.7 Prior to their removal from the facility, spray or dampen with water all drop cloths placed to collect paint particles that become removed during dismantling operations. Place the drop cloths in polyethylene bags, and place the bags in the Hazardous Waste Material Containers specified in Clause 2.1 of this Section.

3.6 Demolition

.1 Demolish complete structure where indicated.

.2 Remove existing equipment, services, finishes and furnishings from buildings.

.3 Disconnect piping before tank removal and empty tanks as specified.

.4 Remove and dispose of all piping above ground as described in Section 02090 - Hazardous Waste Material.

.5 Seal ends of underground piping to remain.

.6 Pump out fuel storage tanks, and dispose of contents as specified in Section 02090 - Hazardous Waste Material.

.7 Purge harmful and flammable vapours from fuel storage tanks in accordance with referenced standards prior to cutting tanks. Upon request, submit the Lower Explosive Limit (LEL) results of Volatile Organic Compound (VOC) testing to the Engineer.

.8 Cut structural steel and bulk fuel tanks in accordance with referenced standards.

.9 Collect and dispose of loose vermiculite and insulation material and place in polyethylene bags.

.10 Dispose of asbestos as specified in Section 02081 - Asbestos Abatement.

.11 Cut non-hazardous materials in such shapes and sizes as to minimize voids when material is landfilled.

.12 Explode non-ventilated gas cylinders in a remote and safe area acceptable to the Engineer. Stockpile empty and ventilated gas cylinders as non-hazardous demolition debris. DO NOT EXPLODE OR VENT CYLINDERS KNOWN OR SUSPECTED TO CONTAIN ANY OZONE DEPLETING SUBSTANCE INCLUDING CHLORODIFLUOROMETHANE (FREON) OR HALON. Containerize these materials in accordance with TDGA packaging standards.

.13 Structures are to be demolished to the top of the concrete foundation level. Remove completely or cut off all creosote-treated timber foundations at 300 mm below ground level. Cut off all other timber foundations at ground level. Cut off, flush with top of remaining foundations, any anchor bolts, reinforcing steel or other projections.

.14 Completely wrap the removed creosote-treated timbers in polyethylene sheeting as specified in Clause 2.3 of this Section. Bind the polyethylene sheeting with tape or other materials as required. It is not necessary to wrap each timber individually.

.15 At end of each day's work, leave work in safe condition so that no part is in danger of toppling or falling. Protect interiors of parts not to be demolished from exterior elements at all times.

16 Demolish to minimize dusting. Keep dusty materials wetted with water only.

.17 Demolish masonry and concrete walls in small sections. Remove and lower structural framing and other heavy or large objects in a safe manner.

.18 Submit to the Engineer upon completion of demolition activities, a detailed inventory of all copper components removed from facilities to be demolished. The information shall include a description and dimensions of each copper component.

3.7 Module Train Ash

.1 Add sufficient water to ash to prevent airborne transport during construction.

.2 Separate ash from demolition debris prior to removal from module train area.

.3 All ash shall be treated as Tier II soil and placed in the on-site Tier II facility.

.4 Do not leave the ash in the Tier II facility exposed and allowed to become airborne.

.5 Transport ash in covered trucks and in a manner to prevent any dispersment of the ash.

3.8 Salvage of Demolition Material

.1 THE CONTRACTOR IS ADVISED THAT MANY OF THE FACILITIES AND STRUCTURES TO BE DEMOLISHED MAY HAVE SIGNIFICANT SALVAGE VALUE. The Contractor may, where appropriate, propose that certain materials be considered for reuse or recycling where savings to the Owner could be obtained. Reuse and recycling proposals must be submitted to the Engineer for review. Should the Owner accept a reuse/recycling proposal from the Contractor, the Contractor will continue to be responsible for the disposal of materials for reuse/recycling.

.2 The Engineer shall consider the following criteria when reviewing the Contractor's proposal for reuse/recycling:

.1 The reuse/recycling of these materials shall not leave the Crown with future liability. (Third party liability waivers will be required for reuse proposals);

.2 The reuse/recycling can be performed in a manner that results in cost savings to the Crown;

.3 Should the Owner accept a reuse/recycling proposal from the Contractor, the Contractor will be required to sign a Waiver Form. A sample copy of the Waiver Form is included in the Tender Form.

3.9 Removal of Drainage Culverts

.1 Excavate, as required, to facilitate culvert removal and removal of all items related to the Module Train runoff pond.

.2 Following culvert removal, trim back slopes of excavation to a maximum slope of 10H:1V, or as directed by the Engineer, to provide a stable channel for drainage flow and to provide for the safe passage of vehicles through the area.

.3 Reuse excavated material for general site regrading operations, or as directed by the Engineer.

.4 Do not remove culverts from areas beyond the DND reserve unless specifically directed by the Engineer.

3.10 Disposal of Demolition Materials

.1 Dispose of asbestos and other hazardous materials in accordance with Sections 02081 – Asbestos Abatement and Section 02090 – Hazardous Material.

.2 Dispose of non-hazardous demolition debris, including pipe culverts, creosote timbers, and polyethylene-wrapped vermiculite and insulation, in the on-site Non-Hazardous Waste landfill in accordance with Section 02209 – Grading.

.3 Segregate metal, asbestos and creosote treated materials from other material when placed in the Non-Hazardous Waste Landfill. Review with the Engineer the proposed location of each of these waste materials. Record the specific location and depth of these materials on the Project Record Drawings.

3.11 Temporary Storage Area

.1 Establish a Temporary Storage Area for the storage of hazardous materials generated during demolition operations at a location approved by the Engineer. The Temporary Storage Area shall be located as follows:

.1 More than 100 m away from any water body or drainage course.
.2 More than 450 m away from any fish bearing body of water.
.3 On stable ground not subject to flooding or seasonal saturation.
.4 In an area not routinely accessed or essential to the Contractor's workforce or site personnel.

.2 Establish the location and size of the Temporary Storage Area to minimize the handling of materials, isolate materials from other work operations and to provide for the collection and removal of these materials from the site. Refer to Section 02209-Grading, Clause 3.9 for the granular requirements of the Temporary Storage Area.

.3 Segregate materials within the Temporary Storage Area as follows:

.1 Containerized PCB-amended building materials.

.2 Containerized CEPA and other hazardous contaminated soil (refer to this section and Section 02066- Contaminated Soil).

.3 Containerized Hazardous Waste Materials.

.4 Provide the Engineer with a detailed inventory of the Temporary Storage Area indicating the location and contents of each container.

.5 Provide and erect signage at access points to the PIN-3 Temporary Storage Area used for the storage of containerized PCB materials. Signage shall be visible from all sides of the area. The English version of the sign shall read:

CAUTION
PCB STORAGE AREA
TRESPASSING IS PROHIBITED.

.6 Post a similar sign in the language of the local dialect. All lettering shall conform to CAN3-Z321-77, or latest edition thereof. All lettering shall be black, not less than 100 mm high, with a 25 mm wide stroke, on a white background.

.7 Keep PCB storage containers locked or equivalently secured to prevent unauthorized access to stored PCB materials.

.1 Permit only authorized personnel to enter the PCB storage area.

.2 Make PCB storage containers accessible to authorized inspectors as required by the Engineer.

.8 Store sufficient sorbent materials or an approved spill kit near the Temporary Storage Area for an emergency clean up.

3.12 Site Grading and Restoration

.1 Upon completion of demolition work, remove debris and leave work sites clean to a condition satisfactory to the Engineer.

.2 Reuse excavated material from culvert removal for general site regrading operations or as directed by the Engineer.

.3 Grade building sites and restore all areas affected by demolition work in accordance with Section 02209 - Grading.

.4 Reshape the area surrounding concrete and timber foundations to remain such that the top of the gravel is flush with the top of the foundation. Fill any voids or holes in the surface of the concrete with gravel.

.5 Reshape or backfill with Type 3 Granular Fill, areas excavated to facilitate demolition requirements. Place Type 3 Granular Fill in holes from which timber piles were removed.

FIGURE 1

ATTENTION

CONTAMINATED WITH PCBs (CHLOROBIPHENYLS)	CONTAMINÉ PAR BPC (BIPHÉNYLES CHLORÉS)
THE CONTENTS OF THIS EQUIPMENT ARE CONTAMINATED WITH PCBs. A TOXIC SUBSTANCE LISTED IN SCHEDULE I OF THE CANADIAN ENVIRONMENTAL PROTECTION ACT. IN CASE OF AN ACCIDENT OR A SPILL OR FOR DISPOSAL INFORMATION, CONTACT THE NEAREST OFFICE OF ENVIRONMENTAL PROTECTION, ENVIRONMENT CANADA.	LE CONTENU DE CET EQUIPEMENT EST CONTAMINE PAR DES BPC, SUBSTANCE TOXIQUE INSCRITE Á L'ANNEXE I DE LA LOI CANADIENNE SUR LA PROTECTION DE L'ENVIRONNEMENT EN CAS D'ACCIDENT OU DE DEVERSEMENT, OU POUR SAVOIR COMMENT L'ELIMINER, CONTACTER LE BUREAU DE LA PROTECTION DE L'ENVIRONNEMENT, ENVIRONNEMENT CANADA, LE PLUS PROCHE.

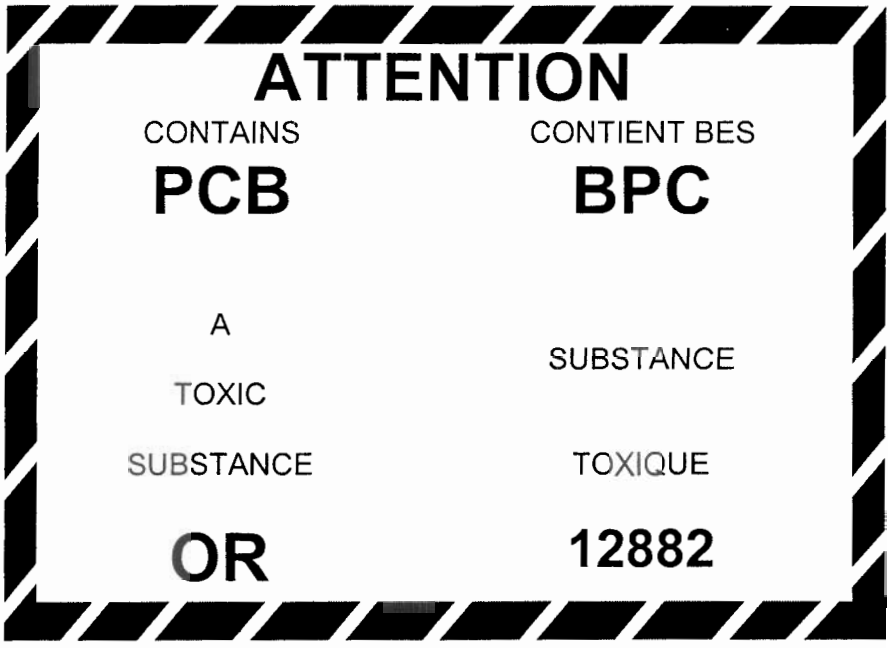
PCB CONCENTRATION (parts per million)
CONCENTRATION DE BPC (parties par million) _____

DATE ANALYSED
DATE D'ANALYSE _____

COMPANY NAME
NOM DE LA COMPAGNIE _____

AUTHORIZED COMPANY OFFICIAL
AGENT OFFICIEL AUTORISE _____

FIGURE 2


ATTENTION
CONTAINS
PCB
A
TOXIC
SUBSTANCE
OR
CONTIENT BES
BPC
SUBSTANCE
TOXIQUE
12882

1.0 GENERAL

1.1 Description

.1 This Section specifies the requirements for the excavation, handling, disposal or containerization and off-site transport of contaminated soils.

1.2 Related Work

.1 Section 01410 - Testing Laboratory Services.

.2 Section 01560 - Environmental Protection.

.3 Section 02067 - Landfarm Operation.

.4 Section 02090 - Hazardous Waste Material.

.5 Section 02209 - Grading.

.6 Section 02219 - Debris Removal.

.7 Section 02240 - Landfill Waste Excavation.

1.3 Definitions

.1 Inorganic Elements: arsenic, cadmium, chromium, cobalt, copper, lead, mercury, nickel, and zinc.

.2 DCC Tier I Contaminated Soil: Soils containing concentrations of any or all contaminants listed as follows:

Lead	- 200 to 500 ppm
PCBs	- 1 to 5 ppm.

.3 DCC Tier II Contaminated Soils: Soils containing concentrations in excess of any or all of the contaminants listed as follows:

Arsenic	- 30 ppm
Cadmium	- 5 ppm
Chromium	- 250 ppm
Cobalt	- 50 ppm
Copper	- 100 ppm
Lead	- 500 ppm
Mercury	- 2 ppm
Nickel	- 100 ppm
Zinc	- 500 ppm
PCBs	- >5 ppm; <50 ppm

.4 Hazardous Contaminated Soil: Contaminated soil is classified as hazardous in accordance with the Transportation of Dangerous Goods Act and Regulations (including CEPA and leachable soil).

.5 CEPA Contaminated Soil: Soil containing concentrations of PCBs in excess of 50 parts per million. Materials contaminated with PCBs at concentration levels in excess of 50 parts per million (mg/kg) are legislated as hazardous materials. Storage, handling, and disposal of PCBs are regulated under the Canadian Environmental Protection Act and the Federal Transportation of Dangerous Goods Act. Comply with all applicable regulations.

.6 Leachable Soil: Soil containing contaminants, that when subject to the leachate test prescribed in the TDGA and Regulations, leaches contaminants in excess of the concentrations listed in Part V of the regulations. Handling and disposal are regulated under Federal, Territorial and Provincial Regulations. Comply with all applicable regulations.

.7 Petroleum Hydrocarbons: Hydrocarbon products described by laboratory analyses as lubricating oil and grease, fuel oil, diesel and/or gasoline.

.8 Hydrocarbon Contaminated Soil: Soil containing concentration of Total Petroleum Hydrocarbons (TPH) in excess of 2500 ppm.

.9 Free Product: The presence of a layer of liquid petroleum hydrocarbons in the subsurface.

.10 Type A Contaminated Soil: Hydrocarbon contaminated soil in which the primary petroleum hydrocarbon product present in the soil as determined by laboratory analysis consists of lubricating oil and grease. TYPE A CONTAMINATED SOIL SHALL BE TREATED AS TIER I CONTAMINATED SOIL CONTAINING HYDROCARBON CONTAMINATION.

.11 Type B Contaminated Soil: Hydrocarbon contaminated soil in which the primary petroleum hydrocarbon product present in the soil as determined by laboratory analysis consists of fuel oil, and/or diesel, and/or gasoline.

.12 Type B - Tier I Contaminated Soil: Type B contaminated soil containing concentrations of lead between 200 and 500 ppm and PCBs between 1 and 5 ppm. Type B and combinations of DCC Tier I and Type B contaminated soil shall be excavated and treated on site as per Section 02067.

.13 Type B contaminated soil containing contaminants in excess of DCC Tier II criteria shall be treated as DCC Tier II contaminated soil containing hydrocarbon contamination.

.14 Clean Soil: Soil that has been sampled, analyzed, and determined to have contaminant concentrations below DCC Tier I contaminant levels, TPH less than 2500 ppm, and lead and PCBs at concentrations of less than 200 ppm and 1 ppm, respectively.

.15 See Table 02066-3 for summary of contaminated soil disposal requirements.

1.4 Qualifications

.1 The Contractor shall be thoroughly familiar with and knowledgeable about existing site conditions, scope of work and requirements of the Specification.

.2 Only Contractor's personnel capable of demonstrating a history of satisfactory experience in the area of hazardous waste management and who can satisfy Federal and Territorial requirements will be permitted to carry out the work of this Section. The Contractor's Superintendent responsible for the work of this Section shall have a minimum of five years of experience in the area of hazardous waste management.

.3 Follow at all times, guidelines such as those established in Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities: NIOSH Publication No. 85-115, or Hazardous Waste Worker Training Manual: Canadian LIUNA - Contractors' Training Council, 1992.

.4 All activities involving the handling of hazardous materials shall be directly supervised by the Contractor's personnel who have successfully completed a 40 hour training course for Hazardous Waste Activities in compliance with OSHA 29 CFR 1910.120 or other approved equivalent training courses such as the Canadian Hazardous Waste Workers Program.

.5 Contractor's personnel trained as described in Clause 1.4.4 of this Section shall instruct and direct all workers with respect to the waste management procedures and labour and safety practices to be followed in carrying out the work.

.6 Provide workers, the Engineer and the Engineer's staff when required with protection appropriate to the potential type and level of exposure. Establish specific safety protocols prior to commencing clean up activities, and include with the Work Methodology Plan described in Clause 1.5 of this Section.

.7 Provide suitable safety clothing and equipment as required during the course of the work.

.8 Trained and certified personnel are required to complete all Transportation of Dangerous Goods Act (TDGA) documentation and recording requirements.

1.5 Work Methodology Plan

.1 The Contaminated Soil Excavation component of the Work Methodology Plan, as described in Section 01005 - General Instructions (Clause 22), is to address, but is not necessarily limited to:

.1 Method for excavating contaminated soil including the identification of excavation equipment, and handling and treatment of free product as required;
.2 Approach to be followed to minimize the potential for cross-contamination between contaminated areas;
.3 Equipment and methods to be used for the transport of contaminated soils to the appropriate disposal or treatment area;
.4 Supply of containers and method for handling and containerizing Hazardous Contaminated Soil including a description of the type, volume, and number of containers;
.5 WRITTEN CONFIRMATION FROM TRANSPORT CANADA THAT THE CONTRACTOR'S PROPOSED CONTAINERS FOR HAZARDOUS CONTAMINATED SOIL SATISFY TDGA REGULATORY REQUIREMENTS FOR MARINE TRANSPORT.
.6 Details of health and safety plans including the experience and qualifications of personnel, training programs to be implemented prior to commencing work, personnel protective equipment, decontamination procedures, and emergency response procedures,
.7 Record keeping and reporting methods;
.8 Work Schedule;
.9 Compliance with all Federal, Provincial, Territorial or other agencies' regulations;
.10 Equipment decontamination procedures, including handling and disposal of wash water or wash solution; and
.11 Any other items that are pertinent to the work.

1.6 Site Conditions

.1 The approximate locations of known service or utility lines and buried objects are as indicated on the Drawings. The Contractor shall ensure that services, not designated for demolition, are not damaged as a result of excavation work. The Contractor shall repair any services, utilities, or objects damaged by his actions at no cost to the Owner.

.2 Suspend operations whenever climatic conditions are unsatisfactory for excavating or regrading to conform with this Specification.

.3 After occurrence of heavy rains, do not operate equipment in designated areas until the material has dried sufficiently to prevent excessive rutting.

.4 THE CONTRACTOR IS ADVISED THAT SHALLOW GROUNDWATER WAS ENCOUNTERED AT THE PIN-3 SITE DURING THE 2000 AND 2001 SITE INVESTIGATION. THE CONTRACTOR SHOULD BE FULLY PREPARED FOR EXCAVATION IN SATURATED GROUND CONDITIONS.

.5 THE CONTRACTOR IS ADVISED THAT GROUNDWATER MAY BE PRESENT IN ANY OF THE TYPE B HYDROCARBON CONTAMINATED AREAS DURING EXCAVATION AND THAT FREE PRODUCT MAY BE ENCOUNTERED. ADVISE ENGINEER UPON ENCOUNTERING FREE PRODUCT. If free product is encountered, collect liquid and treat in a manner in accordance with Section 02090 - Hazardous Materials.

.6 Prior to the commencement of the work, remove debris, snow, ice and standing water from areas to be excavated and regraded.

.7 Information included in Table 02066-1 at the end of this Section indicates the concentration levels of contaminants in each of the contaminated areas. This information is based on the results of site investigation and laboratory testing programs carried out up to August 2000 and August 2001 by the Environmental Sciences Group - Royal Military College.

1.7 Protection

.1 Prevent damage to benchmarks, existing buildings, surface and underground service and utility lines not designated for demolition, as well as to instrumentation excavations. Immediately repair or replace any damage to the above, at no cost to the Owner.

.2 Environmental protection measures shall be in accordance with the requirements specified in Section 01560 - Environmental Protection.

.3 The release of all water resulting from the dewatering of ponded contaminated soil areas and the decontamination of excavation equipment shall conform to the Wastewater Discharge Criteria outlined in Section 01560 - Environmental Protection.

1.8 Personnel Protection

.1 Some areas designated for cleanup under this contract involve soils and hazardous materials which contain PCBs, inorganic elements, hydrocarbons, and other contaminants which are considered hazardous to human health.

.2 Polychlorinated biphenyls (PCBs) at concentrations in excess of 50 ppm are considered to be hazardous substances. Storage, handling and disposal of PCBs are regulated under the Canadian Environmental Protection Act and the Federal Transportation of Dangerous Goods Act. Comply with all applicable regulations.

.3 When working with inorganic elements, PCB containing materials, hydrocarbons, and other contaminants, workers shall wear protective clothing and equipment acceptable to Labour Canada or Territorial Labour Department as suitable for exposure in the work area. Follow National Institute for Occupational Safety and Health (NIOSH) guidelines in providing protection for on-site personnel including contract employees and subcontractor, the Engineer and other authorized site personnel. Provide details of protective clothing and equipment required for each work area in the Health and Safety Plan as required by Section 01545 - Safety, Medical and Security Requirements.

.4 Supply sufficient quantities of designated protection equipment to fit all site personnel including the Engineer and authorized visitors. Workers shall also be educated as to risks, and be trained in safe work practices.

.5 No separate pay item shall apply to the work practice requirements, including personnel protection, of this Section. Costs shall be included in the applicable payment items to which this Section applies.

1.9 Measurement for Payment

.1 The excavation of Tier I and Type A contaminated soil from all site areas (excluding landfill excavation), will be measured for payment by the cubic metre based on the product of the predetermined surface area and depth of excavation as indicated on the Drawings. Excavation of Tier I, Type A contaminated soil will be paid under Item A.02066-1 of the Schedule of Unit Prices.

.2 The scope of work for Payment Item A.02066-1 (Tier I - Type A Contaminated Soil Excavation - Site Areas) shall include:

.1 Excavation of Tier I - Type A contaminated soil from all site areas.
.2 On-site transport and disposal of the soil within an on-site landfill.
.3 The regrading or the supply, placement and compaction of granular fill to replace the excavated contaminated soil, as indicated on the Drawings.

.3 The excavation of Tier I soil from landfill excavations will be measured for payment as described in Section 02240 - Landfill Excavation.

.4 The excavation of Tier II contaminated soil and Tier II co-contaminated with Type A or B hydrocarbon contaminated soil, from all site areas (excluding landfills), will be measured for payment by the cubic metre of soil based on the product of the predetermined surface area and depth of excavation as indicated on the Drawings. Excavation of Tier II and Tier II - Type A/B contaminated soil will be paid under Item A.02066-2 of the Schedule of Unit Prices.

.5 The scope of work for Payment Item A.02066-2 (Tier II and Tier II, Type A/B Contaminated Soil - Site Areas) shall include:

.1 Excavation of Tier II and Tier II - Type A/B contaminated soil from all site areas.
.2 On-site transport and disposal of the soil in the on-site Tier II Disposal Facility.
.3 The regrading or the supply, placement and compaction of granular fill to replace the excavated contaminated soil, as indicated on the Drawings.

.6 The excavation of Tier II contaminated soil from landfill excavations will be measured for payment as described in Section 02240 - Landfill Excavation.

.7 The on-site transport and disposal of Tier I and Tier II contaminated soil excavated from the designated landfill areas will be measured for payment by the cubic metre as determined by truck box measurement, and paid under Item A.02066-3 of the Schedule of Unit Prices. The method of measurement by truck box shall be as described in Clause 1.7.12 of Section 02209 - Grading.

.8 The excavation of hazardous contaminated soil from landfill excavation, will be measured for payment as described in Section 02240 - Landfill Excavation.

.9 The on-site transport and containerization of hazardous contaminated soil excavated from designated landfill excavations will be measured for payment by the cubic metre of soil as placed in containers, and paid under Item A.02066-4 of the Schedule of Unit Prices.

.10 The scope of work for Payment Item A.02066-4 (Containerization of Hazardous Contaminated Soil - Landfill Excavation) shall include:

.1 Handling, on-site transport, and containerization of the hazardous contaminated soil.
.2 Placement of containers at the PIN-3 Temporary Storage Area.

.11 The supply and transport to the site of containers for hazardous contaminated soil, including leakproof liners, will be measured for payment by the cubic metre based on the interior volume of the container. Hazardous Contaminated Soil Containers will be paid under Item A.02066-5 in the Schedule of Unit Prices. Payment will not be made until written approval of containers by Transport Canada has been submitted to the Engineer.

.12 The supply and transport to the site of hydrocarbon resistant liners to be used in containers for hazardous contaminated soil containing hydrocarbon contamination will be measured for payment by the cubic metre based on the volume of hazardous contaminated soil as placed into the containers. Hydrocarbon resistant liners will be paid under Item A.02066-8 in the Schedule of Unit Prices.

.13 The excavation of Type B and Type B, Tier I hydrocarbon contaminated soil from all site areas (excluding landfill excavations) will be measured for payment by the cubic metre based on the product of the predetermined surface area and depth of excavation as indicated on the Drawings or as directed by the Engineer. Excavation of Type B and Type B - Tier I hydrocarbon contaminated soil will be paid under Item A.02066-6 of the Schedule of Unit Prices.

.14 The scope of work for Payment Item A.02066-6 (Type B and Type B, Tier I Hydrocarbon Contaminated Soil Excavation - Site Areas) shall include:

.1 Excavation of Type B and Type B - Tier I contaminated soil from all site areas.
.2 Handling, on-site transport, and placement of hydrocarbon contaminated soil within the landfarm area, including segregation of Type B - Tier I contaminated soil within the Landfarm.
.3 The reshaping or regrading, including the supply, placement and compaction of granular fill to replace the excavated contaminated soil, as indicated on the Drawings.

.15 The excavation of Type B and Type B - Tier I contaminated soil from landfill excavations will be measured for payment as described in Section 02240 - Landfill Waste Excavation.

.16 The on-site transport to the landfarm area of Type B and Type B - Tier I contaminated soil excavated from the designated landfill areas will be measured for payment as determined by truck box measurement, and paid under Item A.02066-7 of Schedule A - Schedule of Unit Prices. The method of measurement by truck box shall be as described in Clause 1.7.12 of Section 02209 - Grading.

.17 The unit price items, as described in Clauses 1.9.1, 1.9.4, 1.9.7, 1.9.9, 1.9.11, 1.9.12, 1.9.13 and 1.9.16 above, shall include direct costs only. All indirect costs associated with the work described in Clauses 1.9.1, 1.9.4, 1.9.7, 1.9.9, 1.9.11, 1.9.12, 1.9.13 and 1.9.16 above, including profit, camp, supervision, overhead, etc., shall be included in Schedule D – Balance of Project Complete in the Tender Form.

.18 No extra payment will be made for soil removed from beyond the specified limits of excavation, unless such removal has been specifically directed by the Engineer. No extra payment will be made for containerizing this soil. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TESTING, TRANSPORTATION AND DISPOSAL COSTS RESULTING FROM THE OVER-EXCAVATION OF CONTAMINATED SOIL. The volume of contaminated soil excavation beyond the specified limits that have been approved by the Engineer will be determined by the measured or surveyed area and depth.

.19 Grading of the Temporary Storage Area at PIN-3, including the supply, placement, and compaction of granular fill, as required, will be measured for payment as described in Clause 3.9 of Section 02209 - Grading.

.20 The following activities are considered incidental to the work and will not be measured separately:

.1 Provision of signage at the hazardous contaminated soil storage areas.
.2 Placement of liners into the hazardous contaminated soil containers.
.3 Preparation of records indicating the contents of soil containers.
.4 Equipment decontamination including preparation and operation of the equipment decontamination area.
.5 Dewatering of ponded contaminated soil areas, as required.
.6 Provision of all necessary safety equipment and clothing.

Costs for these activities are to be included in the unit prices for the elements of work described in this Section.

2.0 PRODUCTS

.1 Hazardous Contaminated Soil Container:

.1 Containers shall satisfy the requirements of the latest edition of the Transportation of Dangerous Goods Act and Regulations, and in particular, the requirements for Intermediate Bulk Containers for marine transport of hazardous materials.
.2 Container shall be appropriate for the type of material being transported.
.3 Submit details of the containers to the Engineer for review prior to commencement of the work as part of the Work Methodology Plan described in Clause 1.5 of this Section. These details shall include written confirmation from Transport Canada that the Contractor's proposed containers satisfy TDGA regulatory requirements for marine transport.

.2 Type 3 Granular Fill, as indicated on the Drawings, in accordance with Section 02209 - Grading.

.3 Hydrocarbon Resistant Liners: Reinforced Polyethylene (Oil-Resistant) OR RPE 25 as manufactured by Layfield Plastics or approved equivalent, to the following requirements:

.1 High strength, oriented-tape high density polyethylene (HDPE) scrim coated on both sides with an impervious HDPE coating for oil resistance.
.2 Thickness: 20 mil; 0.51 mm nominal.
.3 Coating Thickness: 2 mil 0.05 mm nominal.
.4 Tensile Strength (ASTM D751): 1512 N (340 pounds)
.5 Elongation (ASTM D751): 15 percent.
.6 Tear Strength (ASTM D751 Tongue Tear): 222 N (50 pounds).
.7 Low Temperature Bend (ASTM D2136): -55 degrees C.
.8 Burst Strength (ASTM D751): 4140 kPa.
.9 UV Resistance (G53-84; 2000 hours): >80 percent.

3.0 EXECUTION

3.1 Removal and Disposal of Contaminated Soil (Excluding Hazardous Contaminated Soil)

.1 Excavate the contaminated soil to the limits defined on the Drawings. In contaminated soil areas containing boulders, remove all organic materials and fine grained materials from the boulders. The use of hand excavation tools may be necessary for this work.

.2 Suppress dust generated during excavation operations with a water spray. Prevent surface water from entering the excavated area.

.3 Dewater ponded contaminated soil areas, as required. Comply with the requirements of the Waste Water Discharge Criteria indicated in Section 01560 - Environmental Protection.

.4 Transport the Tier I/Type A soil in a manner such that no soil or liquid will be spilled during transport to the designated site landfill.

.5 Place the soil in the designated landfill as per Section 02209 - Grading.

.6 Transport Tier II and Tier II - Type A/B contaminated soil in a manner such that no soil or liquid will be spilled during transport to the on-site Tier II Disposal Facility.

.7 Place Tier II and Tier II - Type A/B soil in the on-site Tier II Disposal Facility as per Section 02209 - Grading.

.8 Transport Type B and Type B - Tier I hydrocarbon contaminated soil in a manner such that no soil or liquid will be spilled during transport to the Landfarm Area.

.9 Place Type B and Type B - Tier I hydrocarbon contaminated soil in the Landfarm Area as per Section 02067 - Landfarm Operation.

.10 Clean the excavating equipment including the bucket, tracks, etc., of soil lumps and particles prior to mobilizing to the next contaminated soil area. Collect and dispose of the removed material in the appropriate on-site landfill/landfarm. Take special precautions to mitigate the tracking of contaminated soil over the site area.

.11 Decontaminate the equipment used for the excavation of Tier II and Type B contaminated soil in accordance with Clause 3.3 before commencing backfilling or contaminated soil excavation at another location.

.12 Replace excavated material with granular fill (as indicated on the Drawings), compact, and grade to match existing ground surface. Do not commence backfilling or regrading of the excavated contaminated soil areas until confirmatory testing has been completed by the Engineer, and the requirement for possible additional contaminated soil excavation is determined.

.13 Do not operate equipment in contaminated soil areas that have been excavated until the Engineer has confirmed, based on the results of confirmatory testing, that no further excavation of contaminated soil in the area is required.

3.2 Excavation of Hazardous Contaminated Soil

.1 Excavate the hazardous contaminated soil to the limits defined on the Drawings. In areas containing boulders, remove all organic materials from the boulders. The use of hand excavation tools may be necessary for this work.

.2 Prior to placing hazardous contaminated soil in containers, remove all boulders and rocks greater than 200 mm in maximum dimension. Remove CEPA hazardous contaminated soil from these materials.

.3 Suppress dust generated during excavation operations with a water spray. Prevent surface water from entering the excavated area.

.4 Dewater ponded hazardous contaminated soil areas, as required. Comply with the requirements of the Wastewater Discharge Criteria indicated in Section 01560 - Environmental Protection.

.5 Place the hazardous contaminated soil in containers as described in Clause 2.1 of this Section.

.6 Transport the soil in its container to the designated on-site Temporary Storage Area. PRIOR TO TRANSPORT OF MATERIALS, ENSURE THAT THE CONTAMINATED SOIL CONTAINERS ARE LEAKPROOF. IF CONTAINERS SHOW ANY EVIDENCE OF LEAKAGE, REMOVE THE CONTENTS FROM THE CONTAINER AND RE-CONTAINERIZE IN A LEAKPROOF CONTAINER, AS REQUIRED.

.7 Develop a numbering system for the identification of each hazardous contaminated soil container. Based on this numbering system, mark on the containers, the number and contents (e.g. CEPA Soil, CEPA Type B Soil) of the container. Submit to the Engineer, a listing of the numbered containers, their contents, and the Hazardous Contaminated Area designation from where the soil was excavated.

.8 Clean the excavating equipment including the bucket, tracks, etc., of soil lumps and particles prior to mobilizing to the next contaminated soil area. Collect and dispose of the removed material in the contaminated soil containers. Take special precautions to mitigate the tracking of contaminated soil over the site area.

.9 Decontaminate the equipment used for the excavation of hazardous contaminated soil in accordance with Clause 3.3 of this Section before commencing contaminated soil excavation at another location.

.10 Replace excavated material with granular fill (as indicated on the Drawings), compact, and grade to match existing ground surface. Do not commence backfilling or regrading of the excavated contaminated soil areas until confirmatory testing has been completed by the Engineer, and the requirement for possible additional contaminated soil excavation is determined.

.11 Do not operate equipment in contaminated soil areas that have been excavated until the Engineer has confirmed, based on the results of confirmatory testing, that no further excavation of contaminated soil in the area is required.

3.3 Equipment Decontamination

.1 Decontaminate equipment which comes into direct contact with the contaminated soils by steam cleaning or other means acceptable to the Engineer in a secure area capable of containing the waste generated by the washing operation.

.2 Collect and dispose of any contaminated soil that leaks, spills or otherwise leaves the piece of equipment during transport from the area of work to the decontamination area.

.3 Filter liquid waste resulting from the decontamination operation through an oil-absorbent material. The disposal requirements for the oil-absorbent material are dependent on the results of testing to be carried out by the Contractor. If test results indicate:

- PCBs <2 ppm;
- Chlorine <1,000 ppm;
- Cadmium <2 ppm;
- Chromium <10 ppm; and
- Lead <100 ppm,

then incinerate the oil-absorbent material on-site. Package oil-absorbent material containing contaminants in excess of the above criteria in accordance with TDGA and dispose off-site at a licensed disposal facility.

.4 Dispose of liquid waste in accordance with the Wastewater Discharge Criteria outlined in Section 01560 - Environmental Protection.

.5 Treat any waste soil resulting from the decontamination procedure as Tier II, Type B hydrocarbon and hazardous contaminated soil, depending on the source of the material, and handle accordingly.

3.4 Temporary Storage Area

.1 Store the hazardous contaminated soil containers in a single designated area, approved by the Engineer, to facilitate loading of the containers onto off-site transport equipment. Requirements for the Temporary Storage Area are described in Section 02209 - Grading.

.2 Within the Temporary Storage Area, store hazardous contaminated soil containers separately from any other shipping containers.

.3 For storage of hazardous waste materials, no stacking of containers will be allowed.

TABLE 02066-1
CONTAMINATED SOIL CONCENTRATIONS

Area Designation	Drawing Reference	Contaminant Concentration (mg/kg)
Garage	H-L13/1-9101-103	Copper: <100 to 670 Cadmium: <1.0 to 6.5 Lead: <100 to 670 Zinc: <15 to 6,000 PCBs: <0.5 to 17 TPH: <40 to 10,000
Diesel Re-fuelling Area	H-L13/1-9101-103	Copper: <100 to 120 TPH: <40 to 13,000
Station POL Pad	H-L13/1-9101-103	Copper: <100 to 1,600 Lead: <100 to 2,100 Zinc: <15 to 30,000 PCBs: <0.5 to 4.0 TPH: <40 to 9,000
Module Train	H-L13/1-9101-103	Copper: <3.0 to 1,600 Lead: <10 to 750 Zinc: <15 to 3,000 PCBs: <8.5 to 31 TPH: <40 to 18,000 (Type B)
Module Train Ash	H-L13/1-9101-103	Copper: 45 to 16,000 Nickel: 5.2 to 230 Cobalt: <5.0 to 69 Cadmium: <1.0 to 15 Lead: 49 to 3,400 Zinc: 230 to 31,000 PCBs: <0.5 to 35 Asbestos: 6 of 13 samples with 25-50% Chrysotile/Amosite Asbestos Content
Sewage Lagoon	H-L13/1-9101-103	Copper: <100 to 9,400 Zinc: <15 to 1,800 PCBs: <0.5 to 12 TPH: <40 to 3,300

TABLE 02066-1
CONTAMINATED SOIL CONCENTRATIONS

Area Designation	Drawing Reference	Contaminant Concentration (mg/kg)
Warehouse	H-L13/1-9101-103	Lead: 10 to 810 PCBs: <0.5 to 53
Hanger Area	H-L13/1-9101-105	PCBs: <0.5 to 12 TPH: <40 to 9,500
Beach POL	H-L13/1-9101-107	Lead: <10 to 430 TPH: <40 to _____ (Type B)
Beach Pallet Line	H-L13/1-9101-107	TPH: <13 to 3,200 (Type A)
Pallet Line	H-L13/1-9101-103	PCBs: <0.5 to 16 TPH: <40 to 26,000
Haz Mat Storage Area	H-L13/1-9101-103	Lead: <10 to 280 PCBs: <0.5 to 9.4 TPH: <40 to 22,000 (Type A)
North and Northeast Debris Areas	H-L13/1-9101-103	Copper: 4.0 to 19,000 Cadmium: <1.0 to 5.5 Lead: <10 to 11,000 Zinc: <15 to 5,000
Open Storage Area	H-L13/1-9101-103	PCB's: <0.5 to 9.4
Main Landfill	H-L13/1-9101-104	Copper: 4.8 to 1,000 Lead: <10 to 1,200 TPH: <40 to 57,000 (Type A)
NWS Landfill	H-L13/1-9101-104	Copper: 6.9 to 260 Lead: <10 to 5,900 TPH: <40 to 33,000 (Type A)

Notes:
1. TPH: Total Petroleum Hydrocarbon.
2. Parameters for analysis in any specific contaminated area were determined by the Environmental Sciences Group (ESG) - Royal Military College (RMC).
3. All analytical results provided by ESG.
4. Only contaminant concentrations in excess of Cleanup Criteria are reported for a specific parameter.

TABLE 02066-2
SOIL SAMPLE LEACHATE TEST RESULTS

Leachate Data	Garage S-C-1	Hangar Interior S-C-2	Sewage Lagoon S-C-3	Station POL Pad S-C-4	Station POL Pad S-C-5	Station POL Pad S-C-6	Warehouse S-C-7	North Debris Area #2 S-C-8	Module Train S-C-9	Module Train S-C-10	Module Train S-C-11	Module Train Ash A-C-1
Copper	<0.05		<0.05	<0.05	1.0	<0.05	<0.05	2.5	0.080	0.06	--	8.8
Nickel	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	0.27
Cobalt	<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	0.11
Cadmium	<0.005		<0.005	<0.005	0.044	<0.005	0.014	0.007	0.009	0.005	--	0.13
Lead	<0.05		<0.05	0.48	0.19	<0.05	<0.05	1.1	0.16	<0.05	--	1.6
Zinc	35		0.37	0.70	100	3.8	1.0	21	4.0	9.1	--	147
Chromium	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	0.07
Arsenic	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05
PCBs	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	<1.0		<1.0	1.2	<1.0	<1.0	<1.0	2.4	<1.0	<1.0	--	2.2
Mercury	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	--	<0.001
Selenium	<0.01		<0.01	<0.01	<0.01	<0.01	<0.010	<0.010	<0.010	<0.010	--	<0.01
Silver	<0.02		<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	--	<0.05
Boron	<1.0		<1.0	<1.0	<1.0	<1.0	<1.0	1.7	<1.0	<1.0	--	20
Cyanide	<0.2		<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	--	<0.1
Fluoride	<0.10		<0.10	<0.10	<0.10	<0.10	0.18	<0.10	0.14	<0.10	--	0.14
Chloride	<0.05	--	--	--	--	--	--	--	--	--	--	--

Data provided by Environmental Sciences Group - Royal Military College.

TABLE 02066-3
SUMMARY OF LOCATION FOR DISPOSAL OF CONTAMINATED SOILS BY TYPE

Designation / Co-Designation	Tier I	Tier II	Type A	Type B	Hazardous
None (No Co-contaminants)	Non-Hazardous Landfill or Intermediate Fill at Tier II Facility as Directed by the Engineer	Tier II Disposal Facility	Non-Hazardous Landfill	Landfarm	Containerize for off-site transport and disposal by others
Type A	Non-Hazardous Landfill or Intermediate Fill at Tier II Facility as Directed by the Engineer	Tier II Disposal Facility			Containerize for off-site transport and disposal by others
Type B	Landfarm	Tier II Disposal Facility			Containerize for off-site transport and disposal by others with Hydrocarbon Resistant Liners

1.0 GENERAL

1.1 Description

.1 This section specifies the requirements for the treatment of hydrocarbon contaminated soil.

1.2 Related Work

.1 Section 01410 - Testing Laboratory Services

.2 Section 01560 - Environmental Protection

.3 Section 02066 - Contaminated Soils

.4 Section 02090 - Hazardous Materials

.5 Section 02209 - Grading

.6 Section 02240 - Landfill Waste Excavation

.7 Section 02510 - Instrumentation

1.3 Definitions

.1 Contact Water: Water generated during the decontamination process and/or water that has come in contact with the contaminated soil in the treatment area.

.2 Primary construction clean up activities are those activities described in this contract up to the satisfactory clean up of the site, removal from the site of the construction camp, equipment and materials and submission to the Engineer of all contract submittals. Clauses 1.4 and 1.5, respectively, of Section 01110 - Mobilization and Demobilization.

.3 Secondary construction clean up activities are those activities carried out in support of the operation of the landfarm subsequent to 2003, including the closure of the landfarm.

.4 Event hectare is defined as tilling of 1 hectare of soil as described in Clause 3.3 of this Section.

1.4 Qualifications

.1 The Contractor shall be thoroughly familiar with and knowledgeable about existing site conditions, scope of work and requirements of the Specification.

.2 Only Contractor's personnel capable of demonstrating a history of satisfactory experience in the area of hazardous waste management and who can satisfy Federal and Territorial requirements will be permitted to carry out the work of this Section. The Contractor's superintendent responsible for the work of this Section shall have a minimum of five years experience in the area of hazardous waste management.

.3 Follow at all times, guidelines such as those established in Occupational Safety and Health Guidance Manual for Hazardous Waste Activities: NIOSH Publication No. 85-115 or Hazardous Waste Worker Training Manual: Canadian LIUNA - Contractors Training Council - 1992.

.4 All activities involving the handling and treatment of hydrocarbon contaminated soil, shall be directly supervised by Contractor's personnel who have successfully completed a 40 hour training course for Hazardous Waste Activities in compliance with OSHA 29 CFR 1910.120 or other approved equivalent training courses such as the Canadian Hazardous Waste Workers Program.

.5 Contractor's personnel trained as described in Clause 1.4.4 shall instruct and direct all workers with respect to the waste management procedures and labour and safety practices to be followed in carrying out the work.

.6 Provide workers with protection appropriate to the potential type and level of exposure. Establish specific safety protocols prior to commencing clean up activities, and include with the Work Methodology Plan described in Clause 1.5 of this Section.

.7 Provide suitable safety clothing and equipment as required during the course of the work.

1.5 Work Methodology Plan

.1 The Landfarming component of the Work Methodology Plan, as described in Section 01005 (Clause 22), is to address, but is not necessarily limited to:

.1 The schedule including dates and duration of hauling, stockpiling, as required, landfarm construction, excavation, treatment of contaminated materials, and disposal of wastes.

.2 A description of the principles of operation including landfarm operations, stockpiling plan, water management, properties and handling of nutrients, waste generation and disposal.

.3 A description of the equipment to be used, including but not limited to, tilling devices, pumps, valves, irrigation equipment, and nutrient application equipment.

.4 A description of the methods to be used for the sampling and testing of contact water from the Landfarm area, including the identification of the testing laboratory.

.5 Details of health and safety plans including experience and qualifications of personnel, training programs to be implement prior to commencing work, personnel protective equipment, decontamination procedures, and emergency response procedures.

.6 Compliance with all Federal, Territorial or other agencies regulations.

.7 Any other items that are pertinent to the work.

1.6 Site Conditions

.1 The approximate locations of known service or utility and buried objects are as indicated on the Drawings.

.2 Suspend operations whenever climatic conditions are unsatisfactory for treatment to conform with this Specification.

.3 After occurrence of heavy rains, do not operate equipment in designated areas until the material has dried sufficiently to prevent excessive rutting.

.4 Prior to the commencement of the work, remove debris, snow, ice and standing water from treatment area. Dispose of standing water in compliance with Section 01560 - Environmental Protection.

1.7 Protection

.1 Prevent damage to benchmarks, existing buildings, surface and underground service and utilities or culverts not designated for demolition. Immediately repair or replace any damage to the above, at no cost to the Owner.

.2 Environmental protection measures shall be in accordance with the requirements specified in Section 01560 - Environmental Protection.

.3 The release of all contact water, shall conform to the Waste Water Discharge Criteria outlined in Section 01560 - Environmental Protection.

1.8 Personnel Protection

.1 Areas designated for cleanup under this section involve soils or groundwater containing petroleum hydrocarbon products, which may be dangerous to human health.

.2 When working with hydrocarbon contaminated media, workers shall wear protective clothing and equipment acceptable to Labour Canada or Territorial Labour Department as suitable for exposure in the work area. Follow National Institute for Occupational Safety and Health (NIOSH) guidelines in providing protection for on-site personnel including contract employees and subcontractor, for Engineer and other authorized site personnel.

.3 Supply sufficient quantities of designated protection equipment to fit all site personnel including the Engineer and authorized visitors. Educate workers as to risks and train in safe work practices.

.4 No separate pay item shall apply to the work practice requirements, including personnel protection, of this Section. Costs shall be included in the applicable payment items to which this Section applies.

1.9 Signs

.1 Signage: Provide and erect signage at access points to the Landfarm Area. Signage shall be visible from all sides of these areas. The English version of the sign shall read:

CAUTION: CONTAMINATED SOIL LANDFARM AREA

AUTHORIZED PERSONNEL ONLY

Post a similar sign in the language of the local dialect.

.2 Graphic Symbols: All lettering shall conform to CAN-Z321-77, or latest edition thereof. All lettering shall be black, not less than 100 mm high, with a 25 mm wide stroke, on a white background.

1.10 Measurement for Payment

.1 The Contractor is advised that the Engineer reserves the right to remove from this contract all or any portion of the work related to the Landfarm Operations as described in this section.

.2 The supply, placement and compaction of Type 2 granular fill for the levelling course and perimeter berms of the Landfarm will be measured for payment by the cubic metre. The cubic metre measurement will be by the Average End Area Method as described in Clause 1.7.11 in Section 02209 - Grading. The supply, placement and compaction of Type 2 fill will be paid under Item A.02209-6 in the Schedule of Unit Prices.

.3 Include all direct costs for the following work items in the lump sum price for Landfarm Operation, Item B.02067-1, Schedule of Lump Sum Items, in the Tender Form:

.1 Construction of the perimeter collection system.
.2 Operation of the contact water collection system.
.3 Any testing associated with the disposal of contact water.
.4 Provision of signage at the Landfarm Area.

.4 The supply, transport to the site, and on-site storage of granular nutrient, will be measured for payment by the kilogram of granular nutrient in which the granular nutrient has a nitrogen loading of 20% by mass. Granular Nutrient will be paid under Item A.02067-1 in the Schedule of Unit Prices.

.5 The application of nutrient to the Landfarm Area will be measured for payment by the number of event hectares and will be paid under Item A.02067-2 during primary clean-up activities and Item A.02067-3 during secondary clean-up activities in the Schedule of Unit Prices in the Tender Form.

.6 The scope of work for Payment Items A.02067-2 and A.02067-3 (Nutrient Application) shall include application of granular nutrient over the entire landfarm area, at the application ratio (kg/hectare) specified by the Engineer, based on the nutrient content of the soil. Nutrient content testing will be carried out and paid for by the Engineer.

.7 The tilling of the Landfarm Area will be measured for payment by the number of event hectares and will be paid under Item A.02067-4 during primary clean-up activities and Item A.02067-5 during secondary clean-up activities in the Schedule of Unit Prices in the Tender Form.

.8 The scope of work for Payment Items A.02067-4 and A.02067-5 (Tilling Events) shall include tilling of the contaminated soil over the entire landfarm area to a maximum depth of 0.5 metres and any moisture conditioning or snow removal required.

.9 The unit price items, as described in Clauses 1.10.4, 1.10.5 and 1.10.7 above, shall include direct costs only. All indirect costs associated with the work described in Clauses 1.10.4, 1.10.5 and 1.10.7 above, including profit, camp, supervision, overhead, etc., shall be included in Schedule D – Balance of Project Complete in the Tender Form.

.10 Include all direct costs for the following work items in the lump sum price for Landfarm Closure, Item B.02067-2 in the Schedule of Lump Sum Items in the Tender Form.

.1 Consolidation of treated contaminated soil within one area of the landfarm.
.2 Excavation of granular materials from the perimeter berms, and placement of this material as cover over the treated contaminated soil area.
.3 Supply, placement, and compaction of additional granular fill over the treated contaminated soil area.
.4 Reshaping of the landfarm areas.
.5 Spreading of all remaining granular nutrient in areas designated by the Engineer.
.6 Decommissioning of groundwater monitoring wells including backfill with appropriate grout.

.7 The supply, placement and compaction of additional Type 3 granular fill to complete the closure of the landfarm will be measured for payment by the cubic metre and paid under Item A.02209-7 - Type 3 Granular Fill. The cubic metre measurement will be by truck box measurement as described in Clause 1.7.12 of Section 02209 - Gracing.

.11 The lump sum payment for demobilization of all labour, equipment and materials to support landfarming operations after 2003 are completed will be paid under B.01110-3 of the Lump Sum Payment Items as described in Clause 2.3 of Section 01110 - Mobilization and Demobilization.

.12 All indirect costs associated with the work described in Clauses 1.10.2 and 1.10.8 including supervision, overhead, profit, etc., as well as fixed camp costs shall be included in Schedule D - Balance of Project Complete in the Tender Form.

.13 The containerization and on-site transport of hazardous materials generated during the operation of the Landfarm will be paid under the Unknown Hazardous Material Collection Prime Cost Allowance as described in Section 01020.

.14 The supply and installation of groundwater monitoring wells at the perimeter of the Landfarm Area will be measured for payment by the number of monitoring wells supplied and installed, as described in Section 02510 - Instrumentation.

.15 The provision of all necessary safety equipment and clothing, signage and moisture conditioning of the contaminated soil is considered incidental to the work and will not be measured separately. Costs for safety equipment are to be included in the unit prices or lump sum prices for the elements of work described in this Section.

2.0 PRODUCTS

2.1 Materials

.1 Granular Fill: Type 2 Granular Fill as described in Section 02209 - Grading.

.2 Granular Nutrient (Fertilizer):

.1 Minimum Nitrogen Loading: 45 kg/hectare; for example, if the nitrogen concentration in the nutrient is 20% by weight, then the application ratio of the nutrient would be 225 kg/hectare.

.2 Minimum Phosphorous Loading: 10 percent of Nitrogen load.

.3 Slow release nitrogen and phosphorous.

.4 Provide supporting information to demonstrate that the granular nutrient has been used successfully on large scale remediation programs.

.5 Prior to shipment of material to the site, submit to the Engineer the manufacturer's certification that the granular nutrient satisfies the requirements of this Specification, as well as the following information:

.1 Material Safety Data Sheet (MSDS).
.2 Colour.
.3 Specific gravity.
.4 Unit weight.
.5 TDG Classification.
.6 Manufactured Date.
.7 Shelf-life.

.6 The granular nutrient transported to the site shall remain the property of the Owner.

.3 Monitoring Wells: as described in Section 02510 - Instrumentation.

3.0 EXECUTION

3.1 Landfarm Construction

.1 Construct Landfarm for the treatment of Type B Hydrocarbon Contaminated soils, at the location as shown on the Drawings, or as approved by the Engineer. The Landfarm shall be located:

.1 at least 100 metres from any body of water, and in an area that is free of ponded water;
.2 to provide for the convenient access of equipment;
.3 at least 500 metres from the Contractor's construction camp, Engineer's office, and site laboratory; and
.4 in an area that is relatively free of boulders and that is generally level.

.2 Provide for access to the Landfarm area to facilitate entrance and exit of equipment and trucks from the area during operation.

.3 Place a minimum 150 mm depth of Type 2 Granular Fill as a levelling course over the plan area of the Landfarm in accordance with Section 02209 - Grading.

.4 Construct perimeter berms and the perimeter collection system to the dimensions and grades as shown on the Drawings.

.5 Compact all Type 2 Granular Fill to 95% of Maximum Dry Density with a smooth drum compactor and finish with a tight surface.

.6 Install monitoring wells at locations as directed by the Engineer, in accordance with Section 02510 - Instrumentation, prior to the placement of any contaminated soil in the Landfarm.

3.2 Placement of Type B Hydrocarbon Contaminated Soil

.1 Place Type B Hydrocarbon Contaminated Soil within the Landfarm Area in accordance with Clauses 3.1.2 to 3.1.8 of Section 02066 - Contaminated Soils.

.2 If required, stockpile contaminated soil within the Landfarm, at the high end of the Landfarm area. Stockpile not to exceed one metre in height.

.3 Upon completion of placement of the contaminated soil, spread the contaminated soil in a layer not to exceed 400 mm in thickness. Grade contaminated soil to provide a minimum slope of 1.5 to 4 percent towards the low end of the Landfarm area.

3.3 Landfarm Operation

.1 Distribute granular nutrient evenly over the surface of the contaminated soil using a cyclone type spreader or other methods acceptable to the Engineer. Distribute at an application rate that will provide the minimum nitrogen loading, or as directed by the Engineer.

.2 The Engineer will confirm the application rates of the granular nutrients with the Contractor based on the results of testing to be carried out by the Engineer prior to landfarm operation, and on the nitrogen loading of the nutrient provided by the Contractor.

.3 Moisture condition the landfarm area as required by application of water spray, to maintain a water content within the soil of approximately 10 percent. Testing of the water content of the soil shall be carried out on a weekly basis during primary clean-up activities and at the Engineer's discretion afterwards.

.4 Following application of the nutrients, till the full thickness of the contaminated soil.

.5 Unless otherwise directed by the Engineer, till the full thickness of the contaminated soil once per twenty days of operation. During periods of prolonged warm, dry weather, increase the frequency of tilling to every fifth day. During periods of precipitation, delay tilling of the soil until the soil is considered damp to a depth of 100 millimetres. Alternate the direction of tilling between lengthwise, cross-wise and diagonal.

.6 Suspend tilling and irrigation operations if the average daily temperature is below 0°C for a period exceeding 5 days.

.7 Inspect perimeter collection system weekly, and after any precipitation event to ensure overflow has not occurred. Provide immediate containment and repair berm in an overflow situation.

.8 Collect and test all contact water in the perimeter collection system as required to ensure a sufficient volume can be released to prevent overflow of the system and prior to the end of each operation season. Discharge of water shall conform to the Waste Water Discharge Guidelines in Section 01560 - Environmental Protection. Dispose of contact water not conforming to these guidelines as hazardous material in accordance with Section 02090 - Hazardous Material.

.9 Submit to the Engineer on a monthly basis, a Landfarm Operation Report which shall include the following information:

.1 Volume of contaminated soil placed.
.2 Dates of tilling.
.3 Date and application rate of granular nutrient.
.4 Results of testing of contact water.
.5 Climate data including average daily temperature, dates of precipitation events, and amount of precipitation.

.10 At the beginning of the second and subsequent seasons of landfarm operation:

.1 Clear any and all accumulated snow from the Landfarm area.
.2 Do not commence tilling of the contaminated soil until depth of thaw exceeds 150 mm.

3.4 Landfarm Closure

.1 At the conclusion of the third season of landfill operation, or as directed by the Engineer, carry out the following work to close the Landfarm:

.1 Consolidate the treated contaminated soil within one area of the Landfarm to a maximum depth of 1 metre.
.2 Excavate granular material from the Landfarm perimeter berms and place this material over the consolidated contaminated soil area.
.3 Place and compact granular material from the perimeter berms as directed by the Engineer to provide a cover over the contaminated soil area. Supply, haul and place additional Type 3 material to provide a 300 mm minimum depth of compacted granular fill as cover over the contaminated soil area. Compact all granular fill cover to 95 percent Maximum Dry Density.
.4 Grade the surface of the area to a minimum slope of 2% to 4% to promote surface water run-off.
.5 The decommissioning of groundwater monitoring wells, including backfill with appropriate grout.
.6 THE CONTRACTOR SHALL PROVIDE TO THE ENGINEER TWO WEEKS NOTICE PRIOR TO CLOSURE OF THE LANDFARM.

3.5 Testing

.1 Testing of hydrocarbon contaminated soil in the Landfarm will be carried out and paid for by the Engineer. Frequency of testing will be determined by the Engineer.

.2 The Contractor is responsible for all testing associated with the disposal of all contact water, and for the testing of water collected in the perimeter collection system.

1.0 GENERAL

1.1 Related Work

.1 Section 01500 - Temporary Facilities.

.2 Section 01545 - Safety, Medical, Security Requirements.

.3 Section 01560 - Environmental Protection.

.4 Section 02060 - Demolition.

.5 Section 02090 - Hazardous Waste Material.

.6 Section 02209 - Grading.

.7 Section 02219 - Debris Removal.

.8 Section 02240 - Landfill Waste Excavation.

1.2 Scope of Work

.1 Comply with the requirements of this Section when performing the following work:

.1 Type 1 (Low Risk) Asbestos Removal for asbestos wall panels, asbestos duct cloth, flue stack covering, and vinyl asbestos floor tile from buildings scheduled for demolition.

.2 Type 2 (Moderate Risk) Asbestos Removal for minor removal of friable asbestos containing materials and removal of false ceilings where a significant quantity of friable material containing asbestos is likely to be lying on the surface of the false ceiling in buildings scheduled for demolition.

.3 Type 3 (High Risk) Asbestos Removal for removal of friable asbestos material other than minor removal including asbestos pipe and duct insulation from buildings scheduled for demolition. The Glove Bag Method may be used in place of Type 3 Asbestos Removal.

.4 Removal of all asbestos pipe and duct insulation using the Glove Bag Method or optional pipe removal method.

.5 Transport and containerization or stockpiling of all asbestos materials removed from buildings scheduled for demolition, from the collection and sorting of site debris, and/or as specified for removal as stated above.

1.3 Definitions

.1 Airlock: A system for permitting ingress or egress without permitting air movement between a contaminated area and an uncontaminated area, typically consisting of two curtained doorways at least 2 m apart.

.2 Amended Water: Water to which a non-ionic surfactant has been added to reduce surface tension to allow thorough wetting of asbestos fibres.

.3 Asbestos Containing Material: Any material which has been shown by laboratory analysis to contain more than 1% asbestos by weight or volume.

.4 Asbestos Process: Any handling of material containing asbestos, including: the sawing, cutting, drilling, or abrasion of asbestos material; the packing or unpacking of asbestos; the installation, removal, encapsulation or enclosure of asbestos insulation or covering; the mixing or application of asbestos cement, plasters, putties, or similar compounds; the cleaning of asbestos-contaminated clothing; the storage, conveyance or disposal of material containing asbestos or; any maintenance of asbestos material that causes the release of asbestos fibres.

.5 Asbestos Waste Receptacle: Two separate containers shall consist of 0.15 mm (6 mil) minimum thickness sealable polyethylene bag. The other container may be 0.15 mm (6 mil) minimum thickness polyethylene bag, or rigid sealable container such as cardboard, fibre drum or wooden box. The container shall be adequate to prevent perforating rips, or tears during filling, transport or disposal. The container must be accepted by the environmental approving authority. All containers must be clearly labelled to identify asbestos waste.

.6 Asbestos Work Area: Space bounded by containment barricades or enclosures in which asbestos process is being performed.

.7 Authorized Visitor: The Engineer or his representative and persons representing regulatory agencies.

.8 Clean Area: An area which has been identified as not having airborne fibrous asbestos contamination which exceeds 0.05 fibres/cc.

.9 Contaminated Area: An area which has been identified as having an airborne asbestos fibre count greater than 0.05 fibres/cc.

.10 Curtained doorway: An arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, typically constructed by placing two overlapping sheets of polyethylene over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of one sheet along one vertical side of the doorway, and securing the vertical edge of the other sheet along the opposite vertical side of the doorway. All free edges of polyethylene shall be reinforced with duct tape and the bottom edge shall be weighted to ensure proper closing. Each polyethylene sheet shall overlap openings not less than 1.5 m on each side.

.11 Disposable Coveralls: Full-body, one piece poly-laminated type with permanently attached hood having elasticized tight fitting sleeves and leg cuffs. The waist and ankle junctions of the coveralls may be taped if necessary to prevent contamination of skin and underclothing without restricting physical movement.

.12 Disposable Gloves: Eleven inch latex or rubber disposable gloves.

.13 Friable Material: Material that is crumbled, pulverized or powdered or that when dry can be crumbled, pulverized or powdered by hand pressure.

.14 Glove Bag: Prefabricated, 0.25 mm (10 mil) minimum thickness polyvinyl chloride bag with integral 0.25 mm (10 mil) thick polyvinyl chloride gloves and elasticized ports. The bag is equipped with a reversible double-pull double throw zipper on top to facilitate installation on pipe and progressive movement along pipe and with straps for sealing ends of bag around pipe.

.15 Glove Bag Knife: Knife with full retractable blade for use inside Glove Bag.

.16 Ground Fault Panel: Portable electrical panel equipped with ground fault circuit interrupters (5 mA protection) of sufficient capacity to power all electrical equipment and lights in asbestos work enclosure. Panel complete with ground fault interrupter lights, test switch to ensure unit is working, and reset switch. Installed by licensed electrician.

.17 HEPA Vacuum: High Efficiency Particulate Aerosol filtered vacuum equipment with a filter system capable of collecting and retaining fibres greater than 0.3 microns in diameter at 99.97% efficiency.

.18 Isolate or Enclose: Placing an impermeable barrier between the friable asbestos material and the working area.

.19 Material Decontamination Facilities: Shall be comprised of a Decontamination Room, Holding Room and Transfer Room as follows:

.1 Decontamination Room: Decontamination Room to be located between the Asbestos Work Area and Holding Room with two curtained doorways, one to the Asbestos Work Area and one to the Holding Room. Provide high pressure low volume sprays for washing of drums and equipment. Pump wastewater through 5 micrometre filter system before directing into drains. Provide piping and connect to water sources and drains.

.2 Holding Room: Holding Room to be located between the Decontamination Room and the Transfer Room, with two curtained doorways, one to the Decontamination Room and one to the Unloading Room. The Holding Room shall be of sufficient size to accommodate at least two barrels and the largest item of equipment used.

.3 Transfer Room: Transfer Room to be located between the Holding Room and the outside, with two curtained doorways, one to the Holding Room and one to outside.

.20 Minor Removal: Minor removal of friable asbestos corresponds to Type 2 Asbestos Removal. This is limited to 6 m or less of asbestos pipe insulation or equivalent friable surface area material. Beyond these limits Type 3 Asbestos Removal is required.

.21 Negative Pressure System: A system which extracts air directly from the work area, filters it through a HEPA filtering system, and discharges it directly outside the work area to the exterior of the building. This system shall maintain a minimum pressure differential of 5 Pa relative to adjacent areas outside of work areas and shall be equipped with an alarm to warn of system breakdown. In partially occupied buildings, an instrument is to be provided to monitor and record pressure differences. The rated total capacity of units with filters in place shall be sufficient to provide complete air exchange in work area every 15 minutes.

.22 Personnel Decontamination Facilities: Shall be comprised of an Equipment Room, a Shower Room, and a Clean Room, as follows:

.1 Clean Room: Clean Room to be located between the Shower Room and clean areas outside of enclosures, with two curtained doorways, one to outside of facilities and one to Shower Room. Provide lockers or hangers for workers' street clothes and personal belongings. Provide storage for clean protective clothing and respiratory equipment. Install a mirror to permit workers to fit respiratory equipment properly, and sufficient hangers and hooks.

.2 Equipment Room: Equipment Room to be located between Shower Room and work areas, with two curtained doorways, one to the Shower Room and one to work areas. Provide waste receptor and storage facilities for workers' shoes and any other protective clothing to be reworn in work areas. The Equipment Room shall be large enough to accommodate specified facilities, any other equipment needed, and at least one worker allowing him sufficient space to undress comfortably.

.3 Shower Room: Shower Room to be located between the Clean Room and Equipment Room, with two curtained doorways, one to the Clean Room and one to the Equipment Room. Provide one shower for every five workers. Provide a constant supply of hot and cold or warm water. No water containing fibres other than from showering shall enter the drains. Provide soap, clean towels and appropriate containers for disposal of used respirator filters.

.23 Polyethylene Sheeting: Polyethylene sheeting of 0.15 mm (6 mil) minimum thickness with tape seals along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide continuous polyethylene membrane protection.

.24 Rip-Proof Polyethylene: 0.24 mm(8 mil) fabric made up from 0.13 mm (5 mil) weave and 2 layers 0.04 mm (1.5 mil) poly-laminate, in sheet size to minimize joints.

.25 Safety Foot Wear: Construction safety (leather or rubber) boots acceptable to the territorial ministry of labour.

.26 Securing Straps: For glove bag, reusable nylon straps at least 25 mm wide with metal tightening buckle for sealing ends of bags around pipe and/or insulation.

.27 Slow Drying Sealer: Non-staining, clear, water dispersible type that remains tacky on surface for at least 8 hours and is designed for the purpose of trapping residual asbestos fibres. Sealer shall have a flame spread and smoke development rating less than 50.

.28 Sprayer: Garden type, low velocity, portable manual sprayer, capable of producing fine spray.

.29 Tape: Tape suitable for sealing polyethylene to surface encountered under wet and dry conditions.

.30 Type 1 Asbestos Removal: An asbestos removal technique which applies only to material which can be removed intact, or in pieces or sections, without producing crumbled, pulverized or powdered waste, and includes these materials which may be coated with PCB-amended paint. Materials such as asbestos-containing plasters, texture finishes and fireproofing which, during the removal procedure become pulverized or powdered waste, are covered under Type 2 or Type 3 removals as applicable.

.31 Type 2 Asbestos Removal: An asbestos removal technique which applies to minor handling of friable asbestos in any given area. This work is classified by the following two types applicable to DEW Line Cleanup work:

.1 Ceiling Entry which may disturb friable asbestos containing materials above the ceiling system; and
.2 Minor Removal of friable asbestos containing material including asbestos pipe and duct insulation.

This removal technique also applies to the above materials which may be coated with PCB-amended paint.

.32 Type 3 or Glove Bag Asbestos Removal: Asbestos removal techniques for friable asbestos material (other than the minor removal). This work applies to the following DEW Line Clean Up work:

.1 Removal of friable asbestos pipe and duct insulation; and
.2 Manual excavation of asbestos from landfills.

This removal technique also applies to the above materials which may be coated with PCB-amended paint.

.33 Wetting Agent: Non-sudsing surface active agent; mixed with water in concentration to provide thorough wetting of asbestos fibre.

1.4 Regulatory Requirements

.1 Comply with the following regulations pertaining to asbestos. If these requirements or specifications conflict, the more stringent requirement shall apply:

.1 Nunavut Government Safety Regulations Handbook
.2 Transportation of Dangerous Goods Act.

1.5 Work Methodology Plan and Submittals

.1 The Asbestos Abatement component of the Work Methodology Plan, as described in Clause 22 of Section 01005 - General Instructions, is to include and/or address, but is not necessarily limited to:

.1 Supply of containers and/or method for handling and disposing of asbestos.
.2 An asbestos transport plan showing mode of on-site transport.
.3 A description of the methods for the handling and disposal of asbestos covered with PCB-amended paint.
.4 A copy of instructions as provided to all workers describing the hazards of asbestos exposure, respirator use, clothing, use of showers, entry and exit from work areas, and all other aspects of work procedures and protective measures.
.5 Layout of proposed enclosures.
.6 Details of health and safety plans including the experience and qualifications of personnel to carry out the asbestos abatement requirements, and training programs to be implemented prior to commencing the work.
.7 Record keeping and reporting methods.
.8 Work schedule.
.9 Compliance with all regulations.
.10 Any other items that are pertinent to the Work.

1.6 Existing Conditions

.1 General information pertaining to material containing asbestos to be handled, removed, or otherwise disturbed during this project is noted on the Drawings and in the Demolition Tables in the Appendix. Original asbestos survey data was provided by the United States Air Force (1990).

.2 Notify the Engineer of friable material discovered during the work which was not apparent from the Drawings or Specifications pertaining to the work. Do not disturb such material pending instructions from the Engineer.

1.7 Instruction and Training

.1 The Contractor's Superintendent shall have attended a minimum 48 hour asbestos abatement course approved by the Engineer and have a minimum two years of experience in Type 1, Type 2, Type 3, and glove bag asbestos removal techniques.

.2 Instruction and training related to asbestos abatement shall include:

.1 Demonstration and instruction in the use of all protective equipment, including:
.1 The limitations of the equipment.
.2 The inspection and maintenance of the equipment.
.3 The fitting of the equipment.
.4 The decontamination of the equipment.
.2 Safe handling and proper disposal of asbestos.
.3 Health education information.

1.8 Personnel Protection Requirements

.1 Type 1 Asbestos Removal:

.1 Respirators are not mandatory for work with non-friable asbestos-containing materials. If workers request, provide non-powered, half-face air purifying respirators with high efficiency (HEPA) cartridge filters. Provide proper instruction to workers in use of respirators including qualitative fit testing. Replace filters as necessary, according to manufacturer's instructions.
.2 Provide at minimum, two full-face respirators for personnel who cannot be satisfactorily fitted with half-face respirators.
.3 Provide facilities for all workers for washing of hands and face when leaving Asbestos Work Area. Prohibit smoking, eating and drinking in Asbestos Work Area.

.2 Type 2 Asbestos Removal:

.1 Before entering Asbestos Work Area(s), instruct workers and visitors in use of respirators, procedures for entry and exit from enclosures and all aspects of work procedures and protective measures. Qualitative fit testing of respirators shall be carried out prior to entering the Asbestos Work Area. Instruction shall be provided by competent person as defined by the Nunavut Safety Act.
.2 Provide respiratory equipment for all persons entering Asbestos Work Area enclosure including authorized visitors. When doing work which will or may disturb asbestos-containing materials, workers, supervisors, and authorized visitors must be supplied with and use non-powered, half-face respirators with high efficiency (HEPA) cartridge filters. Filters, once used, shall be replaced daily or tested according to manufacturer's specifications and replaced as necessary. No supervisor, worker or authorized visitor shall wear facial hair which affects the seal between respirator and face.
.3 Provide at minimum, two full-face respirators for personnel who cannot be satisfactorily fitted with half-face respirators.
.4 Provide workers and visitors with full-enclosure sites and full body coveralls with integral hoods. Once coveralls are worn in Asbestos Work Area, treat and dispose of as asbestos contaminated waste. Workers and visitors shall also wear other protective apparel as required under local construction regulations.

.5 Before entering enclosure(s), put on respirator with new or tested filters, clean coveralls and head covers. Wear coveralls with hoods up at all times.

.6 Workers may leave enclosure only after all disturbance of asbestos-containing materials is complete and enclosure has been cleaned up. When leaving enclosure, workers and visitors must use the HEPA vacuum to clean the exterior of their respirator to remove visible contamination, and remove gross contamination from coveralls and other protective equipment. Immediately upon leaving enclosure, workers and visitors shall remove coveralls and wash face and hands thoroughly with soap and water. The inside of each respirator shall be wetted and cleaned. Remove filters and dispose or test according to manufacturer's specifications. Place coveralls and used filters in receptacles for disposal with other asbestos-contaminated materials. Coveralls can be reused, to a maximum of 8 hours wear, as long as coveralls remain inside work area.

.7 Do not eat, drink, smoke or chew gum or tobacco in enclosures.

.8 Fully protect workers and visitors as specified herein whenever the possibility of disturbance of asbestos exists.

.3 Glove Bag Removal of Pipe and Duct Insulation: This method may be used in place of Type 3 Asbestos Removal:

.1 Before entering Asbestos Work Area(s), instruct workers and visitors in use of respirators, use of glove bags, and all aspects of work procedures and protective measures. Instruction shall be provided by a competent person as defined by the Nunavut Safety Act.

.2 Workers performing glove bag removal shall wear as a minimum, non-powered half-face respirators with high efficiency (HEPA) cartridge filters. Provide approved respirators to visitors. Replace filters daily or test according to manufacturer's specifications and replace as indicated. Provide instruction to users in use of respirators, including qualitative fit testing. No user shall wear facial hair which affects seal between respirator and face. Maintain respirators in proper functioning and clean condition, or remove from site.

.3 Provide at minimum, two full-face respirators for personnel who cannot be satisfactorily fitted with half-face respirators.

.4 Provide workers and visitors with full body coveralls with integral hoods. Once coveralls are worn in the asbestos work area, dispose of as contaminated waste. Workers and visitors shall also wear other protective apparel as required under local construction regulations.

.5 Do not eat, drink, smoke or chew gum or tobacco in Asbestos Work Area.

.4 Type 3 Asbestos Removal: This method may be used in place of the Glove Bag Method:

.1 Before commencing work, instruct workers in use of respirators, dress, showers, entry and exit from work areas, and all aspects of work procedures and protective measures.

.2 Provide workers with personally issued and marked respiratory equipment acceptable to Labour Canada or territorial labour department as suitable for asbestos exposure in the work area.

.1 For wet removal of amosite or crocidolite asbestos, provide positive pressure, full-face piece, powered air purifying respirators (PAPR) with high efficiency filters. If only chrysotile asbestos is present, non-powered half-face respirators with HEPA filters are acceptable for use during wet removal. Where friable asbestos cannot be wetted, a supplied air positive pressure, full-face piece respirator is required.

.2 No worker, supervisor or authorized visitor may have facial hair which prevents a proper seal between respirator face piece and skin. All respiratory equipment used shall be approved and labelled for protection against asbestos fibres and shall meet the design and usage requirements of the National Institute of Occupational Safety and Health (NIOSH) or equivalent criteria. If disposable type filters are used, provide sufficient filters so that workers can install new filters following disposal of used filters and before re-entering contaminated areas.

.3 Provide at minimum, two full-face respirators for personnel who cannot be satisfactorily fitted with half-face respirators.

.3 Remove street clothes in clean change room of the personnel decontamination facility and put on clean coveralls, head covers, safety footwear, disposable gloves and a respirator with new filters or reusable filters that have been tested as satisfactory, before entering shower room. If reusable protective clothing is used, each worker shall remove all street clothes in clean room, proceed naked into shower room, don respirator only in shower room and proceed into the equipment room to dress into protective clothing prior to entering asbestos work area. All street clothes, uncontaminated footwear, towels, and similar uncontaminated articles shall be stored in clean change room only.

.4 Remove gross contamination from clothing before leaving work area and proceed to the Equipment Room and remove all clothing except respirators. Place contaminated work suits in receptacles for disposal with other asbestos contaminated materials. Leave reusable items except respirator in Equipment Room. Still wearing the respirator, proceed naked to the showers. Clean outside of respirator with soap and water while showering; remove respirator; remove filters for testing or disposal in the container provided for this purpose; and wash and rinse the inside of the respirator. Test filters according to manufacturer's recommendations or dispose of filters daily. When not in use in the work area, store work footwear in Equipment Room. Upon completion of asbestos abatement, dispose of footwear as contaminated waste or clean thoroughly inside and out using soap and water before removing from work area or from Equipment Room.

.5 Following showering and drying off, proceed to Clean Change Room and dress in street clothes at the end of each day's work, or in clean coveralls if work area will be re-entered.

.6 For removal of materials from the Asbestos Work Area, enter the Transfer Room from outside dressed in clean coveralls to remove drums and equipment from the Holding Room of the material decontamination facility. No worker shall use this system as a means to leave or enter the work area.

.7 Workers shall be fully protected with respirators and protective clothing during all work which may disturb asbestos containing material, including work prior to commencing actual asbestos removal, encapsulation or enclosure.

.8 Provide and post in Clean Change Room and in Equipment Room the procedures described in Clauses 1.4 and 1.5 of this Section, in the English language plus the local dialect.

.9 Eating, drinking, chewing, and smoking, are not permitted in the Work Area.

.5 PCB-Amended Painted Asbestos Materials:

.1 Some areas designated for asbestos abatement under this contract involve materials which contain polychlorinated biphenyls. PCBs at concentrations in excess of 50 ppm are considered to be hazardous substances. Storage, handling and disposal of PCBs are regulated under the Canadian Environmental Protection Act and the Federal Transportation of Dangerous Goods Act. Comply with all applicable regulations.

.2 When working with PCB containing materials, workers shall wear protective clothing and equipment acceptable to Labour Canada or Territorial Labour Department as suitable for exposure in the work area. Follow National Institute for Occupational Safety and Health (NIOSH) guidelines in providing protection for on-site personnel including contract employees and subcontractor, the Engineer and other authorized site personnel.

.3 Supply sufficient quantities of designated protection equipment to fit all site personnel including the Engineer and authorized visitors. Workers shall also be educated as to risks, and be trained in safe work practices.

.4 No separate pay item shall apply to the work practice requirements, including personnel protection, of this Section. Costs shall be included in the applicable payment items to which this Section applies.

1.9 Environmental Protection

.1 Environmental protection measures shall be in accordance with Section 01560 - Environmental Protection.

1.10 Notification

.1 Prior to commencement of asbestos abatement work, meet with Nunavut Government officials (Chief Safety Officer) to discuss asbestos removal requirements. Provide the Engineer with a copy of minutes from this meeting.

.2 Provide a written schedule to the following agencies 30 days prior to commencement of asbestos abatement work:

.1 The appropriate Regional or Zone Director of the Medical Services Branch, Health and Welfare Canada.
.2 Regional Office of Human Resources Development Canada, Labour Program.
.3 Nunavut Government Chief Safety Officer.

.3 Submit to the Engineer a copy of all notifications prior to the start of work.

1.11 Work Schedule

.1 The asbestos removal Contractor shall have complete control over the affected work area during asbestos removal.

.2 Do not commence asbestos abatement work until:

.1 Minutes from the meeting between the Contractor and Territorial regulatory authorities been provided to the Engineer.
.2 Written approval of the Contractor's Asbestos Abatement Work Methodology Plan has been provided by the Nunavut Government. Provide a copy of the written approval to the Engineer.
.3 Arrangements have been made for filtering wastewater through a 5 micrometre filter prior to discharge.
.4 Wet vacuuming of dust has been completed.
.5 Work and decontamination areas are effectively segregated.
.6 Tools, equipment and material waste receptors are readily available.
.7 Arrangements have been made for daily inspections by the Contractor.
.8 All other preparatory steps have been taken.
.9 All permits have been obtained.
.10 All warning signs have been mounted at work access locations.

.3 The Engineer reserves the right to order an immediate stop to all work if it is considered that practices are violating pertinent regulations or endangering workers.

1.12 Air Monitoring

.1 From commencement of work until completion of cleaning operations, arrange for air monitoring both inside and outside of Asbestos Work Area enclosures.

.2 Monitor air in accordance with NIOSH Method 7400, or with a fibrous aerosol monitor.

.3 If air monitoring shows that areas outside work area enclosures are contaminated, then enclose, maintain and clean these areas in the same manner as that applicable to Asbestos Work Areas.

.4 Use the results of air monitoring inside work areas to establish the type of respirators to be worn.

.5 Workers may be required to wear asbestos sample pumps for up to full shift periods.

.6 Air monitoring shall comply with the requirements of the Canada labour code, Hazardous Substances Regulations, Part X, which specifies a maximum occupational exposure standard of 0.1 fibres per cubic centimetre of air, as determined by the standard Phase Contrast Microscope Method.

1.13 Signs

.1 Signage: Display signs in all work areas where access to a contaminated area is possible. The English version of the signs shall read:

CAUTION, ASBESTOS HAZARD AREA.
UNAUTHORIZED ENTRY PROHIBITED.
WEAR PROTECTIVE EQUIPMENT.

Post a similar sign in the language of the local dialect.

.2 Sign letters: all lettering shall be HELVETICA Medium font. The letter size shall be:

English:	
Caution, Asbestos Hazard Area.	25 mm
Unauthorized entry prohibited:	19 mm
Wear Protective Equipment	19 mm

1.14 Measurement For Payment

.1 The removal, packaging and disposal of asbestos from buildings, structures and facilities to be demolished will be measured for payment as described in Section 02060 - Demolition. Costs shall include:

.1 Supply of all materials, labour, and equipment necessary to perform the work in accordance with these specifications, including the supply and transport to the site of asbestos waste containers.
.2 Construction of temporary enclosures.
.3 Handling, packaging and disposal of asbestos materials coated with PCB-amended paint.
.4 Preparation of asbestos inventory.

2.0 PRODUCTS

2.1 Materials

.1 For Type 1 asbestos abatement work, the following materials are required:

- Asbestos Waste Receptors
- HEPA Vacuum
- Sprayer
- Polyethylene Sheeting
- Tape
- Wetting Agent
- Amended Water

.2 For Type 2 asbestos abatement work, the following materials are required:

- Personnel Protective Equipment (Outlined in Clause 1.8.2 of this Section.)
- Polyethylene Sheeting
- Rip-Proof Polyethylene
- Tape
- Wetting Agent
- Amended Water
- Asbestos Waste Receptors
- Sprayer
- HEPA Vacuum
- Slow drying sealer

.3 For Type 3 asbestos abatement work, the following materials are required:

- Personnel Protective Equipment (Outlined in Clause 1.8.4 of this Section.)
- Polyethylene
- Rip proof polyethylene
- Wetting Agent
- Asbestos Waste Receptors
- Tape
- Slow drying sealer
- Sprayer
- Electrical equipment
- HEPA Vacuums
- Negative Air Unit

.4 For the optional Glove Bag Method, the following materials are required:

- Personnel Protective Equipment (Outlined in Clause 1.8.3 of this Section.)
- Glove bag
- Polyethylene
- Sprayers
- Wetting agent
- Amended Water
- Asbestos Waste Receptors
- Tape
- HEPA vacuum
- Securing straps
- Glove bag knife
- Slow drying sealer

3.0 EXECUTION

.1 Prepare an asbestos inventory for each building to be demolished. Identify, as applicable, location of asbestos, asbestos type (i.e. wall board, duct cloth, galbestos, pipe insulation), and dimensions. Submit to the Engineer the asbestos inventory at the conclusion of asbestos removal operations.

3.1 Type 1 Asbestos Removal Procedures

.1 The following procedures apply to the removal of non-friable asbestos containing materials carried out prior to demolition. Damage to non-friable asbestos during removal and/or demolition operations will constitute a cleanup requiring Type 3 Asbestos Removal Procedures at Contractor's expense.

.2 Preparation:

.1 Before disturbing non-friable asbestos materials, except those used as flooring, cover floor and furnishings below work area with polyethylene sheeting.

.2 Wherever dust on surface within Asbestos Work Area is likely to be disturbed, remove beforehand with HEPA vacuum or damp cloth.

.3 Removal of Vinyl Asbestos Floor Tile: It is not a mandatory requirement to remove asbestos floor tiles from sub-floor structures of facilities to be demolished. The floor tiles can be removed with the sub-floor structures in conjunction with the facility demolition operations. If floor tiles are removed, comply with the following:

.1 Remove tiles using heavy duty hand tools without breaking individual tiles into smaller pieces. Place removed tiles into asbestos waste receptors.

.2 Hot air guns or heaters may be used to heat the tile to soften the tile adhesive.

.3 Do not use powered electric scrapers.

.4 After removal of a small area of tiles, remove adhesive remaining on floor with hand scraper, hot air gun or infrared heater until only a thin smooth film remains. Deposit adhesive scrapings into asbestos waste receptors.

.5 Upon completion of area, clean floor with HEPA vacuum.

.4 Removal of Asbestos Wall Panels, Duct Cloth and Flue Stack Coverings:

.1 Where possible wet all materials to be disturbed.

.2 As necessary, use hand-powered tools or power tools with HEPA filtered dust collection device attached for cutting of asbestos containing materials.

.3 Immediately place waste in asbestos waste receptor. Clean area frequently during work with HEPA vacuum or with wet methods.

.4 Undo fasteners if necessary to remove material. Whenever possible, remove materials intact. Break only if unavoidable. If broken, immediately wet freshly exposed edges.

.5 Wet material and use hand scrapers to remove material adhering to substrate.

.6 Immediately place removed material in asbestos waste receptor. Clean surrounding surfaces and asbestos work area frequently with HEPA vacuum or with wet methods.

.7 Dispose of drop sheets as asbestos waste. Do not reuse.

.8 Dispose of asbestos wastes in accordance with Clause 3.5 of this Section.

3.2 Type 2 Asbestos Removal Procedures

.1 Preparation:

.1 Move equipment, tools, furnishings, and stored materials which can be moved without disturbing asbestos-containing materials.

.2 Remove below ceiling elements (demountable partitions, walls, doors, carpets, and similar items), which can be removed without disturbing ceiling space or friable asbestos material.

.3 Shut off air handling and ventilation systems supplying or exhausting from asbestos work area enclosure(s). Ensure air handling systems remain shut off for duration of work.

.4 Erect wood framing between Asbestos Work Area and remaining building area, as necessary to support polyethylene sheeting enclosures. Seal all openings in enclosures. Enclosures for access into ceilings shall extend to underside of ceiling system and may be supported from ceiling system. Free standing enclosures shall have a completely sealed polyethylene top.

.5 After isolation of work area, remove heating, ventilating, and air conditioning filters, pack in sealed plastic bags, 0.15 mm minimum thickness, and treat as contaminated asbestos waste. Remove ceiling mounted objects such as lights, partitions, other fixtures not previously sealed off, and other objects that interfere with asbestos removal. Do not remove items which require disturbance of asbestos, ceilings, or cladding enclosing asbestos until full protective measures are in place.

.6 Cover motors, heating units, fire apparatus, door closers, fans, tanks, benches, shelving, storage racks, valves, taps, controllers, lights, and other fixtures and furnishings within the enclosure with polyethylene sheeting. Clean previously contaminated surfaces with HEPA vacuum before covering with sheeting.

.7 If enclosure is used for more than one shift, construct an airlock for entry to and exit from enclosure. Clean enclosure prior to exiting at completion of each shift.

.8 Establish negative pressure in Asbestos Work Area. Operate negative pressure units or HEPA vacuums continuously from this time until completion of contaminated work.

.9 Provide soap, water and towels for washing of workers' face and hands when exiting enclosure.

.10 Maintain emergency and fire exits from Asbestos Work Area, or establish alternative exits satisfactory to the Engineer.

.11 Ensure existing power supply to Asbestos Work Area is isolated and disconnected where necessary.

.12 Ensure barriers and polyethylene linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery.

.13 Visually inspect enclosures at beginning of each working period.

.14 Dispose of asbestos wastes in accordance with Clause 3.5 of this Section.

.15 Ensure that tools, equipment and material waste receptors are inside enclosure.

.16 Ensure that signs are displayed in all areas where access to sealed asbestos work areas is possible. Signs shall be in accordance with Clause 1.13 of this Section.

.17 Where application of water is required for wetting asbestos-containing materials, shut off electrical power, provide ground fault interrupter circuits on power source for electrical tools and temporary lighting, in accordance with applicable CSA Standards. Ensure safe installation of electrical lines and equipment.

.2 Minor removal of Friable Asbestos and removal of Ceiling Tiles with friable asbestos on surface of tiles:

.1 Seal opening of enclosure with tape after entry of worker. Worker shall remain inside enclosure until removal of asbestos-containing materials is complete and enclosure has been effectively cleaned.

.2 Where necessary, remove ceiling materials to access ceiling space. Prior to beginning work, vacuum the top of ceiling systems, light fixtures etc. in proximity of ceiling entry.

.3 Perform work required inside enclosure.

.4 When removing minor amounts of asbestos-containing materials from systems or surfaces within enclosure, spray asbestos-containing material with amended water. Saturate asbestos to prevent release of airborne fibres during removal. Scrape fully saturated asbestos directly into waste containers. Do not allow asbestos to fall onto floor of enclosure.

.5 Remove minor amounts of asbestos-containing pipe insulation in layers, maintaining exposed surfaces of insulation or lagging in wet condition.

.6 Treat all materials removed as asbestos contaminated waste and dispose of as such.

.7 After removal of asbestos, clean surfaces from which asbestos has been removed with stiff bristle brushes, vacuum, or wet-sponge if appropriate, to remove all visible material.

.8 Carefully place asbestos waste in the inner bag of asbestos waste receptor. Clean inner bag of gross contamination and place in clean 6 mil outer bag. If waste is likely to tear inner bag, do not use outer bag, instead use fibre or metal drum, cardboard or wood box, or other suitably sturdy container.

.9 After brushing, wet-sponging or vacuuming to remove visible asbestos, wet clean entire enclosure, including equipment, floor, wall surfaces, ducts and similar items not covered with polyethylene sheeting. Apply heavy coat of sealer to all surfaces from which asbestos has been removed. Apply thinned coat (sufficient to coat all surfaces) to interior of polyethylene enclosure and uncovered surfaces scheduled for demolition.

.10 Arrange for air samples to be taken from commencement of work until completion of cleaning operations, both inside and outside of Asbestos Work Area(s) enclosures in accordance with NIOSH Method 7400 or with a Fibrous Aerosol Monitor.

.11 If air monitoring or visual inspection shows that areas outside current asbestos work area enclosures are contaminated above 0.05 fibre/cc, clean these areas in same manner as that applicable to Asbestos Work Areas.

.12 Dispose of asbestos wastes in accordance with Clause 3.5 of this Section.

.3 Tear Down Protection:

.1 When dismantling enclosure, carefully roll polyethylene toward centre of enclosure. As polyethylene is rolled away, immediately remove any visible debris with HEPA vacuum.

.2 Place polyethylene sheeting seals, tape, cleaning material, coveralls, and other contaminated waste in asbestos waste receptors for transport. Remove any debris with HEPA vacuum.

.3 Clean up asbestos waste receptors and equipment used in work, and remove from Asbestos Work Area(s) via drum and equipment decontamination enclosure systems, at appropriate time in sequence. Double bag waste immediately prior to transport from site.

3.3 Pipe Insulation Removal Using Glove Bag Method (Alternative)

.1 The following procedures may be used for the removal of asbestos on pipe, as an alternative to the Type 3 Asbestos Removal procedures outlined in Clause 3.4 of this Section.

.2 Glove Bag Method:

.1 Isolate Asbestos Work Area with tape, other barriers and with poster notices marking area as Asbestos Removal Area.

.2 Spray any areas of damaged jacketing with a mist of amended water. Tape over damage to provide temporary repair.

.3 Clean surface of pipe or minor amounts of fallen or damaged insulation by HEPA vacuuming or by damp wiping.

.4 Zip glove bag onto pipe and seal all openings to pipe with cloth securing straps. For valve bags, seal valve cover with wire tie or equivalent.

.5 Roll insulation carefully to minimize the possibility of ripping or puncturing glove bags. Arrange insulation in bag to obtain full capacity of bag.

.6 Insert nozzle of spray pump into bag through valve and wash down pipe and interior of glove bag thoroughly. Wet surface of insulation in lower section of bag and exposed ends of asbestos insulation remaining on pipe by spraying with water.

.7 If glove bag is to be removed from pipe for use on new section of pipe, seal interior plastic closure before removing from pipe. Re-install in new location before opening interior closure.

.8 If glove bag is to be moved along pipe, move bag, reseal to pipe using double-pull zipper to pass hangers. Repeat stripping operation.

.9 If glove bag is ripped, cut or opened in any way, cease work. If the rip, cut or opening is not easily repaired all workers in area shall put on protective clothing. All spilled material must be cleaned up and removed with HEPA vacuum.

.10 To remove bag after completion of asbestos removal, wash top section and tools thoroughly. Place all tools in one hand (glove), pull hand out inverted, twist to create a separate pouch and double tape to seal. Cut between tape and place pouch with tools in next glove bag or into a water bucket, open pouch underwater, clean, and then allow to dry.

.11 Pull 0.15 mm (6 mil) polyethylene bag over glove bag before removing from pipe. Remove securing straps. Unfasten zipper. Seal top of glove bag while removing from pipe.

.12 After removal of glove bag, ensure pipe is clean of all residue. If necessary, after removal of each section of asbestos, vacuum all surfaces of pipe, using HEPA filtered vacuum equipment or wipe with wet cloth. Ensure that surfaces are kept free of wet sludge which, after drying, could release asbestos dust into atmosphere.

.13 After asbestos has been removed from pipe, seal all pipe surfaces with slow drying sealer.

.14 Place cloths, mops, sponges, rags, wire brushes, disposable filters and protective clothing in double waste bags. Seal bags tightly.

.15 Vacuum all surfaces within work area including waste receptors, reusable equipment used to perform the work, shoes and soles of shoes.

.16 Thoroughly wash outside of respirators, eye protection, hard hats, hands and face.

.17 Dispose of asbestos wastes in an on site landfill in accordance with Clause 3.5 of this Section.