

3 ENVIRONMENTAL MANAGEMENT PLANS

3.1 Introduction

Environmental management plans address project-wide issues. Management plans have been developed for:

- activities that will occur in all jurisdictions in the project area and during all phases of the project
- issues or activities resulting in potential socio-economic or environmental impacts in the project area
- areas with high levels of concern from northern residents
- meeting regulatory requirements

Environmental management plans are based on current best management practices. They provide the proponents with the scope and guiding principles of various topics throughout all project phases. Guiding principles include all levels of applicable legislation that govern particular project-related activities. Community concerns are also included as guiding principles to consider when undertaking project activities. The environmental management plans cover the following project activities:

- planning and design
- construction
- drilling
- operations
- decommissioning and abandonment

3.1.1 Roles and Responsibilities

The individual environmental management plans included in the Environmental Impact Statement (EIS) will be revised by the proponents periodically throughout the project to accommodate new or amended legislation, industry standards, community concerns, or changes to the project's design or schedule. If revisions are made to a particular management plan after the initial filing of the EIS, the proponents will submit the revised management plan to applicable regulatory agencies as a supplemental filing. Copies will be provided to interested parties, such as communities, on request. If, during the remainder of the planning period, concerns that are not addressed in this volume are brought to the attention of the proponents and a revised environmental management plan is needed to address the concerns, the proponents will revise the plan.

Environmental management plans have been prepared that consider:

- emissions
- water
- waste
- hazardous materials
- transportation and logistics
- wildlife
- reclamation
- operations

The proponents will be responsible for ensuring that the contractors and key staff apply and maintain the principles and procedures outlined in the management plans during construction and operations.

3.2 Emissions Management

Drilling and construction, operations and maintenance, and decommissioning activities will generate air and noise emissions. Information in the Emissions Management Plan will assist users in planning and implementing procedures to manage air and noise emissions from:

- normal operating conditions of process equipment and vehicles
- unexpected releases

The plan will:

- outline procedures for designing, purchasing and operating project equipment according to applicable regulatory requirements, land use permits and industry best practices for emissions management
- include measures for managing project-related air and noise emissions
- recognize the potential for uncontrolled releases

3.2.1 Scope

Project activities will produce air and noise emissions from a variety of controlled and uncontrolled sources. Controlled air and noise emissions are assumed to occur because of normal operation of equipment and facilities according to regulatory standards and permits. Emission sources might include:

- equipment and vehicle operations during construction and operations
- electrical generation during construction and operations
- process equipment and piping

- process cooling equipment
- compressors
- flare and vent stacks
- flow line
- pipeline purging and maintenance

Uncontrolled air and noise emissions are expected to occur during normal operations. However, the most significant events are assumed to result from emergency occurrences and might include, but are not limited to:

- vapour loss during fuel transfer, opening of valves, vent stack releases
- vapour loss from fuel storage facilities
- flow line, vessel or pipeline rupture
- well failure during drilling or workover activities

3.2.2 Guiding Principles

The guiding principles used to develop the Emissions Management Plan include:

- meeting all applicable regulatory standards regarding emissions
- consulting with northern communities and understanding community emissions management issues related to the project
- designing, procuring and operating equipment according to the procedures outlined in this plan
- having a program in place to monitor and verify regulatory compliance

3.2.2.1 Regulatory Requirements

Section 2, Environmental Design and Planning Considerations outlines some of the regulations and permits for emissions. The following identifies some of the federal, territorial and provincial regulatory requirements for emissions that will be used in developing final project emission practices:

- *Alberta Ambient Air Quality Guidelines 2000a*, Alberta Environment
- *Guideline for Ambient Air Quality Standards in the Northwest Territories 2002a*, Government of Northwest Territories – Resources, Wildlife and Economic Development (GNWT–RWED)
- *Air Quality Code of Practice, Upstream Oil and Gas Industry, Consultation Draft 2002b*, GNWT-RWED
- *Canadian Environmental Protection Act 1999a*, Government of Canada

- *Guide 38: Noise Control Directive User Guide 1999a*, Alberta Energy and Utilities Board (EUB)
- *Noise Control Directive (Interim Directive (ID) 99-8) 1999c*, Alberta Energy and Utilities Board
- *Guide 60: Upstream Petroleum Industry Flaring Requirements 1999b*, Alberta Energy and Utilities Board
- *Updates and Clarifications to Guide 60, 2001b* Alberta Energy and Utilities Board
- *National Emission Guidelines for Stationary Combustion Turbines 1992*, Canadian Council of Ministers of the Environment (CCME)
- *National Emission Guidelines for Commercial/Industrial Boiler and Heater Sources 1997*, Canadian Council of Ministers of the Environment
- *Environmental Code of Practice for the Measurement and Control of Fugitive VOC Emissions from Equipment Leaks 1993*, Canadian Council of Ministers of the Environment
- *Substance Release Regulations (AR 124/93) 1993*, Government of Alberta
- *Code of Practice for Compressor and Pumping Stations and Sweet Gas Processing Plants 1996*, Alberta Environment
- *Guide 64: Facility Inspection Manual 2002*, Alberta Energy and Utilities Board
- *Guide 63: Oil and Gas Conservation Regulations/ Facility Inspection Manual, 2001c*, Alberta Energy and Utilities Board

3.2.2.2 Community Involvement

Community guidance and concerns related to emissions management will be addressed, and suitable planning and mitigation measures will be applied to ensure that best management practices related to controlling emissions are followed throughout the project.

Community issues will be addressed, including those already identified, such as:

- increases in ambient air concentrations, acid deposition and greenhouse gas emissions

- increases in continuous noise levels from the presence of project activities that disrupt community activities and lifestyle activities
- disruption of wildlife life cycle activities

3.2.3 Controlled Air Emissions

The project's air emission sources will include facilities, vehicles, and flaring and venting activities.

Gas turbines will meet applicable emission guidelines, as follows:

- gas turbines will use commercially available low emission combustors to reduce emissions of nitrogen oxides and manage other gaseous compounds
- fuel mixtures will be monitored to ensure optimal combustion and to comply with exhaust emission requirements

Project facilities will develop an emission-monitoring program to track controlled emissions to demonstrate regulatory and operating permit compliance.

Mitigation strategies might include:

- implementing good site management practices to control dust emissions where project road use might disrupt community air quality
- reducing the length of time vehicles are left idling during the winter within communities along the access roads to the project
- designing flares to ensure effective combustion
- reducing flaring duration from well testing where practical
- ensuring flare stack design requirements and flare performance standards are consistent with EUB Guide G-60 and its amendments
- using process and compression equipment that complies with CCME emission standards
- maintaining vehicles and equipment to reduce fuel use

3.2.4 Uncontrolled Air Emissions

Project facilities will include an emergency reporting protocol within the scope of their emission-monitoring program. This will ensure proper reporting and tracking of uncontrolled emission releases during normal facility operations, as specified in regulatory permits.

3.2.5 Controlled Noise Emissions

The project's noise emission sources will include facilities, vehicles, and flaring and venting activities.

Noise control measures will be adopted consistent with recognized industry practices and guidelines. Facility site designs will be consistent with EUB *Guideline 38: Noise Control Directive – User Guide* (EUB 1999) and its amendments. Primary mitigation strategies might include:

- implementing industry proven engineering noise controls, including silencers, pipe lagging, upgraded building shells, intake and exhaust plenums
- applying acoustical treatments to building walls, roofs and floors
- applying acoustical insulation to above-ground piping
- using inherently quiet equipment and equipment with strict emission specifications
- scheduling operations activities, e.g., scheduling emergency power generator set testing during the daytime only

3.2.6 Uncontrolled Noise Emissions

Uncontrolled noise emissions are assumed to occur only during emergency events. Because of their short-term nature, they are not considered in this plan.

3.3 Water Management

The Water Management Plan includes:

- applicable regulatory requirements
- water demand
- water supply
- water withdrawal
- water delivery
- water treatment

3.3.1 Scope

The Water Management Plan addresses the following project requirements for water:

- potable water for camps and facilities
- water required to build winter roads

- water required to build the right-of-way work pad
- water required to build drilling and work pads
- hydrostatic test water
- industrial water
- fire suppression water
- water for drilling and production operations
- water required for horizontal directional drilling during pipeline construction
- ballast water for ocean-going barges

See Section 3.4, Waste Management, for treatment and disposal of wastewater types not suitable for direct discharge to the environment.

3.3.2 Guiding Principles

The guiding principles used to develop the Water Management Plan include:

- meeting all applicable regulatory standards regarding water use
- consulting with northern communities and understanding community water management issues related to the project
- implementing best management practices in water management

3.3.2.1 Regulatory Requirements

Federal, territorial and provincial regulatory requirements used for water management planning include:

- water withdrawal in the Northwest Territories – *Protocol for Water Withdrawal for Oil and Gas Activities in the Northwest Territories* (Fisheries and Oceans Canada [DFO] 2002b)
- water withdrawal in Alberta – *Code of Practice for the Temporary Diversion of Water for Hydrostatic Testing of Pipelines* (Alberta Environmental Protection 1999b)
- potable water – *Canadian Environmental Quality Guidelines* (Canadian Council of Ministers of the Environment [CCME] 1999a), *Guidelines for Canadian Drinking Water Quality* (Health Canada 1996) and *Summary of Guidelines for Canadian Drinking Water Quality* (Health Canada 2003)
- hydrostatic testing – *Code of Practice for the Release of Hydrostatic Test Water from Hydrostatic Testing of Petroleum Liquid and Gas Pipelines* (Alberta Environmental Protection [AEP] 1999a) and *Hydrostatic Test Water Management Guidelines* (Canadian Association of Petroleum Producers [CAPP] 1996)

- construction of water works in navigable waterways – *Navigable Waters Protection Act* (Government of Canada 1985b)
- ballast water management and disposal – *Guidelines in the Control of Ballast Water Discharge from Ships in Waters Under Canadian Jurisdiction* (Transport Canada 2001) and the *Code of Best Practices for Ballast Water Management* (Shipping Federation of Canada 2000)

In the absence of specific federal or territorial regulatory guidelines and requirements, other provincial industry standards will be applied, such as the *Hydrostatic Test Water Management Guidelines* (CAPP 1996). In all cases, conditions attached to land and water board water licences in the Northwest Territories and temporary diversion licences in Alberta will be followed.

Project permit applications will be made in the Northwest Territories. The resulting water licences will be adhered to throughout the project and include:

- Mackenzie Valley Land and Water Board – Type A Water Licence – Gwich'in Settlement Area for private and Crown lands
- Mackenzie Valley Land and Water Board – Type A Water Licence – Sahtu Settlement Area for private and Crown lands
- Mackenzie Valley Land and Water Board – Type A Water Licence – Deh Cho Region for Crown lands
- Northwest Territories Water Board – Type A Water Licence – Inuvialuit Settlement Region for private and Crown lands

Applications will be made in northwestern Alberta, where required, under the *Water Act* (Government of Alberta 2000i) and the resulting licences, e.g., temporary diversion licences, will be adhered to throughout the project.

3.3.2.2 Community Involvement

Community guidance and concerns related to water management will be addressed, and suitable planning and mitigation measures will be applied, to ensure that best management practices related to water use are followed throughout the project. During the selection process for water sources, project proponents will use traditional and local knowledge related to waterbodies and knowledge of economically and culturally important fish-bearing lakes. In addition, communities will be consulted during the planning stages for camps. Community issues will be addressed, including those already identified, such as:

- increased disturbance to fish habitats and pressure to sensitive fish harvesting areas because of increased access to waterbodies

- water withdrawal effect on waterbodies and fish habitat
- water disposal
- interference with community water intakes
- potential adverse effects on water quality upstream of community water intakes

Throughout the project, best management practices related to water use will be executed, including:

- planning and consultation to understand and identify all water needs associated with the project
- making best estimates of water volumes required for specific components of the project
- identifying suitable water sources based on:
 - community input
 - regulatory protocols
- ensuring that water used during the project is of suitable quality before being released back into the environment
- evaluating the possibility of reusing or recycling water

Detailed best management practices will be developed for various types of water use. They will be included in the protection plans and applications.

3.3.3 Water Demand

As part of preliminary engineering, water requirements for various components and activities associated with construction, drilling, operations and maintenance were identified (see Volume 2, Project Description).

Subsequent engineering analysis will refine water requirements and attempt to reduce the total water demand for the project through re-use and recycling.

3.3.4 Water Sources

Identifying project water sources is an ongoing process. Water will be sourced from nearby lakes and rivers. Groundwater is being considered for potable water at camps, and for anchor field processes and operations. Where construction camps and facilities are near municipalities with treated water, the proponents will

discuss with the communities the possibility of obtaining potable water from their systems.

The suitability of potential water sources, from a regulatory perspective, will be determined before sources are finally selected. Unless permission is otherwise granted, all water sources for the project in the Northwest Territories will meet Fisheries and Oceans Canada (2002b) *Protocol for Water Withdrawal for Oil and Gas Activities in the Northwest Territories*. All water sources for the project in northwestern Alberta will meet regulations related to water use under the *Water Act* (Government of Alberta 2000i).

Treated domestic wastewater from camps is being considered for constructing winter roads and pads. Further study is required to determine the suitability of these sources.

Selecting water sources includes considering physical parameters, such as:

- depth
- surface area of the waterbody
- proximity to the right-of-way, camps or anchor field
- community concerns
- compliance with existing regulations and guidelines

3.3.5 Water Quality

Water quality requirements will vary depending on the use for the water and the proposed disposal methods. To ensure that water is suitable for its intended use, water sources being considered by the project will be tested before use. Qualified technicians will use approved methods for water testing, samples will be analyzed and results will be compared to relevant water quality guidelines. In particular, potable water will be tested according to *Canadian Environmental Quality Guidelines* (CCME 1999a with updates to 2002) for at least the following parameters:

- pH
- total suspended solids
- major ions
- turbidity
- nutrients
- chlorophyll *a*
- total and fecal coliforms

The need for additional test parameters will be determined on a site-by-site basis.

3.3.6 Water Withdrawal

Unless permission is otherwise granted, water withdrawal in the Northwest Territories will be undertaken in compliance with the *Protocol for Water Withdrawal for Oil and Gas Activities in the Northwest Territories* (DFO 2002b) and the terms and conditions of applicable water licences.

Water withdrawal locations and volumes required will be identified in the land and water board permit applications.

Water withdrawal for the project in northwestern Alberta will meet the regulations related to water use under the *Water Act* (Government of Alberta 2000i) and temporary diversion licences will be obtained, where applicable. The *Water Act* requires that approvals and temporary diversion licences be obtained before undertaking a construction activity in a waterbody or before diverting and using surface and groundwater for the project.

Water withdrawal points will be monitored during use to ensure withdrawal rates do not exceed approved guidelines.

3.3.7 Water Delivery and Storage

Water trucks will deliver water as required. Alternatively, insulated, or heated and insulated, surface pipelines might be used to transport water for short distances.

Details of water delivery will be refined as part of further preliminary engineering.

Water will be stored in tanks within heated buildings or in heated tanks. Details of water storage will be refined as part of further preliminary engineering.

3.3.8 Raw Water Treatment

The need for raw water treatment has yet to be determined. Treatment processes will depend on the use. It is expected that conventional processes will be sufficient for all purposes (see *Guidelines for Canadian Drinking Water Quality*, Health Canada 1996). No special processes are planned for treating raw water used for constructing winter roads and pads. Water used for industrial purposes, i.e., water for cleaning and fire suppression, will likely require minimal treatment.

3.3.8.1 Potable Water

Potable water might be treated with one or more of the following systems:

- filters
- distillation
- reverse osmosis

- flocculants
- chemicals, e.g., chlorination

3.3.8.2 Hydrostatic Test Water

Hydrostatic test water will be tested before use. The following treatments and additives will be considered:

- filtering to remove suspended sediments
- adding freeze-point depressant to prevent freezing during testing
- adding corrosion inhibitors to prevent internal corrosion of the pipe
- adding oxygen scavengers for use during in situ testing at facility sites

The proponents will make final decisions on what additive and treatments will be required once the water quality of the source water has been analyzed and once hydrostatic test water specifications have been finalized.

3.3.8.3 Industrial Water

Water used for industrial purposes will likely be taken from local raw water sources or from potable supplies and will require minimal treatment.

It is expected that water from the Mackenzie River and other streams and lakes will be of sufficient quality to be used without treatment for the following industrial applications:

- well drilling operations, i.e., make-up water for drilling fluids
- horizontal directional drilling for pipeline construction
- production and processing operations, i.e., make-up water for coolants on water injection pumps
- fire suppression
- washing vehicles and equipment
- constructing winter roads and pads

Treatment of industrial water, if any, will be determined once the water sources and applications are determined and will be in compliance with applicable regulations.

3.3.8.4 Ballast Water

Ballast water is required for maintaining draft:

- within the depth range necessary for navigation of ocean-going barge vessels
- in barge-based processing facilities, to accommodate changes in river water levels

The ballast water system will be managed to ensure proper barge stability and operation, while reducing the potential for barge water contamination. Several options exist for managing ballast water, all of which include some degree of contact between ballast water and the surrounding river water.

Ocean-going barges will be designed to prevent contamination of ballast water. A barge might be equipped with:

- a ballast water cleanup system
- a treatment system to remove large particles and fine sediments
- an ultraviolet sterilization system
- double-skin enclosures for liquid storage tanks in contact with ballast water

Ballast water will be managed according to *Guidelines for the Control of Ballast Water Discharge from Ships in Waters Under Canadian Jurisdiction* (Transport Canada 2001), which is expected to become part of the *Canada Shipping Act* in 2004, and the *Code of Best Practices for Ballast Water Management* (Shipping Federation of Canada 2000).

3.3.9 Water Disposal

Water disposal techniques will depend on the water quality after use. Treatment measures before disposal into the environment will be required where additives have been used, or where special conditions necessitate treatment.

Winter roads, some drilling and work pads, and right-of-way work pads will be allowed to melt in place during spring breakup. Sediment and erosion control will be required in locations where large volumes of spring runoff water could result in erosion.

Hydrostatic test water not containing freeze-point depressants might be tested as it is released to the environment at a suitable discharge location. Mitigation measures to reduce adverse effects of this water will be developed before hydrostatic testing starts.

Ballast water will be disposed of into the surrounding waterbody and will comply with *Guidelines for the Control of Ballast Water Discharge from Ships in Waters Under Canadian Jurisdiction* (Transport Canada 2001).

For considerations regarding the disposal of treated water, see Section 3.4.8, Waste Disposal.

3.4 Waste Management

Construction, drilling and operations activities will generate various types of liquid, solid and semi-solid waste, which will be governed by a Waste Management Plan.

The Waste Management Plan contains guidelines, standards and requirements for identifying, classifying, handling, storing, transporting, treating and disposing of waste.

3.4.1 Scope

The Waste Management Plan provides standards to identify, handle, store, transport, treat and dispose of the following waste types:

- solid waste
- semi-solid waste, including sludge
- liquid waste
- drilling waste from production wells and water crossings
- spill waste
- hydrostatic test fluid, such as a freeze-point depressant and water mixture
- domestic wastewater, including grey water and black water
- process wastewater, including produced water, vessel drains, wash water and potentially contaminated surface water runoff

3.4.2 Guiding Principles

The guiding principles used to develop the Waste Management Plan include:

- meeting all existing regulatory standards regarding waste management
- consulting with northern communities and understanding community waste management issues related to the project
- implementing best management practices in waste management

3.4.2.1 Regulatory Requirements

The regulatory requirements governing the Waste Management Plan set clear direction and standards for decision-making and implementation. The project will require approvals from federal, territorial, provincial and regional levels of government.

Waste management activities will be performed according to the requirements of federal and territorial regulations, and the terms and conditions of approvals issued under them, and proponents' policies and procedures.

Key federal and territorial regulatory requirements used for waste management planning include:

- *Canadian Environmental Protection Act* (Government of Canada 1999a)
- *Export and Import of Hazardous Wastes Regulations* (Government of Canada 1992c)
- *Interprovincial Movement of Hazardous Waste Regulations* (Government of Canada 2002c)
- *Transportation of Dangerous Goods Act* (Government of Canada 1992)
- *Transportation of Dangerous Goods Regulations* (Government of Canada 2001c)
- *International Civil Aviation Organization (ICAO) Technical Instructions*
- *International Maritime Dangerous Goods Code (IMDG)*
- *Public Health Act* (GNWT 1988)
- *Camp Sanitation Regulations* (GNWT 1990)
- *General Sanitation Regulations* (GNWT 1990)
- *Guideline for the General Management of Hazardous Waste in the N.W.T.* (Government of the Northwest Territories, Resources, Wildlife and Economic Development [GNWT RWED] 1998a)
- *Guideline for Industrial Waste Discharges in the N.W.T.* (GNWT RWED 1998b)

- *Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories* (GNWT Municipal and Community Affairs 2003)
- *Guidelines for the Discharge of Treated Municipal Wastewater in the Northwest Territories* (GNWT Water Board 1992)

In the absence of federal or territorial waste management regulations, a decision will be made to follow either:

- the most suitable standard from another jurisdiction, e.g., Alberta, British Columbia or Alaska
- industry standards and best practice available from recognized associations, e.g., Canadian Association of Petroleum Producers

Developing a project-specific standard will also be an option when integrating the Waste Management Plan with detailed engineering information. In all cases, conditions attached to land and water board licences in the Northwest Territories will be followed.

3.4.2.2 Community Involvement

Community guidance and concerns related to waste management will be addressed, and suitable planning and mitigation measures will be applied to ensure that best management practices are followed throughout the project. Communities will be consulted during the planning stages and issues will be addressed, including the potential use of community infrastructure and services for waste transportation, treatment and disposal.

3.4.3 Integrated Waste Management

The project will take an integrated systems approach to waste management, combining several complementary alternative waste management methods. No single approach is capable of meeting project needs, because of the:

- diversity of the waste streams
- disparity in available infrastructure in the region
- variety of geographic and geologic conditions

An integrated waste management hierarchy will be used to reduce the environmental impact and improve efficiency. The hierarchy will reflect the preferred waste management alternatives that should be explored, in order of preference. Figure 3-1 illustrates the proposed decision-making process for managing waste from point of generation to disposal.

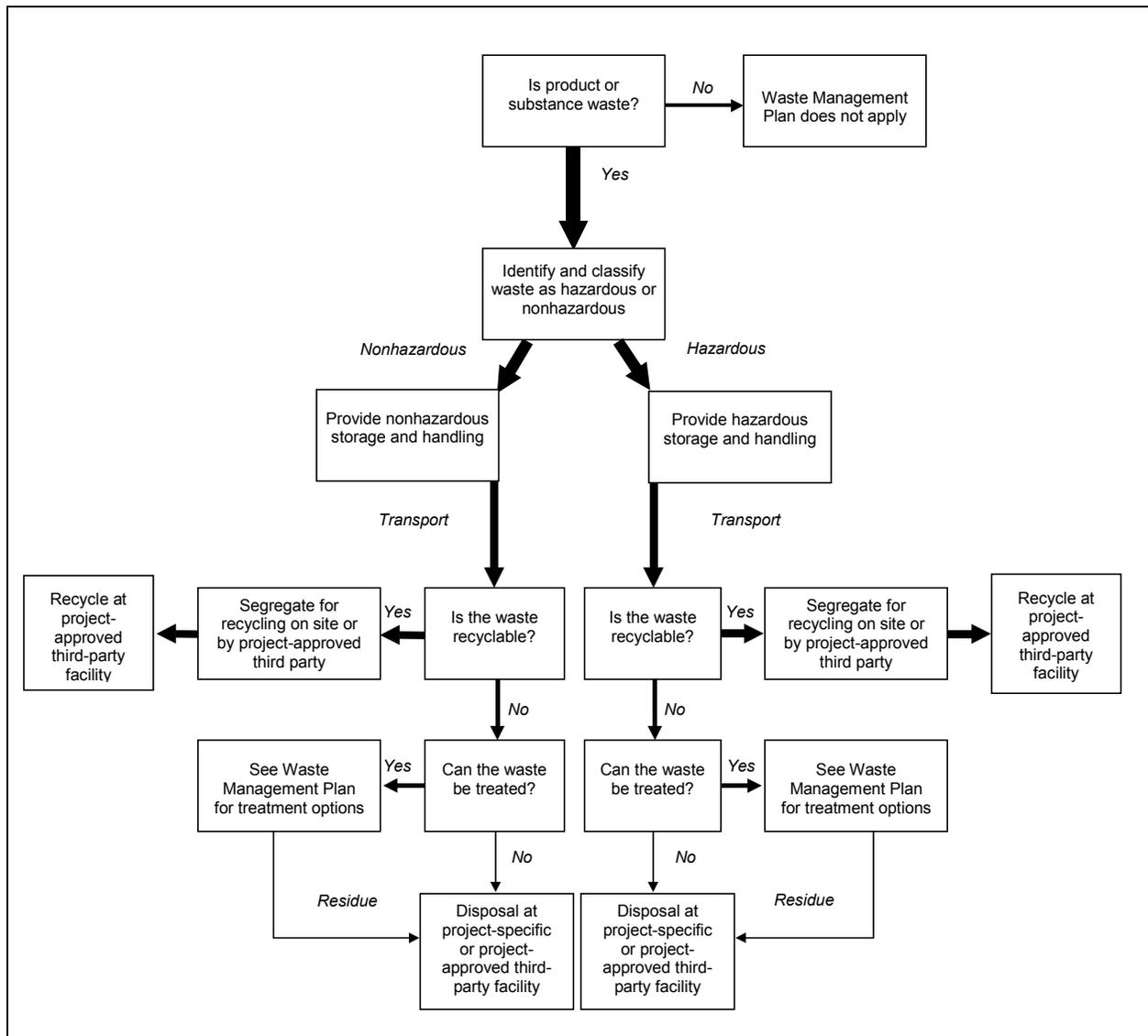


Figure 3-1: Waste Management Plan Decision-Making Process

The project will use the most suitable methods for managing the different waste types, always considering the needs and requirements of the local environment. As a general principle, project activities will seek opportunities to reduce the amount of waste generated according to the following:

- prevent or reduce at the source, where practical
- reuse or recycle, where practical
- treat, where practical
- dispose or release within regulatory requirements

To support the waste management hierarchy, dedicated and trained project personnel will:

- identify waste types and classification
- provide proper handling, transportation and storage
- ensure proper treatment and disposal
- provide suitable documentation for all waste management activities

3.4.4 Waste Identification and Classification

Waste identification information is critical to planning, designing and implementing plans for proper waste handling, storage, transportation, treatment and disposal, e.g., size of storage facilities, number of transportation vehicles required, capacity of incinerators and wastewater treatment requirements.

This information will also be used to support environmental protection plan undertakings and predictions of environmental impacts from project waste management practices.

3.4.4.1 Waste Types, Sources and Quantities

The project will develop and maintain a specific waste inventory, including waste types, sources and quantities, which will form the basis of the waste management program. This will support tracking and reporting requirements.

Each project phase will generate different types and quantities of waste. For example, the initial Design and Construction Phase will produce large quantities of waste over a short time frame, i.e., three to four years. The Operations Phase will generate smaller quantities of most waste types.

See Volume 2, Project Description, for details of the expected general waste types and estimated quantities to be generated during construction, drilling, operations, future drilling, and future construction for each project component. Table 3-1 presents the expected specific waste types. As project details are further refined, these waste quantities and classifications might be changed to reflect the availability of more comprehensive information.

Table 3-1: Expected Specific Waste Types

Liquid Waste Types	Solid Waste Types
Antifreeze, i.e., glycol or methanol	Absorbents
Chemicals	Batteries
Completion fluids	Cardboard
Drilling fluids – oil-based	Cement and concrete
Drilling fluids – water-based	Construction waste
Freeze point depressants	Containers
Hydrostatic test fluid	Contaminated debris and soil
Lubricating oil	Domestic waste
Produced water	Drilling cuttings – oil based
Solvents	Drilling cuttings – water based
Wash fluids – solvents	Filters – air
Wash fluids – water	Filters – glycol
Wastewater – domestic	Filters – lubricating oil
Wastewater – process	Filters – methanol
Well workover fluids	Filters – process wastewater
	Filters – produced water
	Foam pigs
	Horizontal directional drilling waste
	Incinerator ash
	Insulation
	Paint and coating waste
	Pigging waste
	Pipe ends
	Plastic
	Produced sand
	Scrap metal
	Sludge – domestic wastewater treatment
	Sludge – process
	Sludge – tank bottoms
	Spent mole sieve
	Tires
Welding rods and consumables	
Wood	

3.4.4.2 Waste Classification

Waste is considered to be a product or substance that is no longer used for its intended purpose, including:

- any substance that is a scrap material or effluent or otherwise unwanted surplus
- any substance or article that is being disposed of as broken, worn out, contaminated or spoiled

Waste generated by the project will be classified as hazardous or nonhazardous according to the following definitions provided in the *Guideline for the General Management of Hazardous Waste in the Northwest Territories* (Government of the Northwest Territories, Resources, Wildlife and Economic Development [GNWT RWED] 1998a) and *Guideline for Industrial Waste Discharges in the Northwest Territories* (GNWT RWED 1998b):

- hazardous waste – a contaminant that is a dangerous good that is no longer used for its original purpose and is intended for recycling, treatment, disposal or storage. A hazardous waste does not include a contaminant that is:
 - household in origin
 - included in Class 1 – Explosives, or Class 7 – Radioactive Materials, of the *Transportation of Dangerous Goods Regulations* (Government of Canada 2001c)
 - exempted as a small quantity
 - an empty container
 - intended for disposal in a sewage system or landfill that meets the applicable standards set out in Schedules I, III or IV of the *Guideline for Industrial Waste Discharges in the Northwest Territories* (GNWT RWED 1998b)
- dangerous goods – any product, substance or organism included by its nature or by the *Transportation of Dangerous Goods Regulations* in any of the classes listed in the schedule provided by the *Transportation of Dangerous Goods Act* (Government of Canada 1992b)

- small quantity – hazardous waste that is generated in an amount that is less than 5 kg/month if a solid, or less than 5 L/month if a liquid, and where the total quantity accumulated at any one time does not exceed 5 kg or 5 L. This does not apply to waste that is mercury, or in Classes 2.3, 5.1 or 6.1 of the *Transportation of Dangerous Goods Regulations* (Government of Canada 2001c). These wastes must be generated in an amount less than 1 kg/month if a solid or less than 1 L/month if a liquid, and where the total quantity accumulated at any one time does not exceed 1 kg or 1 L

Hazardous waste will not be mixed or diluted with any substance or divided into smaller quantities to avoid being defined as hazardous waste.

Nonhazardous waste is considered to be waste that does not meet the previous definitions.

A standard hazardous waste classification process will form the basis of project waste classification. A list will be prepared to itemize all project waste as hazardous or nonhazardous. Hazardous dangerous waste classification will follow accepted *Transportation of Dangerous Goods Regulations* criteria:

- Class 1 – explosives
- Class 2 – gases
- Class 3 – flammable and combustible liquids
- Class 4 – flammable solids, substances liable to spontaneously combust and substances which, on contact with water, emit flammable gases
- Class 5 – oxidizing substances and organic peroxides
- Class 6 – poisonous, toxic and infectious substances
- Class 7 – radioactive materials
- Class 8 – corrosives
- Class 9 – assorted other dangerous goods

The waste generator is responsible for the proper identification, classification, labelling and tracking of hazardous waste. Classification of hazardous waste includes identifying, according to the *Transportation of Dangerous Goods Regulations* criteria, the following:

- the shipping name
- the primary class

- the compatibility group
- the subsidiary class
- the United Nations number
- the packing group
- the risk group

3.4.5 Waste Handling and Storage

The project will require facilities for waste storage before transporting waste for recycling, treatment and disposal. During construction, waste storage will only be temporary. However, some materials might be stored longer during facilities operations until waste volumes are sufficient for the selected treatment or disposal option, or for transportation to a waste management facility. In either case, recognizing historical issues with the long-term storage of waste, it is intended that all waste will not be stored longer than two years.

The following guidelines are to ensure proper handling and storage for all waste types:

- Temporary waste storage sites and containers will be provided at designated sites.
- Waste will be sorted and separated according to waste classification, i.e., hazardous and nonhazardous, and end use, e.g., recyclable materials will be segregated from waste intended for treatment and disposal.
- Containers will be selected based on:
 - waste type, i.e., physical and chemical properties
 - preventing wildlife attraction, e.g., positive clamping lids
 - transport requirements, e.g., truck, barge or forklift
- All containers will be labelled to facilitate the safe and proper handling of the waste type.
- Waste will be transferred regularly from points of waste generation, for consolidation at centralized waste management facilities or transfer points (see Figure 3-2).
- Waste will be stored until quantities are sufficient to support transport for recycling, treatment and disposal.

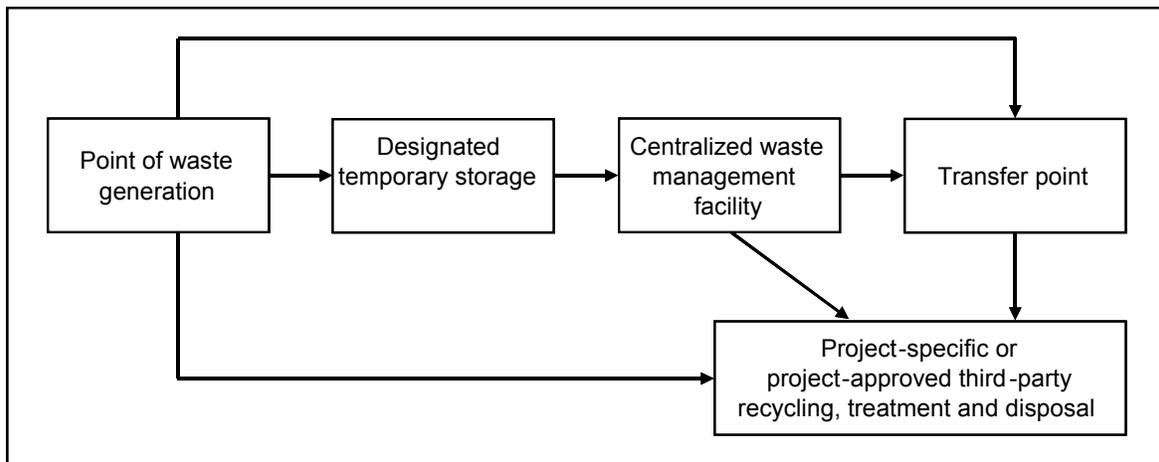


Figure 3-2: Waste Transfer and Storage Facilities

- Hazardous waste storage facilities will be registered with GNWT's Environmental Protection Service if:
 - the facility is used or intended for the storage of hazardous waste for a period of 180 days or more
 - quantities of waste to be stored exceed the quantities set out in Schedule 1 of *Guideline for the General Management of Hazardous Waste in the Northwest Territories* (Government of the Northwest Territories, Resources, Wildlife and Economic Development [GNWT RWED] 1998a) or if the aggregate quantity for all classes of waste stored exceeds 5,000 kg or L
- Waste management facilities and transfer points will have secondary containment to prevent loss of materials to the surrounding environment.
- Centralized waste management facilities and transfer points will provide:
 - weather protection, where needed
 - adequate ventilation
 - electricity and support services for staff, where required
 - emergency response equipment suitable for the waste stored
 - fire extinguishing equipment suitable for the waste stored
 - monitoring
- Waste management facilities and transfer points will have controlled access restricted to authorized personnel.
- All waste types and quantities accepted and removed from waste management facilities and transfer points will be documented using waste tracking procedures.

3.4.6 Waste Transportation

The remote location of the project and seasonal land and water accessibility make waste transportation a critical element in the Waste Management Plan. Waste transportation will be required to move materials from points of waste generation or temporary storage to centralized waste management facilities, transfer points or both. Waste will then be transported for recycling, treatment and disposal to project-specific or project-approved third-party facilities.

Transportation activities will be planned and implemented to ensure safety for the carriers and to reduce impacts to the environment. Waste will be transported according to the most recent amendment of the *Transportation of Dangerous Goods Act* and regulations, *Air International Civil Aviation Organization Technical Instructions* (ICAO) and *International Maritime Dangerous Goods Code* (IMDG). Any interprovincial and transboundary movement of waste will be performed according to the most recent amendments of the *Canadian Environmental Protection Act* (Government of Canada 1999a) and its *Interprovincial Movement of Hazardous Waste Regulations* (Government of Canada 2002c) and *Export and Import of Hazardous Waste Regulations* (Government of Canada 1992c).

Waste will be transported primarily by road and barge. Air transport of waste will be used where necessary and where safety allows. Transportation of waste will involve the use of specific, designated vehicles or vehicles that have been adequately adapted to ensure the safe transport of waste.

Transportation plans will include emergency response and reporting procedures for the carrier, including communications equipment and notification procedures for emergencies.

Details for the transportation of waste will be provided, including routes, waste pickup schedules, and waste tracking and documentation for waste identification, pickup, delivery and chain-of-custody.

3.4.7 Waste Reduction and Treatment

3.4.7.1 Reduction

Waste reduction is an important part of the Waste Management Plan because of the isolated locations of project activities and facilities, and the limited availability of commercial waste management services in the Northwest Territories. Measures will be implemented, whenever practical, to limit waste generation through reduction, reuse and recycling. Reduction and reuse options can usually be applied on site. The on-site application of recycling is limited and usually requires the use of third-party commercial services.

Waste reduction strategies will include:

- using procedures and technology to reduce waste
- purchasing materials in bulk to reduce container waste
- stipulating, where practical, that suppliers provide materials in reusable containers
- purchasing, whenever practical, from suppliers who provide a cradle-to-grave approach for chemicals and materials that create waste

3.4.7.2 Treatment

Technology for treating solid, liquid and semi-solid waste can be used to further reduce the volume or relative toxicity and the potential for environmental contamination. Treatment can render the waste less hazardous and safer to store, transport and dispose of. Treatment technology includes anything that changes the physical, chemical or biological character of the waste.

As commercial waste treatment facilities are not available in the immediate project area, the project will use technology that can be readily implemented in the field.

Screening and Selecting Treatment Technology

Treatment technology and methods will be screened and selected based on the best practical technology suited to project conditions and limitations. Technology will be screened and selected to provide:

- pretreatment to reduce waste volume and toxicity
- efficiency in handling, storage, transportation and final treatment
- physical, chemical or thermal measures to reduce toxicity and reduce potential environmental contaminants for final disposal

Only waste treatment technology and methods that comply with regulatory and project requirements, considering best practical technology, will be used.

Technology and methods will be selected to provide treatment either at the source of generation, or at centralized waste management facilities or transfer points. Where this does not apply, waste will be bulked and transferred to project-approved third-party waste management infrastructure and services.

Screening treatment technology will consider the following:

- waste quantities and volumes, i.e., waste generation rates will affect decisions about technology sizing, operations and economics
- waste type, i.e., hazardous or nonhazardous, composition, and physical and chemical characteristics
- regulatory requirements for operating the technology, including:
 - approval process
 - permits
 - licences
 - present and future liabilities
- pretreatment requirements for the waste materials
- operating requirements, including regulatory monitoring and reporting that might be defined as a condition of approval
- additional facilities that might be required, such as equipment for receiving or pretreating the waste and managing any residue generated by the technology
- local climatic and environmental conditions
- degree of risk and liability associated with the treatment technology selected
- economic factors, such as pre-treatment and storage costs

Based on the best practical technology currently being used by the industry, it is expected that incineration will be used to treat solid nonhazardous waste.

Treatment measures before wastewater disposal into the environment will likely be required where additives have been used, or where special conditions necessitate treatment, including:

- water-based well completion, workover and drilling fluids
- hydrostatic test water, i.e., where a freeze-point depressant and water mixture is used
- domestic wastewater
- process wastewater
- barge ballast wastewater

Final choices of treatment technology will be made when detailed engineering design information becomes available. Specific information on waste types, sources and amounts will be used to support choices on technology size, capacity, operating criteria, and emission and effluent limits.

Some waste might be treated by third-party infrastructure or services. Third parties include local communities and commercial enterprises. Only project-approved third-party waste management infrastructure and services will be used.

3.4.8 Waste Disposal

Waste disposal involves transferring waste and residue from waste treatment areas to a place for final disposal. Screening and selecting the disposal options will consider the following:

- waste quantities and volumes, i.e., waste generation rates will affect decisions on sizing, operations and economics
- waste type, i.e., hazardous or nonhazardous
- composition and characteristics, i.e., physical and chemical
- regulatory requirements for the disposal method, including:
 - approval processes
 - permits
 - licences
 - present and future liabilities
- level of design criteria for disposal facilities to receive different waste types, e.g., hazardous or nonhazardous waste
- operating requirements that might be defined as a condition of approval, including regulatory monitoring and reporting
- additional amenities that might be required, such as equipment for receiving and handling waste
- local climatic and environmental conditions
- degree of risk and liability associated with the disposal method
- economic factors, such as transportation and disposal costs

Based on best practical technology currently used by the industry, it is expected that landfills will be used for the disposal of solid nonhazardous waste. Waste disposal wells and drilling waste sumps might also be required.

Water used by the project suitable for direct disposal into the environment might include:

- hydrostatic test water, not containing freeze-point depressants
- clean ballast water, to be disposed of in Canadian waters in compliance with *Guidelines for the Control of Ballast Water Discharge from Ships in Waters Under Canadian Jurisdiction* (Transport Canada 2001)

Treated domestic wastewater might also be used for the development of winter roads and some drilling and work pads.

Final choices for disposal options will be made when detailed engineering design information becomes available.

Some waste might be disposed of by third-party infrastructure or services. Third parties include local communities and commercial enterprises. Only project-approved third-party waste management infrastructure and services will be used.

3.4.9 Waste Tracking and Documentation

A waste tracking system will manage and account for all waste. This system will require that waste be tracked from its point of generation to its ultimate disposal, reuse, recycling or treatment location. Waste inventory and tracking systems will be used to:

- document waste stream production information and data, to identify opportunities for waste elimination, reduction, recycling or beneficial reuse
- document waste disposition information and data, to meet regulatory reporting requirements and to provide information if waste disposal sites require future characterization or remediation because of potential or actual environmental impact
- support ongoing waste management decisions, such as identifying and assessing the need for additional treatment or disposal capacity

3.5 Hazardous Materials Management

All project phases will involve handling, storing and transporting a variety of hazardous materials. Information in the Hazardous Materials Management Plan will assist users in planning and implementing hazardous materials management activities according to the requirements of federal and territorial regulations, land use permits and industry best practices. The plan outlines standards to classify, label, store, handle and transport the hazardous materials associated with project activities.

The Hazardous Materials Management Plan includes proactive measures to prevent the occurrence of releases. These measures include handling and containment procedures, plans, policies, and training and documentation requirements.

It is expected that the requirements and procedures presented in the Hazardous Materials Management Plan might need to be updated throughout the project life to reflect changes in project design and requirements.

3.5.1 Scope

The Hazardous Materials Management Plan will provide guidelines, standards and requirements for classifying, handling, storing and transporting hazardous materials, including the following controlled substances identified in the Workplace Hazardous Materials Information System under the federal *Controlled Products Regulations* (Government of Canada 1988):

- compressed gases – any product, material or substance contained under pressure
- flammable and compressed materials – solids, liquids and gases that might catch fire or explode with an ignition source
- oxidizing materials – substances that cause or contribute to the combustion of other substances or materials by expelling oxygen or other oxidizing substances, whether the matter is combustible or not
- poisonous and infectious materials – substances that cause negative health effects to living organisms
- corrosives – substances that erode steel or nonclad aluminum at a rate exceeding 6.25 mm/a according to prescribed tests
- dangerously reactive materials – products that can undergo vigorous polymerization, decomposition or condensation reactions

The following uncontrolled substances are also considered hazardous materials and are included within the scope of this plan:

- explosives covered by the federal *Explosives Act* (Government of Canada 1985g)
- cosmetics, devices and drugs covered by the federal *Food and Drugs Act* (Government of Canada 1985h)
- pesticides and herbicides covered by the *Pest Control Products Act* (Government of Canada 1985i)

- radioactive materials covered by the federal *Nuclear Energy Act* (Government of Canada 1985j)
- restricted consumer products covered by the federal *Hazardous Products Act* (Government of Canada 1985k)

3.5.2 Guiding Principles

The guiding principles used to develop the Hazardous Materials Management Plan include:

- meeting all existing regulatory standards regarding the management of hazardous materials
- consulting with northern communities and understanding community hazardous materials issues and concerns related to the project
- implementing best management practices regarding hazardous materials
- emphasizing non hazardous, recyclable and environmentally acceptable procurement

3.5.2.1 Regulatory Requirements

The regulatory requirements governing the Hazardous Materials Management Plan set clear direction and standards for decision-making and implementation. The project will require approvals from federal, territorial, provincial and regional levels of government.

Hazardous materials management activities will be performed according to the requirements of federal and territorial regulations and proponents' policies and procedures, and the terms and conditions of approvals issued under them.

Key federal and territorial regulatory requirements used for hazardous materials management planning include:

- *Safety Act* (RSNWT 1988, c.S-1)
- *Worksite Hazardous Materials Information System Regulations* (RRNWT 1990, c.S-2)
- *Consolidation of Transportation of Dangerous Goods Regulations* (Government of Northwest Territories 1991)
- *Transportation of Dangerous Goods Act, 1990* (Government of Northwest Territories 1995)

- *Export and Import of Hazardous Wastes Regulations* (Government of Canada 1992c)
- *Hazardous Products Act* (Government of Canada 1985k)
- *Controlled Products Regulations* (Government of Canada 1988)
- *Workplace Hazardous Materials Information System Regulation* (Government of Canada 1990)

In the absence of federal or territorial hazardous materials management regulations, a decision will be made to follow the most relevant standard from another jurisdiction, e.g., Alberta, British Columbia or Alaska, or industry standards and best practice available from recognized associations, e.g., Canadian Association of Petroleum Producers.

3.5.2.2 Community Involvement

Communities will be consulted during the planning stages. Community input and concerns related to hazardous materials management will be addressed, and suitable planning and mitigation measures will be applied.

3.5.2.3 Procurement Guidelines

Where practical, purchasing materials required for all project phases will focus on nonhazardous, recyclable and environmentally acceptable alternatives, to:

- reduce environmental impacts
- reduce waste volumes
- manage health and safety risks

3.5.3 Training

All workers and contractors directly involved in handling, storing and transporting controlled and hazardous materials will be trained in the following:

- procedures and criteria as outlined in the Hazardous Materials Management Plan
- responsibilities for the implementation and management of the Hazardous Materials Management Plan
- definitions of controlled and hazardous materials and their associated hazards
- classes, shipping names, United Nations numbers and packing groups for the controlled and hazardous materials normally encountered on the job

- using and maintaining Material Safety Data Sheets
- safety marks, such as labels and placards, that are used to identify the different classes of controlled and hazardous materials normally encountered on the job
- preparing shipping documents
- requirements regarding mixed loads and the need for segregating incompatible controlled and hazardous materials
- choosing the proper means of containment for controlled and hazardous materials
- knowing what to do if the shipping documents, placards, labels, other safety marks or means of containment seem inadequate or incorrect
- knowing what constitutes an accidental release and the reporting requirements if an incident occurs
- properly using all equipment involved in handling, offering for transport or transporting controlled and hazardous materials
- controlled and hazardous materials requiring emergency response plans

3.5.3.1 Training Certificates for Handling and Transportation

All project workers who are involved in storing, handling or transporting controlled and hazardous materials will possess recognized and up-to-date *Transportation of Dangerous Goods Act* (Government of Canada 1992b) and Workplace Hazardous Materials Information System training certificates. Copies of the training certificates, signed by management, will be filed as controlled documents, with a regulatory agency or as part of a company's document management process. The documents will be reviewed periodically.

3.5.4 Classifying and Labelling Hazardous Materials

All controlled and hazardous materials will be classified and labelled according to the Workplace Hazardous Materials Information System and the *Transportation of Dangerous Goods Act* and regulations. Labelling will be the first indicator that a worker is dealing with a controlled or hazardous material. If a controlled or hazardous product in the workplace is not labelled, it must not be used. Where hazardous or controlled materials are stored in underground facilities, including sections of a pipeline, transportation of dangerous goods and Workplace Hazardous Materials Information System identification will be placed visibly at the points of access, e.g., valves, caps.

Material Safety Data Sheets for a controlled product will be required to provide a more detailed description of the product, including precautionary and emergency information. Material Safety Data Sheets are required to be on site, and dated within three years, where controlled materials occur.

Project personnel will not offer for transport, transport, or receive a container that contains controlled or hazardous materials, unless the container displays the safety marks required by the *Transportation of Dangerous Goods Act* and regulations.

3.5.5 Security and Right of Access

All facilities and vessels involved in the handling, storage and transportation of controlled and hazardous materials will have security measures in place, such as fences, signage and secured storage, to ensure that right of access to facilities is only granted to trained and approved workers and contractors.

3.5.6 Emergency Preparedness and Response

Emergency response plans, which meet regulatory requirements, will be developed before construction and drilling for all storage, handling and transportation of controlled or hazardous materials. Responsibilities and communication structures will be defined and all workers directly involved will be trained in the emergency response plans.

3.5.7 Storage

Hazardous materials will be stored in a way that reduces potential environmental hazards. The following requirements have been prepared to address environmental hazard concerns that apply to solids and liquids stored in containers.

3.5.7.1 Compatible Materials and Spacing Requirements

All controlled and hazardous materials will be labelled before storage or transport using Material Safety Data Sheets or transportation of dangerous goods regulations classes. This will help prevent impacts on health, safety and the environment.

All controlled and hazardous materials will be referenced according to class, ensuring that requirements for container spacing are met.

3.5.7.2 Siting

Siting considerations will be incorporated into the design of storage areas or facilities. A storage area or facility will be located so that it is:

- accessible for fire-fighting and other emergency procedures
- not located in riparian areas, unless suitable secondary containment measures are incorporated into the design and installation
- chosen to reduce the risk of environmental damage, including any threats to the:
 - integrity of the storage facility
 - quality of soils
 - surface water quality
 - groundwater quality
 - health of humans, animals and plants
- not located within 100 m of the normal high water mark of a waterbody, unless regulatory authorization is received
- where practical, construction and operations waste storage areas will be located at the same sites

When temporary storage is associated with an emergency, fully implementing these criteria might not be practical.

3.5.7.3 Storage Duration

For public safety and environmental protection, materials will not be stored indefinitely. In most cases, controlled and hazardous materials will move through the project area quickly. The duration of hazardous materials storage will mainly be dictated by relevant regulatory requirements and land use permit requirements. Where necessary, procedures will be implemented to reduce the inventory of controlled and hazardous materials.

3.5.8 Spill Contingency Plans

The Environmental Protection Service, Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories requires spill contingency plans for the following for fuel storage facilities (Environmental Protection Service RWED):

- any above-ground facility whose storage capacity is greater than 20,000 litres or kilograms
- any underground storage facility with a capacity equal to or greater than 4,000 litres or kilograms

3.5.8.1 Secondary Containment

Secondary containment will be used, where required by regulations and land use permit requirements, for all storage, handling and transportation infrastructure. Impermeable dikes or double-walled tanks will be used as secondary containment around any container, or group of stationary fuel containers, where any one container has a capacity exceeding 4,000 L.

Secondary containment systems, such as dykes, double-walled steel tanks, curbs and collection trays, will be constructed of materials that are impervious to the materials being stored, and will:

- be constructed of material that will not react with, or absorb, any material being stored, and will have no openings that might provide a direct connection to the ground underneath or surrounding the primary container
- have a net capacity of not less than 110% of the tank
- be achieved through the proper use of at least one of the following devices:
 - a storage compound that meets the secondary containment criteria for above-ground storage tanks, e.g., an impervious liner and dyke
 - competent double-walled steel tanks
 - a storage building with curbing
 - a storage trailer
 - metal and plastic bins
 - overpacks
 - drip trays or spill pallets
- include the following for storage trailers and buildings:
 - clad structures with concrete floors or equivalent option, and sufficiently high curbing placed on the perimeter of the floor so that the contained material cannot escape between the floor and the curb
 - clad structures with containment floors
 - sealed shipping containers with containment floors
 - loading dock buildings with containment floors

3.5.8.2 Loading and Securing

All controlled and hazardous materials will be loaded and secured in containers. Containers will be loaded and secured to the means of transport to prevent, under normal conditions of transport, damage to the container, which could lead to an accidental release of the controlled or hazardous materials.

3.5.8.3 Filling

Any worker filling a container with controlled or hazardous materials must not exceed the filling limit specified in a safety standard or safety requirement for that container.

If the filling limit for a container is not specified in a safety standard or safety requirement, the worker filling the container with dangerous goods must:

- not exceed the maximum quantity limit established by the manufacturer for the container
- ensure that the container could not become over full at maximum design temperature

3.5.9 Handling and Transportation

The handling and transportation of controlled and hazardous materials will be conducted according to the specifications outlined in federal, territorial and provincial *Dangerous Goods Transportation and Handling Regulation*, (Government of Alberta 2001b), *Transportation of Dangerous Goods Regulations*, (Government of Canada 2001c) and *Consolidation of Transportation of Dangerous Goods Regulations*, (Government of the Northwest Territories 1991).

Shipping documents must accompany any controlled or hazardous material that will be transported by a carrier and received by a consignor on the project. All shipping documents will contain the necessary information as outlined in the *Transportation of Dangerous Goods Regulations*.

Each carrier who transports the controlled or hazardous materials must possess, and be able to produce a copy of, the shipping document related to the materials, while the materials are in transport.

Placards will be used as clear indications that a transport unit contains controlled or hazardous materials. When an incident involving a transport unit occurs, these placards will alert responders to the presence of controlled or hazardous materials.

3.5.10 Release Response and Reporting Requirements

If an accidental release of controlled or hazardous material occurs, the worker or contractor present during the release will make an immediate report to their supervisor. Federal, territorial and provincial authorities must be notified, as required by regulations and land use permits. Northwest Territories minimal reportable amounts for releases are as follows:

- explosives – any amount
- compressed gas (flammable) – any amount of gas from containers with a capacity greater than 100 L
- compressed gas (non-corrosive, non flammable) – any amount of gas from containers with a capacity greater than 100 L
- compressed gas (toxic) – any amount
- compressed gas (corrosive) – any amount
- flammable liquid – 100 L
- flammable solid – 25 kg
- spontaneously combustible solids – 25 kg
- water reactant solids – 25 kg
- oxidizing substances – 50 L or 50 kg
- organic peroxides – 1 L or 1 kg
- poisonous substances – 5 L or 5 kg

Release reports will be documented and maintained. If the emergency response plan must be activated, the release reports will be included in the emergency response documentation.

3.5.11 Enforcement

Trained personnel will monitor the movement of controlled and hazardous materials to ensure compliance with relevant regulations and land use permit requirements.

The Hazardous Materials Management Plan will be enforced in any situation involving a suspected problem with a standardized container. Enforcement might

require that a statistical sample be inspected within a specified time frame. The results would determine the next course of action, which could include:

- removing all such containers from service
- establishing a compulsory inspection program for the remaining containers
- taking no further action

3.6 Transportation and Logistics Management

The Transportation and Logistics Management Plan provides information to be used in the planning and implementation of transportation requirements for all project personnel while taking into consideration the unique conditions of the project area. Specifically it presents baseline information to describe how personnel and materials will be transported on land, water and the air within the project area.

3.6.1 Scope

The Transportation and Logistics Management Plan provides guidelines for the planning of day-to-day movement of project personnel and materials using air, land or marine carriers. Guidelines included in this plan will apply to only that air, water or land modes of transportation necessary to support the transport of project personnel supporting project drilling, construction or operations activities. As a general plan, it is expected that it may require modification as planning becomes more specialized during each project phase. The plan provides information for the following modes of transportation including:

- air traffic, including commercial scheduled airlines, fixed-wing and rotary-wing charter services
- inland water traffic, including boats and barges or other flotation devices
- vehicular traffic, including but not limited to trucks, buses, all-terrain vehicles, low-ground-pressure vehicles, snowmobiles and heavy equipment transporters
- rail traffic, including the railway to Hay River
- marine traffic

Transportation of dangerous goods will follow the relevant air, land or water dangerous goods legislation, regulations or standards.

3.6.2 Guiding Principles

The guiding principles used to develop the Transportation and Logistics Management Plan include:

- ensuring that transportation or logistics services are properly licensed as required by the applicable existing regulatory standards
- consulting with northern communities and to ensure project needs to do not conflict with existing commercial infrastructure
- ensuring local transportation services follow regional benefits agreements and other guidelines specific to the project
- ensuring the project communications needs are planned and put in place without compromising existing telecommunications services

3.6.2.1 Regulatory Requirements

All transportation and logistics for the project will follow:

- existing federal, territorial and provincial legislation
- regional requirements and procedures provided through the land claim agreements in the Inuvialuit Settlement Region and the Gwich'in and Sahtu settlement areas

Many laws and guidelines will affect the decision-making process of transportation and logistics management for the proposed project. Table 3-2 summarizes the applicable governing bodies, Acts, regulations and guidelines.

3.6.2.2 Community Involvement

Community guidance and concerns related to transportation and logistics will be addressed, with suitable planning to ensure that use of any local services does not limit and or interfere with existing services.

The proponents will ensure that the government, the public and other stakeholders of project activities are notified of the potential for disruption to existing users of roads and waterways. This notification could be in the form of:

- radio announcements
- newspaper advertisements
- public announcements
- meetings
- letters
- publicly visible posters

Table 3-2: Transportation and Logistics Management Acts, Regulations and Guidelines

Governing Body	Legislation	Applicability to the Project
Federal		
Indian and Northern Affairs Canada	<i>Mackenzie Valley Resource Management Act</i> (Government of Canada 1998b)	Regulations governing land use
	<i>Territorial Lands Act and Territorial Land Use Regulations</i> (Government of Canada 1985e, 2003c)	Regulations affecting camps and other land uses
	<i>NWT Waters Act</i> (Government of Canada 1992a)	Regulations about water use in the Inuvialuit Settlement Region
Fisheries and Oceans Canada	<i>Fisheries Act</i> (Government of Canada 1985a)	Regulations about alteration to fish habitat
Transport Canada	<i>Navigable Waters Protection Act</i> (Government of Canada 1985b)	Regulations governing boat traffic and industrial activity on and across navigable waters
	<i>Arctic Waters Pollution Prevention Act</i> (Government of Canada 1985d)	Regulations about contamination of waters north of 60°
	<i>Aeronautics Act</i> (Government of Canada 1985l) and regulations	Regulations governing air traffic
	<i>Transportation of Dangerous Goods Act and Regulations</i> (Government of Canada 1992b, 2001c)	Regulations governing transportation of dangerous goods
	<i>Guidelines for the Operation of Tankers and Barges in Canadian Arctic Waters (interim)</i> April 1997 (Transport Canada, Prairie and Northern Region 1997)	Guidelines for the construction design of barges and tankers in Canadian arctic waters for increased safeguards against spills
Canadian Transportation Agency	<i>Canada Shipping Act</i> (Government of Canada 2001a)	Regulations governing shipping
Environment Canada	<i>Canadian Environmental Protection Act</i> (Government of Canada 1999a) and regulations	Regulations governing development
	<i>Ocean Disposal: Dredged Sediments</i> (Environment Canada 1996a)	Environment Canada screening for contaminants
	<i>Ocean Disposal: Dredged Sediments Inventory of Potential Impacts and Mitigation Measures (tables)</i> (Environment Canada 1996b)	Environment Canada suggested mitigation

Table 3-2: Transportation and Logistics Management Acts, Regulations and Guidelines (cont'd)

Governing Body	Legislation	Applicability to the Project
Environment Canada (cont'd)	<i>Management of Migratory Bird Sanctuaries in the Inuvialuit Settlement Region: Anderson River Delta Bird Sanctuary, Banks Island Bird Sanctuary No. 1, Banks Island Bird Sanctuary No. 2, Cape Parry Bird Sanctuary, Kendall Island Bird Sanctuary</i> (Canadian Wildlife Service 1992)	Regulations governing development in Kendall Island Bird Sanctuary
Territorial		
Northwest Territories Water Board	<i>Northwest Territories Waters Act</i> (Government of Canada 1992a) and Regulations (Government of Canada 1993b)	Regulations governing water use in the Inuvialuit Settlement Region
Resources, Wildlife and Economic Development	<i>Forest Management Act</i> (GNWT 1988f)	Use and salvage of timber for access clearing
	<i>Forest Protection Act</i> (GNWT 1988e)	Regulations affecting industrial activities in forest lands for preventing fires in camps or during clearing of the right-of-way
	<i>Northwest Territories Fishery Regulations</i> (Government of Canada 2003d)	Regulations about watercourse crossing, logging and gravel removal in fish habitat
	<i>Environmental Protection Act</i> (GNWT 1988b)	Regulations about spills and discharge of contaminants
Department of Transportation	<i>Motor Vehicles Act</i> (GNWT 1988g)	Regulations governing highways, ferry crossings, ice crossings, airports
	<i>All-Terrain Vehicles Act</i> (GNWT 1988h)	Regulations governing the use of off-road vehicles
	<i>Transportation of Dangerous Goods Act</i> 1990 (GNWT 1995)	Regulations governing transportation of dangerous goods
	<i>Environmental Guidelines for the Construction, Maintenance and Closure of Winter Roads in the Northwest Territories</i> (GNWT Department of Transportation 1993)	Guidelines about winter road construction and maintenance
Regional		
Inuvialuit Land Administration (ILA)	<i>The Western Arctic (Inuvialuit) Land Claim Settlement Act: The Inuvialuit Final Agreement</i> (Indian Northern Affairs Canada [INAC] 1988b), <i>Inuvialuit Land Management System (ILMS)</i> (ILA 2004)	Regulations governing private land access

Table 3-2: Transportation and Logistics Management Acts, Regulations and Guidelines (cont'd)

Governing Body	Legislation	Applicability to the Project
Gwich'in Land and Water Board	<i>Gwich'in Comprehensive Land Claim Agreement</i> (Government of Canada and the Gwich'in Tribal Council 1992)	Regulations governing private land access
	<i>Gwich'in Land Management and Control Guidelines with Schedule of Rates, Fees & Penalties</i> (Gwich'in Tribal Council 2003b)	Regulations governing private land access
	<i>Mackenzie Valley Land Use Regulations</i> (Government of Canada 1998a)	Regulations governing land use
	<i>Mackenzie Valley Resource Management Act</i> (Government of Canada 1998b)	Regulations governing land use
Sahtu Land and Water Board	<i>Mackenzie Valley Land Use Regulations</i> (Government of Canada 1998a)	Regulations governing land use
	<i>Mackenzie Valley Resource Management Act</i> (Government of Canada 1998b)	Regulations governing land use
Mackenzie Valley Land and Water Board	<i>Mackenzie Valley Land Use Regulations</i> (Government of Canada 1998a)	Regulations governing land use
	<i>Mackenzie Valley Resource Management Act</i> (Government of Canada 1998b)	Regulations governing land use
Environmental Impact Screening Committee	<i>Operating Guidelines and Procedures</i> (Environmental Impact Screening Committee 2002)	Recommendations for minimum flight altitudes

3.6.3 Transportation and Logistics Guidelines

The following sections present general guidelines for the planning and implementation of transportation of project personnel during all phases of the project, i.e., via vehicle, inland waters, marine and air transportation. As general guidelines, it is expected they may need to be modified to satisfy specific project requirements, and seasonal circumstances.

3.6.3.1 Guidelines for Vehicular Traffic

The following guidelines apply to vehicular traffic:

- All drivers will be properly licensed and trained according to specific vehicle type and operating conditions.

- Vehicle use will be determined by local ground conditions and access requirements.
- All local traffic laws and speed limits will be obeyed.
- All vehicle operators will respect community residents and users of public roads, and avoid affecting their quality of life or compromising their safety.
- All project vehicle operators will be fully aware of, and comply with their company's project-approved environment, health and safety plans.
- All project personnel on the pipeline rights-of-way, anchor fields, facilities or other construction sites will receive suitable environment and safety orientation, before arriving at the site and starting work.
- Visitors to the pipeline rights-of-way, anchor fields, facilities or other construction sites will receive suitable safety and environment orientation upon arrival, and will be escorted by project personnel while on the work site.
- Traffic on the rights-of-way will follow the posted speed limits, which might vary depending on site-specific conditions.
- Vehicular traffic, including all-terrain low-ground-pressure-vehicles and snowmobile traffic, will be confined to approved rights-of-way, workspace and access roads or trails, except where specifically authorized by the applicable hamlet, municipality or regulatory authority. Boundaries of shooflies and local access trails will be clearly marked with signs, staking or flagging.
- Access to flow line, pipeline rights-of-way with heavy vehicles and equipment will be restricted to dry or frozen conditions, unless low-ground-pressure vehicles are used.
- Site-specific features of concern, e.g., rare plant communities or heritage resource sites, identified during biophysical surveys, will be flagged, or otherwise designated, so that subsequent traffic can avoid these areas.
- All project roads and access points to the anchor fields, the pipeline rights-of-way and other construction or drilling sites will be controlled, where the proponents consider it necessary, to prohibit unauthorized use.
- Most construction and drilling personnel will be transported to and from the work sites by bus, reducing vehicle traffic between camps and work sites.
- Designated turnaround areas for stringing trucks and other equipment and vehicles will be necessary. Existing clearings will be used where practical.

- Recreational and after-hours use of all-terrain vehicles by project personnel will be prohibited on:
 - the rights-of-way
 - shooflies
 - access roads
 - seismic lines
 - trails
 - trap lines
- The proponents and all contractor personnel will abide by any restrictions regarding entry and exit privileges in areas requiring special protection.
- If land surface is being excessively rutted, or soils are being damaged, traffic control measures will be implemented for operating and loading vehicles, e.g., avoiding unnecessary wheel slip.
- Control of off-road vehicle use of rights-of-way where required will be coordinated with government authorities and communities. Methods to control access might include one or a combination of the following:
 - posting signs at all points of access
 - installing locking gates and fences
 - installing slash or rock barriers

3.6.3.2 Guidelines for Inland Water Traffic

The following guidelines apply to inland water traffic:

- Project boat operators will be fully aware of, and comply with their company's project-approved environmental, health and safety plans.
- Project-related inland water traffic operators will abide by laws and regulations, e.g., safety, speed and load restrictions.
- Project-related inland water traffic will be operated safely and courteously, to reduce conflicts and impacts to existing waterway users.
- Information regarding potential hazards, such as shallow areas, will be requested from applicable authorities. Boats and barges operated on behalf of the project will avoid these hazards.

3.6.3.3 Guidelines for Marine Traffic

The following guidelines apply to marine traffic:

- Project boat and barge operators will be fully aware of, and comply with their company's project-approved environmental, health and safety plans.
- Project-related marine traffic will abide by laws and regulations, e.g., safety, speed and load restrictions.
- Project-related marine traffic will be operated safely and courteously to reduce conflicts and impacts to existing waterway users.

3.6.3.4 Guidelines for Air Traffic

Project personnel will be moved to and from the project area using a combination of commercial scheduled airlines and chartered services. Charter fixed-wing aircraft and helicopters will be hired, as required, in compliance with contracts and with established project standards, using project-approved carriers.

The following guidelines apply to chartered air services:

- All pilots will be fully aware of, and comply with, their company's project-approved environmental, health and safety plans.
- All applicable federal, territorial, provincial and local legislation and regulations will be adhered to on all project-related flights, unless authorized by regulatory authorities.
- Communication with the relevant air traffic control unit will be maintained at all times for all air traffic required during the project as per compliance with air traffic control instructions and clearances. This is a responsibility of the helicopter or fixed-wing company, and project personnel will verify that this has been done.
- Pilots will follow appropriate flight planning procedures.
- Project staff will seek approval from the applicable authorities for long term or frequent use of airstrips or other cleared areas, e.g., Enbridge pipeline right-of-way, for the low-level flying and landing.
- Project staff and aircraft charter companies will be provided a list of sites or areas to be avoided because of cultural or environmental sensitivity.
- Helicopter pilots will circle potential landing sites before landing, to ensure that the terrain is safe and that wildlife is not located within the immediate vicinity.

Project-related consultation identified preferred flight altitudes and flying conditions issued by the Inuvialuit Game Council to all commercial air transportation companies, environmental review agencies and boards within the Northwest Territories. The guidelines are intended to reduce the impact of air traffic to the people and wildlife in the Inuvialuit Settlement Region. These general guidelines were adopted by the proponents and recognized as an acceptable baseline for planning and developing flight programs for the normal shuttle transport of project personnel. Specialized reconnaissance programs will require site-specific review to:

- ensure compliance with the general guidelines
- provide the basis for developing any special air transportation programs

The following will apply:

- A minimum flying altitude of 460 m, i.e., 1,500 feet, above the surface should be maintained in areas where no people or concentrations of wildlife occur, unless authorization to fly at lower altitudes has been received, not including landings and take-offs.
- A minimum flying altitude of 600 m, i.e., 2,000 feet, above the surface should be maintained in areas where people or concentrations of wildlife occur, not including landings and take-offs.
- Where concentrations of migratory birds occur 1,000 m, i.e., 3,500 feet, above the surface flying altitude, a 1.5-km horizontal distance should be maintained, not including landings and take-offs.
- There should be no detours off the designated corridors for nonproject purposes.
- When planning to fly on or near the existing Enbridge corridor, Enbridge should be contacted before departure to advise them of flight plans.
- When wildlife is observed, the pilot must not fly off course to get closer to the wildlife. This is viewed as harassment and is not permitted on project flights.
- Regularly scheduled line patrols will maintain a minimum elevation above the surface.

3.6.3.5 Guidelines for Rail Traffic

The railway to Hay River might be used to transport materials to the North. The proponents will ensure that project activities involving rail will comply with applicable regulations that govern the rail industry, and the capacities and restrictions of the rail line to Hay River.

3.7 Wildlife Management

Through all phases of the proposed project there is the potential to negatively affect wildlife and their habitat, including protected species and culturally important species. Local residents, government agencies and non-governmental organizations have shown a high level of concern for these potential effects on wildlife and habitat.

3.7.1 Scope

The Wildlife Management Plan will assist project planning and execution so that negative impacts to wildlife and wildlife habitat are prevented or controlled. The plan will incorporate applicable community concerns and address regulatory requirements that will guide the decision-making process for wildlife management.

The goals of the Wildlife Management Plan are to provide guidelines aimed at:

- preventing direct mortality of wildlife
- reducing disturbance to wildlife
- reducing the amount of the project's footprints on wildlife habitat
- preventing or reducing changes to wildlife movement

The measures included in the Wildlife Management Plan have been developed after considering community concerns, and applicable federal, territorial, provincial and regional laws and guidelines.

3.7.2 Guiding Principles

The guiding principles used to develop the Wildlife Management Plan include:

- meeting or exceeding all existing regulatory standards regarding wildlife
- consulting with northern residents and understanding wildlife management issues related to the project
- implementing best management practices in wildlife management

3.7.2.1 Regulatory Requirements

The proposed project will affect areas under the jurisdiction of many different authorities. The proposed project will also occur near, or within, areas with special designations, including:

- Kendall Island Bird Sanctuary
- Inuvialuit Community Conservation Plans special designated lands
- Gwich'in and Sahtu conservation zones
- caribou protection areas

As a result, many laws and guidelines will affect the decision-making process of wildlife management for the proposed project. Table 3-3 summarizes the relevant regulatory agencies, acts and guidelines.

Table 3-3: Wildlife-Related Acts, Regulations and Guidelines

Governing Body or Agency	Legislation or Source Document
Federal	
Environment Canada	<i>Canada Wildlife Act</i> (Government of Canada 1985m)
	<i>Migratory Birds Convention Act</i> (Government of Canada 1994a)
	<i>Migratory Birds Regulations, of the Migratory Birds Convention Act</i> (Government of Canada 1994b)
	<i>Migratory Bird Sanctuary Regulations, of the Migratory Birds Convention Act</i> (Government of Canada 1994c)
	<i>Species at Risk Act</i> (Government of Canada 2002a)
	<i>Canadian Environmental Protection Act</i> (Government of Canada 1999a) and regulations
	<i>Guidelines for Petroleum Industry Activities that affect Species at Risk in Prairie and Northern Regions</i> (Canadian Wildlife Service 2003)
	<i>Ocean Disposal: Dredged Sediments. Inventory of Potential Impacts and Mitigation Measures</i> (Environment Canada 1996b)
Indian and Northern Affairs Canada	<i>Mackenzie Valley Resource Management Act</i> (Government of Canada 1998b)
	<i>Mackenzie Valley Land Use Regulations of the Mackenzie Valley Resource Management Act</i> (Government of Canada 1998a, 1998b)
	<i>Territorial Lands Act</i> (Government of Canada 1985e) and <i>Territorial Land Use Regulations</i> (Government of Canada 2003c)
	<i>Environmental Guidelines: Pits and Quarries</i> (INAC 1982)
	<i>Land Use Guidelines: Access Roads and Trails</i> (INAC 1994b)
	<i>Environmental Guidelines Northern Seismic Operations</i> (INAC 1988a)
Fisheries and Oceans Canada	<i>Marine Mammal Regulations of the Fisheries Act</i> (Government of Canada 1993a)
National Energy Board	<i>Onshore Pipeline Regulations of the National Energy Board Act</i> (Government of Canada 1999b)
Territorial	
Resources, Wildlife and Economic Development	<i>Wildlife Act</i> (GNWT 1988d)
	<i>Environmental Protection Act</i> (GNWT 1988b)
	<i>Forest Management Act</i> (GNWT 1988f)
	<i>Forest Management Regulations, of the Forest Management Act</i> (GNWT 1990c)
	<i>Critical Wildlife Areas Regulations, of the Wildlife Act</i> (GNWT 1990b)

Table 3-3: Wildlife-Related Acts, Regulations and Guidelines (cont'd)

Governing Body or Agency	Legislation or Source Document
Resources, Wildlife and Economic Development (cont'd)	<i>Air Quality Code of Practice Upstream Oil and Gas Industry Consultation Draft</i> (Government of Northwest Territories - Resources, Wildlife and Economic Development [GNWT RWED] 2002b)
	<i>Safety in Bear Country: A Reference Manual</i> (Graf et al.1992)
Department of Transportation	<i>Environmental Guidelines for the Construction, Maintenance and Closure of Winter Roads in the Northwest Territories</i> (GNWT Department of Transportation 1993)
Regional	
Inuvialuit Land Administration	<i>The Western Arctic (Inuvialuit) Land Claim Settlement Act: The Inuvialuit Final Agreement</i> (Indian Northern Affairs Canada [INAC] 1988b), <i>Inuvialuit Land Management System (ILMS)</i> (ILA 2004)
Gwich'in Tribal Council	<i>Working for the Land: Gwich'in Land Use Plan</i> (Gwich'n Land Use Planning Board [GLUPB] 2002)
Sahtu Land Use Planning Board	<i>Sahtu Preliminary Draft Land Use Plan</i> (Sahtu Land Use Planning Board 2003)
Inuvialuit Game Council	<i>Flight altitudes/routes and interference with Inuvialuit Harvesting</i> (Inuvialuit Game Council 2002)
Community of Inuvik	<i>Inuvik Inuvialuit Community Conservation Plan: A Plan for the Conservation and Management of Renewable Resources and Lands within the Inuvialuit Settlement Region in the Vicinity of Inuvik, Northwest Territories</i> (Community of Inuvik, Wildlife Management Advisory Council (Northwest Territories) and Joint Secretariat 2000)
Community of Aklavik	<i>Aklavik Inuvialuit Community Conservation Plan: A Plan for the Conservation and Management of Renewable Resources and Lands within the Vicinity of Aklavik, Northwest Territories</i> (Community of Aklavik, Wildlife Management Advisory Council (Northwest Territories) and Joint Secretariat 2000)
Community of Tuktoyaktuk	<i>Tuktoyaktuk Community Conservation Plan: A Plan for the Conservation and Management of Renewable Resources and Lands within the Vicinity of Tuktoyaktuk, Northwest Territories</i> (Community of Tuktoyaktuk, Wildlife Management Advisory Council (Northwest Territories) and Joint Secretariat 2000)
Fisheries Joint Management Committee	<i>Beaufort Sea Beluga Management Plan</i> (Fisheries Joint Management Committee 2001)
Inuvialuit Game Council and North Slope Inupiat	<i>Inuvialuit – Inupiat Polar Bear Management Agreement in the Southern Beaufort Sea</i> (Inuvialuit Game Council and North Slope Inupiat 2000)
	<i>International Agreement on the Conservation of Polar Bears</i> (CTS 1976/24) (Governments of Canada, Denmark, Norway, the Union of Soviet Socialist Republics and the United States of America 1973)

Table 3-3: Wildlife-Related Acts, Regulations and Guidelines (cont'd)

Governing Body or Agency	Legislation or Source Document
Provincial	
Government of Alberta	<i>Environmental Protection and Enhancement Act, R.S.A. 2000, c. E-13.3.</i> (Government of Alberta 2000d)
	<i>Wildlife Act</i> (Government of Alberta 2000h)
Alberta Environment	<i>Environmental Protection Guidelines for Pipelines – Conservation and Reclamation Information Letter.</i> C&R/IL/94-5 (AEP 1994)
	<i>Environmental Protection Guidelines for Roadways.</i> C&R/IL/00-5 (Alberta Environment 2000c)
	<i>Re-vegetation using Native Plant Materials: Guidelines for Industrial Development Sites.</i> R&R/03-3. (Alberta Environment 2003a)
	<i>Conservation and Reclamation Guidelines in Alberta.</i> C&R/IL/97-1 (AEP 1997b)
Alberta Energy and Utilities Board (EUB)	<i>Operating Guidelines for Industrial Activity in Caribou Range – Northwest Alberta.</i> IL 94-22 (EUB 1994)
Alberta Agriculture, Food and Rural Development	<i>Native Plant Revegetation Guidelines for Alberta</i> (Native Plant Working Group 2001)
Other	
Boreal Caribou Committee	<i>Strategic Plan and Industrial Guidelines for Boreal Caribou Ranges in Northern Alberta</i> (Boreal Caribou Committee 2001)
Canadian Association of Petroleum Producers	<i>Environmental Operating Practices for the Upstream Petroleum Industry – Alberta Operations.</i> Pipelines Volume (CAPP 1999a)
Canadian Pipeline Environment Committee	<i>The Pipeline Industry and the Migratory Birds Convention Act</i> (Canadian Pipeline Environment Committee 2003)
The World Conservation Union (IUCN)	<i>Oil and Gas Exploration and Production in Arctic and Subarctic Onshore Regions: Guidelines for Environmental Protection</i> (IUCN 1993)
Protection of the Arctic Marine Environment Working Group	<i>Arctic Offshore Oil & Gas Guidelines</i> (Protection of the Arctic Marine Environment Working Group 2002)
United States Department of Interior Fish and Wildlife Service (USFWS)	<i>Service Guidance on the Siting, Construction, Operation and Decommissioning of Communications Towers</i> (USFWS 2000)

3.7.2.2 Community Involvement

Community guidance and concerns related to wildlife management will be addressed, and suitable planning and mitigation measures will be applied, to ensure that best management practices related to wildlife are followed throughout the project.

In addition to the applicable laws, regulations and guidelines, the Wildlife Management Plan considers the concerns of the communities that will be affected by the proposed project. Community meetings were held to determine community concerns. Table 3-4 summarizes issues raised during the meetings.

Table 3-4: Wildlife-Related Community Concerns

General Category	Concern
General Disturbance	Disturbance to migrating species
	Effects of snowdrifts caused by above-ground lines, which might result in the loss of habitat and decreased mobility for migratory species
	Potential for wildlife to access dangerous chemicals
	Effects on caribou grazing areas, moose habitat and waterfowl, caused by barge traffic
	Effects on nesting sites of waterfowl
	Effects on rabbit, grouse and ptarmigan populations, caused by winter roads
	Effects on key nesting areas for raptors
Safety	Potential for bear–human interactions
	Attraction of animals to certain odours – safety issue with bears
Noise	Potential disturbance of migratory species caused by infrastructure noise, both constant and intermittent
	Attraction of wild animals to noise and light from flaring
	Effects of noise during construction, drilling and operations
Access	Effects of increased access to areas previously inaccessible, which might disturb or deplete wildlife, and result in increased harvesting from roads
	Effects on migration patterns, caused by roads
	Potential for increased access to allow increased access for predators
	Potential for increased fragmentation and loss of old growth habitats
	Consideration that zones of influence are greater than the areas directly cleared or used
	Potential for all-year access, resulting in southern species being introduced
Emissions	Long-term effects of greenhouse gases, potentially causing climate change, on wildlife and habitat

3.7.3 Wildlife Management Initiatives

The following sections cover project initiatives to address:

- potential project wildlife impacts
- community wildlife concerns
- agency concerns or guidelines
- regulatory requirements

3.7.3.1 Guidelines to Prevent Mortality

General and specific measures to reduce wildlife mortality or injury attributable to project activities include the following:

- no wildlife will be harvested, harassed, harmed or fed by construction personnel, including northern residents, while on the job site
- no personnel, other than wildlife monitors, will have controlled firearms on site
- vehicles will yield to wildlife, and vessels will yield to marine mammals identified by independent, onboard spotters
- vehicle traffic will be planned to limit disturbance of sensitive wildlife areas, or where wildlife is concentrated
- warning and speed limit signs will be installed in traffic areas where there is the potential to encounter wildlife
- security lighting will be downshielded, i.e., light will be directed to the ground
- existing communication towers will be used, wherever practical, to reduce ground disturbance
- white strobe lights are preferred over red lights as warning signals on communication towers specifically constructed for project use
- daytime visual markers will be used on any guy-wired towers
- waste material will be stored so that wildlife will not gain access to it or be drawn to it
- bears will be deterred from camp sites by authorized project wildlife monitors and government renewable resource officers

Mitigation measures to reduce the effect that increased access might have on the vulnerability of wildlife to hunting and trapping can include but are not limited to:

- doglegging the right-of-way at crossings of existing roads in forested areas, where practical
- coordinating with government authorities and communities to control increased access
- using slash berms in forested areas for access control

- selectively transplanting woody species in forested areas to screen parts of the right-of-way

3.7.3.2 Guidelines to Reduce Disturbance

General and specific measures proposed to reduce disturbance to wildlife caused by increased traffic, noise and light associated with the project, include the following:

- restrict disturbance within important wildlife habitat by modifying the location or the site of the disturbance, or the technology employed, when practical
- adhere to restrictions placed on activities and timing, in designated areas
- avoid blasting in sensitive areas during ecologically sensitive times, where practical
- avoid traditional harvest areas where practical
- control the use of project-related access roads
- create visual screens or implement techniques to maintain existing vegetation screening, where practical
- prohibit detours from the project area for nonproject related purposes
- establish flight corridors, and times of use, to avoid sensitive areas
- limit visual or noise disturbances near migrating animals, such as caribou and waterfowl
- maintain a minimum flying altitude of 600 m, i.e., 2,000 feet, in areas where wildlife concentrations occur except where flights at lower altitudes have been approved
- maintain a minimum flying altitude of 1,000 m, i.e., 3,500 feet where concentrations of migratory birds occur, except where flights at lower altitudes have been approved
- use slash berms in forested areas for access control and visual screens
- confine all barge and any required dredging activities to designated routes and areas
- avoid or reduce time of passage through beluga harvesting areas during critical periods

- adopt measures to control the effects of explosives, e.g., spreading out charges, preceding the main blast with small explosions to scare away wildlife
- reduce the speed of ships or delay trips, if marine mammals are observed within 1 km of project activities

3.7.3.3 Guidelines to Reduce Disruption to Migration Routes

To reduce the probability that roads and facilities will disrupt the migration routes of wildlife, particularly caribou, the proponents, where practical, might:

- construct above-ground pipelines at suitable heights with consideration for all-season wildlife movements
- include breaks when stringing pipe and storing equipment along or across wildlife paths
- keep the length and time frame for open trenches short enough to allow wildlife movement, particularly during migration
- use slash or vegetation to screen the right-of-way where it crosses traditional movement corridors, e.g., north of Travaillant Lake
- reduce visual or noise disturbances near migrating animals

3.7.3.4 Guidelines to Prevent Habitat Alteration

To reduce the destruction or fragmentation of habitat, the proponents, where practical, might:

- modify the location of a disturbance to avoid or reduce effects on sensitive habitats
- control the footprint by using existing access or disturbed areas
- control and restore drainage to maintain pipeline right-of-way and drainage integrity, and reduce habitat alterations
- encourage the return of native vegetation to disturbed areas through proper soil handling, erosion control and revegetation programs
- ensure that cutting and clearing practices allow for reforestation to an acceptable wildlife habitat
- implement all fire and containment prevention measures and emergency response plans, as warranted

- limit disturbance near riparian areas and lakeshores
- restrict clearing to the area required for construction
- use protective barriers, e.g., impermeable membranes, at sensitive dredging sites
- to the extent possible, restore disturbed habitat to the level of biological potential that existed previously, where significant project impacts are expected
- spread dredged material to a depth that promotes colonization by benthic organisms, i.e., at the bottom of the waterbody, when disposing of dredging material in shallow water

3.7.3.5 Key Species Initiatives

Some species require special attention. To address these concerns, the proponents will:

- monitor selected species responses to activities and facilities during all phases of the project
- ensure that caribou protection plans, as required, are prepared for the Northwest Territories and Alberta before construction starts
- enhance off-site habitat, or implement restoration and wildlife habitat enhancement programs, if required
- develop protocols for effective storage and disposal of food items, petroleum products and other chemicals and garbage, including daily incineration of garbage
- develop protocols for managing potential bear–human interactions, including measures to deter bears from camps and other facilities

3.7.3.6 Environmental Training

Environmental training is required to support wildlife management initiatives. The proponents will:

- provide all project environmental inspectors with wildlife training
- provide workers with basic wildlife training, and ensure procedural guidelines related to wildlife protocols are followed

- ensure environmental inspectors are adequately trained in local traditional knowledge, mitigation practices and record keeping
- review environmental protection measures with contractors and provide relevant supplemental field documentation, e.g., guides, project directives, special contact information

3.7.4 Wildlife Management in the Inuvialuit Settlement Region

3.7.4.1 Worst Case Scenario

As required in the EIS Terms of Reference under Scope of Assessment and Obligations under the Inuvialuit Final Agreement (IFA), the proponents are jointly developing with the Inuvialuit Game Council (IGC), worst case scenario(s) for the project as identified under the IFA paragraph 13(11)(b).

Meetings with representatives of the IGC were held June 14, 2004 in Tuktoyaktuk and June 24, 2004 in Calgary. Further meetings are planned with the IGC, with a final report expected to be jointly submitted by the proponents and the IGC to the Joint Review Panel to allow the panel to carry out its responsibilities.

It is expected worst case scenarios will be developed that include each of the three anchor fields and the gathering pipelines located within the Inuvialuit Settlement Region. A description of each scenario, the rationale for its selection and assumptions, and alternatives considered, will be documented.

3.7.4.2 Wildlife Compensation

Before drilling and construction begins in the Inuvialuit Settlement Region the proponents will prepare detailed Wildlife Management Plans that will incorporate feedback obtained during the regulatory review of the EIS, traditional knowledge and input from community consultations. Specific measures to avoid or reduce impacts on wildlife and harvesting, and restore wildlife and its habitat as far as is practical will be detailed. In the event compensation might be required for loss of equipment or income, it is understood by each proponent that the relevant provisions of the Inuvialuit Final Agreement will apply.

3.8 Reclamation Management

3.8.1 Scope

The Reclamation Management Plan is a reference document containing guidelines, standards and requirements for the reclamation of lands disturbed because of construction activities.

The scope of the Reclamation Management Plan is to establish a reclamation strategy that will provide a stable vegetated ground surface to:

- maintain the integrity of the pipelines, including flow lines and gathering pipelines, and their associated facilities
- control remediation work once construction equipment has been demobilized
- protect the environment from the potential effects of altering local surface and subsurface drainage and erosion of soils

3.8.2 Guiding Principles

The guiding principles used to develop the Reclamation Management Plan include:

- meeting all existing and applicable regulatory standards regarding reclamation
- consulting with northern residents regarding their reclamation expectations
- implementing best management practices in reclamation planning to ensure a stable surface is in place following construction and drilling

3.8.2.1 Regulatory Requirements

The following is a list of regulatory agencies and specific acts and guidelines that directly state the requirements for reclamation planning for oil and gas-related activities proposed within the project area:

- *Filing Manual* (National Energy Board 2004)
- *Seeds Act* (Government of Canada 1985n)
- *The Western Arctic (Inuvialuit) Land Claim Settlement Act: The Inuvialuit Final Agreement* (INAC 1988b)
- *Guide to Completing the Application for a Land Use Permit Pursuant to the Territorial Land Use Regulations* (INAC nd)
- *Reclamation Guidelines for Northern Canada* (Indian and Northern Affairs Canada 1987)
- *Weed Control Act* (Government of Alberta 2000e)
- *Environmental Protection and Enhancement Act and Regulations* (Government of Alberta 2000d)

- *Consolidated Information Requirements for the Environmental Assessment and Regulatory Review of a Northern Gas Pipeline Project through the Northwest Territories* (Northern Pipeline Environmental Impact Assessment and Regulatory Chairs' Committee 2002)
- *Gwich'in Settlement Area Water Licence and Land Use Permit Application Process* (Gwich'in Land and Water Board)
- *Land Use Permit Process (draft)* (Sahtu Land and Water Board 2002)
- *Guide for Completing the Application for a Land Use Permit Pursuant to the Territorial Land Use Regulations* (Mackenzie Valley Land and Water Board 2001)

3.8.2.2 Community Involvement

Community guidance and concerns related to reclamation will be addressed, and suitable planning and mitigation measures will be applied to ensure that best management practices related to reclamation are followed throughout the project.

Environmental workshops were held in communities in the project area. The main objective was to obtain feedback from community residents and resource users regarding impacts that the project might have on the social and physical environments. Of particular relevance to reclamation were the concerns that deal with:

- introducing weeds to the North, i.e., non-native and invasive species
- permafrost degradation
- soil erosion and the subsequent siltation of watercourses
- loss or modification of wildlife habitat

3.8.3 Reclamation Strategy

The goals of the reclamation strategy are to:

- stabilize the rights-of-way and all other disturbed areas
- reduce disturbance of the surface soil and ground cover vegetation
- reduce the effects of project-induced permafrost degradation
- reduce the loss of nonrenewable resources, such as surface soil and granular material
- reduce the loss of soil quality

- reduce the use of fertilizer
- encourage and facilitate the natural recovery of native plants
- encourage and facilitate the establishment of self-sustaining native plant communities
- establish species that provide erosion control and do not interfere with existing or proposed end land use
- avoid introducing weeds and invasive species

These goals are based on a combination of community expectations and concerns about the project and regulatory requirements.

A stable ground surface will be established by implementing suitable construction and reclamation techniques throughout construction and drilling, including:

- grading selectively
- establishing erosion and drainage control structures
- revegetating most disturbed areas

Successfully reclaiming areas disturbed by project activities will rely on:

- preparing a stable ground surface to help vegetation become established and to support natural habitat for native plants and animal species
- reducing terrain disturbance, which can result in settlement, slope instability and erosion, and changes in surface and subsurface drainage. These can be addressed by avoidance, mitigation by engineering and environmental design, or mitigation applied during construction and drilling.
- implementing reclamation strategies aimed at returning disturbed areas to ground conditions similar to natural undisturbed habitat adjacent to the developed areas

3.8.4 Revegetation Guidelines

Revegetation guidelines that might be implemented by the proponents throughout all project phases include:

- using a range of plant materials compatible with existing adjacent ground cover, such as woody cuttings and seeds of multiple species, multiple planting events or a combination, to achieve plant community diversity

- selecting plant species based on their establishment rate, rooting and ground cover characteristics, where erosion control is a major objective
- examining the certificate of analysis for each seed lot that has the potential to provide seed for the project, to determine if the seed lot is acceptable. Seed lots with excessive quantities of problem species, i.e., weeds and invasive non-native species, will not be accepted.

Section 4, Environmental Protection Plan outlines environmental protection measures considered appropriate for preliminary project planning. These measures might be implemented during construction and subsequent reclamation of the anchor fields, pipeline rights-of-way, associated facilities, infrastructure, borrow sites and access roads. See Volume 8, Environmental Alignment Sheets, for locations where reclamation measures might be implemented.

3.9 Operations Management Plans

The project will be planned and constructed to control and manage expected socio-economic and environmental impacts. The environmental management plan for operations will be based on the environmental requirements established for the project in its regulatory approvals and permits. It is expected that final plans developed in response to permitting requirements will be developed from data presented in the plans prepared to support project construction and drilling activities.

3.9.1 Scope

The operations management plan provides information on:

- general environmental requirements set out for the project in regulatory approvals and permits and industry best management practices
- measures to support operating, decommissioning and abandonment practices

The plans provide the basis for developing environmental management practices for anchor field facilities, the Inuvik area facility, compressor stations, metering facilities and areas along the pipeline rights-of-way. Operations, decommissioning and abandonment procedures are discussed in general terms because technology, industry best practices and regulatory requirements will likely change over the expected life of the project.

3.9.2 Guiding Principles

Guiding principles that will be used in developing the operations, decommissioning and abandonment plans for the project are:

- All environmental management procedures applied during operations will be performed according to the requirements of applicable federal, territorial and provincial regulations, and the operators' policies and procedures.
- An environmental management system will be in place to ensure that practices being applied reflect the most suitable within the scope of project operating practices.
- Decommissioning and abandonment activities will be developed to ensure that no long-term or legacy environmental contamination or land use issues remain following their implementation.
- Decommissioning and abandonment plans will be discussed with local communities to ensure local cultural, land use and environmental principles are incorporated into project planning and implementation decisions.
- Regulators and community representatives will participate with proponents' representatives to establish environmental, social and land use decommissioning and abandonment strategies.
- Before implementing decommissioning and abandonment activities, the proponents will evaluate alternative land and facility uses, such as divestment opportunities, or the requirements of other right-of-way uses.
- Decommissioning and abandonment assessments will be conducted on any community facilities used by the project, to determine if any potential environmental liability issues exist.

3.9.2.1 Regulatory Requirements

The final plan will be developed to ensure compliance of procedures with facility, flow line and pipeline regulatory permit and approval requirements.

Regulatory documentation outlined in Section 2 and conditions of project approval will be used in preparing the final operations environmental management plan.

3.9.2.2 Community Involvement

The plan will be developed following the community involvement principles established for the project. Key aspects will include:

- ensuring regulatory community consultation on operational practices
- using community resources, where relevant

3.9.3 Operations

Operations personnel with designated responsibilities for environmental regulatory and operations practices will implement operations plans. Environmental matters will be considered when conducting regular operations and maintenance tasks, according to the requirements of applicable federal, territorial and provincial regulations, and operators' policies and procedures. These activities might include:

- right-of-way maintenance
- hazardous materials management
- liquid and solid waste management
- spill response and remediation
- monitoring and reporting

3.9.4 Decommissioning and Abandonment

Individual operators will implement decommissioning and abandonment plans. Environmental matters will be considered when conducting decommissioning and abandonment activities, according to the requirements of applicable federal, territorial and provincial regulations, community and public expectations, and operators' policies and procedures in place at the time of the required activity. These activities might include:

- removing all above-ground equipment
- abandoning the production and disposal wells to *Canadian Oil and Gas Operations Act (COGOA)* regulatory guidelines
- purging product from buried pipelines and abandoning the pipelines in place
- reclaiming disturbed sites, where practical
- removing and reusing gravel, where practical