from accurately known commercial formulations) |
| Sample contamination | • Determined by analyzing blank samples (i.e., reference materials) |
| Detection limits or sensitivity | • Defined as the lowest concentration at which individual measurement results for a specific analyte are statistically different from a blank sample with a specified confidence level for a given method and representative media<br>• Detection limits vary among methods for most analytes and are an important consideration when concentrations are likely to be very low (i.e., near detection limits) |

## 7.3 Audit and Inspection

Audits and inspections check compliance with internal and external reporting requirements specific to site water management.

Audits are less frequent than regular monitoring and may need to be completed by a third party. Audits can also be used to verify internal reporting requirements.

Inspections are a set of regular activities to check and verify site water management performance. Site water management inspections are summarized in Table 6 and described in the site water management procedure *Site Water Monitoring and Measurement*.

Deviations, instances of regulatory noncompliance, and opportunities for improvement identified through audits and inspections are managed as outlined in the *Rook I Integrated Management System Manual* (IMS Manual).

Table 6: Site Water Inspections

| Water | Infrastructure | Criteria | Type | Frequency |
|---|---|---|---|---|
| Non-contact water | Diversion ditches away from industrial area | Integrity of conveyance geometry | Routine | Quarterly |
| | | | Event-driven | After heavy runoff event |
| | Perimeter berms away from industrial area | Integrity of embankments or control structures | Routine | Quarterly |
| Non-mineralized Contact Water | Site swales for collection and capture | Integrity of conveyance geometry | Event-driven | After heavy runoff event |
| | Perimeter berms for collection and capture | Integrity of embankments or control structures | Routine | Quarterly |
| | Ditches for collection and capture | Integrity of conveyance geometry | Routine | Weekly |
| | | | Event-driven | After heavy runoff event<br>Spring Freshet |
| | Site runoff ponds #1 and #2 | Integrity of containment structure, signs of erosion | Routine | Monthly |
| | | Leak detection | Routine | Weekly |
| Mineralized contact water | Site swales for collection and capture | Integrity of conveyance geometry | Routine | Quarterly |
| | | | Event-driven | After heavy runoff event |
| | Perimeter berms for collection and capture | Integrity of embankments or control structures | Routine | Quarterly |
| | Ditches for collection and capture | Integrity of conveyance geometry | Routine | Monthly |
| | | | Event-driven | After heavy runoff event<br>Spring Freshet |

| Water | Infrastructure | Criteria | Type | Frequency |
|---|---|---|---|---|
| | Pumping and pipelines for transfer to settling pond | Capability of containing flow and pressure<br>Integrity in all weather conditions | Routine | Quarterly |
| | | | Event-driven | Response to alarm |

## 7.4 Plan Maintenance and Review

The Plan is subject to periodic review and update to confirm compliance with regulations, permits, and relevant legislation in accordance with requirements outlined in the IMS Manual.

# 8.0 References

## 8.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-ADM-CHT-00001 | *Rook I Organizational Chart* |
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-ENV-RPT-00001 | *Rook I Environmental Impact Statement* |
| ROOK-ENV-COP-00001 | *Rook I Environmental Code of Practice* |
| ROOK-ENG-MAN-00001 | *Rook I Mining and Milling Facility Description Manual* |
| ROOK-TRN-PGM-00001 | *Rook I Training Program* |
| ROOK-CMT-PGM-00001 | *Rook I Construction Management Program* |
| ROOK-COM-PGM-00001 | *Rook I Commissioning Management Program* |
| ROOK-AST-PGM-00001 | *Rook I Asset Management Program* |
| ROOK-ENV-PGM-00001 | *Rook I Environmental Protection Program* |
| ROOK-ENV-PLN-00001 | *Environmental Monitoring Plan* |
| ROOK-ENV-PLN-00002 | *Effluent and Emissions Plan* |
| ROOK-WST-PGM-00001 | *Rook I Waste Management Program* |
| ROOK-WST-PLN-00001 | *Mine Waste Management Plan* |
| ROOK-WST-PLN-00003 | *Conventional Waste Management Plan* |
| ROOK-WST-PRO-00001 | *Site Water Monitoring and Measurement* |

## 8.2 External

- Other
  - *CanNorth (Canada North Environmental Services). 2022. NexGen Rook I Project Baseline Gamma Radiation Survey. Draft Report – Revision 1. December 2022. 234 p.*
  - *SRK (SRK Consulting). 2023. Rook I Project – Geochemical Characterization of Waste Rock. Final Report – January 2023*
  - *Canadian Standards Association. N286 Management system requirements for nuclear facilities*
  - *International Standards Organization. 9001 Quality management systems – Requirements*

# Appendix A: Drawings


C:\Users\jeighs\OneDrive - JDSEM\NEXR0001C - EPCM\Drawings\Layout Optimization 21.03.2023.dwg Apr 24, 2023 - 2:26pm

REFERENCE DRAWINGS — NO. | DWG NO. | TITLE

NOTES:
1. Figure reflects the maximum extents of the Project site at the end of the Construction phase.

DRAWING REVISION

| NO. | DESCRIPTION | DATE |
| --- | --- | --- |
| IP | FIGURE FOR PERMITTING | 2023.04.17 |

| | NAME | DATE |
| --- | --- | --- |
| DRAWN BY: | J.J | 14 NOV 2022 |
| DESIGNED BY: | A.S | 14 NOV 2022 |
| CHECKED BY: | | |
| APPROVED BY: | | |

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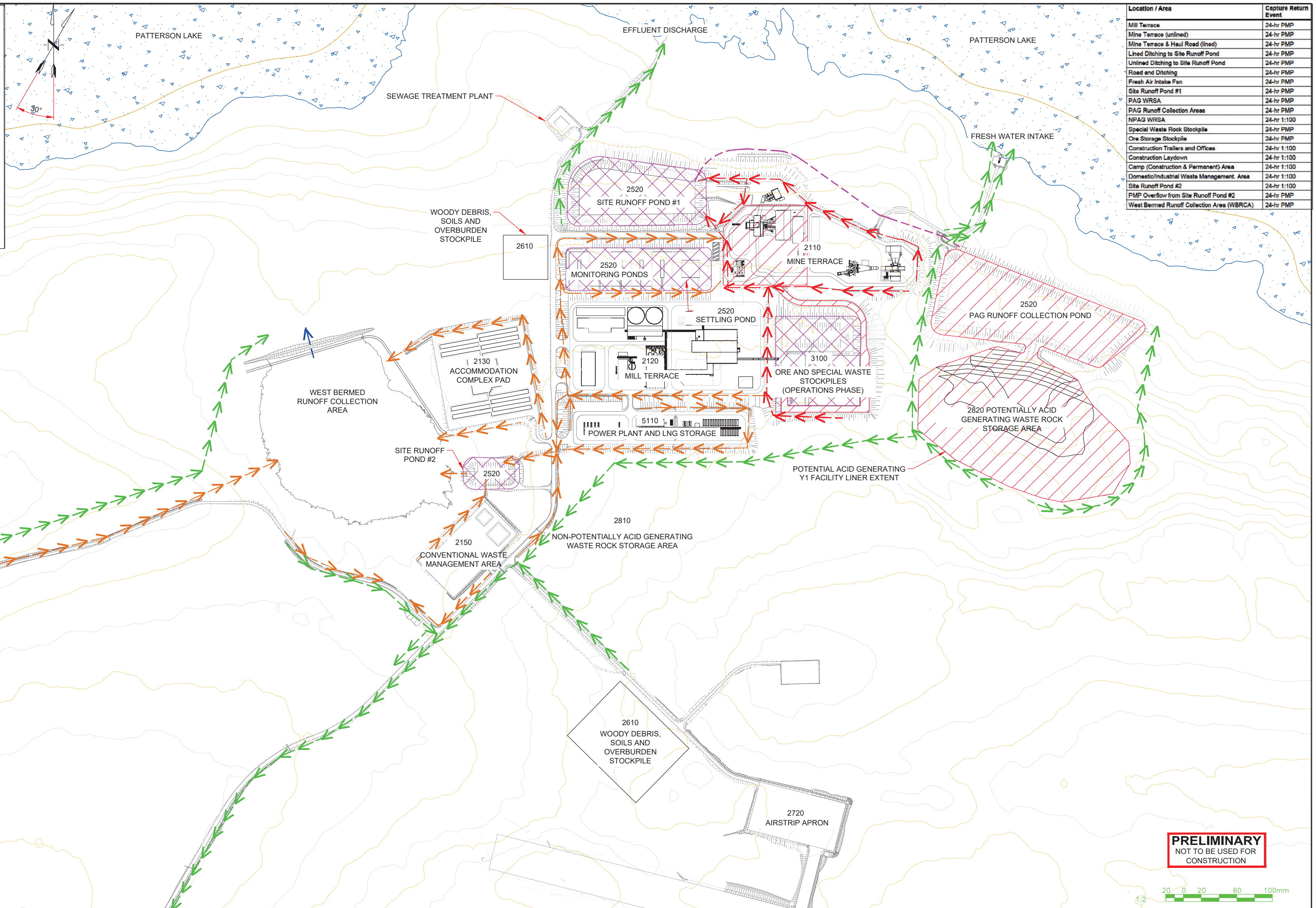
ROOK I PROJECT

MINE SITE DEVELOPMENT
CONSTRUCTION PHASE
OVERALL SITE LAYOUT

DWG NO.
REV. IP

NOTES:
1. FOR NOTES SEE DRAWING H366614-2000-220-260-0001.
2. CONTRACTOR TO READ DRAWINGS IN CONJUNCTION WITH PROJECT SPECIFICATIONS.
3. ALL UNITS ARE IN METRIC, COORDINATES AND DIMENSIONS ARE IN METERS, UNLESS NOTED OTHERWISE.
4. TOPOGRAPHY, UTM NAD83 ZONE 12N
5. CONTOURS ARE IN 5M INTERVALS

LEGEND:
- SINGLE LINED
- DOUBLE LINED
- NON-CONTACT WATER DIVERSION
- RELEASE WATER
- MINERALIZED CONTACT WATER DIVERSION
- NON-MINERALIZED CONTACT WATER DIVERSION
- NON-MINERALIZED WATER PIPELINE




| Location / Area | Capture Return Event |
|---|---|
| Mill Terrace | 24-hr PMP |
| Mine Terrace (unlined) | 24-hr PMP |
| Mine Terrace & Haul Road (lined) | 24-hr PMP |
| Lined Ditching to Site Runoff Pond | 24-hr PMP |
| Unlined Ditching to Site Runoff Pond | 24-hr PMP |
| Road and Ditching | 24-hr PMP |
| Fresh Air Intake Fan | 24-hr PMP |
| Site Runoff Pond #1 | 24-hr PMP |
| PAG WRSA | 24-hr PMP |
| PAG Runoff Collection Areas | 24-hr PMP |
| NPAG WRSA | 24-hr 1:100 |
| Special Waste Rock Stockpile | 24-hr PMP |
| Ore Storage Stockpile | 24-hr PMP |
| Construction Trailers and Offices | 24-hr 1:100 |
| Construction Laydown | 24-hr 1:100 |
| Camp (Construction & Permanent) Area | 24-hr 1:100 |
| Domestic/Industrial Waste Management. Area | 24-hr 1:100 |
| Site Runoff Pond #2 | 24-hr 1:100 |
| PMP Overflow from Site Runoff Pond #2 | 24-hr PMP |
| West Bermed Runoff Collection Area (WBRCA) | 24-hr PMP |

**PRELIMINARY**
NOT TO BE USED FOR CONSTRUCTION

20 0 20 60 100mm
1:2

REFERENCE DRAWINGS

| NO. | DWG NO. | TITLE |
|---|---|---|

NOTES:
1. Figure reflects the maximum extents of the Project site at the end of the Construction phase.

DRAWING REVISION

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|---|---|---|
| IP | FIGURE FOR PERMITTED | 17.04.2023 |

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| DESIGNED BY: | A.S | 14 NOV 2022 |
| CHECKED BY: | | |
| APPROVED BY: | | |



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ROOK I WATER MANAGEMENT
INFRASTRUCTURE AT END OF CONSTRUCTION

DWG NO.: ROOK-WST-DWG-000002
REV.: IP

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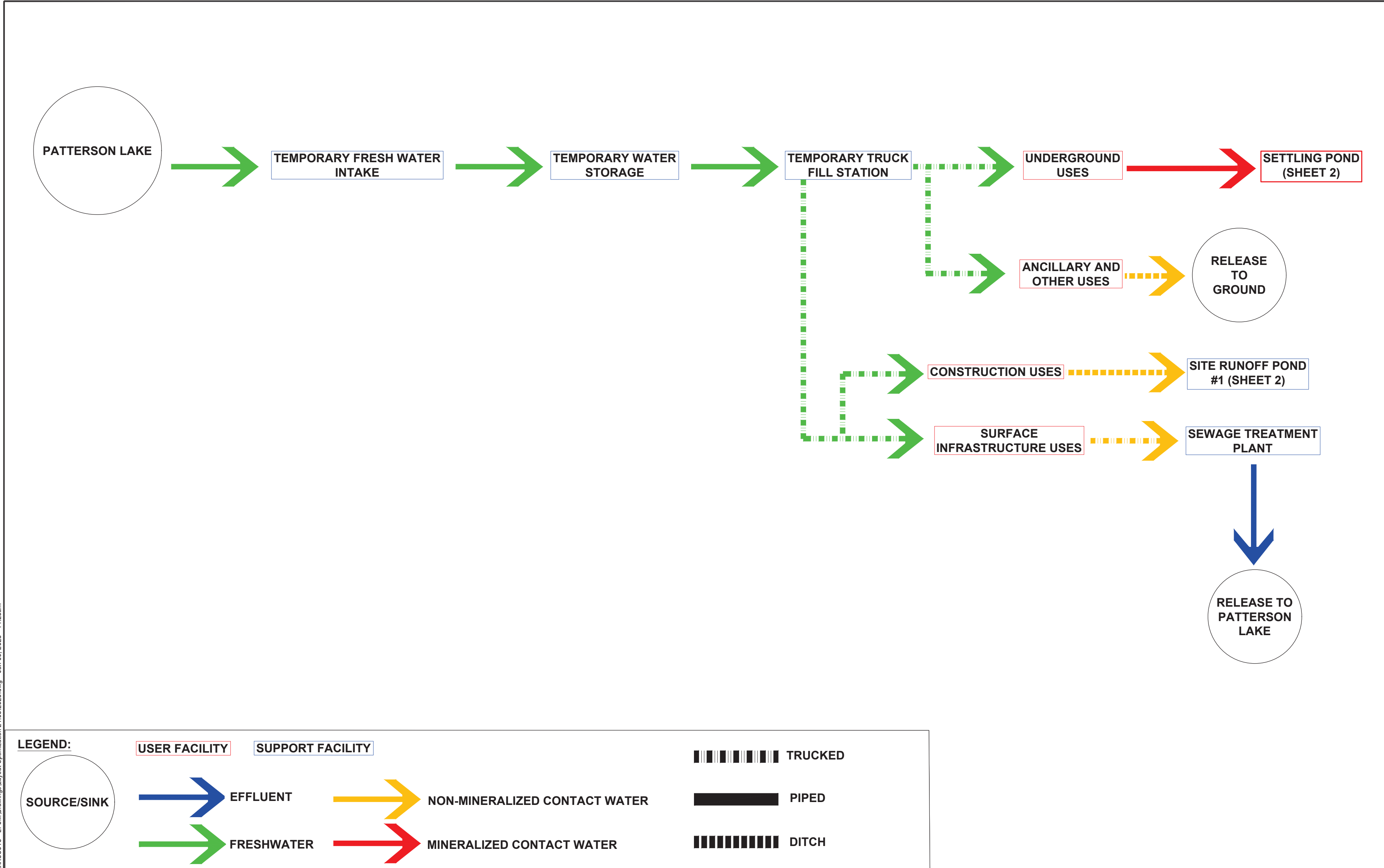
# Appendix B: Block Flow Diagrams




REFERENCE DRAWINGS

| NO. | DWG NO. | TITLE |
|---|---|---|

NOTES:

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| 1 | ISSUED FOR USE | 07.06.2023 |
| 0 | ISSUED FOR USE | 30.05.2023 |

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| CHECKED BY: | | |
| APPROVED BY: | | |

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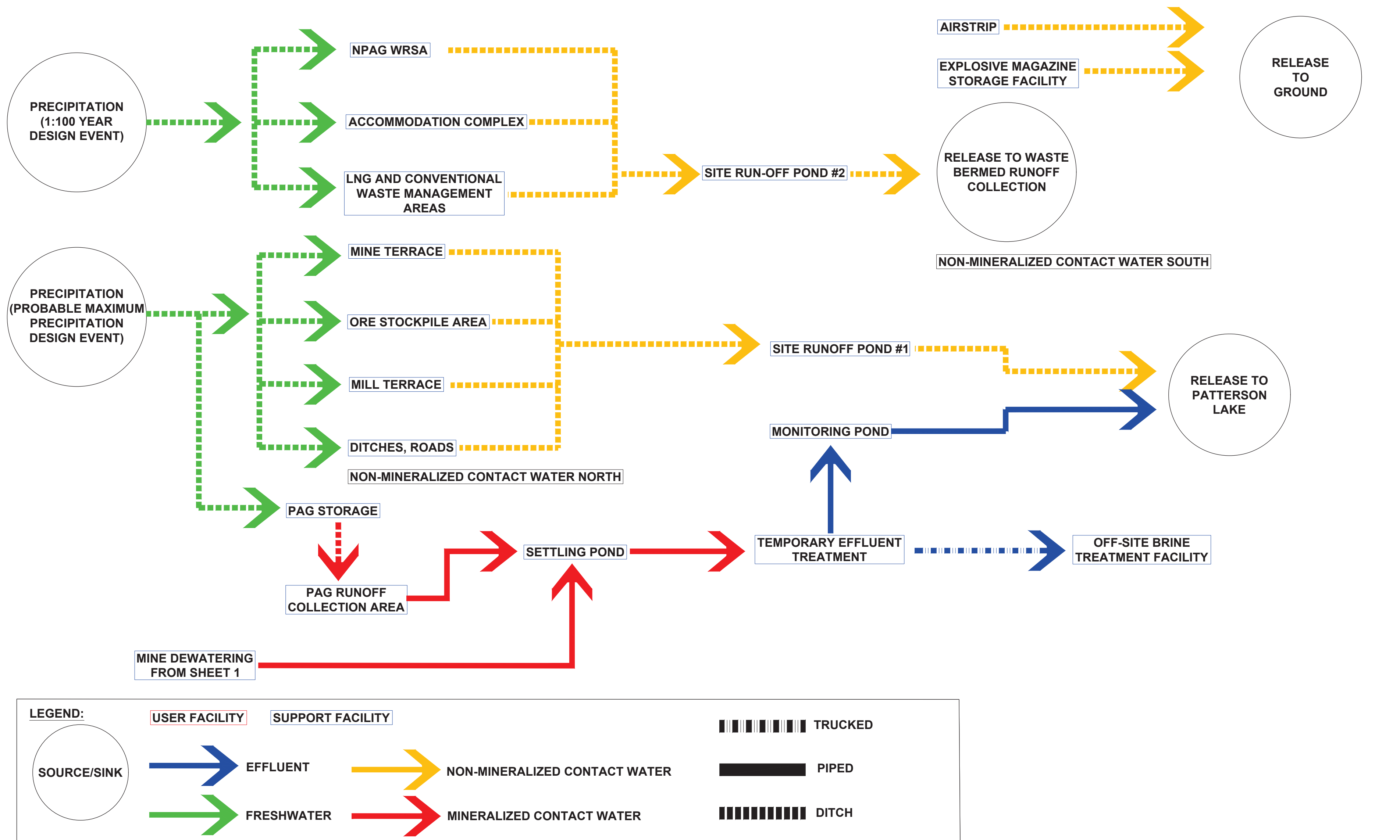
ROOK I PROJECT

TEMPORARY BLOCK FLOW DIAGRAM
FRESH AND POTABLE WATER, SEWAGE
CONSTRUCTION YEARS 1 TO 4

DWG NO. ROOK-WST-BFD-0001 REV. 1

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NOTES:

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| NO. | DESCRIPTION | DATE |
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TEMPORARY BLOCK FLOW DIAGRAM
PRECIP., SEEPAGE, EFFLUENT, DISCHARGE
CONSTRUCTION YEARS 1 TO 4

DWG NO. ROOK-WST-BFD-0002 REV. 1

# Conventional Waste Management Plan
# ROOK-WST-PLN-00003

# Rook I Project

## Conventional Waste Management Plan

ROOK-WST-PLN-00003



June 2023

# Record of Revisions

| Version. No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| A | 23-June-2023 | Issued for initial CNSC review and feedback | J. Henderson | L. Moger<br>J. Cooper<br>A. Swerhone | N/A |

# Table of Contents

## List of Figures



## List of Tables

# 1.0 Introduction

The *Conventional Waste Management Plan* (Plan) details the systematic and risk-based approach to managing conventional waste at the NexGen Energy Ltd. (NexGen) Rook I Project (Project). The Plan describes processes to characterize, collect, transport, store, handle, and dispose of conventional waste generated during Project site preparation, construction, and commissioning (i.e., Construction phase) in a manner that protects people and the environment, minimizes waste generation to the extent practicable, and maintains regulatory compliance.

This Plan, along with the *Site Water Management Plan* and *Mine Waste Management Plan,* supports the *Rook I Waste Management Program* and is part of the overall *Rook I Integrated Management System* (IMS). As a component of the IMS, this Plan is subject to the *Rook I Integrated Management System Policy* (Policy) which provides the foundation for NexGen's approach to waste management. This Plan and its relationship to the other IMS programs within the IMS hierarchy is shown in Figure 1.

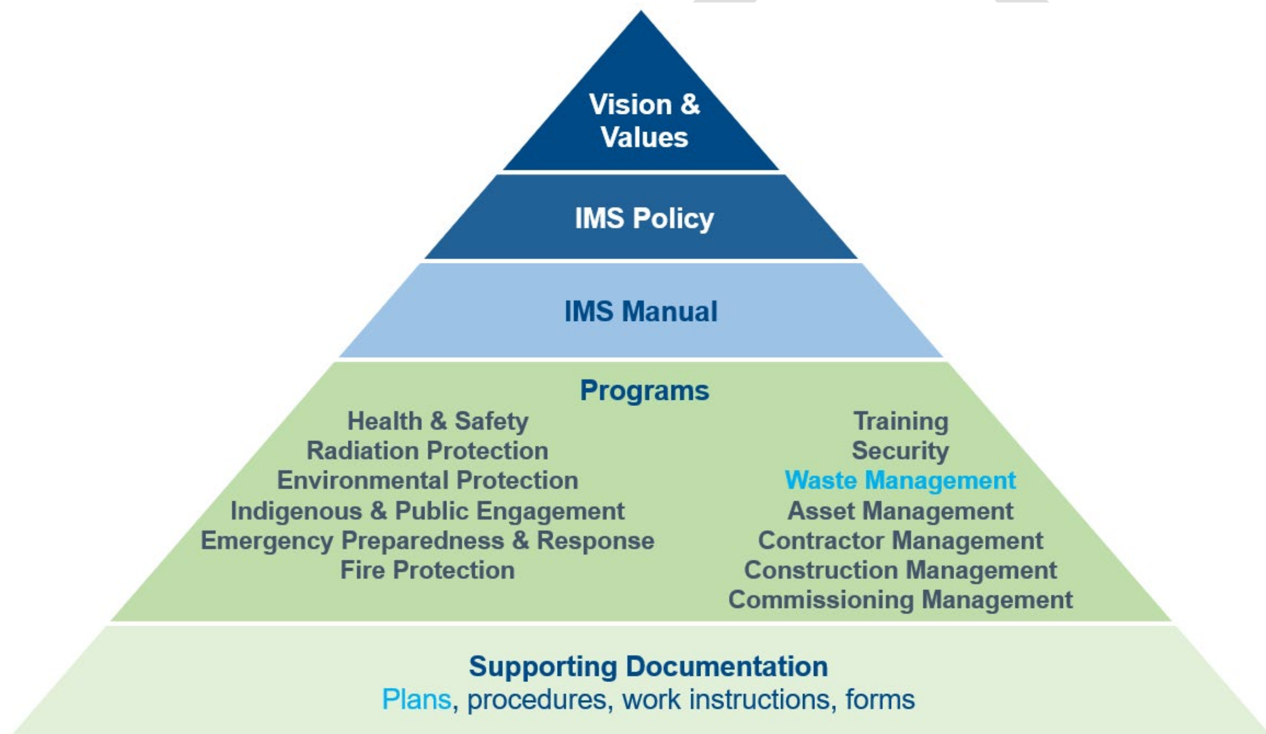


Figure 1: Plan Context Within the IMS

## 1.1 Purpose

The Plan describes management philosophies, processes, roles, responsibilities, infrastructure, and monitoring necessary to effectively reduce, reuse, recycle, recover, treat, and dispose of conventional waste in a manner that minimizes the generation of waste to the extent practicable, prevents pollution, and protects people and the environment.

The Plan provides a standardized, consistent, and multi-faceted approach that accounts for Project-specific factors (e.g., location, climate), the availability of local off-site waste management facilities, and best available technology and techniques.

The Plan is developed to address applicable regulatory requirements outlined in section 6.2 including *REGDOC 2.11.1, Waste Management, Volume I: Management of Radioactive Waste, The Environment Management and Protection Act, 2010*, *The Hazardous Substances and Waste Dangerous Goods Regulations*, and *The Mines Regulations, 2018*. The Plan was also developed in support of the goals of *Saskatchewan's Solid Waste Management Strategy* (Government of Saskatchewan, 2020).

## 1.2 Scope

The Plan applies to the generation, handling, storage, processing, and long-term disposal of solid and liquid domestic, industrial, low-level radioactive, and hazardous waste generated during Project site preparation, construction, and commissioning (i.e., Construction phase). The processes outlined as part of the Plan apply to all Project workers.

This Plan uses a graded, risk-based approach to waste management that is commensurate with waste characteristics (e.g., radiological, chemical, biological, and physical hazards) and accounts for the level of risk, safety significance, and complexity of waste management activities and facilities.

Additional information on the design and expected operating performance of conventional waste management facilities, systems, and components is provided in the *Rook I Mining and Milling Facility Description Manual*.

The Plan is not intended to provide all necessary details for all possible factors influencing conventional waste management decisions; workers with the appropriate level of authority and competence are expected to make and perform decisions to manage waste safely and effectively. The planning and resource identification included herein is designed to provide important and appropriate guidance for waste management personnel.

The mining of uranium ore, the production of uranium concentrate, and the generation of tailings are not within the scope of the Construction phase of the Project; however, the processes described herein account for the possibility of encountering radiologically contaminated material and for establishing and maintaining effective conventional waste management measures throughout the Project life cycle. The Plan and its supporting processes are subject to periodic review throughout the Project life cycle and will be updated prior to the Operations phase.

## 1.3 Conventional Waste Management Framework

This Plan directly supports the *Rook I Waste Management Program* and is used in conjunction with the *Rook I Environmental Protection Program* and related conventional waste management documents (i.e., plans, procedures, work instructions, forms) referenced in the Plan and outlined in Figure 2.

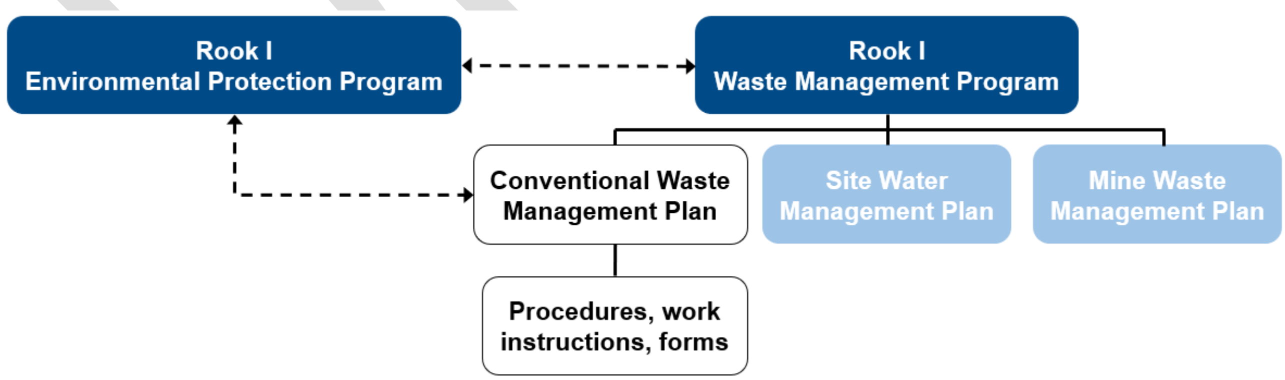


Figure 2: Waste Management Framework

## 1.4 Conventional Waste Management Philosophy

NexGen's conventional waste management philosophy is founded on commitments to:

- minimize the generation of waste to the extent practicable with consideration for the waste management hierarchy;
- keep all releases and adverse impacts as low as reasonably achievable (ALARA);
- apply economically viable best available technology and techniques;
- proactively engage with local Indigenous groups and the public regarding conventional waste management; and
- maintain compliance with legal and other requirements.

The remote Project location and limited availability of viable off-site regional waste management facilities requires a multi-faceted approach to conventional waste management that considers the waste management hierarchy as illustrated in Figure 3 and described in Table 1.

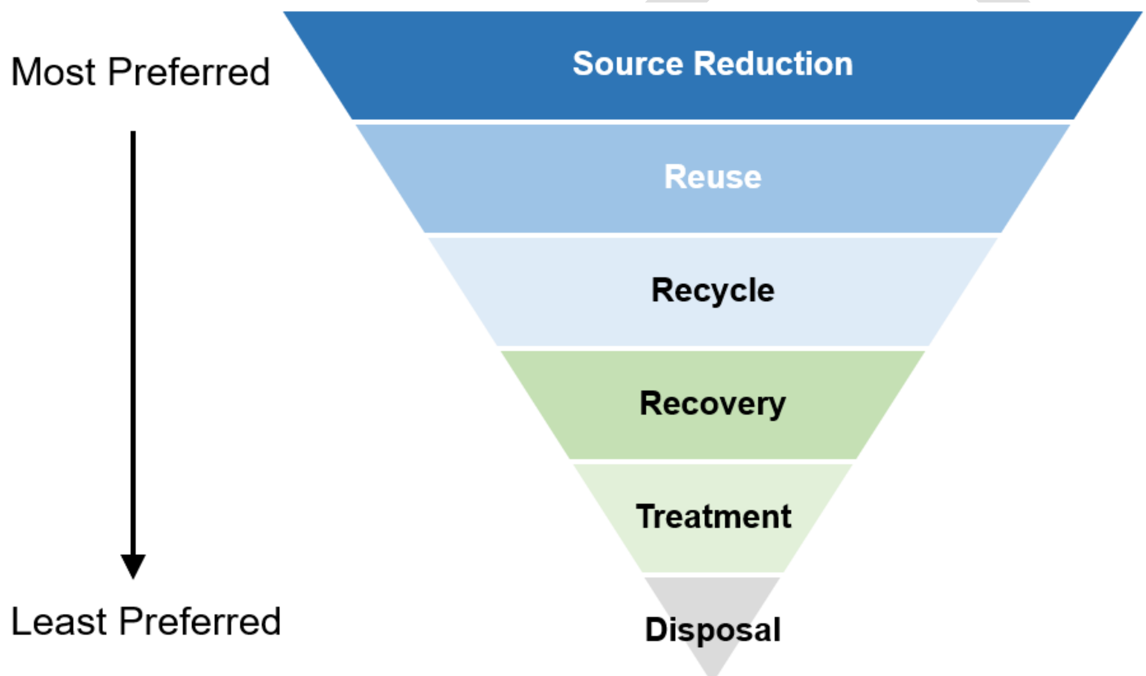


Figure 3: Waste Management Hierarchy

Table 1: Waste Hierarchy Descriptions

| Waste Reduction Strategy | Strategy Description |
|---|---|
| Source Reduction | • Eliminating waste before it is created and/or using alternative materials and processes to decrease the quantity and risk of waste generated |
| Reuse | • Using a material again for its initial purpose (i.e., conventional reuse) or to fulfill a different function (i.e., repurpose) as many times as possible before it enters the waste stream |

| Waste Reduction Strategy | Strategy Description |
|---|---|
| Recycle | • Collecting and processing material for manufacturing new products or materials |
| Recovery | • Extracting fuel or energy from materials or waste that cannot be reused or recycled using technologies such as waste-to-energy and anaerobic digestion |
| Treatment | • Changing the physical, chemical, biological, or radiological character or composition of waste (e.g., incineration, compaction) |
| Disposal (Residuals Management) | • Permanent, indefinite, or long-term storage of waste |

## 1.5 Terminology

Terminology introduced in this Plan is provided in this section. A comprehensive list of common terms applicable to this Plan and the IMS are available in the *Rook I Project Glossary*.

**as low as reasonably achievable (ALARA)** – Minimizing the risk of adverse health, safety, environmental, and radiological impacts to the lowest extent practicable, considering technical, legal, social, and economic factors.

**conventional waste** – Domestic, industrial, low-level radioactive, and hazardous waste generated during the Construction and Operations phases of the Project.

**domestic waste** – Non-industrial, non-hazardous, and non-low-level radioactive waste generated from office and camp areas including living quarters, coffee rooms, kitchen, and food preparation and eating areas. Domestic waste is composed of recyclable and non-recyclable materials including food scraps, plastic, glass, paper, cardboard, metal food containers, and electronics.

**hazard** – A situation or circumstance that could cause harm to people, damage to assets, business loss, and impact on the environment or the organization's reputation. Harm could be to people, environment, material assets, financial assets, reputation, or legal status.

**hazardous substance** – A substance that is defined as hazardous in *The Hazardous Substances and Waste Dangerous Goods Regulations*.

**hazardous waste** – a waste dangerous good as defined in *The Hazardous Substances and Waste Dangerous Goods Regulations*.

**incineration** – The thermal destruction of waste for the primary purpose of disposal, with or without recovery of energy.

**Indigenous** – Includes the First Nations, Inuit, and Métis peoples of Canada.

**industrial waste** – Non-domestic, non-hazardous, and non-low-level radioactive waste generated from construction, commissioning, operation, and maintenance activities associated with the underground mine and process plant. Industrial waste for the Project will be composed of recyclable and non-recyclable materials, including cardboard (e.g., packaging), wood (e.g., pallets), metal (e.g., metal drums and containers), used tires, and plastics (e.g., piping).

**low-level radioactive waste (LLRW)** – Waste with radionuclide content above established unconditional clearance levels and exemption quantities but that generally have limited amounts of long-lived radionuclides. Does not include ore, special waste, waste rock, or tailings.

**product stewardship program** – A program for the collection, treatment, safe disposal, recycling, recovery, reuse, and reduction in use of household hazardous waste product.

**Project site** – Term used to describe all property within the physical NexGen Rook I boundary.

**recyclable** – A substance or object that can be recycled.

**recycling** – The process of collecting and processing material to make raw materials for the manufacture of new products or material.

**reduction** – Specific to this Plan, reducing and preventing the amount of material entering the recycling and solid waste stream.

**single-stream recycling** – A system in which all recyclable materials (e.g., fiber, plastics, tin, aluminum) are mixed together during disposal.

**target** – A defined measurement for an objective that is specific, measurable, achievable, relevant, and timebound.

**waste** – A solid or liquid that is one or more of the following: (i) rubbish; (ii) tailings; (iii) effluent; (iv) sewage; (v) garbage; (vi) refuse; (vii) scrap; (viii) discarded articles, bottles or cans; (ix) any other material that is prescribed or set out in the *Saskatchewan Environmental Code*.

**waste characterization** – The process by which the composition of different waste streams is analyzed.

**waste minimization** – Activity, process, or measure undertaken for the purpose of reducing, reusing, recycling, or recovering waste.

# 2.0 Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Plan. Workers are informed of their roles and responsibilities and are accountable for understanding and fulfilling them. Although NexGen maintains overall accountability for Project activities, the term Rook I is used in the following role descriptions to reinforce that the role is applicable and may be assigned to NexGen employees and contractors performing work on behalf of the Project.

Workers with responsibilities for tasks and activities related to conventional waste management are provided with the training and resources required to fulfill prescribed tasks as outlined in the *Rook I Training Program*.

Additional roles and responsibilities are further detailed as part of the supporting processes.

**Rook I management** is responsible for:

- providing resources to achieve Plan objectives and to fulfill the required roles, responsibilities, and processes of the Plan;
- providing support to maintain effective conventional waste management practices;
- controlling conventional waste management incidents and deviations and directing corrective action;
- communicating with the applicable regulatory agencies and other external stakeholders on behalf of the Project, as appropriate; and
- identifying and pursuing opportunities to achieve continual improvement.

**Plan coordinator** is responsible for:

- implementing all aspects of this Plan and related processes;

- providing oversight and direction to workers regarding conventional waste management practices;
- implementing resources and assigning appropriate workers to fulfill the required roles, responsibilities, and processes of the Plan and associated processes;
- confirming that workers meet and maintain required Plan-specific training and qualifications;
- managing activities under conventional waste management service contracts and communicating regularly with the conventional waste management service providers;
- providing day-to-day oversight of Project conventional waste service providers;
- establishing and maintaining a monitoring system to evaluate and track the effectiveness of this Plan;
- maintaining Plan-specific data and records in a controlled manner;
- addressing Plan deficiencies and deviations; and
- implementing opportunities to continually improve conventional waste management processes.

**Conventional waste service providers** – are responsible for:

- providing appropriately trained workers to effectively perform conventional waste management duties and responsibilities;
- handling, storing, processing, and disposing of conventional waste in accordance with Plan processes;
- tracking and monitoring waste materials from origin to disposal;
- identifying and reporting Plan deficiencies and deviations to the Plan coordinator and supporting the implementation of remedial actions as required; and
- identifying and supporting opportunities to minimize the generation of conventional waste and to continually improve conventional waste management processes.

**Supervisors** – are responsible for:

- overseeing the implementation of work activities in the field in accordance with the Plan;
- informing workers of their roles and responsibilities;
- verifying workers are aware of and able to execute specific tasks and activities related to conventional waste management processes;
- verifying workers meet and maintain required Plan-specific training qualifications;
- identifying Plan deficiencies and deviations and consulting with Rook I management and the Plan coordinator as required to develop and implement remedial actions; and
- identifying and supporting opportunities to minimize the generation of conventional waste and to continually improve conventional waste management processes.

**Workers** – are responsible for:

- understanding and following Plan processes;
- meeting and maintaining required Plan-specific training qualifications;
- handling, storing, and disposing waste materials according to conventional waste management practices;
- recognizing and promptly communicating hazards or deviations;
- using all equipment, devices, facilities, and equipment in accordance with Plan processes and training; and
- identifying and supporting opportunities to minimize the generation of conventional waste and to continually improve conventional waste management processes.

# 3.0 Project Context

This section provides an overview of the Project and a summary of site features and characteristics that may influence conventional waste management practices. Additional details are outlined in the *Rook I Mining and Milling Facility Description Manual* and *Rook I Environmental Impact Statement.*

## 3.1 Project Overview

The Project operates year-round and includes construction activities to establish permanent underground and surface facilities required to support extraction of uranium ore and production of uranium concentrate, including:

- an underground mine accessed by two shafts;
- mine rock management facilities;
- site water management facilities;
- a surface uranium ore processing plant;
- a surface paste backfill plant;
- an underground tailings management facility;
- an effluent treatment plant; and
- administration and accommodation complex facilities, utilities, an airstrip, and roads.

For illustrative purposes, a general schematic of Project infrastructure at the end of the Operations phase is shown in Figure 4.

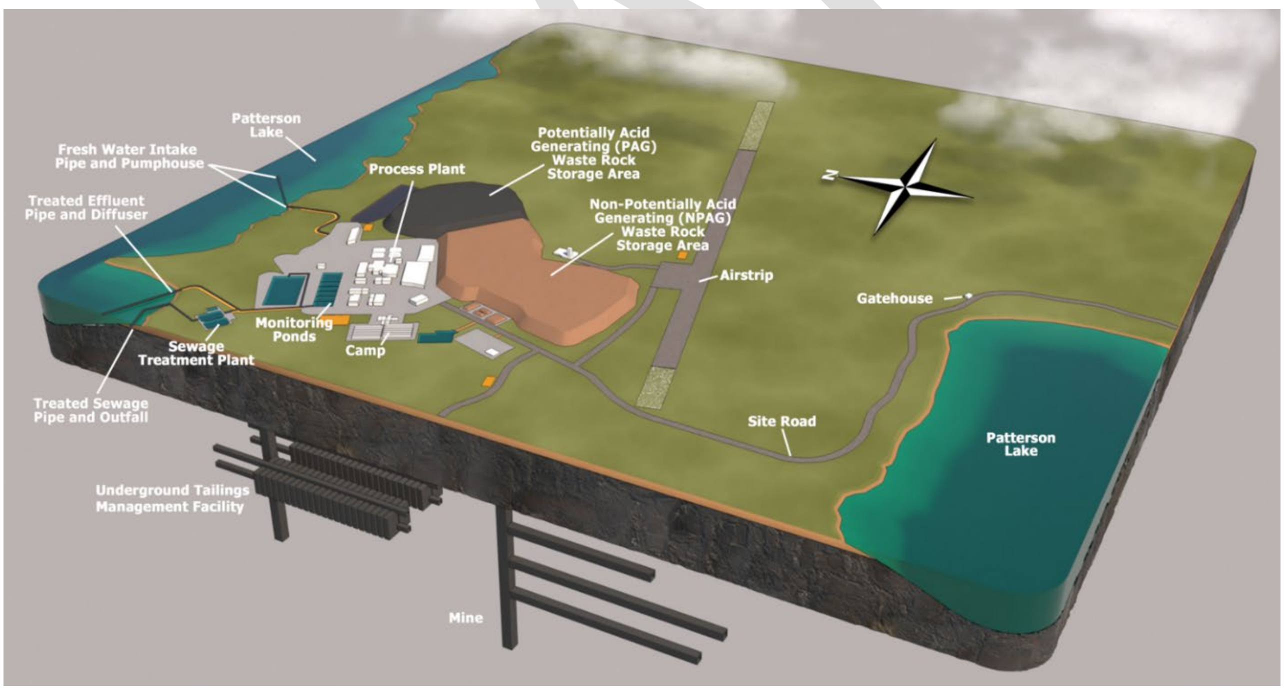


Figure 4: Schematic of Primary Project Infrastructure (Operations phase)

## 3.2 Project Setting and Baseline Conditions

This section provides an overview of the physical features and characteristics of the region in which the Project is located and the potential influences on conventional waste management infrastructure and processes. The physical features and regional characteristics are obtained from baseline studies conducted for the Project. Additional details are outlined in the *Rook I Environmental Impact Statement*.

### 3.2.1 Location

The Project is located adjacent to Patterson Lake in the southwestern Athabasca Basin in of northern Saskatchewan, Canada, approximately 40 km east of the Saskatchewan-Alberta border, 130 km north of the village of La Loche, and 640 km northwest of the City of Saskatoon as shown in Figure 5. The location of the Project relative to other communities and conventional waste processing and disposal facilities influences decisions regarding conventional waste management disposal options.

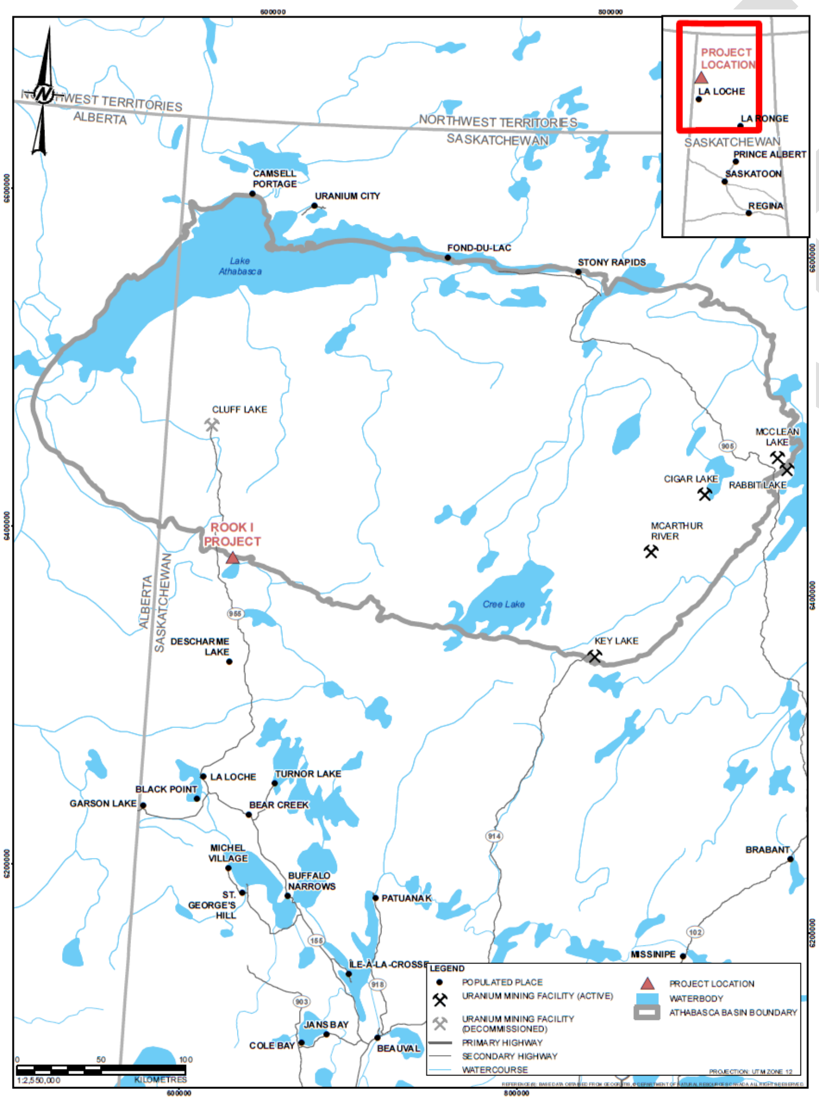


Figure 5: Project Location

### 3.2.2 Climate

Climatic considerations are one of the factors considered when selecting suitable infrastructure and practices for managing conventional waste. The Project is situated in a region where temperatures range from greater than 30°C in the summer to colder than -40°C in winter. Winters are long and cold, with mean monthly temperatures of below freezing from October to April. Annual precipitation is approximately 0.53 m, with approximately 70% of annual precipitation occurring as rain during summer and the remainder as snow during winter. Ice formation on water bodies typically begins in October, with break-up occurring in April during the spring freshet and continuing into late May for larger waterbodies.

Additional information on climate is outlined in the *Rook I Environmental Impact Statement.*

### 3.2.3 Wildlife

Knowledge of wildlife present in the area factors into storage and disposal decisions to minimize wildlife attraction and avoid habituation. Wildlife species known to occur in the region include moose (*Alces alces*), woodland caribou *(Rangifer tarandus caribou*), deer (*Odocoileus* spp.), black bear (*Ursus americanus*), wolf (*Canis lupus*), and other mammal species commonly found in boreal forest ecosystems. Semi-aquatic mammals common to the area include beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and river otter (*Lontra canadensis*).

Additional information on wildlife in and around the Project site is outlined in the *Rook I Environmental Impact Statement*.

The process for minimizing, documenting, and managing wildlife interactions is outlined in the *Rook I Environmental Protection Program*.

### 3.2.4 Radioactivity

Radioactivity is the spontaneous emission of radiation in the form of particles or high energy photons. Understanding baseline surface radioactivity in areas local to the Project site informs conventional waste characterization and segregation practices to verify proper handling and storage practices are applied to keep risks to workers and the environment ALARA.

A baseline gamma survey of the site and two sections of Highway 955 was performed in 2022 to characterize the natural variability in baseline gamma radiation levels above ground (CanNorth, 2022). Overall, the baseline gamma radiation levels across the Project site and the surveyed portions of Highway 955 were low, with the highest hectare average recorded being 0.26 micro sieverts per hour (μSv/hr). Average baseline gamma radiation levels across the Project site, access road, and Highway 955 sections were 0.021 μSv/hr, 0.014 μSv/hr, and 0.025 μSv/hr, respectively.

Delineation drilling performed at the Project site indicates the main source of radioactivity is expected in the crystalline basement outside the extent of shaft sinking and early mine development planned during the Construction phase; this was supported by geochemical testing (i.e., humidity cell testing) by SRK (2023).

## 4.0 Waste Management Overview

Conventional waste management includes processes and infrastructure to reduce, characterize, collect, transport, store, handle, and dispose of conventional waste generated during Project activities in a safe and environmentally responsible manner. Conventional waste streams managed at the Project include domestic, industrial, low-level radioactive, and hazardous waste.

## 4.1 Source Reduction

Reducing waste is the most preferred option of the waste management hierarchy. Procurement, education, and training are key mechanisms to prevent, reduce, and divert waste from being generated at the source.

### 4.1.1 Procurement

Procurement is the process of purchasing goods that meet specified requirements and is the first stage where decision-making influences the type, quantity, and management approach for conventional waste.

Procurement requirements are documented and provided to approved vendors. Procurement requirements are developed with consideration for conventional waste management and include, but are not limited to:

- restricting materials that are difficult to reuse, recycle, recover (e.g., styrofoam) or dispose (e.g., asbestos);
- streamlining purchasing across Project activities to reduce the variability of similar items (e.g., personal protective equipment [PPE]);
- selecting reusable materials where possible to reduce the quantity of waste (e.g., reusable dishware);
- proactively planning for adequate storage to maintain material integrity (e.g., heated shelter for items that are sensitive to temperature);
- coordinating shipping and backhauling schedules to efficiently transfer materials off-site (e.g., baled recyclables can be loaded onto trucks that deliver pallets to the Project site);
- quantifying the composition of incoming materials to assist in forecasting waste management needs;
- working with local Indigenous groups and communities to identify off-site regional conventional waste management opportunities, as appropriate;
- including provisions related to conventional waste in contracts and agreements (e.g., requiring contractors to provide waste type and quantity estimates prior to arrival); and
- making arrangements with vendors to return used items to their place of origin (e.g., pallets, empty containers).

Further information on procurement processes and establishing purchasing requirements is outlined in the IMS Manual.

### 4.1.2 Education and Engagement

Educating workers and providing information on conventional waste management initiatives and requirements fosters understanding and supports worker participation which are integral to maintaining a successful waste management system. Information provided may include, but not be limited to:

- proper handling, storage, and disposal instructions;
- contact information for Project conventional waste management personnel;
- protocols for the safe storage and handling of hazardous substances and waste dangerous goods;
- measures to limit wildlife attraction;
- conventional waste hazards and risks;
- statistics on conventional waste performance; and
- information required by regulation.

Information regarding conventional waste disposal requirements is provided to workers using signage, labelling, and colour coding with signage placed in strategic, high-traffic areas or next to disposal locations.

Workers are encouraged to provide suggestions for and participate in initiatives to continually improve.

### 4.1.3 Training and Qualifications

The Project follows a systematic approach to training (SAT) to educate, train, and qualify workers to carry out the work assigned to them. Training requirements are monitored to provide workers with the training they require when they require it to maintain competency and work safely. Specific training requirements, including tracking worker credentials and qualifications for expiry, are defined and managed as outlined the *Rook I Training Program*. Training is developed, delivered, and tracked within the SAT framework.

Workers responsible for conventional waste management tasks and activities are provided with the training and resources required to fulfill prescribed tasks. Additional roles and responsibilities are further described in supporting processes.

## 4.2 Waste Classification and Management Considerations

Waste materials are classified according to their characteristics (e.g., physical, chemical), the origin, and the potential hazards they pose to human health and the environment. Waste management decisions are risk-based and appropriate for waste classification.

Waste types, generation rates, and quantities are tracked in accordance with processes described in section 5.0.

To maintain compliance with *The Mines Regulations, 2018* and to prevent the creation of potential fire hazards in the underground workings, waste disposed underground will either be non-combustible or would be processed or contained in a manner that would make it non-combustible.

### 4.2.1 Domestic Waste

Domestic waste for the Project includes all non-industrial, non-hazardous, and non-low-level radioactive waste (non-LLRW) generated from Project offices and accommodations including coffee rooms and kitchen. Domestic waste is composed of recyclable and non-recyclable materials including food scraps, plastic, glass, paper, cardboard, metal food containers, and electronics.

Suitable options for managing domestic waste include:

- on-site repurpose or recycle;
- on-site incineration as described in section 4.6;
- off-site disposal; and
- off-site repurpose or recycle.

Key considerations for successful management of domestic waste are described in Table 2.

Table 2: Key Considerations for Domestic Waste Management

| Material | Examples | Key Considerations |
|---|---|---|
| Plastic | Plastics 1 through 7, beverage containers, clam shells, food, and product packaging | • Plastic 2 and Plastic 5 have strong recycling options<br>• Plastic intended for recycle must be clean and separated<br>• Single-stream recycling may be an option<br>• Beverage containers are included as part of product stewardship programs in Saskatchewan and recycling options exist<br>• Plastic film is difficult to clean and may not be accepted by recycling service providers |
| Glass | Food and product containers, ceramics, Pyrex, crystal | • Glass often breaks during transportation and processing<br>• Glass containers for food and beverage may have recycling options if separated and not broken |

| Material | Examples | Key Considerations |
|---|---|---|
| | | • Other types of glass (e.g., windows, ovenware, Pyrex, crystal) are manufactured through a different process and are more challenging to recycle<br>• Glass is inert and can also be reused as a construction material (i.e., crushed in road base or other construction applications) |
| Paper | Office paper, newspaper, flyers | • Paper intended for recycle must be clean and separated from waste stream<br>• Most recycling service providers accept paper in single-stream recycling |
| Cardboard | Shipping boxes, cereal boxes | • Cardboard intended for recycle must be clean and flattened<br>• Cardboard is a relatively high-value recycling commodity with recycling options<br>• Some commercial options exist (e.g., baling and selling desirable corrugated cardboard direct to buyer) |
| Food | Fruit and vegetable scraps, compostable paper | • Scraps intended for compost must be separated with no plastic or other contamination<br>• Scraps attract wildlife and must be stored in an enclosed space or bin |
| Metals | Aluminum cans, pie plates, tin | • Single-stream recycling may be an option<br>• Commercial recycling service providers exist for various metal types<br>• Aluminium cans are light, compactible, and can be recycled as a deposit material<br>• Standards for cleanliness of metal material are lower, but material must not be rusted<br>• Metal is a higher value commodity for recycling |
| Other Household Waste | Textiles, furniture, furnishings, electronics, hygiene, bagged municipal solid waste | • Disposal options for each category will require additional research<br>• Electronics are included as part of product stewardship programs in Saskatchewan and recycling options exist |

### 4.2.2 Industrial Waste

Industrial waste for the Project includes all non-domestic, non-hazardous, and non-LLRW generated from construction, commissioning, operation, and maintenance activities. Industrial waste is composed of recyclable and non-recyclable materials, including cardboard (e.g., packaging), wood (e.g., pallets), metal (e.g., metal drums, containers), used tires, and plastics (e.g., piping). This waste may be handled similarly to domestic waste in terms of diversion.

Suitable options for managing industrial waste include:

- on-site repurpose or recycle;
- on-site incineration as described in section 4.6;
- off-site disposal;
- off-site repurpose or recycle; and
- underground disposal.

Key considerations for successful management of industrial waste are described in Table 3.

Table 3: Key Considerations for Industrial Waste Management

| Material | Examples | Key Considerations |
|---|---|---|
| Plastic | Rigid plastic, plastics 1 through 7 including film, and plastic packaging | • Options exist for rigid plastic, depending on material that was previously in the container (e.g., hazardous, household)<br>• Plastic film is difficult to clean and may not be accepted by recycling service providers |
| Paper | Office paper, paper packaging | • Paper intended for recycle must be clean and separated<br>• Most recycling service providers accept paper in single-stream recycling |
| Cardboard | Corrugated boxes, paperboard, boxboard cartons, and kraft paper bags | • Cardboard intended for recycle must be clean and flattened<br>• Cardboard is a relatively high-value recycling commodity with recycling options<br>• Some commercial options exist (e.g., baling and selling desirable corrugated cardboard direct to buyer) |
| Metals | Ferrous and non-ferrous metals, metal packaging | • Single-stream recycling may be an option<br>• Metal should be stored away from water to avoid rust<br>• Commercial recycling service providers exist for various metal types<br>• Metal is a higher-value commodity for recycling<br>• Electronics and appliances are not always appropriate to recycle as scrap metal<br>• Standards for cleanliness of metal material is lower, but metal must not be rusted |
| Wood | Treated and untreated wood, wood fibre products | • Chemically-treated wood waste is not an inert waste and must not be burned in open fires<br>• Treated wood can be recycled or reused<br>• Untreated wood can be recycled, reused, or composted<br>• Reuse options for untreated wood include chipping and using as mulch for weed control, wood flour for cleaning up spills, fuel pellets for wood stoves, and wood chips for landscaping and trail stabilization |
| Tires | Various tire types and sizes | • Tires are included as part of product stewardship programs in Saskatchewan and recycling options exist<br>• Likely requires shipment to a centralized collection point<br>• Uncontaminated tires must be separated from tires that may have contacted radioactive material |

### 4.2.3 Low-Level Radioactive Waste

LLRW includes waste with radionuclide content above established unconditional clearance levels and exemption quantities, but typically have limited amounts of long-lived radionuclides. This waste type includes radiologically contaminated materials from mining and processing activities but does not include ore, special waste, waste rock, or tailings.

Mining uranium ore, producing uranium concentrate, and generating tailings are not within the scope of the Construction phase of the Project and radiological contamination is not anticipated. However, if radiologically contaminated material (e.g., LLRW) is encountered, it will be segregated and temporarily stored in a dedicated facility until the material can be processed (e.g., incinerated) and permanently disposed underground.

### 4.2.4 Hazardous Waste

Hazardous waste for the Project includes all non-domestic, non-industrial, and non-LLRW defined as a waste dangerous good in *The Hazardous Substances and Waste Dangerous Goods Regulations.* Hazardous waste includes waste oils, batteries, cleaners, degreasers, fuels, chemicals, paints, and hydrocarbon-contaminated soil.

Hazardous waste is stored in accordance with applicable permits and the requirements of *The Hazardous Substances and Waste Dangerous Goods Regulations.* Off-site transportation of hazardous waste is performed in accordance with the requirements of the *Transportation of Dangerous Goods Act and Regulations*.

Suitable options for managing hazardous waste include:

- off-site disposal; and
- off-site repurpose or recycle.

Planning and reporting minimize the likelihood of hazardous waste getting in domestic and industrial waste streams. Storage considerations as described in section 4.4.

Key considerations for successful management of hazardous waste are described in Table 4.

Table 4: Key Considerations for Hazardous Waste Management

| Material | Examples | Key Considerations |
|---|---|---|
| Hydrocarbon Materials | Waste oils, waste fuel, lubricants, antifreeze | • Must be stored in tanks and storage containers above ground<br>• Must be kept free of water, stored in tightly sealed containers, and covered to protect from rainwater<br>• Must be disposed at an approved facility with appropriate authorizations<br>• Waste oil and antifreeze are included as part of product stewardship programs in Saskatchewan and recycling options exist<br>• Off-site disposal is likely required |
| Hydrocarbon Impacted Materials | Oil and fuel filters, spill pads, rags | • Treated similarly to hydrocarbon materials<br>• Must be disposed at an approved facility with appropriate authorizations |
| Hazardous Waste | Aerosols, batteries, cleaners, degreasers, mercury-containing items | • Depending on volumes, hazardous waste requires proper storage and permitting under *The Hazardous Substances and Waste Dangerous Goods Regulations* prior to final fate disposal, and proper transportation off-site under the *Transportation of Dangerous Goods Act and Regulations*<br>• Must be disposed at an approved facility with appropriate authorizations |
| Paints | Paint, primers, aerosol paint, empty containers | • Treated similarly to hazardous waste<br>• Paint must be in original container, tightly sealed with the labels affixed<br>• Different types of paint cannot be mixed together<br>• Must be disposed at an approved facility with appropriate authorizations |
| Biomedical Waste | Waste from first aid rooms (e.g., sharps, used bandages) | • Must be collected in designated, purpose-built containers, and transferred to an authorized off-site disposal facility |

## 4.3 Collection and Transport

Indoor receptacles and outdoor collection bins designed to limit wildlife attraction are used around the Project site in appropriate areas to collect recyclable and non-recyclable domestic and industrial waste. To the extent possible, receptacles and collection bins are designated for specific domestic and industrial waste types to segregate materials at the origin, minimize cross-contamination, and optimize domestic waste handling, processing, and disposal.

Full bins and storage containers are transferred to the conventional waste management area as described in section 4.4 for temporary staging, on-site processing (e.g., shredding, compacting), preparation for off-site disposal or recycling, or treatment in the non-LLRW incinerator as described in section 4.6.1. All waste is segregated according to classification and disposal option.

Hazardous waste transported off-site for recycling or disposal is packaged and transported in accordance with specifications provided in *The Hazardous Substances and Waste Dangerous Goods Regulations* and the *Transportation of Dangerous Goods Regulations*, respectively.

## 4.4 Storage

Conventional waste is primarily stored in the conventional waste management area, a designated waste management facility located southwest of the mill terrace. This area will house the non-LLRW waste incinerator and provide sufficient room for staging and processing (e.g., shredding, compacting) of conventional waste.

Waste is stored in compatible receptacles which are sized with sufficient storage capacity. Preference is for receptacles to be placed in locations that are easily accessible and as close to the waste source as possible.

Waste is stored in a manner that protects people and the environment with consideration for the following:

- chemical compatibility between different materials;
- access (e.g., sealed, locked);
- storage temperature;
- exposure to the elements (e.g., precipitation, wind);
- rate at which material deteriorates (e.g., metal rusting, cardboard getting wet);
- labelling requirements;
- reuse (e.g., returning material as inventory); and
- containment requirements.

Where required, waste receptacles are equipped with features to limit wildlife attraction and access. Adequate containment is provided in appropriate areas to temporarily store hazardous substances and waste dangerous goods.

Wastes are removed from storage as soon as practicable to limit accumulation and prevent uncontrolled discharge. Storage areas are monitored through regular inspections as described in the procedure *Conventional Waste Monitoring and Measurement*.

## 4.5 Handling

Waste is handled by workers that possess the necessary training and qualifications and using PPE, and equipment appropriate for the receptacle and waste type.

Waste is handled in accordance with safe handling practices described in applicable safety data sheets (SDSs). SDSs are made available to workers.

## 4.6 Treatment

Incineration is a waste treatment process of burning materials at temperatures high enough to destroy contaminants. Incineration can help reduce wildlife habituation and significantly reduces the volume of waste requiring management which optimizes the use of the space available for disposal.

As part of the multi-faceted approach to effectively managing conventional waste, the Project will include a 5-tonne batch incinerator located within a dedicated building to treat non-LLRW (i.e., domestic and industrial) and reduce volumes of combustible waste by more than 90% to a non-environmentally toxic residual ash that will be placed in 220 L metal drums and transferred underground for permanent disposal.

The timing for establishing the non-LLRW incinerator is driven by the availability of adequate off-site recycling and disposal options for conventional waste generated during the Construction phase. Establishing and operating a non-LLRW incinerator at the Project is contingent upon receiving applicable provincial and federal regulatory approvals.

### 4.6.1 Incineration

The incineration technology proposed for the Project uses a two-stage starved-air (i.e., pyrolytic-style) process to convert the waste into gas which is mixed with oxygen and exposed to high temperatures to complete the conversion process.

Prior to incineration, waste is segregated at the source and transferred to the conventional waste management area for temporary staging. Waste materials not suitable for incineration include:

- explosives;
- reactive, corrosive, and oxidizing materials;
- pressurized canisters (e.g., aerosol cans, fuel containers);
- materials with low flash points (e.g., solvents, paints);
- batteries;
- light bulbs (all types);
- electronics and electrical items; and
- chlorinated plastics.

Waste considered suitable for incineration may be processed (e.g., cut) to fit within the dimensions of the primary chamber (as required) and segregated (e.g., wood, plastics) to allow operators to selectively create a balanced mix for each batch with consideration for:

- heating value;
- moisture content;
- plastics content; and
- quantity by volume or weight.

Combustible waste is weighed to confirm loads are within capacity and placed in the incinerator.

The availability of suitable materials, staging area storage capacity, diversion and disposal management resources, and other site conditions (e.g., wind magnitude and direction) inform considerations for the timing for initiating the burn cycle.

Additional engineering details on incineration infrastructure are outlined in the *Rook I Mining and Milling Facility Description Manual*. Information on the operation and maintenance of the non-LLRW incinerator are described in the *Waste Incinerator Operating Manual.*

## 4.7 Diversion and Disposal

Diversion and disposal is the final stage of the waste management process during which material is sent to the final destination. Diversion includes reuse and recycling. Disposal is the permanent, indefinite, or long-term storage of waste.

Where possible, diversion is the preferred conventional waste management method. Other factors considered when selecting preferred conventional waste management strategies include:

- availability of facilities and service providers;
- feedback from engagement with local Indigenous groups and communities;
- cost;
- transportation logistics (e.g., backhauling);
- potential for effluents and emissions; and
- health, safety, and well-being of people and the environment.

Once underground mine development has advanced to the point where there is sufficient excess capacity, underground storage is the primary option for disposing of conventional waste from the Project.

Information on off-site diversion and disposal facilities and services is provided in Table 5.

Conventional waste transported off-site for diversion or disposal is packaged in accordance with applicable requirements and accompanied by the appropriate paperwork for tracking and record keeping.

Table 5: Information for Off-site Diversion and Disposal Facilities

| Facility | Materials Handled | Distance to Site | Fees[1] ($/tonne) | Contact Information |
|---|---|---|---|---|
| Northwest Regional Landfill (Meadow Lake) | Domestic and industrial waste (e.g., tires, appliances, clean cement, wood) | 488 km | $125 | Administrator<br>(780) 826-0497 |
| La Ronge Regional Landfill | Domestic waste (e.g., metals, clean wood) | 548 km | $120 | (306) 420-5492 |
| Material Recovery Facility<br>Landfill and Organics | Domestic recyclables (e.g., paper, carboard, household plastic) | 800 km | Varies by service | Loraas Disposal North<br>(306) 242-2300<br>Customer service@loraas.ca |
| SARCAN Recycling | Domestic recyclables (e.g., deposit beverage containers, electronics) | Multiple locations | No fee | Multiple locations |
| City of Prince Albert Landfill | Domestic and industrial waste (e.g., metal, yard waste) | 661 km | $154 | (306) 953-4900 |
| Call2Recycle | Consumer batteries | See website | See website | 1 (888) 224-9764<br>www.call2recycle.ca/saskatchewan |

| Facility | Materials Handled | Distance to Site | Fees[1] ($/tonne) | Contact Information |
|---|---|---|---|---|
| Hazardous Waste Facilities | Hazardous wastes | 800 km | Varies by service | GFL Saskatoon<br>(306) 244-9500 |
| Product Care Association of Canada | Hazardous wastes (e.g., paint, flammable, corrosive, toxic, environmentally hazardous) | See website | Varies by service | info@recyclesaskatchewan.ca<br>www.productcare.org/province/saskatchewan |

[1] Fees provided based on rates from 2022. Actual fees may vary depending on the type and quantity of waste.

### 4.7.1 Asset Disposition

Asset disposition is the process for permanently removing a physical asset from service or inventory in a controlled manner. Asset disposition includes checking inventory to verify obsolete spare parts are disposed and relevant maintenance strategies are removed or modified. If asset disposition constitutes a change as outlined in the IMS Manual, it is managed in accordance with the requirements outlined therein.

Final disposal of assets in a manner that protects people and the environment is outlined in the *Rook I Waste Management Program*. Off-site release of dispositioned assets is subject to clearance for off-site release requirements as outlined in the *Rook I Radiation Protection Program*. Asset disposition is outlined in the *Rook I Asset Management Program*.

# 5.0 Monitoring and Measurement

## 5.1 Measurement

Waste management measurement and reporting confirms that waste generation, handling, treatment, and disposal is completed correctly and that generated wastes are accounted for.

Tracking waste using the characteristics described in Table 6 is an important component of waste management. Waste data is centralized into a single database that includes, but is not limited to, information on:

- weight:
- volume;
- material types;
- densities;
- conversion factors (as required); and
- origin or final destination.

Additional information on conventional waste measurement is described in the conventional waste management procedure *Conventional Waste Monitoring and Measurement.*

Table 6: Waste Tracking System Characteristics

| Tracking System Characteristic | Description |
|---|---|
| Waste Types | • Tracking domestic and industrial waste separately is important as landfills in Saskatchewan have limits on the amount of industrial waste they can accept<br>• Categorizing waste by type and source helps to identify diversion opportunities |
| Waste Quantities | • Recording volume or weight-based data using scales or other processes (e.g., visual observation) at key points in the management process |

## 5.2 Monitoring

Monitoring activities include steps to check and observe the quality of waste management activities to verify conventional waste is effectively managed in a safe and appropriate manner. Monitoring includes routine inspections, tracking disposal trends, and identification of opportunities for improvement. Conventional waste management incidents and deviations are managed in accordance with the IMS Manual.

Additional information on conventional waste monitoring is described in the conventional waste management procedure *Conventional Waste Monitoring and Measurement.*

### 5.2.1 Discharge and Discovery Prevention and Management

General response requirements for unplanned discharges to air, land, groundwater, or surface water or the discovery of a historical discharge, are outlined in the *Rook I Environmental Protection Program.* This includes prevention measures and requirements for initial response (e.g., spill kit use), internal and external reporting, remediation, and disposal.

Discharges and discoveries that trigger emergency response are managed in accordance with the *Emergency Response Plan* or *Ground Transportation Emergency Response Plan* for on-site and off-site events, respectively.

### 5.2.2 Waste Assessments

Waste assessments are used to gather additional information about the conventional waste management system. Waste assessments may be performed to validate assumptions regarding waste composition, to measure waste diversion performance, or to evaluate the effectiveness of specific diversion initiatives.

The need for waste assessments is determined using professional judgement. Waste assessments may be performed by third-party service providers and are documented in accordance with the document management process outlined in the IMS Manual.

## 5.3 Audit and Inspection

Audits and inspections check compliance with internal and external reporting requirements specific to conventional waste management. Inspections are a set of regular activities to check and verify on-site compliance, including safety standards, working conditions, and other critical areas of the Project site. Audits are less frequent than regular monitoring and may need to be completed by a third party. Audits can also be used to verify internal reporting requirements.

Compliance with all relevant acts, regulations, permits, and licenses, as well as any other relevant Project guidelines, are monitored using:

- environmental inspections;

- environmental audits;
- communication with regulatory authorities (e.g., federal, provincial); and
- communication with waste consultants and service providers.

Deviations, instances of regulatory noncompliance, and opportunities for improvement and adaptive management identified through inspections, audits, and reviews are managed as outlined in the IMS Manual.

## 5.4 Service Provider Audits

Vendors performing conventional waste management services on behalf of the Project are verified through service provider audits. Service provider audits are planned and performed as required to confirm the acceptability of the service provider's management system and to verify processes are effective for providing conventional waste management services that comply with Project and regulatory requirements. Service provider audits delegated to a third party are reviewed by NexGen to verify the results are acceptable.

Information demonstrating service providers have conformed to Project-specific criteria (including initiatives to support local service providers) is documented. Service provider selection and award is based upon the continued approval of the service provider capability and the ability of the service provider to meet the purchasing requirements within budgetary considerations.

The process for performing service provider audits is outlined in the IMS Manual.

## 5.5 Plan Maintenance and Review

The Plan is subject to periodic review and update to confirm compliance with regulations, permits, and relevant legislation in accordance with requirements outlined in the IMS Manual.

# 6.0 References

## 6.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |
| ROOK-ENG-MAN-00001 | *Rook I Mining and Milling Facility Description Manual* |
| ROOK-CON-PGM-00001 | *Rook I Contractor Management Program* |
| ROOK-AST-PGM-00001 | *Rook I Asset Management Program* |
| ROOK-TRN-PGM-00001 | *Rook I Training Program* |
| ROOK-RAD-PGM-00001 | *Rook I Radiation Protection Program* |
| ROOK-ENV-PGM-00001 | *Rook I Environmental Protection Program* |
| ROOK-EMG-PLN-00001 | *Emergency Response Plan* |
| ROOK-EMG-PLN-00002 | *Ground Transportation Emergency Response Plan* |
| ROOK-WST-PGM-00001 | *Rook I Waste Management Program* |
| ROOK-WST-PLN-00002 | *Site Water Management Plan* |
| ROOK-WST-PLN-00001 | *Mine Waste Management Plan* |
| ROOK-WST-MAN-00001 | *Waste Incinerator Operating Manual* |

| Document Number | Document Title |
| --- | --- |
| ROOK-WST-PRO-00009 | *Conventional Waste Monitoring and Measurement* |

## 6.2 External

- Federal
  - *Nuclear Safety and Control Act*
  - *REGDOC 2.11.1, Waste Management, Volume I: Management of Radioactive Waste*
  - *Transportation of Dangerous Goods Act and Regulations*
- Provincial
  - *The Environment Management and Protection Act, 2010*
  - *The Hazardous Substances and Waste Dangerous Goods Regulations*
  - *The Mines Regulations, 2018*
  - Government of Saskatchewan. *Solid Waste Management Strategy*. January 2020.
- Other
  - *CanNorth (Canada North Environmental Services). 2022. NexGen Rook I Project Baseline Gamma Radiation Survey. Draft Report – Revision 1. December 2022. 234 p.*
  - *SRK (SRK Consulting). 2023. Rook I Project – Geochemical Characterization of Waste Rock. Final Report – January 2023*

# Preliminary Decommissioning and Reclamation Plan
# ROOK-DEC-PLN-00001

NexGen Energy Ltd.

# Rook I Project

## Preliminary Decommissioning and Reclamation Plan

ROOK-DEC-PLN-00001

March 2025

# Record of Revisions

| Version No. | Date | Description | Originator | Reviewer | Approver |
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| 0 | 29-Jun-2023 | Final | J. Henderson | K. Oakes<br>K. Small<br>J. Cooper<br>A. Swerhone<br>N. Espenberg | L. Moger |
| 1 | 31-Mar-2025 | Final | J. Margeson | L. Moger<br>C. Copley<br>J. Henderson<br>J. Cooper | G. Johnson |

# Executive Summary

This *Rook I Preliminary Decommissioning and Reclamation Plan* (Plan) provides a conceptual overview of the proposed decommissioning and reclamation objectives, criteria, methods, and monitoring requirements for the NexGen Energy Ltd. (NexGen) Rook I Project (Project), a proposed uranium ore processing operation located adjacent to Patterson Lake in northern Saskatchewan. The anticipated life cycle of the Project is 43 years and includes Construction, Operations, and Decommissioning and Reclamation (i.e., Closure) phases.

The proposed Project is subject to both provincial and federal environmental assessment processes, would be licensed as a nuclear facility by the Canadian Nuclear Safety Commission (CNSC), and would be subject to various provincial and federal permits and approvals. Consistent with the provincial requirements for a uranium mine, this Plan is based on a "decommission-tomorrow by a third-party scenario" (Government of Saskatchewan 2008). As such, this document includes facilities planned to the end of the site preparation, construction, and commissioning (i.e., Construction) phase of the Project. Federally, the development of a preliminary decommissioning plan is required during the siting phase of a Class I nuclear facility and uranium mine and mill (CNSC 2021). This Plan will be periodically updated to reflect the most up-to-date information, and at minimum every five years throughout the Project life cycle. The next iteration of this Plan is anticipated in advance of the transition of the Project from the Construction phase to the Operations phase.

This Plan aligns with and meets applicable requirements included in:

- *The Mineral Industry Environmental Protection Regulations, 1996*;
- *Northern Mine Decommissioning and Reclamation Guidelines,* EPB 381 (Government of Saskatchewan 2008);
- *The Mines Regulations, 2018*;
- *Metal and Diamond Mining Effluent Regulations*;
- *Environmental Code of Practice for Metal Mines* (Environment Canada 2009);
- *Uranium Mines and Mills Regulations*;
- *REGDOC-2.11.2, Decommissioning*; and
- *Canadian Standards Association (CSA) N294:19. Decommissioning of facilities containing nuclear substances*.

This Plan reflects NexGen's commitment to progressive reclamation and to designing, constructing, and operating for responsible closure by considering industry best practices and incorporating feedback received from local Indigenous groups and communities. Decommissioning and reclamation of the Project addresses requirements associated with the provincial and federal legislation and fulfills Saskatchewan's long-term Institutional Control Program requirements with no, or minimal, maintenance post-closure (Government of Saskatchewan 2025).

The decommissioning and reclamation objectives for the Project are to establish a closure landscape that is:

- geotechnically, geochemically, and radiologically stable and remains stable under a natural disturbance regime typical for the Project location;
- capable of supporting a functioning, self-sustaining ecosystem with diverse fish and wildlife habitats and that is safe for human use; retains the landscape and its function as designed over time; and requires no, or minimal, maintenance post-closure;
- accessible for unrestricted traditional use by local Indigenous groups and communities; and

- integrated with the adjacent natural landforms and drainage systems in the Patterson Lake watershed (i.e., has a natural appearance).

Criteria would be developed for each objective prior to reclamation implementation. Reclamation criteria may:

- be site-specific;
- be adopted from provincial or federal standards or through engagement activities;
- be narrative statements;
- be numerical values;
- contain a temporal aspect; and
- include one or more indicators or attributes.

Reclamation criteria would be selected to be meaningful, measurable, and achievable. Reclamation criteria may be adjusted over time as new information is acquired. The *Detailed Decommissioning and Reclamation Plan* would include final criteria to establish how decommissioning and reclamation is determined to be successful.

NexGen is currently estimating that the Active Closure stage at the end of the Construction phase would last for 2 years following cessation of site activities and be followed by an approximate 10-year Transitional Monitoring stage. Monitoring would confirm the success of the decommissioning and reclamation activities and demonstrate the Project site is in a stable or improving condition. Once this is demonstrated, NexGen would return the land to the Government of Saskatchewan under the Institutional Control Program with no long-term control measures anticipated.

Sufficient detail is included herein to confirm that this Plan reflects a technically and financially feasible approach to decommissioning and reclamation that protects health, safety, security, and the environment. This Plan informs the basis for establishing the financial guarantee required to cover costs associated with the Active Closure stage, Transitional Monitoring stage, and participation in the Institutional Control Program which is further described in the *Rook I Preliminary Decommissioning and Reclamation Cost Estimate*. Additionally, it provides the structural outline for both future required updates to this Plan and the *Detailed Decommissioning and Reclamation Plan* that would be developed prior to cessation of the Operations phase and transition to the Active Closure stage.

# Abbreviations and Units of Measure

| Acronym | Term |
|---|---|
| ALARA | as low as reasonably achievable |
| CNSC | Canadian Nuclear Safety Commission |
| ICR | Institutional Control Registry |
| IMS | Integrated Management System |
| NexGen | NexGen Energy Ltd. |
| NPAG | non-potentially acid generating |
| PAG | potentially acid generating |
| PE | planning envelope |
| Plan | Rook I Preliminary Decommissioning and Reclamation Plan |
| Project | Rook I Project |
| SWR | special waste rock |
| UGTMF | underground tailings management facility |
| WRSA | waste rock storage area |

| Unit | Definition |
|---|---|
| km | kilometre |
| m | metre |
| $m^2$ | square metre |
| $m^3$ | cubic metre |
| μS/hr | micro sieverts per hour |
| Bq/g | becquerels per gram |

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# 1 Introduction

The NexGen Energy Ltd. (NexGen) Rook I Project (Project) is a proposed uranium mining and milling operation located in northwestern Saskatchewan within the southern Athabasca Basin adjacent to Patterson Lake, and along the upper Clearwater River system (Figure 1). The proposed Project resides within Treaty 8 territory and the Métis Homeland. Access to the Project site is from an existing 13 km road off Highway 955.

The Project, which is 100% owned by NexGen, includes facilities to support the extraction and processing of uranium ore from the Arrow deposit, a land-based, basement-hosted, high-grade uranium deposit. The anticipated life cycle of the Project is 43 years and includes Construction, Operations, and Decommissioning and Reclamation (i.e., Closure) phases. The Closure phase would consist of an Active Closure stage followed by a Transitional Monitoring stage.

This *Rook I Preliminary Decommissioning and Reclamation Plan* (Plan) provides a conceptual overview of the proposed decommissioning and reclamation objectives, criteria, methods, and monitoring requirements for the Project at the end of the Construction phase.

This Plan reflects NexGen's commitment to progressive reclamation and to designing, constructing, and operating for responsible closure by considering industry best practices and incorporating feedback received from local Indigenous groups and communities. NexGen's intent is to leave areas disturbed by Project activities in a condition that is free from access restrictions, safe for traditional land use, and in an ecological condition that is functional and integrates with the surrounding physical and biological environment. Decommissioning and reclamation of the Project addresses requirements associated with the provincial and federal legislation described in section 1.1 and fulfills Saskatchewan's long-term Institutional Control Program requirements with no, or minimal, maintenance post-closure (Government of Saskatchewan 2025).

Sufficient detail is included herein to confirm this Plan reflects a technically and financially feasible approach that protects health, safety, security, and the environment. This Plan informs the basis for establishing the financial guarantee required to cover costs associated with the Active Closure stage, Transitional Monitoring stage, and participation in the Institutional Control Program as described in the *Rook I Preliminary Decommissioning and Reclamation Cost Estimate*. Additionally, it provides the structural outline for future required updates to this Plan and the *Detailed Decommissioning and Reclamation Plan* that would be developed prior to cessation of the Operations phase and transition to the Active Closure stage.

Consistent with the provincial requirements for a uranium mine, this Plan is based on a "decommission-tomorrow by a third-party scenario" (Government of Saskatchewan 2008). As such, this document includes facilities planned to the end of the Construction phase. This Plan will be periodically updated to reflect the most up-to-date information, and at minimum every five years throughout the Project life cycle. The next iteration of this Plan is anticipated in advance of the transition of the Project from the Construction phase to the Operations phase.

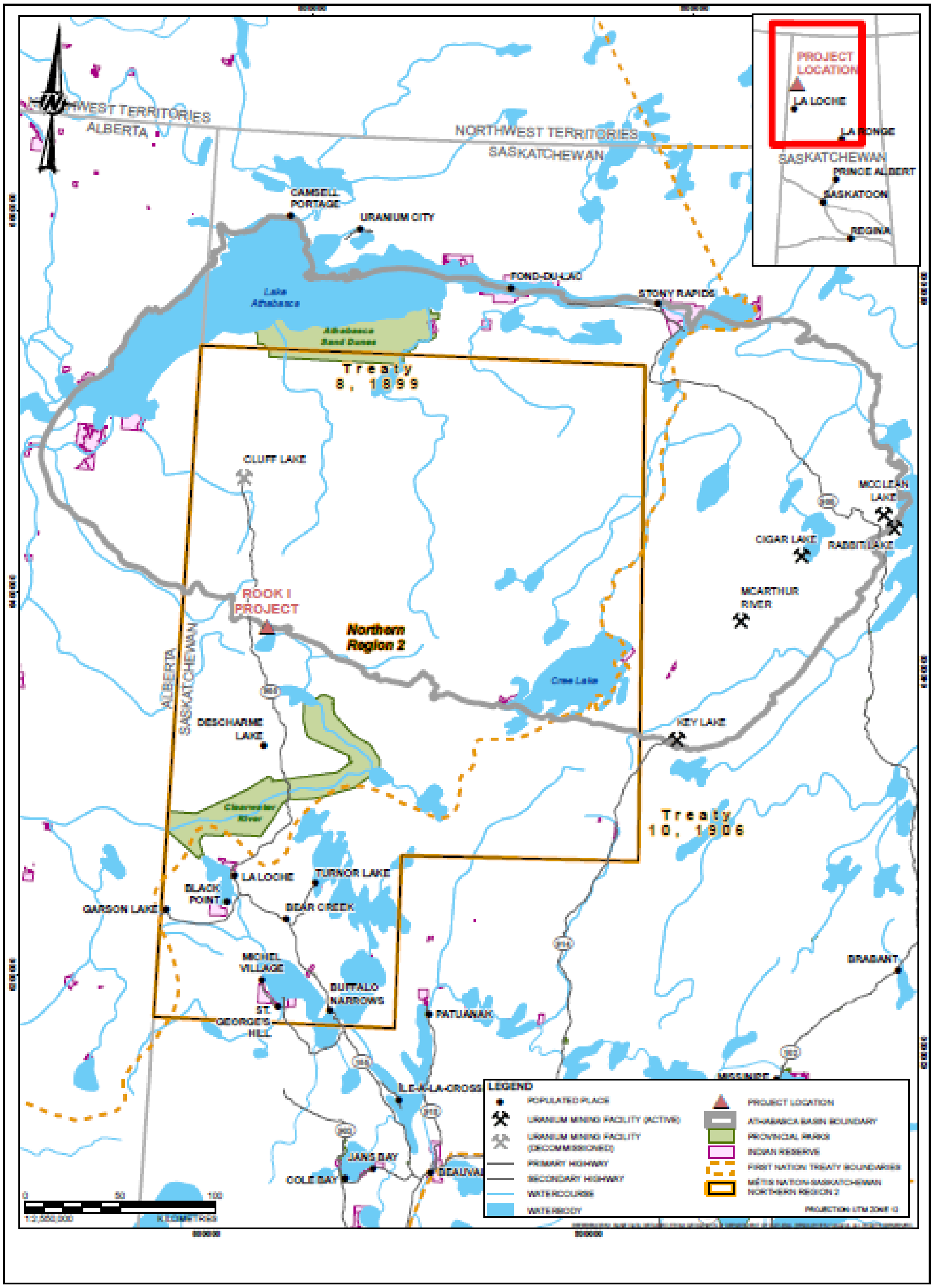


Figure 1: Location of the Rook I Project

## 1.1 Purpose

This Plan provides a conceptual overview of the strategy for decommissioning and reclaiming the Project, including:

- a roadmap for progressive decommissioning and reclamation throughout the Project life cycle;
- anticipated post-operational conditions;
- radiological and environmental monitoring and survey commitments; and
- the basis for the cost estimate and value of the financial guarantee required as outlined in the *Rook I Preliminary Decommissioning and Reclamation Cost Estimate.*

The decommissioning and reclamation methods outlined in this Plan reflect NexGen's commitment to protect and promote the health, safety, and well-being of people and the environment, and feedback received from local Indigenous groups and communities. This Plan also incorporates the measures required to assess and, if required, mitigate the environmental impacts identified in the *Rook I Environmental Impact Statement* and reclaim disturbed areas to the targeted end land uses.

This Plan is periodically re-evaluated throughout the Project life cycle to incorporate best available information and feedback from ongoing engagement with local Indigenous groups, communities, and the public. Planning for decommissioning and reclamation throughout the life of the Project assists in:

- Planning a decommissioning strategy for the Project that is technically feasible and protects health, safety, security, and the environment.
- Identifying potentially difficult or challenging technical issues early so that solutions can be pursued in a proactive manner.
- Designing and operating the Project in a manner that facilitates decommissioning (e.g., designing facilities and systems to mitigate the spread of radiological contamination, underground storage of tailings and construction of the potentially acid generating [PAG] waste rock storage area [WRSA] at final 4H:1V design slopes that helps facilitate progressive reclamation and the assessment of the decommissioning and reclamation process during the Operations phase).
- Allowing for continual improvement and/or adaptative management to adjust decommissioning and reclamation processes to incorporate new learnings, requirements, and practices.
- Estimating the quantities, types, and classes of waste that would be generated during decommissioning so appropriate management plans and cost estimates can be developed as part of the *Rook I Preliminary Decommissioning and Reclamation Cost Estimate*.

This Plan aligns with and meets applicable requirements of the references outlined in section 12 including:

- *The Mineral Industry Environmental Protection Regulations*, *1996*;
- *Northern Mine Decommissioning and Reclamation Guidelines*, EPB 381 (Government of Saskatchewan 2008);
- *The Mines Regulations*, *2018*;
- *Metal and Diamond Mining Effluent Regulations*;
- *Environmental Code of Practice for Metal Mines* (Environment Canada 2009);
- *Uranium Mines and Mills Regulations*;
- *REGDOC-2.11.2, Decommissioning*; and

- *Canadian Standards Association (CSA) N294:19. Decommissioning of facilities containing nuclear substances.*

## 1.2 Scope

This Plan documents the preliminary decommissioning and reclamation strategy for the Construction phase of the Project (section 1.4). It is based on a “decommission-tomorrow by a third-party scenario” (Government of Saskatchewan 2008); as such, this document takes into account the current stage of disturbance at the site, as well as any facilities planned to the end of the Construction phase.

Topics covered in this Plan include:

- ongoing management and implementation of this Plan;
- shut-down, demolition, and removal of site facilities and infrastructure;
- landform design, reclamation material management, and revegetation; and
- planned monitoring activities in the local and regional environment.

Environmental monitoring would continue to be completed post-decommissioning and reclamation to confirm that closure objectives have been met, the Project site is safe and stable, and that ecological conditions are appropriate to return the land to the Government of Saskatchewan under the Institutional Control Program.

The mining of uranium ore, the production of uranium concentrate, and the generation of tailings are not within the scope of the Construction phase of the Project; however, the decommissioning strategies described herein account for the potential to encounter mineralization and for maintaining effective decommissioning and reclamation measures throughout the Project life cycle.

This Plan and the *Rook I Preliminary Decommissioning and Reclamation Cost Estimate* are subject to periodic review and would be revised as required to reflect the measures and costs necessary to safely decommission radiologically contaminated facilities.

## 1.3 Terminology

Terminology introduced in this Plan is provided below. A comprehensive list of common terms applicable to this Plan is available in the *Rook I Project Glossary*:

- **closure** – To decommission, remediate, and reclaim a mine and plant site, with the ultimate goal of returning the land to the Crown.
- **closure phase** – Refers to the Decommissioning and Reclamation phase for the Project, which includes the Active Closure stage and Transitional Monitoring stage.
- **decommissioning** – To remove or retire permanently from service or take any action to remove or retire all or part of a mining site as outlined in *The Mineral Industry Environmental Protection Regulations, 1996*.
- **Indigenous knowledge** – The unique and collective knowledge of Indigenous Peoples that has been built up over time and passed on through generations of living in close contact with the land and natural environment.
- **integrated management system (IMS)** – A common framework of programs, plans, procedures, work instructions, and other supporting documentation describing management system processes for achieving Project objectives and completing work safety, reliably, and consistently while conforming to internal requirements and complying with legal requirements.
- **local knowledge** – The knowledge of local people who may or may not be Indigenous and who hold knowledge that is based on personal and collective experiences of their local environments over time, without necessarily having generational connections to a place. Represents information from a local citizen

or representative, but without local Indigenous group/Elder sanction, and is therefore not considered Indigenous knowledge.

- **non-potentially acid generating (NPAG)** – Mine rock with less than 0.03% triuranium octoxide ($U_3O_8$) and less than 0.1% sulphur.
- **planning envelope** – A definable part or area of a facility that is sufficiently removed from, or otherwise independent of, other parts or areas so that the strategic approach to decommissioning that part or area may be planned in a relatively independent manner. (Canadian Nuclear Safety Commission).
- **potentially acid generating (PAG)** – Mine rock with less than 0.03% $U_3O_8$ and greater than or equal to 0.1% sulphur.
- **project site** – Term used to describe all property within the physical NexGen Rook I boundary.
- **reclaim** – To rehabilitate all or part of the land, water, or watercourses used or disturbed by the construction or operation of a pollutant control facility, mine, or mill (*The Mineral Industry Environmental Protection Regulations, 1996*).

## 1.4 Life Cycle Decommissioning and Reclamation Planning

Life cycle decommissioning and reclamation planning is founded on the understanding that considerations and practices for safe and reliable closure begin at Project planning and are regularly reviewed and updated until the Project has been fully decommissioned and reclaimed and the Project site transferred back to the Government of Saskatchewan. Life cycle decommissioning and reclamation planning is an effective approach to:

- limit risks;
- control costs;
- maintain integrity;
- engage with local land users; and
- continually improve decommissioning and reclamation practices.

An overview of the phases for the full life cycle of the Project and the anticipated duration of each is provided in Table 1 for context. The scope of this Plan is based on a “decommission-tomorrow by a third-party scenario” during the Construction phase. The approximate timeline for Active Closure is further described in section 11.

By planning for responsible mine closure early in the Project life cycle, resources are protected (e.g., soil salvage), progressive reclamation is completed (where feasible), research and monitoring are conducted to allow for improved processes, and engagement is undertaken to help build a collaborative relationship and maximize benefits of the Project to all parties. This approach results in the integration of decommissioning and reclamation considerations into Project design and a Plan that facilitates the protection and preservation of the environment through the Project life cycle and for future generations.

This Plan has been developed using best available information regarding the Project setting; planned Project facilities, systems, and components; and fit-for-purpose decommissioning and reclamation practices, and technologies. This Plan and associated cost estimates will be reviewed, updated, and submitted for regulatory approval throughout the Project life cycle at a minimum of every five years. Updates would be completed sooner if there are material changes to the Project. Iterations of this Plan will be included in applications for provincial authorizations and Canadian Nuclear Safety Commission (CNSC) licence related to construction, operation, and decommissioning of the Project.

When the Project is nearing the end of its operational life, a *Detailed Decommissioning and Reclamation Plan* would be prepared as part of the application to the Saskatchewan Ministry of Environment and CNSC for decommissioning approval. The detailed plan would provide similar information as this Plan, but with greater operational detail that incorporates information gathered through Project activities up to that time.

Following the Active Closure stage, the Transitional Monitoring stage is expected to last for approximately 10 years (pending achievement of success criteria) prior to returning the land to the Government of Saskatchewan under the Institutional Control Program. This Plan informs the basis for establishing the financial guarantee required to cover costs associated with Active Closure stage, Transitional Monitoring stage, and participation in the Institutional Control Program which is further described in the *Rook I Preliminary Decommissioning and Reclamation Cost Estimate*.

The decommissioning and reclamation planning management life cycle framework is illustrated in Figure 2.

Table 1: Rook I Project Phases

| Phase/Stage | | Description | Estimated Duration (years) |
|---|---|---|---|
| Construction Phase | | Includes site preparation; mine, process plant, and additional infrastructure development; transportation of people and materials to and from the Project; and all activities associated with commissioning the Project up until the Operations phase commences. | 4[a] |
| Operations Phase | | Includes all activities associated with mining and processing ore; tailings management; management of mine rock, domestic waste, and hazardous materials; water management; release of treated effluent; surface storage of clean material; site maintenance; progressive reclamation; and transportation of workers and materials to and from the Project. | 24 |
| Decommissioning and Reclamation Phase | Active Closure Stage | Includes maintaining the site in a safe inactive state while regulatory approvals are obtained and performing active decommissioning and reclamation activities that occur post-Operations such as backfilling mine workings, removal of physical infrastructure, recontouring and revegetating disturbed areas, waste disposal or removal, and any other activities required to achieve decommissioning objectives and to return the site to a safe and stable condition prior to Transitional Monitoring. | 2[b] |
| | Transitional Monitoring Stage | Includes site inspections, environmental monitoring, and reporting until results verify that the success criteria have been met. Once success criteria have been fully demonstrated, an application to be released from the Saskatchewan Ministry of Environment approval and Canadian Nuclear Safety Commission licence would be submitted, and upon approval, the land would be transferred back to the Government of Saskatchewan under provincial management through the Institutional Control Program. | 10[c] |

a) This Plan is based on a “decommission-tomorrow by a third-party scenario” (Government of Saskatchewan 2008) at the end of the Construction phase.

b) The Active Closure stage for the post-Construction scenario is estimated as 2 years. The Active Closure stage for the post-Operations scenario is estimated as 5 years.

c) Actual duration depends on achieving success criteria.

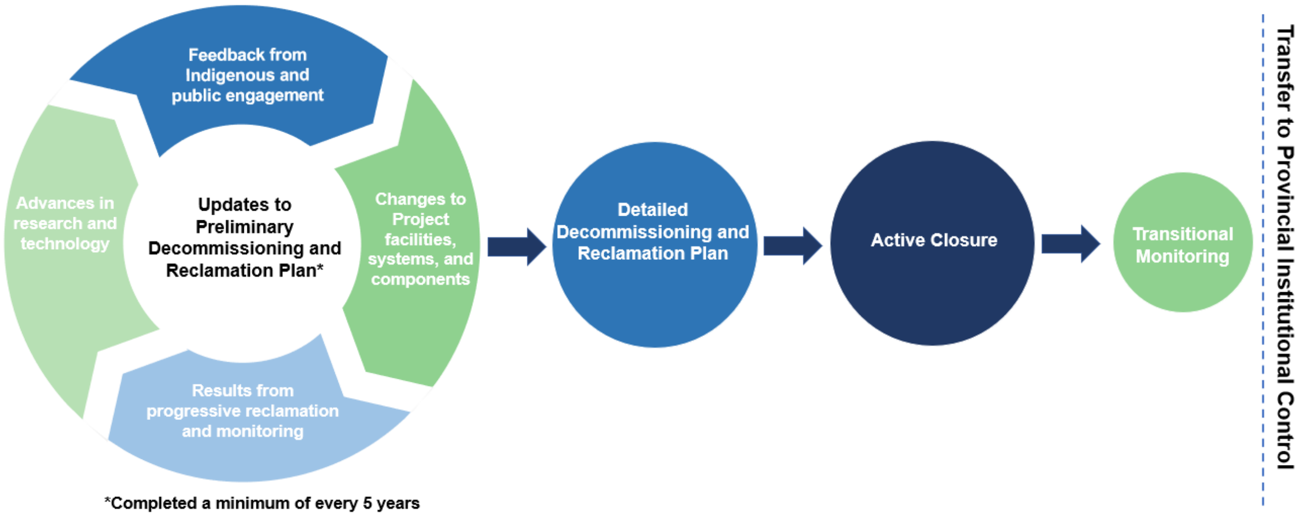


Figure 2: Life Cycle Decommissioning and Reclamation Planning

## 1.5 Plan Framework

This Plan is part of a hierarchy of interrelated documents that support applications for provincial authorizations and a CNSC licence for the Project (Figure 3), which include the *Rook I Environmental Impact Statement*, Rook I Integrated Management System (IMS) documentation, and the *Rook I Mining and Milling Facility Description Manual*.

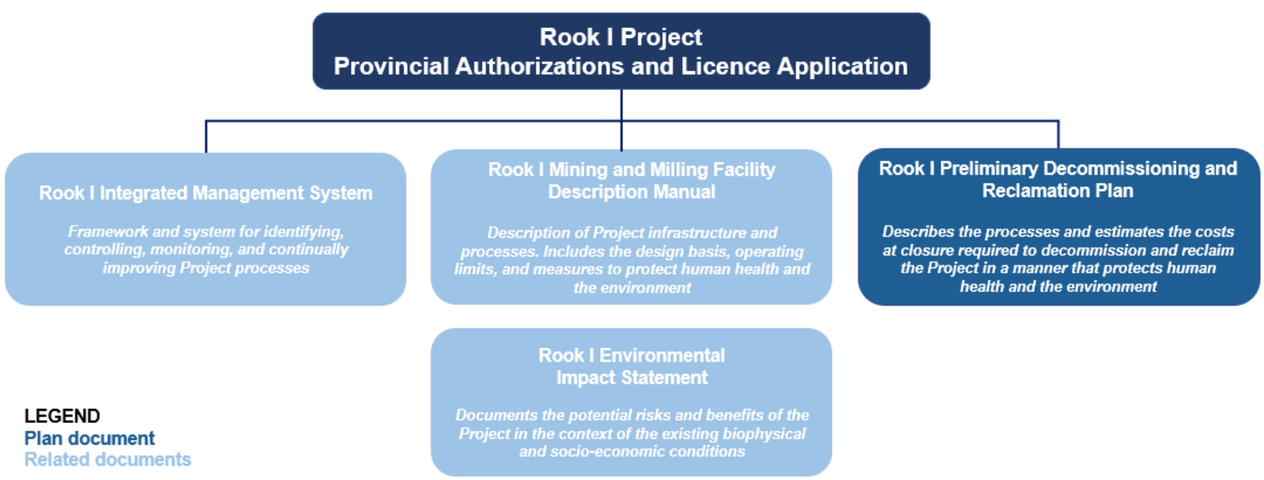


Figure 3: Overarching Rook I Project Provincial Authorization and Licence Application Document Hierarchy

The *Rook I Environmental Impact Statement* documents the potential adverse effects and benefits of the Project in the context of the existing biophysical and socio-economic conditions. The *Rook I Environmental Impact Statement* considers a number of components and factors, including baseline studies used to characterize the existing environment, Indigenous and local knowledge, effects predictions, residual effects classification and determination of significance to valued components, and recommendations for monitoring and follow-up programs to verify predicted effects or address uncertainties. This Plan incorporates the measures required to mitigate the potential environmental effects identified in the *Rook I Environmental Impact Statement* and reclaim disturbed areas to target end land uses.

The IMS outlines the management system policy, programs, and processes that provide a common framework for performing Project activities, including processes for implementing compliance measures, enabling continual improvement, and fostering a culture in which protecting the health and safety of workers and protecting the environment are principal considerations guiding decisions and actions. The use of management system processes during decommissioning and reclamation are described further in sections 8 and 9.

The IMS consists of the program-level documents and supporting documentation that are organized into categories that reflect the CNSC safety and control areas and other matters of regulatory interest as shown in Figure 4. The program-level documents shown in Figure 4 are closely integrated into the decommissioning and reclamation planning process as referenced throughout this Plan. Programs and supporting processes would be modified, as appropriate, and continue to be applied during the Active Closure stage and Transitional Monitoring stage to maintain protection of human health and safety and the environment as described in section 9.

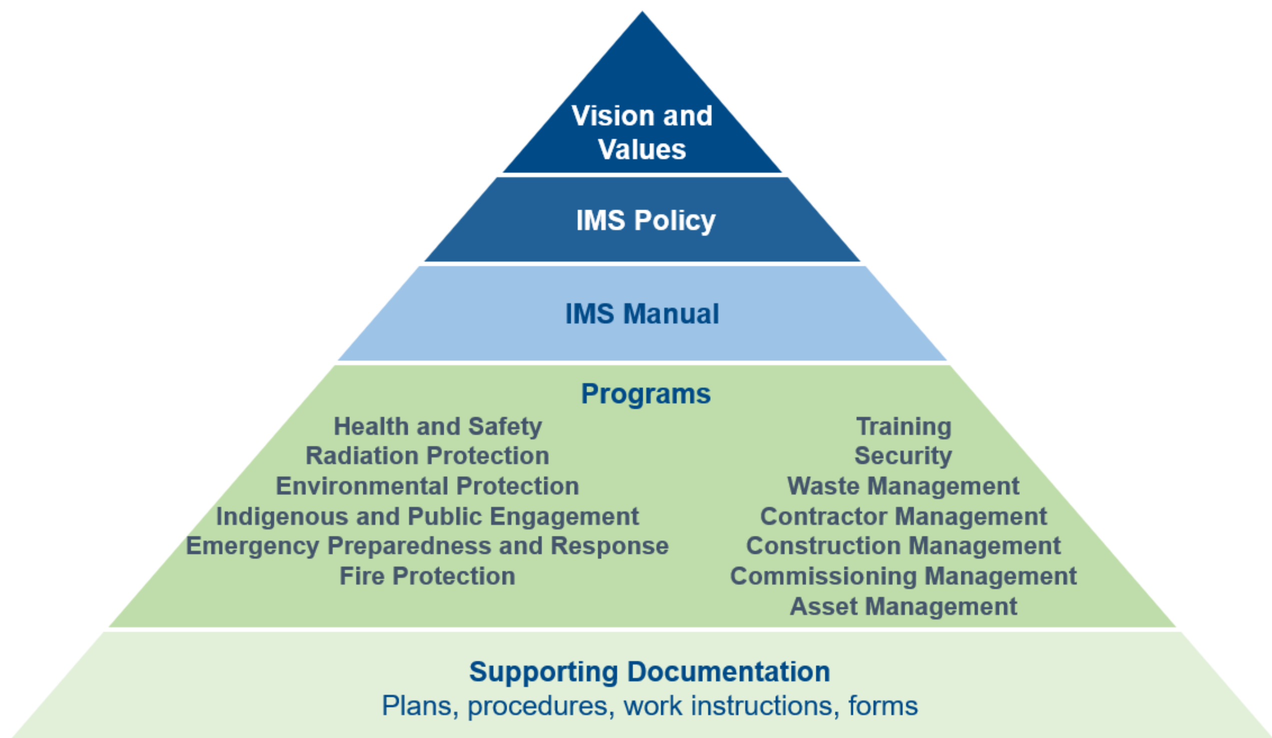


Figure 4: Rook I Integrated Management System Framework

The *Rook I Mining and Milling Facility Description Manual* describes the facilities, systems, components, and processes that would be used to carry out the licensed activities for the Project. The *Rook I Mining and Milling Facility Description Manual* documents design bases and provides an overview of the expected operating performance and mitigation and control measures important to protect worker health and safety and the environment.

# 2 Plan Development

NexGen recognizes the importance of safe, secure, and environmentally responsible mine closure to protect people and the environment. By embracing the application of technology and best practices and through engagement with local Indigenous groups and communities, employees, and other stakeholders, NexGen is focussed on achieving excellence in all aspects of the Project, including decommissioning and reclamation. These themes have been incorporated into the development of this Plan and Project decommissioning and reclamation planning more broadly.

By planning for responsible mine closure early in the Project life and maintaining a life cycle decommissioning and reclamation approach, decommissioning and reclamation considerations are integrated into Project design, and decommissioning and reclamation planning facilitates the protection and preservation of the environment throughout the Project life cycle and for future generations.

## 2.1 Objectives

Decommissioning and reclamation objectives are used to outline the targets towards which mine closure efforts are directed. The decommissioning and reclamation objectives are to establish a closure landscape that is:

- geotechnically, geochemically, and radiologically stable, and remains stable under a natural disturbance regime typical for the Project location;
- capable of supporting a functioning, self-sustaining ecosystem with diverse fish and wildlife habitats and that is safe for human use; retains the landscape and its function as designed over time; and requires no, or minimal, maintenance post-closure;
- accessible for unrestricted traditional use by local Indigenous groups and communities; and
- integrated with the adjacent natural landforms and drainage systems in the Patterson Lake watershed and has a natural appearance.

The returning land use objective of the Project site throughout the Project life cycle would be to leave all areas that were disturbed during Project activities safe for traditional land uses and in an ecological condition that is consistent with the surrounding physical and biological environment (Government of Saskatchewan 2008), with no, or minimal, maintenance post-closure and no long-term control measures. Specific returning land use objectives and criteria would be established following a systematic approach that accounts for site-specific characteristics and conditions and feedback from engagement with local Indigenous groups and communities. Final returning land use objectives and criteria would be documented in the *Detailed Decommissioning and Reclamation Plan* prior to initiation of the Active Closure stage.

### 2.1.1 Returning Land Use Planning

Returning land use planning represents the identification of preferred returning land uses and establishment of strategies to achieve preferred returning land uses with consideration for local ecosystems and habitat types based on landforms, substrates, and moisture regimes. The returning land use planning process includes engaging and collaborating with local Indigenous groups and communities to identify the various possible uses of the Project landscape after it has been decommissioned and reclaimed.

It is understood that returning land uses envelop a multitude of values beyond ecological conditions and that a single piece of land may be used for multiple uses at any point in time (e.g., traditional land use, recreation, wildlife habitat). Land uses change over time as reclaimed ecosystems mature and undergo a natural disturbance regime (e.g., fires, insect outbreaks, droughts, floods, windstorms).

Additional information on returning land using planning for the Project is outlined in the *Rook I Returning Land Use Plan.*

## 2.2 Criteria

Decommissioning and reclamation criteria are used to evaluate whether objectives have been met and if reclamation can be deemed successful. Criteria would be developed for each objective prior to reclamation implementation. Reclamation criteria may:

- be site-specific;
- be developed through Indigenous and public engagement;
- be adopted from provincial or federal standards;
- be narrative statements;
- be numerical values;
- contain a temporal aspect; and/or
- include one or more indicators or attributes.

Reclamation criteria would be selected to be meaningful, measurable, and achievable. Reclamation criteria may be adjusted over time as new information is acquired. Criteria would take into consideration the components of the *Rook I Environmental Protection Program,* such as activities completed under the *Environmental Monitoring Plan* and *Effluent and Emissions Plan*, to make use of available programs and monitoring results. The *Detailed Decommissioning and Reclamation Plan* would include final criteria to determine how decommissioning and reclamation is determined to be successful.

## 2.3 Indigenous and Public Engagement

NexGen's goal is to leave lasting benefits to local Indigenous groups and communities well beyond the Closure phase. NexGen recognizes the unique relationship that local Indigenous groups and communities have with the environment and the importance of fostering trusting relationships that facilitate collaboration and maximize benefits of the Project beyond the Project life cycle. Advancing design for the Project incorporates a life cycle planning approach in consideration of current and future generations, and in recognition of the role that Indigenous and local knowledge has in guiding aspects of decision making throughout the Project life cycle.

The proposed Project has been designed to promote high levels of environmental performance and incorporate best practices of minimalistic surface expression, progressive reclamation, and advanced closure management design. Knowledge of community values, commitment to high standards, and understanding of lessons learned from other mining operations led to key early design decisions being incorporated into the Project. Identification, presentation, and due consideration of local Indigenous groups' input through the early and ongoing engagement processes has validated, informed, and influenced aspects of Project design. These aspects include the deposition of all tailings underground, minimization of the total site disturbance footprint, optimization of water management strategies and infrastructure, and commitment to fund and support independent Indigenous Monitors for opportunities to participate in Project environmental monitoring programs through all Project phases. The *Rook I Environmental Impact Statement* provides further detail on the influence of Indigenous and local knowledge on the Project design.

As NexGen has proceeded through the regulatory process and advanced development of the Project, engagement activities have evolved as necessary to provide local Indigenous groups and communities opportunities for effective information exchange and dialogue specific to each stage of the Project. Returning land use planning has represented a specific topic of meetings with local Indigenous groups and the importance of traditional land use to local Indigenous groups and communities has been communicated to NexGen during these and broader Project engagement activities. Local Indigenous groups have indicated that the continued ability to pursue traditional activities is important for the preservation of culture, as is the ability to safely use the land after Closure.

Indigenous and local knowledge has been and will continue to be integrated into Project design and reclamation planning, including returning a reclaimed landscape that allows for the exercise of Treaty Rights and traditional land use. Further opportunities will be offered to local Indigenous groups to provide input, feedback, and Indigenous and local knowledge regarding returning land use planning. NexGen's commitment and approach to effectively sharing information and receiving feedback from local Indigenous groups, local communities, and the public on Project-related topics such as decommissioning and reclamation, is outlined in the *Rook I Indigenous and Public Engagement Program*.

Feedback has been and will continue to be documented, tracked, and used to inform updates to decommissioning and reclamation planning documents throughout the Project life cycle.

## 2.4 Uncertainty

The proposed decommissioning and reclamation objectives, methods, and measures described within this Plan are based on best available conservative information and predictions (CNSC 2021) and are sufficiently detailed to confirm that the approach is technically feasible and adequate to:

- achieve the decommissioning and reclamation objectives;
- protect worker and public health and safety;
- protect the environment;
- maintain security; and
- accurately estimate costs.

At this phase of Project development, uncertainties related to Project decommissioning and reclamation include:

- developing and meeting a set of reclamation criteria for successful revegetation, particularly on the WRSAs, when challenged with nutrient-poor soils that exhibit poor water-holding capacity; and
- establishing vegetation communities required to support local wildlife populations on reclaimed landscapes.

This uncertainty is mitigated through the application of adaptive management which is a rigorous and systematic approach to learning from experience to address uncertainties, gain knowledge, adapt planning, and improve confidence in reclamation success.

Adaptive management consists of the following steps:

- assess: formulate the problem;
- design: develop a solution to address the problem;
- implement: put the solution(s) into practice;
- monitor: collect information to understand outcomes and impacts;
- evaluate: compare monitoring results against established criteria; and

- adjust: modify decisions with consideration for results.

Adaptive management is supplemental and complementary to the continual improvement processes outlined in the *Rook I Integrated Management System Manual*. The process for determining when, how, and where adaptive management should be used is further described in the *Rook I Integrated Management System Manual*.

## 2.5 Contingencies

The Project is not likely to pose any significant issues related to decommissioning or reclamation because of the:

- modern protection measures integrated in the design of the Project (e.g., storage of all tailings underground);
- use of proven technology (e.g., design and management of WRSAs);
- small Project footprint;
- consideration of best management practices; and
- application of lessons learned from other decommissioned properties.

Nonetheless, contingencies have been developed as viable alternate options that may be used for decommissioning and reclamation based on changes to mine plans, technology updates, logistics, timelines, costs, and efficiency.

As described in the *Rook I Environmental Impact Statement*, alternative assessments were completed to evaluate, among other things, management options for:

- tailings;
- waste rock;
- general site decommissioning; and
- decommissioning demolition waste disposal.

The selected alternatives identified from these assessments (i.e., those that form the basis of the Project components) and additional alternative decommissioning approaches are outlined in Table 2.

Table 2: Contingencies for Decommissioning and Reclamation by Planning Envelope

| Planning Envelope | Current Plan | Contingency Plan |
|---|---|---|
| PE 1.0 Underground Facilities | ▪ Clean and remove infrastructure suitable for reuse from the underground.<br>▪ Fill production and exhaust shafts with non-hazardous decommissioning demolition waste up to the unconformity and place a concrete plug at the unconformity.<br>▪ Fill production and exhaust shafts from the unconformity to the surface with non-hazardous decommissioning demolition waste and place an engineered concrete plug at surface to seal the shafts.<br>▪ Decommission other mine surface openings with hydrated bentonite. | ▪ Leave all underground infrastructure in place.<br>▪ Backfill underground workings with decommissioning demolition waste and NPAG waste rock. |
| PE 2.0 Surface Buildings, Facilities, and Services | ▪ Demolish all buildings, facilities, and services.<br>▪ Move temporary construction infrastructure (e.g., freeze plant) to off-site storage or return to contractors or vendors.<br>▪ Once buildings, facilities, and services are demolished and demolition waste removed, reclaim as described in section 7. | ▪ Deconstruct some buildings, facilities, and services to maintain for reuse off-site.<br>▪ Leave some buildings, facilities, and services on-site for use by local Indigenous groups and communities (e.g., accommodation complex, roads, airstrip). |
| PE 3.0 Waste Disposal | ▪ Segregate decommissioning demolition waste.<br>▪ Dispose of non-hazardous and non-recyclable decommissioning demolition wastes in the shafts.<br>▪ Dispose of a portion of clean concrete on the NPAG WRSA.<br>▪ Send material off-site for recycling (e.g., clean steel).<br>▪ Transfer hazardous materials to authorized facilities off-site. | ▪ Dispose and recycle all non-hazardous decommissioning demolition wastes off-site.<br>▪ Dispose all clean concrete on the NPAG WRSA.<br>▪ Backfill all non-hazardous decommissioning demolition waste in the underground workings. |
| PE 4.0 Mine Rock Stockpiles and Storage Areas | ▪ Construct the PAG WRSA using alternating lifts of PAG waste rock and engineered source control layers at 4H:1V final design slopes to facilitate progressive reclamation.<br>▪ Use NPAG waste rock as supplemental material to fill void spacing in the shafts (as required).<br>▪ Decommission and reclaim the NPAG waste rock in situ during the Active Closure stage. | ▪ Transfer maximum possible portions of PAG and NPAG waste rock underground according to available storage volume. |
| PE 5.0 Site Roads and Disturbed Areas | ▪ Remove roads and culverts, level berms, and decompact surfaces. Reclaim as described in section 7. | ▪ Leave site roads in-place.<br>▪ Discourage access by adding physical barriers (e.g., large rocks, soil mounds) at entrances.<br>▪ Allow the area to naturally regenerate. |

PAG = potentially acid generating; PE = planning envelope; NPAG = non-potentially acid generating; WRSA = waste rock storage area; H:V = horizontal to vertical.

# 3 Overview of Rook I Project Site Conditions

Section 3.1 (Environmental Setting) and section 3.2 (Anthropogenic Activity) provide an overview of the pre-development environmental setting and human development activities occurring at and near the Project site.

## 3.1 Environmental Setting

The following subsections provide brief summaries of the pre-development environmental setting in and around the Project site. Additional detail can be found in the *Rook I Environmental Impact Statement*.

### 3.1.1 Climate

Climatic conditions are a key consideration when determining the best time of the year to conduct decommissioning and reclamation activities and selecting suitable vegetation species for revegetation of disturbed areas.

Climatic conditions in the area of the Project are considered sub-arctic, with temperatures ranging from warmer than 30°C in the summer to colder than -40°C during the winter. Winters are characterized as long and cold, with mean monthly temperatures below freezing between October and April. Precipitation typically falls as rain between May and October, and as snow from October to April, with the greatest snowfall amounts occurring between November and January. Average total annual precipitation in the region is on the order of 440 mm. Maximum wind speeds in the region can vary between 30 km/h and 48 km/h, and can occur from every direction but are most commonly from the northwest.

### 3.1.2 Soils

Parameters such as soil texture, coarse fragment content, ease of salvage, and depth of soil horizons are used to determine the suitability of soils for use as reclamation material.

The landscape in the area of the Project has been formed through historical glacier influences. The existing topography is variable, with drumlins and lakes/wetlands dominating the northwest and southeast parts of the regional area of the Project, respectively, and lowland lakes, rivers, and muskeg dominating the central part of the area. Surficial soils in the region are scattered with rocks, boulders, sands, and fines. Surficial materials in the immediate vicinity of the Project site include coarse sands and gravels with varying quantities of cobbles, boulders, and larger blocks.

Based on baseline field programs and mapping, the mineral soil map units at the Project site are considered to have a poor reclamation suitability in the upper lift and lower lift. The poor reclamation suitability rankings are due to low pH and low cation exchange capacity, which suggests low nutrient content, and coarse underlying subsoil. These conditions are consistent with reference sites in the surrounding area and, although they are not considered inappropriate for reclamation, they are not conducive to rapid vegetation establishment on reclaimed sites due to the low nutrient content and lack of water holding capacity.

### 3.1.3 Vegetation

Observations of plant species present prior to disturbance help guide the selection of revegetation species suitable for the reclaimed landscape that support the desired returning land uses. Understanding local vegetation is also an important aspect of determining traditional land use objectives for the reclaimed landscape.

The broader regional area of the Project intersects the Boreal Shield and Boreal Plain ecozones. At a smaller, more local scale, the Project site is located within the Boreal Plain Ecozone of the Mid-Boreal Uplands Ecoregion. The area surrounding the Project site consists of recent burns with residual stands of jack pine (*Pinus banksiana*) and some black spruce (*Picea mariana*), with shrub and lichen as ground cover. Over the last 40 years, much of the region has been burned in historical fires.

Climax communities at and around the Project site consist of closed-crown mixed wood and coniferous species, including:

- trembling aspen (*Populus tremuloides*);
- balsam poplar (*Populus balsamifera*);
- paper birch (*Betula papyrifera*);
- white spruce (*Picea glauca*);
- black spruce;
- tamarack (*Larix laricina*); and
- jack pine.

The most frequently observed traditional use plant species during baseline studies included jack pine, bog cranberry (*Vaccinium vitis-idaea*), common Labrador tea (*Rhododendron groenlandicum*), and blueberry (*Vaccinium myrtilloides)*. Traditional use species that were observed at least once included knotted rush (*Juncus nodosus* var. *nodosus*), wild black currant (*Ribes americanum*), low bush-cranberry (*Viburnum edule*), and American wild strawberry (*Fragaria veseca* ssp*. americana*).

Gathering plants for food, medicinal, spiritual, and ceremonial purposes is an important traditional activity for local Indigenous groups and an important aspect of culture and community well-being. The Clearwater River Dene Nation and Métis Nation – Saskatchewan have described the importance of berries, medicinal plants, and other traditional plants for the promotion of health and community well-being.

### 3.1.4 Wildlife

Knowledge of wildlife presence in the Project area factors into final landscape design decisions and the selection of revegetation species to facilitate successful reclamation of local wildlife habitats. Understanding local wildlife is also an important aspect of determining traditional land use objectives for the reclaimed landscape.

The wildlife species present within the regional area of the Project are typical of the Boreal Shield and Boreal Plains ecozones. The proposed Project is located within the SK2 West administration unit for woodland caribou (*Rangifer tarandus caribou*) and adjacent to the boundary of the SK1 caribou conservation unit.

Wildlife species known to occur in the region include moose (*Alces alces*), woodland caribou, deer (*Odocoileus* spp.), black bear (*Ursus americanus*), wolf (*Canis lupus*), and other mammal species commonly found in boreal forest ecosystems. Semi-aquatic mammals common to the area include beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and river otter (*Lontra canadensis*).

Local Indigenous groups have shared their knowledge with NexGen through a variety of engagement activities and sources of information. Traditional land use studies have indicated that trapping and hunting of a variety of mammals is conducted around Patterson Lake. For example, members of the local Dene Nations use the area:

- to harvest Spruce grouse (*Falcipennis canadensis*) and rabbits (*Leporidae* spp.);
- for temporary resting and camping locations during moose hunts;
- for moose processing locations; and
- as water routes and terrestrial trails for accessing hunting and trapping locations for American marten (*Martes americana*), beaver, red fox (*Vulpes vulpes*), mink (*Neovison vison*), and Canada lynx (*Lynx canadensis)*.

The Clearwater River Dene Nation and Birch Narrows Dene Nation members use the area for travel routes for hunting and trapping; teaching areas for trapping; trapping sites for lynx, marten, beaver, fisher (*Pekania pennanti*), muskrat, squirrel (*Sciurus* spp.), weasel (*Mustela* spp.), and otter; and hunting for moose, caribou, deer, rabbits, and bear. The Métis Nation – Saskatchewan Northern Region 2 live off the land hunting moose and other wildlife and trapping rabbit.

### 3.1.5 Surface Water

Knowledge of water features local to the Project site factors into final landscape design decisions to support final drainage patterns that would integrate with the surrounding areas. The location of water features is also required to plan for soil conservation and reclamation material management.

At a regional scale, the Project is situated within the southern Athabasca Basin adjacent to Patterson Lake, near the headwaters of the Clearwater River system (Figure 1). The Clearwater River watershed drains to the Mackenzie River watershed.

The Clearwater River watershed near the Project site has an abundance of waterbodies from small wetlands to larger lakes. The waterbodies along the mainstem of the Clearwater River include Broach, Patterson, Forrest, Beet, and Naomi lakes, and there are numerous other smaller-sized named and unnamed lakes.

North of the Clearwater River watershed are the headwaters of the Williams and Douglas rivers that both eventually flow into Lake Athabasca in Saskatchewan. West of the Clearwater River drainage divide, near Broach Lake, is the Davidson River watershed, which is a tributary of the Richardson River that flows into the Athabasca River in Alberta, upstream of Lake Athabasca.

Waterbodies including Broach, Patterson, Forrest, Beet, and Naomi lakes, as well as the Clearwater River are culturally important to local Indigenous groups and used for harvesting activities (e.g., fishing), drinking water, occupancy, and travel. Clearwater River was identified as an ancestral water route that is still used presently to access traditional use areas. The Clearwater River Dene Nation reported that the Patterson Lake, Forrest Lake, Beet Lake, and other lakes farther downstream are intrinsically connected and integral to the Clearwater River, and the Métis Nation – Saskatchewan highlighted Patterson Lake as being central to the river system for the entire area because it feeds the lakes to the south.

### 3.1.6 Radioactivity

Radioactivity is the spontaneous emission of radiation in the form of particles or high energy photons. Soil covers are used during reclamation to provide a barrier between possible residual low-level gamma radiation and the reclaimed ecosystems. Soil covers can act to sequester radionuclides, thereby limiting infiltration into groundwater, leaching into surface water, and consequently radionuclide uptake by plants. Information collected from baseline gamma radiation surveys would be used to help determine how thick of a soil cover (if any) may be required during reclamation for areas with elevated gamma radiation.

Radionuclide analysis of soils samples taken at the 2019 exposure and reference sites identified no detectable levels of lead-210, thorium-228, thorium-230, or thorium-232 (*Rook I Environmental Impact Statement*). Polonium-210 levels ranged between 0.01 Becquerels per gram (Bq/g) and 0.02 Bq/g, and radium-226 levels ranged between 0.02 and 0.03 Bq/g. Concentrations of polonium-210 and radium-226 were slightly elevated at reference sites outside of the Project boundary as compared to the exposure sites. When compared to the *Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials* (Canadian NORM Working Group 2013), none of the radionuclides analyzed in 2019 from the Project site exceeded the derived release limits.

A gamma radiation baseline program was conducted in 2022 to gather baseline data across the Project site and along two sections of Highway 955 to characterize the natural variability in baseline gamma radiation levels (CanNorth 2022). Overall, the baseline gamma radiation levels across the Project site and the surveyed portions of Highway 955 were low with the highest hectare average recorded being 0.26 micro sieverts per hour (μSv/h). Average baseline gamma radiation levels across the Project site, access road, and Highway 955 sections were 0.021 μSv/h, 0.014 μSv/h, and 0.025 μSv/h, respectively. These baseline gamma levels are generally in line with background levels determined for use at other uranium mines in northern Saskatchewan that are in the process of being decommissioned or reclaimed.

## 3.2 Anthropogenic Activity

The broader regional area surrounding the Project site is largely undisturbed by human activities and infrastructure; approximately 0.5% of the regional area (i.e., 1,000 $km^2$) encompassing the Patterson Lake watershed has been influenced by human developments. Most human-related disturbances in this regional area include linear features such as Highway 955, cutlines, seismic lines, and trails, with some cleared areas. The Project site is north of the commercial forest zone; commercial forestry activity is not conducted in vicinity of the proposed Project. There are no active mines near the Project site. The now closed Cluff Lake Mine was operated by AREVA Resources Canada Inc. (now Orano) and is located 80 km north of the Project site.

Mineral exploration has been recorded in and around the Project site by multiple companies since 1968. Exploration activities, delineation drilling, and geotechnical and other investigations continue at the Project site and surrounding area.

Additional detail on anthropogenic activity can be found in the *Rook I Environmental Impact Statement*.

# 4 Rook I Project Overview

The Project consists of underground and surface facilities to support the extraction of uranium ore and the production of uranium concentrate, including:

- an underground mine accessed by two shafts;
- mine rock management facilities;
- site water management facilities;
- a surface uranium ore processing plant;
- an underground tailings management facility (UGTMF);
- an effluent treatment plant; and
- administration and camp facilities, utilities, an airstrip, and roads.

The anticipated life cycle of the Project is 43 years and includes Construction, Operations, and Decommissioning and Reclamation (i.e., Closure) phases. Project phases are further described in section 1.4.

To adequately account for a “decommission-tomorrow by a third-party scenario”, the descriptions of Project infrastructure and decommissioning methods provided below represent the maximum anticipated extent of surface and underground development at the end of the Construction phase covered by the scope of this Plan. In the unlikely event that the Project does not proceed to the Operations phase, the actual decommissioning and reclamation requirements would be commensurate with the actual extent of surface and underground infrastructure and development. Radiological contamination is not anticipated during the Construction phase.

For illustrative purposes, a general schematic of primary Project infrastructure at the end of the Construction phase is shown in Figure 5 and the *Mine Site Development Construction Phase Overall Site Layout* drawing included in Appendix A. The anticipated physical footprint of the Project site and main site access road at the end of the Construction phase is approximately 200 ha. Project facilities and dimensions are further described in section 6. A more detailed description of the underground and surface facilities is provided in the *Rook I Mining and Milling Facility Description Manual*.

The decommissioning methods described below are considered adequate and appropriate to protect people and the environment, meet decommissioning criteria, and satisfy applicable external requirements during the entire Construction phase.

The underground mine would be developed using longhole stope mining methods and accessed through two shafts: the production shaft and the exhaust shaft. Once constructed, the first shaft would be used as a production shaft to transport personnel and materials, to deliver ore and waste rock from the workings, and to deliver fresh air from surface into the mine. The second shaft would be used as an exhaust shaft (i.e., to return exhaust air from the underground to surface) and would provide secondary emergency egress.

Mine rock would be segregated and stored on surface either in permanent storage areas or temporary stockpiles. Non-potentially acid generating (NPAG) (i.e., clean) waste rock would be used, where possible, as a source of aggregate material for activities such as construction and road maintenance. NPAG not used for these purposes would be stored on surface on a pad, regraded, and reclaimed with a cover system and growth media to support revegetation. Potentially acid generating (PAG) waste rock would be segregated, stored on surface on a lined pad at 4H:1V closure slopes and with an engineered source control cover system and growth media to support revegetation. Ore and special waste rock[1] (SWR) are not expected to be encountered during the Construction phase; however, if encountered it would be segregated, temporarily stored on the surface on a lined pad, and then placed at the bottom of the shaft(s) during Active Closure.

The milling facilities designed to process the ore on site during the Operations phase would be located on surface directly above the underground mine. During the Operations phase, tailings from the processed ore would be progressively decommissioned through permanent storage underground, either as cemented paste backfill in mined out stopes or cemented paste tailings within a purpose-built UGTMF. The UGTMF represents a key Project environmental design feature that avoids the requirement for permanent surface tailings storage and the associated potential risks to the environment.

Fresh water for site activities (e.g., construction, domestic purposes, emergency firewater) would be drawn from Patterson Lake. To the extent practicable, contact water generated by Project or as a result of mine development would be recycled to minimize the amount of surface water drawn from Patterson Lake and the amount requiring active management.

A temporary effluent treatment plant purpose-built for the Construction phase would receive and treat contact water to meet established discharge criteria and would be constructed with sufficient capacity to meet operational requirements and manage non-routine inflows from underground and surface runoff from extreme precipitation events. Treated effluent would be batch released to Patterson Lake.

The access road from Highway 955 would be used to transport equipment and supplies to and from the Project site. Personnel would be flown to and from site. Electricity for both surface and underground operations would be provided by on-site diesel generators during the Construction phase and liquid natural gas during the Operations phase.

[1] Special waste rock is mine rock that is mineralized with insufficient grade to be considered ore (i.e., greater than 0.03% of tiuranium octoxide [$U_3O_8$] and less than 0.26% $U_3O_8$).

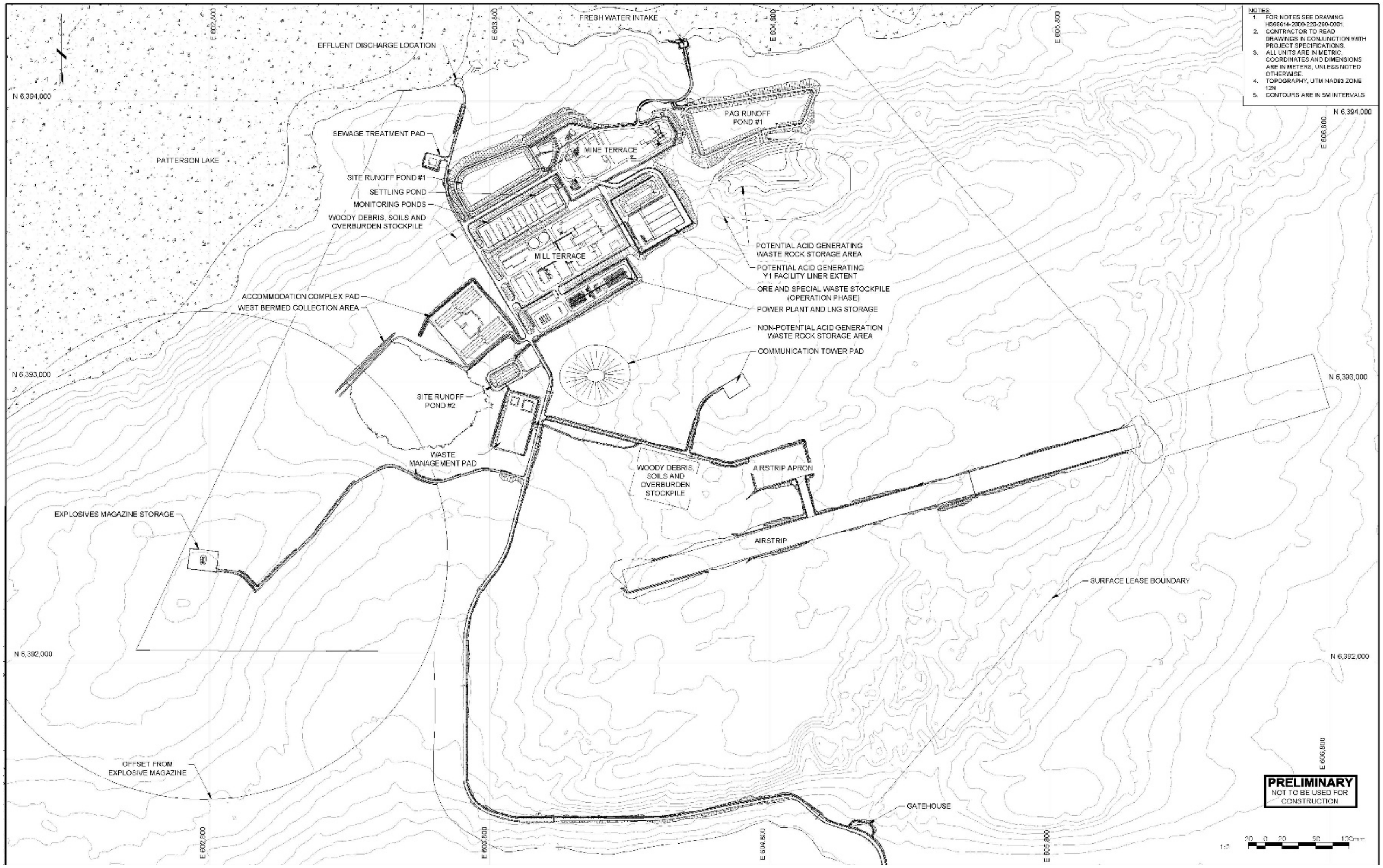


Figure 5: Primary Rook I Project Infrastructure at the end of the Construction Phase

# 5 Regulatory Approvals

The decommissioning and reclamation methods described in this Plan are considered adequate and appropriate to protect health, safety, security, and the environment, achieve decommissioning and reclamation objectives, and satisfy applicable external requirements.

Following submission and acceptance of this Plan as part of provincial permitting and federal licensing processes, this Plan will be periodically updated to reflect the most up-to-date Project information and at a minimum every five years throughout the Project life cycle.

In the unlikely event that the Project does not proceed beyond the term of this Plan (i.e., the Construction phase) the *Detailed Decommissioning and Reclamation Plan* would be developed in accordance with provincial and federal requirements and an application to decommission the Project would be made to the Saskatchewan Ministry of Environment and the CNSC before entering the Active Closure stage.

As required by *The Mines Regulations, 2018,* prior to initiating final closure activities, the Saskatchewan Ministry of Labour Relations and Workplace Safety would be notified and provided with copies of current mine plans.

The costs associated with securing the necessary provincial and federal regulatory approvals, including the costs associated with engaging with local Indigenous groups and communities are outlined in the *Rook I Preliminary Decommissioning and Reclamation Cost Estimate*.

# 6 Decommissioning Plan

To “decommission” means to remove or retire permanently from service, or to take any action to remove or retire all or part of a mining site (section 1.3). This Plan includes decommissioning of facilities planned to the end of the Construction phase. Decommissioning would be preceded by the orderly cessation of site activities and transition of the Project site into a safe inactive state. The site would be placed in care and maintenance until provincial and federal approvals to decommission were in place. Underground mining areas would be decommissioned and secured. Surface facilities, infrastructure, and equipment would be cleaned (as necessary), scanned, and prepared for demolition in a staged and controlled manner.

Wherever practicable, surface and underground infrastructure, equipment, and materials not required during the Active Closure stage, and which meet radiological criteria for off-site removal, would be salvaged, sold, or transferred off-site by a licensed contractor for recycling or disposal at an authorized facility. No structures or equipment would remain on the surface of the site post-decommissioning unless required for monitoring or maintenance activities. The *Rook I Preliminary Decommissioning and Reclamation Cost Estimate* does not account for recovering value associated with the salvage or sale of structures and equipment. Decommissioning demolition waste would be segregated to separate hazardous materials (as required). Hazardous materials would be sent off-site to authorized facilities, non-hazardous decommissioning demolition wastes would either be recycled off-site (e.g., clean steel), placed on the NPAG WRSA (i.e., clean concrete), or disposed of in the shafts.

Non-hazardous decommissioning demolition wastes would be deposited into the shafts starting at the shaft bottom. Disposal would be temporarily halted once waste reaches the bottom of the hydrostatic liner near the top of the bedrock to install concrete plugs for each shaft. Once the concrete plug is set, waste disposal would resume. Broken concrete from the decommissioning demolition process would be deposited into the shafts above the concrete plug using a stacker. Waste would be deposited systematically, filling the shafts until the waste is near the surface. If required, NPAG waste rock may be used as supplemental material to fill void spacing above the concrete plug. A shallow reinforced engineered concrete plug would then be placed at surface to seal each shaft.

All other openings to surface would be filled with a low conductivity, impermeable material and sealed at surface. Following closure of the mine openings, groundwater elevations would re-establish to natural equilibrium and the site would be reclaimed as outlined in section 7.

Effluent treatment and the associated site water management infrastructure would remain operable until operational control monitoring results determine that the collection and treatment of contact water is no longer required to meet established decommissioning criteria and protect the environment.

The success of decommissioning activities would be determined through assessment against the relevant objectives and criteria, as outlined in section 2.

## 6.1 Planning Envelopes

As per CNSC *REGDOC-2.11.2, Decommissioning,* planning envelopes (PEs) are “a definable part or area of a facility that is sufficiently removed from, or otherwise independent of, other parts of areas so that the strategic approach to decommissioning that part or area may be planned in a relatively independent manner” (CNSC 2021). The PEs for the Project are described in Table 3 and a summary of specific decommissioning activities for each is provided below. Monitoring and reporting during decommissioning, reclamation, and post-closure is described in section 9.

The design bases, locations, and function of the infrastructure associated with each PE are further outlined in the *Rook I Mining and Milling Facility Description Manual*.

Table 3: Rook I Project Planning Envelopes

| Planning Envelope | Sub-Envelope | Rationale |
|---|---|---|
| PE 1.0 Underground Facilities | 1.1 Underground Infrastructure and Services | Decommissioned using similar strategies, processes, equipment, and skilled labour, distinct from surface facilities. |
| | 1.2 Underground Tailings Management Facility | Decommissioned in-place. May require unique strategies for monitoring during closure. |
| | 1.3 Mine Surface Openings | Decommissioned using similar strategies, processes, equipment, and skilled labour, distinct from surface facilities. |
| PE 2.0 Surface Buildings, Facilities, and Services | 2.1 Mining Surface Facilities | Decommissioned using similar strategies, processes, equipment, and skilled labour. |
| | 2.2 Process Plant | |
| | 2.3 Site Water Management | |
| | 2.4 Utilities and Essential Services | |
| | 2.5 Waste Management Facilities | |
| | 2.6 Surface Ancillary and Support Facilities | |
| PE 3.0 Waste Disposal | 3.1 On-site Disposal | Similar waste management processes (e.g., sorting, staging). |
| | 3.2 Off-site Disposal | |
| PE 4.0 Mine Rock Stockpiles and Storage Areas | - | Decommissioned and reclaimed using similar strategies, processes, equipment, and skilled labour. |
| PE 5.0 Site Roads and Disturbed Areas | - | Decommissioned and reclaimed using similar strategies, processes, equipment, and skilled labour. |

PE = planning envelope; - = not applicable.

### 6.1.1 PE 1.0 Underground Facilities

Access underground would be via two shafts: an 8.0 m diameter production and service shaft (production shaft) for intake air, and a 5.5 m diameter exhaust shaft for secondary egress and exhaust air. Access to the workings would be from the production shaft, with stations on the 500 Level and 560 Level (Figure 6).

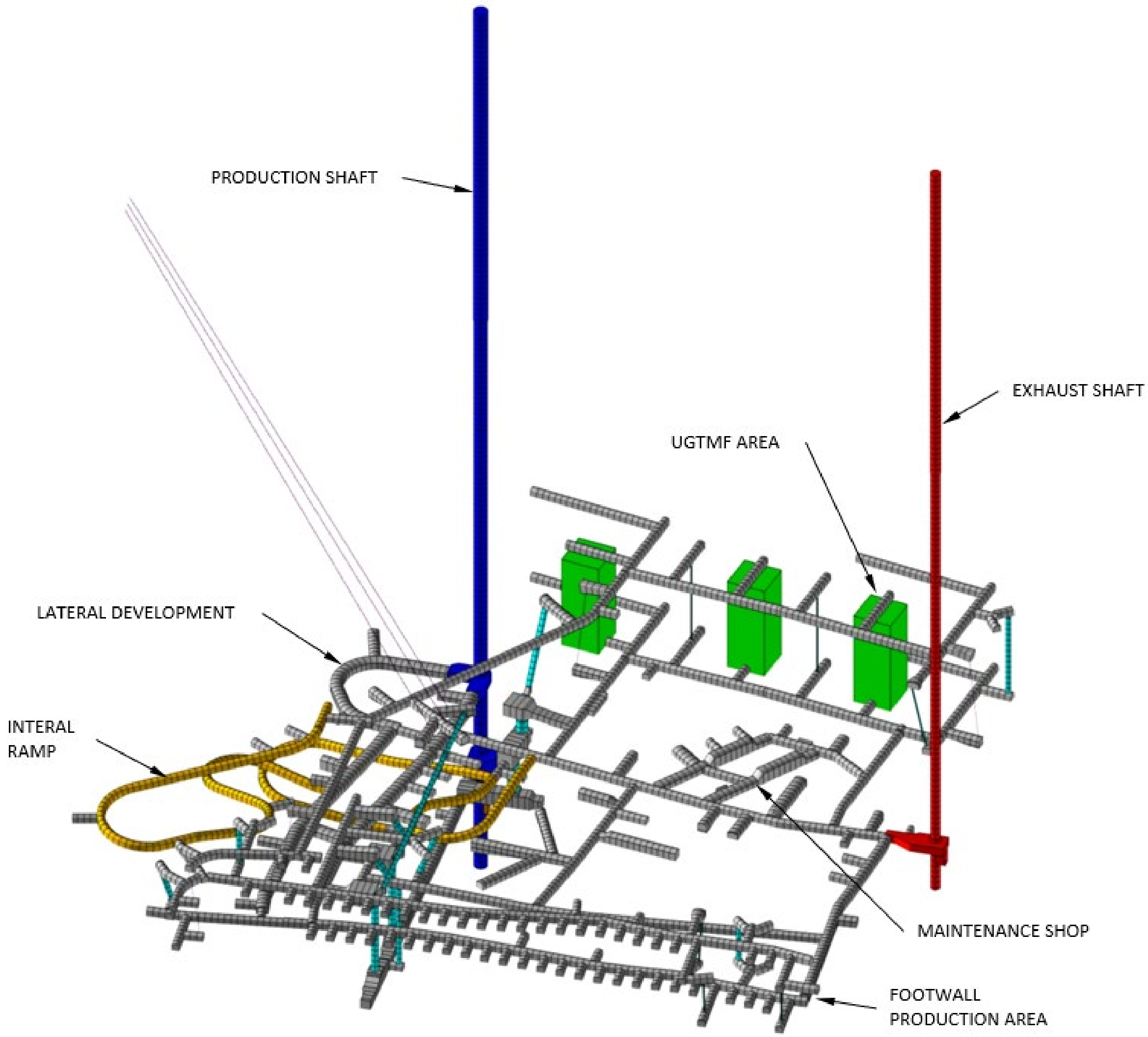


Figure 6: Overview of Underground Mine and Infrastructure at the end of the Construction Phase

The volume available to store decommissioning demolition waste in the underground workings and the shafts is provided in PE 3.0 (section 6.1.12). The approximate volumes of decommissioning demolition waste at the end of Construction phase and disposal methods are described in PE 3.0 (section 6.1.12).

Critical services (e.g., underground mine dewatering, heating, ventilation) and required equipment would remain in place during care and maintenance and until decommissioning demolition waste quantities are confirmed and it is determined that sufficient storage space is available to dispose of waste in the shafts. Once dewatering ceases, groundwater levels elevations would re-establish to natural equilibrium.

### 6.1.2 PE 1.1 Underground Infrastructure and Services

Underground infrastructure and services required to support underground activities during the Active Closure stage include:

- underground mobile equipment;
- surface equipment;
- shotcrete and concrete receiving station;
- refuge stations and sanitary systems;
- maintenance facilities;
- fuel and lubricant storage and service;
- personnel and materials movement;
- electrical infrastructure; and
- communications and automation services.

At decommissioning, underground infrastructure that is suitable for reuse would be cleaned and removed from the underground. The remaining infrastructure would be abandoned underground. Prior to abandonment, fuel, oil, transmission fluid, hydraulic fluid, coolant, and other hazardous materials would be removed and transported to the surface along with residual explosives and other chemicals to be sent off-site for recycling or disposal at an authorized facility.

### 6.1.3 PE 1.2 Underground Tailings Management Facility

Tailings would not be produced during the Construction phase of the Project.

### 6.1.4 PE 1.3 Mine Surface Openings

The production shaft would serve as the primary access point to the underground workings and the exhaust shaft would provide a means of secondary egress should the production shaft become incapacitated. At the exhaust shaft, an airlock would be required for the cage pod entering the shaft. To stabilize the ground and manage water during excavation, the ground around the shaft excavations would be temporarily frozen using a freeze plant.

Once the ground is excavated, a 600 mm thick concrete hydrostatic liner would be installed in each shaft to prevent water inflows once active freezing is stopped and the ground thaws. The freezing would extend to the competent ground estimated at 175 m below surface for the production shaft, and 220 m below surface for the exhaust shaft.

A summary of the mine surface openings included in this PE is provided in Table 4.

Following the disposal of non-hazardous decommissioning demolition wastes into the shafts, a shallow engineered concrete plug would be placed to seal the shafts as described in PE 3.1 (section 6.1.13). Any surficial monuments or stickups for remaining mine surface openings (e.g., paste delivery boreholes, freeze holes) would be cut below grade and disposed of with other demolition waste as described in PE 3.0 (section 6.1.12). Holes would be decommissioned using hydrated bentonite in accordance with regulatory requirements for decommissioning groundwater wells.

Table 4: Mine Surface Openings

| Facility Name | Quantity | Surface Dimensions | | Subsurface Dimensions (m)[(a)] | Height (m) | Footprint ($m^2$) | Volume ($m^3$) |
|---|---|---|---|---|---|---|---|
| | | Length (m) | Width (m) | | | | |
| Production Shaft | 1 | ⌀9.2 | | ⌀8 | 568 | 66 | 133[(b)] |
| Exhaust Shaft | 1 | ⌀7 | | ⌀5.5 | 533 | 35 | 71[(b)] |
| Paste Delivery Borehole | 6 | ⌀0.11 | | ⌀0.10 | 500 | 0.5 | 24[(c)] |
| Production Freeze Borehole | 27 | ⌀0.11 | | ⌀0.10 | 175 | 0.5 | 37[(c)] |
| Production Pressure Well | 1 | ⌀0.11 | | ⌀0.10 | 80 | 0.5 | 1[(c)] |
| Production Monitoring Well | 4 | ⌀0.11 | | ⌀0.10 | 175 | 0.5 | 5 |
| Exhaust Freeze Borehole | 24 | ⌀0.11 | | ⌀0.10 | 220 | 0.5 | 41[(c)] |
| Exhaust Pressure Well | 1 | ⌀0.11 | | ⌀0.10 | 80 | 0.5 | 1[(c)] |
| Exhaust Monitoring Well | 4 | ⌀0.11 | | ⌀0.10 | 220 | 0.5 | 7[(c)] |

a) Finished internal diameter.
b) Volume consists of concrete required for two 1 m-thick engineered concrete plugs per shaft.
c) Volume consists of concrete required for one 1 m-thick concrete plug per hole.
⌀ = outside diameter.

### 6.1.5 PE 2.0 Surface Buildings, Facilities, and Services

This PE includes surface buildings and facilities used to support ore extraction, processing, water management, waste management, site management, and maintenance as well as the utilities required to service them (e.g., power, potable water).

Temporary infrastructure required for the Construction phase only (e.g., freeze plant) would be moved to off-site storage or returned to contactors or vendors. All remaining surface buildings, facilities, and services would be demolished in an orderly sequence prioritizing infrastructure that is not required to support Active Closure stage activities. The approximate timeline for the Active Closure stage is provided in section 11. All surface buildings, facilities, and services would be demolished in the following sequence:

- locate utilities, hoarding work areas, and identify hazards;
- isolate all utilities and services to achieve a zero-energy state;
- manage access to specific work areas and re-route site traffic as necessary;
- remove fixtures (e.g., furniture) and hazardous materials;
- demolish structures from the top-down and from the exterior to interior using equipment appropriate for the building, facility, or service (e.g., excavator with specialty tools);
- break-up and remove structural reinforced slabs and foundations to below grade to allow for backfilling and grading;
- remove utilities, as required (e.g., non-hazardous materials that are safely drained and capped, or cut off at least 1 m below the ground surface, may remain in place); and
- segregate, process (e.g., cut, shred, pulverize), and transport decommissioning demolition waste streams to the appropriate disposal location (PE 3.0 [section 6.1.12]).

Radiological contamination is not anticipated during the Construction phase and would be verified through routine workplace monitoring. Facilities that are radiologically contaminated would be demolished in a manner that minimizes the generation of dust and the spread of contamination.

NexGen would work with local communities to determine if there is an ongoing use case to keep the electrical power station building and power lines and poles in place. Once buildings, facilities, and services are demolished and demolition waste is removed, the remaining disturbance would be remediated as required (e.g., fuel tanks or potentially contaminated sites), decompacted (if necessary), and recontoured to a self-draining condition that is suitable for reclamation as described in section 7.

### 6.1.6 PE 2.1 Mining Surface Facilities

The facilities included in this PE include surface infrastructure required to support underground operations as summarized in Table 5. A general schematic of primary Project infrastructure is shown in Figure 5.

Table 5: Mining Surface Facilities

| Facility Name | Quantity | Surface Dimensions | | | Footprint ($m^2$) |
|---|---|---|---|---|---|
| | | Length (m) | Width (m) | Height (m) | |
| Production Headframe | 1 | Irregular | | 68 | 1,100 |
| Exhaust Headframe | 1 | Irregular | | 54 | 541 |
| Production Shaft Hoist House | 1 | 34 | 66 | 17.5 | 2,244 |
| Exhaust Shaft Hoist House | 1 | 26 | 33 | 14 | 858 |
| Core Sheds | 70 | 12 | 8 | 2.5 | 96 |
| Temporary Freeze Plant | 1 | 15.5 | 12.5 | 4 | 194 |
| Surface Intake Fan | 1 | Irregular | | 10 | 980 |
| Surface Exhaust Fan | 1 | Irregular | | 15 | 1,028 |
| Surface Explosive Magazine Pad | 1 | 70 | 100 | n/a | 7,000 |

n/a = not applicable.

### 6.1.7 PE 2.2 Process Plant

Processing refers to the activities occurring after ore is received at the ore storage stockpile, to the point of the uranium concentrate (i.e., triuranium octoxide, [$U_3O_8$]) being packaged. Process plant buildings will be located on the mill terrace, as shown in Figure 7. Facilities included in this PE are summarized in Table 6.

Buildings associated with the process plant would be decommissioned as described in PE 2.0 (section 6.1.5). Hazardous materials would be removed and sent off-site for recycling or disposal as described in PE 3.2 (section 6.1.14).

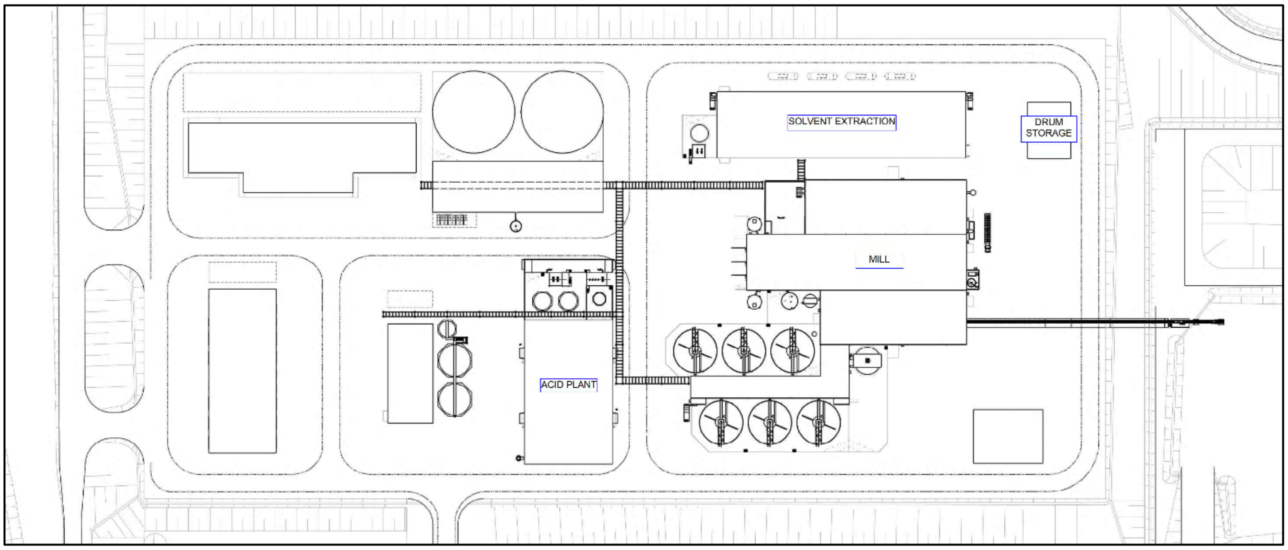


Figure 7: Process Plant Layout on Mill Terrace

Table 6: Process Plant Facilities

| Facility Name | Quantity | Surface Dimensions | | | Footprint (m$^2$) |
|---|---|---|---|---|---|
| | | Length (m) | Width (m) | Height (m) | |
| Mill Building | 1 | Irregular | | 35 | 7,120 |
| Solvent Extraction | 1 | 114 | 30 | 14 | 3,420 |
| Acid Plant - Process | 1 | 40 | 66 | 22 | 2,640 |
| Acid Plant – Exterior Containment | 1 | 28 | 40 | 1 | 1,120 |
| CCD Thickeners – Exterior Containment | 1 | Irregular | | 1 | 3,681 |
| CCD Thickeners – Tanks | 6 | ⌀20 | | 12 | 314 |
| Pin Bed Clarifier | 1 | ⌀6 | | 15 | 28 |
| Raffinate Tank | 1 | ⌀8 | | 10 | 50 |
| Emergency Organic Dump Tank #1 | 1 | ⌀3.2 | | 13 | 167 |
| Lime Silo and Bag House | 1 | ⌀3.8 | | 18 | 238 |

CCD = counter current decantation; ⌀ = outside diameter.

### 6.1.8 PE 2.3 Site Water Management

Site contact water is any water that interacts with the Project, including water from precipitation events that is intercepted by the Project and mine water generated as a result of mine development and Project-related activity. Site water management is the control of precipitation, runoff, and mine water from underground workings, through collection, reuse, storage, treatment, and batch release to protect the receiving environment of the Project.

Site water management facilities included in this PE are summarized in Table 7.

Water management infrastructure would remain operable until operational control monitoring results determine that the collection and treatment of contact water is no longer required to meet established decommissioning criteria and protect the environment. Once water management infrastructure is no longer required, ponds would be drained in accordance with the applicable site water management plan and authorizations. Sediments that settled in the ponds and pond liners would be excavated and disposed of in the shafts. Pipes, pumps, culverts, and other equipment that can be reused or recycled would be transported off-site and the remaining material would be dumped in the shafts. No water management infrastructure would be retained during the Transitional Monitoring stage; once the water management infrastructure is removed, areas would be graded and recontoured as described in PE 5.0 (section 6.1.16).

Table 7: Site Water Management Facilities

| Facility Name | Quantity | Surface Dimensions | | | Footprint ($m^2$) |
|---|---|---|---|---|---|
| | | Length (m) | Width (m) | Height (m) | |
| Freshwater Intake Pumphouse Building | 1 | 8 | 7 | 8 | 58 |
| PAG Runoff Collection | 1 | Irregular, Perimeter = 1,140 m | | | 58,600 |
| Settling Pond | 1 | 78 | 76 | - | 5,928 |
| Contingency Pond | 1 | 44 | 76 | - | 3,344 |
| West Bermed Runoff Containment Area | 1 | Irregular, Perimeter = 1,440 m | | | 128,950 |
| Site Runoff Pond #1 | 1 | Irregular | | - | 36,420 |
| Site Runoff Pond #2 | 1 | 110 | | - | 5,940 |
| Effluent Treatment Plant (Temporary) | 3 | 10 | 4 | 3 | 120 |
| Effluent Treatment Plant (Permanent) | 1 | 80 | 20 | 16 | 1,600 |
| Effluent Water Treatment Tanks (Clarifier) | 2 | ⌀ 38 | | 7 | 1,444 |
| Diffuser (Treated Effluent Discharge) | 1 | 5 | 10 | 3 | 50 |
| Monitoring Ponds | 4 | 44 | 76 | - | 3,344 |

PAG = potentially acid generating; - = not applicable; ⌀ = outside diameter.

### 6.1.9 PE 2.4 Utilities and Essential Services

Utilities and essential services include infrastructure to provide the electricity, heat, water, and communication resources required to support the continued safe operation of site infrastructure and processes. A summary of the facilities included in this PE is provided in Table 8.

Table 8: Utilities and Essential Services Facilities

| Facility Name | Quantity | Surface Dimensions | | | Footprint ($m^2$) |
|---|---|---|---|---|---|
| | | Length (m) | Width (m) | Height (m) | |
| Liquefied Natural Gas Power Plant | 1 | 60 | 40 | 7 | 2,400 |
| Liquefied Natural Gas Storage Area | 1 | 84 | 40 | 5 | 3,360 |
| Regasifier Area | 1 | 20 | 6 | 8 | 120 |
| Above Ground Power Lines and Poles | 1 | 5,813 | 6 | 16 | 34,878 |
| Buried Piping Fire Water | 1 | 10,900 | - | - | - |
| Buried Piping Sanitary | 1 | 2,310 | - | - | - |
| Drum Storage | 1 | 20 | 26 | 6 | 520 |
| Diesel Generator (Construction) | 6 | 3 | 2 | 2 | 36 |
| Reagents Storage | 1 | 32 | 25 | 6.0 | 800 |
| Fuel Station and Storage | 1 | 45 | 40 | - | 1,800 |

- = not applicable.

Buildings associated with utilities and essential services would be decommissioned as described in PE 2.0 (section 6.1.5). Hazardous materials would be removed and sent off-site for recycling or disposal as described in PE 3.2 (section 6.1.14). Tanks and liners would be safely cleaned, compressed, and disposed of in the shafts if they cannot be recycled or reused. Buried piping would be drained, capped, and abandoned in place.

### 6.1.10 PE 2.5 Waste Management Facilities

Waste management is the effective collection, processing, transport, and disposal of waste generated during decommissioning and reclamation. The waste management infrastructure included in this PE is summarized in Table 9. Though low-level radioactive waste is not anticipated during the Construction phase, it is currently conservatively assumed that the low-level radioactive waste incinerator building would be constructed in preparation for the Operations phase. The buildings associated with waste management would be decommissioned as described in PE 2.0 (section 6.1.5).

Table 9: Waste Management Facilities

| Facility Name | Quantity | Surface Dimensions | | | Footprint ($m^2$) |
|---|---|---|---|---|---|
| | | Length (m) | Width (m) | Height (m) | |
| Non-LLRW Incinerator Building | 1 | 24 | 22 | 8.5 | 528 |
| LLRW Incinerator Building | 1 | 33 | 32 | 14 | 1,056 |

LLRW = low-level radioactive waste.

### 6.1.11 PE 2.6 Surface Ancillary and Support Facilities

This section provides an overview of support services, buildings, and infrastructure. A summary of the facilities included in this PE is provided in Table 10.

Buildings associated with surface ancillary and support facilities would be decommissioned as described in PE 2.0 (section 6.1.5).

Table 10: Surface Ancillary and Support Facilities

| Facility Name | Quantity | Length (m) | Width (m) | Height (m) | Footprint ($m^2$) |
|---|---|---|---|---|---|
| Communication Building Area Pad | 1 | 50 | 85 | 1 | 4,250 |
| Warehouse / Maintenance Shop | 1 | 58 | 31 | 13 | 1,798 |
| Wash Building | 1 | 19 | 31 | 13 | 589 |
| Concrete / Shotcrete Delivery Building | 1 | 21 | 13 | 8 | 273 |
| Accommodation Complex / Camp (Construction) | 80 | 10 | 4 | 3 | 3,200 |
| Accommodation Complex / Camp (Permanent) | 1 | Irregular | | 7 | 12,858 |
| Emergency Response Building | 1 | 25 | 23 | 7 | 575 |
| Mill Dry Facility | 1 | 30 | 23 | 7 | 690 |
| Mine and Process Plant Dry Facilities | 1 | 58 | 20 | 7 | 1,160 |
| Fresh Water and Fire Water Building | 1 | 24 | 20 | 10 | 480 |
| Process Plant Control Room and Laboratory Building | 1 | 19 | 25 | 14 | 475 |
| Sewage Treatment Facilities – Pad | 1 | 28 | 22 | - | 616 |
| Administration Permanent Office and Building | 1 | 51 | 32 | 7 | 1,632 |
| Communication Tower[(a)] | 1 | 4 | 4 | 20 | 16 |
| Treated Water Tanks | 2 | ⌀14.5 | | 18 | 165 |
| Airstrip | 1 | 80 | 1,900 | - | 152,000 |
| Construction Trailers | 55 | 18 | 4 | 3 | 3,564 |
| Potable Water Treatment Building | 1 | 20 | 20 | 10 | 400 |
| Fences | 1 | 986 | - | - | - |

a) NexGen assumes the communications tower and building would be retained and maintained by SaskTel following decommissioning and reclamation of the Project.

⌀ = outside diameter; - = not applicable.

## 6.1.12 PE 3.0 Waste Disposal

Decommissioning demolition waste would be segregated as required, and non-hazardous demolition wastes collected and disposed of in the production shaft and exhaust shaft for permanent storage as described in PE 3.1 (section 6.1.13). Hazardous materials would be disposed of off-site at an authorized facility as described in PE 3.2 (section 6.1.14). Clean concrete would be segregated and disposed in the shafts and on the NPAG WRSA.

Approximate decommissioning waste quantities after the Construction phase and their expected disposal destinations are provided in Table 11.

Table 11: Non-Hazardous Decommissioning Waste Streams and Disposal Destinations

| Source | Waste Type | Volume ($m^3$) | Disposal Destination ($m^3$) | | |
|---|---|---|---|---|---|
| | | | Shafts | NPAG WRSA | Off-site Recycling |
| Surface Buildings, Services, and Facilities | Steel | 6,962 | 1,392 | - | 5,569 |
| | Concrete | 65,632 | 22,849 | 42,784 | - |
| | Mixed | 7,250 | 7,250 | - | - |
| Lined Areas | Mixed | 3,827 | 3,827 | - | - |
| Linear Infrastructure | Mixed | 1,774 | 1,774 | - | - |
| **Subtotal – Steel** | | 6,962 | 1,392 | - | 5,569 |
| **Subtotal – Concrete** | | 65,632 | 22,849 | 42,784 | - |
| **Subtotal – Mixed** | | 12,850 | 12,850 | - | - |
| **Total** | | **85,445** | **37,092** | **42,784** | **5,569** |

NPAG = non-potentially acid generating; WRSA = waste rock storage area; - = not applicable.

Approximate volumes available for disposing decommissioning demolition waste into the shafts at the end of the Construction phase and prior to the Operations phase are shown in Table 12. Volumes provided do not account for the engineered concrete plugs. It is anticipated that approximately 90% of the shaft volumes would be available for waste disposal at the end of the Construction phase. A range of utilization percentages is provided to help estimate the amount of residual material that may require management if 90% utilization is not met.

Table 12: Available Underground Volume in Mine Shafts at the end of the Construction Phase

| Facility | Inner Diameter (m) | Depth (m) | Volume Utilization | | | |
|---|---|---|---|---|---|---|
| | | | 100% | 90% | 80% | 70% |
| Production Shaft | 8 | 568 | 28,551 | 25,696 | 22,841 | 19,986 |
| Exhaust Shaft | 5.5 | 533 | 12,663 | 11,397 | 10,131 | 8,864 |
| **Total Shaft Volume ($m^3$)** | | | **41,214** | **37,093** | **32,971** | **28,850** |

Waste requiring underground disposal prior to commencement of decommissioning would be stored in the underground mine workings. Underground workings could also be utilized to store decommissioning demolition waste should the volume of decommissioning demolition waste exceed space available in the shafts. Approximate volumes available for disposing waste into the open lateral development within the mine workings at the end of the Construction phase are shown in Table 13.

Table 13: Available Underground Volume in Mine Workings at the end of the Construction Phase

| Facility | Drift Size | | Available Length (m) | Volume Utilization ($m^3$) [(a)] | | |
|---|---|---|---|---|---|---|
| | Width (m) | Height (m) | | 100% | 70% | 30% |
| Total lateral development | 5 | 5 | 4,600 | 115,000 | 80,500 | 34,500 |

a) Volume represented as total void space. Volume utilization is predicted to range between 30% (end dumping) to 70% (mechanical stacking).

### 6.1.13 PE 3.1 On-site Disposal

Underground disposal of decommissioning demolition waste was selected through a detailed multiple accounts exercise as a preferred method of disposal because it would create no additional visual impacts, have low potential for community effects, and have low potential physical and/or health risks to people downstream. No additional disturbance is required for underground disposal and ecological effects are limited to the existing surface disturbance and interactions of the waste with groundwater. Critical services (e.g., mine dewatering, heating, ventilation) and required equipment would remain in place during care and maintenance and until decommissioning demolition waste quantities are confirmed and it is determined that sufficient storage space is available to dispose waste in the shafts.

Non-hazardous decommissioning demolition waste that is not slated for recycling or disposal off-site will be dumped into the shafts. To prevent inadvertent plugging of the shafts during disposal, the internal shaft infrastructure (e.g., shaft steel) would be removed. To facilitate disposal activities, waste materials would be sheered to appropriate sizes. Dumping activities would be conducted using a systematic orderly approach.

As shown in Figure 8 and the *Production & Exhaust Shaft Post-Closure Concept, ROOK-DEC-SEC-00001* drawing included in Appendix A, non-hazardous decommissioning demolition wastes would be deposited into the shafts starting at the shaft bottom. Disposal would be temporarily halted once waste reaches the bottom of the hydrostatic liner near the top of the bedrock to install concrete plugs (Figure 8) for each shaft. Once the concrete plug is set, waste disposal would resume. Broken concrete from the decommissioning demolition process would be deposited into the shafts above the concrete plug using a stacker. Waste would be deposited systematically, filling the shafts until the waste is near the surface. If required, NPAG waste rock may be used as supplemental material to fill void spacing above the concrete plug. A shallow reinforced engineered concrete plug would then be placed at surface to seal each shaft.

As described in PE 3.0 Waste Disposal (section 6.1.12), if decommissioning demolition waste volumes exceed the space available in the shafts, the underground mine workings would be utilized for disposal of excess waste. Decommissioning demolition waste requiring disposal in underground workings would be staged on surface prior to being loaded by surface equipment into the production shaft underground conveyance system (i.e., skips). Following conveyance underground via the production shaft, waste would be unloaded by underground equipment into a near-shaft staging area. Underground loading and hauling equipment would then transfer the materials from the staging area to the appropriate disposal areas for end-dumping or mechanical stacking.

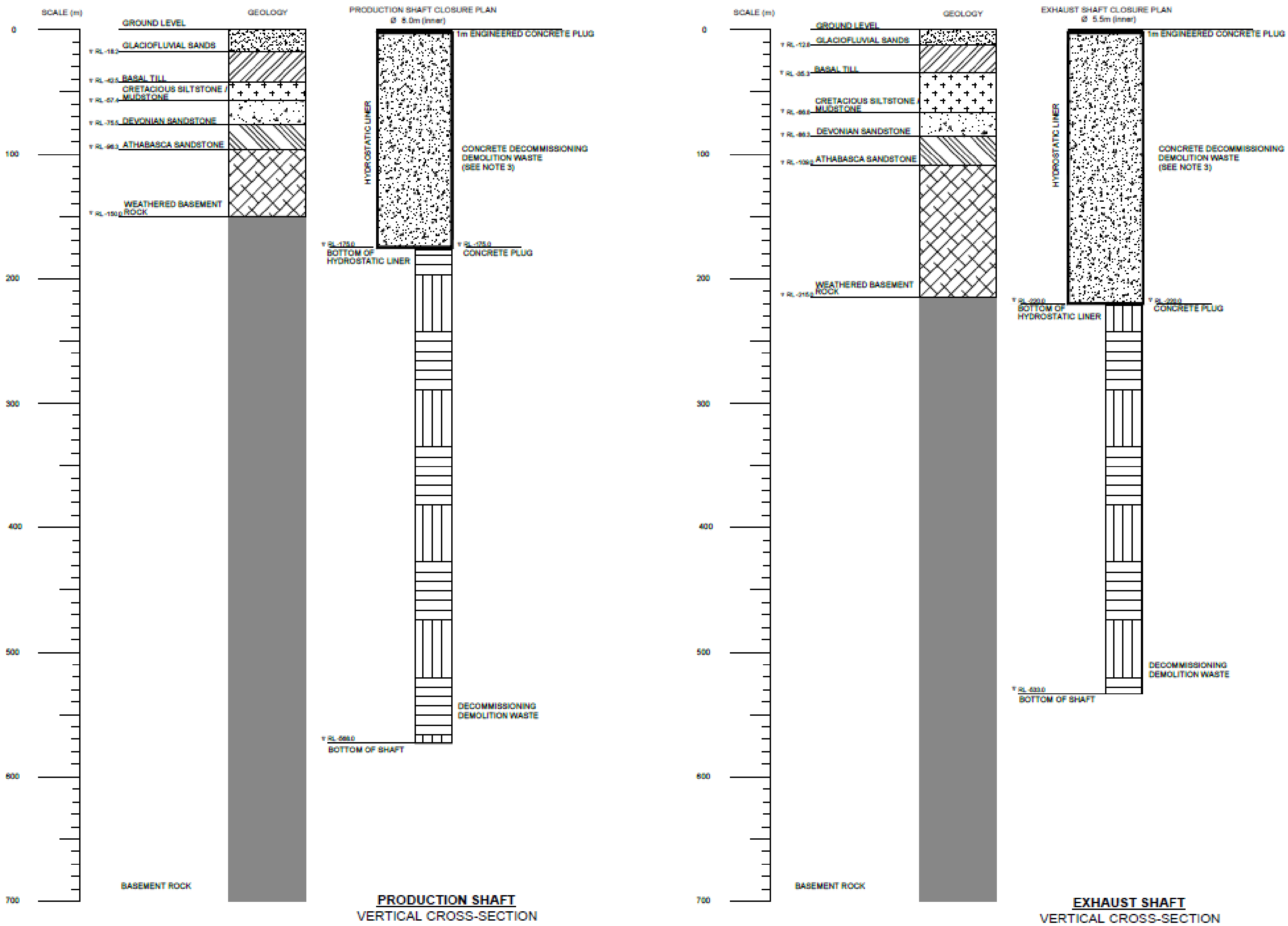


Figure 8: Exhaust Shaft and Production Shaft Closure Plan Geology and Decommisisoning Plan

### 6.1.14 PE 3.2 Off-site Disposal

Wherever practicable, surface and underground infrastructure, equipment, and materials not required during the Active Closure stage, and which meet radiological criteria for off-site removal, would be salvaged, sold, or transferred off-site for recycling or disposal at an authorized facility. Oversize steel components identified for potential future re-use, such as mill components, would be systematically dismantled and transported off-site via flat deck trailer. Other metal wastes would be segregated during demolition, sheared to appropriate size, and loaded into super Bs with open-top bin style containment for transportation to an authorized facility. The *Rook I Preliminary Decommissioning and Reclamation Cost Estimate* does not account for recovering value associated with the salvage or sale of structures and equipment. All waste sent off-site will be packaged in a manner to minimize accidental release and transported in a manner that complies with applicable requirements.

Hazardous materials not required for decommissioning would be removed and sent off-site by a licensed contractor for recycling or disposal at an authorized facility. Dangerous goods would be managed in accordance with *The Hazardous Substances and Waste Dangerous Goods Regulations* and transported in accordance with the *Transportation of Dangerous Goods Regulations*. Hazardous materials that may be on-site at the end of the Construction phase include:

- acetylene gas;
- ammonia;
- diesel fuel;
- jet fuel;
- ferric chloride;
- organosulphide;
- liquid natural gas;
- sodium hydroxide;
- sulphuric acid;
- unleaded gasoline; and
- waste oil.

Hazardous materials required to facilitate Active Closure stage activities (e.g., diesel fuel) would be consumed on-site. Inventories would be monitored and resupplied as necessary to maintain sufficient quantities. Stock reordering would be tapered such that a minimal amount of material would remain on-site at the end of the Active Closure stage. Any remaining hazardous materials would be removed, and the systems would be purged. The tanks and any vaporizer components and piping would be dismantled and disposed of as described above.

No structures or equipment would remain on the surface of the site post-decommissioning unless required for monitoring or maintenance activities. Hazardous decommissioning demolition waste not suitable or not safe for underground storage would be sent off-site to authorized facilities.

### 6.1.15 PE 4.0 Mine Rock Stockpiles and Storage Areas

Mine rock is the material removed from the underground workings. Mine rock generated during the Construction phase of the Project due to shaft sinking, underground mine development, and excavation of the UGTMF storage chambers would be characterized, segregated according to the definitions in Table 14, and transported to the respective storage locations (Figure 9). Mine rock expected to be encountered during the Construction phase includes soils and overburden, PAG waste rock, and NPAG waste rock. Ore, marginal ore, and special waste rock is not expected to be encountered during the Construction phase. The mine rock storage location capacities and footprints at the end of the Construction phase are provided in Table 14.

Waste rock management facilities and systems are designed for responsible closure in a manner that protects and preserves the environment though the Project life cycle and minimizes the reliance on active institutional controls following decommissioning and reclamation.

The PAG WRSA would be placed on a high-density polyethylene (HDPE) liner and used for long-term storage of PAG waste rock. Alternating lifts of PAG waste rock and engineered source control layers would be placed at the PAG WRSA at 4H:1V final design slopes to facilitate progressive reclamation (i.e., revegetation) of lower slopes (section 7.6). The engineered source control design concept includes the use of prescribed waste rock and control layer placement such that oxygen ingress to the waste rock is reduced compared to conventional construction methods. The PAG WRSA would be fully decommissioned, revegetated, and closed during the Active Closure stage.

The NPAG WRSA would be unlined and used for short- and long-term storage of NPAG waste rock. The NPAG waste rock not used as a construction borrow source would remain in place and be contoured and reclaimed during the Active Closure stage.

Table 14: Mine Rock Storage Areas Terminology, Footprints, and Capacity

| Waste Rock Term | Details | Volume Capacity ($m^3$) at the end of Construction | Footprint ($m^2$) at the end of Construction |
|---|---|---|---|
| Ore | Ore is mine rock sourced from underground with greater than or equal to 0.3% $U_3O_8$ (i.e., triuranium octoxide). Ore would be temporarily stored in the ore storage stockpile. | - | |
| Marginal Ore | Marginal ore is mine rock with greater than or equal to 0.26% $U_3O_8$ and less than 0.3% $U_3O_8$ that must be extracted to access ore mining areas. Marginal ore would be temporarily stored in the ore storage stockpile. | - | 13,382 |
| Special Waste Rock (SWR) | Special waste rock includes mine rock with greater than 0.03% $U_3O_8$ and less than 0.26% $U_3O_8$. All SWR would be temporarily stored in the SWR stockpile. | - | |
| Potentially Acid Generating (PAG) Waste Rock | PAG waste rock is mine rock with less than 0.03% $U_3O_8$ and greater than or equal to 0.1% sulphur. All PAG mine rock would be stored in the PAG waste rock storage area (WRSA). | 196,622 | 56,000 |
| Non-potentially Acid Generating (NPAG) Waste Rock | NPAG waste rock is clean mine rock with less than 0.03% $U_3O_8$ and less than 0.1% sulphur. NPAG waste rock would either be stockpiled for use as construction material at site or stored in the NPAG WRSA. | 245,715[a] | 45,000 |

a) If required, NPAG waste rock may be used as supplemental material to fill void spacing above the concrete plugs in the production and exhaust shafts.

- = not applicable; $U_3O_8$ = triuranium octoxide; SWR = special waste rock; PAG = potentially acid generating; NPAG = non-potentially acid generating; WRSA = waste rock storage area.

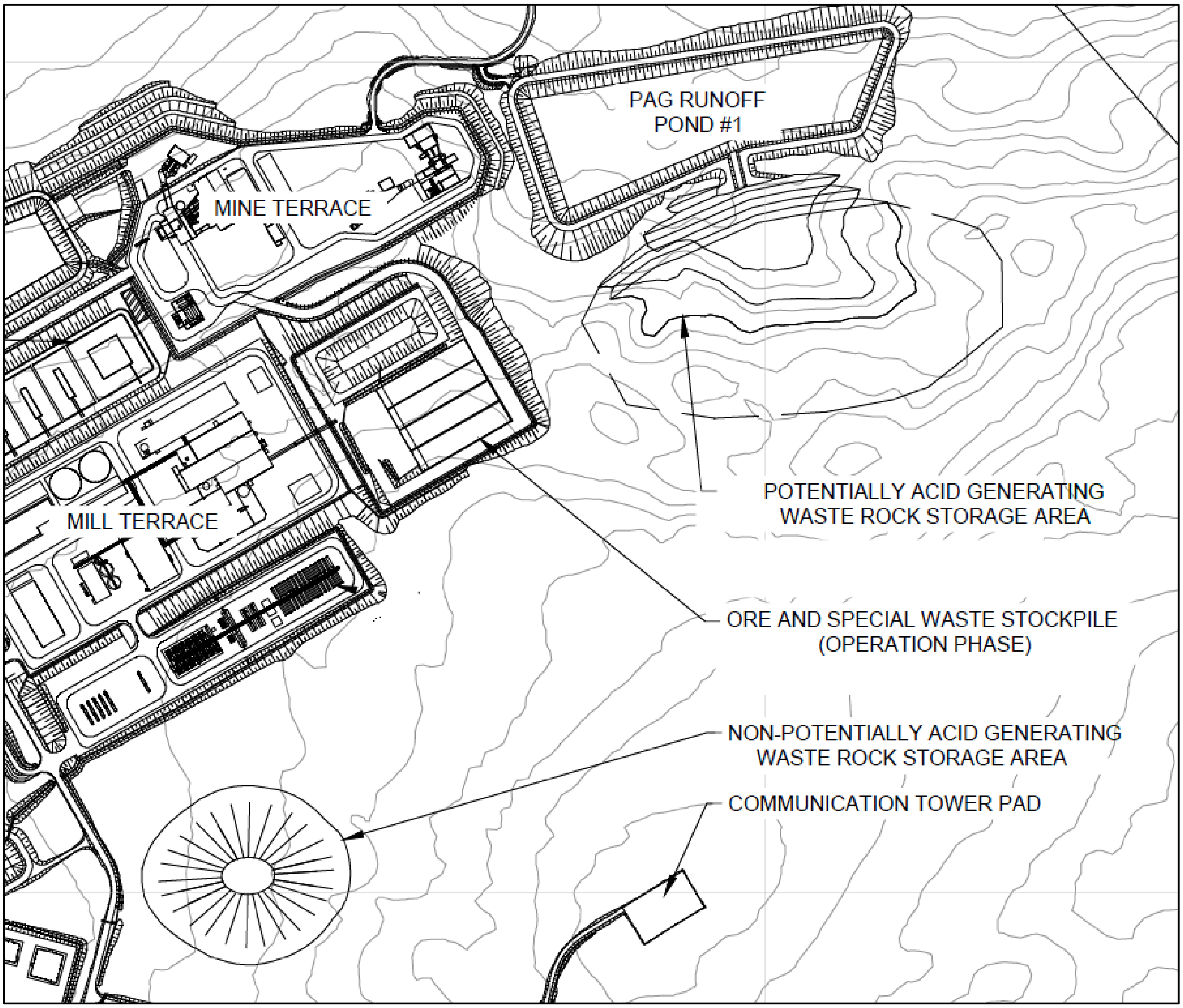


Figure 9: Mine Rock Storage Locations

### 6.1.16 PE 5.0 Site Roads and Disturbed Areas

Site roads are trafficable areas that provide access to Project site features. All site features would be accessible either by new site roads or by upgraded site trails or roads where a feature requires minimal access and a site trail or road to it already exists. A summary of the approximate areas of roads, culverts, and disturbed areas that would be developed to support the Project is included in Table 15. Figure 10 shows a layout of the site roads.

Disturbed surface areas (i.e., supporting infrastructure areas that were disturbed to support the Construction phase of the Project), would be reclaimed as described in section 7. Roads would be decommissioned by removing culverts, levelling berms, and decompacting surfaces, where required, to establish conditions that are suitable for reclamation as described in section 7. The gatehouse would remain in place to restrict public access until the end of the Active Closure stage and be disposed off-site.

Table 15: Roads and Disturbed Areas

| Category | | Length (m) | Width (m) | Height (m) | Footprint (m$^2$) |
|---|---|---|---|---|---|
| Site Roads | Primary | 3,256 | 8 | - | 26,048 |
| | Secondary | 3,695 | 6 | - | 22,170 |
| | Off-site | Irregular | | - | 240,000 |
| | Mine Haul Road | 1,014 | 12 | - | 12,168 |
| | Mine Haul Road (Temporary) | 1,369 | 12 | - | 16,428 |
| Disturbed Areas | Gatehouse | 8 | 8 | 5 | 64 |
| | Culverts | 1,113 | 0.15 to 0.6 | - | - |
| | Apron | 200 | 110 | - | 22,000 |
| | Contractor Laydown | 450 | 500 | - | 225,000 |
| | Temporary Camp Laydown | 100 | 100 | - | 10,000 |
| | Owner's Office Laydown | 200 | 100 | - | 20,000 |
| | Area of Mine Surface | Irregular | | - | 78,725 |
| | Area of Mill Surface | 220 | 440 | - | 96,800 |

- = not applicable.

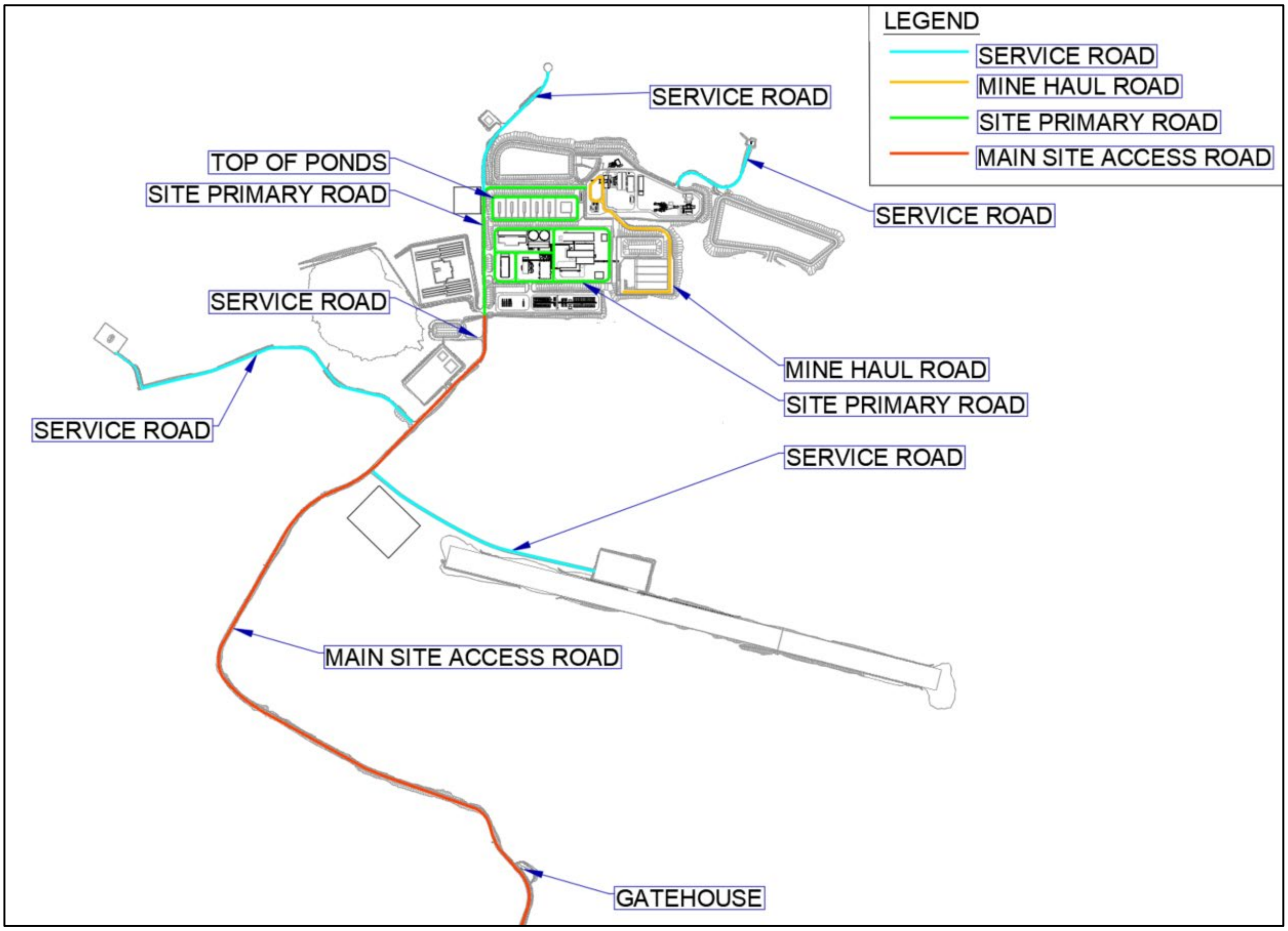


Figure 10: Site Roads

## 6.2 Site-wide Gamma Survey

A detailed site-wide gamma survey would be performed prior to the commencement of decommissioning activities. Results of the baseline site-wide gamma survey completed in 2022 (CanNorth 2022), and from the detailed site-wide gamma survey, would inform the *Detailed Decommissioning and Reclamation Plan.* Results would help to characterize the radiological conditions, establish detailed radiological end-points, and identify targeted decommissioning and reclamation activities. Results would be compared to criteria identified in the *Saskatchewan Guidelines for Northern Mine Decommissioning and Reclamation* for gamma radiation.

During the Closure phase, a post-closure site-wide gamma survey on a 10 m x 10 m grid would be performed and a record of the results maintained; however, radiological contamination is not anticipated during the Construction phase. If material within the survey area is identified that exceeds the established radiological criteria it would be collected and dumped into the shafts during the Active Closure stage. The surveys would include, but may not necessarily be limited to, all disturbed area within the mineral surface lease and the access road from the site to Highway 955.

# 7 Land Reclamation

Land reclamation is a mitigation measure that returns the land to a useful and productive state (e.g., covering and revegetating a surface facility). This section describes the approach to reclaiming the disturbed land in a way that would facilitate achieving the final decommissioning and reclamation objectives described in section 2.1. Reclamation of the Project area would consist of:

- landform design;
- site preparation including decompaction, as required;
- reclamation material handling;
- erosion control;
- revegetation; and
- progressive decommissioning and reclamation.

Conceptual renderings of the Project site (end of the Operations phase) before and after the Active Closure stage are shown in Figure 11 and Figure 12.

Figure 11: Conceptual Rendering of the Rook I Project following the Operations Phase, before the Active Closure Stage

Figure 12: Conceptual Rendering of the Rook I Project after the Active Closure Stage

## 7.1 Landform Design

Landform design is the process of establishing criteria for landforms such as stable slopes and cover system concepts. For the Project site, landform design involves re-shaping the land surface to be stable and integrated into the landscape resulting in landforms that are similar to those in the adjacent undisturbed landscape. Implementation of the desired landform designs for the Project generally involves two primary stages:

- **Construction/stabilization**
  - NPAG WRSA – The NPAG WRSA would be contoured and reclaimed during the Active Closure stage to create a long-term structurally stable form.
  - PAG WRSA – The PAG WRSA would be constructed in alternating lifts of PAG waste rock and engineered source control layers at 4H:1V final design slopes to facilitate progressive reclamation (i.e., revegetation) of lower slopes. The PAG WRSA would be fully decommissioned, revegetated, and closed during the Active Closure stage.
- **Recontouring the Project site**
  - The Project site would be contoured to result in a gently rolling terrain that is similar to existing topography and would encourage topographic diversity.

### 7.1.1 Drainage Design

Drainage design is the process of designing landform features in a specific way to encourage the flow of surface water in desired directions. Natural drainage would be established on the Project site using a geomorphic design approach. This approach aims to provide sustainable, dynamic systems capable of accommodating changes without accelerated erosion or unacceptable environmental risks. The geomorphic approach is based on the recognition that natural drainage systems ebb and flow seasonally and exhibit sediment equilibrium, and that natural channels change over time.

At the Project site, to the extent possible, drainage patterns would be reintegrated with the surrounding landscape with the objective of channelling overland flows to limit erosion and unintentional ponding on, or adjacent to, the Project. To the extent practicable, water drainage would be restored to flow to the same watersheds as prior to Project development.

## 7.2 Site Preparation

Site preparation consists of the techniques that are used to prepare a site to integrate with the surrounding landscape by adding surface variability, providing a more effective growth medium (e.g., enhancing soil moisture) to support revegetation, and increasing biodiversity and vegetation survival.

Site preparation would be completed using a combination of the following techniques, depending on the facility and site-specific conditions:

- **Recontouring** – Landform features would be reshaped to be safe, stable, accessible, functional, and appear natural. One of the most important aspects of recontouring is to restore effective drainage. This technique would be applied throughout the Project site.
- **Deep ripping** – This technique would be used to break up any heavily compacted surfaces. Ripping is typically completed with a ripper tooth or a plow to a depth of at least 50 cm. Ripping is commonly used on building pads, roads, and laydowns that are heavily compacted. Disking can also be used to decompact the surface (from 10 to 15 cm depth) of less compacted areas. The majority of the substrates within the Project site are sandy and are typically not prone to compaction; however, the need to 'deep rip' would be determined on a site-by-site basis.
- **Rough mounding** – Mounds and hollows would be created using Project equipment such as excavators. The bucket/rake attachment for excavators is specifically designed to flip the soil in a manner that creates more suitable planting sites. Excavated material is generally placed adjacent to, or overlapping, the edge of a depression to create mounds and hollows in a checkerboard pattern. Mounding is effective for erosion-prone slopes and low-lying organic areas.

## 7.3 Reclamation Material Handling

### 7.3.1 Soil Salvage and Stockpiling

Soils in and surrounding the Project site are in the upper 0.05 m to 0.10 m of the upper glacial till unit. The soils support vegetation growth and are an important resource for progressive reclamation during the Operations phase and reclamation during the Active Closure stage. Surface soil (i.e., topsoil) consists of organic litter layers, low-lying vegetation mats, and the underlying upper mineral horizon. It may also include stumps and root wads. This material would be salvaged to a depth of approximately 15 cm (6 in), and not deeper than 30 cm (12 in), except where the removal of root wads brings up deeper materials.

Industry best management practices for soil savage include:

- monitoring of soil salvage activities by a qualified professional who identifies materials to be stripped, material types, appropriate stripping depths, and appropriate stockpile locations;
- using low ground-bearing pressure machinery to prevent compaction;
- suspending placement operations if the ground becomes too wet such that equipment causes severe rutting or compaction; and
- separating surface soils from the underlying subsoil to the extent practicable.

A preliminary estimate of the amount of soil available for salvage during the Construction phase and placement during reclamation is approximately 310,000 $m^3$. This balance is based on soil depths and properties recorded during baseline soil surveys. The balance is a calculation of *in situ* volumes and does not account for bulk density changes during salvage and stockpiling or material loss through handling. It is expected that the actual volume of soil would vary based on site-specific conditions and soil handling equipment limitations.

Industry best management practices for stockpiling soils include:

- locating soil stockpiles in areas that minimize handling requirements during site preparation and mine operations;
- locating soil stockpiles away from waterbodies, watercourses, and wetlands (e.g., farther than 10 m away);
- creating rough surfaces on the stockpiles to reduce the potential for erosion and provide a seed bed for revegetation;
- seeding soil stockpiles with a rapidly establishing, erosion-control native grass seed mix suited to the area; and
- installing drainage ditches, berms, sediment fencing, straw bales, or other erosion control cloths to protect the surrounding area from siltation, where required.

Soil stockpiles are monitored for erosion, weed growth, and native vegetation establishment. Where required, weeds are removed, and erosion paths are repaired.

Replacing soil as part of progressive reclamation during the Operations phase and reclamation during the Active Closure stage helps rebuild a functioning ecosystem by providing water-holding capacity, maintaining nutrient cycling, and contributing organic matter. Properly salvaged, stockpiled, and replaced soil can reduce the time and cost to meet reclamation objectives.

The management of soils and overburden at the Project site is further described in the *Rook I Waste Management Program*.

### 7.3.2 Woody Debris Management

Coarse woody debris is defined as dead, downed, or standing wood such as logs, uprooted stumps, large branches, and coarse roots, in all stages of decomposition. Coarse woody debris is recognized as a valuable reclamation resource as its application increases microtopographic variability and creates favourable microsites for seedling establishment, along with localized changes in soil moisture, improved erosion control, reduced herbivore browsing, habitat for small animals and soil fauna, and additional organic matter and nutrients associated with vegetation decomposition.

Where safe and effective, non-merchantable timber would be salvaged and stockpiled for use as a reclamation material.

### 7.3.3 Reclamation Material Placement

Reclamation material placement is the process of placing salvaged soil and/or woody debris back on the landscape. Reclamation material prescriptions are developed to facilitate the effective management of reclamation materials to develop a growth medium that would facilitate achieving the overall reclamation objectives. Soil cover systems would be created for the Project to encourage biodiversity at closure through the development of variable soil moisture and nutrient regimes designed to facilitate various target ecosystems and planting prescriptions. Woody debris is spread over replaced soil, where possible.

Industry best management practices for reclamation material placement include the following:

- monitoring of placement activities by a qualified professional using a handheld probe to confirm minimum depths are achieved and soil suitability is maintained during application activities;
- minimizing the number of equipment passes over newly placed soil;
- preferentially using wheeled or tracked equipment with low ground-bearing pressure front ends (i.e., loaders and/or bulldozers); and
- suspending placement operations if the ground becomes too wet such that equipment causes severe rutting or compaction.

NexGen continues to investigate soil amendments and other methods to improve probability of reclamation success and quality of on-site reclamation materials.

## 7.4 Erosion Control

Erosion control includes techniques, activities, or practices that are designed to protect exposed soil surfaces and conserve soil to prevent or reduce sediment transport, promote revegetation, and help safeguard the geotechnical stability of structures. Generally, the primary erosion control measure is to seed and plant disturbed areas at the earliest opportunity; however, additional short-term erosion control measures may be required where there may not be enough time for vegetation establishment. Short-term erosion control measures may include the use of erosion control blankets, live staking, clean straw bales, straw wattles, socks, or sediment fencing. Erosion control measures would be determined on a site-by-site basis. Re-sloping may also be conducted to direct surface flow away from slope faces to minimize surface water erosion, where possible.

Proper contouring of a reclamation area would limit the overall erosion potential by creating irregular surfaces that slow overland flows, channels that capture and direct flows, and rapid revegetation to further slow surface water and increase infiltration.

## 7.5 Revegetation

Revegetation is the process of revegetating areas that have been previously disturbed. Successful reclamation requires the re-establishment of ecosystem functions based on natural successional processes. Natural ecological succession is a process whereby changes in the species structure of an ecological community occur naturally over time. Accordingly, revegetation prescriptions are planned with the intention of achieving ecosite-specific goals for a given area of land.

Industry best management practices for revegetation include the following:

- monitoring of planting activities by a qualified professional;
- establishing a diversity of plant species richness and structural diversity;
- minimizing bare ground and subsequent weed invasion;
- promoting the use of local seed sources to maintain the genetic integrity of revegetation plant material; and
- promoting early recolonization of reclaimed land by wildlife with a focus on species of primary interest for traditional land use.

Revegetation may vary according to the substrate type, target ecosite, landform, landscape position, and vegetation type being planted.

### 7.5.1 Planting Prescriptions

Planting prescriptions provide instructions detailing the plant species, application rate, and timing of fertilizer applications, if required. Planting prescriptions provide a roadmap for revegetation to achieve target returning land uses and overarching reclamation goals. Revegetation would be augmented by natural ingress of locally common species, many of which have been identified as traditional use species, and natural succession, thereby providing a framework for these revegetated areas to evolve into ecosystems similar to those naturally present in the region.

Revegetation activities would proceed as areas become available for reclamation. Target ecosites would be selected using the Field Guide to the Ecosites of Saskatchewan's Provincial Forests (McLaughlan et al. 2010) by matching predicted edaphic (i.e., influenced by soil) conditions of areas to be reclaimed to their respective ecosite.

The preliminary planting prescriptions for the Project (Table 16) consider the species composition needed for different ecosites and gives preference to species identified for traditional use as described in the *Rook I Environmental Impact Statement*. Final planting prescriptions including in the *Detailed Decommissioning and Reclamation Plan* would be subject to approval by the Saskatchewan Ministry of Environment. The density and distribution of species would be determined on a site-by-site basis depending on material availability, returning land use objectives, substrate type, and results from monitoring of reclaimed sites at other mines.

Table 16: Preliminary Planting Prescriptions Linking Ecosites to Vegetation, Reclamation, and Capping Material[(a)]

| Site Type | Cover System | Landscape Position | Suitable Vegetation Species |
|---|---|---|---|
| Dry Forest Jack Pine / Lichen | topsoil mixed with sandy substrate | level areas, mid and upper slopes | jack pine |
| | | | paper birch |
| | | | blueberry |
| Shrubland, Riparian | topsoil mixed with sandy substrate | lower slopes, adjacent to watercourses, waterbodies and wetlands | river alder |
| | | | paper birch |

a) Planting densities would target densities similar to ecosystems in the surrounding undisturbed landscape.

Additional species may be added to planting prescriptions on a site-by-site basis. This may include introduction of understorey species, locally collected traditional use species, locally common grasses for erosion control, specific habitat elements for target species (e.g., berry bushes for bears), or experimental introduction of mosses and lichens (e.g., transplant mats, clippings).

## 7.6 Progressive Decommissioning and Reclamation

Temporary reclamation, sometimes referred to as interim reclamation, is reclamation and maintenance activities for areas that are expected to be re-disturbed in the future (e.g., revegetation of road ditches, revegetation of soil stockpiles to support erosion control measures).

Progressive reclamation is any interim or concurrent reclamation of land undertaken during, following or in connection with construction/development and ongoing operation associated with an active mine site. Progressive reclamation reduces the amount of land that must be reclaimed at the end of a mining operation.

The pace of progressive reclamation is governed by the availability of areas that are no longer required for mine operations. NexGen's goal is to complete reclamation activities as soon as practicable after development areas are no longer required as part of operations.

The benefits of progressive reclamation include:

- reducing the cumulative effects of the Project (e.g., area direct habitat loss, erosion potential, dust production, invasive species establishment);
- optimizing the quality and availability of reclamation materials (e.g., direct placement and/or short-term stockpiling of soil, creating seed sources for future reclamation);
- creating opportunities to use woody debris and other habitat enhancements that may be more difficult to store in the long term;
- returning land uses more quickly;
- spreading the cost of reclamation out over the mine life;
- reclaiming landforms while equipment, operators, and personnel to monitor reclaimed sites are already present on-site, reducing the need for additional mobilizations; and
- creating opportunities to test reclamation approaches, with outcomes influencing future reclamation plans and prescriptions.

Key considerations to determine if a piece of land is appropriate for progressive reclamation include:

- confirmation that the land would not be needed again during Project activities and would be accessible for reclamation activities and monitoring;
- confirmation that the landform would be built in its closure configuration or can be recontoured without negatively affecting the adjacent areas;
- planning for how water that is coming on to and off of the reclaimed site would be managed both during progressive reclamation and after it is integrated into the site-wide reclamation;
- planning for how the reclaimed land would be used (e.g., would the reclaimed site attract wildlife and would that result in damage to the landform or potential human-wildlife interactions; would the public be allowed on the land and what type of land use would be permitted); and
- planning for access management to prevent access by wildlife and/or humans, if required.

Progressively reclaimed sites can be closely monitored and maintained by on-site personnel and can provide mitigations for environmental impacts as well as learnings that would allow for improved reclamation success over time.

Areas available for progressive reclamation are expected to be limited because of the conscious Project design decisions made by NexGen in consideration of future decommissioning and reclamation requirements. NexGen has incorporated key elements of progressive reclamation into the underground mine design (e.g., progressive closure of underground areas and UGTMF chambers during the Operations phase) and the design of the PAG WRSA (e.g., construction incorporating engineered source control layers and stockpile configuration to final closure side slopes). Any other areas that may be disturbed during the Construction phase or Operations phase, but that are not required for the continued operation of the Project, would be identified as candidates for progressive reclamation.

# 8 Document and Record Management

Documents and records generated for or due to decommissioning and reclamation activities are controlled to verify the information is accurate, available when needed, and protected from uncontrolled alteration. Documents and records allow for the long-term retention of knowledge and can help identify post-closure land use restrictions that may exist.

Documents may include, but are not limited to, procedures and work instructions that outline safe and environmentally responsible decommissioning and reclamation practices.

Records specific to decommissioning and reclamation may include, but are not limited to:

- training received by workers performing decommissioning and reclamation activities;
- drawings and plans showing surface infrastructure, underground mine workings, and waste disposal facilities;
- quantities of decommissioning demolition waste disposed on-site and off-site;
- worker dosimetry records; and
- effluent and environmental monitoring results.

The processes for managing documents and records are outlined within the *Rook I Integrated Management System Manual*.

# 9 Monitoring and Control

The IMS would provide the management system processes and administrative control required to protect workers, the public, and environment from associated risks during decommissioning and reclamation.

The IMS consists of the program-level documents and supporting documentation that are organized into categories that reflect the CNSC safety and control areas and other matters of regulatory interest as shown in Figure 4. Programs and supporting processes (e.g., plans, procedures) would be reviewed and revised prior to commencing the Active Closure stage to align with the work being completed at site (e.g., the cessation of mining and the beginning of building and infrastructure demolition) and to effectively mitigate impacts of radiological and non-radiological hazards on people and the environment.

## 9.1 Risk Management

Potential hazards associated with Project activities are systematically assessed to determine risks to human health and safety and the environment and to identify and implement measures to mitigate impacts. The type of assessment performed is appropriate for the topic, apparent level of risk, safety significance, and the complexity of activity. The general risk management framework, process, and requirements are described in the *Rook I Integrated Management System Manual*. Other risk assessment methodologies (e.g., Job Hazard Analysis) are further described in the supporting programs, plans, and procedures, as applicable.

Pillars that would be established as a result of the construction of the UGTMF were assessed to evaluate stress-strength relationships and sensitivity to intact and rock mass inputs. Results indicate that pillars are predicted to exhibit general overall stability conditions, with modelled stress moderately below standard damage limitation threshold criteria (*Rook I Mining and Milling Facility Description Manual*).

A preliminary summary of hazards to workers, the public, and the environment that are anticipated to be encountered during Active Closure for each PE is provided in Table 17. A more detailed overview, including an overview of applicable controls to mitigate impacts, would be developed as part of the *Detailed Decommissioning and Reclamation Plan*.

Table 17: Summary of Decommissioning and Reclamation Risks to Workers, the Public, and the Environment

| Planning Envelope | Workers | Public | Environment |
|---|---|---|---|
| PE 1.0 Underground Facilities | ▪ Working around moving and active equipment<br>▪ Exposure to spills or unauthorized releases<br>▪ Radiation exposure and cross-contamination<br>▪ Handling explosives<br>▪ Confined spaces<br>▪ Handling demolition materials<br>▪ Dust | ▪ None, public access to the site would be restricted during the Active Closure stage | ▪ Spills or unauthorized releases |
| PE 2.0 Surface Buildings, Facilities, and Services | ▪ Moving and active equipment<br>▪ Locating utilities<br>▪ Exposure to spills or unauthorized releases<br>▪ Radiation exposure and cross-contamination<br>▪ Dust<br>▪ Handling demolition materials<br>▪ Confined spaces<br>▪ Exposure to acid fumes and liquid acid<br>▪ Working alongside hazardous substances<br>▪ Working around excavations | ▪ None, public access to the site would be restricted during the Active Closure stage | ▪ Spills or unauthorized releases<br>▪ Impacts to surface water due to erosion and sedimentation<br>▪ Injury or mortality to wildlife caused by Active Closure stage activities (e.g., moving equipment, excavations) |
| PE 3.0 Waste Disposal | ▪ Working around moving and active equipment<br>▪ Working around shaft openings/holes<br>▪ Exposure to spills or unauthorized releases | ▪ Vehicle traffic on public roads used to send waste for off-site disposal | ▪ Spills or unauthorized releases<br>▪ Injury or mortality to wildlife caused by Active Closure stage activities (e.g., moving equipment, excavations) |
| PE 4.0 Mine Rock Stockpiles and Storage Areas | ▪ Working around moving and active equipment<br>▪ Exposure to spills or unauthorized releases | ▪ None, public access to the site would be restricted during the Active Closure stage | ▪ Spills or unauthorized releases<br>▪ Injury or mortality to wildlife caused by Active Closure stage activities (e.g., moving equipment, excavations) |
| PE 5.0 Site Roads and Disturbed Areas | ▪ Working around moving and active equipment<br>▪ Exposure to spills or unauthorized releases<br>▪ Working around excavations<br>▪ Handling demolition materials<br>▪ Dust | ▪ None, public access to the site would be restricted during the Active Closure stage<br>▪ Hazards, such as motor vehicle incidents, exist for the public who don't follow posted and communicated access restrictions | ▪ Spills or unauthorized releases<br>▪ Impacts to surface water due to erosion and sedimentation<br>▪ Injury or mortality to wildlife caused by Active Closure stage activities (e.g., moving equipment, excavations) |

## 9.2 Worker Monitoring

To keep exposures to ionizing radiation hazards as low as reasonably achievable (ALARA) during all phases of mine life, exposures to gamma radiation, long-lived radioactive dust, radon progeny, and radon gas would be routinely monitored for workers designated as nuclear energy workers. Personal dosimetry equipment is provided for all workers who require it, and dose records would be maintained for each nuclear energy worker at the Project site. Effective (whole body) and equivalent (organ-specific) doses are measured and recorded as applicable. Doses are routinely tracked and compared to internal and external limits. The processes for classifying nuclear energy workers and for managing worker dosimetry is described in the *Rook I Radiation Protection Program*.

Chemical, physical, or biological health and safety hazards encountered during all phases of mine life would be monitored in accordance with established sample collection and analysis methods to quantify exposure risk to workers and confirm the effectiveness of applicable controls. Results from personal occupational exposure and workplace monitoring would be collected, maintained, stored, communicated, and used to identify improvement opportunities (as required). The process for identifying health and safety hazards and monitoring occupational exposures is described in the *Rook I Health and Safety Program*.

## 9.3 Environmental Monitoring

Environmental monitoring performed during decommissioning and reclamation would include the parameters, locations, and frequencies required to maintain sufficient information regarding environmental quality and closure outcomes and to keep risks to the human health and the environment ALARA.

The *Effluent and Emissions Plan* and the *Environmental Monitoring Plan* (or equivalent) provide the basis for effluent, emission, and environmental monitoring requirements during decommissioning and reclamation.

For this Plan, it is assumed that environmental monitoring would occur in two distinct stages during the Active Closure stage and Transitional Monitoring stage. The *Detailed Decommissioning and Reclamation Plan* would include final environmental monitoring requirements.

Monitoring would confirm the success of the decommissioning and reclamation activities and demonstrate the Project site is in a stable or improving condition. Once this is demonstrated, NexGen would return the land to the Government of Saskatchewan under the Institutional Control Program with no long-term control measures anticipated.

### 9.3.1 Active Closure

Monitoring would continue during the Active Closure stage at approximately the same level as during the Construction phase. Within three years of notifying the Minster of Environment of the intention to close the Project, a biological monitoring study would be completed as required under the *Fisheries Act* and as further described in the *Metal and Diamond Mining Effluent Regulations*.

As decommissioning and reclamation advances, monitoring requirements are expected to be modified to accurately reflect the site conditions and activities (e.g., effluent monitoring would stop once effluent releases and emissions have ceased).

In general, environmental monitoring during the Active Closure stage would quantify changes (e.g., air, water, sediments, soil) to the environment. Once the Active Closure stage environmental monitoring is complete, the Transitional Monitoring stage monitoring would commence.

### 9.3.2 Transitional Monitoring

The Transitional Monitoring stage represents the period of time between the completion of the Active Closure stage and when the site is entered into the Institutional Control Program. The Transitional Monitoring stage is expected to last about 10 years, the standard minimum period for transition monitoring (MER 2018), pending achievement of success criteria. This stage would provide periodic measurement and assessment of the effectiveness of decommissioning and reclamation. The focus of monitoring during the Transitional Monitoring stage would be determined during the development of the *Detailed Decommissioning and Reclamation Plan* and is expected to focus on monitoring of post-decommissioning constituents of potential concern loadings, residual changes to the local drainage system and groundwater, geotechnical stability, and reclamation success. Post-reclamation gamma surveys would be completed after decommissioning and reclamation as required by the Saskatchewan Ministry of Environment and CNSC. Financial assurances sufficient to cover the cost of the Transitional Monitoring stage activities, as well as a contingency for unexpected occurrences, would be maintained.

During the Transitional Monitoring stage, periodic inspections would be conducted by regulators to confirm compliance with legal and other requirements. Reporting on monitoring and maintenance methods and results would be provided as required. Once the Project meets applicable success criteria (section 2.2), the process for transfer to the Institutional Control Program (section 10) would be initiated.

# 10 Transfer to Institutional Control Program

In Saskatchewan, the Institutional Control Registry (ICR) maintains a formal record of closed mining and mill sites, manages the funding for ongoing monitoring and maintenance (if required), and performs required monitoring and maintenance work.

The process of entering the Project into the ICR may be initiated once the success criteria of the Project site has been established and confirmed during the Transitional Monitoring stage. To enter the Project into the ICR, an application for the revocation of the CNSC licence under the *Nuclear Safety and Control Act* and an *Application for a Release from Decommissioning and Reclamation* would be prepared to obtain a release from further monitoring and maintenance responsibilities, and from the obligation to maintain financial assurance. Engagement with local Indigenous groups and communities would continue during this period.

Project decommissioning and reclamation would address requirements associated with the provincial and federal legislation. NexGen plans to transfer the Project land back to the Government of Saskatchewan through the Institutional Control Program with no, or minimal, maintenance post-closure and no long-term control measures.

# 11 Preliminary Decommissioning and Reclamation Schedule

Project decommissioning and reclamation would follow a logical sequence to ensure that adequate facilities and services are available for workers involved in decommissioning activities and with consideration for external factors (e.g., weather). Progressive decommissioning and reclamation of any areas of the mine that are no longer required (e.g., areas developed and used for construction of the mine) would be completed when possible.

The preliminary schedule (Table 18) was developed based on critical path activities and was used to support the development of the *Rook I Preliminary Decommissioning and Reclamation Cost Estimate.* Activities required for decommissioning and reclamation of each PE were determined and organized chronologically to better define the work scope and overall schedule.

Considerations that were factored into the development of the schedule include:

- The Active Closure stage includes a period of care and maintenance, which involves maintaining the site in a safe inactive state while regulatory approvals for decommissioning and closure are secured.
- Decommissioning activities can occur across PEs concurrently.
- Task durations are determined by the critical path equipment hours.
- The sequence of activities is based on the generation and disposal of decommissioning demolition waste and the need to maintain utilities and essential services required to support decommissioning and reclamation.
- Effluent treatment and the associated water management infrastructure would remain operable until operational control monitoring results determine that the collection and treatment of contact water is no longer required to meet established decommissioning criteria and protect the environment.
- The gatehouse will remain in place to restrict public access until the end of the Active Closure stage.

The schedule will be periodically updated along with the *Rook I Preliminary Decommissioning and Reclamation Cost Estimate* to reflect the most up-to-date information, and at minimum every five years throughout the Project life cycle. A detailed schedule of decommissioning activities would be included in the *Detailed Decommissioning and Reclamation Plan* that would be developed prior to cessation of operations and transition to the Closure phase.

The preliminary schedule for the Project is provided in Table 18. Year 0 indicates the commencement of the Active Closure stage regardless of the calendar year.

Table 18: Preliminary Decommissioning and Reclamation Schedule for the Rook I Project

| TASK | Year 0 | | | | Year 1 | | | | Year 2 to Year 12 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Approvals Management | | | | | | | | | | | | |
| Detailed Decommissioning Plan[(a)] | | | | | | | | | | | | |
| Decommissioning Regulatory Approvals | | | | | | | | | | | | |
| CNSC Cost Recovery Fee | | | | | | | | | | | | |
| Decommissioning Management | | | | | | | | | | | | |
| Site Management - Care and Maintenance | | | | | | | | | | | | |
| Decommissioning Management | | | | | | | | | | | | |
| Site Operations | | | | | | | | | | | | |
| Planning Envelope 1.0: Underground Facilities | | | | | | | | | | | | |
| PE 1.1: Underground Infrastructure and Services | | | | | | | | | | | | |
| PE 1.2: Underground Tailings Management Facility | | | | | | | | | | | | |
| PE 1.3: Mine Surface Openings | | | | | | | | | | | | |
| Planning Envelope 2.0: Surface Buildings, Facilities, and Services | | | | | | | | | | | | |
| PE 2.1: Mining Surface Facilities | | | | | | | | | | | | |
| PE 2.2: Process Plant | | | | | | | | | | | | |
| PE 2.3: Site Water Management | | | | | | | | | | | | |
| PE 2.4: Utilities and Essential Services | | | | | | | | | | | | |
| PE 2.5: Waste Management Facilities | | | | | | | | | | | | |
| PE 2.6: Surface Ancillary and Support Facilities | | | | | | | | | | | | |
| Planning Envelope 3.0: Waste Disposal | | | | | | | | | | | | |
| PE 3.1: On-Site Disposal | | | | | | | | | | | | |
| PE 3.2: Off-site Disposal | | | | | | | | | | | | |
| Planning Envelope 4.0: Mine Rock Stockpiles and Storage Areas | | | | | | | | | | | | |
| NPAG Waste Rock Storage Area | | | | | | | | | | | | |
| PAG - Waste Rock Storage Area | | | | | | | | | | | | |
| Ore and Special Waste Stockpile | | | | | | | | | | | | |
| Topsoil and Overburden Stockpiles | | | | | | | | | | | | |
| Planning Envelope 5.0: Site Roads and Disturbed Areas | | | | | | | | | | | | |
| Access Road | | | | | | | | | | | | |
| Gatehouse | | | | | | | | | | | | |
| Disturbed Areas | | | | | | | | | | | | |
| Environmental Monitoring | | | | | | | | | | | | |
| Active Closure stage[(b)] | | | | | | | | | | | | |
| Transitional Monitoring stage | | | | | | | | | | | | |

a) Includes pre-closure gamma survey.
b) Includes post-closure gamma survey.
Y = year; Q = quarter; PE = planning envelope.

# 12 References

## 12.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-DEC-PLN-00002 | *Rook I Preliminary Decommissioning and Reclamation Cost Estimate* |
| ROOK-ENG-MAN-00001 | *Rook I Mining and Milling Facility Description Manual* |
| ROOK-ENV-RPT-00001 | *Rook I Environmental Impact Statement* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-HSF-PGM-00001 | *Rook I Health and Safety Program* |
| ROOK-RAD-PGM-00001 | *Rook I Radiation Protection Program* |
| ROOK-ENV-PGM-00001 | *Rook I Environmental Protection Program* |
| ROOK-ENV-PLN-00001 | *Environmental Monitoring Plan* |
| ROOK-ENV-PLN-00002 | *Effluent and Emissions Plan* |
| ROOK-WST-PGM-00001 | *Rook I Waste Management Program* |
| ROOK-IPE-PGM-00001 | *Rook I Indigenous and Public Engagement Program* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |

## 12.2 External


- Federal
  - *Canadian NORM Working Group. 2013. Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials.*
  - *Canadian Nuclear Safety Commission (CNSC). 2021. REGDOC-2.11.2, Decommissioning.*
  - *Canadian Standards Association (CSA). 2019. N294:19 Decommissioning of facilities containing nuclear substances.*
  - *Environment Canada. 2009. Environmental Code of Practice for Metal Mines.*
  - *Metal and Diamon Mining Effluent Regulations.*
  - *Nuclear Safety and Control Act.*
  - *Transportation of Dangerous Goods Regulations.*
  - *Uranium Mines and Mills Regulations.*

- Provincial
  - *Government of Saskatchewan. 2008. Northern Mine Decommissioning and Reclamation Guidelines, EPB 381.*
  - *Government of Saskatchewan. 2025. Institutional Control Program. Accessed March 2025. Available at Institutional Control Program | Mineral Exploration and Mining | Government of Saskatchewan*
  - *Ministry of Energy and Resources (MER). 2018. Post Closure Management of Decommissioned Mine/Mill Properties Located on Crown Land in Saskatchewan (Institutional Control Program).*
  - *The Hazardous Substances and Waste Dangerous Goods Regulations.*
  - *The Mineral Industry Environmental Protection Regulations, 1996.*
  - *The Mines Regulations, 2018.*

- Other
  - *CanNorth (Canada North Environmental Services). 2022. NexGen Rook I Project Baseline Gama Radiation Survey. Draft Report – Revision 1. December 2022. 234 p.*
  - *McLaughlan MS, Wright RA, Jiricka RD. 2010. Field guide to the ecosites of Saskatchewan's provincial forests. Prince Albert, SK: Saskatchewan Ministry of Environment, Forest Service. 338 p.*

# Appendix A: Drawings

Appendix A


C:\Users\jleighs\OneDrive - JDSEM\NEXR0001C - EPCM\Drawings\Layout Optimization 21.03.2023.dwg Apr 24, 2023 - 2:26pm

REFERENCE DRAWINGS

| NO. | DWG NO. | TITLE |
|---|---|---|

NOTES:

1. Figure reflects the maximum extents of the Project site at the end of the Construction phase.

DRAWING REVISION

| NO. | DESCRIPTION | DATE |
|---|---|---|
| IP | FIGURE FOR PERMITTING | 2023.04.17 |

| | NAME | DATE |
|---|---|---|
| DRAWN BY: | J.J | 14 NOV 2022 |
| DESIGNED BY: | A.S | 14 NOV 2022 |
| CHECKED BY: | | |
| APPROVED BY: | | |

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NexGen

JDS Energy & Mining Inc.

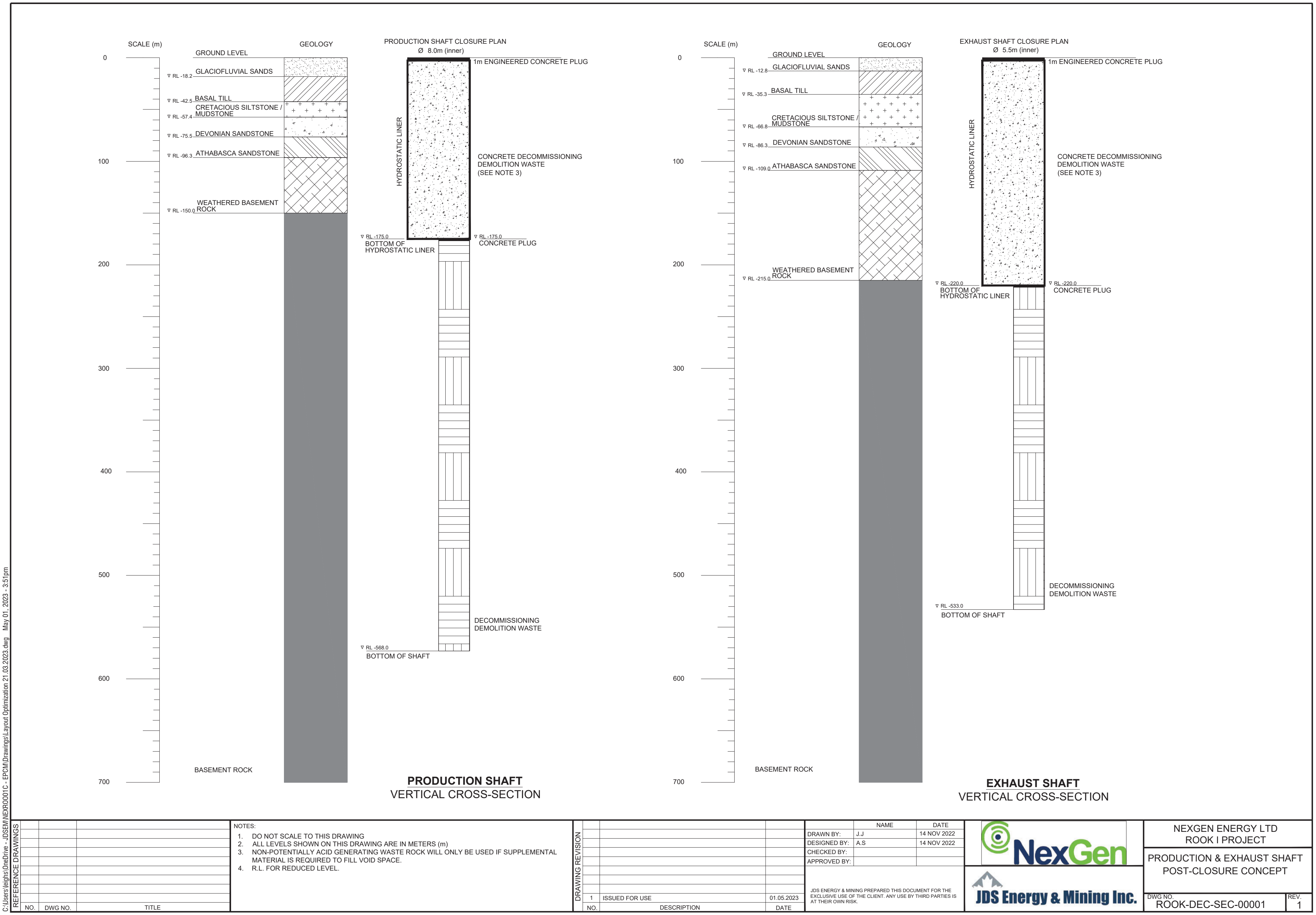
NEXGEN ENERGY LTD
ROOK I PROJECT

MINE SITE DEVELOPMENT
CONSTRUCTION PHASE
OVERALL SITE LAYOUT

DWG NO.

REV. IP

ROOK-DEC-PLN-00001


SCALE (m)
GEOLOGY
GROUND LEVEL
RL -18.2 GLACIOFLUVIAL SANDS
RL -42.5 BASAL TILL
CRETACIOUS SILTSTONE / MUDSTONE
RL -57.4
RL -75.5 DEVONIAN SANDSTONE
RL -96.3 ATHABASCA SANDSTONE
RL -150.0 WEATHERED BASEMENT ROCK
BASEMENT ROCK
PRODUCTION SHAFT CLOSURE PLAN
Ø 8.0m (inner)
1m ENGINEERED CONCRETE PLUG
HYDROSTATIC LINER
CONCRETE DECOMMISSIONING DEMOLITION WASTE (SEE NOTE 3)
RL -175.0 BOTTOM OF HYDROSTATIC LINER
RL -175.0 CONCRETE PLUG
DECOMMISSIONING DEMOLITION WASTE
RL -568.0 BOTTOM OF SHAFT
PRODUCTION SHAFT
VERTICAL CROSS-SECTION
SCALE (m)
GEOLOGY
GROUND LEVEL
RL -12.8 GLACIOFLUVIAL SANDS
RL -35.3 BASAL TILL
RL -66.8 CRETACIOUS SILTSTONE / MUDSTONE
RL -86.3 DEVONIAN SANDSTONE
RL -109.0 ATHABASCA SANDSTONE
RL -215.0 WEATHERED BASEMENT ROCK
BASEMENT ROCK
EXHAUST SHAFT CLOSURE PLAN
Ø 5.5m (inner)
1m ENGINEERED CONCRETE PLUG
HYDROSTATIC LINER
CONCRETE DECOMMISSIONING DEMOLITION WASTE (SEE NOTE 3)
RL -220.0 BOTTOM OF HYDROSTATIC LINER
RL -220.0 CONCRETE PLUG
DECOMMISSIONING DEMOLITION WASTE
RL -533.0 BOTTOM OF SHAFT
EXHAUST SHAFT
VERTICAL CROSS-SECTION
0
100
200
300
400
500
600
700
REFERENCE DRAWINGS
NO. DWG NO. TITLE
NOTES:
1. DO NOT SCALE TO THIS DRAWING
2. ALL LEVELS SHOWN ON THIS DRAWING ARE IN METERS (m)
3. NON-POTENTIALLY ACID GENERATING WASTE ROCK WILL ONLY BE USED IF SUPPLEMENTAL MATERIAL IS REQUIRED TO FILL VOID SPACE.
4. R.L. FOR REDUCED LEVEL.
DRAWING REVISION
1 ISSUED FOR USE 01.05.2023
NO. DESCRIPTION DATE
NAME DATE
DRAWN BY: J.J 14 NOV 2022
DESIGNED BY: A.S 14 NOV 2022
CHECKED BY:
APPROVED BY:
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JDS Energy & Mining Inc.
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ROOK I PROJECT
PRODUCTION & EXHAUST SHAFT POST-CLOSURE CONCEPT
DWG NO. ROOK-DEC-SEC-00001
REV. 1
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# Appendix B: Discharge Inventory

**Table B-1: Rook I Project Discharge Inventory**

| Date | Material | Volume | Detailed Circumstances | Cause | Mitigating Procedures |
|---|---|---|---|---|---|
| | | | | | |

*No discharges have occurred on the Project site. This table will be updated once information is available.*

# Appendix C: Hazardous and Radioactive Substance Inventory

**Table C-1: Rook I Project Hazardous Substances and Waste Dangerous Goods Storage Facilities**

| Tank Number/Storage Facility | Location | Contents | Capacity |
| --- | --- | --- | --- |
| | | | |

*Placeholder – This table will be updated once an inventory of hazardous and radioactive substances is available.*

# Indigenous and Public Engagement Program
# ROOK-IPE-PGM-00001

# Rook I Project

## Indigenous and Public Engagement Program

ROOK-IPE-PGM-00001

November 2022

# Record of Revisions

| Version. No. | Date | Description | Originator | Reviewer | Approver |
|---|---|---|---|---|---|
| 0 | 15-Dec-2021 | Issued Final | Jon Henderson | Luke Moger | Tony George |
| 1 | 9-Nov-2022 | Issued Final | Jon Henderson | Adam Engdahl | Luke Moger |

# Table of Contents

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# 1.0 Introduction

NexGen Energy Ltd. (NexGen) is a Canadian uranium development company advancing the Rook I Project (Project), a proposed uranium mining and milling operation located adjacent to Patterson Lake approximately 130 km north of the town of La Loche, and 640 km northwest of City of Saskatoon as shown in Figure 1. The Project resides within Treaty 8 territory and the Homeland of the Métis.

NexGen is committed to providing clear, ongoing, and timely information as it relates to its licensed activities to local Indigenous (First Nation and Métis) groups, local communities, and other members of the public who may be affected by or have a direct interest in the Project.

To uphold these commitments, NexGen has developed the *Rook I Indigenous and Public Engagement Program* (Program) and an *Indigenous and Public Disclosure Protocol* (Disclosure Protocol) as described in Appendix A to support the site preparation, construction, and commissioning phase of the Project.

The Program outlines NexGen's systematic approach to managing Indigenous and public engagement as part of the Project. It provides the framework and describes processes for maintaining compliance, enabling continual improvement, and fostering a communications culture which values the input and contributions of local Indigenous groups and communities.

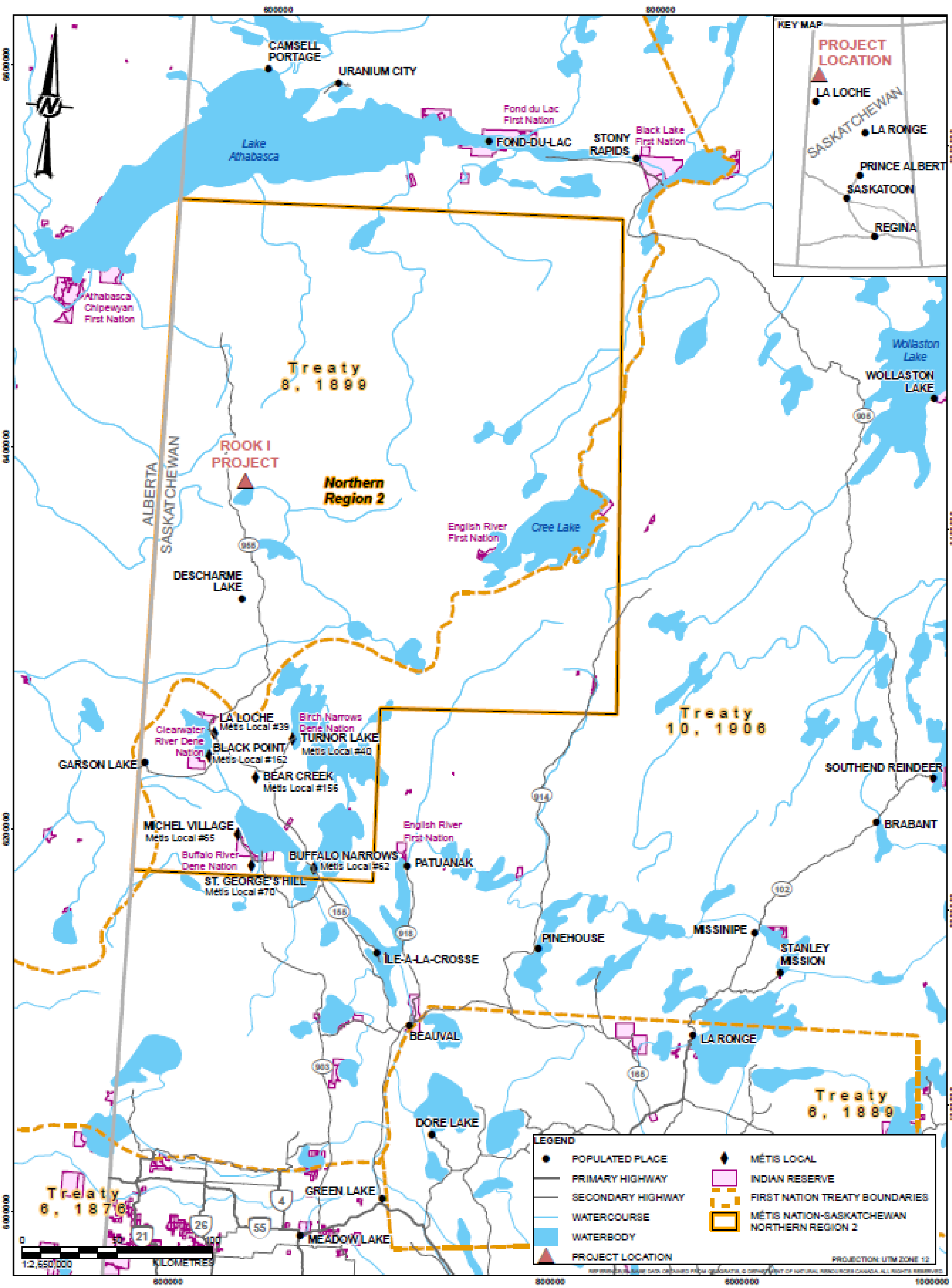


Figure 1: Rook I Project Site and Local Indigenous Groups and Communities

This Program is part of the *Rook I Integrated Management System* (IMS) as shown in Figure 2. All aspects of the IMS are subject to the *Rook I Integrated Management System Policy*, which provides the foundation for NexGen's approach to Indigenous and public engagement. As a component of the IMS, this Program follows the Plan-Do-Check-Act cycle to identify, control, monitor, and continually improve processes related to Indigenous and public engagement.

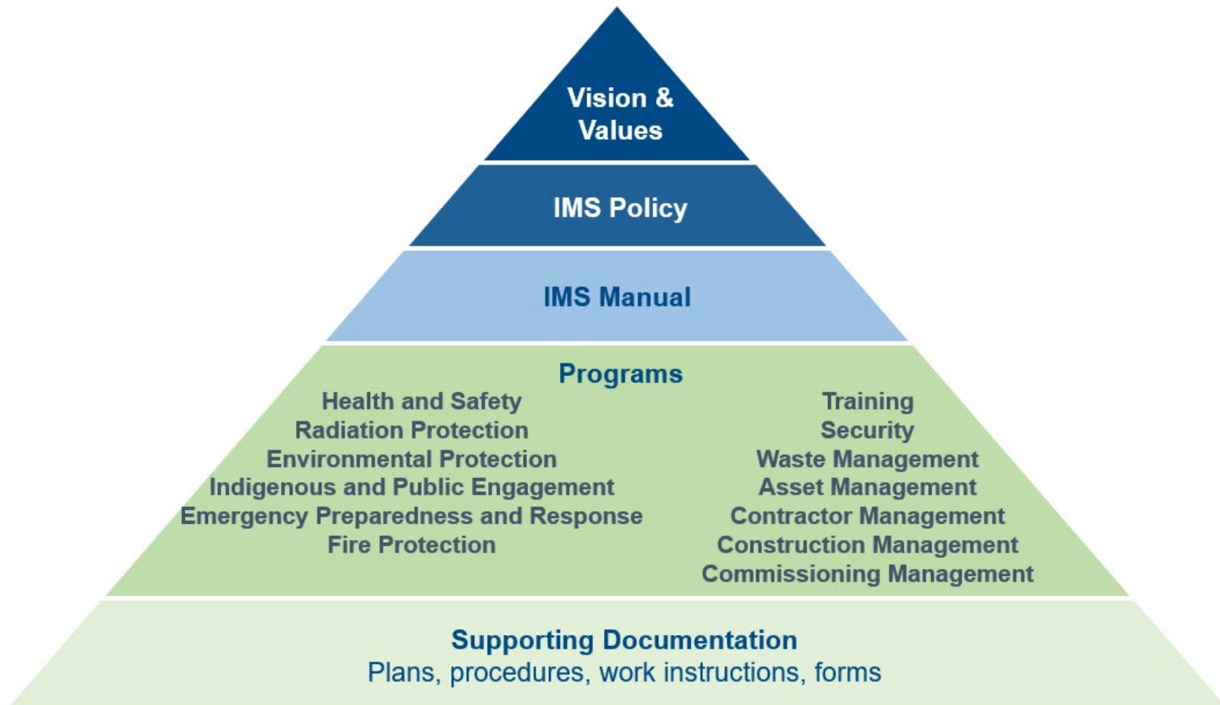


Figure 2: Rook I Integrated Management System

## 1.1 Purpose

This Program describes the principles, processes, and framework for effectively communicating Project-related and public disclosure information to local Indigenous groups, local communities, and members of the public. This Program incorporates the provisions outlined in the *Rook I Project – Indigenous Engagement Report*, submitted to the Canadian Nuclear Safety Commission (CNSC) as part of the environmental assessment and licence to prepare the site and construct the mine and mill. This Program has been prepared to align with and meet all requirements of the references outlined in section 6.0, including the *Nuclear Safety and Control Act* and the associated regulations.

## 1.2 Scope

This Program defines the approach to providing information related to the health, safety, and security of people and the environment and other topics to local Indigenous groups, local communities, and members of the public who may be affected or have a direct interest in the Project as described in section 2.5. The scope of this Program includes planning, delivering, evaluating, and improving processes for effectively managing Indigenous and public engagement as it relates to licensed activities during the Project's site preparation, construction, and commissioning phase.

This Program is a part of the IMS, which is the framework of processes, procedures, and practices designed to allow NexGen to fulfill tasks required to achieve its objectives safely and consistently. As a component of the IMS, this Program includes process planning, delivery, evaluation, and improvement so the Program remains current, relevant, and effective.

## 1.3 Program Principles

NexGen recognizes the unique relationship that local Indigenous groups and communities have with the environment and the importance of fostering trusting relationships that facilitate collaboration and maximize benefits from the Project beyond the Project life cycle. Effective and transparent communication contributes to upholding trust and meaningful engagement with local Indigenous groups, local communities, and members of the public with a direct interest in the Project. NexGen's approach to effectively communicating Project-related information and public disclosure information to local Indigenous groups, local communities, and members of the public is reflected in the following Program principles:

- Provide clear, accurate, and timely information regarding the Project, the potential and perceived risk of the facility, and relevant information related to health, safety, and security of people and the environment through community engagement, public communications, and postings to the Project website.
- Provide information that is understandable and meets the needs of the target audience, adjusting the approach to communications based on feedback from members of the target audience.
- Encourage and systematically document feedback and respond to comments in a timely manner.
- Maintain diverse, open, and transparent two-way communication channels to identify, respond to, and address interests and concerns in a way that builds trust and confidence of local Indigenous groups and communities.
- Establish clear and realistic timelines for responding to requests, suggestions, and submissions, and be sensitive to the potentially limited resources available to the target audience.
- Provide practical assistance to the target audience to actively take part in discussions, as aligned with NexGen's approved approach to engagement.
- Provide information, including technical document summaries, in clear, non-technical language, and provide Dene, Cree, and French translation of relevant material, when required.
- Stimulate conciliatory and constructive exchanges of views and genuinely address the major areas of interest without prejudice.
- Regularly review public information to ensure accuracy and relevance to public interest.
- Meet or exceed relevant provincial and federal requirements.
- Regularly assess, evaluate, and improve Program performance.

## 1.4 Terminology

Terminology introduced in this Program is provided below. A comprehensive list of common terms applicable to this Program and the IMS are available in the *Rook I Project Glossary*.

**Indigenous** – Includes the First Nations, Inuit, and Métis people of Canada.

**integrated management system (IMS) program** – IMS documents which provide the scope and general description of inter-related processes for a licensed program (e.g., *Rook I Integrated Management System Manual*, *Rook I Health and Safety Program*, *Rook I Radiation Protection Program*, *Rook I Construction Management Program*).

**licensed activities** – Project activities within the scope of CNSC licensing. Project site-based activities that may be outside the scope of CNSC licensed conditions are subject to the integrated management system on a risk-informed basis (i.e., where the consequence of human error poses a risk to the environment, the health and safety of people, or to the security of Project facilities).

**local communities** – All communities north of the highway junction 155 and 925 and south of Descharme Lake.

**prime contractor** – Contractor, under contract directly with NexGen, who is responsible for the completion of a defined project and who directs the work of multiple sub-contractors to do the same.

**public disclosure** – The act of making information available to the public.

**worker** – Any person working for NexGen, including a contractor.

## 1.5 Contact Information

The NexGen Vice President, Environment, Permitting, & Licensing is responsible for this Program and the Disclosure Protocol and can be reached by phone (306-954-2275), email (engagement@nxe-energy.ca), or mail at the following address:

NexGen Energy Ltd.
Attn: Vice President, Environment, Permitting, & Licensing
Suite 200 475 2nd Avenue S
Saskatoon, SK S7K 1P4

This contact information is posted along with the Disclosure Protocol to the Project website.

# 2.0 Plan

The *Plan* component of this Program includes processes that support a systematic approach to prioritizing Indigenous and public engagement when planning Project activities. Planning processes include:

- providing the resources necessary to implement Program processes;
- setting Program-specific objectives and targets;
- identifying risks associated with the Project and managing the associated risks;
- formulating an Indigenous and Public Disclosure Protocol;
- determining the relevant target audience for Indigenous and public engagement;
- identifying obligations and legal and other requirements;
- managing change to process, key personnel, design, facilities, and equipment; and
- providing for effective methods for documenting information and safekeeping of communication records.

## 2.1 Risk Management

The risk management process includes identifying Project-related hazards that could affect the health, safety, and security of local Indigenous groups, local communities, and the public as well as potential impacts on the environment, assessing the significance of the associated risks, and managing the risks to acceptable levels through the application of controls. Potential hazards and risks which could impact the health, safety, or environment beyond the Project site are communicated through Indigenous and public engagement to advise and receive feedback on risk control strategies. The general risk management process is outlined in the *Rook I Integrated Management System Manual*.

## 2.2 Objectives and Targets

Program objectives and targets are established at regular intervals, linked to clear accountabilities, and monitored for status to completion. Objectives and targets are tangible, documented actions that result in improvements to Indigenous and public engagement processes and Program outcomes.

Setting and managing objectives and targets, including establishing monitoring measures, is outlined in the *Rook I Integrated Management System Manual*.

## 2.3 Resources

Rook I management is committed to providing the necessary resources to establish, implement, maintain, and continually improve this Program and its associated processes. In addition to providing financial resources necessary to achieve objectives and meet requirements, management provides the infrastructure, work environment, and the competent personnel necessary to implement the Program and foster a healthy and effective communications culture with local Indigenous groups and communities.

### 2.3.1 Roles and Responsibilities

The *Rook I Organizational Chart* outlines roles and responsibilities for effectively implementing this Program. Workers are informed of their roles and responsibilities and are accountable for understanding and fulfilling them. The Project's prime contractor performs their role in accordance with the scope and requirements of this Program and its supporting information and as required in accordance with *The Saskatchewan Employment Act*.

Although NexGen maintains overall accountability for Project activities, the term Rook I is used in the following role descriptions to reinforce that the role is applicable to the Project and may be assigned to NexGen employees and contractors performing work on behalf of the Project.

#### NexGen Executive

NexGen executive is accountable for:

- establishing the direction, strategy, and policies of the organization;
- promoting initiatives and behaviours that enhance worker awareness of the history, traditions, and rights of Indigenous peoples;
- promoting the understanding that safety is a principal consideration guiding decisions and actions;
- providing adequate resources to deliver the requirements of the Program; and
- communicating with external stakeholders as appropriate.

#### Rook I Management

Rook I management is accountable for:

- maintaining the effectiveness of this Program;
- promoting a culture which values the input and contributions of the local Indigenous groups and communities;
- approving annual Program objectives and targets;
- promoting the integration of the Program requirements into Project processes;
- communicating the importance of effective management and of conforming to Program requirements;
- allocating adequate and appropriate resources to fulfill Program implementation;
- developing proper documentation and tools to implement this Program effectively;
- participating in the management review process;

- monitoring and reporting on Program performance and effectiveness to the NexGen executive;
- providing independent oversight of processes through monitoring and auditing activities; and
- identifying and pursuing opportunities to achieve continual improvement.

### Program Management

Program management is responsible for:

- overseeing the development, implementation, and adherence to this Program;
- communicating with local Indigenous groups, local communities, and members of the public on behalf of the Project;
- setting annual objectives and targets, monitoring performance, and preparing internal and external reports regarding Program activities and outcomes;
- managing resources to confirm legal compliance with regulatory requirements, obligations from contracts and Project conditions, and conformance with Program requirements;
- confirming workers have the necessary competence, training, and awareness of Program requirements;
- providing independent oversight of processes through monitoring and auditing activities;
- reporting on Program performance and effectiveness to Rook I management;
- facilitating management review of this Program; and
- promoting, identifying, and supporting continual improvement through Program evaluation.

### Program Coordination

The program coordinator is responsible for:

- establishing and implementing this Program;
- communicating accurate and timely information to local Indigenous groups, local communities, and members of the public as part of this Program;
- maintaining this Program in compliance with applicable legal and other requirements;
- maintaining communication records, including information provided and information received;
- responding to questions or feedback received from target audiences and verifying all associated actions are completed according to agreed-upon timelines;
- representing NexGen in communities through direct participation at Indigenous and public forums where information regarding the Project is shared;
- maintaining functional web-based, phone, and electronic communication mechanisms;
- preparing and supporting management review and maintaining associated records including tracking the decisions and actions stemming from the review; and
- verifying that monitoring processes are implemented in accordance with Program and regulatory requirements.

## 2.3.2 External Support

Competent external subject matter experts may be engaged to support and assist with Program delivery in areas such as:

- media relations;
- media monitoring;
- public opinion monitoring;
- website traffic monitoring;
- social media monitoring;

- website design and development;
- print media (e.g., handouts, posters) design, development, and printing;
- communication content review;
- written and oral translation of communication content into Dene, Cree, and French (when required); and
- in-person delivery of technical or specialized subject matter at Indigenous engagement and community information sessions, meetings, and workshops.

## 2.4 Indigenous and Public Disclosure Protocol

This Program includes a Disclosure Protocol as described in Appendix A that outlines NexGen's approach to the public disclosure of information related to the health, safety, and security of people and the environment, and other topics associated with the life cycle of a uranium mine and mill. This Disclosure Protocol applies to local Indigenous groups, local communities, and members of the public who may be affected by or have a direct interest in the Project.

The Disclosure Protocol satisfies the requirements of the public disclosure protocol in *REGDOC-3.2.1 Public Information and Disclosure*. NexGen will inform the CNSC of disclosures made under the Disclosure Protocol at the time of, or before, such disclosure. Copies of disclosure information will be provided to the CNSC point of contact. The Disclosure Protocol is posted publicly on the Project website (www.saskatchewanuranium.ca).

Information that triggers reporting in accordance with the Disclosure Protocol is reviewed by competent subject matter experts within NexGen to verify the accuracy of information before it is released.

The format in which information is provided is informed, in part, by communication protocols established with interested Indigenous groups.

## 2.5 Target Audience

### 2.5.1 Indigenous Groups

NexGen has undertaken the identification of Indigenous groups for engagement in relation to the Project using an approach that considers the factors outlined in *REGDOC-3.2.2 Indigenous Engagement*, as well as NexGen's understanding of the region, engagement conducted by nearby facilities licensed by the CNSC, and information gathered through early engagement activities undertaken to date.

This included consideration of:

- historical and modern treaties;
- proximity of the Project to Indigenous groups;
- traditional territories;
- traditional and current land uses;
- settled or on-going land claims or litigation;
- existing relationships between Indigenous groups and NexGen or the CNSC; and
- potential Project impacts to health and safety, the environment, and any potential or established Indigenous and/or treaty rights and related interests of Indigenous groups.

Identification of potentially affected or interested Indigenous groups has been further informed through direct correspondence and discussion with Indigenous leaders, community members, other organizations in the region, review of publicly available information and guidance provided by provincial and federal governments. Based on this approach, the following Indigenous groups have been identified as an integral component of the target audience for this Program:

- First Nations:
  - Clearwater River Dene Nation;
  - Birch Narrows Dene Nation;
  - Buffalo River Dene Nation;
  - English River First Nation;
  - Athabasca Chipewyan First Nation;
  - Black Lake Denesuline First Nation (represented by the Ya'thi Néné Lands and Resources); and
  - Fond du Lac Denesuline First Nation (represented by the Ya'thi Néné Lands and Resources).
- Métis Nation-Saskatchewan (MN-S), Northern Region 2:
  - Local 39, La Loche;
  - Local 156, Bear Creek;
  - Local 162, Black Point;
  - Local 40, Turnor Lake;
  - Local 62, Buffalo Narrows;
  - Local 70, St. George's Hill; and
  - Local 65, Michel Village.

Other relevant Indigenous groups identified include:

- Meadow Lake Tribal Council;
- Métis Nation – Saskatchewan;
- Métis Nation – Saskatchewan Northern Region 2; and
- Ya'thi Néné Lands and Resources.

### 2.5.2 Local Communities

Local communities were identified as a component of the target audience based on their proximity to the Project or their proximity to the highway corridor that provides access to the Project. The following is a list of local communities that were identified, ordered according to their proximity to the Project:

- Northern Settlement of Descharme Lake;
- Northern Village of La Loche;
- Northern Hamlet of Black Point;
- Northern Hamlet of Bear Creek;
- Northern Settlement of Garson Lake;
- Northern Hamlet of Turnor Lake;
- Northern Village of Buffalo Narrows;
- Northern Hamlet of St. George's Hill;
- Northern Hamlet of Michel Village;
- Northern Village of Île-à-la-Crosse;
- Northern Village of Beauval; and
- Northern Village of Green Lake.

### 2.5.3 Members of the Public

Members of the public have been identified as a component of the target audience based on having a direct interest in the Project and include, but are not limited to:

- local cabin owners;
- local businesses;
- local economic development organizations;
- N-19 Trappers Association;
- Northern Saskatchewan Environmental Quality Committee (NSEQC);
- North/Northwest Transportation Committee;
- Northern Labour Market Committee;
- Provincial and Federal elected government officials;
- Regulatory bodies and government agencies;
- other First Nations and Métis Locals located within the Northern Saskatchewan Administration District (NSAD);
- other municipal communities and residents within the NSAD;
- Project staff;
- first responders; and
- the media.

## 2.6 Legal and Other Requirements

NexGen is committed to conforming to internal processes and to complying with applicable legal and other requirements. This Program has been prepared in consideration of the requirements outlined in the CNSC regulatory documents *REGDOC-3.2.1 Public Information and Disclosure* and *REGDOC-3.2.2 Indigenous Engagement*. Development of this Program has also considered other applicable legislation and relevant industry best practices as described in section 5.2.

Changes to relevant internal and external requirements are monitored and evaluated to identify whether updates to this Program or related Indigenous and public engagement processes are required. Other requirements include contracts and agreements with local Indigenous groups and communities.

The process for managing legal and other requirements is outlined in the *Rook I Integrated Management System Manual.*

## 2.7 Change Management

Change is managed to maintain protection of health and safety, the environment, security, and property. This includes changes to Project:

- design;
- facilities;
- equipment;
- management system processes;
- organizational structure;
- key roles and responsibilities;
- documentation; and
- legal and other requirements.

Changes are evaluated with consideration for impact to this Program, the Disclosure Protocol, and related Indigenous and public engagement processes to verify that:

- change is clearly defined;
- risks associated with change are assessed and managed;
- change is communicated to those affected; and
- associated documentation is updated.

The general change management process is outlined in the *Rook I Integrated Management System Manual*.

## 2.8 Document and Record Management

Information, including documents and records generated for or as a result of licensed activities, are controlled to maintain information accuracy, available when needed, and protected from uncontrolled alteration.

Documents include this Program and the Disclosure Protocol.

Records include, but are not limited to:

- communication products for distribution;
- meeting minutes;
- feedback (including grievances) and responses received through public forum, email, and phone call;
- media analysis;
- records associated with the review of Program performance, and
- records associated with any corrective or improvement actions planned or taken.

Documents and records are readily accessible to those that require them. The processes for managing documents and records, including document review frequency, are outlined within the *Rook I Integrated Management System Manual*.

# 3.0 Do

The *Do* component of the Program includes determining and implementing a communication strategy and appropriate communication methods.

## 3.1 Communication Strategy and Methods

This Program has been designed to provide open and transparent communication, as well as the opportunity for target audiences to obtain desired operational, environmental, and safety information about the Project and its activities. As part of this Program, reports from major Project-related, regulatory-driven activities (e.g., environmental risk assessment) will also be posted to the Project website, as required.

The methods and frequency for communicating information and receiving feedback are diverse to maintain flexibility so that information can be tailored to the target audiences and provided in a manner that meets the needs and preferences within these groups. Leveraging a combination of modern (e.g., electronic), traditional (e.g., print), and in-person (e.g., verbal) information methods is considered the most effective approach to ensuring the objectives of this Program are consistently met.

### 3.1.1 Communication Content

Communication content addresses information related to the health, safety, and security of people and the environment in the context of Project-related activities. Engagement with target audiences identifies other Project-related areas of interest that inform follow up communications by NexGen. Communication protocols established with interested Indigenous groups also define criteria for determining which information and reports are made available.

Communication content is reviewed and vetted by competent subject matter experts within NexGen to verify the accuracy of information before it is released to the public. Where possible, consideration of visual communication approaches will be prioritized based on feedback from Indigenous groups.

Information considered confidential or sensitive, such as security-related information and trade secrets or scientific, technical, commercial, financial, labour-relations, or Indigenous Knowledge (identified as non-disclosable) information is not included as part of communications covered by this Program or the Disclosure Protocol.

### 3.1.2 Communication Frequency

The criteria used to determine how often information is communicated is provided in Table 1. The frequency with which information is provided to target audiences depends on availability of new information, the type of communication, and the communication delivery method. Responses to feedback or inquiries are provided within target timeframes; however, the complexity (i.e., scope and scale) of the information request may necessitate additional time.

Table 1: Communication Frequency Criteria

| Category | Description | Frequency |
|---|---|---|
| Communication Type | Project updates | Key Project milestones (e.g., start of shaft sinking, updates to the environmental risk assessment)<br><br>As information is available, minimum varies |
| | Reportable incidents | Following regulatory notification, as soon as practical |
| | Responses to requests for information | Target response within five business days; however, response timing dependant on scope or scale of request |
| Delivery Method | Direct mail (e.g., letters, flyers) | As information is available, no minimum |
| | In-person meetings, workshops | As information is available, at least annually |
| | Email | Target response within five business days; however, response timing dependant on scope or scale of request |
| | Website | As information is available, no minimum |

| Category | Description | Frequency |
| --- | --- | --- |
| | Social media | As information is available, no minimum |
| | Print media | As information is available, no minimum |
| | Advertisements (e.g., radio, print, online) | As information is available, no minimum |

### 3.1.3 Communication Tools

NexGen employs a diverse range of tools to communicate with local Indigenous groups, local communities, and members of the public. Communication tools include:

- hosting community information sessions and attending NSEQC meetings on a regular basis;
- providing posters and/or other print material (e.g., community newsletters);
- hosting slide and multi-media presentations;
- posting material to the Project website (www.saskatchewanuranium.ca);
- monitoring and responding to queries made to the Project email address (engagement@nxe-energy.ca);
- maintaining a toll-free phone number for Project queries (1-833-333-8895);
- providing NexGen's contact information to facilitate communication over a variety of means;
- providing information in plain language and, where applicable, developing plain language summaries in English, Dene, Cree, and French, when required;
- hosting site visits for:
  - Indigenous Leaders, Elders, and student groups;
  - municipal community leaders;
  - regulators;
  - other interested parties;
- attending local community and cultural events;
- providing appropriate information and notices over community radio stations;
- corresponding directly through written means (i.e., letters and emails); and
- issuing news releases.

NexGen receives queries, requests for information, and feedback (including grievances) from local Indigenous groups, local communities, and members of the public through the communications methods which include:

- attending in-person meetings;
- emailing engagement@nxe-energy.ca;
- receiving phone calls through the inquiry line;
- posting to NexGen social media accounts; and
- mailing correspondence to:

  NexGen Energy Ltd.<br>Re: Rook I Project<br>Suite 200, 475 2nd Avenue S<br>Saskatoon, SK S7K 1P4

### 3.1.4 Non-routine Communications

NexGen will work to formalize communication protocols with interested Indigenous groups and will document these protocols in accordance with the *Rook I Integrated Management System Manual*.

Information related to health, safety, security, and environmental incidents, including those that are reportable under Section 29 of the *General Nuclear Safety and Control Regulations* or that would be of concern to the target audience, is communicated through the Project website within 24 hours of notifying applicable regulatory agencies.

Information provided for these circumstances includes descriptions of:

- the incident (including date, time, and location);
- mitigation measures implemented; and
- status of the incident.

The incident reporting process is outlined in the *Rook I Integrated Management System Manual.*

Additional information posted on the Project website includes:

- environmental monitoring results;
- significant operational developments such as labour disputes and expansion or changes in facility design or operation;
- events with offsite effects or which could result in public interest and concern or media attention;
- impacts from extreme natural events such as earthquakes, floods, and forest fires on the Project;
- planned and unplanned significant interruptions of facility operations; and
- non-routine releases of radiological and hazardous materials to the environment.

Incident and deviation reporting criteria, audiences, timelines, and required information to be communicated are outlined in the *Rook I Integrated Management System Manual*.

# 4.0 Check

The *Check* component of this Program consists of ongoing monitoring, periodic audits, and reviews, analysis, and reporting of results in order to ensure that the Program is operating effectively and efficiently.

## 4.1 Monitoring and Measurement

Management system processes are continually monitored and measured to evaluate whether Project deliverables meet internal and external requirements. Program-specific monitoring and measurement activities include public and media opinion and performance monitoring.

Monitoring and measurement processes and requirements are outlined in the *Rook I Integrated Management System Manual*.

### 4.1.1 Public and Media Opinion

Community and public views, opinions, and concerns in relation to Project activities are obtained using a combination of methods outlined in Table 2.

Table 2: Evaluation of Public and Media Opinion

| Category | Method | Frequency |
|---|---|---|
| Public Opinion | Third-party opinion polling/surveys | Requirement and timing to be set as part of the annual management review |
| | Open houses | Ongoing, as required |
| | Direct correspondence | Ongoing, as received |
| Media Opinion | Third-party aggregation of all Project-related print and news media | Annually, complete before annual management review |
| | Third-party aggregation of all Project-related web-based media | Annually, complete before annual management review |

Results of public and media opinion monitoring are analyzed, interpreted, summarized in reports, and used to evaluate trends in opinions and inform improvement opportunities, management decisions, and ongoing communication activities. A fulsome summary of activities related to public and media opinion monitoring (e.g., media coverage, news releases, media analysis) is reported as part of the *Annual Compliance Monitoring Report* submitted to the CNSC.

### 4.1.2 Performance Monitoring

Program and Disclosure Protocol performance and effectiveness are monitored on a regular basis using information sources which include:

- results of Program-specific key performance indicators (KPIs) linked to objectives and targets;
- feedback from local Indigenous groups, local communities, and other members of the public;
- feedback from public and media opinion monitoring;
- website and social media analysis; and
- auditing results.

### 4.1.3 Performance Evaluation

This Program and its Disclosure Protocol are reviewed and evaluated during preparation of the *Annual Compliance Monitoring Report* and in advance of the annual management review. Performance monitoring results are used to evaluate the effectiveness of Program implementation and adequacy of communication efforts. The Program performance evaluation results drive Program improvement opportunities and initiatives.

The Program performance evaluation results are key inputs for the annual management review and are a source of information for process improvement and the development of objectives and targets for the following year.

Methods for evaluating Program performance and effectiveness are outlined in the *Rook I Integrated Management System Manual*.

## 4.2 Audits

Regular conformance audits are used to monitor and verify the effective implementation and performance of this Program and its associated processes. Audits are conducted by qualified personnel independent of the work being assessed in accordance with the *Rook I Integrated Management System Manual.*

Deviations, instances of regulatory noncompliance, or opportunities for improvement identified through audits or inspections are managed as outlined in the *Rook I Integrated Management System Manual.*

## 4.3 Management Review

This Program and supporting processes are subject to regular review and evaluation by Rook I management. In addition to the general topics outlined in the *Rook I Integrated Management System Manual*, inputs specific to Indigenous and public engagement include, but are not limited to:

- queries, requests for information, and feedback received;
- public and media opinion;
- performance monitoring;
- performance evaluation;
- audit findings; and
- status of corrective actions.

The management review process is outlined in the *Rook I Integrated Management System Manual.*

# 5.0 Act

The *Act* component of this Program consists of facilitating continual improvement and ensuring that, when required, adequate corrective actions are taken and appropriately managed. The results of these program elements feed back into *Plan* to complete the Plan-Do-Check-Act cycle.

## 5.1 Corrective Action Process

Evidence of deviation or noncompliance related to this Program are evaluated and, if required, are investigated and appropriate actions are developed and implemented to correct and prevent reoccurrence. Corrective actions are planned, implemented, verified, and reviewed for effectiveness commensurate with the level of risk.

The corrective action process is outlined in the *Rook I Integrated Management System Manual.*

## 5.2 Continual Improvement

Continual improvement is an ongoing process to improve the suitability, adequacy, and effectiveness of the IMS. Workers continually seek out improvement opportunities for the IMS and Project processes through Program monitoring, auditing, and management review as well as maintaining awareness of changes in the business environment. Improvement may also involve benchmarking Project performance against other projects and facilities.

The use of experience gained during Project construction and commissioning, including information collected from relevant external sources, informs improvement opportunities. Potential sources of information include:

- monitoring results;
- worker experience;

- government and industry publications;
- industrial peer information exchange;
- professional associations;
- lessons learned;
- feedback from local Indigenous groups and communities; and
- incident investigations.

Continual improvement opportunities are identified, documented, evaluated, and implemented as outlined in the *Rook I Integrated Management System Manual*.

# 6.0 References

## 6.1 Internal

| Document Number | Document Title |
|---|---|
| ROOK-ADM-CHT-00001 | *Rook I Organizational Chart* |
| ROOK-IMS-POL-00001 | *Rook I Integrated Management System Policy* |
| ROOK-IMS-MAN-00003 | *Rook I Integrated Management System Manual* |
| ROOK-ADM-LST-00001 | *Rook I Project Glossary* |

## 6.2 External

- Federal
  - *Nuclear Safety and Control Act*
  - *Uranium Mines and Mills Regulations*
  - *General Nuclear Safety and Control Regulations*
  - *Canadian Nuclear Safety Commission. REGDOC-3.1.2, Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills*
  - *Canadian Nuclear Safety Commission. REGDOC-3.2.1, Public Information and Disclosure*
  - *Canadian Nuclear Safety Commission. REGDOC-3.2.2, Indigenous Engagement*
- Provincial
  - *Government of Saskatchewan. Proponent Handbook: Voluntary Engagement with First Nations and Métis Communities to Inform Government's Duty to Consult Process*
  - *Government of Saskatchewan. First Nation and Métis Consultation Policy Framework.*
  - *The Saskatchewan Employment Act*
- Other
  - *Mining Association of Canada. Towards Sustainable Mining Indigenous and Community Relationships Protocol*

# Appendix A: Indigenous and Public Disclosure Protocol

# Rook I Project

## Indigenous and Public Disclosure Protocol

NexGen Energy Ltd. (NexGen) is committed to providing clear, ongoing, and timely information to the target audience for the Rook I Project (Project), including local Indigenous groups, local communities, and other members of the public who have a direct interest in the Project.

This Disclosure Protocol is integral to the *Rook I Indigenous and Public Engagement Program*, which recognizes effective and transparent communications as a cornerstone to maintaining trust and enhancing supportive communities. To keep the Project target audience informed, NexGen commits to:

- Providing relevant and timely information through community engagement, public communications, and postings to the Project website.
- Maintaining diverse and open communication channels with the target audience to identify and respond to their issues and concerns.
- Providing information that is understandable, and meets the needs of the target audience, and adjusting the approach to communications based on feedback from members of the target audience.
- Regularly meeting with local Indigenous and community leaders and community representatives, including Elders and youth, to understand perspectives and address opportunities and concerns.
- Regularly meeting with the Northern Saskatchewan Environmental Quality Committee (NSEQC) to provide information on Project-related environmental performance and respond to their queries.
- Conducting tours of the Project site for members of the target audience to increase knowledge and the understanding of the Project.
- Posting to the Project website summaries of:
  - environmental monitoring results;
  - significant operational developments such as labour disputes and expansion or changes in facility design or operation;
  - events with offsite effects or which could result in public interest and concern or media attention;
  - impacts of extreme natural events such as earthquakes, floods, and forest fires on the Project; and
  - planned and unplanned significant interruptions of facility operations.
- Posting to the Project website information about unusual Project-related events or health, safety, security, and environmental incidents that trigger a Section 29 notification pursuant to the *General Nuclear Safety and Control Regulations*, or that may result in significant public concern within 24 hours of notifying applicable regulatory agencies. At a minimum, posted information includes:
  - a description of the event or incident;
  - measures implemented to mitigate effects; and
  - status of the event or incident.
- Posting this Disclosure Protocol to the Project website.

The types of events or incidents that trigger reporting in accordance with the Disclosure Protocol are informed, in part, by communication protocols established with interested Indigenous groups. Information that triggers reporting in accordance with the Disclosure Protocol is reviewed by competent subject matter experts within NexGen to verify the accuracy of information before it is released.

For more information, contact the NexGen Vice President, Environment, Permitting, & Licensing by phone (306-954-2275), email (engagement@nxe-energy.ca) or by mail at the following address:

NexGen Energy Ltd.
Attn: Vice President, Environment, Permitting, & Licensing
Suite 200 475 2nd Avenue S
Saskatoon, SK S7K 1P4