

Construction Execution Plan Bulk Fuel Storage Capacity Increase Arviat, NU 15235-00290

Prepared by: Government of Nunavut Department of Community & Government Services P.O. Box 1000- Station 1600 Iqaluit, NU X0A 0H0

Date: February 19, 2019 Revision 2: March 1, 2019

Point of Contact: Lisa Mitchell, EIT Facility Planner Tel: (867) 975-6448 Email: LMitchell@gov.nu.ca



TABLE OF CONTENTS

1. Construction Execution Plan

- 1.1. General Scope of Work
- 1.2. The Project Team
- 1.3. Construction Sequence
- 1.4. Phase I Year 1 Activities
- 1.5. Phase II Year 2 Activities
- 1.6. Painting

2. API 653 Out of Service Inspection Procedure

3. Hydrostatic Test Procedures and Other Plans

- 3.1. Hydrostatic Test Procedure
- 3.2. Lifting Procedure

4. QA/QC

- 4.1. Civil Work
- 4.2. HDPE Membrane Liner
- 4.3. Cast In Place Concrete
- 4.4. Tank Fabrication and Erection
- 4.5. Pipe Fabrication and Installation
- 4.6. Pigging
- 4.7. Electrical
- 4.8. Procurement
- 4.9. Material Receiving
- 4.10. Correction of Non-Conformity
- 4.11. Welding
- 4.12. Calibration and Testing Equipment

Appendices

- A. Inspection and Test Plan for Painting
- B. Lifting Beam Drawing
- C. Inspection and Test Plan for Tank Construction
- D. Inspection and Test Plan for Shop Construction
- E. Test Sheet for Electrical Installations
- F. Welding Procedures



1. Construction Execution Plan

1.1. General Scope of Work

The existing tank farm in Arviat does not meet capacity or codes requirements. Costing to upgrade the current facility is equivalent to new build costs (including demolision and remediation of the old tank farm). It is more cost effective and feasible to justify a new build within the community.

There is currently no contracted engineering consultant or construction contractor as this work is still within planning stages. Construction will be completed throughout summer 2021 and 2023. Substantial completion is targeted for September 30, 2023. Painting of external surfaces is scheduled for the Summer of 2024 to achieve the best coating application in accordance with the Contract Division 1, Section 01014 Work Sequence 1.9.

The major elements of the scope of work are listed for a new tank farm within Arviat and include the following:

- 1. Construct 4 new vertical tanks;
 - a. 3 for LSDL (diesel) service at 3,333 m³ capacity each,
 - b. 1 for Gasoline service at 3,333 m³ capacity, and
 - c. 1 for Jet A-1 service at 3,333 m³ capacity.
- 2. Add motor operated automatic shut off valves at tank outlets;
- 3. Dismantle and remove existing tank farm including;
 - a. piping and pipe supports,
 - b. tanks (vertical and horizontal),
 - c. dispenser building,
 - d. operator shelter,
 - e. island dispenser,
 - f. liner,
 - g. berm,
 - h. resupply pipeline (approximately 920 m long), and
 - i. shore manifold.
- 4. Supply and install new painted piping and pipe supports;
- 5. Supply and install the following buildings;
 - a. Operator Shelter Building at the tank farm
 - b. Jet A1 Dispenser Building at the tank farm
 - c. Jet A1 Dispenser Building at the airport
 - d. Gasoline / LSDL Remove Dispenser Island
- 6. Supply and install new above ground resupply lines from the marine unloading dock to the tank farm complete with pipe supports, external painting and secondary



containment;

- 7. Supply and install a new marine spill basin;
- 8. Supply and install two mooring bollards at the unloading dock;
- 9. Supply and install new overfill alarm system on vertical tanks;
- 10. Supply and install tank lighting and site lighting; and
- 11. Decommission underground resupply lines and ship the dismantled lines South.

1.2. The Project Team

There is currently no engineering consultant or general contractor. However, the selected engineering consultant and contractor would be responsible for the successful completion while the Government of Nunavut, Department of Community and Government Services, Projects Division would be responsible for the overall management of the project.

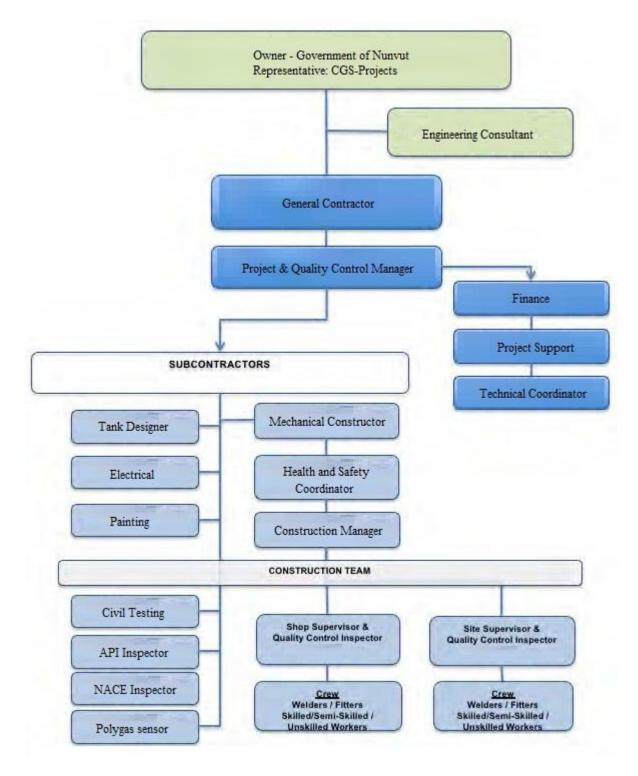
The selected consultant and contractor would need to inform the GN of any subcontractors and provide all associated certifications, resumes, etc. for the selected team as per the Contract.

Subcontractors could include;

- Electrical services including operator shelter and dispenser buildings
- Welding
- Laboratory analysis
- Painting
- API Inspectors



Organization of the Arviat Tank Farm Expansion



Construction Execution Plan – Bulk Fuel Storage Capacity Increase – Arviat, 5



1.3. Construction Sequence

The construction sequence will ensure no interruption to resupply and dispensing operations. The facility will operate as intended during each year of construction and fuel dispensing services to the community will not be disrupted. This will be achieved by the creation of temporary fuel facilities early within the construction season and by commissioning new aspects of the facility prior to any decommissioning and disconnection activities.

Year 1 Activities: Design, purchasing, marshaling of material, and pre-construction will be completed in 2020-2021 (estimated). Pre-construction activities will commence throughout the fall of 2019. Materials will be shipped to the site in summer 2020 and initial construction will begin.

Year 2 Activities: Additional materials will be shipped to the site to support construction activities in 2021. Work will include the establishment of fuel facilities, tank work and new resupply lines, and the installation of buildings. It will include all electrical and lighting work, the decommissioning of piping lines and shipping materials South for proper disposal, and substantial completion of construction by September 30, 2023.

Painting of the exterior of tanks, piping, etc. will be completed in the summer of 2022 to achieve the best coating application.

A more detailed description of the construction sequence and activities is provided below with the complete work breakdown structure (WBS) provided in Appendix A.

1.4. Phase I – Year 1 Activities

1.4.1. Tank and Piping Work – Pre-construction

The following items will need to be pre-fabricated:

- All tank structural steel
- Tank nozzles, stairways and handrails
- Appurtenances for the tanks
- Misc. structural steel pipe supports for the resupply line and the tank farm
- Stiles to be installed over the pipe.
- Pipe spools for the tank farm.

Wherever possible, welding will be completed on location before barged to the community. Generally a percentage of welds completed in the shop will be inspected



and tested by non-destructive visual examination and full gamma-ray radiographic by a third party certified API 653 inspection company.

1.4.2. New LSDL/Gasoline Dispenser Building – Pre-construction

A prefabricated building, skid and building walls and roof for the new LSDL / gasoline dispenser building will be purchased as per design specifications, Section 13227 Gasoline and LSDL Fuel Dispenser Building. The building will be outfitted with pumps, piping, vessels, electrical equipment, and components all purchased down south. The building will be commissioned onsite.

1.4.3. Other Materials Prepared and Shipped

All concrete material along with rebar and formwork will be purchased down south, where applicable. It will be shipped by container or crated for sealift transportation. Containers will be shipped from down south to the site carrying all loose materials, welding rods, PPE, consumables, etc. One of the containers is generally converted to provide a lunchroom and office onsite.

1.4.4. Pipe Painting

All pipe spools and loose pipe will be blasted, primed with design specified primer. One full intermediate coat and one full coat of paint will be applied. Shop painting will be completed by the selected contractor. Onsite painting will be completed by the selected contractor. All painting will be applied as per Contract Specifications and Inspection and Test Plan in Appendix A.

1.4.5. Tanks – Pre-construction

The selected contractor will supply shell, floor, and roof plates. Generally, a subcontractor manufacturer supplies the items.

All shell plates will be squared and sketch plates for the roof and floor will be cut. The floor and roof plates will be crated for sealift transportation. Note that the plates will be shaped at the site as per API 650 or they could be pre-rolled on arrival to site.

The roof will be painted down south or on site based on the selected contractor's best judgment. It is generally recommended that painting be completed before shipment wherever possible.

The floor, shell plates, flat racks, rim ngles, and skids will be shipped to site. Whenever possible, shell plates and tanks should be blasted and primed.

The tank shell plates and roof plates will be shop sandblasted to SSPC-SP10 and



primed with one coat of primer as per designer specifications. Welds will be prepared onsite to SSPC 3 or SP7 brush blast. One coat will be applied to the welds. An intermediate coat will be applied over the entire exterior surface. A full finish coat of will be applied. All painting will be applied as per Contract Specifications Division 9, Section 09900 and the Inspection and Test Plan in Appendix A. Welders certificates are required from the selected contractor before work is initiated.

1.4.6. Underground Piping

Underground piping will be purchased from PermaPipe, as per designed specification, and delivered for crating for sealift transportation.

1.4.7. Cabinet at Remote Island Dispenser

The new cabinet at the remote island dispenser will be purchased from the selected contractor's chosen subcontractor manufacturer based on design specifications. It will need to be crated and transported for sealift to community.

1.4.8. Equipment Mobilization

The following equipment is generally shipped to site by the selected contractor:

- New 30-ton boom truck
- Cat 320 excavator
- Two new girth scaffolds
- Cat 950 loader
- L9000 dump truck
- 25 ton tag trailer
- Cat 323C compactor
- Two pickup trucks
- 15 passenger van
- JLG 80 foot articulated boom
- Three 500A welding machines
- One 300A welding machine

- Four multi-welders complete with welding leads and welding consumables
- Dewatering pump
- 4 inch water transfer pump
- Hydrostatic pump
- 375 CFM compressor
- Cat 267 Skid Steer
- Pig launcher
- 2 inch fuel transfer pump
- ³/₄ inch fuel transfer pump
- Hose fittings and fasteners for temporary fuel hookup



There is generally an onsite mechanic for equipment repairs if and when needed along with appropriate spare parts.

Heavy equipment may also be used by the Hamlet, who could act as a subcontractor to the selected contractor. The Hamlet of Arviat has a wide inventory of heavy equipment already within the community.

1.4.9. Paint Supplies Management

The paint and sand grit required for internal coating of the tanks is shipped before construction. The paint is to be stored in a heated storage facility for the duration of winter. The paint and sand grit for the balance of the facility will be shipped before construction commences.

1.4.10. On-Site Construction

On arrival of the sealift, crew will mobilize to transport the material and equipment from the high water mark at the sealift receiving area to the laydown area location provided by GN-PPD in accordance with Contract Specifications.

The Quality Control Inspector (Site Supervisor) will review the manifest and check the boxes for damage. Next, the Supervisor will inspect the material itself to ensure it is in good condition and that it conforms with the purchase order. If any materials have been damaged in shipment, the Supervisor will notify the sealift and raise a Non-Conformance Report (NCR). All NCRs will be submitted to the Engineer / Owner with the description of how to resolve the issue.

Equipment and materials will be moved to the site using a boom truck, dump truck, and a 25-ton TAG trailer.

Paint will be stored in a heated storage facility. The liquid level management system control panel and the MOV control panel will also be stored in the storage facility. All remaining electronics are designed to be stored in their marine shipment crates until ready for installation. Plywood boards will be installed on all windows of heavy equipment to protect from vandalism.

The selected contractor generally meets with PPD to review the site and the location of the laydown area. While there, they will investigate potential sources of aggregate for the Project. The gravel at the site will be reviewed as well as the aggregates at the Arviat quarry, if applicable.

If the stockpiled materials look suitable, samples will be taken and tested to confirm if they meet the requirements of Contract Specifications Division 2, Section 02224 Part 2



 Products. The Hamlet's crusher and screener will also be inspected to confirm the equipment is in good working condition.

If stockpile materials are not suitable as per specifications, granular material will be shipped to the site from the south by the selected contractor.

Granular materials will be kept in separate piles. Gravel will be compacted and a subcontractor is generally hired to complete sieve analysis, prepare a sieve analysis report, as well as conduct compaction-testing services. Quality control test frequency is addressed in Section 4.1.

Site work will be completed as per the Contract. Multiple tank pads will be constructed and new tank floors (tank bottom plate) will be laid. Also in this season, weather permitting, there is generally an attempt to install the granular pad for the resupply / marine pipeline. Work will continue through the month of September and will wrap up based on weather conditions, potentially the end of October for Arviat.



1.5. Phase 2 – Year 2 Activities

1.5.1. Mobilization

Mobilization will occur on site summer 2021, however the date is weather dependent. Crews will be tasked as follows:

- 1. One crew to complete the initiate ground work for the new tank farm site
- 2. One crew to complete the construction of the new vertical tanks
- 3. One crew to construct the new marine line

It is important to note that the new facility and all associated infrastructure must be constructed, tested and commissioned before the old facility can be removed from the community.

1.5.2. Construction of New Tanks and Bermed Area

The bermed area will need to be completed first before tank pads are installed. The berm will be sealed with HDPE liner and geotextile. The selected contractor (or subcontractor) will supply the liner and will provide a field service technician to weld the new liner, if required.

After the tank pads are constructed, using a crane, man lift, scaffold, skid steer, and welding machines, the tanks will be constructed in accordance with Division 15 – Section 15060. A new 30-ton boom truck should be used to erect the steel plate. Fabrication, erection, inspection, and labeling will be performed as per API STD650. Welding will be completed specifically as per API STD650 Section 5.2 and 7.0.

The tanks will include external painting, spiral stairway, roof handrail around top half of the tanks, 24" roof and shell manholes (varies depending on size and capacity), mechanical level gauge, electronic level gauge, conservation pressure and vacuum valve, gauge hatch and other appurtenances as per the drawings.

No welding will be permitted during fuel resupply. Shell plates will be formed onsite and will be shaped to suit the curvature of the tanks.

1.5.3. Inspection of New Tanks

Inspection and testing of the Tanks will be completed in accordance with the Inspection and Test Plan in Appendix D.

1.5.6. Installation of New Piping, LSDL building, Jet A1 building



All new pipe supports, new pipe spools, valves, pressure relief bypass, MOV, etc. will be installed after berm completion and tank erection.

Perma-pipe will be installed through the berm and it will be sealed with HDPE liner and geotextile. The selected contractor (or subcontractor) will supply the liner and will provide a field service technician to weld the new liner.

New piping will be inspected and tested as per Contract.

A new concrete pad and apron for the LSDL Dispenser building will be poured.

The new LSDL / Gasoline Dispenser building will be commissioned onsite as per Section 13227. An electrical inspector will inspect the dispenser building any time after the conduit, wires, panels, and equipment are installed.

The same will be done for the Jet A1 building at the tank farm facility. A new concrete pad and apron will be poured for the new Jet A1 building. The new Jet A1 building will be commissioned on site as per Section 13227. An electrical inspector will inspect the dispenser building any time after the conduit, wires, panels, and equipment are installed.

New concrete sleepers for the sump at the remote island dispenser and a new concrete floor for the Jet A1 fuel truck unloading spill basin will be poured. And finally, a new concrete pad at the gravity flow location will be poured.

New cabinets at the remote island will be supplied and installed.

A second railing on the three existing stiles and two stiles over the piping will be installed.

Of this work, 15% of these welds completed in the field will be inspected and tested by a non-destructive visual examination and full gamma-ray radiographic by a third party. All welds will be hydrostatic tested as per Contract Specification.

1.5.9. Construction of the New Resupply Line (different crew)

The existing resupply line will be kept in operation until the new line is constructed and commissioned.

The resupply pipeline consists of 150 mm LSDL pipeline, 150 mm Jet A1 pipeline, and one 100 mm gasoline pipeline. All pipe supports for the new resupply line will be installed along with the concrete anchors. The new line will be fit and welded and, on



completion, it will be radio-graphically and hydrostatically tested as per the Specification.

The concrete for the spill basin will be poured at the sea hose connection. A fire extinguisher cabinet will be provided at the marine spill basin. The sea hose valve cover will be installed and a manual winch will be installed at the marine spill basin.

An aluminum sign, which will be purchased by the selected contractor and shipped to the site by sealift, will be installed at the spill basin. Caution signs and line markers will be installed along the resupply line along with anchor locks. The selected contractor, or their subcontractor, will install the mooring bollards.

Prior to any excavation activity, the selected contractor will inform the Hamlet so the community can be advised of upcoming work on the resupply line that runs through the town.

Perma-pipe will be installed under any road or ATV crossings. The perma-pipe consists of an internal 6" carrier pipe with a 10" containment pipe coated with fiberglass for the LSDL and Jet A1 pipeline. The gasoline line will be an internal 4" carrier pipe with an 8" containment pipe coated with fiberglass.

Expansion loops will be installed, if required, as per the construction drawings provided by the selected engineering consultant. All drawings require signature by a professional engineer as per Environment and Climate Change Canada regulations.

Once the new resupply line has been commissioned, the existing resupply line will be decommissioned. The lines will be decommissioned as follows:

- 1. The line will be excavated;
- 2. It will be drained, purged, cleaned, cut, bundled and stacked at a location specified by the Owner;
- 3. Pipe will be cut to be maximum 6 m length or as directed by the Engineer;
- 4. Valves, flexible connectors and usable equipment will be removed from the piping and turned over to Regional Petroleum Products Officer for future use or disposal;
- 5. The anodes and other cathodic protection will be removed; and
- 6. The excavated route will be reinstated to its original condition

The Hamlet Office will be informed of operations when excavating as the line goes through town. Notice and Poster will be provided at various public places like the Airport, Post Office, Hamlet Office, Co-Op store etc. Information regarding start and finish dates and a 24-hour emergency number will be included in the Notice and Poster.



The removed pipe will be bundled, crated for sealift transportation, and transported to a credited facility for proper disposal. The selected contractor, or their subcontractor, will receive and properly dispose of the material.

1.5.7. Removal of Existing Facility; Tanks, Piping, Fittings, Valves and Pipe Supports

Once the new fuel facility has been installed, tested and inspected, all old lines will be drained and pigged. Then they will be stripped out and deposited at a location assigned by the Owner (GN-PPD). It is estimated that the materials will be stored at this temporary location for 4 weeks until it is transferred to the sealift. The old pipe will be bundled and crated for sealift transportation and shipped for proper disposal.

The associated tankage will be drained, cleaned, stripped out, and dismantled. The parts will be deposited at the same location assigned by the Owner. Please note that GN-PPD is currently looking at temporary sites until transportation by sealift to a southern facility for disposal.

1.5.10. Electrical

It is common for the selected contractor to subcontract the electrical work. The following is an outline of the electrical scope of work:

- Conduit and wiring for buildings and tanks will be dismantled.
- New conduits and wiring will be supplied and installed at the new facility.
- All area lighting will be replaced with new equipment.
- New lighting at new vertical tanks will be supplied and installed.
- All light fixtures on existing tanks will be removed for disposal.
- All new tanks will be bonded and ground.
- Power and control cablings to remove dispenser island.
- New overfill protection will be installed for all tanks.
- New Operator shelter installed with power and control panels.
- New Jet A1 dispenser building installed with power and control panels.
- New Gas/LSDL dispenser building new services and grounding.
- Supply and install 701 Jamjar.
- Other miscellaneous electrical work.
- Testing and commissioning

1.5.11. Demonstration and Training Video of Facility

A training and demonstration video will be prepared to demonstrate commissioning of the facility. It will be provided by the selected contractor or the subcontractor to the PPD Fuel Delivery Contractor.



1.5.12. Substantial Completion

Following commissioning of the facility, the selected contractor will request a substantial completion inspection in accordance with Contract Specifications, Section 01650 Substantial Completion Inspection Requirements.

1.6. Painting

Painting will commence late June 2020 and be completed by September 2020. See Appendix A, Inspection and Test Plan – Painting, for a detailed discussion of the procedures and testing that will be used to ensure a quality paint application. All surface preparation and painting will be completed in accordance with the Contract Specification.

1.6.1. Painting – Exterior of New Tanks

Please note the following are general practices for exterior tank painting;

- The entire tank will be washed with Devprep 88 reduced 2 or 3 times with fresh, clean water. The tank will be fresh water washed after washing with Devprep 88.
- The exterior surface will be accessed to ensure it is dull and free of any surface contamination. Any shiny areas will be sanded until dull. It will be abrasive blasted in accordance with SSPC-SP10 Near White Metal Blast Cleaning.
- The tank exterior will be shop primed with one coat of Wasser MC-Zink 100 primer.
- Onsite surface preparation of the welds and other minor damages as per SSPC-3 or SP7 brush blast. One coat of Wasser MC-Zinc primer will be applied at 2-3 mils. One intermediate coat of Wasser MC-CR will be applied over the entire exterior surface at 2 – 3 mils. One full finish coat of Wasser MC-Luster 2.8 will be applied as at 2-3 mils.

1.6.2. Painting – Interior of New Tanks

Please note the following are general practices for exterior tank painting;

- Inside the tank, the floor and 1.5 m band of the shell wall will be sandblasted.
- Two coats of International Intergard #264 at 6-8 mils DFT per coat will be applied as per manufacturer's specifications.
- The interior coating will be 100% holiday tested in accordance with NACE SP0178 with a third-party inspection report prepared following coating application and Holiday testing.

1.6.3. Piping in Tank Farm, Piping for Resupply Pipeline, and Stiles

The welds will be prepared to SP3. Welds will be coated with one coat of Wasser MC-



Miozinc 100 over the welds. One full coat of Wasser MC-CR100 will be applied along with a full final coat of Wasser MC-Luster 2.8.



2. API 650 In-Service Inspection Procedure

Generally, the selected contractor subcontracts this work to a third party to maintain quality control. The API 650 Out of Service Inspection work should be completed by an independent certified API 650 Inspector once all tanks have been erected and before refurbishment work (should it be required based on the API 650 inspection).

The tanks require internal and external inspection will full adherence to safety procedures regarding work in confined spaces as per applicable guidelines, standards and best practices. The selected contractor will need to provide their confined space procedure for review to CGS-Projects, CGS-PPD, and Technical Services.

2.1. Inspection Activities

A detailed list of inspection activities, to be performed by API 650 inspector, is as follows:

- General housekeeping of the tank farm, drainage away from tank, settlement around perimeter of tank, vegetation, operation of dike sump pump, etc.
- Visual inspection of bottom shell joints
- Visual inspection of shell for bulges and distortions, shell mapping and defect location
- Foundation and chine ring inspection (e.g. broken/spalling concrete, cracks in concrete, cavities under tank, grout bottom-to- foundation seal condition, sand, etc.)
- Measure foundation levelness and bottom elevations
- Ultrasonic spot inspection of tank nozzles
- Shell plate thickness measurement with spot ultrasonic testing for actual thickness
- Roof deck visual inspection with spot ultrasonic testing for actual thickness
- Visual inspection of appurtenances (manways, flanged nozzles, sample hatches, roof drains, gage wells, vents, vacuum breakers, etc. – check for cracks, signs of leakage on welded joints, shell plate dimpling, etc.
- Indications and suspect areas to be inspected with magnetic particle inspection.)
- Visual inspection of the tank for defects and evidence of leakage
- Inspection of stairs, ladders, and handrails pitting, holes, and paint failure; welds; safety chain, etc.
- Overall hydraulic and structural integrity survey of the tank
- Survey for tank plumbness and roundness
- External shell coating paint failure, corrosion, pitting, disbanding, discoloration
- Identify low areas on the roof of the tank that do not drain adequately

All vertical tanks in service shall be drained (or product transferred), cleaned, and gas



freed prior to inspection. The floor of the tanks will be power wire brushed and vacuumed and/or swept clean.

The interior of the tanks will be visually inspected by the API 650 inspector and the Engineer to check if any defects, metal pitting, rust or corrosion are present. Chipping and power wire brushing will be required for the removal of hard rust blisters and scale from the bottom to measure pitting.

Out of service inspection work shall include Non Destructive testing such as MFL floor scan, ultrasonic and magnetic particle testing. It will report on the condition of the tank bottoms and the structural integrity of the tanks. Internal inspection will include:

- Visual inspection of the floor-to-shell weld and shell joints, including wet "black and white" magnetic particle inspection (MPI) of 100% of the floor-to-shell weld for crack detection 100% MPI of the shell joints in the 1st course including the first girth seam
- Visual inspection of bottom course shell joints
- Visual inspection of the floor for evidence of leakage
- Bottom interior surface depth of pitting and description, check welds for corrosion and leaks
- Floor mapping with location of columns and any defects
- Hammer test or ultrasonically examine any discolored or damp areas
- Locate and mark voids under the bottom
- Visual inspection of the shell for bulges and distortions
- Interior roof visual inspection
- Inspection of condition of roof rafters and rafter to support column connections
- Visual inspection of interior appurtenances, nozzles and piping
- Condition of internal components (fill lines, sumps, etc.)
- Visual inspection of tank columns and Column base's for Plumbness.
- Tank shell, floor edge, and out-of-plane settlement survey
- Identify low areas on the bottom that do not drain adequately
- Overall hydraulic and structural integrity survey of the tank
- All suspect locations discovered shall be recorded on the floor map and marked on the floor for repairs.

Detailed procedures of the inspection will be submitted at a later date once the certified API inspector is selected.



2.2. Internal Magnetic Flux Exclusion Inspection of Tank Floor

The tank floor will be inspected with an MFE machine for backside corrosion.

- MFE inspection of all accessible areas of the floor.
- Inaccessible areas may include: 3 inches from the shell, floor plate lap welds, and underneath tank appurtenances (i.e. floating suction line), etc. shall be tested by hand scanning.
- B-Scan ultrasonic method will be used to prove up MFE.
- Recording of floor MFE and ultrasonic indications on a floor map.
- Additional 10" by 10" A-scan testing of low ultrasonic readings.
- Location of backside corrosion areas on floor map.

2.3. Ultrasonic (UT) Inspection

- Four ultrasonic readings on each shell plate in the first course.
- A minimum of six ultrasonic readings on the rest of the courses in locations accessible from the tank stairs/ladder.
- A minimum of four ultrasonic readings on each tank floor plate.
- Recording of floor ultrasonic readings on a floor map.
- Additional 10" by 10" A-scan testing of low ultrasonic readings.
- Location of corrosion and metal loss areas on floor map.

Upon completion of API 650 Inspection, completed checklist for tank inspection, NDE examination results and inspection report with recommendations for repair/replacement methods will be submitted.

If tank repair is needed, the work will be completed in accordance with API Standard 650, Tank inspection, Repair, Alteration and Reconstruction and the API Inspector's Report.



3. Hydrostatic Test Procedures and Other Plans

3.1. Hydrostatic Test Procedure

Each tank will be hydrostatically tested using salt water from the ocean. The Department of Fisheries and Oceans (DFO) as well as the Department of Environment (GN) will be contacted for direction regarding disposal of the seawater. A"NO Objection" letter will be required from the Nunavut Water Board through the selected contractor. The selected subcontractor will follow DFO's direction in managing seawater for hydrotesting.

The variation of the following hydrostatic test procedure will be used:

- 1. Prior to filling the tank, the foundation level will be checked.
- 2. Hydrotesting will be documented and witnessed by the GN.
- 3. Tanks will be completely clean and dry before filling with fuel.
- 4. For the first 3 courses, the filling rate will be maximum 18 inches per hour. The last course will be 12 inches per hour. The emptying rate and water disposal will be as stipulated by DFO. The hydrostatic testing equipment will include a water pump, hose, and a solid particle collector on the discharge.
- As the tanks are being filled, the tank elevations will be shot at 0%, 25%, 50%, 75% and 100% full and a final measurement will be taken 24 hours after 100% full. The tank will be considered full when the water level reaches the roof manhole.
- 6. The tank will remain at 100% level for at least 24hrs and all weld joints will be inspected visually for leaks. A final tank elevation will be shot at that time.
- 7. In the event of a leak, the tank will be emptied and the weld repaired.
- 8. Repeat step 4-5.
- 9. Water will be drained from the tank in accordance with the requirements of DFO.
- 10. After the tank is drained, it will be wiped clean of all water and contaminant. The tank will be pressure washed to ensure no salt remains in the tank.
- 11. Proper gaskets must be used on all manhole covers (1/8" thick on shell manhole and 1/16" thick on roof manhole).

Internal bottom elevation settlement measurement will be made before and after hydrostatic test as per API 650 paragraph 7.3.7.8.

3.2. Lifting Plan

For lifting, a brand new 30-ton boom truck ELLIOTT Model 30105 front mount – 30 -Ton CRANE mounted on a 2014 Freightliner Tandem Axle Diesel Truck will be used. All below the hook components will be certified rigging equipment consisting of, and not limited to: shackles, nylon straps, plate grabs, lifting beam (see drawing in

Appendix C. The operator will be an



experienced, certified crane operator and the riggers will be experienced, competent steel workers.

The lifting of the shell plates or large floor or roof plate will consist of:

- Using the crane, nylon straps, shackles, and plate grabs
- 2 workers will be on the ground to hook the plate and signal the crane operator
- Two to three men will receive the plate, align and tack in position, and disconnect the load.

The following video has been submitted by Mosher Engineering with a previous submission for the Gjoa Haven Tank Farm Upgrade.



4. QA/QC

The selected contractor must be committed to delivering products and services on-time, at a competitive price, and exhibiting high quality design and workmanship standards. They must take full responsibility for the quality of materials, products, and workmanship in the completion of the Work.

Work will be inspected both through formal quality control methods such as inspection and testing during procurement, welding, fabrication, and through informal daily inspection as the work progresses in accordance with the Contract Specifications and Drawings.

4.1. Civil Work

The selected contractor will be required to retain the services of an independent testing company to complete the following tests:

- 1. Sieve analysis of sands and aggregates
- 2. Standard Proctor Density curves for backfill materials
- 3. Standard Proctor Density curves for approved borrow materials
- 4. Compaction control tests for backfill and embankment materials



Field densities test frequencies will be as follows:

- Structures and embankments (from excavated material) one for each 400 m2 of compacted layers
- Pipe bedding one for each 100 m of pipe installed
- Pipe zone backfill one for each 100 m of pipe installed
- Trench backfill one for every 100 m of trench of 1,000 mm fill depth
- Subgrade Preparation one field density for every 200 m2 of 150 mm compacted layers
- Road sub-base and base course one field density for every 100 m2 of subbase and one field density for every 100 m2 of base course

The selected contractor will promptly prepare and distribute required copies of test reports, test information, and reports as deemed appropriate. The Engineering consultant will be provided with the reports plus all supporting test information promptly.

4.2. HDPE Liner Membrane

- 1. The selected contractor will submit certification from the liner manufacturer stating that the liner and proposed field joining will meet the physical property requirements for the intended application.
- 2. The material mill test specifications and quality control certificate will be submitted to the engineer prior to shipment
- 3. The Engineer will be notified when the prequalification testing will be performed.
- 4. Test seams will be performed by the technician and observed by the Engineer to ensure conditions are adequate. Test seams will be conducted at the beginning of each seaming period and performed under the same conditions and with the same equipment as production seaming. The test seam will be 3,050 mm long for double wedge fusion welding and 900 mm long for extrusion welding with the seam centered lengthwise.
- 5. Three 25 mm wide pieces will be die cut by the technician. One from each opposite end, and one from the centre of the test seam. These pieces wil be tested by the technician using a field tensiometer in peel and will not fail in the weld. The three weld seam specimens will be tested. Any failures through the weld will be considered a failing test.
- The minimum acceptable seam strength values must adhere to Division 2 Section 02592 Clause 2.7.
- 7. If a test seam fails, a second test will be conducted. If the second test fails, the seaming apparatus will be rejected and not used for production until it is fixed and a successful seam is produced.
- 8. Non-destructive field seam testing will be as per Division 2 Section 02592 Clause



3.9.2 and destructive field seam testing will be as per Division 2 – Section 02592 Clause 3.9.3.

4.3. Cast in Place Concrete

An independent testing company will complete the following quality control tests:

- 1. One set of three cylinders for each type of concrete mix, for each days concreting, or for each 40 m3 of concrete placed.
- 2. Cylinders will be taken at the point of deposit
- 3. For each test, slump and air content will be taken and three cylinders will be prepared for and cured in the lab
- 4. One cylinder from each test will be broken at 7 days and the remaining at 28 days.
- 5. When temperatures are below 5 degrees C, additional field cured cylinders will be prepared to verify the strength.
- 6. Test reports will be distributed to the Engineer.
- 7. In the case of concrete not meeting the specifications, a remedial measure may be taken as per Division 3 Section 03300 Clause 1.5.6.

4.4 Tank Fabrication and Erection

See also Appendix D – Inspection and Test Program for tank construction.

4.4.1. Foundations

- 1. The tank foundation must be built to the elevation shown on the drawing.
- 2. Tank foundations must be level to within 12 mm around the circumference and crowned to allow water to drain to the water draw off valve. Crown slope: 1:120.
- 3. The tank foundation must be properly compacted. A 100 mm lift of sand is required on the tank pad.
- 4. As the tanks are being filled with water for hydrotesting, the tank elevations must be shot 6 times as follows: before filling (0%), 25%, 50%, 75%, 100% full, and again 24 hours after 100% full.

4.4.2. Welding

- 1. A weld map must be made showing the name and symbol of each welder.
- 2. Rod ovens will be used to keep low hydrogen rods dry. Holding rods will be kept at 220 degrees C.

4.4.3. Quality Control Procedures

1. Weep holes must be installed on shell reinforcing pads and air tested to 15psig. Test must be witnessed and documented.



- 2. Floors must be vacuum box tested to -20 kpa to -35 kpa (-3 psig to -5 psig). This test must be documented and witnessed by GN.
- 3. Magnetic particle test will be conducted on floor to shell plate to ensure the joints are not leaking. This test must be documented and witnessed by the GN.
- Low temperature flanges must be used on all pipelines and tanks. The low temperature flanges are stamped "ASTM A350 LF2". Normal flanges stamped "A105N" are **not** to be used.

4.4.4. Fabrication

- 1. Tank floors must be fabricated level.
- 2. Tank shell plate must be erected plumb and round. The shell plate must be free from bulges and flat spots.
- 3. Ensure tank floor extend more then 25mm beyond the shell.
- 4. Maximum peaking and banding is .5". To be measured prior hydrostatic testing.
- 5. Care must be taken not to damage shop-applied coatings.
- **6.** All welds must be stamped and identified on shell-expanded view of the tank erection drawing.

4.5. Pipe Fabrication and Installation Procedures

See also Appendix E – Inspection and Test Program for Shop Construction.

Previous PPD projects have required the following materials will be used, as per Section 15010:

- Pipe: ASTM A106 SMLS, 100mm and larger ERW
- Pipe: ASTM A106 75mm and smaller seamless.
- Pipe and fitting 50mm and larger: Sch40
- Pipe and fitting: 40mm and smaller: Sch80
- Butt welded fittings: ASTM A234 Grade B
- Flange: 1,034 kPA (Class 150), ANSI B16.5, raised face, ASTM A-350, Grade LF2
- o Fitting 3000#: ASTM A-350, Grade LF2, 20680 kPA (Class 3,000)
- Valves: ASTM A352 LCB or LCC
- Studs: ASTM A320 Grade L7

A piping schematic should be kept in the job shack. The location of any spades will be marked on the schematic. Ensure spades have a handle on them so they can be seen visually and removed. A weld map will be made showing the name and symbol of each welder, utilizing drawing 308-M10 or the contract drawing.



Rod ovens will be used to keep low hydrogen rods dry and low point drains and high point vents will be installed as required. A 1" gate valve c/w lockable plate will be used.

4.6. Pigging Procedures

It is very important to remove all dirt and water from new and existing fuel lines prior to putting the lines in service. The following procedure will ensure that pipelines are clean and dry prior to operation:

- The pipeline should be walked and visually inspected for low points that cannot be pigged. In some cases a low point drain will have to be installed.
- The lines should be cleaned with a wire brush pig to remove scale, rust, dirt and welding slag. This pig should be propelled through the lines several times and should be done prior to hydrotesting. If tees or reducers exist, contact the office for work around plan.
- Once the lines have been hydrotested, a rigid foam pig should be used to remove water. It should be run through several times to ensure all water has been removed. Light foam swab pigs will compress and will not remove all water.
- Once all water has been removed, swab pigs should be propelled through the line until they come out clean and dry.

4.7. Electrical

- All work will be completed in accordance with the Canadian Electrical Code, Part 1, latest edition.
- The Polygas Surveillance and Detection System will be verified, calibrated, and tested on site.
- The LSDL / Gasoline Dispenser Building equipment, lighting fixtures, heater, etc. will be tested at the shop prior to shipping.
- The ventilation system for each dispenser building will be tested onsite.
- The following will be checked for motors:
 - That the motor starter and its overload settings are sized appropriately and that the motor is properly rated for its location.
 - Voltage and rotation.
 - Amperage including insulation resistance testing; high potential testing; loop impedance under fault conditions; and motors, heaters, and associated control equipment at full load.
 - \circ Test data will be reported on Test Sheet in Appendix F.
- Anti-static ground continuity tests will be conducted on each tank.
- Circuits originating from branch distribution panels will be tested for continuity, short circuit and ground.



- All lighting and controls will be tested, and the Earth Fault Loop Impendence test will be conducted at the main intake, switchboards, distribution boards, bus-bar systems, lighting circuits and all accessible 15 amp socket outlets and fixed equipment.
- All light switches will be operated and any defective or burned out lamps will be replaced.
- Breaker sizes will be verified at the electrical panel boards. All circuits will be properly identified in the panel board and covered by plastic.
- The line voltages at entrance to main breakers will be tested.
- Starters and contactors will be properly identified.
- Voltage and amps at all pump motors will be verified under no load and maximum flow conditions.
- All electrical and static grounding will be checked. Ground continuity and resistance tests will be performed.
- Test results will be submitted to the Engineer for review.

4.8. **Procurement Procedures**

- 1. The Procurement Agent (GN-CGS Project Manager) will prepare purchase orders from the drawings.
- 2. The Procurement Agent (Project Manager) will request Material Test Reports (MTR) for any materials that are required by the Contract to provide MTRs. They will be forwarded on the date of shipment of the material.
- 3. When ordering material, the Purchase Order will state that the items must have all the required manufacturer's markings.
- 4. When the Purchase Order is developed, it will be approved by the Quality Control Manager if found to be acceptable. After approval, it will be issued to the vendor for procurement of materials.

4.9. Material Receiving

- 1. The Quality Control Inspector (Shop Supervisor) shall receive all material at the shop.
- The Quality Control Inspector (Shop Supervisor) using the Purchase Order, packing slips, and the Material Test Reports examines all material for visual defects, manufacturer's markings, dimensions and condition. Each item, bundle or package will be marked with the identifying shop order number.
- 3. The Quality Control Inspector (Shop Supervisor) will confirm that the MTR received matches the heat number on the product. They will be forwarded to the Quality



Control Manager (Project Manager).

- 4. The Quality Control Manager (Project Manager) will compile the MTRs and submit to the Engineer.
- 5. Other miscellaneous parts shall be verified by trademark, manufacturer's markings or such other markings as are required by the ASME/ANSI standard. These parts are examined for size, ratings type of material and visual defects. If material is found to be unacceptable the Quality Control Inspector will notify the Quality Control Manager.
- 6. All rejected items will be marked with the shop order and retained in the "Rejected Area".

4.10. Correction of Non-Conformity

Non-conformity is any condition that does not meet all the applicable requirements. If during the Receiving inspection, any non-conformity is detected, the following steps shall be taken:

- 1. When the nonconformity requires repairs by welding, the Quality Control Inspector will oversee the repair work and ensure it is completed correctly.
- 2. When the disposition is use-as-is, the QCM will verify that Code compliance is maintained, and request correction of affected documents by the Consulting Engineer as described in the Quality Control Manager.
- 3. For items rejected for scrap or return to vendor, they will be removed to a segregated area and marked "REJECTED" to prevent further use.
- For non-conformities that can be corrected, after the fault has been corrected and reinspected, the "Reject – Do Not Use" marking will be removed by the Quality Control Inspector only.

4.11. Welding

- 1. Structural steel welding will be performed to CSA-W47.1 and W59.
- 2. Welding procedures and certified electrodes will be to CSAW48.
- 3. Tank farm yard piping will be performed in accordance with ASME B 31.3 with ASME Section IX qualified WPS.
- 4. Resupply pipeline will be welded in accordance with CSA Z662 with ASME Section IX qualified WPS.
- 5. Tankage welding will be performed in accordance with API 650 with ASME Section IX qualified WPS.
- 6. MEL will inspect and test fabrication, welding and fastening.



- 7. The Engineer will be notified in advance of fabrication and erection.
- 8. Welding procedures are included in Appendix G.
- All welding personnel will be qualified and licensed welders certified as per CWB. Welders qualifications are included in Appendix H. Certifications are required from the selected contractor. All welders must be certified to work in Nunavut.
- 10. All weld areas will be clean and free of dirt, grease, paint prior to welding.
- 11. Temperature of the welding area will be managed to maintain appropriate conditions for welding.
- 12. Low hydrogen, low temperature electrodes such as E7018-1 will be used along with low hydrogen fluxes and low hydrogen welding practices
- 13. Welding associated with the handrails will be grinded, polished, and buffed to ensure a smooth finish.
- 14. No welding or open flame will be allowed at or near tanks or piping containing product.
- 15. Regarding pipe welding, 15% of all welds will be inspected and tested by nondestructive visual examination and full gamma ray radiographic tests. They will be hydrostatically tested as per B31.3 (tank farm piping)/Z662 (pipeline) and the entire circumference of the weld will be visually examined externally and, where ever possible, internally. If there is failure identified by visual examination, then additional testing will be performed of a total of up to 10% of all welds, as selected by the Engineer by radiographic testing.
- 16. Welding will conform to CSA W59, W47.1 and W55.2 and ASME Code Section IX as applicable.
- 17. Welding of new tanks will be in accordance with API Std. 650, Sections 5.2 and 7.0 with ASME Section IX qualified WPS (MEL-WP-002, see Appendix G).
- Radiographic inspections will be carried out on butt weld shell joints in accordance with API Std. 650, Section 6.1. The shell to bottom weld will be inspected by Magnetic Particle or Dye Penetrant inspections.
- 19. Inspection and testing of new tank bottom and roof welds will be by vacuum method in accordance with API Std 50 Section 5.3.
- 20. Finally, the tank will be hydrostatically tested, strapped and calibrated.
- 21. Welding consumables shall be stored in a warm dry area or heated containers to comply with manufacturer recommendations. Portable rod ovens shall be used in shop for low hydrogen electrodes.
- 22. The superintendent shall issue and control all welding material. Low hydrogen electrodes shall be stored after opening in a heated oven to manufacturers' recommended temperatures. Low Hydrogen electrodes will be issued in small quantities sufficient for 7 hours use. Any unused electrodes shall be discarded.



23. All tack welds shall be performed to qualified procedures. If left in the final weld, a qualified welder whose symbol is marked on the drawing shall perform them. The ends shall be ground to a smooth taper and inspected for defects. If defective, they shall be removed.

4.12. Calibration and Testing Equipment

- 1. All pressure gauges shall be calibrated against a standard deadweight tester. The gauges shall be recalibrated at any time that there is a reason to believe that they are in error or at no more than 12-month intervals.
- 2. Each gauge or measurement and test instrument shall have a unique serial number permanently marked on it.
- 3. Test gauges will be issued to the Shop Superintendent by the QCM as required for Hydrostatic or Pneumatic Testing and will be returned to the QCM immediately after testing.
- 4. Linear and other measuring devices shall be calibrated in conformance with the manufacturer' standard recommendations.



Appendix A - Inspection and Test Plan - Painting



Inspection and Test Program Painting of Tanks and Piping Bulk Fuel Storage Capacity Increase Arviat, NU

Prepared by:

Government of Nunavut Department of Community & Government Services P.O. Box 1000- Station 1600 Iqaluit, NU X0A 0H0

Revision Date: February 28, 2019



1. Scope of Document

This Plan provides an outline of procedures that will be used to ensure quality control during the preparation, painting, inspection and testing of the two new tanks and in painting the existing tanks and pipelines at of the Bulk Fuel Storage Capacity Increase Project in Arviat, Nunavut. The areas to be painted include:

- 1. New vertical tanks
- 2. Internal coating of tanks
- 3. All piping, supports, valves, etc., new resupply line, and the new and existing stilts

2. Reference Standards

In addition to the Arviat Tank Farm Expansion, Division 13 Section 09900 Painting specification, the following standards are referenced in this work.

Society for Protective Coatings (SSPC):

- SP1 Solvent Cleaning
- SP2 Hand Tool Cleaning
- SP3 Power Tool Cleaning
- SP5/NACE 1 White Metal Blast Cleaning
- SP6/NACE 3 Commercial Blast Cleaning
- SP7/NACE 4 Brush-off Blast Cleaning
- SP10/NACE 2 Near White Metal Blast Cleaning
- SP12/NACE 5 High Pressure Water Jetting
- SSPC VIS.1 Guide and Reference Photographs for Steel Surfaces
- SSPC VIS.2 Visual Standard No. 2, Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces
- PA 1 Shop, Field and Maintenance Painting of Steel
- PA 2 Measurement of Dry Paint Thickness with Magnetic Gauges
- PA 8/ NACE 11-Thin Film Organic Linings Applied New Carbon Steel Process Vessels
- NACE SP0178 Design, Fabrication, and Surface Finish Practices for Tanks and Vessels to be lined for immersion Service
- NACE SP0188 Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates
- NACE SP0288 Inspection of Lining Application in Steel and Concrete Equipment

American Society for Testing and Materials (ASTM):

- D1186 Measurement of Dry Film Thickness of Non-Magnetic Organic Coatings Applied on Magnetic Base
- D2200 Pictorial Surface Preparation Standards for Painting Steel Surfaces.

Construction Execution Plan - Bulk Fuel Storage Capacity Increase - Arviat, NU



3. Coat Systems for Arviat

All tanks and associated piping will be painted according to Division 13 – Section 09900. Manufacturer product information sheets for the paint system are attached. Preparation and painting activities will include:

New tanks and associated piping, railings, etc. will be prepared and painted as follows:

- 1. The exterior surfaces of the tank will be sandblasted in the shop to SSPC-SP10 Near White Metal Blast Cleaning. The tank exterior will be shop primed with one coat of Wasser MC-Zink 100 primer at 2-3 mils.
- 2. Once onsite the surfaces will be accessed to ensure it is dull and free of any surface contamination. Any shiny areas will be hand sanded until dull.
- 3. The tanks will then be tested for chloride contamination. If chloride is at or below normal levels, then the tank will be washed with 3,500 to 4,500 psi water to remove dirt, grease, and oil. If salt is found in concentrations above normal, then the tanks will be washed with DevPrep 88 reduced with water and rinsed with fresh water. The tank will then be retested and the process repeated if salt above normal levels is detected.
- 4. The welds and other minor damages will be prepared to SSPC-3 or SP7 brush blast. One coat of Wasser MC-Miozinc primer will be applied at 2-3 mils. One intermediate coat of Wasser MC-CR will be applied over the entire exterior surface at 2 3 mils. One full finish coat of Wasser MC-Luster 2.8 will be applied as at 2-3 mils.

Piping in Tank Farm, Piping for Resupply Pipeline, and Stilts

- 1. The welds will be prepared to SP3.
- 2. Welds will be coated with one coat of MC-Miozinc 100. One full coat of MC-CR100 will be applied along with a full final coat of MC-Luster 2.8.



4. General Procedures

Before washing any new or existing tank, the surfaces will be tested for chloride contamination. If chloride is at or below normal levels, then the tank will be washed with 3,500 to 4,500 psi water to remove dirt, grease, and oil. If salt is found in concentrations above normal, then the tanks will be washed with DevPrep. The tank will then be retested and the process repeated if salt above normal levels is detected.

Sandblasting will be completed in accordance with best standards.

Prior to painting, all metal surfaces will be blown down and free of surface dust. After the surfaces are cleaned to the appropriate surface preparation specification, the steel surfaces will be primed as soon as possible. Should recontamination of the steel surface occurs before the primer is ready to be applied, the surface will be re-cleaned to meet the specification. As such, the cleaning of surfaces will be coordinated so that the cleaned surface can be primed in the same work day.

Product application, thinning, drying interval and film thickness requirements for each of the coating systems will be applied in accordance with the manufacturer's data sheets and recommended application procedures. The Wasser product system (product sheets attached) is a low-temperature product line and as such they can be applied with air temperatures down to - 8 degrees C and up to 99% relative humidity.

Ambient conditions will be measured to ensure they meet the application requirements and painting will take place only when the ambient conditions are favorable. To be protective, painting will be carried out when:

- When the temperature of the air, product, and surface to be painted is at or above 0°C
- When the relative humidity is less than 99%.

DFT tests will be performed to ensure that the minimum Dry Film Thickness has been achieved. Any area that does meet the dry film thickness specified will be rectified by adding additional coats until the specified thickness of the system is obtained. DFT will be measured by SSPC PA-2, Measurement of Dry Paint Thickness with Magnetic Gauge, or ASTM D1186.



Table 2 – Quality Control Measures provides an overview of the test procedures, frequencies, and acceptable criteria that will be used to ensure quality control of painting activities.

The crew should be journeymen certified painters by trade. While each member of the team should be able to perform all tasks required of the project, certain crew members are designated to focus on certain aspects of the job. For example, crew will complete the sandblasting and painting while other crew will focus on mixing and other tasks. Work will be coordinated so that activities of a different nature are not interfering with each other.



Table 2 – Quality Control Measures

Inspection Item	Technique/Instr ument	Frequency of Test	Standard Test Method Reference	Spec Reference	Acceptance Criteria
Verify grease and oil removal	Visual	100% of surfaces prior to mechanical surface preparation	SSPC-SP1	Division 9 – Section 09900 3.1.1.1	No visible surface contamination
Verify surface chloride, sulfate, and nitrate removal	Test with chlor tester	Before coating and repeated until surface chloride level meets acceptable criteria.	As per manufacturer's recommendations for surface chloride removal	Division 9 – Section 09900 3.1.1.2	At or below normal chloride levels
Ensure coating materials are correct materials and in good condition	Visual	Prior to surface preparation	N/A	Division 9 – Section 09900 1.5.2-1.5.10	Materials are in original containers, sealed with labels intact; no damaged containers; materials are stored in dry, weatherproof, heated storage away from heating devices in a temperature range from 5 C to 30 C.
Verify correct coating environmental conditions	Visual	Prior to coating and during coating if conditions change	N/A	Division 9 – Section 09900 1.6.1.1	Surfaces are not to be painted during rain if the surface to be painted will be exposed to or is wetted by rain.



Table 2 – Quality Control Measures (continued)

Inspection Item	Technique/Instr ument	Frequency of Test	Standard Test Method Reference	Spec Reference	Acceptance Criteria
Measure and verify ambient conditions and steel surface temperature	Sling psychrometer – Tailor Pocket Sling range between 20- 120f; Surface thermometer	Prior to coating mixing and at 4 hour intervals	Record measurements in Table 3	Division 9 – Section 09900 1.6.1.2-1.6.1.3	Air temperature $\geq 0^{\circ}$ C; Steel temperature \geq 0° C or \geq 5° F above dew point; Relative
Verify dust removal	Visual / tactile	Prior to primer application	N/A		No visible dust
Verify coating thickness	Dry film thickness gage	Arbitrarily select and measure the first 100 m2 For each additional 1,000 ft2 coated area, arbitrarily select and measure one additional 100 ft2 area.	SSPC-PA 2	Division 9 – Section 09900 Table 3 and 3.3.6	As per thicknesses in Division 9 – Section 09900 Table 3
Verify adhesion to the surface	Test Method A - X Cut Tape Test	3 adhesion tests per tank exterior and interior, if applicable.	ASTM D3359-09		3A or better (less)



Table 3 - Record of Environmental Conditions:

Date	Time	Ambient	Relative	Dew Point	Steel Surface	Weather Condition Observations
		Temperature	Humidity		Temperature	



Appendix C – Lifting Beam Drawing (example)





5 6 7 8 F

4 6 3 Α Е

48

D 1/4 В

В DETAIL A VIEW B-B C SCALE 1 / 10 SCALE 1 / 10

В

2 1 <u>S.W</u>.L. <u>6 TON</u>

36 MIN 36 MIN 144 48 144

4

28'-0"

27'-0"

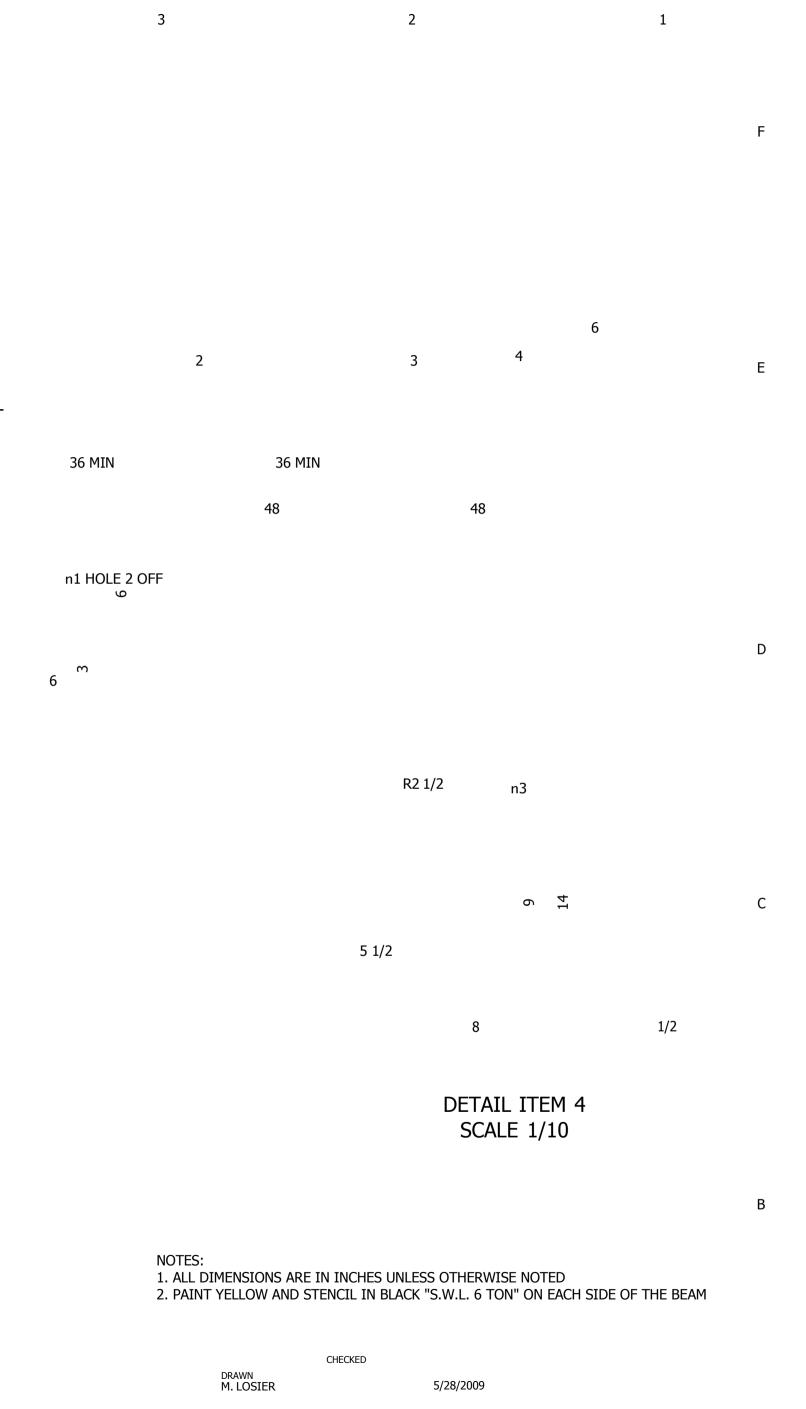
6 DETAIL ITEM 1 SCALE 1 / 20 n1 HOLE 9 OFF

84 വ 6 TYP. 2 1/2 ₀ 30 DETAIL ITEM 2 SCALE 1/20

8 HOLE FOR LIFTING LUG 1/2 2 n1 HOLE 9 OFF 84

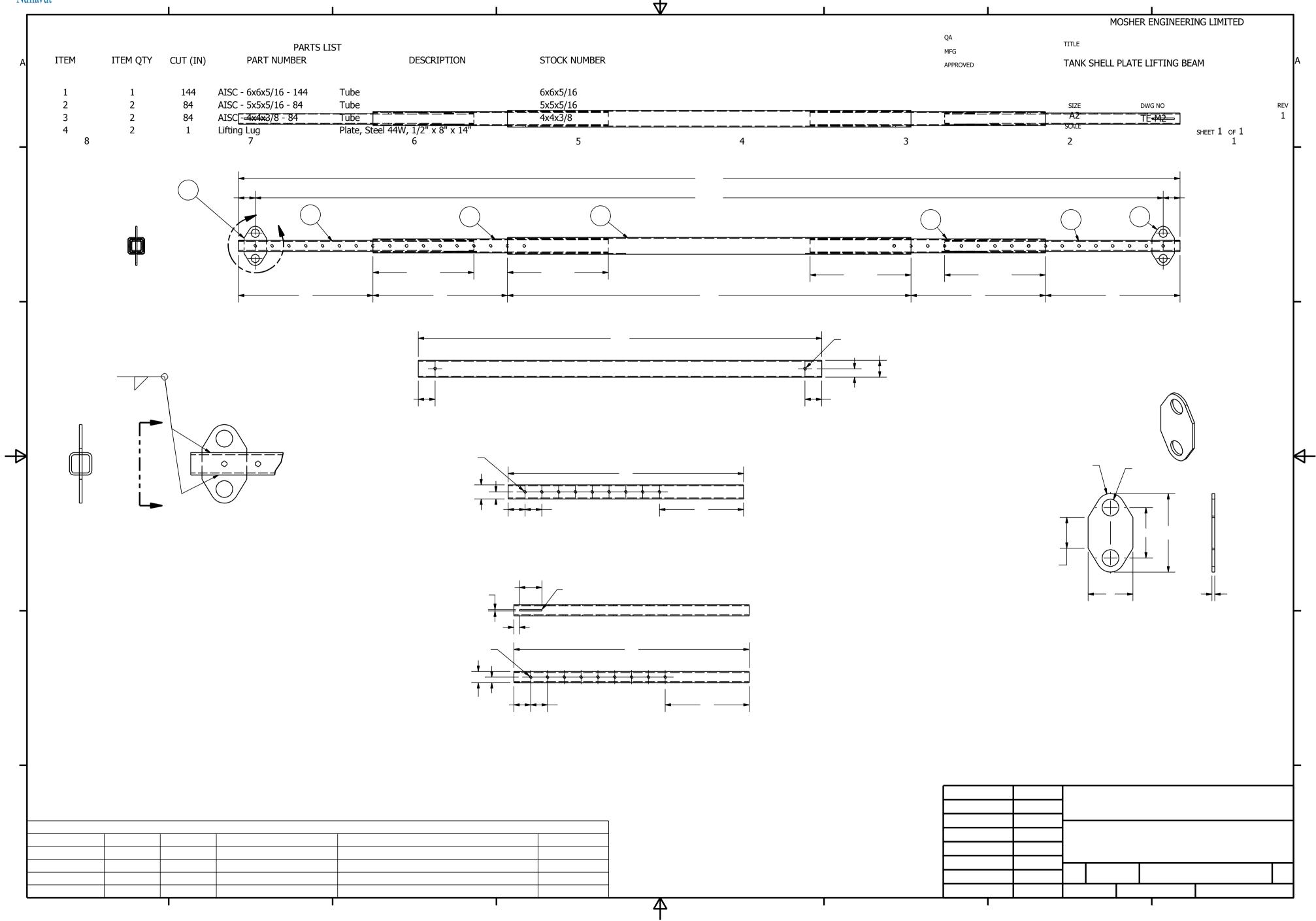
> 4 ⁰ 6 6 TYP. 30 DETAIL ITEM 3

SCALE 1/20



Construction Execution Plan – Bulk Fuel Storage Capacity Increase – Arviat, NU







Appendix D - Inspection and Test Plan – Tank Construction





INSPECTION & TEST PLAN

Tank:	EXAMPLE		Project:	Arviat Fuel Storage Tank Farm Expan	nsion	Document:		
By:	Contractor to be se	lected	Proj. #:			Revision:	EXAMPLE	
ltem	Component	Activity	ITP Type	Documentation	Acceptance Criteria	Notes		ss, Hold, <u>w Points</u> Q.C. Sign/Date
1	Kick-Off Meeting	Kickoff Meeting	N/A	Meeting Minutes	N/A		olgi#ba	H
2	Signature Log	Verify	N/A	Signature Log	N/A			н
3	Welder Qualification	Verify	N/A	Individual Welder Qualifications / Welder Log	API-650 / ASME IX			н
4	Inspector Qualification	Verify	N/A	In house Inspector & 3 rd Party Qualifications	API-650			Н
5	Weld Procedures	Verify	N/A	Approved Weld Procedures	API-650 / ASME IX, CWB W47.1, ASME B 31.3, CSA Z662			Н
6	Welding Consumable	Electrode Storage	N/A	N/A	Manufacturer's Instructions			R
7	Foundation	Foundation Survey	DC	Foundation Acceptance Report, Compaction Report & Survey from 3rd Party	API-650 Para 7.5.5			Н
8	Floor	Materials	FI	MTR Confirmation to Dwg	Drawing & API-650 Sect. 4	MTR issued prior to shipping		н
		Fit up	VE, DC	As Built Drawing	Drawing	Per API-650 5.1.5.4 - bottom plates under the shell shall have the outer ends of the joints fitted and lap- welded		R
		Welding	VE	Weld Map, Visual Report	API-650 Para 7.2 & 8.5 & WPS MEL - WP-002			R
		Vacuum Test	VB	Vacuum Box Test Report	API-650 Para 7.3.3(a) & 8.6			W
9	Shell to Floor	Initial Weld Pass	VE	Weld Map, Visual Report	API-650 Para 8.5, 7.2.4.1			R
	Seams	Final Weld Pass	VE	Weld Map, Visual Report	API-650 Para 8.5, 7.2.4.1			R
		MPI	NDT	MPI Report	API-650 Para 7.2.4.3 c)	MPI inside or outside of final joint		W
10	Shell	Materials	FI	MTR Confirmation to Dwg	Drawing & API-650 Sect. 4	MTR issued prior to shipping		н
		Fit up 1 st Course	VE, DC	As Built Drawing	Drawing			R
		Roundness	DC	Dimension Report	API-650 Para 7.5.3			Н



b⊃∩⊃J <u>ca</u> ⁽> ∧P^{sb}<^c⊂<∩^c >^c Building <u>Nunavut</u> Together <u>Nunavu</u>liuqatigiingniq Bâtir le <u>Nunavut</u> ensemble

		Welding	VE	Weld Map, Visual Report	API-650 Para 7.2, 7.5, 8.5 & WPS MEL - WP-002		R
		Tolerance Check – Plumbness & Local Deviations	DC	Dimension Report	API-650 Para 7.5		W
		Radiography	NDT	X-ray report / Log / Map	API-650 Para 7.2.3 & 8.1		R
Fank:	LSDL Tank #01		Project:	ArviatFuel Storage Tank Farm E	kpansion	Document: TK	(#1 ITP
By:	Mosher Engineering	g	Proj. #:	308		Revision: B-	Issued for Approva
11	Compression Ring	Fit up	VE, DC	As Built Drawing	Drawing		R
		Welding	VE	Weld Map, Visual Report	API-650 Para 7.2 & 8.5 & WPS		R
12	Roof	Fit up	VE, DC	As Built Drawing	Drawing		R
		Welding	VE	Visual Report	API-650 Para 7.2 & 8.5 & WPS		R
		Vacuum Test	VB	Vacuum Box Test Report	API-650 Para 7.3.8(b) & 8.6		W
13	Roof Structure	Fit up	VE, DC	As Built Drawing	Drawing		R
		Column Plumbness	DC	Dimension Report	API–650 Para 7.5.2 b)		Н
		Welding	VE	Visual Report	API-650 Para 7.2 & 8.5 & WPS		R
14	Nozzles	Layout	VE, DC	As Built Drawing	Drawing		Н
		Fit up	VE, DC	As Built Drawing	Drawing		R
		Shop Prep Welding	VE	Weld Map, Visual Report	API-650 Para 7.2 & 8.5 & WPS		R
		Welding	VE	Weld Map, Visual Report	API-650 Para 7.2 & 8.5 & WPS		R
		Tolerance Check – Plumbness & Local Deviations	DC	Dimension Report	API-650 Para 7.5		н
		Shell Nozzle Repad Air test	AT	Leak Test Report	API-650 Para 7.3.5		W
		MPI of Shell Nozzles	NDT	MPI Report	API-650 Para 7.2.3.6	All welds of Shell Nozzles	W
15	Manways	Layout	VE, DC	As Built Drawing	Drawing		Н
		Fit up	VE, DC	As Built Drawing	Drawing		R
		Welding	VE	Weld Map, Visual Report	API-650 Para 7.2 & 8.5 & WPS		R
		Tolerance Check – Plumbness & Local Deviations	DC	Dimension Report	API-650 Para 7.5		н



		Shell Manway Repad Air test	AT	Leak Test Report	API-650 Para 7.3.5			W
		MPI	NDT	MPI Report	API-650 Para 7.2.3.6	All welds of Shell Manways		R
16	Internals	Layout	VE, DC	As Built Drawing	Drawing			Н
		Fit up	VE, DC	As Built Drawing	Drawing			R
		Welding	VE	Visual Report	API-650 Para 7.2 & 8.5 & WPS			R
17	Externals	Layout	VE, DC	As Built Drawing	Drawing			Н
		Fit up	VE, DC	As Built Drawing	Drawing			R
		Welding	VE	Visual Report	API-650 Para 7.2 & 8.5 & WPS			R
Tank	LSDL Tank #01		Project:	ArviatFuel Storage Tank Farm Expa	nsion	Document:	TK#1 ITP	
By	: Mosher Engineerir	ng	Proj. #:	308		Revision:	B-Issued for	r Approval
18	Stairs & Platforms	Layout	VE, DC	As Built Drawing	Drawing			Н
		Fit up	VE, DC	As Built Drawing	Drawing			R
		Welding	VE	Visual Report	API-650 Para 7.2 & 8.5 & WPS			R
19	Bolts & Nuts	Inspection	VE, DC	As Built Drawing	Drawing	Bolt Torque		W
20	Hydrotest	Inspection	VE, NDT	Hydrotest Report	API-650 Para 7.3.6 & 7.3.7	Steps per separate hydrotest procedure.		Н
21	Final	Name Plate Verification	N/A	Scan of Name Plate	Drawings			Н
		Final Inspection	FI	As Built Drawings, Data Sheet, Manufacturer's Certification (3 rd Party), Punch List	Drawings			н

DEFINITIONS:

W - WITNESS: Specified activity to be observed by an outlined party. QC to provide the applicable party 24 hours notice of witness point.

H - HOLD: Specified component or installation to be inspected by an outlined party. No further activities specific to the component or installation may proceed until inspection is carried out. QC to provide the applicable party 24 hours notice of hold point.

R - REVIEW: Specified documentation and specifications applicable to a particular component and/or installation to be examined by an outlined party.

AT - AIR TEST: Specified component and/or installation to be air tested according to specified documentation and specifications.

DC - DIMENSION CHECK: Physical dimensions of component and/or installation to be verified according to specified documentation and specifications.

FI - FINAL INSPECTION: Specified inspection procedures to be executed prior to release of the component and/or installation and verified according to specified documentation and specifications.

NDT - NON DESTRUCTIVE TESTING: Specified component and/or installation to be inspected using a named non destructive testing method according to specified documentation and specifications.

VE - VISUAL Examination: Specified component and/or installation to be examined visually according to specified documentation and specification.

VB - VACUUM-BOX TEST: Specified component and/or installation to be vacuum box tested according to specified documentation and specifications.



INSPECTION & TEST PLAN

Tank:	LSDL Tank #02		Project:	ArviatFuel Storage Tank Farm Expan	ision	Document:	TK#2 ITP	
By:	Mosher Engineerin	g	Proj. #:	308		Revision:	B-Issued f	or Approval
ltem	Component	Activity	ITP Type	Documentation	Acceptance Criteria	Notes		is, Hold, v Points Q.C.
							Sign/Da	_
	Kick-Off Meeting	Kickoff Meeting	N/A	Meeting Minutes	N/A			Н
2	Signature Log	Verify	N/A	Signature Log	N/A			Н
3	Welder Qualification	Verify	N/A	Individual Welder Qualifications / Welder Log	API-650 / ASME IX			Н
4	Inspector Qualification	Verify	N/A	In house Inspector & 3 rd Party Qualifications	API-650			Н
5	Weld Procedures	Verify	N/A	Approved Weld Procedures	API-650 / ASME IX, CWB W47.1, ASME B 31.3, CSA Z662			Н
6	Welding Consumable	Electrode Storage	N/A	N/A	Manufacturer's Instructions			R
7	Foundation	Foundation Survey	DC	Foundation Acceptance Report, Compaction Report & Survey from 3rd Party	API-650 Para 7.5.5			Н
8	Floor	Materials	FI	MTR Confirmation to Dwg	Drawing & API-650 Sect. 4	MTR issued prior to shipping		Н
		Fit up	VE, DC	As Built Drawing	Drawing	Per API-650 5.1.5.4 - bottom plates under the shell shall have the outer ends of the joints fitted and lap- welded		R
		Welding	VE	Weld Map, Visual Report	API-650 Para 7.2 & 8.5 & WPS MEL - WP-002			R
		Vacuum Test	VB	Vacuum Box Test Report	API-650 Para 7.3.3(a) & 8.6			W
9	Shell to Floor	Initial Weld Pass	VE	Weld Map, Visual Report	API-650 Para 8.5, 7.2.4.1			R
	Seams	Final Weld Pass	VE	Weld Map, Visual Report	API-650 Para 8.5, 7.2.4.1			R
		MPI	NDT	MPI Report	API-650 Para 7.2.4.3 c)	MPI inside or outside of final joint		W
10	Shell	Materials	FI	MTR Confirmation to Dwg	Drawing & API-650 Sect. 4	MTR issued prior to shipping		Н
		Fit up 1 st Course	VE, DC	As Built Drawing	Drawing			R
		Roundness	DC	Dimension Report	API-650 Para 7.5.3			Н



	Welding	VE		API–650 Para 7.2, 7.5, 8.5 & WPS MEL - WP-002		R
	Tolerance Check – Plumbness & Local Deviations	DC	Dimension Report	API-650 Para 7.5		w
	Radiography	NDT	X-ray report / Log / Map	API-650 Para 7.2.3 & 8.1		R

Tank:	LSDL Tank #02		Project:	ArviatFuel Storage Tank Farm E	xpansion	Document:	TK#2 ITP
By:	Mosher Engineering	g	Proj. #:	308		Revision:	B-Issued for Approval
11	Compression Ring	Fit up	VE, DC	As Built Drawing	Drawing		R
		Welding	VE	Weld Map, Visual Report	API-650 Para 7.2 & 8.5 & WPS		R
12	Roof	Fit up	VE, DC	As Built Drawing	Drawing		R
		Welding	VE	Visual Report	API–650 Para 7.2 & 8.5 & WPS		R
		Vacuum Test	VB	Vacuum Box Test Report	API-650 Para 7.3.8(b) & 8.6		W
13	Roof Structure	Fit up	VE, DC	As Built Drawing	Drawing		R
		Column Plumbness	DC	Dimension Report	API–650 Para 7.5.2 b)		н
		Welding	VE	Visual Report	API–650 Para 7.2 & 8.5 & WPS		R
14	Nozzles	Layout	VE, DC	As Built Drawing	Drawing		Н
		Fit up	VE, DC	As Built Drawing	Drawing		R
		Shop Prep Welding	VE	Weld Map, Visual Report	API–650 Para 7.2 & 8.5 & WPS		R
		Welding	VE	Weld Map, Visual Report	API-650 Para 7.2 & 8.5 & WPS		R
		Tolerance Check – Plumbness & Local Deviations	DC	Dimension Report	API-650 Para 7.5		н
		Shell Nozzle Repad Air test	AT	Leak Test Report	API-650 Para 7.3.5		W
		MPI of Shell Nozzles	NDT	MPI Report	API-650 Para 7.2.3.6	All welds of Shell Nozzles	W
15	Manways	Layout	VE, DC	As Built Drawing	Drawing		н
		Fit up	VE, DC	As Built Drawing	Drawing		R
		Welding	VE	Weld Map, Visual Report	API-650 Para 7.2 & 8.5 & WPS		R



		Tolerance Check – Plumbness & Local Deviations	DC	Dimension Report	API-650 Para 7.5		Н
		Shell Manway Repad Air test	AT	Leak Test Report	API-650 Para 7.3.5		W
		MPI	NDT	MPI Report	API-650 Para 7.2.3.6	All welds of Shell Manways	R
16	Internals	Layout	VE, DC	As Built Drawing	Drawing		Н
		Fit up	VE, DC	As Built Drawing	Drawing		R
		Welding	VE	Visual Report	API-650 Para 7.2 & 8.5 & WPS		R
17	Externals	Layout	VE, DC	As Built Drawing	Drawing		Н
		Fit up	VE, DC	As Built Drawing	Drawing		R
		Welding	VE	Visual Report	API-650 Para 7.2 & 8.5 & WPS		R

Tank:	LSDL Tank #02		Project:	ArviatFuel Storage Tank Farm Expans	sion	Document:	TK#2 ITP	
By:	Mosher Engineering	9	Proj. #:	308		Revision:	B-Issued for	or Approval
18	Stairs & Platforms	Layout	VE, DC	As Built Drawing	Drawing			Н
	Fit up		VE, DC	As Built Drawing	Drawing			R
		Welding	VE	Visual Report	API-650 Para 7.2 & 8.5 & WPS			R
19	Bolts & Nuts	Inspection	VE, DC	As Built Drawing	Drawing	Bolt Torque		W
20	Hydrotest	Inspection	VE, NDT	Hydrotest Report	API-650 Para 7.3.6 & 7.3.7	Steps per separate hydrotest procedure.		Н
21	Final	Name Plate Verification	N/A	Scan of Name Plate	Drawings			Н
		Final Inspection	FI	As Built Drawings, Data Sheet, Manufacturer's Certification (3 rd Party), Punch List	Drawings			н

DEFINITIONS:

W - WITNESS: Specified activity to be observed by an outlined party. QC to provide the applicable party 24 hours notice of witness point.

H - HOLD: Specified component or installation to be inspected by an outlined party. No further activities specific to the component or installation may proceed until inspection is carried out. QC to provide the applicable party 24 hours notice of hold point.

R - REVIEW: Specified documentation and specifications applicable to a particular component and/or installation to be examined by an outlined party.

AT - AIR TEST: Specified component and/or installation to be air tested according to specified documentation and specifications.



DC - DIMENSION CHECK: Physical dimensions of component and/or installation to be verified according to specified documentation and specifications.

FI - FINAL INSPECTION: Specified inspection procedures to be executed prior to release of the component and/or installation and verified according to specified documentation and specifications.

NDT - NON DESTRUCTIVE TESTING: Specified component and/or installation to be inspected using a named non destructive testing method according to specified documentation and specifications.

VE - VISUAL Examination: Specified component and/or installation to be examined visually according to specified documentation and specification.

VB - VACUUM-BOX TEST: Specified component and/or installation to be vacuum box tested according to specified documentation and specifications.



Appendix E – Inspection and Test Plan – Shop Construction



				INSPECTIO	ON & TEST PLAN			
By:	Inukshu	k Construction Limited	Project:	ArviatTank Farm Expansion		Document:	SHOP	-ITP
			Proj. #:	308		Revision:	B - Issued for Ap	proval
Item		Component	ITP Type	Documentation	Acceptance Criteria	Notes	Witness, Hold, Review Points	Responsible Party
	1.1	Material matches Purchase Order	VE	Marked up packing slip	PO matches packing slip	Send marked up packing slips to office	R	SM
1.0 Material	1.2	Dimensional Check	VE/DC	N/A	Measurements match shop drawing		R	F/W
Receiving	1.3	Lot, Batches, Heat # Recorded	VE	MTR's with Heat Numbers	MTR's provided for all material, if required	As required, send MTRs to office	R	SM
	1.4	Proper Storage	VE	N/A	N/A	Visual Inspection of Storage	R	SM
	2.1	Checked and approved drawings	VE	N/A	Drawings and Specifications	Ensure Shop Drawings are IFC and current revision only	R	SM
	2.2	Correct Material Issued for Fabrication	VE	N/A	Drawings and Specifications	Ensure material received matches Shop Drawings	R	SM / F/W
	2.3	Dimensional Check Prior to Fit Up	VE/DC	As Built Drawing	Shop Drawings		R	SM / F/W
2.0 Fabrication of Structural Material	2.4	Structural Welding Procedures	N/A	Approved Welding Procedures	CSA-W59M		R	SM / WE
Structural Material	2.5	Welding Consumables - Electrode Storage	N/A	N/A	Manufacturer's Instructions, CSA W48		R	SM / WE
	2.6	Welder Qualifications	N/A	Individual Welder Qualifications / Welder Log	CSA W47.1/W59		R	SM
	2.7	Visual Inspection	N/A	N/A	CSA W59		R	SM
	2.8	Inspector Qualifications	N/A	In house Inspector & 3 rd Party Qualifications	CSA W178.2		R	SM
	3.1	Checked and approved drawings	VE	N/A	Drawings and Specifications	Ensure Shop Drawings are IFC and current revision only	R	SM
	3.2	Correct Material Issued for Fabrication	VE	N/A	Drawings and Specifications	Ensure material received matches Shop Drawings	R	SM / WE
	3.3	Dimensional Check Prior to Fit Up	VE/DC	As Built Drawing	Shop Drawings		R	WE
	3.4	Pipe Welding Procedures	N/A	Approved Welding Procedures	Section 9 Enrollment Letter IX, ASME Boiler Pressure Code, WPS - MEL - WP-002; CSA Z662 for resupply pipeline		R	SM



3.0 Tank Farm	3.5	Welding Consumables - Electrode Storage	N/A	N/A	CSA W48		R	SM / WE
	3.6	Welder Qualifications	N/A	Individual Welder Qualifications / Welder Log	CSA B51		R	SM
	3.7	Visual Inspection	N/A	N/A	ASME B31.3		R	SM
	3.8	Radiography	NDT	X-ray report / Log / Weld Map	ASME B31.3	Testing by a qualified independent inspection firm	R	РМ
	3.9	Inspector Qualifications	N/A	In house Inspector & 3 rd Party Qualifications	CSA W178.2	Ensure all inspectors have required qualifications and experience	R	SM
				INSPECTION	N & TEST PLAN			
By:	Inukshuk	Construction Limited	Project:	ArviatTank Farm Expansion		Document:	SHOP-I	TP
•			Proj. #:			Revision: E	- Issued for App	roval
	4.1	Checked and approved drawings	VE	N/A	Drawings and Specifications	Ensure Shop Drawings are IFC and current revision only	R	SM
	4.2	Correct Material Issued for Assembly	VE	N/A	Drawings and Specifications	Ensure material received matches Shop Drawings	R	SM / WE / LA
4.0 Assembly of Material	4.3	Assembly	VE	As Built Drawing	Drawings and Specifications	Ensure material is assembled as instructed in Drawings and Specifications	R	SM / WE / LA
		Dimensional Check Prior to assembly	VE/DC	As Built Drawing	Shop Drawings		R	WE
			VE	N/A	Drawings and Specifications	As required by specifications	R	SM
	5.1	Stuff Container	VE	Shipping List	Land and Marine Shipping Instructions, Shop Drawings	Send to office list of all items, weights, quantities and container #	R	SM
	-	Crate for Marine Shipping	VE	N/A	NSSI or NEAS Packaging Instructions	As applicable, as per specifications	R	SM
5.0 Shipping - Land,	5.3	Crate for Air Shipment	VE	N/A	Air Freight Shipping Requirements		R	SM
Marine and Air	5.4	TDG	VE	TDG Labelling	Transport Canada Regulations for Marine and Land or Air TDG	Must be overseen by qualified TDG personnel	R	SM / LA
	5.5	Light and Heavy Equipment	VE	N/A	Transport Canada Regulations for Marine TDG	Fuel tank must be at most 1/4 full, or up to 200L maximum.	R	SM
	5.6	Labelling	VE	Tagging	Shop Drawings	All items must be tagged according to shipping/tagging instructions from office	R	SM
6.0 Nonconformance	6.1	Nonconformance	VE	Nonconformance Report	Nonconformance resolved	As required	Н	SM



DEFINITIONS:

- H HOLD: Specified component or installation to be inspected by an outlined party. No further activities specific to the component or installation may proceed until inspection is carried out. QC to provide the applicable party 24 hours notice of hold point.
- R REVIEW: Specified documentation and specifications applicable to a particular component and/or installation to be examined by an outlined party.
- DC DIMENSION CHECK: Physical dimensions of component and/or installation to be verified according to specified documentation and specifications.
- NDT NON DESTRUCTIVE TESTING: Specified component and/or installation to be inspected using a named non destructive testing method according to specified documentation and specifications.
- VE VISUAL EXAMINATION: Specified component and/or installation to be examined visually according to specified documentation and specification.
- TDG Transportation of Dangerous Goods
- IFC Issued for Construction
- PM Project Manager
- SM Shop Manager
- F/W Fitter/Welder
- WE Welder
- LA Labourer



Appendix F – Test Sheet for Electrical Installations



ArviatTank Farm Expansion Project No.: EXAMPLE

Division 16 – Section 16010 General Electrical Provisions Page 9

TEST SHEET FOR ELECTRICAL INSTALLATIONS (USE SEPARATE SHEET FOR EACH MOTOR)

SITE:				PROJECT NO.:			
CONTRACTOR:							
DATE:			MOTO	otor H.P.:			E:
TEST: Installation resistance to ground					_megohms.		
Voltage at panel mains section:							
(1)	Between phases:	A - B		B - C		A - C	
	Line to neutral:	A - N		B - N		C - N	
	(Note for 120/240 V read A - B only and A - N and B - N only)						
(2)	Running amperes of motor:	Α		В		С	
(3)	Overload Settings:	Α		В		С	
	(Note for 120/240V read A and B only)						
Motor Serial No.:				Model No.:			
Manufacturer:							
Pump Duty (Product pumped or other use):							
SIGNATURE:							
(Print name after signature)							



Appendix G - Welding Procedures