



# Rayrock Remediation Project

## Sediment and Erosion Control Plan (Version 1)

August 2020



Earth Moving Equipment at North Borrow Area – Rayrock – August 7<sup>th</sup>, 2019

**Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)  
Contaminants and Remediation Division (CARD)**

**August 2020**





### Plan Revision History

Version No.	Author	Document Date	Sections Revised
1	CIRNAC/CARD	August 2020	Original Document



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**Abbreviations**

ACM	Asbestos –Containing Materials
AHJ	Authority Having Jurisdiction
ASTM	ASTM International (formerly the American Society for Testing and Materials)
Bq/cm <sup>2</sup>	Becquerel per square centimetre
CCME	Canadian Council of the Ministers of the Environment
CDF	Confined Disposal Facility
CIRNAC	Crown-Indigenous Relations and Northern Development Canada
cm	Centimetre
CWQG	Canadian Water Quality Guidelines for the Protection of Aquatic Life
kg/m	Kilogram per metre
km	Kilometre
LUP	Land Use Permit
mg/L	Milligram per litre
mm	Millimetre
MVRMA	Mackenzie Valley Resource Management Act
NT (NWT)	Northwest Territories
NTU	Nephelometric Turbidity Units
PSPC	Public Services and Procurement Canada
RAP	Remedial Action Plan
SARA	Species at Risk Act
SEC	Sediment and Erosion Control
TCA	Tailings Containment Area
TSP	Total Suspended Particulate
TSS	Total Suspended Sediments
WLWB	Wek’èezhii Land and Water Board



# 1 INTRODUCTION

The Rayrock Remediation Project is a project that will address several former Uranium exploration, mining and ancillary sites in the Tł̥ch̥ Region. These sites were impacted from activities that occurred between the 1950’s and the 1970’s. Remediation is planned for 2022 and 2023, although an additional remediation year may be necessary, depending on the progress of work.

The locations of the sites within the Tł̥ch̥ Region that make up the Rayrock Remediation Project are provided on Figure 1 in Appendix A. The Project includes the former Rayrock Uranium Mine (Rayrock Mine), the Sun Rose Advanced Exploration Site (Sun Rose), the REX Exploration Site (REX), the Former Barge Landing Transportation Area (Barge Landing), the former power line between Rayrock and the Snare Hydroelectric facility and the GS, MK and TED drilling sites.

This Sediment and Erosion Control (SEC) Plan for the Rayrock Remediation Project includes guidance for SEC measures to be implemented prior to, during and after remediation activities at Project sites. It is intended to represent the baseline effort required for SEC. Prior to the beginning of site remediation, the Remedial Contractor will be required to present a Contractor SEC Plan that will meet or exceed the guidance provided in this SEC Plan.

All personnel conducting Land Use activities at the Rayrock site will need to be familiar with this document in its most recently updated version. It will be posted on-site during all land use. This SEC Plan is a working document that is designed to be adapted to planned activities at the sites. The Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) Project Manager may be contacted to verify the current version of the SEC Plan, and can supply an electronic copy of the most recent SEC Plan version on request.

## 1.1 Revisions to The Plan

Table 1-1 tracks the SEC Plan revisions and ensures that all stakeholders have the most up to date copy of the Plan. The table will be updated each time a revision is made to the SEC Plan. This SEC Plan will be submitted as part of the Water Licence and Land Use Permit (LUP) applications that will be made to the Wek’èezhii Land and Water Board (WLWB). Updates to the SEC Plan will be submitted to WLWB as necessary, and will be available on their registry website.

**Table 1-1 Revision history of the Plan**

Version #	Crown Approval	Date	Sections Revised	Comments	Revision Distribution Date	GCDocs #59512796 version
1	Ron Breadmore, Project Manager	April 2020	Not Applicable	Not Available	Not Applicable	1

## 1.2 Roles and Responsibilities

The Rayrock Remediation Project will require the pumping and treating of water, excavation of contaminated soils and tailings, excavation of non-impacted soils for borrow, excavation of lake-bed sediments, and movement of soil and sediment to new locations using large machinery. These activities have a potential to cause erosion and exposure of the ground surfaces which can result in loss of soils through transport to nearby water bodies. This sedimentation of water bodies can be detrimental to aquatic life. All activities under the Rayrock Remediation Project will be completed with the goal of minimizing erosion and sediment loss to water bodies in the project area.



SEC will be the responsibility of the Rayrock Remediation Project Management Team. Table 1-2 outlines each Project Team member’s roles and responsibilities as they pertain to SEC.

**Table 1-2 Project Team’s Roles and Responsibilities**

Role	Responsibility
Crown Project Managers	<ul style="list-style-type: none"> <li>Verifying that all contractual work is required to be performed in a manner that will minimize erosion and sediment loss.</li> </ul>
Contractor Project Manager	<ul style="list-style-type: none"> <li>Ensuring necessary resources are available to implement this SEC Plan.</li> <li>Organizing all materials, personnel and equipment necessary to implement the controls in this SEC Plan.</li> <li>Directing the SEC Plan requirements for all remediation activities.</li> </ul>
Departmental Representative	<ul style="list-style-type: none"> <li>Monitoring all field activities for erosion and sedimentation.</li> <li>Implementing sediment and erosion mitigation, as required.</li> </ul>
Field Supervisors	<ul style="list-style-type: none"> <li>Implementing requirements of this SEC Plan under the direction of the Contractor Project Manager.</li> </ul>
Geotechnical Inspector	<ul style="list-style-type: none"> <li>Conducting geotechnical inspections and providing recommendations to the Contractor Project Manager concerning sediment and erosion risks.</li> </ul>

### 1.3 Project Description

The Rayrock Remediation Project includes the remediation of eight sites, two of which are on Crown land excluded from the Tł̓ch̓q Comprehensive Land Claims Agreement while the other six are located on Tł̓ch̓q Lands. The Rayrock and Sun Rose sites are on Crown Lands, while the REX site, Barge Landing, Rayrock power line, GS site, MK site and TED site are on Tł̓ch̓q Lands. The locations of the seven sites and the ends of the power line alignment are provided in Figure 1 of Appendix A. Remedial activities required for these sites are detailed here, with attention to those activities that will require sediment and erosion control.

#### 1.3.1 Rayrock

Rayrock has the following risk elements identified for remedial action:

- **Mine Openings** - Five vent raises are located atop the Marian Ridge. Closure of these openings will be completed with engineered covers.
- **Former Mine Camp Area** - Asbestos Containing Materials (ACMs) that were used in the construction of Rayrock buildings have mixed with soil. All potentially ACM-impacted soil will be collected and encapsulated in the Confined Disposal Facility (CDF).
- **Mill Pad and Building Foundations** - Remediation will include the break-up and disposal of the concrete from the mill pad in the CDF.
- **Impacted Soils** - Impacted soils will be excavated and encapsulated in CDF.
- **North and South Tailings Containment Areas and Waste Dump** - The deteriorated areas of the TCAs and dump will be repaired.
- **Spilled Tailings** - Readily accessible tailings will be collected and encapsulated in the CDF.
- **Borrow Areas** –Borrow areas will be restored to prevent erosion and to permit natural recovery.
- **Non Hazardous Waste** - Non-hazardous waste and debris will be collected and shipped to an approved facility in the south.
- **Hazardous Waste** - Hazardous wastes will be collected and shipped to an approved facility in the south.
- **Mill Lake** – Sediments and water in Mill Lake are contaminated with Uranium. Water from Mill Lake will be pumped out, treated to water quality objectives and deposited in Sherman Lake. Sediment from Mill Lake will be consolidated in the CDF, which will be located in a portion of the former Mill Lake basin.



### 1.3.2 Sun Rose

The Sun Rose Advanced Exploration Site is a former uranium exploration site located on the north side of Chico Lake. It is 35 kilometres (km) north of Behchokq, NWT and 3 km to the east of the Tłı̨chq winter road. The Sun Rose site is approximately 15 hectares in area, and is located near the top of a dome-shaped bedrock outcrop. The site consists of ruins of burned down building structures, waste rock and scattered non-hazardous debris. The site also contains an open, but fenced, shaft. Remediation will include collection of all non-hazardous and hazardous wastes and shipping to an approved facility in the south.

The shaft will be closed with an engineered cover. This will require some excavation and will need basic SEC control measures. All exploration workings with elevated gamma radiation and waste rock with elevated Uranium concentrations will be covered with clean borrow material and graded to the surrounding terrain. Most of the remedial activity at the Sun Rose site, including work at the shaft, exploration workings and waste rock, is over 250 metres from surface water bodies; so SEC appropriate for the location will be implemented. SEC will be implemented at the borrow sources used for all capping, as they are located in areas near the bottom dome-shaped outcrop and much nearer to regional Lakes. SEC measures for non-hazardous wastes will be the same as those employed at the Rayrock site.

### 1.3.3 Sites on Tłı̨chq Lands

In addition to the Rayrock and Sun Rose sites, there are six other affiliated site locations that will also be cleaned-up as part of the Rayrock Remediation Project. These sites include REX, the Barge Landing, the former power line between Rayrock and the Snare Hydroelectric facility and the GS, MK and TED drilling sites.

The Horn Plateau – REX Showing, otherwise referred to as the REX Exploration Site, is a former uranium exploration Site. Non-hazardous wastes are prevalent around the site. The plan for the clean-up of this site is to consolidate all non-hazardous wastes at Rayrock for off-site disposal. All deeper exploration workings will be covered with clean borrow material. All non-treated wood will be burned with the resultant ash shipped to Rayrock for disposal in the CDF. One non-hazardous waste dump is located within the water of Sheldon Lake; sedimentation controls, such as silt curtains or equivalent measures, will be implemented during recovery of this waste. SEC measures for the exploration workings at REX will be similar to Sun Rose.

The Barge Landing is located on Marian Lake at the former terminus of the Rayrock all-season road. All activities at the Barge Landing will occur near Marian Lake. Non-hazardous waste pick-up will occur at the Barge Landing. As some of this waste is located in the Lake, SEC measures similar to those for the REX site at Sheldon Lake will be necessary. SEC measures may be required to remove a culvert from the former road; the need for control measures will be determined before this work is completed. Drums with liquid will be treated in accordance with requirements of the Rayrock Spill Contingency Plan; see that document for further details. All other hazardous waste collection will not require SEC measures.

The Rayrock Power line consisted of power poles and wire, and is situated between the mine and the Snare Hydro System. Work in this area is anticipated to be only non-hazardous waste consolidation, and may not require SEC measures.

GS, MK, and TED are small exploration site where companies were attempting to find additional ore for the Rayrock mine operation. Limited SEC measures will be required for the non-hazardous waste collection.



## 1.4 Regulatory Considerations

### Project Specific Regulation

Work at the Rayrock site is currently being completed within the conditions of LUP W2015X0006 issued by the WLWB on August 14<sup>th</sup>, 2015. This LUP is currently set to expire in August 2020, but a two-year extension request has been submitted to the WLWB. Conditions within 26(1)(f) of the LUP, which regulate the “Control or Prevention of Ponding of Water, Flooding, Erosion, Slides, and Subsidence of Land”, are as follows (note the numbering provided is in accordance with the numbering in the LUP):

17. The land-use operation shall not cause obstruction to any natural drainage.
18. The Permittee shall minimize erosion by installing erosion control structures as the land-use operation progresses.
19. The Permittee shall not conduct off-road vehicle travel in areas without snow-covered surfaces.
20. The Permittee shall prepare the site in such a manner as to prevent rutting of the ground surface.
21. The Permittee shall suspend overland travel of equipment or vehicles at the first sign of rutting.
22. The Permittee shall not move any equipment or vehicles unless the ground surface is in a state capable of fully supporting the equipment or vehicles without rutting or gouging.
23. The Permittee shall not use any material other than clean water and snow in the construction of ice bridges.
24. The Permittee shall not use any materials other than clean snow and water in the construction of snow fills.
25. Prior to spring break-up or completion of the land-use operation, the Permittee shall clean up and either remove or v-notch all snowfills from stream crossings, unless otherwise authorized in writing by an Inspector.
26. Prior to spring break-up or completion of the land-use operation, the Permittee shall clean up and v-notch all ice bridges, unless otherwise authorized in writing by an Inspector.
27. The Permittee shall slope the sides of waste material piles, excavations, and embankments — except in solid rock — to a minimum ratio of 2:1 vertical, unless otherwise authorized in writing by an Inspector.
28. The Permittee shall not excavate land or remove vegetation within 100 metres of the Ordinary High Water Mark of any Watercourse, unless otherwise authorized in writing by an Inspector.

It is currently anticipated that new LUPs will be issued for the Rayrock Remediation Project in 2021. The Rayrock Remediation Project may be covered with a single LUP for the entire project, or it may require one LUP covering Territorial jurisdiction and another for Federal jurisdiction.

The work at the Rayrock site in the Rayrock Remediation Project will also require a Type “A” Water Licence. It is currently anticipated that these Water Licences will include the following condition in Part G: Waste and Water Management (note the numbering provided is in accordance with the anticipated numbering in the Water Licence):

2. The Licensee shall minimize erosion by implementing suitable erosion control that shall be located and maintained to the satisfaction of an Inspector.

Schedule 1 of the Water Licence is anticipated to describe the requirements of the Annual Water Licence Report, which expand on the requirement in Part G Item 2 by describing what is required in the reporting. The anticipated wording of Schedule 1, Item 1 Part L is as follows:

- l) A summary of activities conducted in accordance with the approved **Sediment and Erosion Control Plan**, referred to in Part G, Condition 2 of this Licence, including:
  - i. A summary of approved updates or changes to the process or facilities required for the management of erosion and sedimentation;
  - ii. A description of any erosion susceptible areas encountered;



- iii. A summary of activities undertaken to prevent or mitigate erosion;
- iv. A report of the performance of mitigations applied to each area;
- v. A summary and interpretation of monitoring results, including any Action Level exceedances; and
- vi. A description of actions taken in response to any Action Level exceedances.

In order to gather the information required for annual Water Licence reporting and to ensure proper sediment and erosion control this SEC Plan will include the following:

- a) The details of potential SEC measures implemented prior to, during and after Reclamation activities are completed, until all disturbed areas are completely stabilized;
- b) The details of water management during excavation;
- c) A monitoring program that ensures the effectiveness and maintenance of all SEC measures, stabilization and revegetation success; and,
- d) A contingency plan that will be undertaken in the event that SEC issues are identified.

This SEC Plan for the Rayrock Remediation Project includes guidance for potential SEC measures to be implemented at all Rayrock Remediation Project sites. The Remediation Contractor, who will be responsible for the execution of the work under this Plan, will be responsible for development of a detailed, Site-specific SEC Plan that will detail the sites and locations where SEC measures will be required. The Contractor SEC Plan will meet or exceed the conditions outlined in this SEC Plan. The Contractor SEC Plan will be submitted as an updated version to this SEC Plan.

All construction personnel will be made familiar with most current version of this document and a current version will remain on-site for the duration of construction activities. As a working document, the SEC Plan will be updated as necessary, when on-site conditions and site requirements require additional detail. All future versions will meet or exceed the requirement of previous versions.

#### General Federal Regulation

*Fisheries Act:* The Fisheries Act is to provide a framework for the proper management and control of fisheries and the conservation and protection of fish and fish habitat, including by preventing pollution. (Government of Canada 1985, last amended August 28<sup>th</sup>, 2019). According to Section 35 (1) of the Act, “No person shall carry on any work, undertaking or activity that results in the harmful alteration, disruption or destruction of fish habitat.” All lakes in the Rayrock Remediation Project (except Mill Lake) would qualify under this Act. Under the Fisheries Act, if there occurs a deposit of a deleterious substance (such as sediment) in water frequented by fish that is not authorized, or if there is a serious and imminent danger of such an occurrence, and detriment to fish habitat or fish or to the use by humans of fish results or may reasonably be expected to result from the occurrence, then every person shall without delay notify an inspector, a fishery officer, a fishery guardian or an authority prescribed by the regulations. Any person described above shall, as soon as feasible, take all reasonable measures consistent with public safety and with the conservation and protection of fish and fish habitat to prevent the occurrence or to counteract, mitigate or remedy any adverse effects that result from the occurrence or might reasonably be expected to result from it.

*Species at Risk Act:* The Species at Risk Act (SARA (Government of Canada 2002, Last Amended May 22, 2019)) is federal legislation that provides legal protection to “At Risk” wildlife and their habitats. Habitats include “residences”, which are dwelling-places, such as dens, nests or other similar areas or places, that are occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating. Habitats also include “critical habitat” which are the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species’ critical habitat in the recovery strategy or in an action plan for the species.



At-Risk wildlife and plants are listed in SARA. The purpose of the SARA is to prevent Canadian indigenous species, subspecies and distinct populations from becoming extirpated or extinct, and to encourage the management of other species to prevent them from becoming at Risk. This protection applies to all federal lands in Canada.

*Migratory Bird Convention Act:* The Migratory Bird Convention Act protects migratory birds and nests from indiscriminate harvesting and destruction (Government of Canada 1994, last amended December 12 2017). Section 5.1 (1) of the Migratory Birds Convention Act, 1994, stipulate that “No person or vessel shall deposit a substance that is harmful to migratory birds, or permit such a substance to be deposited, in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area.”

### General Territorial Regulation

The Northwest Territories is rich in resources — wildlife, water, minerals, oil and gas, and breathtaking landscapes — that have sustained its Aboriginal inhabitants and other Northerners for countless generations. These resources also contribute to Canada's wealth, and are an important part of Canada's national identity. Protecting, managing and developing these resources require a strong partnership between Northerners, Aboriginal governments, the federal government and the territorial government. In the Northwest Territories, this partnership is known as the regulatory regime. The regime is a network of resource management boards, governments and other organizations that are committed to serving the best interests of Northwest Territories residents and all of Canada.

Territorial regulations that cover work in the Rayrock Remediation Project area include the following:

*Mackenzie Valley Resource Management Act and Regulations:* The Mackenzie Valley Resources Management Act (MVRMA) created and provided authorities to co-management boards that are established to carry out land use planning, monitor regulation of the use of land and water and conduct environmental assessments and reviews of large or complex projects. Land Use Permits and Water Licences are provided under the authority of the MVRMA.

*NWT Waters Act:* The NWT Waters Act is a Territorial Act that replaced the Federal Act of the same name after Territorial devolution. The NWT Waters Act covers the use of waters and the deposit of waste in waters that are not otherwise covered in the MVRMA.

*NWT Species at Risk Act:* The NWT Species at Risk Act is territorial legislation that provides legal protection to “At Risk” wildlife and their habitats in the NWT, as a complementary legislation to the Federal Act. In accordance with Section 8 (1), this Act applies to every species, subspecies and distinct population of animal, plant or other organism that is wild by nature and (a) is indigenous to the Northwest Territories; or (b) has extended its range into the Northwest Territories without human intervention.

One additional Legislative document that is important to the Rayrock Remediation Project is the Land Claims and Self-Government Agreement Among the Tłı̨chǫ and the Government Of The Northwest Territories and the Government Of Canada. This agreement covers the self-government of the Tłı̨chǫ people over the land outlined in the document. All Rayrock Remediation Project sites lie either on Federal lands accessed through Tłı̨chǫ Lands, or directly on Tłı̨chǫ Lands. Sections 9.6 and 18.3 cover the access to Contaminated sites, where 9.6 covers access in Tłı̨chǫ Communities and 18.3 covers other Tłı̨chǫ Lands. As 9.6 and 18.3 provide the same conditions and given that no Rayrock Remediation Project work is within community jurisdictions, the provisions of 18.3 will be provided, as follows:



### 18.3 CONTAMINATED SITES

- 18.3.1 Where government undertakes any program respecting the clean-up of contaminated sites on Crown lands in M̄owhì Gogha Dè Nìttlèè (NWT), the program shall apply to such sites on Tłı̄chọ lands that are listed in part 4 of the appendix to this chapter as if the lands were Crown lands.
- 18.3.2 After the effective date, the Parties may agree that a site not listed in part 4 of the appendix to this chapter existed on the effective date and, upon consent of the Parties, the list in that part of the appendix to this chapter shall be considered to have been amended to include that site.
- 18.3.3 Any dispute as to whether a contaminated site existed on the effective date may be referred for resolution in accordance with chapter 6 by a Party. If a dispute goes to an arbitrator in accordance with chapter 6 and if the arbitrator confirms that a site existed on the effective date, the list in part 4 of the appendix to this chapter shall be considered to have been amended to include that site.
- 18.3.4 Government shall be responsible for the costs associated with any clean-up under 18.3.1 on Tłı̄chọ lands. This provision shall not prevent government from recovering any costs associated with the clean-up from a person who is liable for these costs.
- 18.3.5 There shall be no compensation payable for damage which may be caused to Tłı̄chọ lands as a result of the clean-up of Tłı̄chọ lands under 18.3.1.
- 18.3.6 Government shall not be liable for any loss or damage to a Tłı̄chọ Citizen, to the Tłı̄chọ First Nation or to the Tłı̄chọ Government from contaminated sites on Tłı̄chọ lands whether or not they are known on the effective date. This provision does not affect any obligation of government under 18.3.1 and 18.3.4.

## 2 OBJECTIVE

The objective of the Sediment and Erosion Control Plan is to outline the actions and procedures required to control erosion, sedimentation, and drainage, by preventing migration of silt, mud, sediment, and other debris through the establishment of control structures to contain or remove suspended sediment and through construction procedures that reduce the generation of sedimentation.

Migration of sediment and water has the potential to impact downstream ecological receptors with either acute or long term toxicological effects on aquatic and terrestrial systems. Turbidity and sedimentation resulting from construction works may inhibit light penetration, remove oxygen, and disrupt the water chemistry of aquatic environments; dust deposition may coat vegetation and enter water systems inhibiting ecological function; or land disturbance through excavation and exposure may produce longer term erosion on vulnerable terrain. Remediation of the Rayrock Remediation Project sites is required due to elevated metal concentrations in site soils and sediments; as such, SEC measures will also prevent the migration of metal contamination. The purpose of this Plan is to detail the mitigative measures that will be taken to minimize the impact of all construction activity for the Rayrock Remediation Project.

## 3 PLAN ORGANIZATION

Planning for SEC requires communication between personnel on the Project Management Team, Contractors who will be performing field activities, and regulatory inspectors and managers. Specifics of the SEC Plan may require modification from time to time, so it is imperative that the SEC Plan remains flexible to address changing site situations and to best provide protection to the immediate environment.

Execution of the SEC Plan will be the responsibility of the Contractor and their appropriate field supervisors and workers. All field workers are responsible for reporting any issues of concern that may arise in the course of their work to their Field Supervisor. The Field Supervisor will assess the situation in accordance with directions provided in this Plan and will implement mitigative action as necessary. If the issue cannot be clearly resolved through implementation of directions provided in the Plan, then the Field Supervisor



will consult with the Site Manager and the Departmental Representative to determine a resolution for the issue. Project Team members from Public Services and Procurement Canada (PSPC) and CIRNAC will be informed of all SEC issues by Contractor management through daily reporting and weekly meetings.

If SEC issues require control methods that are not outlined in the current version of the SEC Plan, the SEC Plan will be updated and approved before the control method is implemented.

Section 4 of this Plan will detail the areas and activities that will require SEC measures for the Rayrock Remediation Project, and all of the potential measures that will be made available for SEC. Section 5 will describe how the SEC measures will be implemented in the field during remediation. Section 6 describes the closure and removal of SEC, while Section 7 describes post-remediation monitoring that will be required to show SEC measures were effective.

## 4 SEDIMENT AND EROSION CONTROL METHODS

The Rayrock Remediation Project will include the treatment and discharge of large volumes of water, the excavation, treatment and burial of large volumes of lake-bed sediments and the excavation, transport and placement of large volumes of soil. All of these activities present the possibility of erosion and sediment loss, especially when considering the possibility of heavy precipitation or other natural processes.

### 4.1 General Guidelines

Protecting aquatic and terrestrial systems from sediment deposition during remediation works requires a combination of site-specific measures, to address activities that are known to have potential sedimentation issues, and general guidelines to address any other situation where sedimentation may occur. The SEC Plan includes monitoring and reporting requirements to ensure control measures are in compliance with regulations by Authorities Having Jurisdiction (AHJ) as dictated by the requirements in Project permits and licences.

The primary requirement for effective SEC is the proper training of field staff in the need for and **management** of SEC measures. Employees will be trained on the SEC measures outlined in this plan and will be responsible for installing the measures, as required, under instruction and/or supervision of their supervisors. Employees must also be required to be trained on any safe work plans that are associated with the installation of these measures.

#### 4.1.1 Project Management

The following project management activities will be completed for all SEC planning, implementation and monitoring:

- Prepare and conduct a Pre-mobilization meeting to discuss SEC issues and on-site planning meetings after mobilization;
- Identify key areas of concern with the Project Team and on-site staff;
- Conduct daily tailgate meetings to discuss on-site activities including SEC issues;
- Plan work to include all work activities required for SEC;
- Provide all necessary materials and equipment needed to prevent soil erosion and discharge of soil-bearing water;
- Prior to commencement of remedial activities, install appropriate SEC measures;
- Remove accumulated sediment and debris from controls to maintain proper functioning of measures;
- Dispose of removed sediment and debris in the CDF or other predesignated disposal location;
- Inspect, repair and maintain erosion, sediment, and drainage control equipment;



- Provide and maintain temporary measures (see Section 4.2) which may include, but are not limited to:
  - Silt fences,
  - Ditches,
  - Geotextiles,
  - Drains,
  - Berms,
  - Terracing,
  - Riprap,
  - Temporary drainage piping,
  - Sedimentation basins,
  - Vegetative cover,
  - Dykes,
  - Straw bales,
  - Erosion control matting, and/or
  - Floating turbidity curtain;
- Ensure that adequate control measures are available;
- Ensure that additional materials for control measures are available for contingency (see Section 5.5);
- Ensure that construction activities will not be undertaken during periods of significant rainfall; and
- Remove controls after completion of field remedial program.

#### 4.1.2 Terrestrial Environment Protection

Erosion of exposed soil is the leading cause of sedimentation of adjacent water bodies, and is a significant concern during civil works projects. General activities to protect terrestrial environment include the following:

- Plan construction to control and direct surface drainage from borrow areas, stockpiles, staging areas and other work areas;
- Minimize exposure of bare soil;
- Prevent rutting of the ground surface through grading, landscape management, alternative routings, flow diversion, geotextile, rip rap or other means of stabilization;
- Minimize stripping of topsoil and vegetation, and use all stripped organics for stabilization and erosion control;
- Locate stockpiled organics and borrow material away from natural flow paths for precipitation run-off and greater than 30 metres from any waterbody;
- Minimize operation of heavy equipment within 100 metres of the ordinary high water mark of any watercourse;
- Do not establish quarry operations within 100 metres of the ordinary high water mark of any waterbody or watercourse, unless otherwise authorized in writing by a Land Use Inspector;
- Ensure authorized quarry operations within 100 metres of the ordinary high water mark of any waterbody or watercourse are strictly monitored for SEC issues;
- Minimize approach grades on all watercourse crossings;
- Remove accumulated sediment from construction areas;
- Employ erosion control structures and repair damage caused by soil erosion and sedimentation;
- Employ stabilizing procedures during excavations;
- Maintain excavations free of water; and,
- Install a tear resistant tarp on all long-term organic or borrow stockpile locations.



Of particular concern for the protection of the terrestrial environment is the control of soil loss from wind erosion. Dust from construction activities in areas of impacted materials (sediments, soils, tailings, waste rock) may include Uranium and other metal contaminants of concern. In these areas, additional Personal Protective Equipment (e.g. dust masks) for workers will be required, especially when working in the Mill Lake area with exposed sediments. For all areas where bare soil is exposed, dust and particulate control measures will include:

- Minimizing the raising of dust during construction works at Project sites;
- Maintaining dust control measures during the duration of Project works;
- Preventing and deterring dust migration to outside of the work area or to other areas of the site;
- Using best practices to protect sensitive vegetation and wetlands from dust deposition;
- Covering or wetting down dry materials and rubbish to prevent blowing dust and debris;
- Providing dust control for temporary roads; and,
- Stopping work, to protect worker exposure or ecological health, when dust particulate concentrations above requirements are detected, and immediately addressing the source of the dust.

#### 4.1.3 Aquatic Environment Protection

To ensure protection of all aquatic environments, certain activities are to be avoided and certain activities are required, depending on the site conditions. These conditions apply to all water bodies in the Rayrock Remediation Project area except for Mill Lake. SEC for Mill Lake will be achieved through isolation of the Lake and treatment of all Lake water through a water treatment facility, as detailed in the Remedial Action Plan (RAP).

Activities to avoid are as follows:

- Do not operate construction equipment in waterways unless control measurements are in place – construction equipment will not be operated within lakes, streams or crossings without the establishment of sediment controls;
- Do not disturb embankments – embankments along lakes and streams will not be disturbed unless the disturbance is required and all SEC are in place;
- Avoid encroachment on water bodies or drainage ditch banks – establish necessary buffer zones around water bodies and ensure those buffers are maintained;
- Do not initiate work adjacent to open water until control measures are in place – the location and alignment of the SEC measures should be approved by the Departmental Representative;
- Avoid spawning beds when constructing temporary crossings of waterways;
- Do not use waterway beds, such as ephemeral stream beds, for borrow material – waterway bed may be found within the areas designated for use as borrow material and use of these beds should be avoided;
- Do not dump excavated fill, waste material or debris in waterways or permit these materials to enter waterways – all waterways will be protected from the entry of substances that could deteriorate the water quality; and
- Prevent surface water runoff from leaving work areas – surface water runoff that is laden with sediment must be controlled and must not be permitted to leave the work area without treatment.

Activities that are required are as follows:

- Place silt fences and straw bales in ditches to prevent sediments from escaping – the location and alignment of the SEC measures should be approved by the Departmental Representative;
- Pump water accumulated in work areas to discharge locations that are onto the ground and are greater than 30 metres from natural drainage and 100 metres from fish bearing waters – discharge locations for any dewatering will be carefully selected and locations will be confirmed by the Departmental Representative;



- In lieu of ground discharge of accumulated water from depressions created by impacted soil excavation, consider pumping the water to a tank (or directly to Mill Lake) for treatment through the Rayrock Water Treatment Facility;
- Address sensitive aquatic areas or areas that may affect fisheries – identify and avoid sensitive areas within the aquatic environment near the Rayrock Remediation Project sites;
- Employ DFO requirements or Best Management Practices for all stream crossings – temporary crossing structures will be set-up in accordance with requires and best practices;
- Have ready and available any pumping equipment, machinery, and tanks necessary for emergency response for a sediment release – pumping equipment, machinery, and tankage will be on-site and available for response to sediment loss or emergency control measures;
- Prevent surface water drainage into or out of work areas through proper grading of work areas during and after construction activities – this includes dressing the sides of excavations to achieve gentle slopes (maximum of 5Horizontal:1Vertical) when excavation is complete, fitting the excavation to local topography and providing swales or ditches, as required, to prevent surface standing water and/or erosion;
- Maintain all filters, sediment traps or other SEC structures – all SEC structures require occasional maintenance to ensure continued functionality;
- Protect all work areas at the site from standing or flowing water and grade these areas to drain – ensure work areas are maintained to prevent water accumulation that could create sedimentation issues;
- Control runoff containing suspended materials – runoff from work areas has the potential to contain suspended solids, and controlling this runoff is the easiest way to prevent migration of suspended solids;
- Keep pumps and generators available to collect excess water – pumping equipment, machinery, and tanks will be on-site to be available for collection of excess water; and
- Provide temporary drainage and keep pumping equipment available, as necessary, to keep excavations and sites free of water.

## 4.2 Erosion and Sediment Control Measures

The installation of control measures will follow the Government of Northwest Territories, Department of Transportation – Erosion and Sediment Control Manual Dated January 2013 (or as updated). All required SEC measures will be coordinated with and approved by the Departmental Representative. The installation of control measures must also follow the applicable Site-Specific Health and Safety Plan submitted for work at the site.

This section describes the potential SEC equipment and methods that may be used during the Rayrock Remediation Project. The selection of specific measures will be based on the assessment of the SEC risk, with the most appropriate measure or combination of measures selected for implementation.

### 4.2.1 Silt Fences

Silt fence barriers will be installed during construction activities in areas where water is intended to flow, such as ditches and swales. The silt fence is intended to slow the flow of the water to permit the deposition of larger particle sediments. Criteria to consider for the installation and layout of silt fences include soil conditions, slope, surface drainage, adjacent activities, best practices, and requirements of permits and licences. If slopes are steeper than 1:2 in an area with the potential for moving water; if the soil includes material with high mobility potential (i.e. silts); or when excavating closer than 30 metres to water, then erosion controls will also be implemented and appropriately installed. The location and alignment of the SEC measures should be approved by the Departmental Representative.



Silt fences are intended to intercept sheet flow in areas of low water velocities; therefore, they will be installed at the base of the disturbed slopes requiring protection. Silt fences can be placed in ditches to prevent sediments from escaping. Silt fences should only be used when there are low runoff flow rates and volumes. Sediment control is only achieved if the silt fence is properly installed, maintained, and effective for the local site conditions. Additional and complimentary erosion control measures may be implemented, in conjunction with silt fencing, to achieved the needed level of sediment control. Silt fences will remain in place and will be maintained until the site has been suitably stabilized and/or the potential for down-gradient impact has been mitigated. Damaged silt fences will be repaired as soon as possible as part of regular maintenance activities.

Silt fencing is considered a short-term measure to address sediment migrating at the site. Silt fencing will not be required as a long-term measure for addressing SEC, so all silt fencing will be removed upon completion of up-gradient work activities.

Silt fences will be installed on the down slope side of the storage areas for stockpiled organics or borrow material prior to soil stripping and transport to these areas. Material used in the silt fences will be appropriate for the soils being contained. The lower edge of the fence fabric should be buried on the upslope side of the fence. Installation will be completed with sharpened square wood posts, with 50 millimetre (mm) posts the most commonly used. Other support structures must be used for hard ground or bedrock. Spacing will be a maximum of 2.4 metres between posts. Silt fencing geotextile will be secured to wood posts with suitable staples.

Silt fences will have net backing described as an industrial polypropylene mesh joined to geotextile at both top and bottom with double stitching of heavy-duty cord, with minimum width of 750 mm. On slopes where there is exposed bedrock, where the lower edge of the fence fabric is not able to be toed-in, draping and weighting will be required.

In all silt fence use, additional or alternative control measures may be required to ensure that erosion control is maintained and local water bodies are not impacted by project generated sediments.

#### 4.2.2 Floating Turbidity Curtains

Floating turbidity curtains control and contain sedimentation in aquatic systems by creating a barrier to sediment transport. A turbidity curtain or barrier consists of a floating top boom section attached to a skirt constructed of either water-impermeable or water-permeable materials. The skirt is equipped with a ballast chain or other weight to anchor and “seal” the skirt to the bottom of the water body. Floating turbidity curtains will be deployed prior to the start of any works in or close to aquatic systems. Upon completion of construction works and settling of generated sediments, floating turbidity curtains will be disassembled. Floating turbidity curtains will be installed and maintain in accordance with the manufacturer’s installation procedures and protocols for use.

#### 4.2.3 Ditches and Riprap

Sediment migration can be controlled through proper sloping of graded surfaces and civil infrastructure. The sides of waste material piles, excavations, and embankments, - except where solid rock are encountered - will be sloped to a minimum ratio of 2:1 vertical, unless otherwise authorized in writing by an Inspector. Ditches will preferentially be constructed with side gradients of less than 5% slope; where gradients are greater than 5% slope, the slopes should be protected from erosion with riprap armouring. Riprap is machine or manually placed rock or other material used to armor shorelines, streambeds, bridge abutments, pilings and other shoreline structures against scour from water, wave, or ice erosion. Riprap for use on the Rayrock Remediation Project will consists of screened coarse and well graded gravel and cobbles and will most likely be sourced from on-site waste rock or coarse material remaining in the borrow area. Maximum



particle sizes of 250 mm and minimums of 50 mm are commonly referenced sizes for the riprap. Swales, with a slope greater than 5%, should be protected with 300 mm of riprap and underlain with geotextile; the use of riprap would be a permanent mitigation feature for slopes for the Project. While existing ditches will be assessed for erosion potential through visual examination for signs of potential overtopping flows or bank failure, temporary ditches may be constructed to relieve water accumulation or direct flow away from sensitive areas. Following completion of site works, all temporary ditches will be re-contoured and graded to meet landscape specifications.

#### 4.2.4 Re-contouring and Grading

The re-contouring and grading of remediation sites and borrow quarries will assist in long-term erosion control objectives. Managing and correcting site slopes and contours will address drainage concerns and prepare the local landscape for re-vegetation efforts. During the remediation program, the re-contouring and grading of slopes will be completed as necessary during the progress of work to promote stability of the location. The work required to adjust slopes will be dependent on engineering and logistical considerations including location, aspect, orientation and height. Water quality protection and physical hazard mitigation will govern final site design and layout.

The Rayrock Remediation Project RAP includes rehabilitation of former and future borrow sources through re-contouring and grading. Quarries from past borrow sourcing largely consist of exposed bedrock with areas of muddy water collecting in the bedrock lows. Coarser-grained materials that remain on borrow area sites shall be used for surfacing the side slopes of the quarry to enhance erosion protection and promote re-vegetation. All soils remaining in the borrow areas will be contoured and spread to reduce ponding and to promote drainage from the site. After grading and contouring, the soils should be covered with waste brush and chipped wood from any wood clearance necessary to access borrow. Since the base of the borrow source area will be predominantly bedrock, some minor channel construction through the bedrock may be required to ensure proper drainage. See the Quarry Management Plan for more details.

Grading will be completed in a manner that generates irregular surfaces in granular material, promoting seed retention, micro-habitat stability, and germination. Re-vegetation success will rely on the design and placement of soil, organics and granular substrates achieved through proper contouring and grading. These landscaping efforts will have considerable impacts on habitat function and targeted species richness within the Project sites.

#### 4.2.5 Revegetation

The long-term plan for the Rayrock Remediation Project includes re-vegetation efforts that will enhance the potential for the return of vegetation cover in disturbed locations. In conjunction with contouring and grading, vegetation cover provides long-term erosion protection and prevents sediments from mobilizing. The Rayrock Remediation Project anticipates that re-vegetation activities will be undertaken following capping activities at the CDF, borrow areas, soil excavation areas and in repaired areas of the TCAs.

The use of locally indigenous plant species for revegetation is considered to be more desirable since it provides better habitat for wildlife and reduces the potential for liberating invasive species in the natural environment.

During re-vegetation for the Rayrock Remediation Project, the first step will be establishment of conditions that are more conducive to vegetation growth. Some options may include the following:

- Peat from nearby low-lying peatlands could be mixed into the upper layer of clay for any cap;
- Ideally the peat would be salvaged during clay borrow source excavations in order to reduce the disturbance footprint of the project;



- Should peat or organic soils be removed from non borrow source soil locations, the task should be undertaken thoughtfully to minimize the overall site disturbance and ecological impact;
- Non-contaminated bottom sediments of Mill Lake could provide organic soil and could be mixed with clay in the upper layer of the caps;
- Mixing clay with sandy material would improve near-surface soil structure; and
- Mixing other organic materials with the top of the clay, such as leaf litter, or fine woody material would also improve re-vegetation - consideration should be given to mulching or chipping any wood requiring removal during the remediation project for use as an organic additive to the clay caps.

Two northern pioneering woody plant species that are common in the Northwest Territories, and that have been successfully used in re-vegetation programs at other CIRNAC sites, include green alder and willow. Alder is a fast-growing nitrogen fixing shrub that would be sown directly on the prepared growth medium. Willow, also a fast-growing colonizing species, would be planted as live stakes. Both species are suitable for the re-vegetation program for the Rayrock Remediation Project and will be used as part of long-term SEC for the sites.

Mature alder cones containing mature seed will be collected in late summer/early fall. Harvested alder seeds will be separated from the cones by agitation in a basket with holes (common lettuce dryers have been used successfully on other projects). Dried seeds can be broadcasted by hand to facilitate even coverage when sowing. A recommended application rate of alder is 0.1 kilograms per hectare.

Willow stakes will be collected in early spring and planted as live stakes. Willow should be planted in areas that are water receiving, such as at the base of down-sloped areas. Live stakes should be 20 to 25 mm in diameter and between 1 and 1.5 metres in length. As soaking improves root and shoot development, all stakes should be soaked in a local water-body for several days before planting. Cuttings should be buried  $\frac{3}{4}$  to  $\frac{7}{8}$  of their length into the soil.

Site preparation for all re-vegetation should follow the rough and loose method. Rough and loose refers to the preparation of the growth medium (soil) by loosely piling the soil in small mounds. In addition to providing a suitable medium for planted and seeded species, the method will create sites suitable for the establishment of nearby native plant species' seeds, dispersed from adjacent undisturbed areas, by capturing and protecting the seeds.

Re-vegetation will be carried out under the supervision of a vegetation specialist. Re-establishing soil and vegetative cover after remediation is imperative to successful remediation. Creating preferential conditions for grass and plant growth will best prepare sites for re-vegetation and colonization by native flora.

#### 4.2.6 Straw Bales and Mulch

Straw bales and mulch may be used on site as temporary erosion control measures if these materials are available. The bales would be installed perpendicular to the direction of water flow along area of the site deemed by a Hydrologist as likely to have water flow during precipitation events or freshet. They may also be used in contoured swales and ditches. The intent of the bales is to decrease runoff velocity of overland flow along slopes or ditches. Sediment would also be captured in the bales, along with any other debris that might get washed down slope, so the bales act as a coarse filter for the water.

Straw may also be used on site as mulch to cover exposed soils along embankment slopes. This mulch will prevent agitation and suspension of sediment by raindrops and runoff, and would decrease water velocities, promote water infiltration (by decreasing velocities) and reduce soil compaction. To prevent wind erosion



of the straw mulch, snow fences could be installed along the perimeters of the work areas that are prone to cross winds. This could require occasional replacement of the displaced mulch.

Straw bales should be string tied and, if possible, should be secured by 50 mm square stakes driven through the bales and into the ground. These post should be a maximum of 2.4 metres apart. Straw chinking can be applied to prevent water from escaping between bales.

#### 4.2.7 Erosion Control Matting

Erosion control matting will be considered for long term use in cases where the potential for erosion of backfilled or soil covered areas is assessed as significant, based upon field evaluation by the Contractor's or Departmental Representative's Geotechnical Inspectors. Erosion control matting will be considered for locations with bottlenecks, steep slopes, or where material has a high potential for mobility. The locations and alignments of these SEC measures will be approved by the Departmental Representative.

As much as possible, slopes will be contoured under dry conditions to allow for proper installation of the erosion control mats. These mats should be installed as early as possible in the construction. Erosion control matting will be secured with steel or wooden stakes to reduce the potential for circumvention or failure.

Installation teams will reference and follow the manufacturer's installation procedures and protocols for the erosion control matting. Matting with plastic mesh will not be used for SEC as the plastic does not break-down and interferes with re-vegetation.

#### 4.2.8 Containment Booms

Containment booms may be used during the Rayrock Remediation Project for control of petroleum releases on water. These booms will only be required in the event of an uncontrolled release of petroleum into a site water body. The deployment and use of sorbent booms and/or containment booms for control of petroleum spills on water is detailed in the Rayrock Spill Contingency Plan. Please refer to this document for further information.

#### 4.2.9 Dust Control Measures

Dust and wind-blown tailings are a concern on-site for worker health and safety during the summer months. Dust suppression will be on-going during the summer construction season in areas of work activity. A water truck will be dedicated to keeping dust to a minimum. It is anticipated that water will be sufficient for most dust suppression, but if water is not sufficient then calcium chloride flakes may be utilized as an effective dust suppressant. Dust control is required on all travelled areas on the site, including roads, parking areas, storage areas and turnaround areas. The goal of dust control is to keep dust to levels which do not pose a hazard to workers on site, prevent visible dust which could be conceived as dangerous to the workers or visitors and stop transport of particles to surrounding water bodies. Prevention is the key to dust control, as there is no way of mitigating dust once it is airborne, and wind and dry conditions are common through the summer months in the Rayrock Remediation Project area.

### **4.3 Remedial Activities Requiring Sediment and Erosion Control**

The Rayrock Remediation Project RAP describes the remedial action that will be taken at Project sites to address the environmental issues from historic land use. Section 1.3 of this SEC Plan provides an overview of the remedial activities required for the project and their SEC needs. The principal activities that will require SEC measures are described in this section, with the SEC issues and mitigation measures described for each activity.



#### 4.3.1 Excavation of Impacted Materials

Impacted soil will be excavated to acceptable soil boundaries or to bedrock at Rayrock, and potentially at GS, MK and TED. All impacted soil will be deposited in the CDF. It is anticipated that excavation at Rayrock will be to bedrock in all impacted locations near the Mill, but GS, MK and TED will only be excavated as necessary. Spilled tailings along the former pipeline to the TCAs will only be excavated if they are easily accessible and will not up-root significant vegetation. Since the Human Health and Ecological Risk Assessment for Rayrock determined that these tailings did not pose a risk, excavation of these tailings along the former pipeline will collect only as much material as is required to remove the majority of the surficial tailings.

Excavation of Rayrock soils and tailings in the Mill area will remove all loose material to the bedrock, leaving only minimal silt and sediment on the remaining rock. The primary SEC issues with this work include protection of down-gradient areas from sediment transport (especially during precipitation), grading of the area to prevent ponding and short-term sedimentation from the residual silt and materials left on the rock. During excavation, silt fences, straw bales, mulch or other SEC measures may be employed down-gradient of the work area. Water accumulating in any excavation should be pumped either to Mill Lake for eventual treatment or directly to the Rayrock Water Treatment Facility for treatment. It is anticipated that sediment transport from the residual silt on the rock will be minimal within one year of the completion of excavation; however, SEC measures will remain until sediment transport has stabilized. Long-term stability of the work in this area is not a concern as bare bedrock will remain.

Excavation of spilled tailings along the former pipeline to the TCA will not require SEC measures during implementation as the excavations are anticipated to be very limited and shallow. Any depression remaining from this work will be contoured to the extent feasible to promote proper drainage.

Excavations of impacted soil at GS, MK and TED will be completed with shovels and will be limited in size. SEC measures will not be needed during these excavations. If water is encountered in the excavation, the water will be pumped to the ground surface at least 30 m from the nearest water body. The depression from the excavation will be contoured to the surrounding terrain at a level that ensures the ground is above the level of any water encountered in the depression.

During excavation at the Rayrock Mill area, water from Sherman Lake will be used to prevent dust. The water will be applied as and when necessary to ensure that the creation of air borne dust is minimal.

#### 4.3.2 Break-up and Disposal of Concrete

Concrete from the former Mill foundation and former foundations from site buildings will be broken-up and potentially crushed for cover in the CDF. Water from Sherman Lake will be used to prevent dust during this operation. The water will be applied as and when necessary to ensure that the creation of air borne dust is minimal. Soil under the Mill will be excavated as previously described. Concrete from site buildings is situated on bedrock, so no further SEC measures are required after removal.

#### 4.3.3 Capping of Trenches and Waste Rock

Blast trenches at Sun Rose and REX will be filled with locally sourced fill and capped with borrow. GS and MK also have trenches that will be potentially capped. All trenches are in bedrock, and the depressions will be filled, to the extent possible, with rocks and material from nearby. At Sun Rose, locally sourced borrow will be used to cap the filled depression. At REX (and GS and MK if the trenches are filled), borrow will be imported from the Rayrock borrow source to cap the filled depressions. SEC measures are not anticipated to be required during the filling of the trench and placement of the borrow. Caps will be graded to promote drainage and shedding of precipitation. All caps will be re-vegetated to improve long-term stability. Stability will be monitored through geotechnical monitoring.



Waste rock at Sun Rose will also be capped. The waste rock will first be graded from its current angle of repose to a gentler slope that represents less of a physical hazard and that will shed precipitation. A cap will then be placed over the exposed waste rock. SEC measures, such as silt fences, will be required down-gradient of the waste rock pile during the grading of the waste rock and during the capping. Long-term stability of the cap will be achieved through re-vegetation and will be confirmed through monitoring.

Dust suppression will be used, as necessary, during the filling of the trenches with local material, during the placement and grading of the trench cap and during the grading and capping of the waste rock.

#### 4.3.4 Excavation of Borrow Material

Borrow material will be sourced at Rayrock from the former airstrip area and from several sources at Sun Rose that are down-gradient of the main site workings. Surface vegetation will first be salvaged and stockpiled for future rehabilitation. Borrow will be excavated to bedrock, with organics, boulders and sand lenses segregated from the target clay. Excavation will leave only minimal silt and sediment on the remaining rock. The primary short-term SEC issues with this work include protection of down-gradient areas from sediment transport (especially during precipitation), grading of the area to prevent ponding and sedimentation from the residual silt and materials left on the rock. During excavation, silt fence, straw bales, mulch or other SEC measures may be employed down-gradient of the work area, in the area between the borrow source and the local water bodies. Drainage from the area will be observed during any precipitation event to ensure primary drainage pathways are properly controlled. Water accumulating in any excavation or bedrock low will be pumped to the ground surface at least 30 m from the nearest water body. It is anticipated that sediment transport from the residual silt on the rock will be minimal within one year of the completion of borrow extraction. Channels may be required in the remaining bedrock to prevent the accumulation of standing water. A Quarry Management Plan has been developed which will also review the SEC measures to be taken at the borrow quarries.

Residual organics, boulders and sand will be used to fill depressions and lows in the bedrock and to control drainage through the stripped borrow area. Peripheries of the excavation will be graded to blend the excavated area into the surroundings and to promote proper drainage. Grading, filling and channeling of bedrock will ensure ponding does not occur in the long-term within the excavated area. All filled areas and graded peripheries will be re-vegetated for long-term stability.

#### 4.3.5 Non-Hazardous and Hazardous Waste on Land

A limited quantity of hazardous waste is located at Rayrock and at the Barge Landing. Much of this waste at Rayrock has already been collected. All hazardous waste will be shipped off site for disposal and does not require SEC measures.

Non-hazardous wastes are located at all Rayrock Remediation Project sites. Most of these wastes will be picked-up and consolidated at either Rayrock or Sun Rose and will not require SEC measures. Some non-hazardous waste is buried and will require excavation. Once the waste is removed, the excavation will immediately be filled in, so SEC measures will not be required for the location of the waste, but measures may be required for the sediment covered wastes when they are consolidated.

The 2013 Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials identify that discrete Naturally Occurring Radioactive Material sources with surface contamination less than the Surface Contamination Unconditional Derived Release Limits can be released without further investigation. These limits include a dose rate of 0.5 microsieverts per hour at 50 cm from the waste and surface contamination of 1 Becquerel per square cm (Bq/cm<sup>2</sup>) averaged over a 100 cm<sup>2</sup> area. Non-hazardous waste from the Rayrock site may have been in contact with Uranium, so this waste will need to be tested to verify



that it meets release limits. Stockpiled wastes from the Rayrock site may contain pieces that do not meet these limits due to contaminated soil on the surface of the waste; SEC measures will be required at these stockpiles to control the loss of these soils and spread of Uranium impacts. Non-hazardous waste from the Rayrock site will be segregated into two piles, with untested and tested waste kept separate. Silt fences, straw bales or other sediment control measures need to be established down-gradient of the storage area for the untested wastes if any sediments are dislodged by rain. Following testing of all non-hazardous waste and emptying of this storage area, the corresponding SEC materials should be deposited in the CDF.

Non-hazardous wastes that are above the 1 Bq/cm<sup>2</sup> limit will be washed to reduce the sediment that is coating the waste. Wash water from this operation will be captured and treated through the Water Treatment Facility. Grossly contaminated wastes or wastes that cannot be cleaned can be disposed with the impacted sediments in the CDF.

#### 4.3.6 Non-Hazardous Waste in Water

Non-hazardous waste has been identified in the Lake water at Rayrock (Mill and Sherman Lakes), REX (Sheldon Lake) and the Barge Landing (Marian Lake). Recovery of these materials will result in the disturbance of the sediment that surrounds the waste. For all Lakes except Mill Lake, which is discussed below, floating turbidity curtains will be set up to contain the sediment that will be disturbed before the waste recovery is started. After completion of the waste recovery program, the curtain will remain in place until all sediment has settled, after which the curtain will be removed. There is no long-term SEC issues or monitoring required after the removal of the wastes.

#### 4.3.7 Mill Lake

The sediments of Mill Lake are contaminated with Uranium at concentrations that represent a risk to human health and the environment. Remediation of these sediments will involve the draining of the Lake, solidification of the sediments, and isolation of the sediments under a relatively impermeable cover. Water in the Lake currently discharges periodically through a channel on the southeast side of the Lake. Once work begins on the Lake, it will be necessary to ensure that the Lake is no longer able to discharge. All work on the Mill Lake water and sediments will be restricted to be within the drainage basin of Mill Lake.

The first stage of the work on Mill Lake will be the draining of the Lake. Water from the Lake will be pumped to a Water Treatment Facility set up in an enclosed structure near the Lake and within the drainage basin so that spills or losses will report back to Mill Lake. The water will be treated to remove sediment, Uranium and Copper to concentrations that are acceptable for discharge. Following treatment, the water will be pumped to a discharge point along the shore of Sherman Lake.

The draw-down of Mill Lake water may result in an increase in sediment concentrations in the water. Mill Lake water will not be permitted to discharge naturally, through Mill Creek, once the water pumping is started. An Aquadam may be required to temporarily seal the Mill Lake discharge point until water levels are lowered sufficiently to ensure that natural discharge cannot occur. The need for the Aquadam will be assessed prior to the start of Lake draw-down and will be dependant on the seasonal Mill Lake water levels at the time of the start of the work.

SEC measures may be required for the water discharge from the Mill Lake Water Treatment Facility to ensure that it does not cause sedimentation in Sherman Lake. Water from the treatment plant will be discharged into Sherman Lake and the discharge action must be in a manner that does not cause erosion or sedimentation between the discharge point and the point of entry into Sherman Lake, and does not roil Sherman Lake sediments on entering the Lake. The selected discharge location is at a rock face that is largely devoid of loose material and that should not easily scour. Water will be distributed through a manifold system to spread the discharge over several linear metres, which will reduce the impact of scouring



and down-gradient roiling where the water enters Sherman Lake. SEC measures for this flow will be implemented, as necessary and appropriate, based on daily inspections of the discharge location.

SEC measures associated with the work in consolidating, solidifying and capping of the sediments in the Mill Lake basin are an intrinsic part of the remedial plan for the Mill Lake work. All control measures dictated within the specifications for the remediation must be followed.

SEC measures will be required for all equipment and personnel working within the Mill Lake basin to ensure that sediments from Mill Lake are not spread outside of the basin through the movement of personnel and equipment. Wash stations will be set-up on the edge of Mill Lake near entry/exit locations for removal of sediment and dust from personnel and equipment prior to their entry to the general site. Wash water from this station will be directed through the Water Treatment Facility prior to general discharge. Spread of contaminated material from Mill Lake will be kept as low as possible during remediation.

#### 4.3.8 Repair of Capped Areas

The caps on the North and South TCAs at Rayrock are over 20 years old, but are generally in very good condition; however, some areas along the perimeters of both the northern and southern caps have eroded, exposing the underlying tailings. Unacceptable levels of Gamma radiation have been measured in these locations. The caps will be repaired, as needed, using borrow sourced from the former airstrip, and then regraded to promote positive drainage. An expected additional 0.5 metres of clay will be added to the areas that require maintenance, with field-fitting undertaken to ensure drainage and stability. SEC measures, such as silt fences, will be required down-gradient of the repair work during the grading and capping. Long-term stability of the cap will be improved through re-vegetation and will be confirmed through geotechnical monitoring. Riprap may be used or replaced in channels and near shorelines where erosion caused the tailings exposure (such as near Gamma Lake).

#### 4.3.9 Use of Trails and Roads

Trails and roads on the Rayrock site will be travelled with heavy machinery, to haul borrow to Mill Lake, and with smaller vehicles to move personnel, materials, equipment and wastes over the site. Dry conditions through typical Northern summers will result in significant generation of dust if SEC measures are not employed. Water will be used, as needed, to keep road surfaces wetted to prevent the generation of dust. Calcium Chloride, or other chemical dust suppressant, will be used if water alone is incapable of suppressing dust.

#### 4.3.10 Water Crossings

Water crossings associated with the Winter Access Road will be designed to prevent shoreline erosion during use and after abandonment and melt. These water crossings include on and off ramps for lake access and for ice bridges across rivers and streams.

Mill Stream will require a temporary crossing, which will be installed along the current trail alignment near Sherman Lake and at the base of stream. Drainage from Mill Lake will be blocked, so flow (if any) will be from the small up-gradient catchment area below Mill Lake. A preliminary assessment of the drainage and erosion potential of the crossing site will be completed prior to construction of the crossing. At a minimum, SEC measures will be required in the adjacent Sherman Lake at the Mill Stream outlet to contain sediment and erosion resulting from use of the trail and crossing near the stream. Design drawings will be prepared that provide planned construction. The design drawing will include the location, size and gradient of grubbing areas and stripping areas adjacent to the crossing, vertical and horizontal road alignments, and the length and gradient of embankment slopes, if any of these features are required.



## 5 SEDIMENT AND EROSION CONTROL PLAN IMPLEMENTATION

All SEC operations will be performed in accordance with this SEC Plan. The SEC Plan will be provided to all remediation staff and contractors who will be responsible for Plan implementation. Copies of the SEC Plan will also be provided to the Departmental Representatives for review, reference and verification of implementation.

The Remediation Contractor responsible for remedial activities for the Rayrock Remediation Project will be required to submit a Contractor SEC Plan for review, comment and implementation. The Contractor SEC Plan will meet or exceed the guidance provided in this document.

### 5.1 Installation of Control Measures

The success of erosion, sediment, and drainage control measures relies on the proper and efficient implementation of the measures provided in this SEC Plan. Factors to consider during the implementation of temporary control measure includes the following:

- Do not construct bale barriers and silt fences in flowing streams or swales;
- Check control measures daily and following every significant rainfall;
- Replace all control measures as required;
- During construction, implement additional measures as required to address observed or detected sedimentation and erosion;
- Leave control measures in place as long as they are necessary, or until otherwise directed by the Departmental Representative;
- Repair damaged bales and any undercutting beneath the bales;
- Remove temporary controls upon completion of the work and contour the area to permit natural drainage;
- Inspect all earthwork for erosion and sedimentation, and apply corrective measures, as appropriate; and
- Remove accumulated debris and soil in undesirable areas to decrease their contribution to sedimentation.

Control measures for protecting aquatic systems, such as floating turbidity curtains, may be used in conjunction with on-land control measures to better protect the aquatic environment during construction works near bodies of water. Sedimentation will also be decreased by controlling the transport of dust and fine soil by wind. Water will be applied to roads and trails, as necessary, to minimize dust rising from construction operations. Section 4.3 provides details on the activities for the Rayrock Remediation Project that will require SEC controls.

In order to ensure the effectiveness of the SEC measures used at the site, Action Levels will be established for Total Suspended Solids (TSS) and turbidity in down-stream water bodies. The action level that will be used for the Rayrock Remediation Project is based on the Canadian Council of the Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG). The CWQGs for Total Particulate Matter are based on comparisons to background locations in the subject water body. CWQG states that TSS should not increase more than 25 milligrams per Litre (mg/L) when the background measurement is between 25 mg/L and 250 mg/L, and should not increase by more than 10% when the background measurement is greater than 250 mg/L. The Rayrock Remediation Project will use Action Levels of 30 mg/L for 25-250 mg/L and 10% for >250 mg/L. For turbidity, CWQG states that turbidity should not increase more than 8 Nephelometric Turbidity Units (NTU) when the background measurement is between 8 NTU and 80 NTU, and should not increase by more than 10% when the



background measurement is greater than 80 NTU. The Rayrock Remediation Project will use Action Levels of 10 NTU for 8-80 NTU and 10% for >80 NTU.

Since wave action and other natural phenomena can influence the magnitude of TSS and turbidity, background measurements will have to be obtained at around the same time as the measurement downstream of the remedial work. TSS and turbidity have been historically measured at the Rayrock Site; Table 5-1 provides averages and standard deviations for these parameters from Lakes on the site. It is anticipated that background measurements will be within the ranges indicated in the Table for these Lakes.

**Table 5-1 – Measurements of TSS and Turbidity from Rayrock Lakes**

Lake	Number of Measurements		TSS		Turbidity	
	TSS	Turbidity	Average	Standard Deviation	Average	Standard Deviation
Alpha Lake	13	3	4.6	10.4	1.9	1.0
Beta Lake	10	2	3.9	1.6	1.3	1.4
Gamma Lake	12	3	6.7	9.1	10.4	7.6
Lake A	3	1	4.3	2.4	.53	none
Mill Lake	17	11	2.5	3.3	0.5	0.1
Sherman Lake	27	16	2.3	1.9	1.2	0.8

Note – Units for measurements are in mg/L for TSS and NTU for turbidity.

The Remediation Contractor’s team will actively take measures to reduce and control dust at the site. These measures include:

- visual inspections for dusty conditions during all work inspections;
- stopping work that releases dust, particularly on high-wind days;
- applying a dust control product to areas of exposed soil that are observed to be creating dust; and
- applying calcium chloride to roads if water application is not providing sufficient suppression.

Air quality monitoring will be established at two locations on the Rayrock site to provide data to ensure remediation activities will not cause adverse effects to people or the environment. Only the Rayrock site will require sufficient land disturbance that air quality monitoring would be suggested. The air quality monitoring will provide information that helps protect people and the environment from work happening on the Rayrock site. If one of the two air monitors detects an unusual spike in airborne dust levels, site workers will investigate the cause of the dust and take action to lower the concentrations. This could mean watering the area to keep the dust down, or even stopping the work.

Air quality monitoring will include monitoring stations near the camp and downwind of the borrow area at the former airstrip. The information collected from these stations allows the Rayrock Remediation Project team to ensure workers are not exposed to unacceptable levels of contaminants and contaminant are not being spread to the surrounding environment by dust.

The air quality monitoring will measure concentrations of airborne contaminants so they can take action to avoid impacts on human health or the environment. The monitoring will measure:

- Uranium;
- Copper;
- Airborne dust, including total suspended particulate (TSP), particulate matter 10 (PM<sub>10</sub>) and particulate matter 2.5 (PM<sub>2.5</sub>).



PM<sub>10</sub> has diameter of 10 microns (µm) or less. PM<sub>2.5</sub> has a diameter of 2.5 µm or less. TSP is the amount of airborne dust with particles measuring 100 µm or less in diameter. By determining the amount of airborne dust, TSP indicates overall air quality. Sources of TSP include:

- Construction activities;
- Vehicle emissions;
- Road and excavated surfaces dust;
- Incineration.

The air quality monitoring measures the air quality and identifies if dust and contaminants is being released from the site. If these amounts exceed Health Canada guidelines, the Project team will take action to bring the levels back down. These levels are set at 159 micrograms per cubic metre for PM<sub>10</sub> or 333 micrograms per cubic metre for Total Suspended Particulate over a 15 minute period. Actions the team takes may include spraying dust suppressant or altering work practices in order to keep the dust down.

## 5.2 Quantities of Control Measure Materials

Bulk SEC materials will be transported to Rayrock during the initial mobilization and infrastructure set-up. Materials required for sediment and erosion control will be transported to individual Project sites during mobilization for specific work activities. If sufficient quantities of these materials are not available during the annual operational phase of the Project, then additional material will have to be brought to site by air; therefore, it will be important to plan the necessary inventory to ensure sufficient and appropriate control measures are inventoried at Rayrock to supply all Project sites.

Control measures that will be implemented during the Rayrock Remediation Project will entail a variety of methods specific to identified activities and variable site conditions. The quantity of controls installed will be subject to both site and management considerations and to unforeseeable weather conditions.

The remediation Contractor will be expected to abide by the quantity of control measures as stated within the Specifications for the Rayrock Remediation Project. It is anticipated that the following is the list of the minimum quantities of SEC supplies that will be maintained at Rayrock:

1. 50 metres of silt fence 0.914 meters in height;
2. 100 metres of reusable floating silt curtains;
3. 30 metres x 200 mm diameter hydrophobic sorbent booms;
4. Spill Kits (equipment and small vehicle size);
5. Wooden stakes, native rocks (found on-site);
6. ATV and trailers will be on site to facilitate the installation of SEC; and
7. Heavy equipment will be on site to facilitate the installation of SEC (Excavator, loader, etc.).

The project specific SEC Plan will provide an updated list of necessary SEC materials.

Protection will focus on excavation areas adjacent to wetlands. Straw bales, erosion control matting or other similar SEC materials will be used as SEC situations warrant and will be introduced as needed. For example, straw bales and erosion control matting may be used to address unexpected sedimentation and erosion associated with rain events with greater than 5 mm of precipitation. Sufficient quantities of these materials should be available in inventory to address a precipitation rate that is 50% above the annual average for the Yellowknife area of the Northwest Territories (Yellowknife is used to calculate the quantities required because it has the most accurate weather records and has similar climatic conditions to the Rayrock Remediation Project area).



### 5.3 Implementation Plan Schedule

Different SEC measures will be required during different phases of the project. A tentative schedule of control measures use is included in Table 5-2. The Contractor’s Project Schedule will provide more specific dates and details of control measures for each work location. Actual dates for implementation of control measures will be dependent on site conditions and Project progress.

**Table 5-2: Control Measures Implementation Schedule**

Proposed Control Measures	Pre-Construction	Construction	Post-Construction & Remediation	
Silt Fencing	Planning	Install prior to upstream works	Maintain if necessary	Remove
Straw Bales	Planning	Install if necessary	Maintain if necessary	Remove
Seeding and Revegetation	Research seed combinations and local varieties	Seed collection	Planting and seeding	
Erosion Control Mats	Planning	Install if necessary	Maintain if necessary	Remove

### 5.4 Inspection Program and Quality Control

An Inspection Program for remediation works will be developed that will include monitoring water bodies for actions levels that could trigger SEC measures, monitoring for wind-generated dust and a robust inspection of installed SEC measures. The inspection program will also include all aspects of inspection required by the LUP and Water Licence. The objective of the Inspection Program will be to monitor and assess the progress of Project remediation works to ensure the SEC is implemented where needed and SEC measures are properly functioning. Program attributes will include:

- Water body monitoring for TSS and turbidity prior to, during and after remedial activity;
- Regular monitoring of TSP monitoring devices, especially during periods of dry weather;
- Daily inspections of SEC works;
- Inspections of SEC works following heavy rainstorm or snow melt (> 5 mm);
- Weekly monitoring reports during field efforts; and
- Maintenance activities on control measures, such as maintenance of filters and sedimentation traps.

Prior to the start of remedial works with 100 metres a body of water, such as work on the TCAs, in-situ turbidity measurements will be obtained from the most likely entry point of any run-off from the remediation (the target location) and from a point between 50 and 100 metres away from that point on the same water body (the background location). The background location that will be used for comparison to the target location should be physically similar to the target location (slope of lake bottom, sediment composition, etc.) so that similar turbidity would result in both locations from natural conditions (e.g. increased wave action, etc.). The in-situ turbidity results for the background location should be within 10% of the value of the target location, so that the locations would be considered comparable after the start of remedial activity. If possible, several days of turbidity measures should be obtained to verify that readings are consistent between locations on each day. A measurement should also be obtained for TSS analysis from both sample locations.

After the start of remedial activity, in-situ turbidity sampling will be performed daily at the target and background location. Action levels described in Section 5.1 will be applied for the comparison of the target and background locations. If the turbidity measurement exceeds the target difference, then SEC action will



be required at the target location. Weekly TSS samples will provide a secondary measurement to confirm that targets are being achieved.

Daily turbidity and weekly TSS sampling will be continued throughout the remedial activity. If SEC measures are implemented, these measurements will be used to confirm that the SEC measures are performing as intended or that additional SEC measures are required. Turbidity and TSS measurements will continue until two weeks after the completion of remedial action, or two weeks after the removal of SEC measures if SEC measures are implemented.

A change in air quality around Rayrock will not always be from work happening on the site. For example, smoke from forest fires and ice fog can cause the monitors to read action levels. Whenever monitors surpass the set levels, site workers will investigate the cause of the higher reading. The procedure to check for the cause of an alarm is as follows:

- Do visual checks of the area for dust;
- Review activities happening on site that may create dust;
- Verify wind speed and direction; and
- Check other environmental factors, like forest fires, could be impacting air quality.

If work on site is determined as the causes the dust readings, Remediation Contractor personnel will takes action to address it right away. When conditions are extremely smoky from things such as forest fires, the project team will be made aware of the situation, and the Rayrock Remediation Project Emergency Management and Fire Protection Plan will be consulted for further considerations.

If a monitor indicates dust levels are approaching or exceeding the action level ( $333\mu/m^3$ ) and if the dust is determined to originate from the site, the Remedial Contractor will takes immediate action to reduce or eliminate the dust. Actions to be taken include:

- Informing all members of the Site Staff about the air quality monitoring data and wind conditions;
- Applying dust suppression such, as watering the area or applying calcium chloride as necessary; and
- Modifying, reducing, or even stopping work activities.

An on-site Field Supervisor will be responsible for inspection duties and will complete all reporting requirements. An example inspection sheet is included in Appendix B. Inspections will occur daily during remedial works. Any issues or concerns with SEC measures or equipment will be communicated directly to the Crew Lead responsible for the work area. Immediate action will be taken by the Remediation Contractor when the need for maintenance or repair of SEC measures is identified.

Departmental Representative inspections will occur as frequently as daily, and will be completed following heavy rainstorm or snow melt ( $>5$  mm). These inspections will be used to confirm the effectiveness of the control measures.

The requirements of this SEC Plan and inspection monitoring will continue regardless of any interruptions to remediation works due to weather or planned shut-down. In the event of an emergency evacuation, such as due to an encroaching wild fire, time should be taken before evacuation (if possible) to prepare all control measures for abandonment; this would be completed only if worker safety would not be compromised by completing these preparations. In the event of a longer-term planned work stoppage (such as a seasonal shut-down), all disturbed slopes, excavations, and organic stockpiles will be stabilized and the SEC measures will be fortified to ensure continued functionality during the stoppage. SEC measures will be inspected, and repairs will be made, as soon as possible after the resumption of work activities.



Temporary SEC measures should be removed after completion of work; however, certain control measures may remain in place until stability of the works is achieved and confirmed. At the completion of the Rayrock Remediation Project, and prior to removing remaining temporary control measures, the SEC Plan will be updated for Post-Construction Monitoring. Specifics of this revision will be discussed, initiated as required, and determined by the Departmental Representative.

## **5.5 Contingency Plan**

While minimum quantities of SEC materials will be specified to be available on-site to ensure materials are available for control measures, it is anticipated that the Remediation Contractor will make available greater quantities as part of their contingency planning. The objective of the contingency planning is to consider all reasonable potential SEC issues and plan to have the materials and personnel available to address the issues. Contingency planning also includes tracking the inventory of control materials to be prepared for resupply and conducting inspections of implemented control measures to plan for repair and maintenance activities. If installed SEC measures fail, additional and/or alternative measures should be available and ready for use. All potentially effective SEC materials and measures should be available when needed so that if the implemented measure fail, an alternative on-site measure can be utilized. In all cases, photographs and observations must be recorded in order to document SEC effectiveness and for reporting to respective parties.

Turbidity and TSS measurement of nearby water bodies will be used to monitor for SEC issues. If action levels specified in Section 5.1 are observed, then additional SEC measures must be implemented. Sufficient SEC materials and equipment will be needed at or near the location of the work to ensure the source of the action level sedimentation is addressed. If additional SEC measures do not bring turbidity or TSS below action levels, temporary suspension of remedial work will be required.

Available on-site materials will be installed as part of both planned and site-specific SEC measures. If in-stock supplies are running low, additional supplies should be brought into site on the scheduled supply flights from Yellowknife.

The installing of erosion control matting will be considered as a contingency measure for long term use in cases where the potential for erosion of backfilled or soil covered areas is assessed as significant, based upon field evaluation by the Departmental Representative's Geotechnical Inspector.

## **6 PROJECT PLANS**

Each remediation sites where civil works will occur will require unique strategies to accommodate SEC planning. Control measures may include single measures or a combination of control strategies. For all remedial measures, SEC will employ methods to control surface drainage from cuts and fills, borrow areas, stockpiles, staging areas, transportation routes and all other work areas where erosion and sediment transport is possible. General SEC measures for the common remedial actions for the Rayrock Remediation Project are described in Section 4.3. Site specific SEC considerations will be included for all remediation planning.

While the majority of SEC issues are anticipated to be associated with remedial activities, SEC will also be required for a number of project activities that are not covered within the remedial description. Table 6-1 provides other project activities that will occur during the Remediation Project, and their corresponding SEC considerations.



## 6.1 Closure Plan

The following closure activities will be carried out to ensure proper site management and compliance with AHJs:

- Structures installed as part of the road (culverts, berms, signs, etc.) will be removed and drainage channels will be restored to conditions that were present previous to the road upgrades;
- Methods of re-establishing drainage will limit erosion and the potential for sediment loading to adjacent water bodies;
- Road surfaces will be scarified to promote re-vegetation with local self-sustaining plants and to limit impact on migrating wildlife;
- Staging areas and truck pull out areas will be scarified to promote re-vegetation;
- Where feasible, topsoil on the periphery of any road that was graded for the creation of the access road will be mixed back in to the road surface during scarification activities; and
- On steeper slopes, adequate cross drainage, such as cross ditches, will be placed across the road to direct surface water to the adjacent vegetated areas.

**Table 6-1: Activity-Specific SEC Considerations**

Activity	SEC Considerations
Upgrading of site roads and trails	Prepare and maintain passages in a manner that prevents rutting of the ground surface. Ditches, culverts and berms will be installed to direct flow away from access trails. Overburden removed during construction will be stockpiled for use to re-contour the site after operations are complete, with these stockpiles monitored for SEC issues. Closure activities will include removing temporary structures and scarifying passages to promote revegetation.
Collection, consolidation, containerization, transport and disposal of solid and liquid hazardous materials to off-site Designated Contaminated Disposal Facilities.	All spills will be report in accordance with the Spill Contingency Plan. A Hazardous Material Temporary Storage Area will be constructed on stable and compact ground or bedrock and lined with a 20 mil impermeable geomembrane liner. The facility will be located in an area not routinely accessed. SEC measures will be employed, as necessary, during facility construction.
Construction and backfilling of septic pits and trenches	Based on the nature and the function of the septic pit/trench, construction should not require SEC measures. As part of site closure, grading and re-contouring will be completed after backfilling to mimic natural surrounding topography. Re-vegetation will be promoted.
On-site water treatment and discharge – waste water	Treated wastewater from the camp will be released into a sump in the ground that is located a minimum of 30 metres from natural drainage courses and 100 metres of fish bearing waters. The sump will conform to the discharge requirements set out in the Land Use Permit and Water License. The sump will be monitored for SEC issues during use, and may require modification or reconstruction if SEC issues are noted.
Management of water in excavations	Storage tanks will be on-site for transport of contact water. Contact water will be discharged in Mill Lake or will be treated directly through the water treatment plant. No surficial discharge will occur without approval from the Departmental Representative.

## 7 POST-CONSTRUCTION MONITORING

CIRNAC will carry out post-construction monitoring of all Rayrock Remediation Project sites, and will be responsible for continued inspections of longer term SEC measures. The Remediation Contractor will supply clear instructions on the monitoring requirements and conditions for decommissioning of all remaining SEC measures.



The Remediation Contractor will correct construction deficiencies identified in the post-construction monitoring, as necessary. The Remediation Contractor will also provide detailed instruction on required post-construction monitoring that includes suggested SEC measures should SEC issues arise. The Departmental Representatives will review and accept these instructions. Inspection and maintenance requirements for the Remediation Contractor will include:

- Inspection of soil coverings for effectiveness and performance; and
- Provision of advice and expertise to PSPC following inspection of vegetation establishment.

Inspection and maintenance by the Remediation Contractor will continue until short term control measures (i.e. silt fence, straw bale) are no longer required or until monitoring of these measures is accepted by CIRNAC. As part of the final inspection, the Remediation Contractor will dispose of any remaining used silt fence and absorbent booms (if necessary) off-site as non-Hazardous Waste, as long as it is no longer needed.



## **Appendix A**

### **Figure**

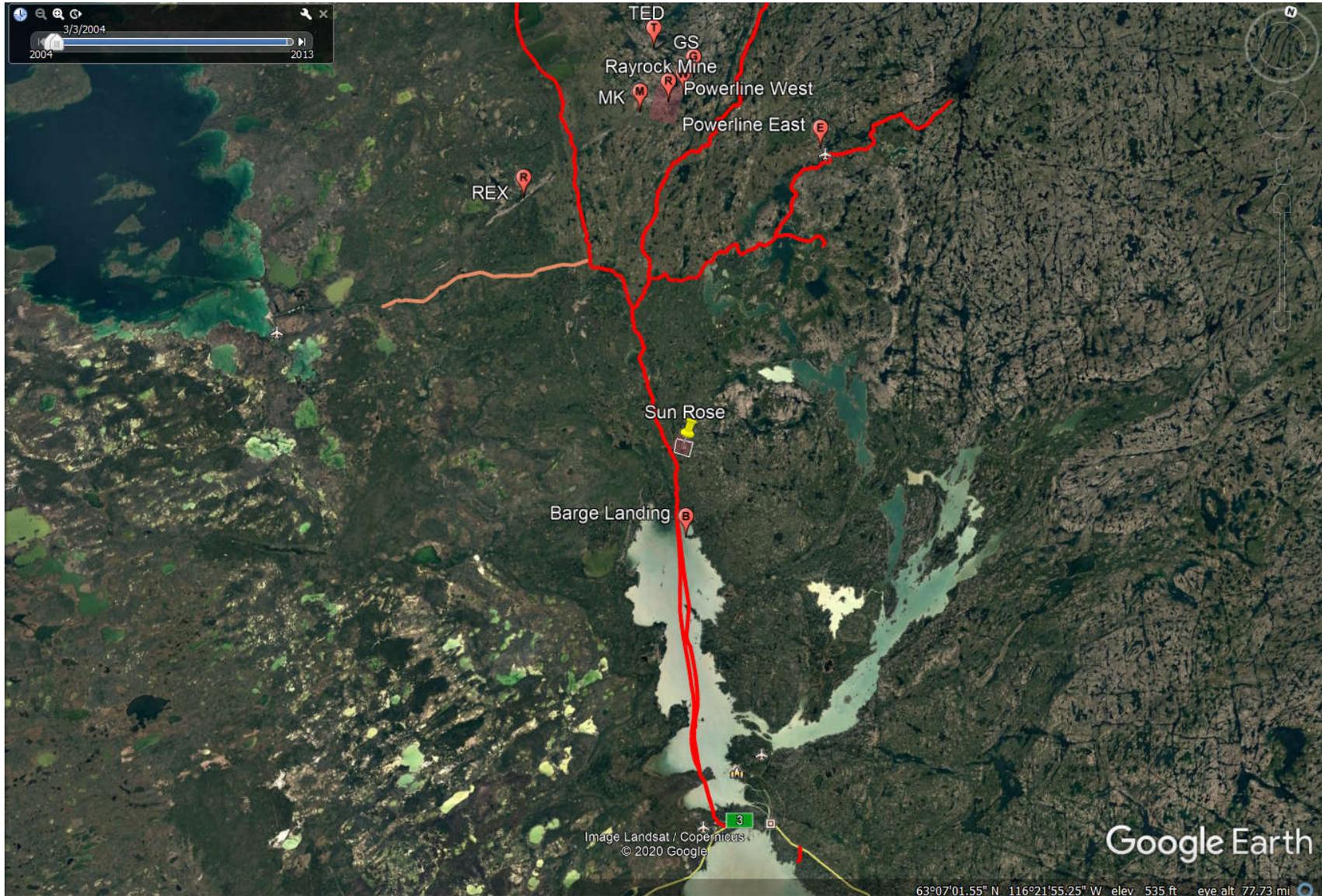


Figure 1 – Rayrock Remediation Project Locations of Project Sites





## **Appendix B**

# **Inspection Checklist**



**RAYROCK REMEDIATION PROJECT – ESDC INSPECTION AND MAINTENANCE FORM**

Site: \_\_\_\_\_  
 Site Location: \_\_\_\_\_  
 Heavy Equipment on Site: \_\_\_\_\_

Contractors on Site: \_\_\_\_\_  
 Construction Activities on Site: \_\_\_\_\_  
 Current Weather: \_\_\_\_\_

Date: \_\_\_\_\_ mm of rain in last week: \_\_\_\_\_

Weather Forecast: \_\_\_\_\_

Date of Last Inspection: \_\_\_\_\_ mm of rain in last 24 hours: \_\_\_\_\_

Type of Measure (BMP)	Location on Construction Site	Intended Function	Sediment Levels	General Condition	General Performance	Maintenance Required	Type of Maintenance Required	Site Super Notified	Date Repairs to be Completed By
			0-1/4-1/2-3/4 Full not applicable	poor fair good	poor fair good	yes no		yes no	
			0-1/4-1/2-3/4 Full not applicable	poor fair good	poor fair good	yes no		yes no	
			0-1/4-1/2-3/4 Full not applicable	poor fair good	poor fair good	yes no		yes no	
			0-1/4-1/2-3/4 Full not applicable	poor fair good	poor fair good	yes no		yes no	
			0-1/4-1/2-3/4 Full not applicable	poor fair good	poor fair good	yes no		yes no	
			0-1/4-1/2-3/4 Full not applicable	poor fair good	poor fair good	yes no		yes no	
			0-1/4-1/2-3/4 Full not applicable	poor fair good	poor fair good	yes no		yes no	
			0-1/4-1/2-3/4 Full not applicable	poor fair good	poor fair good	yes no		yes no	
Notes: _____									

Inspectors Signature: \_\_\_\_\_ Inspectors Name: \_\_\_\_\_

Copies to:  
 Name/Organization: \_\_\_\_\_  
 \_\_\_\_\_