COGEMA Resources Inc.

MIDWEST PROJECT
DESCRIPTION/PROPOSAL

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Version 1

COGEMA Resources Inc.
MIDWEST PROJECT DESCRIPTION/PROPOSAL

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COGEMA Resources Inc.
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1 GENERAL INFORMATION

1.1 Introduction

The Midwest uranium deposit is located in the Athabasca basin in northern Saskatchewan; the existing Midwest site consists of surface facilities constructed for 1988/1989 test mining

The Midwest uranium deposit is located near the eastern margin of the Athabasca basin in northern Saskatchewan, approximately 30 km west of Wollaston Lake, and about 15 km west of the JEB site at the McClean Lake Operation (via air) (Figure 1.1-1). The existing Midwest site consists of a few surface facilities that were constructed when test mining was conducted between 1988 and 1989, including an underground test mine. An access road, approximately 2 km in length, connects the Midwest site to the end of Provincial Road 905 near Points North, a freight forwarding facility comprising a camp, warehousing and airport facilities.

An environmental assessment approval for the Midwest Project was then granted by both the federal and provincial governments in 1998; this proposal involved jet-boring mining

The relatively long history of exploration and development at the Midwest project is outlined in Section 1.2.1. The most recent development proposal, submitted by COGEMA Resources Inc. (COGEMA) in 1995, entailed the development of the Midwest deposit using the underground jet-boring mining method, with off-site ore processing and tailings management at the nearby McClean Lake Operation[1]. This proposal was the subject of public review by the Joint Federal-Provincial Panel on Uranium Developments in Northern Saskatchewan (Joint Panel), and was subsequently recommended by the Joint Panel to proceed in 1997[2]. Both the federal and provincial governments subsequently granted environmental assessment approvals for the Midwest project in 1998[3].

Several changes and improvements are proposed to the project relative to what was previously reviewed and approved

Recent and projected favorable market conditions have led to the review and optimization of the Midwest project by COGEMA, the project operator, on behalf of the owners. The basic concept of mining the Midwest ore body and milling the ore at the McClean Lake mill remains the same. However, several changes are proposed to the project relative to what was previously reviewed and approved. These include a change to the mining method from underground to open pit, development of a dedicated haul road from the Midwest site to the McClean Lake JEB mill, and a faster rate of milling of Midwest ore at the JEB mill. In general, the changes are expected to result

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[1] *The Midwest Project Environmental Impact Statement*, Main Document, 1995

[2] *Report of the Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan: Midwest Uranium Mine; Project Cigar Lake Uranium Mine Project; Cumulative Observations*, November 1997

[3] Province of Saskatchewan, Department of Environment and Resource Management, *Ministerial Approval under The Environmental Assessment Act, The Midwest Project*, March 1998.

Government of Canada, *Federal Response to the Recommendations of the Joint Federal-Provincial Panel on the Cigar Lake and Midwest Uranium Mining Projects*, April 1998.

in improvements to the project in terms of protection of workers and the environment, and project feasibility, while retaining the socioeconomic benefits. A comparison of the current project with the 1995 approved project is found in Section 1.2.

This proposal incorporates innovative and sound approaches that aim to minimize potential effects

Various approaches to minimizing environmental effects have been considered for the current proposed, along with operational experience gained at the McClean Lake Operation. This project description/proposal thus incorporates innovative and sound approaches that aim to minimize potential effects. A more detailed description of the current project is provided in Section 2.

1.1.1 Need for and Purpose of the Project

The purpose of the project is to mine the Midwest deposit and to produce uranium concentrate

The purpose of the project is to mine the Midwest ore body and to produce uranium concentrate (commonly referred to as yellowcake), within the framework for sustainable development applied by COGEMA to all of its activities.

The need for the project is to add to the positive economic, employment and business opportunities

The Midwest project is needed to add to the ore reserves for McClean Lake Operation and thereby add to the positive economic, employment and business opportunities related to uranium developments in northern Saskatchewan.

Uranium contributes to national and international sustainable development through its use to generate nuclear power

On a broader perspective, world uranium production currently falls far short of projected future demands for generation of clean electricity (no generation of greenhouse gas). Uranium from the Midwest deposit will help meet the future needs for nuclear power, which will help reduce, on a global scale, greenhouse gas emissions. The advantages of nuclear power are that it is clean and affordable, has predictable costs and security of supply, and facilitates grid stability. Uranium is also the raw material used for production of a wide range of radioisotopes in nuclear reactors. These radioisotopes are used in research, medicine and industry.

1.2 Background

Three main components to the proposed Midwest Project are discussed in this section

The project, as described in this document, consists of the following components:

- developing the Midwest ore deposit as an open pit mine,
- developing a dedicated road linking the Midwest development with the existing McClean Lake Operation; and
- increasing the production capacity of the JEB mill to accommodate the planned rate for milling of the Midwest ore.

The background relevant to each of these components is described in the following sections.

1.2.1 Midwest Project

Extensive exploration led to the discovery of Midwest ore body in 1978; in 1981, a proposal for an open pit mine and on-site milling was submitted, but withdrawn prior to formal review due to unfavorable market conditions

Exploration in the Midwest area was carried out starting in 1968. Most of the work was concentrated on the area near South McMahon Lake, where uranium-mineralized boulders were found, culminating in the discovery of the Midwest ore body in January 1978. Between 1978 and 1980, more than 400 holes were drilled to delineate the deposit and to further explore the property. The operator of the Midwest Project during this period was Canada Wide Mines Ltd. (CWML), who evaluated mining alternatives and carried out engineering studies related to the milling process. In 1981, CWML prepared a draft Environmental Impact Statement (EIS) for the development of the project involving open pit mining and on-site milling of the ore. Although the EIS was submitted to the regulatory agencies, it was not subjected to formal review due to a corporate decision to defer the development of the Midwest Project.

An EIS for an underground exploration program (test mine) was submitted and approved in 1988; test mining program was carried out during 1988/1989

In 1987, the project was reactivated when Denison Mines Ltd., in joint venture with PNC Exploration (Canada) Company, acquired a 60% interest in the project and became the operator. An EIS for an underground exploration program (test mine) was submitted and approved in 1988. Work at the test mine commenced in 1988 and was competed in 1989. The program consisted of: dewatering a portion of Mink Arm of South McMahon Lake, directly above the ore body; sinking a shaft to a depth of about 185 metres; driving a crosscut above the ore body about 170 metres below surface; and carrying out an evaluation of ground conditions, hydrogeology and test mining using blind-hole boring technology.

Submission of an EIS proposing an underground mine was submitted in 1991; in 1992, a complementary development of the Midwest and McClean Lake projects, with milling of Midwest ore at the McClean Lake mill, was proposed

The experience and data gained during test mining led to the submission of an EIS in 1991 proposing an underground mine, a mill, and a tailings disposal area[4]. The proposal was subsequently amended in 1992 to a complementary development of the Midwest and McClean Lake projects, which proposed the milling of Midwest ore at the McClean Lake mill, eliminating the need of both a mill and a tailings disposal facility at the Midwest site[5]. As part of the complementary development agreement, Minatco Ltd. became operator of the MJV. In July 1993, Minatco Ltd. became a COGEMA subsidiary.

A joint federal-provincial review panel was appointed in August 1991 to review three projects, which included Midwest

In April 1991, the governments of Canada and Saskatchewan announced a joint federal-provincial environmental assessment review to consider three uranium mine developments in northern Saskatchewan. The reviews were conducted in accordance with *The Environmental Assessment Act* (Saskatchewan), and the federal *Environmental Assessment and Review Process Guidelines Order* (*EARPGO*). A joint review panel was appointed in August 1991.

The Joint Panel rejected the Midwest proposal

In December 1993, the Midwest Project, as described in the 1991 EIS and 1992 amendment, was rejected by the federal and provincial governments as a result of recommendations made by the Joint Panel.

Revised Midwest proposal, involving jet-boring method, was submitted for Joint Panel review in 1995

In 1994, COGEMA redesigned the Midwest development proposal, with a view to address the concerns raised by the Joint Panel. COGEMA submitted its EIS on August 31, 1995, which responded to the issues outlined in the panel's previous review. The 1995 EIS adopted a promising new mining method, jet-boring in frozen ground, which was undergoing testing at the Cigar Lake underground test mine. It also included off-site milling of ores and tailings disposal at the McClean Lake Project. The governments of Saskatchewan and Canada referred the review of the 1995 EIS to the Joint Panel on November 9, 1994. The Joint Panel requested additional information from COGEMA, and addenda were submitted on March 1996, May 1996, October 1996, and May 1997.

Joint Panel recommended the approval of the Midwest Project in the 1997 report

The Joint Panel concluded, based on COGEMA's submissions, nineteen days of public hearings, and written submissions from various stakeholders, that the revised Midwest proposal was substantially better than the one

[4] *Midwest Uranium Project Environmental Impact Statement*, Midwest Joint Venture, August 1991.

[5] *McClean Lake Project Environmental Impact Statement Amendment*, complementary McClean Lake and Midwest Projects September 1992

rejected in 1993. The Joint Panel, in their 1997 report[6], recommended approval for mining of the Midwest ore body as proposed in the 1995 EIS. The Joint Panel further recommended that three conditions be attached[7].

Federal and provincial governments approved the project in 1998

The governments of Canada and Saskatchewan accepted the recommendations of the panel, and approved the development of the Midwest Project in 1998.

The current proposal addresses concerns raised by the Joint Panel in 1993

The Joint Panel, in arriving at their 1997 recommendations, outlined the major concerns raised during the review of the initial 1991/92 proposal, and provided a comparison of how the 1995 proposal addressed the key issues. This comparison is extracted from the Joint Panel report and reproduced in the first two columns of Table 1.2-1. The third column notes how the current proposal continues to address these concerns and further improves the project.

The change in the mining method adopted in the current proposal responds to several factors

The change in the mining method adopted in the current proposal responds to several factors that have evolved since the 1995 EIS. The first relates to the feasibility of the jet boring mining technology which has undergone an additional decade of development at the Cigar Lake Project. The costs associated with this technology are substantially higher than originally envisioned. As well, ore recovery using this technology is expected to be about 85% for the Midwest deposit. From a global view, world uranium production is predicted to fall short of future demands for clean electricity, thus it is desirable to maximize the recovery of known reserves. The Midwest open pit design is expected to result in 100% recovery of the known Midwest ore reserve within the pit design.

The proposed open pit mining approach has the potential for increased benefits to the northern workforce

The jet boring method would pose difficulties for the current northern workers and contractors at the McClean Lake Operation, with substantial experience in open pit mining, to directly transfer to the Midwest mine. Thus the proposed open pit mining approach has the potential for increased benefits to the northern workforce.

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[6] *"By the use of a combination of innovative mining methods, COGEMA has shown that it should be possible to recover the high-grade ore without subjecting miners to excessive radioactivity or exposing them to high concentrations for toxic heavy metals such as arsenic or nickel. Modelling also indicates that it will be possible to contain terrestrial and aquatic environmental damage within acceptable levels."* See footnote 2.

[7] *"First, all special waste should be placed underground or in mined-out pits at McClean Lake. Secondly, COGEMA should commit to a long-term monitoring program for the waste rock pile that is proposed for the west side of Mink Arm. If acid mine rock drainage is observed to occur over time, the situation should be mitigated by removal of the waste rock to one of the mined-out Sue pits at the McClean Lake site. Thirdly, COGEMA should commit to a continuing study of fish, macrophytes and sediments of Mink Arm, the proposed site for effluent discharge. Since Mink Arm is separated from the rest of South McMahon Lake by a dam, it provides a natural laboratory for a study of the impacts of uranium mine effluent on the biota."* See footnote 2.

Table 1.2-1 Comparison of the 1992, 1995 and Current Proposals for Mining the Midwest Uranium Deposit

PANEL CONCERNS WITH 1992 PROPOSAL	DIFFERENT APPROACHES IN THE 1995 PROPOSAL	CURRENT PROPOSAL
Use of unacceptable mining methods.	Use of a jet-boring technique, tested at the Cigar Lake test mine, should be a safer mining method.	Open pit mining method maximizes ore recovery and offers enhanced worker safety. Existing experienced workforce can be utilized.
Mining, in confined underground spaces, of an ore that contains high concentrations of uranium, arsenic and nickel.	Automated mining from locations in the basement rock, underneath the ore body, should reduce exposure of miners to radioactivity and toxic heavy metals.	Open pit mining operational experience illustrates lower occupational exposures relative to underground mining methods.
The existence of over 600 exploration bore holes, most of them uncapped, in the vicinity of the ore body.	Freezing of the ore body would seal the bore holes during the operational phase.	Open pit mining would require Mink Arm to be drained. Mink Arm was previously drained during 1988 test mining. Fisheries Act and the Policy for the Management of Fish Habitat provide mechanism to address the Harmful Alteration Disruption or Destruction (HADD) of fish habitat.
The need to transport high grade ore on a public highway.	Ore, in slurry form, would be transported in specially designed and constructed vessels.	Private Road access between Midwest and JEB mill will eliminate need for ore transport on highway 905
The potential for environmental damage through the release of contaminated effluent into the Smith Creek watershed and the need to dewater an area of several square kilometres around the mine site.	Dewatering of Mink Arm and the surrounding area would not be required and the volume of effluent released would be greatly reduced.	Adopting a strategy to minimize the number of effluent discharge points by pumping effluent via pipeline to the Sink/Vulture Treated Effluent Management System (S/V TEMS) at McClean Operation will eliminate impacts on Smith Creek from release of treated effluent. No modifications to the S/V TEMS will be required to maintain current operational constraints. Dewatering impacts will be assessed, and mitigated as per DFO policy (see above).
Uncertainties in the disposal of mill tailings containing high concentrations of toxic heavy metals.	Protection from dust would be enhanced by the subaqueous disposal of tailings; however, there are concerns remaining regarding contamination of ground water.	Uncertainties associated with mill tailings disposal in the JEB TMF have been addressed by the Tailings Optimization and Validation Program. The program has validated predicted performance.
The contribution of this proposed mine to the combined effects of all of the mines (existing and proposed) in a relatively small area on the west side of Wollaston Lake.	The new mining methods and technologies proposed are intended to decrease loadings of contaminants to the environment.	Minimizing the number of treated effluent discharge locations reduces the spatial footprint of potential effects associated with treated effluent release. The incremental effects associated with the discharge of treated Midwest mine water in Collins Creek are expected to be not significant. The Cumulative Effects Monitoring Program has been established by the Province to assess cumulative effects at the regional level. None have been found to date.
RECOMMENDED NOT TO PROCEED	**RECOMMENDED TO PROCEED**	

1.2.2 The McClean Lake Operation

Mineralization was first discovered in 1979, followed by the joint federal-provincial EA review process from 1991 to 1993, and project licensing in stages starting in 1994

Uranium mineralization was first discovered on the McClean Lake site in 1979. Substantial additional mineralization was discovered during the 1980's. The proposed McClean Lake Project[8] went through the Joint Panel review from 1991 to 1993. Based on the recommendations of the Joint Panel report, government approvals for the McClean Lake project were issued in December 1993.

McClean operation construction began in 1994

Licensing by provincial and federal regulators, and initial site construction work, began in 1994. The first ore body (JEB) was mined from 1995 to 1997, and following further regulatory approvals, the mined-out pit was converted into the JEB tailings management facility (TMF). Following regulatory approvals for operation of the mill and TMF, milling of ore to produce uranium concentrate (frequently referred to as U_3O_8 or yellowcake) commenced in June 1999. The second ore body (Sue C) was mined from 1997 to 2002. Stockpiled ore from the Sue C open pit mine is currently being fed to the JEB mill, the Sue A ore body is currently being developed, and the Sue B ore body is approved for development.

Joint Panel review of Cigar Lake and Midwest projects in 1995-1997 included processing of ores from these projects at McClean Lake

In parallel with the construction of the JEB mill for the McClean Lake project, the Joint Panel, between 1995 and 1997, reviewed the project proposals for the Cigar Lake and Midwest projects, which included the proposed processing of ores from these projects at McClean Lake. The environmental assessments were based on annual uranium production at the McClean Lake mill (JEB mill) of 24 million lbs. U_3O_8 equivalent from all ore sources. Based on the recommendations of the Joint Panel on these projects, government approvals of the Cigar Lake and Midwest projects were issued in 1998. Licensing for construction of the Cigar Lake mine, and licensing for the construction of the expanded JEB mill (to receive and process Cigar Lake ore) have both been approved.

At start-up annual production capacity was 6 million pounds U3O8 equivalent

The annual JEB mill production capacity at the 1999 start-up of milling operations was 6 million lbs. U_3O_8 equivalent. In 2001, the approved annual production rate was increased to 8 million lbs. U_3O_8 equivalent, subsequent to completion of a screening assessment under the *Canadian Environmental Assessment Act* (CEAA). No physical modifications were required for this increase in production.

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[8] *The McClean Lake Project Environmental Impact Statement*, August 1991; *Additional Information*, 1992; *Complementary McClean Lake and Midwest Projects*, September 1992. Minatco Limited.

The Sue E ore body was not part of the original McClean Lake approval

An extensive exploration program in the Sue area has led to the discovery of additional economic reserves in the Sue E area, immediately south of the existing Sue C pit. The Sue E ore body was not part of the original 1993 McClean Lake approval, and its development required an environmental assessment to meet both federal and provincial requirements (a *CEAA* screening/provincial EIS). The Sue E environmental assessment re-affirmed, with the inclusion of the mining and milling of Sue E, that the production originally envisioned at the McClean Lake Operation and assessed by the Joint Panel and approved by federal and provincial governments was not likely to cause significant adverse environmental effects.

The Sue E EIS reviewed the mining and milling of all ore sources identified in the 1995 assessment in conjunction with the Sue E deposit

Under the Sue E EIS, the fully developed project entailed a JEB mill capable of an annual production rate of 24 million pounds U_3O_8 equivalent. That is, the Sue E EIS included all ore sources identified in the 1995 EIS, which was reviewed by the Joint Panel, including JEB, Sue A, B, C, McClean Lake underground, Midwest, and Cigar Lake deposits, in conjunction with the Sue E deposit. It also maintained a production envelope consistent with the 1995 EIS.

Maximum uranium production through the mill

As outlined in the Sue E EIS, the maximum uranium production for the McClean Lake and Midwest ores is constrained by the tonnage rate at which ore can be ground and processed through the mill (a "front end" process constraint). In contrast, the maximum uranium production while processing Cigar Lake ore is constrained by the maximum flow rate of uranium bearing solution that can be processed to yellowcake (a "back end" process constraint).

An amendment to construct the JEB mill expansion was approved in 2005

An amendment to the McClean Lake operating licence to construct the JEB mill expansion was approved in 2005. This project, when completed, will provide the capability to receive Cigar Lake ore and produce 12 million lbs. of U_3O_8 equivalent annual production through the "front end" of the mill and 12 million lbs. of U_3O_8 equivalent annual production through the "back end" of the mill. This was referred to as the 12/12 case in the Sue E EIS, and represents a partial implementation of the approved JEB mill.

With the anticipated scale-up of production at the Cigar Lake mine the mill will approach 24 million pounds U_3O_8 equivalent

With the anticipated production ramp-up at the Cigar Lake mine, "front end" feed to the mill will approach 24 million lbs. U_3O_8 equivalent per year. This annual production rate entails 18 million lbs. of production from Cigar Lake, and 6 million lbs. of production from McClean and Midwest ore sources. This increase in JEB mill production capacity, referred to as 24/24 case, falls within the scope of the 1995 EISs for the Midwest and Cigar Lake projects.

The current plan is to utilize excess capacity at the nearby Rabbit Lake mill to process uranium bearing solution generated from Cigar Lake ore

Currently, a joint Cameco-COGEMA assessment is ongoing (Proposed Rabbit Lake Solution Processing Project), proposing to utilize excess capacity at the nearby Rabbit Lake mill to process uranium bearing solution generated from Cigar Lake ore, and not to proceed with the full scope of the approved expansion of the JEB mill, as described in the 1995 EIS and re-affirmed in the Sue E EA. This plan, referred to as the 24/12 case in the Sue E EIS, includes uranium bearing solution loadout facility at McClean Lake site, transport of uranium rich solution to the Rabbit Lake mill, and final processing at Rabbit Lake mill.

The proposal to mill the Midwest ore at the JEB mill at a faster rate reflects current favorable market conditions

The current proposal to mill the Midwest ore at the JEB mill at a faster rate reflects current favorable market conditions. This proposal, when added to the production outlined in the Sue E EIS, results in an annual production capacity of 27 million lbs. U_3O_8 equivalent for uranium in the incoming ore. This proposed production increase exceeds what was reviewed by the Joint Panel (1995 Cigar Lake Project EIS and 1995 Midwest Project EIS), and what was approved by the CNSC (as the *CEAA* Responsible Authority) and provincial government through the Sue E environmental assessment process. For the purpose of establishing an environmental assessment envelope for the Midwest project, COGEMA does not distinguish between "front end" and "back end" production. That is, the intent is to show that the previously approved annual production rate of 24 million lbs. U_3O_8 equivalent can be increased to 27 million lbs. U_3O_8 equivalent per year (an increase of 12 ½ %). For clarity, this scenario will be referred to as the 27/27 JEB mill production case for the current project.

The proposed Rabbit Lake Solution Processing Project falls within the scope of the current proposal

Advancement of the plan to utilize the Rabbit Lake mill excess capacity to process uranium bearing solution will result in a JEB mill operational configuration capable of processing 27 million lbs. U_3O_8 equivalent annually through the "front end", and 16 million pounds U_3O_8 equivalent of uranium bearing solution annually through the "back end". This is referred to as the 27/16 case, and is expected to represent the future licensing application. This falls within the 27/27 case currently proposed to define the EA envelope.

This assessment will be based on the expanded JEB mill production capacity of 27 million lbs. U_3O_8 equivalent per year

As outlined in the following description, mill modifications are required to mill Midwest ore. The assessment of a 27 million pound annual mill production rate will form part of this assessment. Tailings and waste water management associated with faster rate of milling Midwest ores will not require changes to the current management systems.

1.2.3 Dedicated Haul Road Connecting the Midwest Site and the McClean Lake Operation

A dedicated haul road is proposed, which represents an improvement from public safety perspective

This component of the project, *i.e.*, a dedicated haulage road between the Midwest and McClean Lake sites, was not part of earlier environmental assessments. However, previously proposed ore haulage along Provincial Road 905, was identified as a concern by the Joint Panel. COGEMA believes that a dedicated road improves the project, and has identified routing options to be considered during the EA process.

1.3 Proponent

COGEMA is the operator and licensee of the Midwest Project

COGEMA is the operator and licensee of the Midwest Project. Ownership of the Midwest Project is presently as follows:

- COGEMA Resources Inc. 69.16%
- Denison Mines Inc. 25.17%
- OURD (Canada) Co. Ltd. 5.67%

COGEMA is the operator and licensee of the McClean Lake Operation

COGEMA is the operator and licensee of the McClean Lake Operation. It has the same owners, with slight variation in shares as follows:

- COGEMA Resources Inc. 70.0%
- Denison Mines Inc. 22.5%
- OURD (Canada) Co. Ltd 7.5%

1.3.1 Corporate Structure

COGEMA is part of AREVA, a world leader in nuclear energy, electricity transmission and distribution

COGEMA Resources Inc. is a Canadian company, headquartered in Saskatoon, Saskatchewan. The company is a 100% subsidiary of the AREVA group of companies headquartered in Paris, France. AREVA is a world leader in nuclear energy, electricity transmission and distribution, with manufacturing facilities in over 40 countries and a sales network in over 100 countries. Approximately 58,000 people are employed, with 2004 sales revenue of 11.1 billion euros.

AREVA's aim is to provide a comprehensive scope of services in every aspect of the nuclear fuel cycle

AREVA's aim on the nuclear side is to provide a comprehensive scope of services in every aspect of the nuclear fuel cycle (Figure 1.3-1), and of power reactor supply and services. The uranium concentrate provided by COGEMA Resources Inc. enters the nuclear fuel cycle at the front end.

COGEMA represents a major investment by the Mining Business Unit of the COGEMA Group, which holds world-wide gold and uranium interests

COGEMA Resources Inc. represents a major investment by the Mining Business Unit of the COGEMA Group, which holds world-wide gold and uranium interests. The other significant uranium production centers are two projects in Niger, and an *in situ* leach project in Kazakhstan. The COGEMA Group also has extensive experience in reclamation and decommissioning at former uranium production sites in France, in Gabon and in the United States.

COGEMA and its predecessor companies have been involved in uranium exploration, and in project development and operation in the Athabasca Basin

In Canada, COGEMA Resources Inc. (COGEMA) activities can be broadly grouped into projects where it is the operator, those it does not operate but holds an equity interest, and exploration activities. In the past 35 years, COGEMA, and its predecessor companies have been involved in uranium exploration, and in project development and operation in the Athabasca Basin. Projects operated by COGEMA in northern Saskatchewan include Cluff Lake (currently being decommissioned), McClean Lake, and Midwest. COGEMA also has significant minority interests in the Cigar Lake, McArthur River, and Key Lake projects. The company also has an active exploration program.

1.3.2 Organization Management

An organizational chart of positions relevant to the McClean Lake Operation is presented; the General Manager is responsible for all on-site operations, general site management and regulatory compliance

The Midwest Project will be managed by the staff at McClean Lake Operation. Management of operations at the Midwest site will be similar to the current management of operations at the Sue E mining area, while the ore from Midwest will be integrated into the overall ore supply to the JEB mill. The current senior management positions for COGEMA are shown in Figure 1.3-2. This is a partial organizational chart, showing those positions relevant to the operation with respect to protection of the environment, the health and safety of workers and the public, and the maintenance of national security. It is likely that some aspects of the current organization structure will evolve with time as the company responds to changes in both external (regulatory) and internal requirements.

McClean Lake Operation management will oversee activities at Midwest

Current positions at site are shown in bold boxes. The General Manager of McClean Lake Operation, also to be responsible for the Midwest site, is responsible for all on-site operations, general site management, and liaison with regulators on matters concerning the operating licences. This is done through five major departments shown in the figure. The General Manager reports to the Vice-President, Operations and through that position to the President and CEO of COGEMA. The Surface Superintendent will oversee

and be responsible for mining activities at both the McClean Lake Operation and Midwest mine sites.

Corporate departments provide technical support and oversight of operations, and are responsible for the development of new projects

Currently, the corporate departments shown in the figure provide a combination of technical support and oversight of site operations, and are also responsible for the development of new projects, including those that would extend the scope of the McClean Lake Operation. Licensing of new projects is generally done through a project team approach involving both the corporate and site staff, with the Vice-President, Environment Health and Safety responsible for overall co-ordination of licensing and environmental assessments.

Incorporation of the Midwest Project will not involve changes to the management of existing facilities at McClean Lake Operation

The management of the Midwest Project will be incorporated into the McClean Lake Operation. This will not involve changes to the management of existing facilities at McClean Lake Operation, including the approved operating policies, action levels, organization management, and key programs for protection of health, safety and environment, relative to those approved through current or future licenses.

1.3.3 COGEMA's Approach to Sustainable Development

The Saskatchewan uranium industry has been practicing the principles of sustainable development

The Saskatchewan uranium industry has been practicing the principles of sustainable development before the term came into common usage in 1987. The social partnership and high level of environmental protection achieved by the uranium operations have allowed economic development to occur in the north today without compromising the future of the land or the people.

Sustainable development meets the needs of the present without compromising the needs of future generations

Sustainable development, as defined in the Brundtland report (United Nations 1987), is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development fosters long-term protection of the environment and its inhabitants. Its success hinges on balancing three aspects, which are: environmental protection (including worker occupational health and safety), social responsibility, and economic performance.

The proposed Midwest Project has been defined within the framework of sustainable development

The proposed Midwest Project has been defined within the framework of sustainable development. This focus will continue through the environmental assessment process, and into the operational and decommissioning phases of the project. A brief summary of COGEMA's approach to sustainable development is provided below, as it relates to the existing McClean Lake Operation and the proposed Midwest project.

COGEMA's highest priority is providing a safe and healthy workplace for its employees

The highest priority for COGEMA is providing a safe and healthy workplace for its employees. This is achieved through comprehensive and effective programs at the site for both radiation protection and conventional occupational health and safety. The success of these programs is evident in McClean Lake Operation's performance with respect to worker exposure and safety records[9]. The performance statistics indicate that the open pit mining proposed for the Midwest Projects will provide a safe and healthy workplace.

COGEMA is further committed to protecting the environment in both the short and the long- term

COGEMA is also committed to the principle that site activities and developments require only a temporary use of the land, and is committed to protecting the environment in both the short and the long-term. The operational focus is minimizing waste production, and having in place appropriate waste management facilities and systems, and effective mitigation measures. It is noted that the innovative approaches outlined in regards to waste management for the Midwest Project reflect this principle. As well, reclamation and decommissioning strategies to ensure long-term protection will be an integral part of environmental assessment, initial facility design, and ongoing operations.

Sustainable development also involves consideration of nearby communities and embracing social responsibility and social partnerships

Sustainable development also involves consideration of nearby communities and embracing social responsibility and social partnerships. Various initiatives and programs, developed through partnership, are currently in place. These initiatives continually aim to improve dialogue and enhance trust and support among employees and in the communities impacted by the project activities, and to increase the capacity for these community members to participate in the developments. Northern residents benefit economically from the developments, either directly through employment, or indirectly through participation by northern businesses.

The Midwest Project will be undertaken in a manner that is socially responsible; the proposed open pit mining method has a higher potential for benefiting northern workforce

Currently, approximately 300 COGEMA employees and long term contractors work at McClean Lake, of which over 53% of the workforce are residents of northern Saskatchewan, and about a third of the workforce are residents of the Athabasca Basin. COGEMA continually seeks to increase the level of northern participation through a range of scholarships and apprenticeships that are made available to northern residents. The Midwest Project will be undertaken in a manner that is socially responsible. The proposed open pit mining method has a higher potential for benefiting the northern workforce.

[9] *McClean Lake Operation Sue E Project Environmental Impact Statement*, Main Document, November 2004.

Development must also ensure long-term profitable growth to the owners and shareholders

Economic performance is the third component of sustainable development. It is the economic success of the operation which supports the environmental and social requirements and commitments. Thus, the development of Midwest Project must also ensure long-term profitable growth to the owners and shareholders who provide the necessary funds to develop and to operate new projects.

1.3.4 Contacts for the Proposed Program

Additional information and/or clarification can be obtained by contacting Dr. John Rowson

The business address of COGEMA is: P.O. Box 9204, 817 45th Street West, Saskatoon, SK, S7K 3X5, CANADA. Additional information can be obtained by contacting Dr. John Rowson, Director, McClean Regulatory Affairs.

1.4 Purpose of this Document

The purpose of this document is to provide the necessary information so that a determination can be made with respect to the applicability of the CEAA

The purpose of this document is to provide the necessary information so that a determination can be made with respect to the applicability of the *Canadian Environmental Assessment Act (CEAA)*. This document will be used to determine if there is a need to carry out an environmental assessment, pursuant to *CEAA*. The information contained herein will also be used to define the scope of the project and the scope of the assessment in accordance with *CEAA*. This document has been prepared as guided by the Canadian Environmental Assessment Agency *"Operational Policy Statement Preparing Project Descriptions under the Canadian Environmental Assessment Act"*.

This document will be used by Saskatchewan Environment to determine if the proposed activities will require an environmental assessment

The purpose of this document, under *The Environmental Assessment Act* (Saskatchewan), is to enable SE to make a determination as to whether the proposed project would require an environmental impact assessment. This document has been prepared using SE *"General Guidelines for the Preparation of a Project Description"*.

1.5 Authorization Required

1.5.1 Canadian Environmental Assessment Act (CEAA)

The proposed Midwest Project, as outlined in this document, is an undertaking in relation to a physical work

The proposed Midwest Project, as outlined in this document, is an undertaking in relation to a physical work and, as such, is defined as a project under section 2(1)(a) of the *CEAA*.

The implementation of the Midwest Project will require a licensing decision(s) by the CNSC

The implementation of the Midwest Project will require a licensing decision(s) by the Canadian Nuclear Safety Commission (CNSC). The issuance or amendment of a CNSC licence under the *Nuclear Safety Control Act* (NSCA) is a "trigger" under the *Law List Regulations* of the *CEAA*.

It will also require authorization under the Fisheries Act and the Navigable Waters Protection Act

As well, the implementation of the Midwest Project will require an authorization for harmful alteration, disruption or destruction of fish habitat under the *Fisheries Act*, and may require permitting under the *Navigable Waters Protection Act*. The issuance of a permit under these acts is a "trigger" under the *Law List Regulations* of the *CEAA*.

Federal Responsible Authorities for this assessment are expected to be the Canadian Nuclear Safety Commission, Fisheries and Oceans Canada, and Transport Canada

As noted in Section 1.2.1, the Midwest Project has been previously considered and approved through the Joint Panel review process. The basic concept of a mine at Midwest and processing of the ore at a centralized facility remains, with the current project representing essentially an optimization of the previously approved project. However, certain components of the current project represent changes from what has been previously considered, so that a new environmental assessment under *CEAA* is required to assess the environmental implications of the proposed changes.

There are no identified exclusions from environmental assessment

There are no identified exclusions from environmental assessment for the project, pursuant to section 7 of the *CEAA* and Schedule I of the *Exclusion List Regulations* of the *CEAA*.

The responsible authorities are expected to be required to ensure the conduct of an environmental assessment

Therefore, pursuant to the requirements of *CEAA*, the responsible authorities are expected to ensure the conduct of an environmental assessment and the preparation of an environmental assessment report before the proposed approval decision and authorizations can be made pursuant to the respective acts.

An environmental assessment and preparation of an environmental assessment report will be required

It is expected that the conduct of the environmental assessment (technical studies) and the preparation of an assessment report, pursuant to subsection 17(1) of the *CEAA*, will be delegated to COGEMA. The responsible authorities must however ensure that the environmental assessment is conducted in accordance with the provisions of the *CEAA*. This includes determining the scope of the project and the factors to be considered in the assessment, reviewing the assessment report, and making a decision on the course of action to take following this review.

Other federal departments / agencies with an interest related to their mandate may participate in the review

Pursuant to the *Federal Coordination Regulations* under the *CEAA*, other federal departments/agencies with an interest related to their mandate may participate in the review of this project as federal authorities (FAs) in relation to the project. These agencies may include: Environment Canada (EC); Natural Resources Canada (NRCan); Indian and Northern Affairs Canada (INAC); and Health Canada (HC).

1.5.2 Saskatchewan Environmental Assessment Act

The Midwest Project received Ministerial approval in 1998

The Midwest Project has previously undergone a Joint Panel review and has obtained environmental assessment approval under *The Environmental Assessment Act* (Saskatchewan). The currently proposed Midwest Project represents a change to the 1998 approval, as it does not fully conform to the terms and conditions of the 1998 approval under *The Environmental Assessment Act* (Saskatchewan).

Currently proposed Midwest Project represents a change to the 1998 approval; it is expected that an EIS will be required

In Saskatchewan, a change to an approved development is subject to the provisions of section 16 of *The Environmental Assessment Act* (Saskatchewan). It is expected that COGEMA will be required to conduct an environmental impact assessment (EIA) of the proposed project, pursuant to section 16(2)(c) of *The Environmental Assessment Act* (Saskatchewan), and prepare and submit an environmental impact statement (EIS) to the Saskatchewan Minister of Environment.

1.5.3 Federal and Provincial Cooperation in the Environmental Assessment

It is expected that the federal and provincial environmental assessment processes will be coordinated

It is expected that the federal and provincial environmental assessment processes, directed respectively by the *Canadian Environmental Assessment Act* (*CEAA*) and *The Environmental Assessment Act* (Saskatchewan), will be coordinated under the *Canada-Saskatchewan Agreement on Environmental Assessment Cooperation (2005)*. Under the agreement, the Province of Saskatchewan, Environmental Assessment

Branch, will be the lead agency and contact for the proposed project. Working with the Province on this project will be the Canadian Environmental Assessment Agency, acting as the Federal Environmental Assessment Coordinator.

1.6 Consultation Held on the Project

COGEMA strongly supports an open and transparent stakeholder consultation process

COGEMA strongly supports an open and transparent stakeholder consultation process, both during initial planning (environmental assessment) and subsequent phases of the project. COGEMA met with government agencies in December 2005 to introduce the key components of the Midwest Project. The status of the Midwest Project was briefly introduced to McClean Lake site employees at recent long service awards presentations, and to Fond du Lac community members at the November 2005 community meeting/open house as part of joint Cameco-COGEMA community consultation efforts.

COGEMA will develop a comprehensive stakeholder consultation program in support of this environmental assessment

COGEMA will develop a comprehensive stakeholder consultation / information program that promotes a broader understanding of the proposed project, potential effects and key issues. During the environmental assessment process, efforts will be made to engage the public in issue identification and resolution, and in gathering relevant input for consideration.

2 PROJECT INFORMATION

Uranium market conditions have prompted COGEMA to re-evaluate the feasibility of the Midwest Project

Recent and projected favourable uranium market conditions have prompted COGEMA to re-evaluate the feasibility of the Midwest Project. A number of significant changes and improvements to the 1995 approved project are put forward in this document, as briefly outlined in Section 1.1. These changes and improvements are a result of ten additional years of experience in uranium developments in northern Saskatchewan. The current proposal also continues to take into consideration previously identified Joint Panel concerns (refer to Table 1.2-1).

Key aspects of the project include developing the Midwest pit, increasing the JEB mill production, waste water management and haul road construction

The key aspects of the proposed project are described in this section, as follows:

- development of Midwest open pit, construction of site facilities, and waste management at Midwest site (Section 2.1);
- increasing the production capacity of the McClean Lake JEB mill to accommodate an increased rate of milling of Midwest ore (Section 2.2). This proposal represents a planned sequential implementation of increased capacity of the JEB mill, which has previously been approved for 24 to 27 million lbs. U_3O_8 equivalent per year. The management of Midwest tailings at McClean Lake has previously been assessed under the Joint Panel process, and remains unchanged;
- management of waste water generated at Midwest site, which spans both the Midwest and the McClean Lake site (Section 2.3); and
- construction of a dedicated haulage road that connects the Midwest site with the McClean Lake Operation for haulage of run-of-mine ore on this road (Section 2.4).

Section 2.5 discusses air emissions and management of other wastes. Section 2.6 briefly outlines COGEMA's approach to decommissioning, and Section 2.7 outlines proposed project schedule.

2.1 Project Components at Midwest Site

The Midwest site was previously licensed for test mining and is now under care and maintenance

The Midwest site has previously been licensed to carry out a test mining program during 1988 and 1989. The site is currently in care and maintenance under: the Canadian Nuclear Safety Commission (CNSC) Uranium Mine Site Preparation Licence *UMSL-Escavate-Midwest.05/Indf* and Saskatchewan Environment Approval No. IT-31 "*Midwest Joint Venture: Ministerial Approval to Temporarily Close*", dated March 2002.

Main activities proposed at Midwest site include dewatering Mind Arm, mining open pit, development of surface facilities, and on-site management of waste rock

The main activities that will take place at the Midwest site include:

- dewatering of the Mink Arm of McMahon Lake, and infrastructure development;
- mining of Midwest open pit;
- development of associated surface facilities; and
- on-site (Midwest site) management of waste rock;

Management of waste water generated at the Midwest site will involve activities at both the Midwest site and McClean Lake Operation. This discussion is found in Section 2.3.

2.1.1 Existing Midwest Site

The Midwest ore body is located beneath the south end of Mink Arm of South McMahon Lake

Some of the remaining surface infrastructure constructed at the time of test mining include an access road, dam across Mink Arm, exploration shaft, core storage, water treatment plant and ponds. Many of these are not in use today, and all ore and special waste developed during the test mine has been transported to McClean Lake Operation. Refer to Figure 2.1-1 and Figure 2.1-2. Access to the site is by means of an all-weather road, about 2 km in length, connecting with the provincial road system (Provincial Road 905) at Points North. A locked gate is located at the entrance to the site. About 4 km of single lane roadway exists within the site.

A 300m dam was used to dewater Mink Arm during test mining

The Mink Arm portion of South McMahon Lake is at the center of the site. A 300 m dam, which was used to dewater Mink Arm during test mining, crosses the lake and is penetrated by a culvert. Water levels are stabilized on both sides of the dam. A number of monitoring wells have been installed around the Midwest site and are currently used to monitor groundwater hydraulic heads.

The test mine shaft, about 184 m in depth, is located on the west side of Mink Arm

The test mine shaft is located on the west side of the lake. The mine shaft is 3.7 m in diameter and extends to a depth of 183.5 m. A 3 m by 3.5 m drift was mined out for a length of about 180 m from the shaft above the ore body. Today, the mine works have been secured and are no longer in use. The underground shaft has been allowed to flood and the headframe has been removed. The mine shaft is now completely covered by a wooden building that has been secured to a concrete pad. The building is locked and the key is maintained by the Environment group at McClean Lake.

Excavated clean waste rock from test mining remains at the Midwest site

Excavated clean waste rock remains at the Midwest site. This consists of approximately 4,000 bcm of medium to coarse grained sandstone. The underground development did not extend into the underlying basal conglomerate or the metamorphosed basement rock. Portions of the clean waste rock has been used for berm construction and other earthwork construction in the area of the settling ponds.

Water treatment facilities are largely intact

Water treatment facilities used for the test mining program are largely intact, including two HDPE lined sedimentation ponds. When water levels in the ponds become high due to precipitation, the excess water is pumped down the mine shaft. All other water treatment facilities, including the water treatment plant, are no longer in use.

A steel and concrete "V-notch" outlet structure exists at the outlet of John Pond, where treated effluent was discharged during test mining

A steel and concrete "V-notch" outlet structure exists at the outlet of John Pond, where treated effluent was discharged during the test mining program. The purpose of the steel structure was to control the water level in John pond and to provide a means to measure flow. Although the structure still exists in place, flow measurements are no longer carried out.

2.1.2 Proposed Midwest Site Facilities

Proposed facilities will undergo further evaluation and confirmation during the EA process

This section provides a brief discussion of the proposed facilities at the Midwest site. Presently, the proposed site layout and facilities described in this document are conceptual, and will be subject to further evaluation and confirmation during the environmental assessment (EA) process, and the subsequent licensing process upon EA approval.

Prior to the commencement of site development, the southern end of Mink Arm will be drained

The Midwest deposit is located beneath the southern end of Mink Arm of South McMahon Lake (Figure 2.1-3). Prior to the commencement of site development, the southern end of Mink Arm will be drained by first establishing a new engineered dam structure approximately 1 km north of

the existing dam, then breaching the original dam followed by pumping the water from the dammed section into South McMahon Lake.

A single building will be erected adjacent to the Midwest open pit to contain the mine offices for personnel

It is expected that a single building (Midwest offices) will be erected adjacent to the Midwest open pit to contain the mine offices for operations and maintenance personnel, conference room, first aid station, dry facilities for men and women, kitchen facilities, dining room and a maintenance shop complete with overhead cranes. The maintenance shop will consist of several service bays capable of accommodating haul trucks, a wash bay, welding shop, lube bay and tool crib.

JEB camp will be used to house Midwest employees

The dedicated road being proposed between the Midwest and JEB sites will permit the use of the JEB camp to house the Midwest employees. Therefore, they will spend their entire shift at the Midwest site, as is the current practice at the Sue site, and be bussed to and from Midwest at the start and end of each shift.

Explosives storage facility will be located north of the Midwest offices

In order to ensure an uninterrupted supply of explosives for the mining operations, an on-site storage facility is required. The location of this facility is currently proposed about 2,200 metres north of the Midwest offices. The facility will be constructed in accordance with federal and provincial regulations and will contain an explosives magazine, a magazine for blasting accessories, bulk storage silos and a garage to house explosives delivery vehicles. The access road leading to this area will be located within the Midwest surface lease and therefore will prevent unauthorized access.

Other facilities related to power generation, fuel storage and was management will be constructed at the Midwest site

Other facilities at the site will include: a ring of pit dewatering wells, a series of collection and settling ponds and ore storage pond, scanner weigh scale facility, an emergency diesel generator, pumping station, fuel tanks, propane tanks, used oil storage tanks, industrial landfill site and an area designated for recyclable material. Refer to Figure 2.1-4 for a preliminary layout of the proposed Midwest site and facilities.

2.1.3 Proposed Midwest Open Pit Design

The proposed Midwest open pit design is based on a geological model of the deposit

The proposed Midwest open pit design is based on a geological model of the deposit, complete with a mineral inventory. This information combined with economic factors, pit slope stability analysis, government regulations relating to the design of open pit mines, and site topography, forms the basis of the current pit design. The Midwest pit is estimated to yield about 360,000 tonnes of ore averaging approximately 4% U for a total resource of about

14,400 tonnes of U metal (about 37.5 million lbs U_3O_8 equivalent). This ore reserve will be further confirmed during the course of the environmental assessment.

The pit will cover an area of about 44 hectares on surface

The proposed Midwest pit is illustrated in the Figure 2.1-4. The pit will cover an area of about 44 hectares on surface. The maximum dimensions at the pit rim are expected to be 865 m north to south and 630 m east to west. The pit is currently designed to a maximum depth of 215 m and a total volume of about 38 million m^3.

Slope stability analysis results have been incorporated into the pit design

A pit slope stability analysis, which considered field investigations and laboratory testing, has been completed and the results have been incorporated into the Midwest pit design. The design bench angle for the overburden located at the rim of the pit is 45°. Bench face angles within the pit are expected to vary between 65° and 74° depending on rock type. Safety or catchment berms will be constructed as the pit is continuously mined to depth by sequentially removing 12 m to 15 m benches of rock. A berm will remain at the completion of each bench. The berms (ranging in width from 7 to 10 m) will enhance overall stability by reducing the slope angle of the final pit walls. The berms will also act as catchment ledges for rock that may fall from the upper bench faces.

The pit access ramp has been designed to allow safe passage of two 185-tonne trucks

An access ramp (truck haul road) will enter the pit perimeter at the north-east corner of the pit rim. The ramp gradient is -10%, spiralling to the bottom of the pit in a clockwise direction. The ramp is currently designed 26.4 m wide, to allow for the safe passage of two 185 tonne capacity mining trucks without the need for turnouts. This will be reviewed when the mining fleet is selected. The ramp will also provide access to the catchment berms at regular intervals. Like the catchment berms, the ramp will also enhance slope stability by further reducing the ultimate pit wall slope angles. The overall slope angle for the Midwest pit design range from 36° to 44°.

2.1.4 Open Pit Mining Method

Initial pit development involves stripping overburden material within the pit footprint

After draining the south-end of Mink Arm, lake sediments and overburden will be stripped from within the perimeter of the pit so that the underlying bedrock can be exposed. Overburden material will be used to build site roads and form the base of two clean waste rock stockpiles, which are currently located to the south and north of the Midwest pit. Any organic material removed during this initial stripping activity will be stockpiled separately for use in future reclamation activities.

Material mined at all stages of the pit development will be sampled and monitored to ensure proper segregation

The underlying bedrock will be drilled and then blasted using ammonium nitrate based explosives. Shovels and loaders will then be used to load the blasted rock into rear dump mining trucks for transport out of the pit to the appropriate stockpile area or to in-pit stockpiles in the case of problematic waste rock. Material excavated from the pit will be classified as clean waste rock, problematic waste rock, or ore. Waste rock mined at all stages of the pit development will be sampled and monitored, to ensure the materials are properly classified and separated for transport to the appropriate stockpile area.

Clean waste will be mined to the pit perimeter, down to about 400 masl

After overburden stripping has been completed, clean waste rock will be mined out to the ultimate limits of the pit (perimeter) down to the horizon in the pit where problematic waste rock may be encountered (at approximately the 400 masl level).

A phased approach to mining has been adopted to access to ore, and to facilitate in-pit management of problematic waste rock

The Midwest deposit will then be mined in two phases, using conventional open pit methods, similar to the pit-in-pit approach taken for the Sue C deposit. A phased approach has been adopted to accelerate ore excavation from the deposit. This phased plan will also permit problematic waste rock (special waste) to be handled largely within the pit perimeters (in-pit), thus minimizing the need for temporarily stockpiling problematic waste rock on surface.

The first phase of ore mining will begin when mining approaches the level where problematic waste may be encountered

The first phase of ore mining will begin at about 400 msasl, when mining approaches the level where problematic waste may be encountered. Clean waste and problematic waste will be removed from about half of the pit. The excavated material will be monitored and effectively segregated, with clean waste hauled to surface stockpiles, and the problematic waste temporarily stockpiled in-pit just above the future second phase pit development. Ore will be hauled to a lined ore transfer pad located east of the pit rim. Any problematic waste encountered during ore mining will continue to be placed in the stockpiles located in-pit.

Second phase of mining will first involve removal of temporarily stockpile problematic waste into the phase 1 pit; this approach minimizes the volume of problematic waste that will be hauled out of the pit

When ore mining in the first phase is completed, mining of the second phase will begin. The first step in this phase involves the removal of problematic waste stockpiled above the second phase mining area. This material will be hauled for permanent disposal within the mined-out first phase pit. Development below the 400 masl will continue with clean waste rock hauled to the surface stockpiles, while problematic waste will be stockpiled in the mined-out first phase pit. The final step will be the mining of the ore from the second phase. This ore will also be placed on the ore transfer pad with any associated special waste hauled in-pit to the mined out first phase.

2.1.4.1 Mining Alternatives

COGEMA is currently carrying out a program to develop an alternate mining method that can be used to extract ore from small ore bodies

COGEMA is currently carrying out a Mining Equipment Development (MED) program to develop and evaluate an underground jet-boring technology deployed from surface to extract ore from small ore bodies that cannot be economically recovered using conventional open pit and underground methods. This work is being carried out at one of the McClean underground mineralized pods at McClean Lake Operation[10]. If successful, this program may lead to the development of an innovative and economically feasible mining technology that can be applied in conjunction with open pit mining at Midwest.

If successful, this technology may be used for the Midwest deposit

As a possible alternative, this mining approach may be used to access Midwest ore sooner in the proposed pit by deploying this technology during pit development. As well, this technology may be used to extract mineralization located beneath the open pit bottom, if mineralization is found to extend further in depth.

2.1.5 Facilities Related to Waste Rock and Ore Management

Waste rock is the material that must be excavated to gain access to the ore body

Waste rock is the material that must be excavated to gain access to the ore body during mining operations. Waste materials may be generally categorized according to their origin and nature. Overburden refers to the surficial soils that lie above the bedrock horizon; it is further classified as organic topsoil and underlying glacial tills. Clean waste rock refers to mined bedrock with low contaminant levels and no acid generating potential. Problematic waste rock (*i.e.*, special waste) refers to material with significant contaminant concentration or acid generating potential.

2.1.5.1 Clean Waste Rock Stockpiles

Two clean waste rock stockpiles will be constructed

Two clean waste rock stockpiles will be constructed to accommodate the majority of material excavated from the pit (*i.e.*, clean unaltered sandstone). Stockpile A will be located to the north of the Midwest open pit, as shown in Figure 2.1-4; further optimization of this stockpile may include infilling of John Pond. Stockpile B is located to the south of the pit. Both stockpiles will be surrounded by perimeter ditches designed to collect runoff water from the stockpiles. Figure 2.1-4 provides a preliminary layout and location of the stockpiles, which will be further refined as part of the EA process.

[10] *Description of Mining Equipment Development Program*, December 2004, Version 1

Runoff water collected from the stockpiles will be collected and directed to ponds for treatment

Water collected from the surface stockpiles will be directed to pre-sedimentation ponds prior to treatment. The overburden material that will be removed to form the surface stockpile perimeter ditches will be used to create berms on the outer edge of each ditch. These berms will prevent surface runoff water from flowing into the perimeter ditch and mixing with runoff water from the stockpiles.

Stockpiles will be constructed to ensure operational and long-term stability

A layered approach to stockpile construction will be followed to increase the overall stockpile stability. The layered placement creates a high uniform density while minimizing segregation to create a stockpile with minimal permeability to air and water penetration. The method also reduces settlement and therefore further enhances overall stockpile stability. The north stockpile (A) will be two lifts high while the south stockpile (B) will be single lift high. It is expected that the stockpiles will be constructed in 20 m lifts with 20 m wide catchments remaining at the completion of each lift. Experience to date has indicated that this configuration will result in a stable stockpile face with an overall slope of 4:1. The catchments will also act as a slope break and minimize erosion caused by surface runoff. Once completed, the stockpiles will be contoured to support the vegetative growth.

2.1.5.2 Problematic Waste Rock

Problematic waste rock will be appropriately segregated and largely managed in-pit

Problematic waste will be segregated from clean waste rock by both radiometric and XRF scanning of drill cuttings, as well as by truck load scanning using an overhead scanner. Currently, about 7 million m^3 (bcm[11]) of problematic waste rock has been estimated. The advancement of the Midwest open pit has been outlined with the goal of managing most of the problematic waste rock within the perimeter of the pit, thus minimizing the requirement for a large temporary stockpile on surface.

A small area will be available on the ore transfer pad to temporarily accommodate problematic waste

The ore transfer pad will also include a small stockpile area for temporary management of problematic waste that may be encountered while mining clean waste in the upper benches of the pit, prior to the commencement of phased mining, and during the development of in-pit special waste stockpiles.

Further work will be carried out to better estimate the volume of problematic waste

A drilling program scheduled for the winter of 2006 is being initiated to further define and delineate the extent of the problematic waste horizon enveloping the Midwest ore body. This additional information will be used to

[11] Bcm = bank cubic metres, or *in situ* unbroken volume

further refine the Midwest mining plan for waste, problematic waste and ore prior to the commencement of mining.

2.1.5.3 Ore Transfer Pad

Ore will be hauled and temporarily stockpiled on surface on the ore transfer pad

Any material having uranium content greater than 0.085% U is classified as ore. All of the ore mined from the Midwest pit will be hauled to a lined transfer pad located adjacent to the pit. Refer to Figure 2.1-4 for a preliminary site layout and location of the ore transfer pad. The ore transfer pad will be surrounded by a perimeter ditch designed to contain any runoff from the pad. Both the pad and the perimeter ditch will be lined with an impervious liner. Any runoff water accumulating in the perimeter ditch will drain by gravity to pre-sedimentation ponds for clarification prior to treatment.

Radiometric scanning will be used on each truck load to determine ore grade

Prior to stockpiling, each truck load of ore will be radiometrically scanned to determine the ore grade. An overhead truck scanning facility will be erected at the entrance to the ore transfer pad for this purpose. The measured grade will dictate the stockpile location on the ore pad for each truck load. On a scheduled basis, depending on production requirements, the stockpiled ore will be reloaded into trucks and hauled to the JEB mill ore pad as is currently the practice for the haulage of ores from Sue to the JEB mill.

2.1.5.4 Waste Rock Characterization

Waste rock associated with uranium deposits in this region is generally characterized by the presence of sulphide and arsenide minerals

The Midwest deposit is one of many uranium anomalies associated with the geologic contact and unconformity between the Athabasca sandstone and the basement rocks. The mineralized zones have developed as a result of fluid interaction. In addition, various degrees of geochemical alteration have occurred. The alteration zones are generally characterized by the presence of sulphide and arsenide minerals that can affect the quality of water associated with disposal of this problematic waste rock (special waste) that is removed during mining. Several previous assessments and characterization studies of other uranium deposits in the Athabasca region have shown that some of the problematic waste rock can be a source of acid and metals release as a result of sulphide mineral oxidation if the rock is deposited on land. The waste rock characterization studies in the late 1980s and early 1990s identified potential leaching of some elements of interest, such as arsenic, if the problematic waste was deposited under water, a mitigation measure intended to minimize sulphide mineral oxidation.

A number of studies have been completed to characterize waste rock and to identify mitigation measures

The identification of mitigation strategies for problematic waste rock is based on a combination of rock characteristics, concentrations of constituents of concern, leachability of constituents of concern within the rock, and the total volume of potentially problematic waste rock. COGEMA has completed, and continues to carry-out several studies to characterize waste rock properties associated with each ore deposit, and to identify effective mitigation measures and potential environmental effects.

One of the effective management of problematic waste rock is in-pit disposal underwater

Work to date has indicated that some of the problematic Midwest waste rock contains significant quantities of sulphur, arsenic, nickel, uranium and other constituents of concern that may affect drainage water quality if stored indefinitely on surface stockpiles. These studies have also concluded that acid generation can be prevented by storing waste rock under water, and that arsenic and nickel are key constituents of concern for potential adverse environmental effects related to subaqueous disposal.

Clean waste rock (sandstone), which is the largest fraction, has been proven to be appropriate for surface disposal

The results of the most recent sandstone characterization program, combined with the results of previous investigations have provided a sound basis for estimating the quantities of clean waste rock that could be permanently disposed of on land without significant adverse effects to the environment.

About 7 million m^3 of problematic waste rock will require in-pit disposal for long-term management

Based on available data, current estimates of potentially problematic material that would require long-term in-pit disposal (subaqueous) is about 7 million m^3 (bcm). This includes material that contains more than 250 mg/kg uranium. This also includes material with some acid generating potential and/or material that contains greater than 200 mg/kg arsenic. This is considered a reasonable estimate, which will be refined based on a complementary drilling and geochemical testing program to be conducted in early 2006.

2.1.5.5 Proposed Waste Rock Segregation Procedures

Material placed on the clean stockpile will be routinely monitored to ensure that it is not problematic

During the development of the Midwest pit, mined material will be routinely monitored to ensure that clean waste rock, potentially problematic waste rock, and ore are effectively segregated. In particular, it will be necessary to ensure that waste rock placed on clean waste rock stockpiles does not contain significant concentrations of constituents of concern, which in the long-term may result in adverse environmental effects. For the Midwest Project, the segregation of mined waste material will be based on both radiometric techniques and a portable x-ray fluorescence (XRF) technology.

XRF technology is currently being evaluated as a routine monitoring tool for identifying problematic waste rock

XRF technology has been identified as a potentially reliable field evaluation tool that can be used to determine arsenic content in waste rock during mining. The XRF technology has greatly advanced in recent years, and it is generally accepted as a quantitative screening tool for environmental investigations and industrial site clean up activities. COGEMA is currently acquiring experience in the application of this technique for the identification of problematic waste rock during mining of Sue A and Sue E pits at McClean Lake Operation.

2.1.5.6 Mitigation Measures to reduce Long Term Effects

A till cap will be placed over the problematic waste disposed-of in the pit to ensure long-term protection of the environment

As outlined in the previous subsection, a significant effort will be undertaken to identify and segregate potentially problematic waste rock. Upon completion of mining activities the problematic wastes in the pit will have a till cap constructed over the waste. The final thickness of the till cap, and the effectiveness of the till cap, will further be assessed during environmental assessment of decommissioning activities.

Once the pit is allowed to reflood, a deep water column will establish

Upon decommissioning, the partially backfilled Midwest pit will be allowed to reflood naturally. Based on the preliminary estimates of 7 million m^3 of problematic waste rock, it is anticipated that up to 80 m of water column will overlay the waste rock, isolating it from natural weathering processes.

Groundwater flowing through the waste rock, which has been placed in the mined-out pit, will very slowly transport constituents of concern to surface waters

Groundwater represents a pathway for potential interactions between dissolved constituents in the water within the pore spaces of the waste rock (*i.e.,* pore water) and the surface waters where it is expected to discharge. Groundwater in the Midwest area moves very slowly, and the primary surface water receptors are at some distance from the proposed Midwest pit. Any interaction with the receiving environment will be far in the future. Thus the interactions must be calculated or modelled to predict the potential long-term effects.

Various predictive models have been developed to assess effects related to in-pit disposal of problematic waste rock

A number of geochemical, groundwater flow and contaminant transport models were recently developed by COGEMA to simulate the potential effects of waste rock management on surface water and groundwater quality. In particular, a three-dimensional groundwater flow model including the Midwest area was developed in 2004 (COGEMA 2004). Also, the results of the most recent waste rock column tests (2001) combined with the reinterpreted results of previous saturated column tests will provide a good basis for deriving source-term functions for input into contaminant transport models.

Preliminary assessment indicates that constituents of concern originating from waste rock placed in the Midwest pit will eventually report to Collins Creek with a travel of time of several thousands of years

The methodology developed over the last two to three years, presented in the Sue E EIS, will be used to assess potential long-term effects of both surface disposal of clean waste rock and in-pit disposal of problematic waste rock. Preliminary results for the Midwest area suggest that constituents of concern originating from waste rock placed in the Midwest pit will eventually report to Collins Creek with a travel of time of several thousands of years within the groundwater flow system. With respect to local surface water bodies, preliminary results indicate that Too Small Lake, Shallow Lake, and Pig Lake, in addition to the flooded pit, would have to be considered as potential receptors for long-term loadings to the environment.

2.2 Project Components at McClean Lake Operations

2.2.1 Existing McClean Lake Operation

The JEB and Sue sites are the two main operating areas of the McClean Lake Operation; treated effluent is discharged via Sink/Vulture Treated Effluent Management System (S/V TEMS)

The McClean Lake Operation (JEB site) is located about 16 km east of Midwest site with the following main facilities. Refer to Figure 1.1-1 and Figure 2.2-1.

- The JEB mill and the JEB tailings management facility (TMF) are located at the JEB site, in the northern part of the lease area. Ore from the Midwest Project will be processed at the JEB mill, and tailings managed at the JEB TMF. As well, a new treatment plant is proposed, adjacent to the JEB water treatment plant, for the treatment of mine waters from the Midwest site.
- At the Sue site, the mined-out Sue C pit is partially filled with special waste from Sue C and JEB pits and waste rock from Sue A pit. The Sue C pit is currently in a partially flooded state. The Sue A and E pits are currently being developed. Sue B pit is licensed, but has yet to be developed. The current Midwest proposal does not affect the Sue site, other than that problematic waste rock (special waste) from the Midwest Project will no longer be disposed-of in Sue C pit.
- There are also various support facilities for waste management (*e.g.*, waste rock, waste water, other wastes, hazardous substances, air emission control), and site infrastructure, such as roads, electricity distribution, and camp facilities. The Midwest proposal will not noticeably affect these support facilities and infrastructure.
- All treated water is released through a single system at Sink Reservoir, shown in green in the figure, and the adjacent Vulture Lake. This system is called the Sink/Vulture Treated Effluent Management System (S/V TEMS). Treated effluent from the Midwest project is proposed to be

discharged at S/V TEMS; this will not alter the operational and management controls currently in place for this system.

This project will impact the JEM mill and associated facilities, JEB water treatment plant, and the S/V TEMS

The components of the McClean Lake Operation that are affected by this project include the JEB mill and associated facilities, JEB water treatment plant, JEB TMF, and the S/V TEMS.

2.2.1.1 JEB Site

Currently licensed activities at the JEB site mainly pertain to processing uranium ore and waste management

The currently licensed key activities at the JEB site include:

- ore storage and milling ore from the McClean Lake sources;
- operating the tailings management facility,
- overburden and waste rock storage (from original JEB pit);
- packaging and transporting the uranium concentrate product (yellowcake);
- support activities such as water treatment and management of other wastes; and
- mining the Sue A, Sue B and Sue E orebodies.

Therefore, the main facilities at the JEB site are the JEB mill and associated facilities, JEB tailings management facility, and the JEB water treatment plant

JEB site and facilities are illustrated in Figure 2.2-2, and Figure 2.2-3 is an aerial view of the JEB site and existing support facilities, including:

- McClean Lake mill and associated circuits and services (*e.g.*, acid plant, ammonium sulphate crystallization plant, electricity distribution system, tailings preparation circuit);
- JEB tailings management facility (JEB TMF);
- JEB water treatment plant and associated facilities (*e.g.*, runoff ponds, sedimentation ponds, monitoring ponds);
- ore stockpile pad;
- organics stockpile, clean waste rock stockpile, special waste stockpile pad;
- contaminated reusable materials management area, temporary contaminated landfill, industrial landfill, and reusable industrial material storage area;
- propane storage;
- services shop, cold storage, laydown area; and
- camp.

The JEB mill is currently undergoing partial expansion to receive and process Cigar

At present, construction activities are ongoing for the expansion of the JEB mill to allow receiving and processing of Cigar Lake ore. Further expansion of the JEB mill will be required to process Midwest ore, which is included in the scope of this project.

2.2.2 Off-site Milling at McClean Lake Operation JEB Mill

JEB mill was initially licensed for 6 million pounds per year of U_3O_8

The JEB mill started operation in June 1999 and has operated continually since start-up, except for scheduled maintenance and vacation shutdown periods. Production rates were gradually increased to the full production rate in January 2000. During its first full year of operation (2000), the mill proved capable of producing at a rate greater than the licensed 6 million pounds per year of U_3O_8 while still meeting environment, radiation, health, and safety requirements.

JEB mil was subsequently licensed to 8 million pounds per year of U_3O_8 after EA screening under CEAA

An application was made and subsequent to completion of an environmental screening under *CEAA*, and licensing review, an approval was granted by the CNSC in August 2001 to increase production levels to 8 million pounds/year of U_3O_8. Currently the facility is processing remaining ore from the Sue C open pit mine and will commence processing of ores from the Sue A and Sue E open pit mines in 2006.

JEB mill is currently undergoing expansion to 12 million pounds per year of U_3O_8 in preparation for processing Cigar Lake ore

At the time of writing, construction activities associated with alterations and additions to the existing mill facility are occurring. These expansions and modifications will be required to receive and process uranium ore slurry from the Cigar Lake Project. Once completed, the modifications will result in an increase in the production capacity of the JEB Mill, from all sources of ore, to 12 million pounds U_3O_8 equivalent per year.

Overall, the process required to produce uranium concentrate from Midwest ore remains unchanged; however facility and equipment expansion and modification will be required (physical work)

The JEB mill is composed of a number of unit processes, or circuits, that extract uranium from ore and produce a packaged product commonly referred to as yellowcake. Overall, the process required to produce uranium concentrate from Midwest ore remains unchanged. However, the facility and equipment in which the process is carried out does require expansion and modifications, either to allow for increased production, or to accommodate specific Midwest ore processing requirements. Figure 2.2-4 presents a three dimensional view of the expanded JEB mill in its current configuration (buildings with dark blue rooftops represent the current mill, and those with light blue rooftops represent the current expansion). New facilities associated with the proposed Midwest expansion are high lighted in red.

JEB mill has undergone a number of partial implementation of the mill capacity assessed in the 1995 Midwest Project EIS and Cigar Lake Project EIS; this proposal involves further increase in capacity to 27 million pounds per year of U_3O_8

A summary relating environmental assessments to licensed or proposed JEB mill operations is provided by Table 2.2.1. It can be seen from the table that several JEB mill licensed or proposed production capacities represent partial implementation of the assessed and approved production in the 1995 *Midwest Project EIS* and the 1995 *Cigar Lake Project EIS*. The new Midwest EIS, expected to be submitted in 2006, will determine the environmental effects of producing at the rate of 27 million lbs U_3O_8 equivalent per year at the McClean Lake Operation. Similarly, as stated in the table, the proposed operation to be licensed and the modifications required to the JEB mill to process Midwest ore as described below, are for a production capacity of 27 million lbs U_3O_8 per year (see note in Table 2.2-1) through the front end of the plant and 16 million lbs packaged (27/16) option.

Table 2.2.1 Summary of Environmental Assessments and Related Operations Pertaining to Production Capacity of the JEB Mill

Approved or Proposed in Environmental Assessments	**Approved or Proposed in Licensed Operations[a]**
1991 McClean Lake Project EIS (Panel review) 2001 Production Increase (CEAA Screening)	Current Licensed JEB Mill Operation capacity, since 2001 - **8/8 M lbs. U_3O_8/yr** mill capacity
1995 Midwest Project EIS (Panel review) 1995 Cigar Lake Project EIS (Panel review) 2004 Sue E EIS (CEAA Screening and provincial EIS) (24 M lbs. U_3O_8/yr)	Current JEB Mill Expansion to receive and process Cigar Lake ore (to be operational in 2007) - **12/12 M lbs. U_3O_8/yr**
Proposed Rabbit Lake URS Project (currently undergoing EA process)	Proposed to be operational in 2008 – **24/12 M lbs. U_3O_8/yr**
Midwest EIS (27 M lbs. U_3O_8/yr)	Proposed Midwest Mill Expansion (proposed construction to begin in 2008) - **27/16 M lbs. U_3O_8/yr**

[a]Note: the first number refers to lbs uranium fed to the mill, and the second number refers to lbs yellowcake produced from the mill. The JEB mill production capacity related to the Rabbit Lake URS and Midwest proposals indicates partial processing of uranium ore at the JEB mill, and final processing into yellowcake at the Rabbit Lake mill of up to 12 M lbs U_3O_8 equivalent per year.

2.2.2.1 JEB Mill – Midwest Expansion

Physical modifications and expansions associated with the current project are identified in this subsection

When the Midwest Project is implemented, the JEB mill will be in operation processing both Cigar Lake and McClean Lake ores. This section briefly describes the mill facility, incorporating modifications required for the processing of Midwest ore (required modifications underlined for clarity), starting with those circuits associated directly with uranium production followed by supporting facilities.

2.2.2.1.1 Uranium Production Circuits

Required modifications or expansions associated with the current project are identified for each of the main circuits in the JEB mill

The main circuits of the mill, in order of processing, are briefly described below, and the required modifications or expansions associated with the current project are underlined for clarity. Figure 2.2-5 presents a simplified process flow diagram for the mill and associated facilities. The figure illustrates that Cigar Lake ore is initially treated separately from the McClean Lake/Midwest ores. The process streams are then combined after leaching.

For more consistent feed density to leaching, a neutral slurry thickener is added for the Midwest Project

Grinding: The grinding circuit receives the run-of-mine ore from either McClean Lake or Midwest sources, mixes it with water, grinds the solids to small particles and discharges the resulting slurry to storage tanks. The grinding circuit consists of a semi-autogenous grinding (SAG) mill in an open circuit followed by a ball mill in a closed circuit with cyclones. For more consistent feed density to leaching, a neutral slurry thickener is added for the Midwest Project.

No modifications are required to the slurry receiving facility

Slurry Receiving: The ore slurry receiving circuit receives and stores Cigar Lake uranium ore, which arrives in the form of a ground slurry. The slurry ore receiving and storage circuit includes a neutral thickener and neutral slurry storage pachucas. Two unloading platforms, vacuum pumps and hoists, unload slurry containers used to transport Cigar Lake ore into a slurry tank. Ore slurry in the slurry tank will be pumped to a neutral thickener to control the density of the slurry prior to storage in the neutral slurry pachucas. No modifications are required to the slurry receiving facility.

The Midwest Project will include the addition of five more leach tanks to leach circuit

Leaching: Leaching is the hydrometallurgical process of dissolving uranium and other metals into solution from the ore by the addition of appropriate chemicals. Sulphuric acid and an oxidant are added to the ore slurry under carefully controlled conditions to efficiently recover uranium from the ore. McClean Lake and Midwest ores are processed in Leach Circuit No. 1 using sulphuric acid as a lixiviant. To optimize the process, either hydrogen peroxide or gaseous oxygen can be used as the oxidant. The processing of

Midwest ore requires significantly longer retention leaching times. The Midwest Project will include the addition of five more leach tanks to Leach Circuit No. 1.

Cigar Lake ore is leached exclusively in Leach Circuit No.2 using sulphuric acid and gaseous oxygen. No modifications are required to this circuit for the Midwest Project.

The capacity of the CCC circuit will be augmented by the addition of a second cyclone at each washing stage

Counter-Current Cyclone (CCC): The capacity of the CCC circuit will be augmented by the addition of a second cyclone at each washing stage. The leached ore from both leaching circuits 1 and 2 will be forwarded to the primary cyclone of the CCC circuit for particle size classification. The coarser solids will be washed in the CCC circuit while the finer solids will be processed in the existing CCD circuit. The soluble uranium recovered from both circuits will be forwarded to the clarification circuit. The washed solids from both circuits will be directed to the tailings preparation unit process.

The existing CCD circuit will continue to operate as it currently does with no modifications

Counter-Current Decantation (CCD): Counter-current decantation is a process of separating product solution from waste solids. This is achieved by washing the leach discharge slurry with a liquid of very low uranium grade through a series of thickeners. The solids, containing a minimum amount of soluble uranium, are sent to the tailings preparation circuit. The existing CCD circuit will continue to operate as it currently does with no modifications.

The clarification circuit will operate in the same manner as it currently does, with minor modifications to increase solution throughput

Clarification: The clarification circuit lowers the concentration of suspended solids remaining in the product solution. This is accomplished by processing the production solution from the counter-current cyclone and counter-current decantation circuits through a clarifier and sand filters. The clarification circuit will operate in the same manner as it currently does, with minor modifications to increase solution throughput.

The solvent extraction facility will be expanded to house four additional counter-current mixer-settler extraction units to increase the solvent extraction capacity

Solvent Extraction: The solvent extraction (SX) circuit purifies and concentrates the uranium product solution. Feed to the circuit consists of dissolved metals in a clear acidic solution. The SX circuit extracts the dissolved uranium into a new aqueous solution and sends the remaining dissolved metals in the original solution (raffinate) to the tailings neutralization circuit. The solvent extraction facility will be expanded immediately to the north of the current building. The new building will house four additional counter-current mixer-settler extraction units to increase the solvent extraction capacity.

Current molybdenum removal circuit will be replaced with a recovery circuit that will produce molybdenum by-product

Molybdenum Recovery: This circuit removes molybdenum from the concentrated uranium solution before uranium precipitation to control molybdenum concentrations to refinery specifications in the final yellow cake product. The activated carbon adsorption process currently used will be replaced by a new solvent extraction process for molybdenum to be located within the new solvent extraction building. A precipitation, filtration and packaging process is being considered to produce molybdenum as a by-product.

No modifications are required to the yellow cake precipitation circuit

Yellowcake Precipitation: This circuit precipitates uranium from the concentrated, purified uranium solution from the SX circuit. Uranium is precipitated from solution with ammonia. The resulting ammonium diuranate product, is thickened to 30% solids, and centrifuged to approximately 60% solids. This form of uranium concentrate is yellow in color and, historically, is the origin of the term yellowcake. No modifications are required to the yellow cake precipitation circuit.

No changes are required to the calcining facility

Calcining: The calcining process converts the ammonium diuranate to uranium trioxide (UO_3) and drives off most of the remaining moisture. This is accomplished through a dryer/calciner that is heated to 800 °C. The calcined product contains approximately 84% uranium and less than 0.5% moisture. Although it is greenish black in color, this form of uranium concentrate is also usually referred to as yellowcake. No changes are required to the calcining facility.

Additional covered storage capacity for yellow cake drums will be required

Yellowcake Packaging: The purpose of the packaging circuit is to package the yellowcake into steel drums. The packaging circuit is comprised of a drumming station, a lidding station, a drum scale, and a drum wash station. Empty drums are loaded, a few at a time, onto the power roller conveyor that moves the drums from one station in the packaging circuit to the next. Filled drums are assembled into a lot, which is trucked off-site to uranium refineries and customers. Filled drums may be stored on site for some time before shipping. Additional covered storage capacity for yellowcake drums is included in the Midwest expansion.

Midwest expansion may include circuitry for nickel/cobalt recovery

Nickel/Cobalt Recovery: Pending the results of a feasibility study currently in progress, the Midwest expansion may include circuitry for nickel/cobalt recovery. This circuit would remove nickel and cobalt from the raffinate solution for shipment to off-site smelters as a by-product. The process would use pH control and addition of reagents, currently used elsewhere in the JEB mill, to produce a nickel/cobalt concentrate. The waste solutions

and solids from this process would be sent to the tailings neutralization process.

Although a new circuit will be added, the tailings neutralization process remains unchanged

Tailings Preparation Circuit: The tailings preparation circuit in the JEB Mill treats the tailings solids, raffinate, and miscellaneous waste solutions. The purpose is to neutralize acidic waste solutions, to precipitate contaminants out of the solution using pH control and appropriate reagents, and to prepare the tailings for disposal in the JEB TMF. No changes are required to the tailings neutralization process. However, an additional circuit will be constructed to accommodate the process on the west end of the CCD circuit.

2.2.2.1.2 Mill Utilities – Supporting Facilities

Required modifications or expansions are identified

The mill and its associated areas contain various other circuits and services which are essential to the proper operation of the yellowcake production circuits. The required modifications or expansions associated with the current Midwest project are underlined for clarity

Only minor modifications are required to the acid plant

Acid Plant: The acid plant produces sulphuric acid from bulk sulphur, which is transported to site from suppliers. The sulphuric acid is used in the mill and the water treatment plants. The acid plant was designed for annual production of 24 million pounds of U_3O_8. Only minor modifications are required to the acid plant for the Midwest expansion.

No additional modifications are required to this plant

Ammonium Sulphate Crystallization Plant: Ammonia gas is used in two unit processes. In the solvent extraction circuit, it is used for pH control to transfer uranium from the organic into the aqueous phase. In the precipitation circuit, ammonia is used to precipitate uranium from aqueous solution. Sulphuric acid is also used in various unit processes and when combined with ammonia, produces ammonium sulphate solution which has to be removed to maintain solution balance. The ammonium sulphate crystallization process is used to evaporate water from the excess process solution and produce crystalline ammonium sulphate as a by-product of mill operations. The crystals are shipped off-site to fertilizer producing companies. No additional modifications are required to this plant.

The current oxygen plant has sufficient capacity to supply the oxygen requirements

Oxygen Plant: Oxygen will be produced at site in a vacuum pressure swing adsorption facility. The facility includes two 20 tonne per day units located south west of the counter-current decantation (CCD) area. The oxygen plant currently being constructed as part of the Cigar Lake expansion

will have sufficient capacity to supply the oxygen requirements for the Midwest mill expansion.

This plant to be constructed in 2006 will be able to continue to operate as it is designed with no modifications.

Ferric Sulphate Plant: Ferric sulphate solution will be produced at site from magnetite ore concentrate in a process using oxygen and sulphuric acid. This reagent is used in the tailings neutralization and water treatment plant processes. This plant to be constructed in 2006 will continue to operate as designed with no modifications.

2.2.2.1.3 Reagents

Various reagents are used in the mill, and the mill is thus designed to contain materials in the event of spills or leak

Various reagents are used in the mill, as listed in Table 2.2-2. Worker safety against the chemical hazards posed by various reagents is a key consideration in the design and operation of the reagent storage and handling circuits. The JEB mill has been designed in such a manner as to contain materials in the event of a spill or leak. Steeply graded floors direct spills into sumps, thus containing liquid spills and minimizing worker contact with hazardous materials.

Table 2.2-2 Reagents Used in the Mill Circuits

Reagent	Circuit
Sulphuric Acid	Leaching, Counter Current Decantation, Solvent Extraction, Molybdenum Removal and Ammonia Removal
Flocculant	Counter Current Decantation, Uranium Precipitation, Tailings Thickener, Clarification (as required)
Kerosene, Amine, Isodecanol	Solvent Extraction
Ammonia	Solvent Extraction and Uranium Precipitation
Sodium Carbonate	Solvent Extraction
Carbon, Sodium Hydroxide	Molybdenum Removal
Lime, Barium Chloride, Ferric Sulphate	Tailings Preparation
Cationic Resins	Ammonia Removal

2.2.3 Tailings Management at McClean Lake Operation

Tailings result from processing of uranium ore, and comprise of leach residue solids, waste solutions, and chemical precipitates

Tailings are a waste product resulting from milling of uranium ore and are comprised of leach residue solids, waste solutions, and chemical precipitates. Leach residue consists of the solids (finely ground up sandstone and basement rock) remaining after leaching the valuable mineral from the uranium ore. All waste solution streams from the chemical processing circuits also report to the tailings neutralization circuit. Chemical precipitates result from treatment and neutralization of the waste solution streams for removal of soluble contaminants.

Tailings management comprises of tailings preparation, delivery and disposal

The overall tailings management system at McClean Lake Operation is comprised of the tailings preparation circuit within the JEB mill, the tailings delivery system, and the JEB tailings management facility (TMF).

The preparation circuit treats and neutralizes to remove soluble contaminants and to thicken tailings prior to disposal

The tailings preparation circuit associated with the JEB mill is used to treat and neutralize tailings for the removal of soluble contaminants and to thicken the resulting tailings slurry prior to disposal. Following the preparation process, tailings are pumped from the mill for disposal.

The JEB pit mine was modified to serve as a tailings management facility (JEB TMF)

The JEB TMF will serve as the repository for all tailings resulting from uranium processing of Midwest ore at the McClean Lake Operation. The facility was designed to minimize environmental effects due to tailings disposal throughout operations and for the decommissioned facility, by application of numerous mitigation measures. During operations, active pumping is used to establish a system of hydrodynamic containment, which uses the continual inflow of groundwater to contain contaminants within the facility. The natural surround design, combined with control of the tailings geochemical and geotechnical properties during tailings preparation, is employed as a passive method to minimize the future release of contaminants from the decommissioned facility.

No changes are required to the tailings management system

No changes to the existing tailings preparation process or tailings management facility are required for Midwest ore.

2.3 Waste Water Management at Midwest Site and McClean Lake Operation

Proposed management of waste water generated at Midwest site represents an improvement to what has previously been approved

The development and operation of the Midwest open pit has the potential to generate significant quantities of water of varying quality, which will need appropriate handling, treatment, storage and release. The preferred option that has been identified represents an improvement from what has previously been approved, and it involves both the Midwest site and McClean Lake Operation. This topic is presented herein.

2.3.1 Existing Waste Water Management at McClean Lake

Waste water management objectives include minimizing contaminated water volumes, and treatment to acceptable levels

Each component of the McClean Lake waste water management system fulfills particular design objectives of the system as a whole. The overall objectives of the system include minimizing volumes of water requiring treatment, treating contaminated water to acceptable levels prior to discharge, and minimizing the effects of effluent discharge on the receiving environment.

This project involves treatment and release of water produced at Midwest at McClean Lake Operation

The waste water management components that are of relevance to this project at McClean Lake Operation are the JEB WTP and the S/V TEMS. A new additional water treatment plant for treating Midwest mine water may be built adjacent to the existing JEB WTP, as described in subsection 2.3.5.2. Water management at the Sue site is not affected by this project.

2.3.1.1 JEB WTP

The JEB WTP has a 6,000 m^3/day capacity and receives waste water from a variety of sources from the JEB site

The JEB WTP currently has an approved capacity of 6,000 m^3/day or 250 m^3/hr. The water treatment plant receives water from various sources. It removes dissolved metals and suspended solids, and subsequently discharges treated effluent to the S/V TEMS. The JEB water treatment process uses three stages in the treatment of waste water. The first stage is an hydroxide precipitation process for the removal of heavy metals. Removal of transition metals, such as arsenic and molybdenum, by adsorption onto ferric ion at pH 4 follows. The third stage removes radium and adjusts the final discharge pH to approximately 7. The precipitated sludges produced at each step are pumped directly to the mill for treatment and disposal within the JEB TMF.

Mill process water, which is the main component of waste water generated at JEB site, is primarily a function of ore tonnage processed

The quantity of water required to process uranium ore is primarily a function of the tonnage of ore processed by the mill each day. When processing is complete this water reports to the TMF. The water in the TMF pond is therefore the primary source feeding the JEB water treatment plant. However, the quantity of effluent requiring treatment is affected by ground water in-flows to the TMF and the volume of TMF reclaim water recycled back to the mill for re-use. For example, a simplified mill site water balance for the expanded JEB mill (expanded to 12 million lbs. U_3O_8 equivalent per year to receive and process Cigar Lake ore) is presented in Figure 2.3-1. This figure clearly illustrates the key features of the JEB site water balance, in particular, the relationship between fresh water consumption, recycle rate of TMF reclaim water and the flow rate treated by the JEB water treatment plant.

Although the site water balance is affected by the increase in mill capacity, no changes are required to the JEB water treatment plant for the processing of Midwest ore at the proposed

A summary of these water balance parameters for each of the approved or proposed operations is presented in Table 2.3-1. As observed in the table, the JEB water treatment plant has sufficient capacity to process waste water corresponding to the uranium production rate of 27 million lbs. U_3O_8 equivalent per year as proposed in the current environmental assessment. No changes are required to the JEB water treatment plant for the processing of Midwest ore and for increasing the uranium production rate to 27 million lbs. U_3O_8 equivalent per year. Water treatment requirement for Midwest minewater discussed in Section 2.3.5.2.

Table 2.3-1 JEB Mill Site Water Balance Summary for Approved or Proposed Production Scenarios

JEB Mill Capacity	Fresh Water from Pat Lake (m^3/hr)	Recycle to Process Water Tank (m^3/hr)	Treated Effluent to Sink Reservoir (m^3/hr)
12/12 M lbs U_3O_8 (JEB Mill Expansion)	5	50	120
24/12 M lbs U_3O_8 (Rabbit Lake URS Project)	25	45	133
24/24 M lbs U_3O_8 (Sue E Assessment)	***25***	***45***	***140***
27/16 M lbs U_3O_8 (Midwest Project)	46	70	155
27/27 M lbs U_3O_8 (Midwest Assessment)	***46***	***70***	***162***

2.3.1.2 Sink/Vulture Treated Effluent Management System

The S/V TEMS, the single point of release of treated effluent, includes Sink Reservoir, Vulture Lake and all interconnecting flow, control and measurement structures

The S/V TEMS is the single common facility for the controlled release of effluent generated at the site. The S/V TEMS consists of Sink Reservoir, Vulture Lake, and all control and measurement structures, and connecting pipelines from Sink Reservoir to the east basin of McClean Lake. A schematic of the S/V TEMS is illustrated in Figure 2.3-2. From the JEB area a single pipeline transports the combined JEB WTP effluent and JEB dewatering well system effluent to a point of discharge at the north end of Sink Reservoir. Similarly, a single pipeline transports water from the Sue WTP to the point of discharge on the east side of Sink Reservoir. A compacted earth dam defines the reservoir containment area. Water is discharged from Sink Reservoir to Vulture Lake via a buried pipeline. The discharge pipeline elevation within Sink Reservoir is 439.5 masl. The reservoir full supply level is defined at 442 masl. This provides approximately 1.3 million cubic metres of active storage capacity. An emergency spillway is constructed on the crest of the Sink Reservoir dam at an elevation of 443 masl.

Flow control and measurement structures are in place at the outlets of Sink Reservoir and Vulture Lake to control rate of release

The discharge rate from the reservoir is controlled by manual manipulation of the sluice gates located within the Sink Reservoir control structure wetwell. A V-notch weir structure is in place to measure the rate of release. Flow from Vulture Lake to the east basin of McClean Lake occurs via a buried pipeline. The discharge pipeline is equipped with a weir measurement structure to allow water sampling and flow measurement, and a flow diffuser to enhance the dispersion of treated effluent in the east basin of McClean Lake.

The S/V TEMS is managed to minimize stream bed erosion and water quality fluctuations

The S/V TEMS provides a means of storing effluent as required to minimize effects to the receiving environment, while allowing water treatment to proceed on demand. The operational objectives are to minimize water quality and flow regime fluctuations, minimize the augmentation of streambed erosion, and to meet SSWQO in Collins Creek, downstream of McClean Lake east basin.

Water may be stored in Sink Reservoir as required to minimize effects of effluent discharge

During normal operations, water can be stored within the reservoir during periods of low flow through the watershed to ensure adequate mixing of effluent in natural creek flows. Additionally, water can be stored during periods of high flow in Collins Creek, to prevent excessive stream bed erosion as a result of effluent discharge.

2.3.2 Dewatering Mink Arm – Pre-mining

The southern portion of Mink Arm on South McMahon Lake will be drained to allow open pit development

The Midwest deposit is located beneath the Mink Arm of South McMahon Lake. During initial development of the mining area, these surface waters will be managed to avoid the Harmful Alteration, Disruption or Destruction (HADD) of fish habitat under the *Fisheries Act*.

Dewatering water from Mink Arm will be discharged to the adjacent South McMahon Lake, which flows into smith Creek

Discharge options include South McMahon Lake, Shallow Lake at the headwaters of the Nicholson Creek drainage, and Too Small Lake in the upper Collins Creek drainage (Figure 2.3-3). Due to the shorter pumping distance, and greater flow capacity of Smith Creek down steam of South McMahon Lake, the preferred option is to discharge Mink Arm surface waters over the Mink Arm dam into the adjacent South McMahon Lake, as was previously done during the test mining.

Dewatering activities will be designed in consultation with Fisheries and Oceans Canada to minimize impact

The gradual dewatering of the southern portion of Mink Arm will be achieved by pumping via barge and pipeline. The Mink Arm pump and pipeline will be appropriately designed to minimize the potential for fish habitat disruption, and turbidity generation, and to mitigate the potential for fish entrainment at the pump screen. The dewatering rate will be determined in consultation with Fisheries and Oceans Canada to ensure that HADD does not occur as a result of the pumping operation. Prior to the initiation of dewatering Mink Arm, a fish removal and transfer program will be undertaken to capture and transfer fish from Mink Arm to South McMahon Lake. A variety of fish capture methods will be employed with emphasis on electrofishing methods to minimize fish capture stress.

2.3.3 Mine Dewatering - Midwest Open Pit

Effective mine dewatering system will consist of dewatering wells and in-pit sumps

During mine development, an effective mine dewatering system is crucial for the safe and efficient operation of a large scale open pit mine. An initial hydrological assessment of the Midwest area indicates the need for a dual dewatering system incorporating a set of deep perimeter wells as well as in-pit pumping system. The operation of this dual system will minimize or eliminate the accumulation of water at active working faces within the pit and enhance overall slope stability by lowering the pore water pressure in the pit walls.

A ring of perimeter wells will be designed and installed based on experience gained at the JEB TMF

The perimeter wells will be installed around the pit prior to the commencement of mining. The well locations as well as the total number installed will be designed by assessing hydrological conditions, and confirmed or modified as the wells are developed. The wells will be drilled to

a depth below the bottom elevation of the ultimate pit to assist the in-pit dewatering system. The proposed system will be similar to the one currently operating around the JEB tailings management facility with the potential ability to handle "dirty" wells differently than "clean" wells.

All water reporting to the pit will be managed with an in-pit sumping system

The in-pit dewatering system will incorporate the use of sumps to allow mining to progress to lower elevations within the pit. The sumps will be developed on the active working or mining elevation and will be equipped with high capacity submersible pumps and discharge pipelines. All the water encountered within the confines of the pit will be diverted to the sump through a series of ditches or intermediate pumping stations. Booster pump capacity will be incorporated into the in-pit system as mining progresses to the lower benches. Incorporating the existing mine shaft into the proposed in-pit system will also be investigated.

Water from the pit sumps will be pumped to the pre-sedimentation ponds located on surface

Water generated by the in-pit dewatering system will be pumped from the main sump to pre-sedimentation ponds located on surface near the east rim of the pit. The ponds will act to clarify this water prior to final treatment. Water collected from the perimeter well system could be pumped to the water treatment plant or diverted for direct release to the environment if clean.

2.3.4 Midwest Site Water Management

The site will be constructed to collect and contain contaminated or potentially contaminated waters produced from mining and other ancillary activities

The site will be constructed to collect and contain contaminated or potentially contaminated waters produced from mining and other ancillary activities. The natural gradient of the site towards Mink Arm will assist in runoff collection. The site runoff containment pond, clean waste rock stockpile perimeter ditches, ore transfer perimeter ditch and the open pit will be designed to capture all the surface runoff at the Midwest site. Diversion and collection ditches will be constructed as required to ensure that surface runoff either avoids active areas or reports directly to a containment area. All stockpile areas (clean waste stockpiles and the ore transfer pad) will be surrounded by containment ditches which will be designed to capture water for treatment.

Midwest site water will be directed to the pre-sedimentation ponds for transfer to McClean Lake site

Water from the clean waste rock stockpiles, ore transfer pad and surface runoff from the shop and office complex will be collected and directed to the pre-sedimentation ponds. Pre-sedimentation ponds will aid in particle settlement from contaminated water prior to treatment. The ponds will be designed for easy cleanout and to effectively remove suspended solids.

Lime may be added in these ponds to promote the settling of suspended solids. All pipelines used to transport contaminated water that are located outside of the pit perimeter will be constructed incorporating double containment safeguards.

2.3.5 Waste Water Management Scenarios

It is currently estimated that about 10,000 m^3 of dewatering water and 5,000 m^3 mine water will be generated at the Midwest site

Preliminary estimates of waste water flows generated from the Midwest site are as follows;

- The development of a pit dewatering system will generate an estimated 10,000 m^3/day of dewatering water, of which at least 5,000 m^3/day is assumed to require treatment, and
- Mine dewatering is expected to generate about 5,000 m^3/day, all of which will require treatment.

Water management options that were evaluated included both on-site and off-site management

A number of options related to the location of the water treatment plant, and the location of the final discharge have been carefully evaluated. These options include on-site or off-site management of treated effluent.

2.3.5.1 On-site Management of Treated Effluent

On-site management will require a reservoir, similar to the S/V TEMS

The Midwest Project site is located at the headwaters of three watersheds (Figure 2.3-3), which translates to low flows for all nearby streams. In order to manage the high volumes of water generated from mine dewatering and site water management activities, it is expected that a reservoir will need to be established, similar in concept to the Sink/Vulture Treated Effluent Management System (S/V TEMS) at the McClean Lake Operation.

The evaluation considered South McMahon Lake converted into a reservoir

A preliminary evaluation of the on-site treated effluent management option was undertaken by superimposing a configuration similar to S/V TEMS at the Midwest site. The evaluation assumed the conversion of South McMahon Lake into a reservoir, which would be achieved by lowering the water level by one metre. It was then assumed that the current discharge constraints applied at the S/V TEMS (constraints related to Collins Creek flow) would also apply at the South McMahon reservoir with respect to the Smith Creek flow rate.

Preliminary assessment has indicated that the South McMahon reservoir capacity would not be sufficient to maintain the dilution objectives that is currently imposed on S/V TEMS

Using the estimated treated effluent and dewatering flows that will report to the reservoir, a preliminary modelling was carried out to assess if the discharge constraints that currently apply to the S/V TEMS can be met at this reservoir. The modelling results indicate that the reservoir capacity would not be sufficient, and that the dilution constraints that are currently applied at the S/V TEMS would have to be relaxed to avoid year to year water storage. Furthermore, lowering the water level in South McMahon Lake by one metre would have a moderate potential to cause the Harmful Alteration, Disruption or Destruction of fish habitat. On the basis of this preliminary assessment, the conversion of South McMahon Lake to a reservoir for the storage and discharge of all water generated at Midwest site is not preferred.

2.3.5.2 Off-site Management of Treated Effluent

Off-site management will require transporting effluent to the McClean Lake Operation

The off-site management option involves transferring a portion or all of the water generated at the Midwest Project site, related to mine dewatering and site water management activities, to the McClean Lake S/V TEMS (Figure 2.3-4).

Preliminary assessment has indicated that the existing capacity of the S/V TEMS is sufficient to handle the additional volume of water from Midwest

A preliminary assessment of the capacity of the S/V TEMS to handle the estimated additional flow from the Midwest site indicates that the current discharge constraints can be maintained without increasing the capacity of the S/V TEMS. This option has the advantage of eliminating the need for a treated effluent discharge location, and the associated reservoir development at the Midwest site, which represents a substantial reduction in the development foot print at the Midwest site. Eliminating the final treated effluent discharge location at the Midwest site, eliminates potential effects associated with treated effluent release. This allows the development of the Midwest Project to proceed while sheltering the Smith Creek drainage system downstream of Mink Arm from site activities. The features associated with the discharge of treated effluent at the S/V TEMS make this the preferred option.

Water from Midwest site can be treated on-site prior to transport to S/V TEMS

Within this preferred option, two possible alternatives exist with regards to the location of the water treatment plant. The first consists of a water treatment facility at the Midwest mine site. Sump mine water, runoff water, and contaminated dewatering water would be treated at site, combined with clean dewatering water, and pumped along the dedicated haul road to the JEB site for ultimate discharge to the S/V TEMS.

Or, water can be treated at the JEB site, and subsequently discharged to S/V TEMS

The second alternative consists of pumping the combined sources of water through a dedicated pipe-in-pipe pipeline along the dedicated haul road to a new water treatment plant located adjacent to the existing JEB WTP, with treated effluent released to the S/V TEMS. This second configuration has several significant operational advantages. As well, locating the water treatment plant capacity at the JEB site has extended benefits associated with the long-term availability of additional treatment capacity at the JEB site, where opportunities for future utilization are more likely to exist, and thus is viewed as a long-term environmental protection asset.

2.3.5.3 Summary of Preferred Water Management Scenario

The preferred option is to transfer untreated effluent to the JEB site for treatment, and subsequent release to S/V TEMS

The preferred option involves transferring all of the contaminated water produced at the Midwest site about 16 km to the JEB site (pipe-in-pipe system) for treatment prior to discharge. A pumping station will be constructed at the Midwest site to receive and pump the water flowing from the pre-sedimentation ponds, site run-off pond and the pit perimeter dewatering wells. Catchment ponds will be strategically located along the transfer route in order to safely drain the pipeline in the event of a leak. A new water treatment plant for processing waste water from the Midwest site will be constructed, located adjacent to the existing JEB WTP. Treated Midwest water will be released to the environment via the existing S/V TEMS.

The pipe-in-pipe transfer system will be designed to handle all water generated at Midwest, as the quantity of clean dewatering water is currently unknown; however, it is expected that the clean dewatering well water will be discharged to the Smith Creek drainage at Midwest

This option involves combining the mine sump and dewatering well water sources at the Midwest site prior to treatment. The proportion of groundwater that would require treatment is currently uncertain, and therefore the pipe-in-pipe transfer system will be designed to have a sufficient capacity to transport the total volume of water expected from the combined sump and dewatering well sources. However, the dewatering system will be configured to provide the capability to divert clean groundwater for local discharge should individual wells prove to be of acceptable quality. It is expected that the Smith Creek drainage has sufficient physical capacity to accommodate groundwater discharge with minimal potential to alter or disrupt fish habitat. Furthermore, the ability to discharge clean water groundwater locally can be used to mitigate possible effects of pit dewatering activities, should lake levels in nearby lakes drop as a result.

2.4 Dedicated Midwest-JEB Haulage Road

A dedicated haul road is proposed in response to concerns regarding impact of ore haulage on public safety

One of the concerns raised by the Joint Panel, upon review of the 1991 EIS and the 1992 Amendment was the proposed ore haulage along Provincial Road 905. The 1995 EIS was approved on the basis that ore transport, in slurry form, will be via specially designed and constructed vessels along Provincial Road 905.

The road will be used to haul ore and to transfer effluent to the McClean Lake site

In this proposal, a dedicated haul road, about 16 km in length, is proposed between the Midwest site, where ore will be mined, and the JEB site, where it is approved to be processed. This plan is considered to be a significant improvement to the 1995 proposal, in that it addresses public safety issues and concerns with respect to use of a public road. This haul road also provides a means to transfer mine water effluent to the McClean Lake Operation for management aimed at reducing the operational footprint at the Midwest site; this component represents an improvement to this proposal.

2.4.1 Preferred Routing

Presently, the preferred routing is the most direct routing, about 16 km in length

The preferred access option is a dedicated all-weather private road running from the JEB site to the Midwest site. The preferred road option is identified as Route A on Figure 2.4-1. Assessment of the proposed road construction is expected to entail:

- a detail assessment of route alignment and route confirmation;
- evaluation of stream crossings, with respect to potential for harmful alteration, disruption or destruction (HADD) of fish habitat;
- assessment of navigable waterways (crossings);
- a rare plant survey; and
- consultation with key stakeholders.

The preferred routing is dependant on COGEMA's ability to acquire a surface lease along the portion of the route which goes through an area designated as treaty land entitlement

A dedicated road will reduce the travel distance between the Midwest site and the JEB mill from about 37 km via existing Provincial Road 905, to about 16 km via the proposed Route A. A surface lease covering the road and right of way between the two sites will need to be obtained. It is noted that this proposed route currently goes through a block of land, which was selected pursuant to the Treaty Land Entitlement framework agreement entered into by the Government of Canada, Government of Saskatchewan, and various bands. Accordingly, the proposed route is contingent on COGEMA's ability to acquire a surface lease to construct and haul on this

road. COGEMA has initiated communications with the Government of Saskatchewan regarding obtaining a surface lease for the road corridor.

A dedicated road will eliminate payload restrictions that applies to Provincial Road 905, which will significantly reduce the number of truckloads

The road will be constructed wide enough to accommodate the one-way passage of a 90 tonne capacity rear dump mining truck with turnouts for on-coming traffic located every half kilometre. This will allow for the use of the current 90 tonne fleet to haul ore from the Midwest ore transfer pad to the JEB mill ore pad. Utilizing the Provincial Road 905 to haul ore would more than double the distance with payloads restricted to 35 tonnes. A dedicated road will reduce the traffic flow on the provincial road and eliminate the need for extensive road maintenance.

A pipeline bench will be incorporated into the road design for transferring effluent to the McClean Lake site

A pipeline bench will be constructed along the entire length of the road to support a heated HDPE pipeline. This pipeline will be designed to transport all of the contaminated water produced at Midwest to the water treatment plant at JEB. Utilizing an expanded JEB water treatment plant will eliminate the need to construct and operate a water treatment plant at Midwest, and utilize the demonstrated capability of both the JEB plant and its experienced operators.

A power line will also be constructed along the road corridor

A power line will also be constructed along the dedicated road right of way. The line will supply power to the Midwest site facilities from the JEB power grid. The line will also be used along the route to provide power to the pipeline heat trace system and to any possible pipeline booster stations that may be installed.

Midwest mine workers will travel to the site from JEB camp via this road

A dedicated road will eliminate the need to construct camp facilities at Midwest. The dedicated road will significantly reduce the travel time for Midwest employees to travel to and from the site and for McClean employees travel to and from the Points North airstrip on crew changes.

2.4.2 Alternative Routings

One alternative to the preferred routing represents a minor variation

Presently, the preferred haulage road routing is outlined by Option A on Figure 2.4-1 Option A' is a minor variation of this preferred option. These two options will be further assessed, and a decision on the final routing will be based on further engineering evaluation, environmental considerations, and consultation with appropriate agencies and other stakeholders.

Two other alternatives represent potential routing in the event that access through the treaty land entitlement area cannot be granted or guaranteed

Options B1 and B2 are possible alternatives in the event that access through the treaty land entitlement area cannot be granted, or guaranteed due to uncertainties. Option B1 requires more new road construction, but results in shorter ore haulage distance (about 23 km) as the road joins the JEB site at the mill. Option B2 requires less new road construction; however, it results in significantly longer ore haulage distance (about 27 km). Of these two alternatives, Option B1, with shorter ore haulage distance is preferred.

2.4.3 Public Access on the Proposed Road

The proposed road will not be accessible to the public, as it will be located beyond the site security gates

The proposed dedicated haulage road will be located beyond the site security gates at both the Midwest and McClean Lake sites. Thus, access to the dedicated haulage road by members of the public will require prior permission, as per the current practice for the existing site access road at McClean Lake Operation.

2.4.4 Ore Haulage

Ore haulage along the dedicated road is considered to be a significant improvement, as it responds to public concerns regarding public safety

It is expected that run-of-mine ore will be hauled from the Midwest to JEB site along the proposed dedicated haulage road using the 90 tonne fleet currently being used at McClean Lake Operation. A dedicated road will address one of the concerns raised during the Joint Panel review of the 1995 EIS pertaining to public safety. It was noted that "*Concerns were expressed over public safety on Highway 102 and Provincial Road 905.... In addition, the opening of the proposed Athabasca road to Black Lake will likely further increase local traffic on the highways*[12]." COGEMA has reviewed the project, as was proposed in 1995, and is thus putting forward the construction of a dedicated haulage road that addresses public concerns related to traffic safety on Provincial Road 905.

2.5 Airborne Emissions, Other Wastes, and Hazardous Substances

2.5.1 Airborne Emissions

Current airborne emissions control systems and practices will continue

Airborne emission control systems and practices currently in place at McClean Lake Operation will similarly be applied to mining of the Midwest

[12] *Report of the Joint Federal-Provincial Panel on Uranium Mining Development in Northern Saskatchewan, Midwest Uranium Mine Project, Cigar Lake Uranium Mine Project, Cumulative Observations*, Page 26, November 1997.

deposit and milling of the ore. The following summarizes controls in place for the various sources of air emissions at McClean Lake.

2.5.1.1 Acid Plant Airborne Emission Control

No changes to the operation of the plant will be required

The acid plant is a source of sulphur dioxide emissions to the atmosphere. Emissions released through the plant's stack are controlled through proper operation, such that an acceptable sulphur conversion ratio may be achieved. An in-stack detector is used to monitor sulphur dioxide emissions from the plant. It is expected that no changes to the operation of the acid plant will be required for the processing of Midwest ore.

2.5.1.2 JEB Mill Airborne Emission Control

No changes to mill airborne emission abatement equipment will be required

Five areas associated with the JEB mill have been identified as potential sources of particulate emissions to the atmosphere and have been equipped with airborne emission abatement equipment. Scrubber systems are used to control emissions from the ammonium sulphate crystallization plant, the ore receiving and grinding area, the yellowcake calciner and the yellowcake packaging areas. The lime silo is equipped with a bag house for control of particulate emissions. It is expected that no changes to mill airborne emission abatement equipment will be required for the processing of Midwest ore.

2.5.1.3 Airborne Emission Related to Mining and Ore Haulage

Dust control measures will be applied

Mining activities at the Midwest site may result in some minimal effect on the air quality (airborne particulate). These activities include blasting, ore and waste hauling, service vehicle traffic, and wind generated dust from ore and waste stockpiles. Appropriate dust suppression measures will be taken, as are currently employed during mining at the McClean property, to maintain air quality within accepted standards. The haulage of ore and the proposed dedicated road will significantly reduce the area effected by truck traffic.

2.5.2 Other Wastes

Waste management program is currently in place at McClean Lake Operation

Waste materials such as recyclable and non-recyclable domestic wastes, sewage, industrial wastes, chemically/radiologically contaminated wastes, and hazardous wastes are identified, handled and disposed of according to the waste management program at McClean Lake Operation. The waste

No changes will be required

management program is documented within the overall quality management system. Each waste category has its own waste management strategy that has been specifically designed for that particular waste product. The waste management facilities are routinely inspected and scanned for radioactivity to ensure proper disposal and handling of waste. Recycling of wastes is encouraged within the waste management program, wherever feasible. It is expected that no changes to existing waste management procedures will be required for the mining and processing of Midwest ore.

2.5.3 Hazardous Substances

Hazardous material will be carefully managed to prevent interaction with the environment

Numerous hazardous materials are used as project inputs, primarily in the form of fuel and reagents. Table 2.3-2 provides a list of various hazardous materials currently stored at McClean Lake Operation, and expected to be required for the mining and processing of Midwest ore. On-site storage of these materials is not expected to interact directly with the environment under normal operating conditions due to preventative design features such as secondary containment.

Table 2.3-2 Hazardous Substances by Class

Dangerous Goods Hazard Class	Dangerous Goods Description	Trade Description
Class 1	Explosives	
Class 2.1 Class 2.2	Compressed Gasses	Propane Anhydrous Ammonia
Class 3	Flammable liquids	Diesel/Gasoline / Kerosene
Class 4	Flammable solids	Molten Sulphur
Class 5	Oxididants	Hydrogen Peroxide
Class 6	Toxic and Poison	Barium Chloride
Class 7	Radioactives	Uranium (product)
Class 8	Corrosives	Caustic Alkali Ferric Sulphate Sulphuric Acid

2.6 Decommissioning Strategy and End State Objectives

Decommissioning and reclamation renders harmless site facilities, and returns the land to a stable, self-sustaining condition

The intent of decommissioning and reclamation is to render harmless all mining-related facilities for which there is no beneficial use and return the land to a stable, self-sustaining condition suitable for traditional uses, taking social and economic factors into consideration. COGEMA's preferred decommissioning policy is to begin reclamation on areas soon after mining or when other operations are complete. By having an on-going reclamation program during the mining operation, a significant portion of the decommissioning work will be done when operations cease.

Upon completion of decommissioning, the site will be safe for non-human biota and human use

The objectives of decommissioning are to remove, minimize, and control potential contaminant sources and thereby mitigate potential adverse environmental effects associated with the decommissioned property. As an overall end state objective, once decommissioning of the McClean Lake and Midwest sites are complete, air, soil, and water quality objectives will be met at designated locations and be safe for non-human and human use. Prior to development, the primary uses for this area were sporadic hunting, trapping, and fishing. Following the proposed decommissioning, these can be continued. After acceptance of the decommissioned state of the property, the provincial government is expected to provide long term institutional care of the site.

The intent of decommissioning is to minimize the need for institutional control

The decommissioning objective will be to minimize the extent of long term institutional control. Passive controls are to be maximized by designing for natural drainage and long-term security of contaminated waste material. Implementing institutional control is not expected to generate costs or liability to the provincial government after acceptance of the decommissioned property, as stringent criteria will be adopted for the decommissioning work and the long-term stability of the reclaimed site, and funding is expected to be provided by the operator for entry of the decommissioned site into the provincial institutional control framework.

Major decommissioning activities include dismantling structures, closure of waste disposal facilities and remediation of disturbed areas

The major decommissioning steps for the McClean Lake Operation, including dismantling of the mill and other physical structures, closure of the JEB TMF and waste rock disposal locations, and remediation of disturbed areas are detailed in McClean Lake Operation *"Preliminary Decommissioning Plan and Financial Assurance"* (COGEMA 2004e). This proposed project will not noticeably alter the plan that is currently in place.

Experience gained during decommissioning of Cluff Lake site will be used to develop plans for the Midwest site

The preliminary conceptual decommissioning plan of the Midwest site and the haulage road will be developed to meet company objectives and regulatory requirements. Experience gained during the current decommissioning of the Cluff Lake site will also be taken into consideration. The preliminary conceptual decommissioning plan will be provided in the environmental assessment, along with the requirements for financial assurance and for post-decommissioning monitoring activities.

2.7 Project Development

Site development activities are listed herein

Once regulatory approval is obtained, site development will include:

- dewatering of Mink Arm and construction of engineered dam;
- establishment of the pit perimeter dewatering well system;
- haulage road construction and effluent transfer pipeline installation;
- development of Midwest site facilities; and
- an expansion of the JEB mill and construction of a water treatment plant at the JEB site.

Dewatering wells will be installed and Mink Arm will be drained

Dewatering wells will have to function in advance of pit development to achieve required draw down of the water table prior to the commencement mining. As well, an engineered dam will have to be constructed, which will prevent water from flowing from South McMahon Lake into the drained section of Mink Arm. Once the construction of the dam is completed, water can be removed from the southern isolated branch of Mink Arm. Backup generators will be installed at this point to power the dewatering well system.

Dedicated haulage road will be constructed and effluent transfer pipeline installed

Construction of the dedicated road from JEB to Midwest and the expansion of the JEB water treatment plant will begin at about the same time. Construction of the road will begin at both ends with the Midwest road crew being housed at Points North. The installation of the power line and pipeline can also begin with road construction with crews again operating from both ends of the road. The final development phase will be the construction of the site facilities including buildings, ponds, stockpile bases and ditches.

JEB mill expansion required for the Midwest project will take about 18 months

Constructions of the expanded JEB mill required for this project will being shortly after regulatory approvals are received. It is anticipated that the new circuits could be operational within 18 months of initial construction.

Mining Midwest open pit is expected to take about 4 ½ years; ore from the Midwest pit will feed the JEB mill for about five years at the faster rate of mill production (27 million lbs. per year U_3O_8 equivalent)

The development of the Midwest open pit (mining) is expected to take about 4 ½ years, with ore initially accessed after about 2 ½ years. Introduction of Midwest ore into the mill feed will commence once ore mining begins. At the proposed increased JEB mill production capacity (27 million lbs. per year U_3O_8 equivalent), the Midwest ore is expected to be milled over about five years. Should the plans for an increased rate of processing unexpectedly lead to a delay in completing this environmental assessment, COGEMA would complete the environmental assessment at the currently approved processing rate (24 million lbs. per year U_3O_8 equivalent), in order to develop the Midwest project as soon as possible. This would extend the duration of the milling period to about seven years.

3 PROJECT SITE INFORMATION

3.1 Project Location

The Midwest deposit is located in the Athabasca region

The Midwest uranium deposit is located near the margin of the Athabasca basin in Northern Saskatchewan, approximately 30 km west of Wollaston Lake (Figure 1.1-1). The site is approximately 700 km north of Saskatoon and 2 km north of Points North Landing at the end of Saskatchewan Highway 905.

3.2 General Existing Environmental Features

3.2.1 Overview

Numerous studies have been undertaken to characterize the environmental setting and baseline of the Midwest area

The Midwest project has a long history of studies designed to characterize the environmental setting of the area and establish environmental baseline conditions. Initial investigations date back to the late 1970s (Beak 1980) with additional studies conducted in the late 1980s and early 1990s (SENES and SRC 1988; TAEM 1991a, 1991b, 1994; Golder 1995). Recent investigations were launched in 2003 and 2004 to update the environmental baseline conditions, and to collate all the environmental baseline information acquired to date (pending). The studies have been conducted to characterize a broad range of environment aspects, including climate, hydrology, terrestrial and aquatic ecology and geology. The studies have focused on the characterization of valued ecosystem components with consideration of the potential to encounter rare and endangered species. Based on this information a brief overview of the existing environment is provided below.

The Midwest project lies within the Athabasca Plain Ecoregion of the Boreal Shield Eco-zone

The Midwest Project area lies within the Athabasca Plain Ecoregion of the Boreal Shield Eco-zone. Topography is more subdued (low relief) in this ecoregion than elsewhere in the Canadian Shield due to flat-lying sandstone bedrock and almost continuous cover of sandy glacial deposits. Distinctive landscape features of this ecoregion include large areas of kame and kettle topography with sandy-till moraines and active sand dunes. Numerous lakes occur, while rivers are generally small and uncommon. The Midwest Project area is located in close proximity to two other ecoregions: the Churchill River Upland to the south and the Selwyn Lake Upland to the northeast.

The project occurs in a poorly drained area, straddling the Southern boundary of the Smith Creek water shed, the Western boundary of the Collins Creek watershed and the Northern boundary of the Nicholson Creek watershed

The project occurs in an area of poorly drained terrain and lakes, approximately 15 km west of the McClean Lake Operation (Figure 1.1-1). As illustrated, the Midwest ore deposit is located below a shallow elongated bay of South McMahon Lake known as Mink Arm (Figure 2.1-3). South McMahon Lake is part of the Fond-du-Lac drainage system and lies within a small sub-basin within the Smith Creek watershed. This small sub-basin borders the western margin of the Collins Creek watershed which flows to Wollaston Lake, and the northern margin of the Nicholson Creek watershed, which ultimately flows to the Waterfound River. Refer to Figure 2.3-3.

Weather records from the Collins Bay and McClean Lake meteorological stations provide a comprehensive characterization of the climate of the area

The climate in the Midwest project area is characterized by short, cool summers with mean temperatures in the warmest month below 15 degrees Celsius and a frost-free period of less than 90 days. Extremely cold temperatures occur in winter with occasional outbreaks of Arctic air alternating with milder intrusions of Pacific air. Snow cover lasts for more than half the year. Long-term records from the nearby Collins Bay meteorological station in conjunction with locally derived data from the weather station at the McClean Lake Operation provide a comprehensive characterization of climate and meteorological conditions.

Regenerating jack pine forests and coniferous shrub lands dominate the landscape surrounding the proposed mine site

Regenerating jack pine forests and coniferous shrub lands from recent fires in 1972, 1979, 1994, and 2002 comprised the largest portion of the landscape in the area surrounding the proposed mine location. Upland coniferous forests are the next most dominant upland vegetation cover. Lowland habitat is dominated by fens. Shrubby fens are the most common fen sub-type. Treed and shrubby bogs are approximately equal in portion. Shrub riparian vegetation tends to be more abundant than treed and graminoid dominated riparian habitat.

Surface water quality in the area is very good, exhibiting neutral to slightly acidic pH and low dissolved solids and hardness

The water quality in the lakes in the project area is typical of those found in the Precambrian Shield. Waters are typically of very good quality, exhibiting neutral to slightly acidic pH, and low in dissolved solids and hardness. The aquatic ecology of the lakes and streams surrounding the Midwest project have been extensively characterized.

Diverse populations of plankton, benthic invertebrates, aquatic macrophytes and sport fish exist in the lakes of the area

Diverse populations of plankton, benthic invertebrates and aquatic macrophytes are common in the lakes of the area. Lakes generally support a good variety of sportfish species including northern pike, lake whitefish, walleye and lake trout. Arctic grayling occur in Collins Creek. White and round sucker are common to the area. Ninespine stickleback, yellow perch, burbot and slimy sculpin are common forage fish.

Local valued ecosystem components include ungulates, aquatic furbearers, waterfowl, upland game birds and fruit bearing vegetation

Of primary importance as local valued ecosystem components are sportfish, ungulates (primarily moose and barren-ground caribou), aquatic furbearers, waterfowl, upland game birds and fruit producing vegetation (blueberries, cranberries) or vegetation having medicinal significance.

Vertebrate species at risk were identified for the area, for use as an evaluation tool

To facilitate recent field investigations, a list of the status and abundance of vertebrate wildlife species known, or expected, to occur during some portion of the year within the Midwest Project area was developed using regional and provincial references. From this list, vertebrate species at risk were identified based on recent regulatory status documents (COSEWIC 2003; SKCDC 2003) and was used to as an evaluation tool during investigations.

3.2.2 Geology and Hydrogeology

3.2.2.1 Geology

The Midwest uranium deposit is located near the eastern margins of the Athabasca Basin

The Midwest uranium deposit is located near the eastern margin of the Athabasca Basin. This area is underlain by about 200 m of flat to gently dipping sandstone and conglomeratic sandstone of the Athabasca Formation. An unconformity separates the Athabasca Formation from underlying, steeply dipping, older basement rocks. The sandstone of the area is covered by surficial deposits, which were laid down during recent glacial episodes and consist mainly of glacial till. Refer to Figure 3.2-1.

The overburden in the Midwest area varies from 4 m to 20 m in thickness and constitutes an unconfined aquifer

The till in the Midwest area is locally overlain by sediments consisting of glaciofluvial sands and gravels, and recent alluvial sands and silts. A two to seven metre thick layer of underwater organic deposit (gyttja) is present at the bottom of lakes including Mink Arm of South McMahon Lake. Overall thickness of the overburden deposits varies from 4 m to 20 m, with an average thickness of 15 m. In the Midwest area the overburden generally constitutes an unconfined aquifer, which is underlain by lower permeability bedrock.

The Athabasca sandstone in the area is approximately 200 m thick and the lower 80 m is characterized by increase conglomerate bedding

The Athabasca Group in the Midwest area consists of a sequence of sandstones with minor interbedded conglomerates. The sandstone sequence is approximately 200 m thick. The lower part of the sandstone sequence, which is approximately 80 m thick, has a much less siliceous matrix and an increased amount of conglomerate bedding. The uranium deposit occurs at the unconformity at the base of the sandstone as an elongated body extending along a structural break. In addition to uranium,

there are varying amounts of arsenic, and metals, such as iron, nickel, cobalt, zinc and molybdenum found in the ore body.

The Precambrian basement rocks at the Midwest site consist of a steeply dipping and folded syncline and are dominantly composed of granitic gneiss

The Precambrian basement rocks at the Midwest site consist of a steeply-dipping and folded syncline consisting of graphitic, pelitic metasediments within a dominant granitic gneiss domain. The syncline has a northeast trend, parallel to the main shear zone and the regional structure. Genetically, the Midwest uranium deposit is associated with the intersection of an unconformity, metasediments and a major fault system, which displaces them.

A fault zone passes through the Midwest deposit and trends parallel to the Mink Arm, directly above it

The general trend of the intersecting fault systems in the Midwest Project area follow the weak, sheared graphitic metasediments that are parallel to Mink Arm that lies directly above it. This zone of faulting passes through the Midwest deposit. The unconformity has been vertically offset by these faults by up to 30 m, with the greatest offset across the northern part of the ore body.

A key feature of the Midwest deposit is an alteration halo surrounding the ore zone consisting of friable sandstone with clay content decreasing away from the ore body

A key feature of the Midwest deposit is the development around the ore zone of an alteration halo consisting of friable sandstone with clay content decreasing away from the ore body. The weathered section of the basement rocks in the vicinity of the ore body is bleached. The bleaching is fracture and permeability controlled, and forms haloes around micro-fractures, joints and faults, and laterally advances along the features parallel to bedding. The bleached halo is almost dome-like above the unconformity and narrows into the basement. In the basal sandstone the bleached halo extends laterally to about 100 m to 200 m on each side of the deposit.

3.2.2.2 Hydrogeology

Both shallow and deep groundwater flow systems have been identified at the Midwest site

Both shallow and deep groundwater flow systems are identified at the Midwest site. The shallow flow system consists of groundwater flow in the glacial deposits (Figure 3.2-1). The water table in this formation generally parallels the ground surface with the water table location dependent on the elevation of the water levels in the nearby lakes. Leakage from lakes located in topographic highs and infiltration from precipitation recharges the aquifer, and water from the aquifer discharges to swamps and lakes and topographic lows.

Deep groundwater flow occurs in the bedrock units and is generally horizontal in the south-east direction

The deep flow system is located in the sandstone bedrock underlying the overburden. Groundwater flow is generally horizontal and in the south-east direction in the lower sandstone. The sandstone aquifer is recharged by downward vertical leakage through the upper sandstone from the shallow groundwater system. Groundwater from the sandstone system ultimately discharges to regional topographic low areas located further southeast of the site. The general piezometry in the Midwest area is relatively flat as a result of both a relatively flat topography and a thick sandstone.

The upper sandstone acts as an aquitard separating the more permeable overburden and underlying bedrock sediments

In the Midwest area, the overburden generally constitutes an unconfined aquifer, which is underlain by lower permeability bedrock. The upper sandstone acts as an aquitard or semi-confining layer separating the more permeable overburden aquifer and the underlying more permeable bedrock sediments (lower sandstone).

Structural mapping showed the permeability of individual fracture zones to be highly variable with no single fracture set dominating permeability

The test mine conducted at the Midwest site at the end of the nineteen eighties provided access to the bedrock where mapping of the geology/structure and inflow observations could be conducted to confirm the presence of the inferred regional structures and to evaluate the permeability of these structures. The permeability of the fracture zones was found to be highly variable and inconsistent. No single fracture set was visibly more permeable than another set. In addition, the permeability of a single fracture within a given set was found to be highly variable, with one fracture yielding from 200 m^3/day to 1,000 m^3/day and another fracture in the same set yielding essentially no flow. It was therefore concluded that *none* of the fracture sets could be characterized as discrete hydrostratigraphic units with a consistent and uniform permeability.

3.2.3 Valued Ecosystem Components

Valued Ecosystem Components form the basis of environmental baseline and monitoring studies and the assessment of potential effects

Valued Ecosystem Components (VECs) provide the common basis that underlies environmental baseline and monitoring studies, and the assessment of potential effects of the project. A VEC can be defined as "*an environmental attribute or component perceived as important for social, cultural, economic or ecological reasons, and identified through consultation with affected people and through scientific opinion*" (Joint Panel 1992). VECs support ecosystem structure, and function as significant cultural, social, and economic values.

Valued Ecosystem Components were chosen through consultations with northern residents

Consultation with northern residents regarding traditional knowledge and land use is intrinsic to the identification of VECs. The VECS were chosen

because of their ecological and cultural significance to the areas. McClean Lake Operation directly monitors effects to many aquatic VECs; however, many terrestrial animal VECs, due to their relatively large home range and seasonal behaviour, are assessed indirectly through a risk assessment approach. Monitoring the physical components of the environment (water, sediment, air and soil quality), within the iterative environmental protection and management framework, allows for the evaluation of the potential effects on human and non-human biota (VECs).

3.3 Land Use

3.3.1 Regional Land Use: Past and Current Land Use

Aboriginal occupation and utilization of the resources in this region for traditional and commercial pursuits over the last 8,000 years

Historically, aboriginal groups have inhabited or utilized the Athabasca Basin since the last glacial retreat, which dates back about 8,000 years. In historic and contemporary times, Dene and Western Woods Cree peoples have occupied and utilized the region to procure the resources necessary to participate in their traditional domestic and commercial activities. Through this time, a wide variety of social and technological adaptations were developed to make full use of the local resources. A reliance on large game, numerous fur-bearers, fish, and waterfowl as well as numerous plant species provided for the physical, social, and spiritual needs of the boreal forest inhabitants.

Seven small communities use the area for traditional activities

Residential use in this sparsely populated region is focused on the seven Athabasca communities. Given extensive traditional land uses, much of the remaining area, particularly near the communities, is used for hunting, trapping, gathering and fishing.

The uranium industry plays an integral role in the economy of the Athabasca Region; resource harvesting also provides important seasonal income

The uranium mining industry, in particular, plays an integral role in the economy of the Athabasca Region, with five uranium mining and/or milling operations within the Region. Resource harvesting (primarily trapping, fishing and guiding) also provides important seasonal income for many of the region's residents. Income from resource harvesting has remained fairly stable over the past two decades at about $2,000 per resource harvester. In recent years, improved fur prices have meant that trapping earnings have improved by more than 40 per cent for the 50 to 70 trappers operating in the Region.

Many outfitters and lodges operate in the region

The area has a number of fishing and outfitting camps for tourists. In 2002, there were 13 bear outfitters and 10 moose outfitters operating in the Wildlife

Management Zone 76, which includes the Athabasca Region. In addition, there are 15 lodges in the Athabasca Region that offer sport fishing services; seven of these also provide outfitting services.

3.3.2 Midwest Study Area Land Use – Past and Current

Traditional land use will be preserved

By protecting the traditional uses of the land during operation, and effectively decommissioning to avoid long term detriment, traditional land use will be preserved. This commitment has been made to the regulatory agencies as well as directly to the communities. The proposed Midwest project will not change site land use or the above commitment.

4 FISH, FISH HABITAT AND NAVIGABLE WATERS

Project components may cause HADD and have implications to navigability

As outlined previously, the proposed open pit mine development of the Midwest ore deposit, and development of site infrastructure has several implications to fish habitat and navigable waters. These include:

- the loss of habitat and navigable waters associated with the dewatering of the Southern portion of Mink Arm;
- the potential alteration and disruption and/or loss of habitat and navigability associated with the development of stream crossings along the proposed dedicated road between the Midwest site and the McClean Lake Operation JEB site; and
- the potential alteration and disruption of fish habitat associated with the discharge of clean groundwater.

Potential for HADD will be addressed through DFO policy, and habitat conservation guidelines

As part of this assessment, the implications of the potential for the harmful alteration, disruption or destruction (HADD) of fish habitat will be addressed through the framework provided by the Department of Fisheries and Ocean's *Policy for the Management of Fish Habitat* (1986) and the *Habitat Conservation and Protection Guidelines* (1998). Project referral to the Department initiates an assessment of potential impacts of the project on fish habitat productive capacity to determine whether it will result in a HADD. The *Habitat Conservation and Protection Guidelines* (1998) provide a series of management options to conserve and protect habitat. Initial options include relocation of the project, or if relocation is not feasible, redesign of the project. When project relocation/redesign are not feasible, or are insufficient to completely eliminate impact on fish habitat productivity, mitigation measures are necessary to minimize threats to fish habitat.

Available mitigations measures are listed herein

Mitigation measures can include measures such as:

- defining timing windows for work in lakes and streams to minimize interference with fish migration and spawning;
- ensuring fish passage, and
- implementing measures to control siltation at construction sites.

Habitat compensation is an option to meet Fisheries and Oceans Canada no net loss policy

When residual impacts of a project on habitat productive capacity persist despite the implementation of the management measures outlined above, habitat compensation is an option to meet Fisheries and Oceans Canada no net loss policy.

Habitat compensation involves replacing productive capacity that has suffered a HADD

Habitat compensation generally involves replacing the productive capacity of habitat that has suffered a HADD with newly created habitat, or improving the productive capacity of some other natural habitat. Habitat compensation options are developed on a case by case basis, in consideration of feasible opportunities and constraints. The conservation and protection guidelines provide prioritized and commonly used habitat compensation options.

Decision steps outlined by DFO will be followed to achieve no net loss of fish habitat; these steps are outlined herein

As part of the environmental assessment of this proposed development, it is intended to follow the decision steps outlined in the habitat conservation and protection guidelines to achieve a no net loss (NNL) of habitat productive capacity. These steps include the following.

- Submit all relevant information describing the fisheries resources and habitat present that may be affected by the project, along with relocation and redesign options and proposed mitigation measures and compensation proposals for anticipated residual impacts. Preliminary discussions will be undertaken with the Department of Fisheries and Oceans to ensure the adequacy of the information provided and identify any constraints that may be evident.
- Based on the information submitted, facilitate the determination of potential impacts on fish and fish habitat productive capacity (HADD determination).
- In view of the varying degree that habitats can contribute to fisheries production, qualify the level of protection required for each element under assessment based on its relative contribution to fish habitat productivity.
- Where residual impact to fish habitat remain, provide appropriate habitat compensation, while maintaining appropriate mitigation measures to ensure residual impacts are minimized.

The HADD associated with draining Mink Arm and potential infringement on the publics right to navigate are triggers under CEAA

The HADD associated with the proposal to drain Mink Arm will require an authorization under the *Fisheries Act.* The possible infringement on the public's right to navigate will likely require an authorization under the *Navigable Waters Act.* Both of these are a trigger under the *Canadian Environmental Assessment Act* (CEAA). Public consultation will be a part of the environmental assessment process.

Implications to navigability will be assessed in conjunction with HADD determinations

An assessment of the interaction of project components with the navigability of waterways will be undertaken in conjunction with HADD determination to identify areas where the public's right to navigate may be jeopardized.

5 SUMMARY

The Midwest Project has previously undergone Joint Panel review and has received government approvals

The Midwest Project has previously undergone Joint Panel review and has received government approvals to proceed to licensing. However, due to market conditions, this project has remained dormant.

Several changes and improvements are herein proposed, which are a result of ten additional years of experience

Recent and projected favorable market conditions have lead to the review and optimization of the Midwest project by COGEMA. Several changes and improvements are herein proposed, which are a result of ten additional years of experience in uranium developments in northern Saskatchewan. The current proposal also continues to take into consideration previously identified Joint Panel concerns.

The environmental assessment will confirm that the proposed changes will result in improvements to the project in terms of protection of workers and the environment, project economic feasibility, and socioeconomic benefits

Broadly, these changes and improvements include a change to the mining method from underground to open pit, development of a dedicated haul road from the Midwest site to the JEB site of the McClean Lake Operation, and accelerated milling of Midwest ore at the JEB mill. The environmental impact assessment will confirm the expectation that the changes will result in improvements to the project in terms of protection of workers and the environment, project economic feasibility, and socioeconomic benefits.