Denison Mines Corp.
Wheeler River Operation

Waste Management Program

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Approval for Use

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1 Introduction

The *Waste Management Program* (the Program) is one of twelve Program documents that comprise the Management System for the Wheeler River Operation (the Operation). The *Waste Management Program* is preceded by the *Management System Program* within the document framework for the Operation as shown in Figure 1. Consistent with all other Program documents, the Program is organized according to the 'Plan-Do-Check-Act' iterative process to incorporate continual improvement in all stages of the Program.

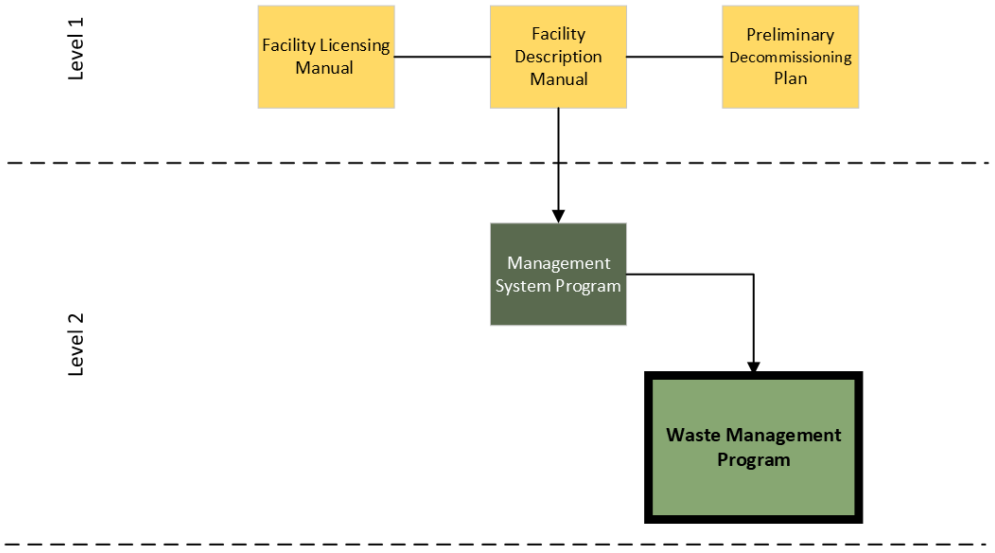

Figure 1: Program showing within Document Framework for the Wheeler River Operation

1.1 Purpose

The purpose of this Program is to describe and document Denison's *Waste Management Program* which governs the waste management practices and proposes effective strategies for minimizing waste generation, improving waste segregation, and implementing sustainable waste management techniques.

The Program uses a risk-based approach to identify waste management measures, which is informed by and commensurate with the risk arising from the potential interactions of Operation waste streams and the workplace and environment.

1.2 Scope

The Program is used to integrate Denison's waste management measures into a documented, managed, and auditable process, and encompasses:

- Waste characterization;
- Waste minimization;
- Waste management; and

- Decommissioning plans.

The scope of the Program extends to both radioactive and non-radioactive waste streams generated during construction and operation of the Operation.

1.3 Program Principles and Denison's Environment, Health, Safety & Sustainability Policy

Denison's commitments around waste management are aligned with its corporate Environment, Health, Safety & Sustainability Policy, applicable to all its facilities. The *Waste Management Program* is based on the principles outlined in that policy, which can be found in the *Management System Program* as well as at the following website:

Environment, Health, Safety & Sustainability Policy

The principles of the *Waste Management Program* focus on presenting well-defined strategies aimed at minimizing waste generation, enhancing waste segregation practices, and implementing sustainable waste management techniques. The Program establishes a practical roadmap that effectively mitigates the environmental consequences associated with waste, optimizes resource allocation, fosters recycling and reuse initiatives, and improves overall waste management efficiency. By successfully addressing these principles, the Program aims to actively contribute to the creation of a cleaner, healthier, and more sustainable environment for the community and stakeholders.

1.4 Compliance with Regulatory Requirements

This Program is compliant with the *Nuclear Safety and Control Act* and associated regulations, including the *General Nuclear Safety and Control Regulations,* the *Uranium Mines and Mills Regulations.* The Program also follows guidance and requirements in the Canadian Nuclear Safety Commission (CNSC) REGDOC 2.11, *Framework for Radioactive Waste Management and Decommissioning in Canada,* REGDOC 2.11.1, *Waste Management, Volume I: Management of Radioactive Waste,* REGDOC 2.11.1, *Waste Management, Volume II: Management of Uranium Mine Waste Rock and Mill Tailings,* and REGDOC 2.11.2, *Decommissioning.*

Additionally, the Program meets CSA N288.4, *Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills,* CSA N288.5, *Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills,* the *Transportation of Dangerous Goods Regulations,* and provincial requirements including the *Environmental Management and Protection Act,* and the *Saskatchewan Hazardous Substances and Waste Dangerous Goods Regulations, Chapter E-10.2 Reg 3.*

1.5 Terminology

1.5.1 Definitions

Term	Definition
Clean waste rock	Waste rock generated as sandstone cuttings and core from drilling activities associated with well and freeze hole development that does not have uranium containing materials.
Conventional waste	Includes: clean waste rock, domestic waste including recyclable waste, non-radioactive chemically contaminated waste, hazardous substances, domestic wastewater, site runoff, and dust.
Domestic Waste	Non-recyclable waste materials that are generated from the camp facility and offices other non-contaminated areas.
Domestic Wastewater Treatment Plant	The wastewater facility for the treatment of domestic wastewater, i.e., greywater (e.g., water drained from sinks, showers, washing machines) and blackwater (i.e., sewage).
Hazardous substances or hazardous waste	Waste dangerous goods designated as hazardous substances as per Appendix D of the Saskatchewan *The Hazardous Substances and Waste Dangerous Goods Regulations* (e.g., contaminated soil, waste oil, paints, solvents, hydrocarbons).
Industrial Waste	Industrial waste at the Operation is defined as waste with chemical or radiological contamination. Waste classified as Industrial waste is disposed of in the Industrial Waste Landfill.
Industrial Wastewater Treatment Plant	The wastewater facility for the treatment of industrial wastewater, including wastewaters produced in the processing plant during uranium extraction and from other various sources (e.g., wash bay sump water, leachate from the industrial landfill, wellfield runoff pond).
Radioactive Waste	Includes: radiologically contaminated water, radiologically contaminated drilling muds and products used in the drilling process, special waste, radioactive gaseous emissions/radon, and low-level radiologically contaminated waste.
Special Waste	Includes mineralized core and cuttings from well development that have uranium containing materials.

1.5.2 Acronyms and Abbreviations

Acronym or Abbreviation	Term
CNA	Canadian Nuclear Association
CNSC	Canadian Nuclear Safety Commission
DWWTP	Domestic Wastewater Treatment Plant

GCL	Geosynthetic Composite Liner
GM	Geomembrane
HDPE	High-Density Polyethylene
IWWTP	Industrial Wastewater Treatment Plant
KPI	Key Performance Indicator
MAC	Mining Association of Canada
PAG	Potential Acid Generation

2 Plan

2.1 Risk Management

Risk management identifies, assesses, and controls risks to workers, the environment, systems, facilities, and equipment associated with a task or process. The Operation adopts a consistent and integrated approach to risk management to identify, manage, and mitigate risk.

This process includes identifying waste management hazards that could affect workers, the environment, or the public, determining the significance of any associated risks, and mitigating the risks to acceptable levels by applying controls.

2.1.1 Hazard Identification

The hazard identification process will assess the origins of hazards, such as hazardous waste, as well as the initiating events that give rise to hazardous situations. These events may encompass technological factors, human performance-related issues, or natural events.

Denison employs a systematic approach to identify hazards that pose risks to workers, the general public, and the environment. Hazards are identified using appropriate types of assessment which are documented and tracked. Typical assessments include job hazard analyses (JHAs) and field level hazard assessments (FLHAs).

Procedures or processes involving identification and control of ionizing radiation are discussed in the *Radiation Protection Program*.

2.1.2 Risk Assessment

Denison evaluates the risks associated with identified hazards related to its waste management practices and activities. This evaluation encompasses an assessment of the likelihood of hazardous events and an evaluation of the potential consequences of these hazards for workers, the general public, and the environment. The assessment of consequences involves an examination of the fate and pathways of exposure to hazardous waste during routine operations, as well as during accidents and malfunctions. Denison utilizes a corporate risk matrix to characterize these risks.

Further information regarding the risk assessment process is detailed in the *Management System Program.*

2.1.3 Risk Register

Denison uses a risk register to proactively identify and address significant waste management risk aspects, prioritize resources, and continuously improve its risk management practices. The risk register is a central repository for recording and tracking information related to the significant waste management aspects.

The risk register may include information such as: risk identification, risk assessment, risk analysis, risk evaluation, risk prioritization, risk mitigation, risk monitoring and review. Further details on the risk register are provided in the *Management System Program*.

2.2 Objectives and Targets

Objectives and targets of this Program will be measurable, documented, and tracked. Performance against the objectives and targets will be communicated at regular intervals (i.e., during Management Review), and opportunities for continual improvement will be identified.

The Program follows targets to guide and measure the progress and effectiveness of waste management efforts. These targets are specific, measurable, achievable, relevant, and time-bound (SMART) and serve as specific objectives that the Program aims to achieve within a defined timeframe. The targets may vary depending on the specific goals and priorities of the organization or jurisdiction.

Common targets of the *Waste Management Program* may include, but are not limited to:

- Waste reduction targets;
- Wastewater management targets;
- Hazardous waste management targets;
- Waste rock management targets;
- Airborne emissions reduction targets; and
- Recycling and composting targets.

The process for setting overall objectives and targets is outlined in the *Management System Program* and supporting procedure.

2.3 Resources

Denison is committed to providing the necessary resources to support effective development, implementation, maintenance, and continual improvement of the Program, including achievement of its objectives and targets.

2.3.1 Roles and Responsibilities

This subsection outlines the specific roles and responsibilities within the Program, including the Environment Manager, the Operations Manager, Department Supervisors, and other workers with various levels of responsibility.

For effective implementation of this Program, workers are informed of their roles and responsibilities and are accountable for comprehending and performing them. Executive and Leadership level roles and responsibilities are specified in the *Management System Program*.

<u>Environment Manager</u>

- Responsibility for compliance with waste management requirements arising from legislation, regulations, licences, permits, and other legal requirements;
- Ensuring compilation of waste inventory for reporting as required; and
- Ensuring identification and promotion of waste management requirements to management and workers is completed, and supports continual improvement; and
- Facilitating management review of this Program.

Operations Manager

- Overseeing the development, implementation, and adherence to this Program and it's plans and procedures;
- Managing and monitoring the effectiveness of this Program*;*
- Allocating adequate and appropriate resources to fulfill Program implementation;
- Working with applicable departments to verify Program roles and responsibilities are qualified to fulfill their roles; and
- Participating in the management review process of this Program.

Department Supervisors

- Overseeing the implementation, and adherence to this Program and it's plans and procedures;
- Communicate requirements for waste management on a job specific basis to workers; and
- Ensure workers effectively follow requirements of this Program.

Workers

- Follow work plans and instructions as they apply to the applicable area of the Operation;
- Performing duties safely with attention to approved protection procedures; and
- Document waste inventory, volumes, and transportation off-site as required.

2.3.2 Facilities and Equipment

Facilities and equipment to support the effective implementation of the Program and its related practices are provided to Program staff and applicable workers.

Examples of facilities and equipment used and maintained as part of the Program include:

- Waste treatment facilities;
- Various waste rock storage pads;
- Dust control equipment;
- Airborne emission control systems;
- Disposal facilities, including landfill; and
- Personal protective equipment.

The *Waste Management Plan* offers operational details for relevant facilities and equipment.

2.4 Training and Competence

A systematic approach to training (SAT) is used to educate, train, and qualify workers and contractors to perform assigned work. Training requirements are monitored to verify workers have necessary training when needed to maintain competency and work safely.

Records of training activities and competencies will be maintained as outlined in the *Training Management Program*.

2.4.1 Program-Specific Training

Training specific to the *Waste Management Program* will be defined for Denison employees and contractors according to the SAT process. Denison will ensure that workers identified under the Program have prior training or relevant work experience in a related field. As well, ongoing professional development will be defined, appropriate to their role.

Denison will also develop and deliver training and awareness programs to enhance hazardous waste knowledge, and skills. To ensure awareness and understanding, Denison will regularly communicate hazardous waste information, policies, and procedures to relevant staff.

2.5 Documentation and Record Management

Denison will establish and maintain documented Plans, Procedures and Work Instructions to ensure effective implementation of the Program. Documentation will be controlled, reviewed, and updated as necessary in accordance with the requirements in the *Management System Program*.

Documents and records will be generated as a result of implementation of the Program and completion of licensed activities. Examples of some records generated specific to the Program may include:

- Environmental and waste monitoring data;
- Program specific training records;
- Waste manifests;
- Waste characterization and lab analysis records;
- Waste volume and inventory records;
- Waste transportation records; and
- Waste treatment records

Further information on documentation and records management is provided in the *Management System Program.*

2.6 Communication

Communication both with internal and external stakeholders is a critical element of the Program to promote a safe work culture that fosters best waste management practices. Relevant information covering topics such as waste generation, segregation, storage, treatment, and disposal practices will be shared.

Communication principles and processes are further outlined in the *Management System Program,* and communication with indigenous communities, local communities, and the public is managed as outlined in the *Public and Indigenous Information Program.*

2.7 Change Management

Change is managed at the Operation to protect workers, the environment, and property, and to ensure that regulatory requirements are met. The Operation's change management process is outlined in the *Management System Program.*

Examples of changes captured by the process could include, but is not limited to changes to the:

- *Waste Management Program* and supporting plans, procedures, and work instructions;

- Structures, systems, and components;
- Changes to the types, volumes, and concentrations of waste streams;
- Relevant regulatory requirements;
- Emerging risks to workers; and
- Organizational changes.

3 Do

3.1 Waste Characterization

The *Waste Management Program* addresses both conventional and radioactive waste. Waste characterization follows the process outlined in the *Waste Management Plan.* All solid, liquid, and gaseous wastes expected to be produced at the Operation are classified as per the plan.

3.1.1 Waste Classification

Wastes are generally classified as:

- Radioactive Waste; or
- Conventional waste.

Radioactive waste can include:

- Radiologically contaminated water;
- Radiologically contaminated drilling muds and products used in the drilling process;
- Special waste;
- Radioactive gaseous emissions/radon; and
- Low-level radiologically contaminated waste.

It should be noted that clean or special waste rock could have very low-level of radioactivity or could be free of radioactivity.

Conventional waste can include:

- Clean waste rock;
- Domestic waste including recyclable waste;
- Non-radioactive chemically contaminated waste;
- Hazardous substances or waste dangerous goods as described in Appendix D of Saskatchewan *Hazardous Substances and Waste Dangerous Goods Regulations*.
- Domestic wastewater;
- Site runoff; and
- Dust.

3.2 Waste Minimization

Waste minimization consists of the processes, practices, materials, products, substances, or energy that avoid or minimize the creation of waste. The *Waste Management Plan* outlines waste minimization measures for the various classes of waste identified in the previous section.

3.3 Waste Management

The waste management practices are tailored to each specific waste stream. The following subsections outline Denison's waste minimization practices for all Operation waste streams.

3.3.1 Special Waste

Special waste is defined as mineralized materials that cannot be disposed of in the clean waste pile. It is primarily made of drill cores, cuttings, muds, and related drilling products from wellfield development.

Special waste will be determined by a radiometric scan and sorted onto the special waste pad. The details of the mineralized/special waste rock and overburden are provided in the *Waste Rock Management Plan*. Anticipated volumes of mineralized/special waste material generated from the wellfield are provided in the *Waste Management Plan* and its supporting documents.

3.3.2 Clean Waste

Clean waste rock will be generated as sandstone cuttings from drilling activities. Clean waste rock will be stored on the clean waste rock pad. Clean waste is expected to be encountered from surface to 300 meters below surface. The clean waste pile will be assayed and tested for Potential Acid Generation (PAG) during operations to ensure the material can be re-used when required. Further details of the clean waste rock are provided in the *Waste Rock Management Plan*. Anticipated volumes of clean waste material generated from the wellfield are provided in in the *Waste Management Plan* and its supporting documents.

3.3.3 Industrial Effluent

The Industrial Wastewater Treatment Plant (IWWTP) receives overflow solution from the Yellowcake Thickener and other sources of contaminated solution on-site and removes dissolved metals and suspended solids to produce an effluent that meets environmental quality requirements.

The IWWTP will consist of three treatment stages, Effluent Treatment Stage One, Effluent Treatment Stage Two and Effluent Treatment Stage Three. Details of the treatment stages are provided in the *Facility Description Manual* as well as the *Waste Management Plan*.

3.3.3.1 Release Ponds

The release ponds consist of three effluent monitoring and release ponds. The ponds will receive water from the IWWTP.

Site preparation and Construction

The water received by the release ponds from the industrial treatment plant will be retained in ponds and will not be released into the environment until commercial operation commences.

Operation Phase

During Operation phase each pond will be operated with the following three stages: filling, holding (while awaiting quality confirmation), and free release to Whitefish Lake (once water quality is confirmed to meet discharge limits).

If necessary, water from the ponds can be recycled back to the processing plant via the process water pond.

3.3.4 Domestic Wastewater

Water drained from sinks, showers, washing machines, and sewage will be generated at the camp, processing plant, airstrip terminal, and operations centre. Domestic wastewater from camp, processing plant, and operations centre will be piped directly to a domestic wastewater treatment plant (DWWTP) for on-site treatment. For the remainder of the areas there will be holding tanks installed in those buildings and domestic wastewater will be transported to the DWWTP by vacuum truck for treatment.

Reject solids from DWWTP will be collected, dewatered, and disposed of at an onsite landfill or the site composting system.

3.3.5 Domestic Waste

Domestic waste is defined as waste materials that are generated from the camp facility and offices other non-contaminated areas. Domestic waste is collected in garbage bins and recycling bins distributed around the site. Recyclable materials are collected and sent to an approved recycling depot. Clean burnables may be burned only when authorized by a provincial *Permit to Burn.*

Denison proposes to use a composter for the disposal of food wastes, this will be a Brome composting system, which is enclosed in a sea container. After composting is complete, an outdoor curing phase will be required during the summer months.

A domestic waste landfill will be used to manage non-recyclable, inert wastes (including non-recyclable plastics, broken furniture, textiles, and other non-recyclable items from the camp and operations site).

The landfill will be developed as per the regulations set out by the *Saskatchewan Ministry of Environment.*

3.3.6 Recyclables

The implementation of the recycling practice involves the establishment of a source separation system, which includes providing easily identifiable and accessible recycling bins for various materials such as paper, plastic, glass, and metal. Additionally, a well-designed collection infrastructure is put in place to ensure the efficient retrieval of recyclable materials from locations within the mine, offices, and the camp. This will involve collaborating with third-party recycling facilities or material recovery facilities to process and sort the collected recyclables effectively.

3.3.7 Industrial Waste

Industrial waste is defined as waste with chemical or radiological contamination. The industrial waste landfill will meet the requirements as set out by the *Canadian Nuclear Safety Commission*, as well as National and International Standards from the*:*

- Canadian Standards Association;
- Environment and Climate Change Canada; and
- International Atomic Energy Agency.

More details of industrial waste are provided in the *Waste Management Plan* and its supporting documents.

3.3.8 Hazardous Waste

Hazardous waste could include chemical contaminated waste such as non-radiologically contaminated soil and waste oil. Waste oil is collected as well as hazardous waste such as paints, solvents, and hydrocarbons and will be temporarily stored on a lined pad. Hazardous waste will be removed by a licensed carrier and delivered to a licensed receiver for recycling. Details of the hazardous waste management stages are provided in the *Waste Management Plan* and its supporting documents.

3.3.9 Site Runoff

Site runoff from non-contaminated areas will be diverted away from the facilities. Site runoff from potentially contaminated areas, such as the process precipitates storage pad and special waste pad will be collected and stored in double lined ponds prior to treatment in the IWWTP.

3.4 Decommissioning Plans

CNSC REGDOC 2.11.2, Decommissioning, which is a part of the CNSC's waste management series requires that the *Waste Management Program* should consider all stages of decommissioning including Planning, preparation, execution, and completion of decommissioning.

The decommissioning planning requires a waste management strategy that identifies the categories and estimated quantities of all waste streams that will be generated and managed during decommissioning, and the planned disposition path.

Preparation of decommissioning requires a waste management plan that considers the waste hierarchy, including waste minimization, reducing radioactivity, reusing and recycling materials and components, and disposing of the waste. The *Waste Management Plan* shall describe the systematic process for how the waste will be moved from the decontamination and dismantling areas to the areas for subsequent steps of waste management. The monitoring and processing areas should be designed and operated to keep recyclable and reusable materials separate from waste materials.

Prior to execution of decommissioning the availability of packages for radioactive waste, the disposition path of radioactive waste arising from decommissioning activities, and the ability of those disposition paths to accommodate the types and volumes of material should be evaluated and ensured.

4 Check

4.1 Monitoring and Measurements

Waste management performance is monitored and measured against established objectives and targets (identified in Section 2.2). Denison will monitor, measure, analyze, and evaluate its performance based on a defined process outlined in the *Management System Program*.

Monitoring and measurement activities specific to the *Waste Management Program* include waste and environmental monitoring and measurements for various waste streams, as outlined in the *Waste Management Plan* and its supporting documents.

The results of monitoring and measurement activities are communicated internally and externally and documented as part of the *Records Management* process outlined in the *Management System Program.*

4.2 Inspections and Audits

Denison will conduct internal audits of the *Waste Management Program* to assure compliance with the requirements set out in the Program and to determine if the Program is being effectively implemented and maintained.

The internal audits will follow the process and procedures outlined in the *Management System Program*.

4.3 Management Review

The *Waste Management Program* will be reviewed by Denison management in accordance with a defined frequency to assure the program is meeting its objectives, is effective or needs adjustment. The types of items related to waste management that Denison management will review may include:

- Suitability, adequacy, and performance of Program objectives and targets;
- Upcoming or new legislation related to waste management;
- Results of monitoring in relation to meeting performance objectives and targets;
- Results of audits and inspections in relation to meeting performance objectives and targets;
- Identified opportunities for improvement based on incident reports and other sources;
- Communications from interested parties;
- Adequacy of resources; and
- Any needs for Program adjustments.

Where necessary, Denison management will identify opportunities for improvement and establish action plans to implement change in accordance with the process outline in the *Management System Program.*

4.4 Reporting

Denison will routinely report both internally and externally on the performance of the *Waste Management Program*. External reporting can include reporting to regulators, the public, and Indigenous and local communities.

External reports to regulators will be produced in accordance with regulatory requirements.

External reports to the public or Indigenous communities on the performance of the Program will be tailored to the interests of these groups as identified through community engagement activities. Reporting, disclosure, and communication to the public and Indigenous and local communities is discussed in more detail in the *Public and Indigenous Information Program.*

5 Act

5.1 Corrective Action

Non-conformities or areas for improvement are identified following the process outlined in the *Management System* and supporting procedures. These non-conformities can include hazardous waste related incidents, environmental incidents, near-misses, and deviations from the *Waste Management System Program.* Non-conformities can also be identified during inspections and audits.

Responses to identification of non-conformities include investigation of cause, and corrective action if appropriate. Corrective actions are planned, implemented, verified, and reviewed for effectiveness based on the process identified in the *Management System Program*.

5.2 Continual Improvement

Opportunities for improvement of this Program will be identified and addressed to enhance waste management performance. The continual improvement process for this Program follows the overall continual improvement process outlined in the *Management System* Program and the supporting procedures. Continual improvement may also include updating Program objectives and targets based on changing circumstances or new information. Improvement may involve benchmarking performance against other similar projects and facilities. Any changes identified through the continual improvement process will be implemented in a systematic and controlled manner.

With respect to waste management, opportunities for continual improvement may be identified through review of techniques, processes, and procedures ensuring effective control of effluent and waste generation.

6 References

6.1 Internal

Document Name
Management System Program
Environmental Management Program
Radiation Protection Program
Training Management Program
Waste Management Plan
Waste Rock Management Plan
Decommissioning Plan

6.2 External

Canadian Nuclear Safety Commission (CNSC). 2021. Waste Management, Volume I: Management of Radioactive Waste, REGDOC-2.11.1.

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