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- 1.1 SECTION INCLUDES .1 Materials, equipment and procedures for the removal of an aboveground storage tank.
- 1.2 RELATED REQUIREMENTS
- .1 Section 01 33 00 - Submittal Procedures
 - .2 Section 01 35 24 - Special Procedures on Fire Safety Requirements
 - .3 Section 01 35 25 - Special Procedures on Lockout Requirements
 - .4 Section 01 35 29 - Health and Safety Requirements
 - .5 Section 01 35 43 - Environmental Procedures
 - .6 Section 01 35 59 - Security Requirements at Correctional Service Canada Facilities
 - .7 Section 01 45 00 - Testing and Quality Control
 - .8 Section 01 50 00 - Temporary Facilities
 - .9 Section 01 74 11 - Cleaning
 - .10 Section 07 72 33 - Roof Access Hatch
 - .11 Section 32 01 16 - Removal of Existing Asphalt Concrete
 - .12 Section 32 12 16 - Hot Mix Asphalt/Roadway Gravels
 - .13 Section 33 23 33.01 - Excavation, Trenching and Backfill
- 1.3 REFERENCES .1 Perform the work in accordance with the most recent edition of the following:
- .1 National Fire Code of Canada
 - .2 API Standard 2015, Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks

- .3 API Standard 653, Tank Inspection, Repair, Alteration and Reconstruction.
- .4 API Recommended Practice 2207, Preparing Tank Bottoms for Hot Work.
- .5 API Publication 2219 - Safe operation of Vacuum Trucks in Petroleum Service
- .6 Canadian Occupational Safety and Health Act Standards
- .7 CAN/CSA W59, Welded Steel and Construction
- .8 Canada Confined Space Regulations - Worker's Compensation Board.
- .9 Canadian Electrical Code

- .2 Canadian Council of Ministers of the Environment (CCME)
 - .1 CCME PN 1326-[2003], Environmental Code of Practice for Underground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products

- .3 Canadian Federal Legislation
 - .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
 - .1 Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations (SOR/2008)
 - .2 Canada Labour Code (R.S. 1985, c. L-2).
 - .3 Part II (September 2000) - Occupational Health and Safety.
 - .4 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

- .4 Provincial Legislation
 - .1 New Brunswick Regulation 87-97, Petroleum Product Storage and Handling Regulation
 - .2 New Brunswick Department of Environment, Construction Standards for Installation and Removal of Petroleum Storage Systems

1.4 ACTION AND

- .1 The Contractor is to provide a written Tank

INFORMATIONAL
SUBMITTALS

Dismantling Procedure for review with their bid. The procedure shall outline the Contractor's proposed methods to:

- clean the tanks;
- dispose of unusable product;
- dismantle the tanks, and
- handle and transport materials.

The Contractor shall demonstrate experience in the dismantling of storage tanks by providing references of similar projects as applicable to the proposed work. The Contractor shall also indicate the proposed Project Foreman or Site Supervisor and provide examples of project related experience of the Foreman/Supervisor. The Contractor shall also indicate any proposed Subcontractors that will be retained for the proposed work.

- .2 Provide the Departmental Representative with copy of daily vapour removal test results.
- .3 Provide submittals in accordance with Section [01 33 00 - Submittal Procedures].

1.5 QUALITY ASSURANCE

- .1 Contractor must be licensed/certified by the Province of New Brunswick for removal of aboveground storage tanks.
 - .1 License/certificate, title and number must accompany tender document.
 - .2 Contractor must be licensed/certified by Provincial authorities having jurisdiction for removal of underground storage tanks.
 - .1 License/certificate, title and number must accompany tender document.
 - .2 Regulatory Requirements: ensure Work is performed in compliance with applicable Federal/Provincial regulations.

1.6 WASTE MANAGEMENT

- .1 Waste product and materials shall be managed

AND DISPOSAL

by the Contractor and detailed in the Tank Cleaning and Dismantling Plan.

1.7 DELIVERY, STORAGE AND HANDLING .1

Delivery, storage and handling of all equipment and products associated with the work shall be the responsibility of the Contractor, including:

- Temporary fuel storage tanks
- Temporary cutting oil tanks, drums, etc
- Temporary slope tanks
- Temporary receptacles (consumables)

2.1 EQUIPMENT .2

Electrical Equipment:
All electrical equipment and conductors used within 15 meters of any fuel pipes or storage tanks, or where hazardous accumulation of flammable vapours may exist shall be CSA approved for hazardous location in accordance with the Canadian Electrical Code, Class 1, Division 1 provisions.

.3 Lighting:
Explosion-proof portable battery-powered lights are the only lights authorized for tank entry until the tank has a vapour reading below four percent of the lower explosive limit, (4% of LEL). Portable lights used outside the tank in the potential vapour travel path from the tank opening, (or inside the tank after it has a vapour reading below 4 percent LEL), will be of the explosion-proof type, and will be connected to 3-wire extension cords that are equipped with connectors or switches approved for hazardous locations.

.4 Air Movers:
Explosion-proof electrically operated or air driven type only. All air movers will be capable of reducing vapours from the tank. Air movers blowing air into the tank will not be used during the vapour freeing or cleaning periods of work.

.5 Intrinsically Safe Indicators:

- .1 A combustible gas indicator capable of testing for hydrocarbon vapours.
- .2 An oxygen indicator capable of checking the tank atmosphere for oxygen.

NOTE

Personnel who make tests with these instruments shall be fully familiar with their function and operation and shall satisfy themselves that they are working properly. The calibration of these instruments shall be checked regularly by the contractor, according to the manufacturer's instruction for calibration.

- .6 Scaffolding, buckets, wrenches, mops, scrapers, brooms and brushes shall be spark proof. Wood ladders and scaffolding may be used provided they are spark-proof. Brooms and brushes that have plastic or synthetic bristles will not be used.
- .7 Diesel Engines:
All diesel engine driven equipment used in tank cleaning operations will be equipped with a spark arrester and a protected ignition system and located upwind of the tank opening, a minimum of 15 meters from the tank and at the highest possible elevation.
- .8 All Equipment:
All equipment shall be portable and have the capability of being grounded and shall be grounded as approved by the Engineer.
- .9 The Contractor shall be required to provide all equipment necessary to load and remove the liquid sludge and waste products. Pumping equipment used should be the air driven double diaphragm type. If electric or diesel engine driven equipment is used, the special precautions outlined in the tender specifications shall be followed.

3.1 SUMMARY OF WORK

- .1 Work of this Contract is comprised of the

following:

The contractor shall be responsible for the cleaning, dismantling, removal and approved disposal of two aboveground bunker C storage tanks and associated piping. The tanks are located in a below grade concrete vault (former coal storage bunker). The two tanks are field constructed rectangular steel tanks.

The Contractor is to provide a written Tank Cleaning and Dismantling Procedure for review with their bid package, including an emergency spill response procedure.

The system has been out of service for approximately 3 years. When the system was shut down, remaining bunker fuel was not removed from the tanks. Tank No. 1 contains approximately 9600 L and Tank No. 2 contains approximately 21,600 L of bunker fuel remaining.

The boiler supply and return piping and steam heat piping have previously been removed. The system heating coils are reportedly still in place, however it has not been confirmed if they are operational. If required by contractor for their proposed Tank Cleaning and Dismantling Procedure, the contractor is responsible to confirm prior to finalizing their procedure.

The bunker tanks were filled remotely through an underground, insulated, single-wall steel fill pipe. Approximately 110 m of underground fill piping (100mm) is required to be removed.

.2 Work shall include:

- Removal of all product remaining in existing tanks
- Removal of all product remaining in existing underground bunker and diesel fill piping
- Removal of steam heat coils associated with the bunker storage tanks

- Dismantling and removal of existing tanks
- Disposal of all equipment and materials at approved disposal facilities
- Coordinate all shut-downs with Departmental Representative well in advance of completing the work
- Coordinate all work with other contractors on site
- Site restoration work including grading and seeding

3.2 WORK SEQUENCE .1 Underground fill piping to be removed prior to winter / frost conditions.

3.3 GENERAL REQUIREMENTS .1 The Contractor shall have use of existing site as power. Water and steam energy will not be available on site.

.2 The Contractor will provide their own job trailer or site facilities including washrooms and decontamination area.

.3 Each bidder shall visit the site and carefully and thoroughly inspect all existing facilities and take into account, in the preparation of the bid, all conditions affecting the work required by the drawings and specifications

.4 Each bidder shall satisfy himself as to the limits of removal, replacement and modification of the existing facilities required to complete the work as indicated on the drawings and as specified, regardless of whether such limits are specifically indicated or specified. Failure to do so will in no way relieve the Contractor of the responsibility for the furnishing of all labour, equipment and materials required.

- .5 Any delay or extra expense caused by encountering construction or materials other than anticipated or different from those indicated shall not constitute grounds for claims for additional payments or damages.
- .6 Contractor shall provide thorough and complete written documentation of the actual removal and dismantling of the storage tank. The documentation shall include a description of the materials, date of removal, date of delivery to the receiving facility, and date of "destruction" of the materials in the processing facility's waste stream. The documentation shall include the written verification of the receiving facility, and shall be of a format and descriptiveness acceptable to the Departmental Representative.
- .7 Piping shall be disconnected, dismantled, and removed as required and in such a manner as to minimize disturbing or damaging adjacent facilities.

3.4 PREPARATION SAFETY AND SECURITY

- .1 Conform to or exceed Federal, Provincial and Territorial codes, local municipal by-laws, by-laws, and codes and regulations of utility authorities having jurisdiction.
- .2 Protection:
 - .1 Disconnect or remove source of ignition from vicinity of tank.
 - .2 Provide temporary protection for safe movement of personnel and vehicle traffic.
 - .3 Cut, braze or weld metal only in monitored areas established to be free of ignitable vapour concentrations.
 - .4 Ground and bond metal equipment, including tanks and transfer pipes, before operating equipment or transferring flammable materials.

- .5 Use non-sparking tools and intrinsically safe electrical equipment.
- .6 Smoking is not permitted.
- .7 Provide shoring to protect adjacent building foundation, if necessary.
- .8 The Contractor is to provide a written Health and Safety Plan for the proposed work activities to be reviewed by Departmental Representative. The Safety Plan must include but not be limited to the following:
 - Identify all hazards and identify the level of risk from each of the hazards.
 - Names and Qualifications of the Contractors Site Supervisor/Forman
 - Names and Qualifications of the Contractor "Alternate" Site Supervisor/Forman"
 - Names and Qualification of the Site "First Aid" Personnel
 - Identify levels of personal protective equipment to be worn by all personnel during specific work operations. I.e.: Breathing Apparatus during initial tank entry
 - Establish Work Zones i.e.: location of equipment, waste disposal areas etc
 - Establishment of Tank Entry and Work Permit Procedures.
 - Identify number of personnel required, specific job function and specific equipment to be used for initial tank entry and subsequent tank entries.
 - Tank Personnel Entry Log
 - Establish Safety Procedures and Contingency Plans in case of

accident

- Establish Procedures for Monitoring of Safety of all personnel
- Identify local emergency facilities
- Communication Plan for CONTRACTOR and Departmental Representative.
- Establish procedure for handling and waste products and where they will be disposed of off-site in accordance with applicable regulations.
- Schedule to identify milestones as initial entry etc.

3.5 ACTION AND
INFORMATIONAL
SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Prior to commencing construction activities or delivery of materials to site, submit Tank Cleaning and Dismantling Procedure for review and approval by the Departmental Representative. Tank Cleaning and Dismantling Procedure is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.
- .2 Address topics at level of detail commensurate with environmental issue and required dismantling task[s].
- .3 Tank Cleaning and Dismantling Procedure:
include:
 - .1 Name[s] of person[s] responsible for ensuring adherence to Tank Dismantling Procedure.
 - .2 Name[s] and qualifications of person[s] responsible for manifesting hazardous waste to be removed from site.
 - .3 Name[s] and qualifications of person[s]

- responsible for training site personnel.
- .4 Descriptions of environmental protection personnel training program.
 - .5 Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
 - .6 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.
 - .7 Identify environmental controls including aprons, vacuum trucks, temporary fuel storage, storage of cutting oils, etc.
 - .8 Identify Fire Controls including air monitoring, tools, procedures, fire suppression equipment, evacuation plan, etc.
 - .9 Procedures, instructions, and reports to be used in event of unforeseen spill of regulated substances.
 - .10 Identify methods and locations for waste disposal.
 - .11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.
 - .12 Identify potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of

these materials.

- .13 Identify methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in cleaning tanks and fill pipes.
- .14 Identify controls to handle storm water during construction.

3.6 TANK ENTRY

- .1 Tank entry is to be completed in accordance with applicable confined space regulations.
- .2 Initial tank access shall be through the tank top access manway.
- .3 Minimum personnel for any task inspection/cleaning operation shall be as follows:
- .4 When one person is to enter the tank, the crew size shall be four persons:
 - .1 Person selected for tank entry who must possess proof of confined space training.
 - .2 Tank cleaning supervisor, who must possess proof of confined space training.
 - .3 The attendant, who must possess proof of confined space training and air monitoring.
 - .4 The safety person, who monitors the fresh air blower monitor and notify others in case of an emergency
- .5 When two persons are to enter the tank, the crew size shall be five persons:
 - .1 Two persons selected for tank entry who must possess proof of confined space training

- .2 Tank cleaning supervisor, who must possess proof of confined space training.
- .3 The attendant, who must possess proof of confined space training and air monitoring
- .4 The safety person, who monitors the fresh air blower monitor and notify others in case of an emergency

- .6 These positions shall be required for inspection and cleaning operations. Individuals assigned to these positions shall not leave their positions for any reason while personnel are in a tank which is not vapour freed.

- .7 During all tank cleaning work, the Contractor shall provide an employee who is qualified to administer cardiopulmonary resuscitation and emergency first aid. This Employee shall not be the person selected for interior entry. A first aid kit shall be on hand at all times.

- .8 The tank will be considered leaded and explosive until designated otherwise by a certified tank entry supervisor. The Combustible gas indicator reading must indicate 0% LEL and oxygen concentration between 18.5% and 23% before tank entry without supplied air equipment is authorized

- .9 Under no circumstances shall anyone remove their mask while they are in the tank. If mask requires adjusting, the wearer shall leave the tank for readjustment.

- .10 Extreme caution shall be exercised in handling sludge and sediment from tanks being cleaned. It shall be kept wet and disposed of as per applicable regulations.

- .11 All matches, lighters and cigarettes to be left outside the tank cleaning area. There

will be NO SMOKING. Matches and cigarette lighters will not be carried by the tank cleaning crew or other persons entering the tank cleaning area. All personal jewellery and metallic objects shall be removed.

- .12 All equipment will be protected against dirt, water, chemical or mechanical injury.
- .13 Respirators, boots, gloves and tools will be cleaned at the end of each working day and at the end of the job. Face pieces and connecting breathing tubes are to be cleaned with soapy water, rinsed and swabbed with an aqueous hypochlorite or iodine disinfectant solution and allowed to air dry before being transferred between personnel.

NOTE

The disinfectant solution will either be a hypochlorite solution, (50 mg/L chlorine), or an aqueous iodine solution, (50 mg/L iodine).

- .14 Physical contact with fuel and sludge shall be avoided.
- .15 If anyone wearing a respirator detects an odour such as petroleum vapour, he shall leave the tank immediately. He will not re-enter until the cause has been determined and satisfactory equipment supplied.
- .16 Contractor required to submit (at time of award) confined space safety training and medical examination certificates for each labourer who will be working inside a fuel tank. Certificate is to indicate that labourer is in good health and is fit for working inside bulk fuel tanks.
- .17 The Contractor shall secure the site and shall provide barricades, signs, lights, etc. to warn of possible dangers on the site.
- .18 In areas where flame cutting will be used,

special attention shall be given to fire protection. All areas shall be dust free before flame cutting will be permitted. Contactor shall provide dry chemical fire extinguishers in such areas and workers trained in their use.

- .19 All demolition work shall be carried out in a manner which will prevent injury to workers and damage to existing facilities or construction. Demolition work shall be performed in accordance with all applicable laws and regulations.

3.7 PERSONAL PROTECTIVE .1
EQUIPMENT

The Contractor shall furnish all required clothing and equipment for the work and protection of his employees.

- .2 The Contractor will provide acid resisting gauntlet type rubber gloves and 3/4 length boots for each man entering or working inside the tank, or handling sludge materials on the exterior of the tank. An additional pair of each shall be available for emergency use.
- .3 Two changes each per man of underwear, cotton coveralls, (light coloured), and painters cap or equivalent. Coveralls shall not be equipped with metallic or adhesive fasteners.
- .4 Respirators: Hose-mask of the air-supply type. Canister type are not acceptable. Personnel shall continue to wear this equipment until all material, which may give rise to hazardous vapours, has been removed and tank is completely vapour freed.
- .5 Goggles: Goggles shall be worn during the scraping of scale or wire brushing unless hose-mask of the air-supply type is worn.
- .6 Personnel engaged in bulk petroleum storage tank cleaning or inspection shall not wear

any article of clothing, inner or outer, made of nylon.

- .7 TyvekTM suits made of impermeable material and resistant to petroleum products may be worn during the cleaning process.
- .8 A safety harness, (leather or cotton webbing only), is required for each person working inside the tank, plus one extra for emergency use.
- .9 A tripod and block and tackle or other appropriate hoisting device is required for removing tank cleaning personnel in case of emergency.

3.8 TANK PREPARATION

- .1 The vapour will be considered as explosive until all sludge, rust and scale have been removed and the entire tank washed down with water.

3.9 TANK VENTILATION

- .1 Educing type air movers shall be used. Tank fuel vapours are heavier than air and except on extremely hot days, (above 27 Celsius), will accumulate in the bottom portion of the tank. Air movers, with flexible oil proof canvas hoses attached and inserted in the tank near the bottom, will remove vapours from the tank in a minimum period of time. On hot days, a fog type water spray over the opening admitting fresh air into the tank will condense vapours and facilitate their removal.
- .2 Air movers blowing air into the tank will not be used during the vapour freeing or cleaning periods of work. Air movers must operate continuously for at least 1 hour before cleaning operations start and continue to operate throughout the entire period personnel are cleaning the tank. High noise

units may be turned off after the first hour of operation with continuous monitoring of the vapour concentration, provided that an alternate means is used to ensure continuous ventilation, (e.g. venturi type airmover).

Personnel working near an open manhole should keep to the upwind side and avoid inhaling any vapours that may issue from the tank.

- .3 The Contractor shall place all equipment upwind of the tank openings. Whenever possible, equipment should be placed at the highest possible level, never in an area lower than the surrounding terrain. In several instances, internal combustion engines placed below the tank mount have ignited vapours emitting from the tank resulting in fire and fatalities. For this reason, internal combustion engine driven equipment shall not be used unless it is located of 15 meters from the tanks/roof hatches.

3.10 ATMOSPHERIC TESTING

- .1 Initial testing of the tank atmosphere with combustible gas/oxygen deficiency indicators will be made at the manhole opening where vapours are being exhausted, or at the exhaust of the ventilating equipment. The tester must be trained and thoroughly familiar with the reading and handling of the instrument. Before taking a reading, he or she should determine that the instrument is in proper working condition and is calibrated correctly. It is important to follow the manufacturer's recommendations for checking and calibrating the instrument.
- .2 The Contractor shall ensure that all gas monitoring devices are calibrated within the appropriate date and hours of usage for each device. The contractor shall also ensure that every monitor be bump tested daily prior to each use.

- .3 The Contractor must also provide the following safety equipment in addition to the above-mentioned gas monitor:
 - Flammable Vapour (Combustible Gas) Detector (%LEL)
 - Oxygen Detector (%O₂)
 - Hydrogen Sulfide Monitor (concentration)
 - Volatile Organic Compounds (ppm/concentration)
- .4 Test interior of tank to determine when tank is free of vapour.
- .5 If the vapour indicator registers 20 percent or less of the lower explosive limit, (LEL), initial entry may be made to perform further testing, provided the individual is equipped with a hosemask of the blower type.
- .6 Since vapour will be present as long as any fuel, scale, or sludge remains inside the tank, forced ventilation must be continued until all such material has been removed.
- .7 Entry into the tank will take place only after the following conditions are satisfied:
 - .1 The Contractor's qualified supervisor is present;
 - .2 Contractor personnel have been briefed by their supervisor on what is to be done, what will be done by each employee in the event of emergency and how long each man or cleaning crew will remain in the tank under normal conditions;
 - .3 All equipment is approved and properly located;
 - .4 Personnel are equipped with properly fitted protective equipment;
 - .5 Entire area adjacent to the tank is properly secured;
 - .6 Shower facilities have been provided in

- the immediate area;
- .7 Sufficient personnel are available to provide a minimum of one safety person with personal protective equipment outside for each person inside, (until tank is vapour freed).
 - .8 An existing exhaust fan for the concrete vault is present and operational. Fan can be used for supplemental venting. Fan specifications:
 - .1 Jenn Co. Fan
 - .2 Model SIB-21
 - .3 CSA Listed
 - .4 HP - unconfirmed (range between $\frac{1}{4}$ - 3)
 - .5 CFM - unconfirmed (range between 1500 - 7400)
- 3.11 INITIAL CLEANING FROM OUTSIDE THE TANK .1 The Contractor is responsible for the removal and disposal of remaining waste product/sludge in the tank. There is approximately 9,600 L of product remaining in Tank No. 1 and approximately 21,600 L remaining in Tank No. 2. The system heating coils are reportedly still in place, however it has not been confirmed if they are operational. If required by contractor for their proposed Tank Cleaning and Dismantling Procedure, the contractor is responsible to confirm prior to finalizing the Procedure. The bunker tanks were filled remotely through an underground, insulated, single-wall steel fill pipe. Approximately 110 m of underground fill piping (100mm) is required to be removed.
- .2 Access for ventilation and initial cleaning from outside the tank shall be provided through existing roof hatches. The original design indicated ten (10) 600mm square hatches were present in the original coal bunker room. Four (4) hatches are currently accessible. One (1) of the hatches has been used for the installation of an emergency exhaust fan. The remaining five (5) hatches have reportedly been sealed and covered by

roof ballast and roof membrane. Contractor shall un-cover and open roof hatches as required for tank access and venting.

- .3 Contractor shall provide equipment, materials and energy source (i.e. steam, hot water, etc) to remove existing bunker fuel. This process must be detailed in the Tank Cleaning and Dismantling Procedure.
- .4 After the foregoing steps have been completed (in the order outlined), initial cleaning, from outside the tank, may be started. Ventilation should be continued to maintain the inflow of air at shell manholes during this process, and frequent tests should be made for explosive vapours. Stirring of sludge releases vapours and increases vapour concentration. If the concentration rises to above 50 percent of the lower explosive limit, ventilation should be augmented and washing temporarily suspended until a safe concentration has been achieved.
- .5 The Contractor is responsible to pump out all remaining product and remove from the site for disposal in accordance with appropriate regulations.
- .6 The Contractor shall provide all necessary materials and equipment required to remove the remaining products from the storage tank including temporary heating coils, cutting fuel and consumables.
- .7 The Contractor is responsible for the disposal of all consumable and wastes generated during the cleaning process in accordance with applicable regulations.
- .8 Pump out liquid from tank
 - .1 Use explosion proof, air driven or hand pump.

- .9 Remove sludge from tank bottom.
- .10 Dispose of product and sludge in accordance with local, Provincial and Territorial regulations using waste disposal carrier licensed by Provincial/Territorial Environmental Agency having jurisdiction.
- .11 Hose streams will be directed through the open manholes to dislodge scale, sludge and fuel residual, and float it to a water draw-off or pump-out connection. The fuel water sludge mixture must be contained in drums or in a portable tank, and disposed of at an approved disposal facility.
- .12 Products entering the tank may generate static electricity. The water nozzle and piping, (or bonded hose, if used), shall be properly grounded. This does not eliminate the hazard completely as it does not remove any charges left on the water after it leaves the nozzle.
- .13 Hosing down of the tank should not be continued when the vapour indicator registers 50 percent LEL or above.
- .14 If electric-power or diesel engine driven equipment is used, the following special precautions will be taken to decrease potential hazards:
 - .1 Steps will be taken to ensure that an adequate flow of fresh air enters the tank at the shell manhole and is exhausted from the roof manhole for above-ground tanks, making sure that explosive vapours will not flow out of the tank shell manhole at ground level.
 - .2 Equipment should be located upwind of the tank openings, a minimum of 15 meters from the tank and at the highest possible elevation;
 - .3 Test the area around the tank for

explosive vapours, with a combustible gas indicator before any equipment which may be a source of ignition is started.

- .15 If a pump is used to remove residuals from the tank, it must be attended and properly maintained for continuous operation during the period of tank cleaning. Each time the equipment is to be started, the area must first be tested for explosive vapours. A gasoline engine must always be stopped and allowed to cool down before refuelling.
- .16 Throughout the pumping period, close checks must be made to make sure that a flow of air is entering the shell manhole for above ground tanks, or being exhausted from the manhole of underground tanks. If at any time the inflow or exhaust of air is stopped, the pump must be stopped immediately. The pumping operation shall not be resumed until ventilation has been re-established and the area has been tested and found to be free of explosive vapours.

3.12 ENTRY FOR
COMPLETING TANK
CLEANING

- .1 After initial cleaning of tank from the outside, ventilation is continued and vapour readings taken at the manhole or equipment exhaust to determine when entry can be made for completing cleaning. If vapour levels are below 20 percent LEL, workers may enter the tank. The tank entry supervisor shall determine the tank entry requirements and whether approved air supply respirators are required.
- .2 Once the initial cleaning of the tank from outside is complete, a larger manway access can be cut in the tanks to allow for additional cleaning.
- .3 Continuous tests for explosive vapours should be conducted during all tank cleaning periods

while the workers are in the tank, because the stirring of sludge releases vapours and increases the vapour concentration. When vapour concentration rises above 20 percent LEL, but no higher than 50 percent LEL, additional ventilation will be used to accelerate vapour removal. The tank cleaning operations will then proceed with caution until after vapour readings are stabilized below 20 percent LEL. Removal of remaining fuel, water and sludge should reduce vapour readings to below 20 percent LEL.

- .4 Under no circumstances will any tank cleaning operations be continued inside the tank when the vapour indicators registers above 50 percent LEL. When the vapour concentration reaches this level, additional ventilation will be used and cleaning inside the tank will be suspended temporarily until a vapour reading of 20 percent LEL or below is reached.
- .5 For all internal bare metal tanks, after sludge has been removed from the tank, and with personnel wearing protective equipment, the bottom of the tank and 1 meter up the sides will be scraped until all loosely adhering rust and scale have been removed.
- .6 The remainder of the tank sides, and all metal supports and braces, will be washed down with a high pressure water/steam hose until the water flowing or pumped out of the tank is clean. The entire upper portion of the tanks will be washed down.
- .7 Waste water created from wash down activities must be contained and disposed at an off-site disposal facility. Under no circumstances is the existing oil water separator on site to be used to treat waste water.
- .8 After the tank has been washed, the floor will

be dried by using absorbent rags. If the combustible gas/oxygen deficiency readings indicate that the atmosphere in the tank is 0 percent of the lower explosive limit and greater than 18.5 percent oxygen, personnel will be allowed to enter the tank without respirators.

- .9 Workmanship shall be of uniformly high standard. Cleaning not to the Departmental Representative's approval shall be done over without cost to the Departmental Representative.

3.13 DISPOSAL OF SLUDGE AND SEDIMENT

- .1 Sludge, wash-water, and sediment from tanks shall be disposed of in storage drums or as per the Contractor's approved procedure.
- .2 Depending on the construction of the tank and the number of openings, sludge may be removed by various methods. The simplest is to sweep, wash and "Squeegee" the sludge into piles, shovel it into buckets and remove from the tank.
- .3 While removing sludge by such methods, care must be taken to minimize release of vapours from the sludge.
- .4 Sludge, sediments, cleaning effluent and liquids are to be temporarily stored on site in storage drums. One sample of the contents shall be analyzed to determine the most suitable means of disposal. Results of the analysis shall be submitted to the Engineer. Drums shall be identified accordingly.
- .5 The drums shall be stored on pallets.

3.14 INSPECTION OF CLEANED TANK SURFACES

- .1 The Contractor shall clean the tank to the extent that no visible traces of bunker fuel remain in the tank or on the tank plating.

Once the tank has been cleaned and dried, the Contractor shall make provisions to have the tank inspected by the Departmental Representative. The Contractor shall provide 24 hours notice to the Departmental Representative to schedule the tank inspection. The Contractor shall conduct any further cleaning activities required should the Departmental Representative deem the tank not cleaned to his/her satisfaction.

3.15 TANK REMOVAL

- .1 The Contractor shall make any necessary provisions as required to avoid exposure to harmful fumes and vapours created from cutting, welding and other hot work conducted on site. Proper Personal Protective Equipment and other precautions shall be made as required to mitigate these risks.
- .2 The Contractor shall dismantle the storage tank as per the submitted and approved tank dismantling procedure.
- .3 The Contractor shall be responsible for all materials and equipment necessary to dismantle the storage tank.
- .4 The storage tank and associated tank appurtenances shall be broken down into manageable pieces that can be removed from the building. The Contractor can make appropriate arrangements to salvage any recyclable materials as per the applicable regulations.
- .5 Contractor shall provide adequate manpower and/or equipment to remove pieces of the dismantled storage tank through the east access door in Building C-7 or by altering an existing roof hatch to allow for removal with a tripod or other lifting mechanism. The area beneath RH1 is a concrete curbed area (approximately 3380mm x 6225mm) in the tank

bunker that would provide the contractor with a controllable area for additional cleaning once pieces have been cut from the main tank shell. RH1 may be the appropriate location to remove the pieces of the tank through the hatch.

- .6 The Contractor shall maintain control of the dismantling activities and provide the necessary measures to prevent the unintended collapse to any partial structures at all times throughout the project.
- .7 The Contractor shall ensure that all products and materials that are to be removed from site shall be disposed of at an approved facility.

3.16 UNDERGROUND FILL
PIPE REMOVAL

- .1 Do work in accordance with Section 31 22 33.01 - Excavation, Trenching and Backfilling.
- .2 Contact the Departmental Representative immediately if there is evidence of contamination in trench excavation. Departmental Representative will provide further direction. Contractor shall identify the location of the potential/actual contamination on the as-built record drawings.
- .3 The Contractor is to make provisions for the Departmental Representative to obtain soil samples from excavations, allow the Departmental Representative to conduct remedial activities as required should contamination be encountered.
- .4 Provide protective material around excavation.
- .5 Provide constant supervision during excavation and backfilling.
- .6 Temporarily stockpile on site soil in the

- vicinity of the trench, until waste classification can be established prior to final disposal.
- .7 All surplus soils are required to be disposed off site once confirmed not to be contaminated by Departmental Representative.
- 3.17 CAPPING .1 Not used.
- 3.18 SECURING AND REMOVAL FROM SITE .1 Not used.
- 3.19 SITE REMEDIATION .1 Immediately notify Departmental Representative in the event hydrocarbon impacted soil or groundwater is encountered
- .1 If impacted soil and/or groundwater is encountered, the Departmental Representative will provide guidance for removal
- .2 Impacted soil will be removed in accordance with Section 31 23 33
- 3.20 ROOF ACCESS OPENING .1 New Roof Access:
- .1 Contractor to provide new access opening in the roof of the C7 bunker as indicated on plans.
- .2 Remove existing roofing system in localized area where new access opening is to be cut through existing reinforced concrete roof slab. Assume minimum 250 mm thick concrete slab for determining cost of saw-cutting and removal of slab section. Field verify actual conditions at time of construction.
- .3 Remove existing roof slab by drilling and saw-cutting as detailed on plans.
- .4 Opening in roof slab to be cut flush with adjacent concrete support beams below.

- Determine exact location with pilot holes drilled through slab.
- .5 Temporarily support existing slab section prior to cutting.
 - .6 Dispose of concrete section removed from roof off site.
 - .7 Maintain opening in weathertight conditions during demolition and removal of Bunker C storage tanks.
 - .8 Upon completion of demolition work below, and final clean-up, install access hatch as specified in Section 07 72 33.
 - .9 Reinstate all roofing system areas disturbed by work and install all new roofing flashings and related system components to provide a permanent weathertight condition. Materials and installation to be to best practice and CRCA standards.
- .2 Roof Access: ventilation and initial cleaning from outside the tank shall be provided through existing roof hatches. The original design indicated ten (10) 600mm square hatches were present in the original coal bunker room. Four (4) hatches are currently accessible. One (1) of the hatches has been used for the installation of an exhaust fan. The remaining five (5) hatches have reportedly been sealed (grouted) and covered by roof ballast and roof membrane. Contractor shall un-cover and open roof hatches as required for tank access and venting:
- .1 Open up existing roof access hatches as indicated.
 - .2 Provide all necessary temporary means of maintaining in a weathertight condition during the demolition work.
 - .3 Upon completion, reinstate existing roofing system in all areas disturbed to original condition. Use compatible

- products and match existing roof materials.
- .4 Do all patching and roof reinstatements to minimum CRCA standards.
- 3.22 EXISTING ROOF HATCH REPAIR .1 Roof hatch must be resealed with grout and the roof membrane and ballast must be replaced.
- .1 Tie Bars: Steel tie bars shall be installed in each of the openings prior to placing the concrete. Tie bars shall be 15M rebar. The bars shall be installed in drilled holes to a depth of 150mm into the sides of the concrete. Tie bars shall be spaced evenly at the mid-point of the concrete thickness with two tie bars per side of each opening.
- .2 Concrete: The concrete mix shall be Class of Exposure C-1 using a maximum 14mm aggregate. It shall be placed and cured in accordance with the requirements of CSA A23.1.
- .3 Roofing: Reinststate roof components (i.e. membrane, ballast, etc.) to match existing using proper manufacturer and Canadian Roofing Contractor Association recommendations and practices, where applicable