INTRODUCTION

The objective of an Emergency Response Plan is to protect people, property and the environment. As project construction and operations planning progresses, ERPs will be developed for the project.

The ERPs will deal with incidents that might occur during construction of the pipelines, associated facilities, and infrastructure. The testing, commissioning, and operations phases of the project will also be addressed, as will decommissioning and abandonment. The focus will be on ensuring a safe, effective, and timely response to the type of emergencies that could arise during any of these phases.

This section describes typical contents of an ERP that might be used for the construction of developments such as those included in this application. A framework of the project Spill Contingency Plan is also described for the proposed construction activities. Detailed information pertaining to the emergency response and spill contingency aspects of the project ERPs will be developed as engineering progresses.

TYPICAL EMERGENCY RESPONSE PLAN

An ERP typically contains information that workers, responders and local residents can use in the event of an emergency situation.

While each ERP varies depending on specific conditions, there are common elements that a standard ERP is expected to contain. These include:

- introduction and description of activities and facilities
- development of a response organization (incident command system) which includes the identification of major functions, personnel, and responsibilities
- mutual aid agreements to allow for the sharing of emergency equipment and personnel
- communication plan and contacts
- notification requirements
- emergency resources inventory

- emergency specific response procedures
- recovery activities

Contractors working on the project, at any of the sites, will be required to have a site-specific ERP in place that supports, and is integrated with, the overall project ERP. Integration will be through mutual aid agreements, which describe equipment, personnel and resources for sharing, and through bridging documents, which outline emergency response responsibilities between organizations, specific to work locations and areas.

Types of Emergencies

The most common accident and malfunction events that could be associated with construction activities, such as those proposed for this project, are:

- evacuation
- extended utility outages
- fire and explosions
- firefighting grass and timber
- logistics, including air, water and road transportation
- loss of containment such as spills, pipeline leaks or ruptures, and NGL leaks
- natural disasters
- search and rescue
- transportation of dangerous goods

Fires associated with the project could occur along the pipeline rights-of-way, at facilities, camps, or storage facilities, or in equipment or vehicles. Explosions could involve the pipelines, facilities, camps, storage facilities, or equipment or vehicles. Loss of containment could include pipeline leaks or ruptures, or spills of materials such as fuel, freeze depressants, wastewater, and drilling and completion fluids. Logistics events could result from collisions, traffic non-compliance, and incidents with equipment and could involve air, water or land vehicles. Evacuation could result from any of these incidents.

Preventative measures, or safeguards, will be put in place to reduce the likelihood of events with the potential to adversely impact the surrounding lands and communities.

Types of Equipment

The types of response equipment needed for specific types of potential emergencies will be specified in the project ERP. Staging locations for emergency response will also be identified. The equipment being considered will be capable of excavation, pipeline lifting and movement, spill containment and cleanup.

Equipment lists will be developed and included in the ERP prior to the start of construction.

Availability

The complete ERP document will be made available to local emergency response organizations, as needed.

The ERP will be available at the work sites. Highlights of the plan and required knowledge for the work will be reviewed with workers as part of their orientation prior to commencing work.

Revisions to the ERP will be made as the ERP develops and as the work progresses from one area to another. Training requirements for workers will be updated as changes and improvements are made to the ERP.

SPILL CONTINGENCY PLAN (SCP)

PURPOSE

The primary objective will be to avoid spills or the unplanned release of materials. All personnel will have an environmental orientation prior to starting work. This will include a review of the project SCP. In addition, all contractors and supervisors will be required to review and comply with the environmental management plan (EMP) for the project that details specific measures to prevent spills and leaks from occurring.

In the unlikely event of a spill or release of material, safe and timely response will be the focus. The SCP will define the responsibilities of site personnel and the required procedures for a quick response to a spill event by emphasizing the need to address the safety hazards and limit the impacts on the environment.

Preliminary Requirements

- A copy of the ERP and EMP will be available at all construction sites.
- Material safety data sheets (MSDS) for each hazardous chemical will be available at all construction sites.
- All vehicles or mobile equipment will be equipped with spill kits and shovels.
- Suitable communication equipment and all emergency numbers will be available prior to the commencement of all field activities.

Initial Response

In the event of a spill or a release of a material of concern, the first person on the scene will:

- do an initial assessment to identify if there is any imminent danger
- identify the material spilled, assess MSDS information and implement appropriate safety procedures, based on the nature of the situation and including donning of required personal protective equipment
- eliminate the source of the spill if possible and if safe to do so
- control risks to human life, for example, by removing ignition sources, if possible, without further assistance
- immediately obtain the assistance of others and begin to contain and clean up the spill
- assess the hazards to personnel in the vicinity of the spill
- notify the field supervisor and the environmental inspector
- gather information on the status and the nature of the situation

When notified of a spill, the field supervisor and the environmental inspector (whomever is on the scene first) will immediately ensure that:

- action is taken to control danger to human life and impacts on the environment
- an on-site safety supervisor is designated, if not already present

The appropriate regulatory authorities will be advised, as required, and the territorial disaster services and the local RCMP will be notified if a risk to the public exists.

The necessary equipment and personnel will be mobilized and measures will be implemented to stop the source of the spill and commence clean up.

Imperial will make appropriate resources available to contain and clean up the spill.

Once the emergency contacts are made and initial efforts to contain and clean up the spill are underway, an Imperial representative will again notify Imperial's management personnel, who will notify the applicable government agencies.

Northwest Territories

NWT SPILL REPORT

(Oil, Gas, Hazardous Chemicals or other Materials)

24 – Hour Report Line
Phone: (867) 920-8130
Fax: (867) 873-6924

A Report Date and Time	B Date and Time of spill (if known)	C ☐ Original Report ☐ Update no.____	Spill Number
D Location and map coordinates (if known) and direction (if moving)			
E Partly responsible for spill			
F Product(s) spilled and estimated quantities (provide metric volumes/weights if possible)			
G Cause of spill			
H Is spill terminated? ☐ yes ☐ no	I If spill is continuing, give estimated rate	J Is further spillage possible? ☐ yes ☐ no	K Extent of contaminated area (in square meters if possible)
L Factors effecting spill or recovery (weather conditions, terrain, snow cover, etc.)		M Containment (natural depression, dikes, etc.)	
N Action, if any, taken or proposed to contain, recover, clean up or dispose of product(s) and contaminated materials			
O Do you require assistance? ☐ no ☐ yes, describe:	P Possible hazards to person, property, or environment; eg: fire, drink water, fish or wildlife		
Q Comments or recommendations		FOR SPILL LINE USE ONLY Lead agency Spill significance Lead Agency contact and time _____ _____ _____ Is this file now closed? ☐ yes ☐ no	
Reported by	Position. Employer, Location	Telephone	
Reported to	Position. Employer, Location	Telephone	

Figure 11-1: Spill Report Form

General Spill Containment Procedures

- Identify the materials spilled, stop the source of the spill, and when safe, immediately implement containment measures to limit the spread of the material and reduce the impacts to the environment and damage to property.

- If the spill source is a leaking fuel truck, transfer the fuel into appropriate containers or another truck.

- A shallow depression might be excavated or a surface berm constructed in the path of the flowing product to stop and contain the flow. If feasible, without unduly delaying containment efforts, the strippings will be salvaged and stored separately during excavations.

- Absorbent materials will be utilized to contain and recover spilled material.

- Heavily contaminated soil and vegetation, as well as used absorbent material, will be disposed of at an approved waste management facility.

- Traffic will be routed around contaminated areas.

- Attempts will be made to restrict the movement of wildlife near the affected area.

- Remediation and final clean-up, in consultation with the applicable government agencies, will be conducted until the spill and immediate location has been reclaimed, its state is satisfactory to the applicable government agencies, and any necessary reclamation certificates have been issued.

Spills Adjacent to or into a Waterbody

- Berms or trenches will be constructed to contain and prevent materials from entering into a waterbody.

- Spilled materials will be recovered as quickly as possible.

- If spilled material enters an open waterbody, booms, skimmers and absorbent pads will be deployed, if feasible, to contain and recover the spilled material.

- If spilled material is released onto a frozen waterbody, snow and absorbent pads will be used to contain and clean up the spill. A backhoe, or similar equipment, will remove all contaminated materials to prevent future release into the waterbody.

- Contaminated areas, including downstream shorelines (non-frozen conditions), will be cleaned up in consultation with spill response specialists and the appropriate government agencies.

- In the event that spilled materials enter a frozen waterbody through or under the ice to water, auguring will be conducted to determine the extent of the spill plume. If feasible, a vacuum truck will be brought to the site to skim off the contaminant. As well, the appropriate regulatory agencies will be contacted and a post-break-up monitoring and reclamation plan will be implemented to determine the extent of the impacts of the spill on the waterbody and its banks.

Spot Spills

- The environmental inspector will be contacted as soon as possible after a spot spill to determine appropriate methods to remove or rehabilitate contaminated soils. Since impacts from small spills can generally be limited if immediate action is taken, all small spot spills will be cleaned up as quickly as possible.

- Activities in the immediate vicinity will be suspended until a supervisor or an environmental inspector grants permission for them to resume.

- Heavily contaminated soil and vegetation, or removed contaminated materials, or both, will be disposed of in an appropriate manner.

- Locations where spot spills have occurred will be flagged and GPS coordinates will be recorded by the environmental inspector.

- The environmental inspector will document and report all details pertaining to the incident.

Spill Reporting

All leaks and spills will be reported to the environmental inspector and site management to initiate immediate clean up. The environmental inspector will detail the nature, location (with GPS coordinates) and extent of each spill along with corrective actions taken to limit impacts. A project spill report will be prepared for each spill and copies sent to the appropriate regulatory agencies. In addition, an Imperial *Supervisor's Investigation Report* will also be filed as part of the spill reporting protocols. The size of the spill will determine how the spill is reported.

If the spill exceeds the threshold quantity listed in Table 11-1, the environmental inspector will complete the *Spill Report Form* (see Figure 11-1) and then immediately report the spill to: NWT 24 Hour Spill Report Line (867) 920-8130.

After the initial response, the environmental inspector will prepare a project spill report that includes the location of the spill (with GPS coordinates), the type of spill, cause of spill, clean up activities, and reclamation procedures undertaken. This report together with the initial *Spill Report Form*, completed immediately

after the spill occurred, will be sent to project and Imperial management and also to local regulatory agencies.

Spill Kits

All vehicles and equipment will be equipped with a spill kit that, at a minimum, includes the following:

- absorbent material (i.e., 10 pads, two socks or equivalent)
- disposal container (tarpaulin, pail, barrel)
- safety gloves and goggles
- shovel

All fuel and service vehicles will carry a spill kit that includes the following:

- a minimum of 10 kg of absorbent material (i.e., 200 pads, 12 socks, 10 pillows, or equivalent)
- absorbent booms
- disposal container (tarpaulin, pails, barrel)
- safety gloves and goggles
- shovel

Extra spill kits will be stored at camp or storage locations.

Table 11-1: Spill Report Threshold Quantities

Item No.	TDGA Class	Description of Contaminant	Amount Spilled
1	1	Explosives	Any amount
2	2.1	Compressed Gas (flammable)	Any amount of gas from containers with a capacity greater than 100 L
3	2.2	Compressed Gas (non-corrosive, non-flammable)	Any amount of gas from containers with a capacity greater than 100 L
4	2.3	Compressed Gas (toxic)	Any amount
5	2.4	Compressed gas (corrosive)	Any amount
6	3.1, 3.2, 3.3	Flammable Liquid	100 L
7	4.1	Flammable Solid	25 kg

Table 11-1: Spill Report Threshold Quantities (cont'd)

Item No.	TDGA Class	Description of Contaminant	Amount Spilled
8	4.2	Spontaneously Combustible Solids	25 kg
9	4.3	Water Reactant Solids	25 kg
10	5.1	Oxidizing Substances	50 L or 50 kg
11	5.2	Organic Peroxides	1 L or 1 kg
12	6.1	Poisonous Substances	5 L or 5 kg
13	6.2	Infectious Substances	Any amount
14	7	Radioactive	Any amount
15	8	Corrosive Substances	5 L or 5 kg
16	9.1 (in part)	Misc. Products or Substances, excluding PCB Mixtures	50 L or 50 kg
17	9.2	Environmentally Hazardous	1 L or 1 kg
18	9.3	Dangerous Wastes	5 L or 5 kg
19	9.1 (in part)	PCB Mixtures of 5 or more parts per million	0.5 L or 0.5 kg
20	None	Other Contaminants	100 L or 100 kg
Environmental Protection Act and the *Spill Contingency Planning and Reporting Regulations* R.R.N.W.T. 1990, c, Schedule B			

INTRODUCTION

The waste management practices outlined in this subject have been developed based on guidelines, standards and requirements in an overall project Waste Management Plan. The measures outlined in the WMP are based upon proven practices commonly used by the oil and gas industry for waste generated from drilling, pipeline and facilities construction and operations.

All waste management activities will be performed according to the requirements of federal and territorial regulations. The requirements and procedures presented in the plan will be updated throughout the project life to reflect changes in specific project design and requirements.

OBJECTIVES

The WMP has been developed following a hierarchy of waste practices from waste reduction and re-use to proper treatment and disposal. The plan has been developed to provide users with information on standards and guidelines to ensure that the project adheres to proper procedures for the management of hazardous and non-hazardous wastes.

Specifically, the plan has been prepared for use by all project staff, contractors and subcontractors in the planning and implementation of project waste management activities that include the following:

- identify project personnel and their responsibility for waste management within the WMP
- include waste management as part of project reporting
- ensure waste management capability is a designated component of contractors' construction plans
- provide training and education to ensure all project personnel are advised as to the importance of good environmental operating practices and the requirements of the WMP
- provide facilities for the proper identification and segregation of hazardous and non-hazardous waste, handling, and storage facilities for all waste liquid, solid and semi-solid materials generated as a result of project activities

- document waste types, quantities, and treatment and disposal actions
- develop continuous improvement capability to allow for updates to management practices to reflect any changes in project approach

The WMP also outlines the responsibility of the waste generator who must ensure that:

- the requirements of the WMP are followed
- waste reduction is considered when possible
- project wastes are properly characterized
- adequate treatment and disposal practices are utilized
- capabilities and limitations of any waste treatment and disposal method are known and incorporated into operating procedures
- accurate and complete waste documentation and manifesting is maintained
- waste carriers and receivers (consignees) have been informed of the waste properties
- the required approval and operations requirements are in place for any waste handling, storage, transportation, treatment and disposal method

Figure 11-2 outlines the decision making process to be used in the assessment and implementation of project-specific waste management practices. The information presented in the remainder of this section represents the preliminary project requirements for the identification, handling, storage, treatment and disposal of project wastes.

WASTE IDENTIFICATION AND CLASSIFICATION

Waste identification information is critical to planning, designing and implementing decisions for providing proper waste handling, storage, transportation, treatment and disposal, such as size of storage facilities, number of transportation vehicles required, capacity of domestic waste incinerators and wastewater treatment requirements.

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

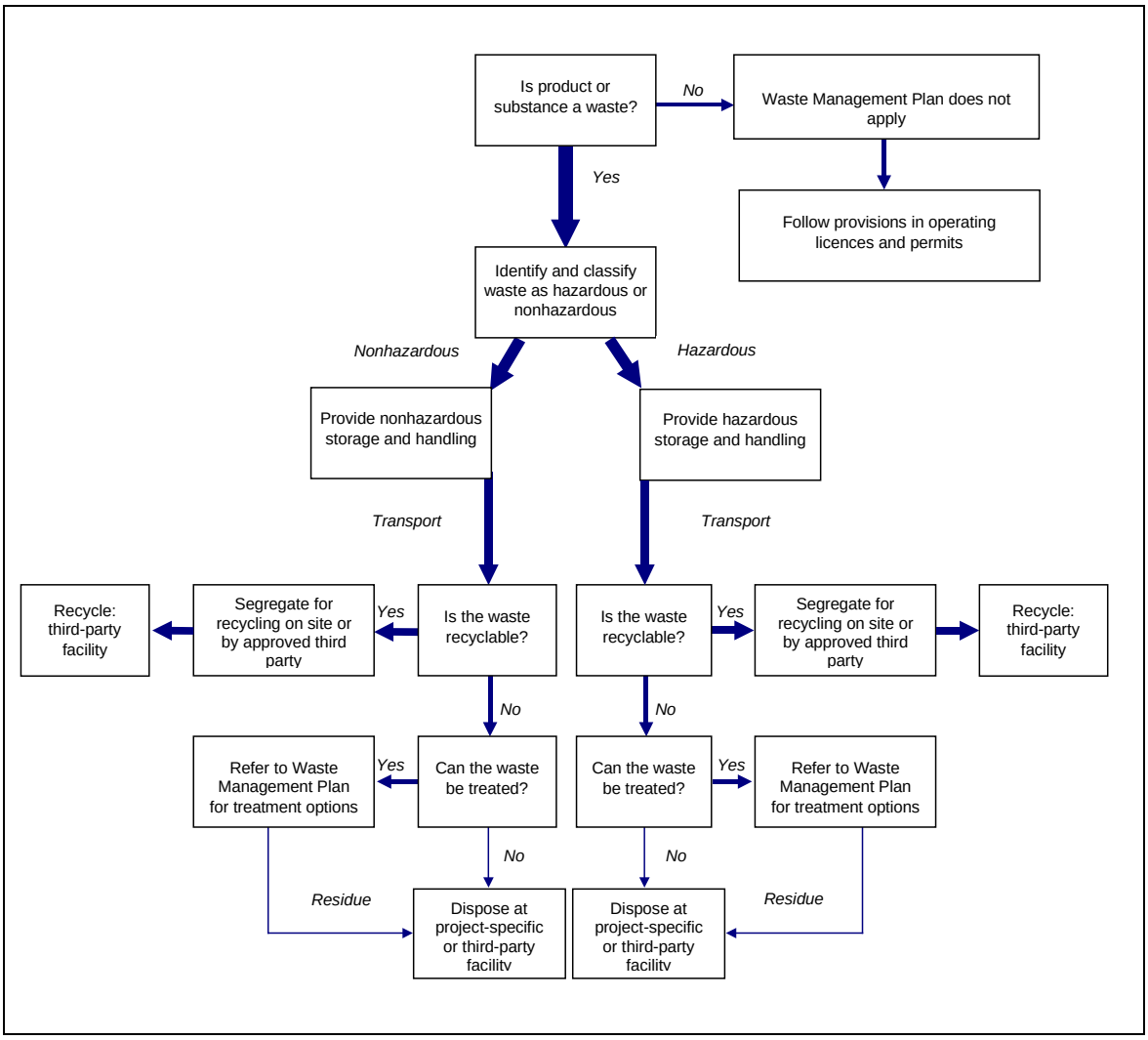

Figure 11-2: Waste Management Plan Decision-Making Process

A first step in this process is understanding the general scope of the expected waste materials and appreciating their physical and chemical conditions. The WMP provides the 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 and watercourse crossings
- spill waste – non-ERP materials

- hydrostatic test water with additives
- produced waste
- domestic wastewater, including gray water and black water
- process wastewater, including produced water, vessel drains, wash waters and potentially contaminated surface water runoff

The following materials will also require planned and approved management, but are not considered to be waste and are not included within the scope of the waste management plan:

- surface water runoff
- right-of-way and site clearing material, including timber and vegetation
- loose surface material
- borrow materials
- air emissions
- noise
- abandonment and decommissioning material

Timber, vegetation and other debris from right-of-way and site clearing will be managed in the following manner.

The primary method for disposal of significant quantities of brush and non-merchantable trees will be burning, with guidance from RWED. Where burning is not practical, (for such reasons as high wind conditions), the second option will be to chip or mulch the brush and trees, and spread the chips or mulch around during cleanup. A third option for disposal is a combination of the first and second methods. Where there is only brush or light tree cover, no disposal will be necessary as the fill will be placed directly over the existing brush.

Loose surface material, such as tree stumps and roots, will be windrowed to the edge of the pipeline right-of-way in graded areas only. This material will also be pushed to the side in thaw stable areas where access roads are graded. The materials might be replaced during construction cleanup and reclamation activities, except on roads required beyond the construction period.

Infrastructure sites will only have loose surface material pushed to the side in thaw stable areas. At the Inuvik area facility and Campbell Lake sites, this material will not be removed after clearing. Instead, as both sites are located in a continuous permafrost area, borrow material pads will be placed directly on the existing surface, as required, to provide a level, usable surface.

At the proposed borrow sites, loose surface material only will be pushed to the side in extraction areas. This material will be stored with the understory slash, in

separate windrows, within cleared but unstripped areas between the pit and the edge of the vegetated buffer. It will later be used during reclamation activities.

Waste Types, Sources and Quantities

A specific waste inventory, including waste types, sources and quantities will be developed for each project activity. This information will form the basis of the waste management program to be implemented for each project component.

Each project phase will generate different types and quantities of waste. For example, the construction phase will produce larger quantities of waste over a short time frame, whereas the operations phase will generate smaller quantities of waste over 25 to 30 years.

The total quantity of waste expected will be determined for each project component. All data is considered preliminary and will be refined as detailed project engineering, construction planning and design is completed. The following is a preliminary list (see Table 11-2) of expected project waste types from construction and operations activities:

Table 11-2: Waste Types

Liquid Waste Types	Solid Waste Types
Chemicals	Absorbents
Freeze point depressants	Batteries
Hydrostatic test fluid	Cardboard
Lubricating oil	Cement and concrete
Solvents	Construction waste
Wash fluids – solvents	Containers
Wash fluids – water	Contaminated debris and soil
Wastewater – domestic	Domestic waste
-	Filters – glycol
-	Filters – lubricating oil
-	Foam pigs
-	Horizontal directional drilling waste
-	Incinerator ash
-	Insulation
-	Paint and coating waste
-	Pigging waste

Table 11-2: Waste Types (cont'd)

Liquid Waste Types	Solid Waste Types
-	Pipe waste
-	Pipe ends
-	Plastic
-	Scrap metal
-	Sludge – domestic wastewater treatment
-	Sludge – tank bottoms
-	Tires
-	Welding rods and consumables
-	Wood

Waste Classification

Waste is considered to be a product or substance that can no longer be used for its intended purpose and can be considered as follows:

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

All waste generated by the project will be classified as hazardous or non-hazardous according to the following definitions provided in the *Guideline for the General Management of Hazardous Waste in the Northwest Territories* (RWED 1998a) and *Guideline for Industrial Waste Discharges in the Northwest Territories* (RWED 1998b).

Identified waste will be classified and the following waste definitions will apply:

- 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* (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 1992c)

- small quantity – hazardous waste that is generated in an amount that is <5.0 kg/month if a solid or <5.0 L/month if a liquid, and where the total quantity accumulated at any one time does not exceed 5.0 kg or 5.0 L. (This does not apply to wastes that contain mercury, or in Classes 2.3, 5.1 or 6.1 of the *Transportation of Dangerous Goods Regulations*. These wastes must be generated in an amount <1.0 kg/month if a solid or <1.0 L/month if a liquid, and where the total quantity accumulated at any one time does not exceed 1.0 kg or 1.0 L.)

Hazardous waste will not be mixed or diluted with any substance or divided into smaller quantities to avoid the definition of a hazardous waste.

A standard hazardous waste classification process will form the basis for project waste classification. A list will be prepared to itemize all project waste as hazardous or nonhazardous. 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 spontaneous combustion 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 identification of the:

- shipping name
- primary class
- compatibility group
- subsidiary class
- United Nations number
- packing group
- risk group according to the *Transportation of Dangerous Goods Regulations* criteria.

WASTE HANDLING AND STORAGE

Waste storage facilities will be necessary to contain waste before being transported for recycling, treatment or disposal. Waste will be stored temporarily until transfer for treatment at a project-managed facility, or stored until completion of construction and then transferred for treatment or disposal at an approved facility as part of site demobilization. During project operations, waste might be stored longer, until waste volumes are sufficient to support the selected treatment or disposal option, or are transported to a waste management facility.

Waste will be transferred regularly from points of waste generation for consolidation at centralized waste management facilities or transfer points, as illustrated in Figure 11-3. Waste will be stored until quantities are adequate to support transport for recycling, treatment and disposal.

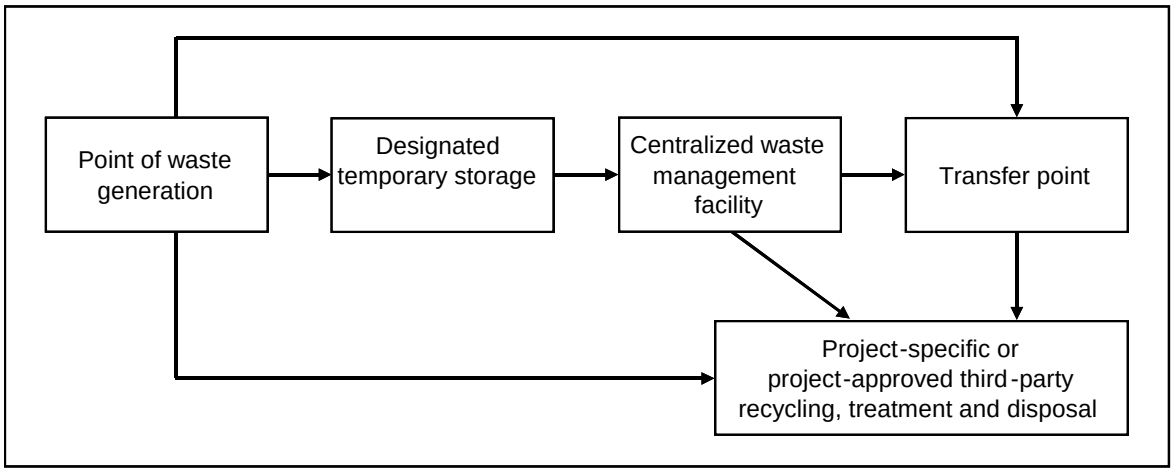

Figure 11-3: Waste Transfer and Storage Facilities

The following guidelines will be used to ensure proper handling and storage for all waste types:

- Temporary waste storage sites and containers will be provided at all points of waste generation.

- Waste will be sorted and segregated according to waste classification, that is, hazardous and non-hazardous, and end usage. For example, recyclable materials will be segregated from waste intended for treatment and disposal.

- Containers will be selected based on waste type, that is, physical and chemical properties, prevention of wildlife attraction, for instance by using positive clamping lids, and transport requirements, such as truck, barge or forklift.

- All containers will be labelled to facilitate the safe and proper handling of the waste type.

- 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 be designed to provide:

    - appropriate weather protection
    - 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 only.

- All waste types and quantities accepted and removed from waste management facilities and transfer points will be documented using waste tracking procedures.

WASTE TRANSPORTATION

The remote location of the project and seasonal land and water accessibility make waste transportation a critical element in the 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, *International Civil Aviation Organization* technical instructions and *International Maritime Dangerous Goods Code*. Any interprovincial and transboundary movement of waste will be performed according to the most recent amendments of the *Canadian Environmental Protection Act* and its *Interprovincial Movement of Hazardous Waste Regulations* and *Export and Import of Hazardous Waste Regulations*.

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.

WASTE REDUCTION AND TREATMENT

Reduction

Waste reduction is an important part of the WMP 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 reduce waste generation through reduction, re-use and recycling.

Treatment

Treatment measures will be used to further reduce the volume or toxicity of waste and the potential for environmental contamination. Treatment can render the waste less hazardous and, therefore, safer to store, transport and dispose of. Treatment technologies include anything that changes the physical, chemical or biological character of the waste.

Waste treatment will be planned for any project location where waste might be produced, and it is considered uneconomical to transport the waste to other project locations for treatment.

Treatment technologies and methods will be screened and selected based upon best practical technologies suited to project conditions and limitations. For

example, technologies used during the design and construction phase might not be suitable for the operations phase. They will be screened and selected to provide:

- pretreatment to reduce waste volume and toxicity
- efficiencies for 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 technologies and methods that comply with regulatory and project requirements, that is, ones that consider the best practical technologies, will be used.

Technologies and methods will be selected to provide treatment either at the source of generation or at centralized waste management facilities or transfer points. Where these circumstances do not apply, waste will be bulked and transferred to third-party waste management infrastructure and services.

Screening and Selecting Treatment Technologies

Screening of the treatment technologies will be done in consideration of the following:

- waste quantities and volumes, that is, waste generation rates will affect technology sizing, operations and economics decisions
- waste type, that is, hazardous or non-hazardous, composition and physical and chemical characteristics
- regulatory requirements for operation of 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 residues generated because of technology operations
- local climatic and environmental conditions

Preliminary project planning has identified several technology options that will be further screened and refined as project planning proceeds. Technology requirements include packaged domestic wastewater treatment units, incineration for volume reduction of non-hazardous materials (such as domestic waste, paper and cardboard), storage of hazardous waste for transfer to approved third-party facilities, and re-use of waste lube oil as supplementary fuel.

WASTE DISPOSAL

Waste disposal involves the transfer of waste and residues from waste treatment to a place for final disposition. Screening and selecting the disposal options will be done considering the following:

- waste quantities and volumes, that is, waste generation rates, will affect sizing, operations and economics decisions
- waste type, that is, hazardous or non-hazardous
- composition and characteristics, that is, physical and chemical
- regulatory requirements for construction and operations of the technology including:
    - approval process
    - permits
    - licences
- economic factors, such as transportation and disposal costs

Project-managed or third-party (for example, community or commercial enterprises) landfills will be used for the final disposal of some non-hazardous waste.

Third-Party Waste Management Infrastructure and Services

Some waste might be handled, transported, treated or disposed of by a third-party located either in the Northwest Territories or other jurisdictions. Third-parties include local communities and commercial enterprises.

The project will use only approved third-party waste management infrastructure and services. The following steps will be taken to identify, assess and approve acceptable third-parties for waste management:

- identifying potential requirements for use of third-party infrastructure and services

- assessing and confirming existing third-party infrastructure and services by project technical personnel
- preparing screening and selection criteria for use by third-party infrastructure and services
- finalizing a protocol for third-party infrastructure and services utilization

WASTE TRACKING AND DOCUMENTATION

According to accepted waste management practices, project waste will be tracked from its point of generation to its ultimate re-use, recycling, treatment or disposal location. Waste inventories and tracking systems will be used to:

- document waste stream production information and data to identify opportunities for waste elimination, reduction, recycling, or beneficial re-use
- 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 effect
- shape ongoing waste management decisions such as identifying and assessing the needs for additional treatment or disposal capacity

ENVIRONMENTAL PROTECTION PLANNING

This subject describes the purpose and content of the Environmental Protection Plans that will be prepared for the project.

The EPPs will provide directions, measures and methods that are specifically designed to protect, conserve or mitigate environmentally sensitive features during the construction phase of a project. Site-specific or typical drawings will illustrate how an approved work site might appear during a specific activity, such as watercourse crossing.

The measures and methods that will be provided in the EPPs will be derived from the results of the impact assessment conducted for the project. It is the intent of the measures and methods to ensure that, if properly applied, they will reduce or eliminate potentially adverse environmental effects such that residual effects would be deemed acceptable.

A majority of the protection measures will be based on current industry standard practices for the construction of oil and gas pipelines and related infrastructure in forested terrain during frozen conditions. Some measures will be tailored specifically to the project due to the presence of ice-rich permafrost and potentially thaw-unstable terrain.

Within each section of the EPPs, measures to be addressed by Imperial will be noted separately from the mitigation measures to be implemented by the construction contractor. The environmental alignment sheets and environmental photo mosaics identify where specific mitigation measures will be applied.

Protection measures noted on the environmental alignment sheets or environmental photo mosaics will be integrated onto the engineering and construction alignment sheets for the project, which will also form part of the contract documents.

The protection measures will be upgraded, as required, throughout the detailed design phase as project design, execution plans, schedules and footprint information are further refined. The EPPs will also be revised upon the receipt of conditions levied on the project by regulatory authorities and further commitments made by Imperial during the regulatory approval process for the project.

The EPPs will address the following topics.

Notification

The notification section of an EPP provides a list of key government, community and industry contacts that will be maintained leading up to and during the construction phase of the project. Notification helps ensure the parties affected by the project are informed of the construction activities and schedule.

General Environmental Protection Measures

General environmental protection measures provided in an EPP are measures that are not specifically related to one phase of construction or restricted to one particular project component. Examples of general protection measures include those associated with servicing and refuelling vehicles and equipment near any waterbody.

Surface Preparation

The surface preparation section of an EPP lists the protection measures that will be applied during surveying, clearing, grading and work pad building activities for different ecological zones and terrain types encountered within the project area. The goal of these measures is to provide a work surface that is safe and trafficable to all project related equipment and vehicles while reducing disturbance, especially where sensitive surfaces, such as ice-rich terrain and steep slopes, are encountered.

Construction

The construction section of an EPP provides protection measures that will be tailored to specific activities that will be conducted during construction of the pipelines, infrastructure sites, access roads, and borrow sites in the SSA.

Pressure Testing

Protection measures related to pressure testing activities will be provided in this section of an EPP. Only protection measures for hydrostatic testing of pipelines will be provided in the pipeline EPP.

Watercourse Crossings

Protection measures pertaining to the installation of vehicle and equipment crossings and pipeline crossing techniques will be provided in the watercourse crossing section of an EPP. Topics covered in this section will include scheduling, surface preparation, installation technique, cleanup and the stabilization of beds and banks.

Cleanup and Reclamation

The cleanup and reclamation section of an EPP describes measures to be implemented to suitably cleanup and reclaim disturbed surfaces following the construction or installation of the various project components.

INTRODUCTION

A heritage resources protection plan (HRPP) has been prepared to identify and assess the heritage resources within the development zones of the project before any adverse effects occur, and to mitigate any effects, if necessary. This protection plan describes the recommended approach for managing potential, unforeseen impacts to previously unidentified heritage resources that are discovered during the construction phase of the project. It balances protection of the resources with recognition of the difficulties associated with identifying all of the heritage resource sites that might be present within the development footprint.

Archaeological investigations were completed during the 2002, 2003 and 2004 field programs. These included both reconnaissance and assessment level investigations which focused primarily on locations with a high potential for heritage resources to be present. Assessment level investigations and any required heritage resource site mitigation will be completed, as required, for the project components before construction activities commence at a specific site.

To the degree practical, effects on known heritage resource sites stemming from the development of the project will be addressed, as required, before construction. One goal of this plan is to provide a framework for use when previously unknown archaeological sites are identified during the construction phase of the project.

POTENTIAL EFFECTS

Heritage resources are non-renewable resources that might be located at, or near, the ground surface and, as such, are highly susceptible to any activities that result in disturbance to the ground. The three primary classifications of heritage resource sites include palaeontological, prehistoric archaeological and historic archaeological sites. Potential effects to archaeological sites are of particular concern. No significant effects to palaeontological sites are anticipated.

An archaeological site is defined in the Northwest Territories *Archaeological Sites Regulations* as “a site where an archaeological artifact is found” and artifacts are defined as “any tangible evidence of human activity that is more than 50 years old, in respect of which an unbroken chain of possession cannot be demonstrated.”

Project activities that might affect heritage resource sites include:

- right-of-way preparation

- pipeline ditch excavation
- development area clearing
- access road construction
- facilities and infrastructure construction
- borrow source development

Individual sites could be affected to varying degrees as a result of the project depending on the intensity, frequency and duration of the physical impacts associated with the development activity. Development activities involve the alteration of the landscape and can result in the damage or complete destruction of all or portions of archaeological sites. These effects can result in the displacement or removal of artifacts from context, as well as the destruction of artifacts, cultural features (e.g., hearths or fire pits), or both. By disturbing the context on which artifacts and features are recovered, archaeological interpretation of a site and ultimately, past lifeways, can be adversely affected.

Some development activities will have a low probability of uncovering or affecting previously unrecorded heritage resources. These include but are not limited to, activities that are confined to frozen ground conditions and do not disturb the natural ground sediments such as the use of winter access routes. Other activities, such as the trench excavations in areas of sediment accumulation and high site density, will have a higher potential for disturbing previously unrecorded heritage resources. Reclamation can also damage sites and artifacts and affect context.

Effects to heritage resources due to the project can vary in degree and are broken down into the following three categories – direct effects, indirect effects and tertiary effects.

Direct or primary effects on heritage resources are those disturbances relating directly to project activity. These might be caused by activities such as vegetation clearance and soil removal. These activities have the potential to alter the spatial patterning of finds. Disturbing the context in which artifacts and features are recovered can make it very difficult to accurately interpret the significance of an archaeological site.

Indirect or secondary effects are those that occur as an indirect result of development activities. These usually occur during the operations phase of a project. Issues such as surface erosion, sloughing due to alterations in the vegetation, and soils or snow pack and winter access road conditions can also have adverse effects on heritage resources.

Tertiary effects are the results of changes in land use patterns made possible by the project. Creation of new access routes and rights-of-way might result in subsequent use by local people on a long-term basis. This could potentially increase effects on heritage resources located within the region.

Primary, secondary and tertiary effects are possible with any new development. The approach proposed herein is designed to mitigate any potential effects to heritage resources that could result from the project.

METHODS

Heritage resources protection measures and management techniques will be based on site-specific conditions and the type of feature that has been discovered. Before construction begins, a report will be completed that will specify mitigation measures at each known heritage resource site. This protection plan will be used to apply similar measures for mitigating effects on sites that are identified during the construction phase of the development.

Because every heritage resource is unique, mitigation strategies are based on case-by-case recommendations provided during the assessment stage of a heritage resources management program, considering the significance of the resource and the severity of the predicted effect.

As a formal Heritage Resources Impact Assessment has not yet been completed for many of the project components, mitigation measures have not been specifically identified. Mitigation strategies are best devised when full information on effects is known. These recommendations will be made in consultation with the PWNHC. Some probable options for mitigation are presented in Table 11-3.

Table 11-3: Examples of Effects of Project Related Activities on Heritage Resources and Associated Mitigation Measures

Activity	Effect type	Potential Effect	Primary Mitigation Strategies
All Activities	Direct effect on heritage resources	Direct damage or destruction of surface and subsurface sites	• Complete Heritage Resource Impact Assessment before construction begins at a particular location. • Avoid heritage resources where possible. • Map, record and document heritage resources before construction begins.
	Indirect effect on heritage resources	Surface erosion	• Avoid heritage resources and complete reclamation of the development area to reduce the potential for erosion at site locations.
		Sloughing	• Avoid heritage resources and complete reclamation of the development area to reduce the potential for erosion at site locations.

Table 11-3: Examples of Effects of Project Related Activities on Heritage Resources and Associated Mitigation Measures (cont'd)

Activity	Effect type	Potential Effect	Primary Mitigation Strategies
All Activities (cont'd)	Indirect effect on heritage resources (cont'd)	Sediment compaction	• Reduce the potential for compaction through appropriate construction of winter access roads and rights-of-way.
		Permafrost degradation	• Where practical, maintain an appropriate buffer around heritage resources so that permafrost degradation does not affect organic artifacts that remain in situ.

If heritage resource sites are discovered during the construction phase, the site will be assessed to determine the most suitable mitigation measures. Imperial will also notify the applicable government agencies, as required.

The site will be assessed based on the following:

- input from the Prince of Wales Northern Heritage Centre
- input from the environmental monitor
- the significance of the site
- the depth of the site
- the location of the site relative to the area being developed
- the practicality of pipeline, access road routes or other development feature relocation to avoid the resource

The following steps will be taken if potential heritage resources are discovered:

- Work will be immediately suspended near any newly discovered archaeological, palaeontological or historic site.
- The Imperial representative will be notified, who, in turn, will notify the PWNHC.
- If necessary, Imperial accredited heritage resource practitioners will develop a suitable mitigation plan in consultation with the staff of the PWNHC.
- Work will resume only after regulatory approval for the mitigation has been obtained.

As part of the mitigation plan described above, a number of different protection measures might be applied to mitigate impacts to heritage resources. These will be determined based on the information recovered in the assessment of the site and the nature of the disturbance. The following measures might be included.

Avoidance

The pipeline or access road, or relocating the facility, borrow or infrastructure site might be realigned to avoid the area of concern. Where practical, the preferred strategy for mitigating effects on significant resources is avoidance through redesign. Depending on the nature of the site and the nature of the project component, this might not be possible for some sites identified during the construction phase. An example would be the design flexibility for an access road, pad location or pipeline.

Physical Site Separation

Setting up a physical barrier between the project activities and the portion of the site that is to be protected, such as the use of fencing or clearly marking the site using flagging, can protect the site from further effects. If the development can be constrained through right-of-way constrictions or other means where the activity will proceed in close proximity to the heritage resource, it might be necessary to cordon off the site to ensure that no further impacts occur.

Capping

Geotextiles, fill, swamp mats, or both fill and swamp mats can be used to protect buried components at a site, as necessary. It might be possible to avoid a site when developments lack design flexibility if, for example, placement of fill over a significant resource would offset the effect of road construction, or drilling under a heritage resource, would avoid the negative effects of a pipeline. In these instances, no physical development-related effects would result on the resource.

Controlled Excavations

In some cases, development effects might be unavoidable. The most common mitigation in these circumstances is information recovery and preservation. Conducting an excavation to salvage and establish an adequate record of the site, according to territorial heritage resource regulations and guidelines, is an acceptable and beneficial approach. For prehistoric and palaeontological sites that are typically concealed in bedrock or mineral soil horizons, these procedures include excavation to recover samples of information and materials before an effect occurs. The required analysis and interpretation of recovered information and submission for permanent conservation is intended as compensation for the negative effects of development activities. These procedures usually result in recovery of a representative sample of information from a particular resource, with all or some of the remainder being consumed by the approved development.

Monitoring

Employing a qualified archaeologist or palaeontologist to monitor grading and trenching activities might be necessary in some locations. Monitoring during the project might be recommended in the event that archaeological sites are encountered at the proposed development locations. It might be possible to allow activities to proceed in close proximity to known significant sites or in areas of high potential for heritage resources if archaeological monitoring takes place.

Survey and Assessment

A complete survey and assessment of the site might be undertaken to document all heritage resources where a pipeline realignment or project component relocation is not practical. This measure will allow for the collection of data and materials at site types that are more common or of a lower significance. The information and materials obtained during the assessment stage might be considered sufficient to offset the impact to this resource. This limited level of mitigation is usually applied in situations where resources of a similar character occur commonly throughout a region and their distribution is considered as or more important than their content.

Other

Other suitable mitigation measures might be used, as decided on in the field during construction by Imperial, in consultation with a qualified archaeologist and the applicable government agency. If the circumstances do not allow for some of these mitigation measures to be completed satisfactorily, a post impact investigation might take place. This might include simple assessment and site detail recording, excavations, or combinations of other measures. Other less typically applied forms of mitigation could include public interpretation programs. These are developed to provide benefits to local and regional communities to help offset the loss of resources during development. Alternatively, types of specialized analyses can be conducted to augment interpretation of a particular resource in a scientific framework. These types of procedures usually accompany more standard forms of mitigation and will be designed on a case-by-case basis, depending on the character of the resource in question.

SUMMARY

This plan provides an approach for the protection of heritage resources over the large area associated with the project. Heritage resources that are represented by above-ground features and artifact scatters represent the highest potential for disturbance. As the project covers a large geographical area, it is possible that not all of the heritage resources will be identified during the course of the assessments. In such instances, the methods outlined above will be employed, in association with a site protection manual, to offset the effects of the project.

All supervisory staff for the plan will be provided with maps and documentation identifying the location and nature of known heritage resource sites in the vicinity of the proposed work areas. This documentation will be created in such a way that these heritage resources (unless previously mitigated) will be avoided by the crews where practical. It will also illustrate a number of different types of heritage resources that might be encountered and detailing procedures to follow should heritage resources be encountered.

All project personnel will be informed that they cannot wilfully disturb or remove archaeological or historic artifacts or materials from sites unless they have a permit under the *Northwest Territories Archaeological Sites Regulations*. Collection of such artifacts is forbidden. Failure to comply could result in prosecution and fines and disciplinary action up to and including termination.