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Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

March 19, 2015

Phyllis Beaulieu
Manager of Licensing
Nunavut Water Board
P.O. Box 119, Gjoa Haven, NU, X0B 1J0
Phone: (867) 645-6338, ext. 27
Fax: (867) 360-6369
Email: phyllis.beaulieu@nwb-oen.ca

Re: Water Licence Application for Hydrostatic Testing of Fuel Storage Tank #3 Repairs, Coral Harbour

Dear Ms. Beaulieu,

The Government of Nunavut, Community and Government Services (GN-CGS) is submitting to the Nunavut Water Board (NWB) a Water Licence Application for Hydrostatic Testing associated with repairs to Fuel Storage Tank #3 at the Coral Harbour Tank Farm. GN-CGS is requesting a Licence for a period of 6 months, from June 2015 to December 2015, to carry-out hydrostatic testing.

The following documents are submitted with this application:

1. Water Licence Application;
2. Executive Summary, English;
3. Executive Summary, Inuktitut Translation – Due to delays in translation, this will be submitted to the NWB by March 27, 2015;
4. Appendix A – Map and Drawing of Coral Harbour Tank Farm;
5. Appendix B – Issued for Tender Drawings of Tank #3 Repairs prepared by Nunami Stantec, February 2015;
6. Appendix C – Solid Particle Collector;
7. Appendix D – *API 653 – Internal/Out Of Service Inspection Program, Above Ground Storage Tank 3, Coral Harbour, Nunavut* prepared by SNC-Lavalin, October 2014;
8. NPC Conformity – Will follow once NWB has referred the Water Licence Application to the NCP. NPC conformity determination is expected by April 17, 2015; and
9. NIRB Determination – Will follow once NWB has referred the Water Licence Application to the NIRB for screening. NIRB screening determination is expected by April 17, 2015.

Please feel free to contact the undersigned if there are any questions or concerns with the enclosed application or documents.

Sincerely,

Mohammed Ansari, PMP, LEED® Green Associate™
Senior Project Officer
Government of Nunavut, Department of Community and Government Services
Kivalliq Regional PMO
P.O. Box 490, Rankin Inlet, NU, X0C 0G0
Phone: (867) 645-8181
Fax: (867) 645-8196
Email: mansari@gov.nu.ca

CC: John Kusugak, GN-Regional Director, CGS, Kivalliq Region
Paul Mulak, GN-Director PMO
Brian Duguay, GN-A/Projects Manager, CGS, Kivalliq Region
Megan Lusty, GN-CGS

General Water Licence Application
(Application for a new Water Licence)

Document Date: April 2013

Application Submission Date: __**03/19/2015**__
Month/Day/Year

P.O. BOX 119
GJOA HAVEN, NUNAVUT
XOB 1J0
TEL: (867) 360-6338
FAX: (867) 360-6369

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NUNAVUT IMALIRIYIN KATIMAYIT
NUNAVUT WATER BOARD
OFFICE DES EAUX DU NUNAVUT

DOCUMENT MANAGEMENT

Original Document Date: April 2010

DOCUMENT AMENDMENTS

	Description	Date
(1)	Updated for public distribution as separate document from NWB Guide 4	June 2010
(2)	Updated NWB logos and reformatted table to allow rows to break across page	May 2011
(3)	Update NWB logo	April 2013
(4)		
(5)		
(6)		
(7)		
(8)		
(9)		
(10)		

P.O. BOX 119
GJOA HAVEN, NU X0B 1J0
TEL: (867) 360-6338
FAX: (867) 360-6369

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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYIT
OFFICE DES EAUX DU NUNAVUT

GENERAL WATER LICENCE APPLICATION
(APPLICATION FOR NEW WATER LICENCE)

The applicant is referred to the NWB's Guide 4: *Guide to Completing and Submitting a Water Licence Application for a New Licence* for more information about this application form.

LICENCE NO: (for NWB use only)	
1. APPLICANT (PROPOSED LICENSEE) CONTACT INFORMATION (name, address) **John Kusugak, A/Regional Director, Kivalliq Region** **Government of Nunavut, Department of Community and Government Services** **P.O. Box 490, Rankin Inlet, X0C 0G0** Phone: _**(867) 645-8101**_____ Fax: _**(867) 645-8196**_____ e-mail: _**jpkusugak@gov.nu.ca**_____	**2. APPLICANT REPRESENTATIVE CONTACT INFORMATION** if different from Block 1 (name, address) **Mohammed Ansari, Senior Project Officer** **Government of Nunavut, Department of Community and Government Services, Kivalliq Regional PMO** **P.O. Box 490, Rankin Inlet, X0C 0G0** Phone: __**(867) 645-8181**_____ Fax: __**(867) 645-8196**_____ e-mail: __**mansari@gov.nu.ca**_____ (Attach authorization letter. **– N/A**)
3. NAME OF PROJECT (including the name of the project location) **Fuel Storage Tank #3 Repairs, Coral Harbour, Nunavut**	
4. LOCATION OF UNDERTAKING **Project Extents** NW: Latitude: (**64°07'58.64"N**) Longitude: (**83°10'14.83"W**) NE: Latitude: (**64°07'59.92"N**) Longitude: (**83°10'10.67"W**) SE: Latitude: (**64°07'58.78"N**) Longitude: (**83°10'08.64"W**) SW: Latitude: (**64°07'57.47"N**) Longitude: (**83°10'12.57"W**) **Camp Location(s)** Latitude: (° ' " N) Longitude: (° ' " W)	
5. MAP - Attach a topographical map, indicating the main components of the undertaking. **See Appendix A.**	

NTS Map Sheet No.: _____ Map Name: _____ Map Scale: _____

6. NATURE OF INTEREST IN THE LAND - Check any of the following that are applicable to the proposed undertaking (at least one box under the 'Surface' header must be checked).

Sub-surface

☐ Mineral Lease from Nunavut Tunngavik Incorporated (NTI)
Date (expected date) of issuance: _____ Date of expiry: _____

☐ Mineral Lease from Indian and Northern Affairs Canada (INAC)
Date (expected date) of issuance: _____ Date of expiry: _____

Surface

☐ Crown Land Use Authorization from Indian and Northern Affairs Canada (INAC)
Date (expected date) of issuance: _____ Date of expiry: _____

☐ Inuit Owned Land (IOL) Authorization from Kitikmeot Inuit Association (KIA)
Date (expected date) of issuance: _____ Date of expiry: _____

☐ IOL Authorization from Kivalliq Inuit Association (KivIA)
Date (expected date) of issuance: _____ Date of expiry: _____

☐ IOL Authorization from Qikiqtani Inuit Association (QIA)
Date (expected date) of issuance: _____ Date of expiry: _____

☐ Commissioner's Land Use Authorization
Date (expected date) of issuance: _____ Date of expiry: _____

☐ Other: _____
Date (expected date) of issuance: _____ Date of expiry: _____

Name of entity(s) holding authorizations:
_____

7. NUNAVUT PLANNING COMMISSION (NPC) DETERMINATION

Indicate the land use planning area in which the project is located.

☐ North Baffin
☐ South Baffin
☐ Akunniq
X Keewatin
☐ Sanikiluaq
☐ West Kitikmeot

Is a land use plan conformity determination required?

X Yes ☐ No

If Yes, indicate date issued and attach copy _ **Expected April 17, 2015**_____
If No, provide written confirmation from NPC confirming that a land use plan conformity review is not required.

8. NUNAVUT IMPACT REVIEW BOARD (NIRB) DETERMINATION

Is an Article 12 Part 4 screening determination required?

X Yes ☐ No

If Yes, indicate date issued and attach copy __ **Expected April 17, 2015**_____
If No, provide written confirmation from NIRB confirming that a screening determination is not required.

9. DESCRIPTION OF UNDERTAKING – List and attach plans and drawings or project proposal.

An American Petroleum Institute (API) Inspection of Tank #3 was completed during August 2014 and it was determined that the tank has only one year of useful life left and should be repaired immediately for continued use in 2015 and onwards. Repairs include replacing the bottom of the tank, roof support, and others. The capacity of the tank will not increase.

Issued for Tender drawings of the Tank #3 repairs are attached in Appendix B.

10. OPTIONS – Provide a brief explanation of the alternative methods or locations that were considered to carry out the project.

No alternative options were considered to carry out the project. Without immediate repairs, Tank #3 cannot be used in 2015 and onwards.

11. CLASSIFICATION OF PRIMARY UNDERTAKING - Indicate the primary classification of undertaking by checking one of the following boxes.

X Industrial ☐ Agricultural
☐ Mining and Milling (includes exploration/drilling/exploration camps)
☐ Conservation
☐ Municipal (includes camps/lodges) ☐ Recreational
☐ Power ☐ Miscellaneous (describe below):

_____

See Schedule II of *Northwest Territories Waters Regulations* for Description of Undertakings.

Information in accordance with applicable Supplemental Information Guidelines (SIG) must be submitted with a New Water Licence Application. Indicate which SIG(s) are applicable to your application.

X Hydrostatic Testing
☐ Tannery
☐ Tourist / Remote Camp
☐ Landfarm & On-Site Storage of Hydrocarbon Contaminated Soil
☐ Onshore Oil and Gas Exploration Drilling
☐ Mineral Exploration / Remote Camp
☐ Advanced Exploration
☐ Mine Development
☐ Municipal
☐ General Water Works
☐ Power

12. **WATER USE -** Check the appropriate box(s) to indicate the type(s) of water use(s) being applied for.

☐ To obtain water for camp/ municipal purposes
X To obtain water for industrial purposes
☐ To cross a watercourse
☐ To alter the flow of, or store water
☐ Other: _____
☐ To divert a watercourse
☐ To modify the bed or bank of a watercourse
☐ Flood control

13. **QUANTITY AND QUALITY OF WATER INVOLVED -** For each type of water use indicated in Block 12, provide the source of water, the quality of the water source and available capacity, the estimated quantity to be used in cubic meters per day, method of extraction, as well as the quantities and qualities of water to be returned to source.

Name of water source(s) (show location(s) on map):
_____

Describe the quality of the water source(s) and the available capacity: _____
_____
_____

Provide the overall estimated quantity of water to be used: _____ m^3/day

Provide the estimated quantity(s) of water to be used from each source:
_**1350 m^3**_____

Indicate the estimated quantities to be used for each purpose (camp, drilling, etc.)
_**1350 m^3 for hydrostatic testing of Tank #3**_____

Describe the method of extraction(s): _**Water pump**_____

Estimated quantity(s) of water returned to source(s) _____ m^3/day

Describe the quality of water(s) returned to source(s): _ **After completion of the repair work, the water will be pumped into a like-new storage tank for testing. Therefore water quality is not anticipated to change much.** _____

14. **WASTE** – Check the appropriate box(s) to indicate the types of waste(s) generated and deposited.

☐ Sewage
☐ Solid Waste
☐ Hazardous
☐ Bulky Items/Scrap Metal
☐ Animal Waste
☐ Waste oil
☐ Greywater
☐ Sludges
☐ Contaminated soil and/or water
X Other (describe): _ **Water**_____

15. QUANTITY AND QUALITY OF WASTE INVOLVED – For each type of waste indicated in Block 14, describe its composition, quantity in cubic meters/day, method of treatment and method of disposal.

Type of Waste	Composition	Quantity Generated	Treatment Method	Disposal Method
Water	**Water**	**1,350 m^3**	**Water discharged through Solid Particle Collector. See Appendix C.**	**Hose from tank to solid particle collector, discharge to field south of Tank Farm.**

16. OTHER AUTHORIZATIONS – In addition to the sub-surface and surface land use authorizations provided in Block 6, indicate any other authorizations required in relation to the proposed undertaking. For each provide the following:

Authorization: _____

Administering Agency: _____

Project Activity: _____

Date (expected date) of issuance: _____ Date of expiry: _____

17. PREDICTED ENVIRONMENTAL IMPACTS OF UNDERTAKING AND PROPOSED MITIGATION MEASURES - Describe direct, indirect, and cumulative impacts related to water and waste.

No predicted environmental impacts if repairs to Tank #3 are completed.

18. WATER RIGHTS OF EXISTING AND OTHER USERS OF WATER

Provide the names, addresses and nature of use for any known persons or properties that may be adversely affected by the proposed undertaking, including those that hold licences for water use in precedent to the application, domestic users, in-stream users, authorized waste depositors, owners of property, occupiers of property, and/or holders of outfitting concessions, registered trapline holders, and holders of other rights of a similar nature.

Advise the Board if compensation has been paid and/or agreement(s) for compensation have been reached with any existing or other users.

19. INUIT WATER RIGHTS

Advise the Board of any substantial affect of the quality, quantity or flow of waters flowing through

Inuit Owned Land (IOL), and advise the Board if negotiations have commenced or an agreement to pay compensation for any loss or damage has been reached with one or more Designated Inuit Organization (DIO).

20. CONSULTATION – Provide a summary of any consultation meetings including when the meetings were held, where and with whom. Include a list of concerns expressed and measures to address concerns.

21. SECURITY INFORMATION

Provide an estimate of the total financial security for final reclamation equal to the total outstanding reclamation liability for land and water combined sufficient to cover the highest liability over the life of the undertaking. Estimates of reclamation costs must be based on the cost of having the necessary reclamation work done by a third party contractor if the operator defaults. The estimate must also include contingency factors appropriate to the particular work to be undertaken.

Where applicable, the financial security assessment should be prepared in a manner consistent with the principals respecting mine site reclamation and implementation found in the *Mine Site Reclamation Policy for Nunavut,* Indian and Northern Affairs Canada, 2002.

22. FINANCIAL INFORMATION

Provide a statement of financial responsibility.

If the applicant is a business entity, provide a list of the officers of the company.

If the applicant is a business entity attach a copy of the Certificate of Incorporation or evidence of registration of the company name.

23. STUDIES UNDERTAKEN TO DATE - List and attach copies of studies, reports, research, etc.

***API 653 – Internal/Out Of Service Inspection Program, Above Ground Storage Tank 3, Coral Harbour, Nunavut* prepared by SNC-Lavalin, October 2014. See Appendix D for report.**

24. PROPOSED TIME SCHEDULE – Indicate the proposed start and completion dates for each applicable phase of development (construction, operation, closure, and post closure).

Construction
Proposed Start Date: ____**June 2015**____ (month/year) Proposed Completion Date: ___**October 2015**_____ (month/year)

Operation
Proposed Start Date: ___**October 2015**___ (month/year) Proposed Completion Date: ___**ongoing**_____ (month/year)

Closure
Proposed Start Date: _____ (month/year) Proposed Completion Date: _____ (month/year)

Post - Closure
Proposed Start Date: _____ (month/year) Proposed Completion Date: _____ (month/year)

For each applicable phase of development indicate which season(s) activities occur.

Construction
☐ Winter ☐ Spring ☐ Summer ☐ Fall ☐ All season

Operation
☐ Winter ☐ Spring ☐ Summer ☐ Fall ☐ All season

Closure
☐ Winter ☐ Spring ☐ Summer ☐ Fall ☐ All season

Post - Closure
☐ Winter ☐ Spring ☐ Summer ☐ Fall ☐ All season

25. PROPOSED TERM OF LICENCE

Number of years (maximum of 25 years): __**0.5**_____ years

Requested Date of Issuance: ___**June 2015**_____ (month/year) Requested Expiry Date: __**December 2015**__ (month/year)

(The requested date of issuance must be at least three (3) months from the date of application for a type B water licence and at least one (1) year from the date of application for a type A water licence, to allow for processing of the water licence application. These timeframes are approximate and do not account for the time to complete any pre-licensing land use planning or development impact requirements, time for the applicant to prepare and submit a water licence application in accordance with any project specific guidelines issued by the NWB, or the time for the applicant to respond to requests for additional information. See the NWB's *Guide 5: Processing Water Licence Applications* for more information)

26. ANNUAL REPORTING – If not using the NWB's *Standardized Form for Annual Reporting*, provide details regarding the content of annual reports and a proposed outline or template of the annual report.

27. **CHECKLIST** – The following must be included with the application for the water licensing process to begin.

Written confirmation from the NPC confirming that NPC's requirements regarding land use plan conformity have been addressed.

☐ Yes X No If no, date expected _ **April 17, 2015**

Written confirmation from the NIRB confirming that NIRB's requirements regarding development impact assessment have been addressed.

☐ Yes X No If no, date expected _ **April 17, 2015**

Completed General Water Licence Application form.

X Yes ☐ No If no, date expected _____

Information addressing Supplemental Information Guideline (SIG) , where applicable (see Block 11)

X Yes ☐ No If no, date expected _____

English Summary of Application.

X Yes ☐ No If no, date expected _____

Inuktitut and/or Inuinnaqtun Summary of Application.

☐ Yes X No If no, date expected __ **March 27, 2015**

Application Fee of $30.00 CDN (Payee Receiver General for Canada).

☐ Yes X No If no, date expected __ ***N/A***

Water Use Fee Deposit of $30.00 CDN (Payee Receiver General for Canada). The actual water use fee will be calculated by the NWB based upon the amount of water authorized for use in accordance with the Regulations at the time of issuance of the licence.

☐ Yes ☐ No If no, date expected _____

28. **SIGNATURE**

JOHNNY KUSUGAK MGR COMM. DEV.	A/Regional Dir.		MARCH 15
Name (Print)	**Title (Print)**	**Signature**	**Date**

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Nunalingni Kavamatkunnilu Pivikhaqautikkut
Department of Community and Government Services
Ministère des Services communautaires et gouvernementaux

Water Licence Application for Hydrostatic Testing of Fuel Storage Tank #3 Repairs, Coral Harbour

EXECUTIVE SUMMARY

The Government of Nunavut, Community and Government Services (GN-CGS) is submitting to the Nunavut Water Board (NWB) a Water Licence Application for Hydrostatic Testing at the Coral Harbour Tank Farm. GN-CGS is requesting a Licence for a period of 6 months, from June 2015 to December 2015. Hydrostatic Testing will be performed on Fuel Storage Tank #3 after repairs have been completed. The Hydrostatic Testing will be carried out by a contractor on behalf of the GN-CGS.

An American Petroleum Institute (API) Inspection was completed during August 2014 of Tank #3 and it was determined that the tank only has one year useful life left and should be repaired immediately if it is to be used in 2015 and onwards. Repairs include replacing the bottom of the tank, roof support, and other details as described in the attached Issued for Tender drawings (Appendix B). The capacity of the tank will not increase.

The estimated quantity of water to be used for Hydrostatic Testing is 1350 m^3. The water will be extracted from an un-named lake across the road, north of the Tank Farm. The water will be pumped from the lake at a rate not to exceed 300 m^3/day.

Once the repaired Tank #3 has been filled with water, the water will remain in the tank for at least 24 hours in order to detect any leakage. After the inspection of all weld joints, ensuring there is no leakage, the water will be discharged to the field in the south end of the tank farm. The water will be discharged through a Solid Particle Collector (Appendix C) to remove particles prior to discharge.

GN-CGS is applying for the Water Licence prior to awarding the project to a contractor to ensure that a Licence is issued so that Hydrostatic Testing of Tank #3 can take place this coming summer. The proposed project schedule is as follows:

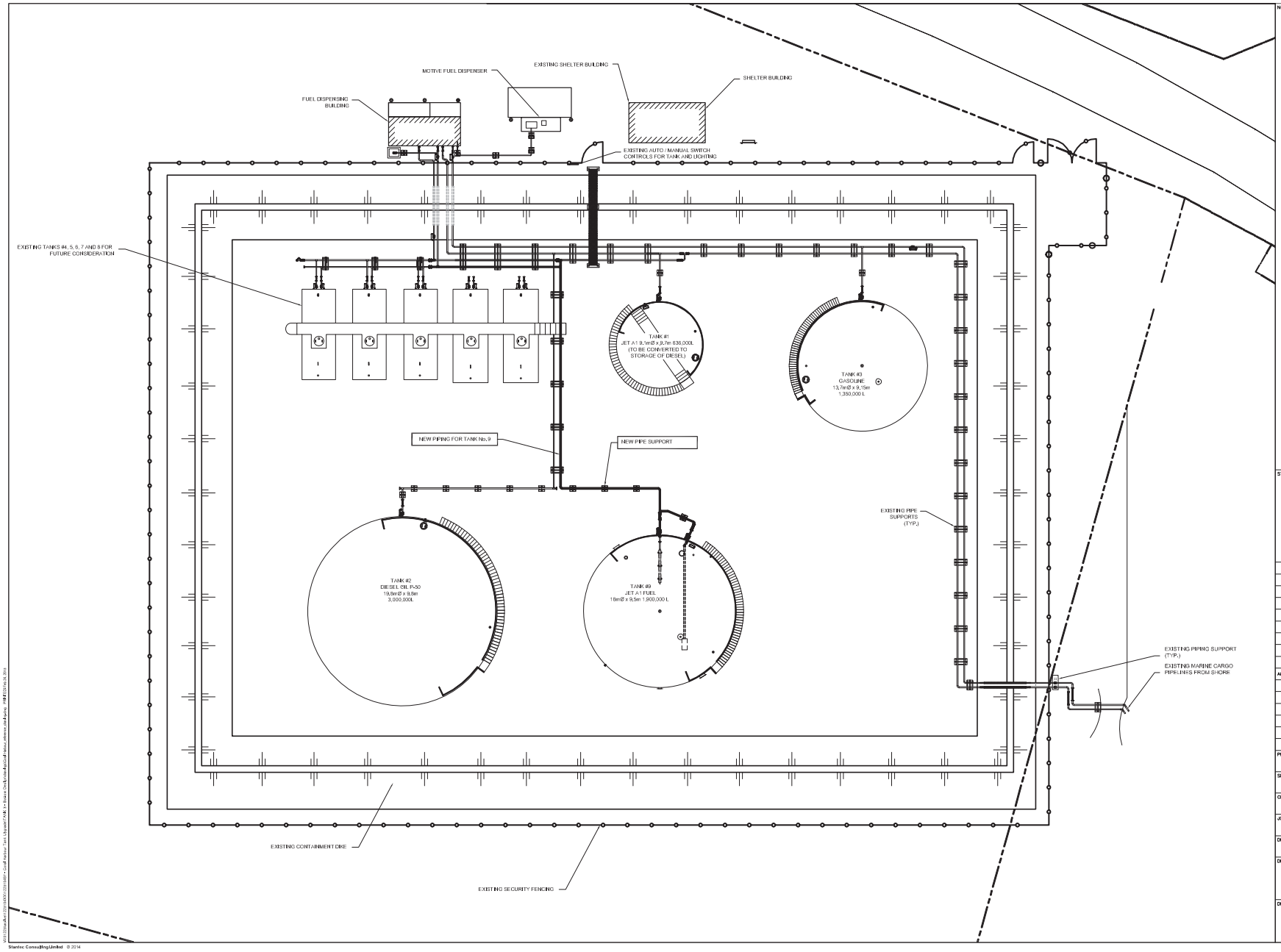
Contract Award: by April 10, 2015
Work Starts: May 15, 2015
Hydrostatic Testing: July/August 2015
Repair Completion: October 31, 2015

Without immediately repairing Tank #3, including Hydrostatic Testing, the tank cannot be used in 2015 and onwards, creating a fuel shortage and emergency situation in Coral Harbour. GN-CGS trusts that the NWB will ensure that this Licence is issued in a timely manner.

Appendix A

Map and Drawing of Coral Harbour Tank Farm

Appendix A – Map and Drawing of Coral Harbour Tank Farm



NOTES:

STAMP

STAMP

NOTES: THIS DRAWING ILLUSTRATES INFORMATION SPECIFIC TO A STANTEC CONSULTING LIMITED PROJECT AND MUST NOT BE USED FOR OTHER PURPOSES.

APP'D	NO.	DETAILS	DATE

REVISIONS

DWG. NO.	DESCRIPTION	DATE

REFERENCES

PROJECT: CORAL HARBOUR FUEL STORAGE TANK 3 BOTTOM REPLACEMENT

SITE ADDRESS: CORAL HARBOUR, NUNAVUT

CLIENT: DEPARTMENT OF COMMUNITY GOVERNMENT SERVICES, GOVERNMENT OF NUNAVUT

JOB No.:	SCALE:	DATE:
122510497	NTS	02/24/2015
DRAWN BY:	DESIGNED BY:	APPROVED BY:
WJO	DB	IF

DRAWING TITLE:

MAIN SITE STORAGE FACILITY
SITE PIPING REFERENCE

DRAWING No.:	REVISION No.
	A

NUNAMI

Appendix B

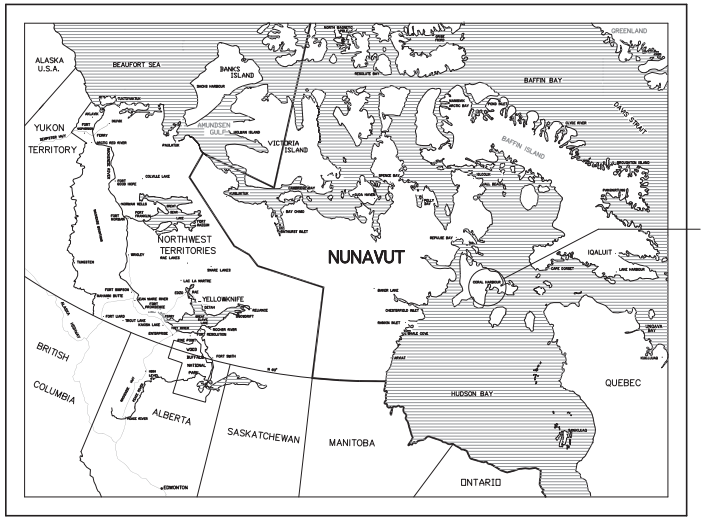
Issued for Tender Drawings

CORAL HARBOUR FUEL STORAGE TANK 3 BOTTOM REPLACEMENT

FOR TENDER

FEBRUARY 2015

NUNAMI
STANTEC LIMITED
1331 CLYDE AVENUE,SUITE 400,
OTTAWA, ON
K2C 3G4, Canada
PHONE: (613) 738-6092
FAX: (613) 722-2799
WWW.STANTEC.COM

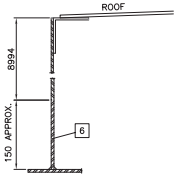


LIST OF DRAWINGS

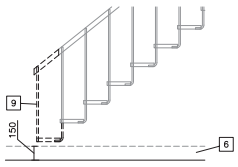
MECHANICAL

STANTEC PROJECT No:
122510497

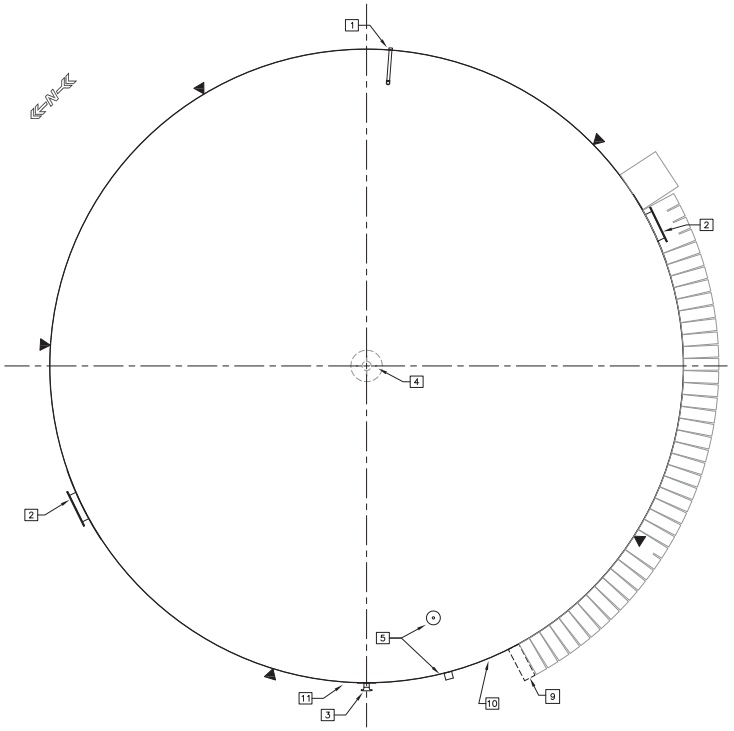
NOTES:
1. REMOVE EXISTING Dn50 WATER DRAW-OFF AND REPLACE NOZZLE WITH NEW AS PER DETAIL 3, M501.
2. REMOVE EXISTING Dn600 MANWAY AND REPLACE WITH NEW AS PER DETAIL 4, M501.
3. REMOVE EXISTING Dn100 NOZZLE AND REPLACE WITH NEW AS PER DETAIL 2, M501.
4. JACK, LEVEL, PLUMB, AND MODIFY EXISTING CENTER COLUMN AS PER DETAIL 5, M502. PROVIDE STRIKER PLATE AND ADJUST HEIGHT AS INDICATED.
5. EXISTING LEVEL GAUGE TO REMAIN. ASSOCIATED FLOAT GUIDE WIRE ATTACHMENTS ON EXISTING BOTTOM PLATES TO BE REMOVED AND REPLACED AFTER COMPLETION OF NEW BOTTOM PLATE.
6. ENTIRE TANK IS TO BE ELEVATED TO ENSURE NOZZLES MAINTAIN THE SAME ELEVATION. FILL, LEVEL, AND COMPACT FOUNDATION MATERIAL. SEE DETAIL 4, M502.
7. CUT 150mm FROM THE BOTTOM OF THE EXISTING SHELL, ALL AROUND TANK, BEFORE INSTALLING NEW BOTTOM PLATES AND APPURTANCES.
8. REMOVE EXISTING GROUNDING SYSTEM. REPLACE WITH 3 NEW GROUNDING LUGS, EVENLY SPACED AROUND TANK, AS PER DETAIL 6, M501. PROVIDE AND INSTALL A 3.05m GROUND ROD AND #4 BARE COPPER WIRE FOR EACH LUG.
9. REMOVE LOWEST TREAD AND HANDRAIL FROM STAIRWAY AS INDICATED.
10. REMOVE EXISTING Dn25 NOZZLE AND REPLACE WITH NEW INSERTION PLATE AS PER DETAIL 1, M501.
11. REMOVE EXISTING JUNCTION BOX ON THE TANK, FLEX CONNECTION, AND UNDERGROUND WIRING BACK TO JUNCTION BOX ON PIPE RACK. RELOCATE CONDUIT BRACKETS ON TANK AND PIPE AS REQUIRED TO SUIT TANK AND PIPING MODIFICATIONS.



SHELL CUT DETAIL
SCALE NTS

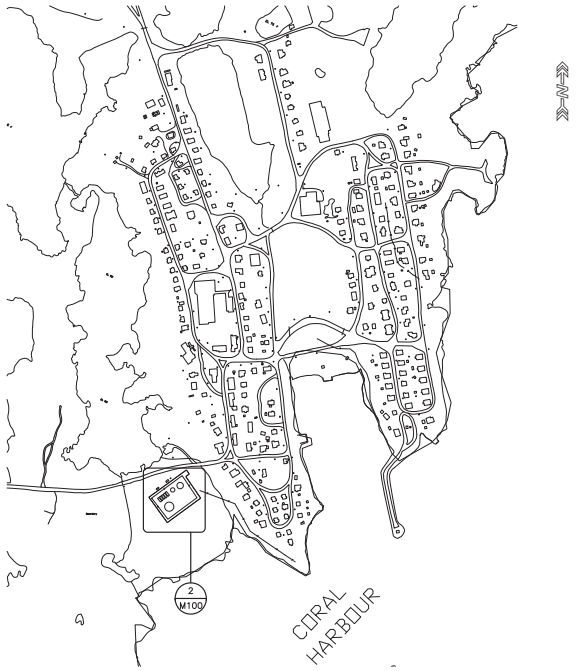


STAIR MODIFICATION
SCALE NTS

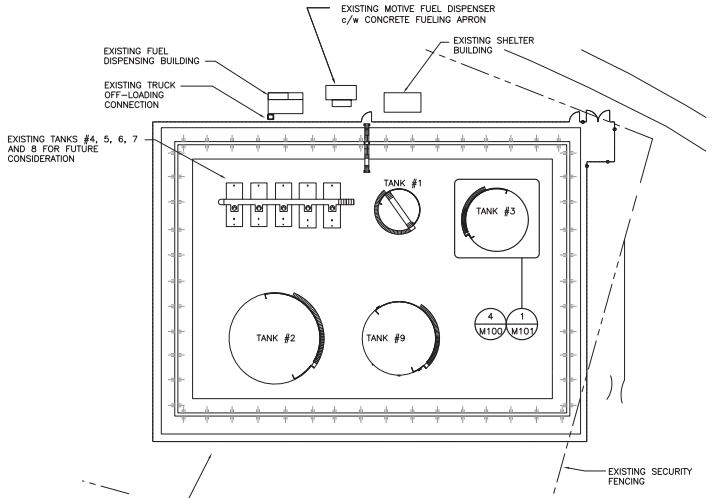


4 M100 DEMOLITION PLAN
SCALE 1:50

0 0.5m 1m 1.5m 2m 2.5m
1:50



1 M100 COMMUNITY PLAN
SCALE 1:5000



2 M100 SITE PLAN
SCALE 1:500

0 50m 100m 150m 200m 250m
1:5000

NOTES:
1. CONFIRM DIMENSIONS PRIOR TO FABRICATION AND NOTIFY ENGINEER OF ANY DISCREPANCIES.
2. PROVIDE NEW CERTIFIED STRAPPING CHARTS TO OWNER AFTER SUCCESSFUL COMPLETION OF HYDROTEST.

LEGEND
(1) NOTE REFERENCE
(Y) TANK APPURTENANCE
DETAIL REFERENCE

STAMP

STAMP

JPD	B	ISSUED FOR TENDER	02.24.2015
JPD	A	ISSUED FOR REVIEW	01.29.2015
APP'D	NO.	DETAILS	DATE

REVISIONS

DWG. NO.	DESCRIPTION	DATE

REFERENCES

PROJECT: CORAL HARBOUR FUEL STORAGE TANK 3 BOTTOM REPLACEMENT

SITE ADDRESS: CORAL HARBOUR, NUNAVUT

CLIENT: DEPARTMENT OF COMMUNITY GOVERNMENT SERVICES, GOVERNMENT OF NUNAVUT

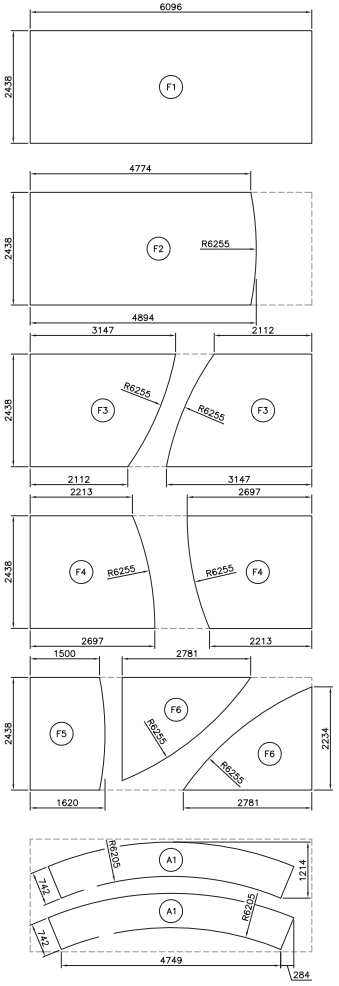
JOB No.:	SCALE:	DATE:
122510497	AS NOTED	01/20/2015
DRAWN BY: BJL	DESIGNED BY: JPD	APPROVED BY: IF

DRAWING TITLE:
LOCATION AND DEMOLITION PLANS

DRAWING No.:	REVISION No.	
M100	B	NUNAMI STANTEC LIMITED

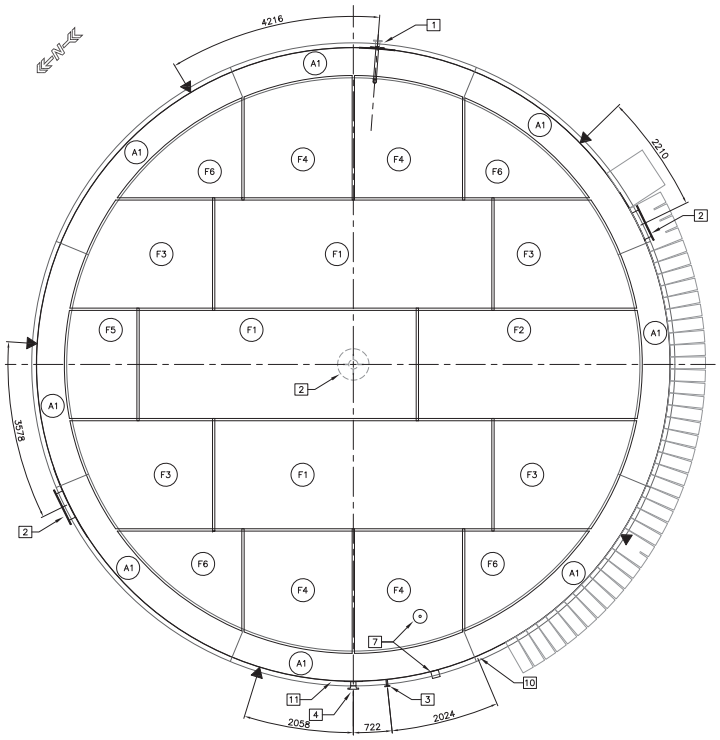
NOTES:
1. NEW Dn50 WATER DRAW-OFF NOZZLE AS PER DETAIL 3, M501.
2. NEW Dn600 MANWAY AS PER DETAIL 4, M501.
3. NEW Dn25 FLANGED NOZZLE AS PER DETAIL 5, M501.
4. NEW Dn100 NOZZLE AS PER DETAIL 2, M501. REFER TO DETAIL 2, M102 FOR DETAILS OF NEW PIPING.
5. JACK, LEVEL, PLUMB, AND MODIFY EXISTING CENTER COLUMN AS PER DETAIL 5, M502. PROVIDE STRIKER PLATE AND ADJUST HEIGHT AS INDICATED.
6. EXISTING LEVEL GAUGE TO REMAIN. ASSOCIATED FLOAT GUIDE WIRE ATTACHMENTS ON EXISTING BOTTOM PLATES TO BE REMOVED AND REPLACED AFTER COMPLETION OF NEW BOTTOM PLATE.
7. CUT 150mm FROM THE BOTTOM OF THE EXISTING SHELL, ALL AROUND TANK, BEFORE INSTALLING NEW BOTTOM PLATES AND APPURTANCES.
8. ENTIRE TANK IS TO BE ELEVATED TO ENSURE NOZZLES MAINTAIN THE SAME ELEVATION. FILL, LEVEL, AND COMPACT FOUNDATION MATERIAL. SEE DETAIL 4, M502. CUT HEIGHT TO BE MEASURED FROM THE TOP OF TANK TO ENSURE TANK HEIGHT IS EVEN.
9. INSTALL 3 NEW GROUNDING LUGS, EVENLY SPACED AROUND TANK, AS PER DETAIL 6, M501. PROVIDE AND INSTALL A 3.05m GROUND ROD AND #4 BARE COPPER WIRE FOR EACH LUG.
10. NEW INSERTION PLATE AS PER DETAIL 1, M501.
11. INSTALL NEW ELECTRICAL COMPONENTS AS INDICATED ON DETAIL 3, M503 AND AS REQUIRED TO COMPLETE MODIFICATION OF THE LIGHTING SYSTEM.

TANK INFO					BILL OF MATERIALS	
NUMBER	3	TAG	QTY.	SIZE	DESCRIPTION	MATERIAL SPEC
PRODUCT	GASOLINE	F1	3	6096x2438x6	STEEL PLATE, FULL SHEET	G40.21, Gr. 260WT
AGE	34 yrs	F2	1	4894x2438x6	STEEL PLATE, CUT 1 FROM FULL SHEET	G40.21, Gr. 260WT
DIAMETER	13.72m	F3	4	3147x2438x6	STEEL PLATE, CUT 2 FROM FULL SHEET	G40.21, Gr. 260WT
HEIGHT	9.15m	F4	4	2697x2438x6	STEEL PLATE, CUT 2 FROM FULL SHEET	G40.21, Gr. 260WT
SAFE FILL HEIGHT	9.15m	F5	1	2438x1620x6	STEEL PLATE, CUT 1 FROM REMAINDER OF F6	G40.21, Gr. 260WT
CAPACITY	1340m3	F6	4	2781x2234x6	STEEL PLATE, CUT 2 FROM FULL SHEET	G40.21, Gr. 260WT
1ST COURSE SHELL THK.	5mm	A1	8	5328x1228x8	STEEL PLATE, CUT 2 FROM FULL SHEET	G40.21, Gr. 260WT



2 M101 FLOOR PLATE DETAILS
SCALE 1:50

0 0.5m 1m 1.5m 2m 2.5m
1:50



1 M101 FLOOR PLATE LAYOUT
SCALE 1:50

0 0.5m 1m 1.5m 2m 2.5m
1:50

NOTES:
1. CONFIRM DIMENSIONS PRIOR TO FABRICATION AND NOTIFY ENGINEER OF ANY DISCREPANCIES.
2. PROVIDE NEW CERTIFIED STRAPPING CHARTS TO OWNER AFTER SUCCESSFUL COMPLETION OF HYDROTEST.

LEGEND
(1) NOTE REFERENCE
(Y) TANK APPURTENANCE
DETAIL REFERENCE

STAMP

STAMP

APP'D	NO.	DETAILS	DATE
JPD	B	ISSUED FOR TENDER	02.24.2015
JPD	A	ISSUED FOR REVIEW	01.29.2015

REVISIONS

DWG. NO.	DESCRIPTION	DATE

REFERENCES

PROJECT: CORAL HARBOUR FUEL STORAGE TANK 3 BOTTOM REPLACEMENT

SITE ADDRESS: CORAL HARBOUR, NUNAVUT

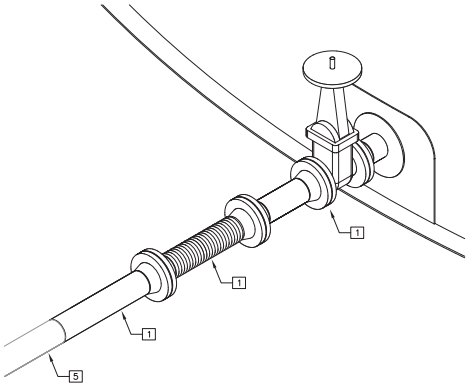
CLIENT: DEPARTMENT OF COMMUNITY GOVERNMENT SERVICES, GOVERNMENT OF NUNAVUT

JOB No.:	SCALE:	DATE:
122510497	AS NOTED	01/20/2015
DRAWN BY: BJL	DESIGNED BY: JPD	APPROVED BY: IF

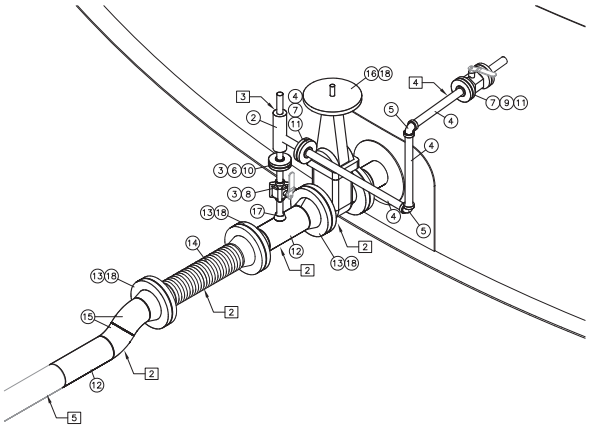
DRAWING TITLE:
FLOOR LAYOUT AND PLATE DETAILS

DRAWING No.:	REVISION No.	
M101	B	NUNAMI STANTEC LIMITED

NOTES:
1. REMOVE EXISTING Dn100 NOZZLE, VALVE, FLEXIBLE CONNECTION, AND SECTIONS OF SUPPLY PIPING AS INDICATED. EXACT DIMENSION TO SUIT NEW FIT-UP DIMENSIONS.
2. INSTALL NEW Dn100 GATE VALVE, FLEXIBLE CONNECTION, AND OFFSET PIPING TO CONNECT TO NEW Dn100 TANK NOZZLE. MODIFY EXISTING PIPE SUPPORT AS REQUIRED TO SUPPORT PIPING AT NEW ELEVATION.
3. INSTALL PRESSURE RELIEF VALVE.
4. CONNECT DN25 RELIEF PIPING TO NEW TANK NOZZLE.
5. RELOCATE CONDUIT BRACKET ON PIPING IN THIS APPROXIMATE LOCATION AS REQUIRED TO SUIT NEW ELECTRICAL COMPONENTS AND PIPE OFFSET.
6. BOND FLEXIBLE CONNECTOR AS PER DETAIL 1, M503.

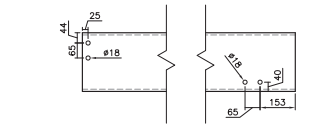


DEMOLITION

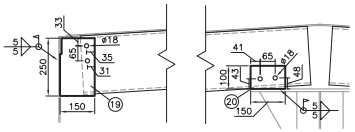


NEW WORK

2 / M102 PIPING MODIFICATIONS
SCALE NTS



RAFTER – SHELL END RAFTER – COLUMN END



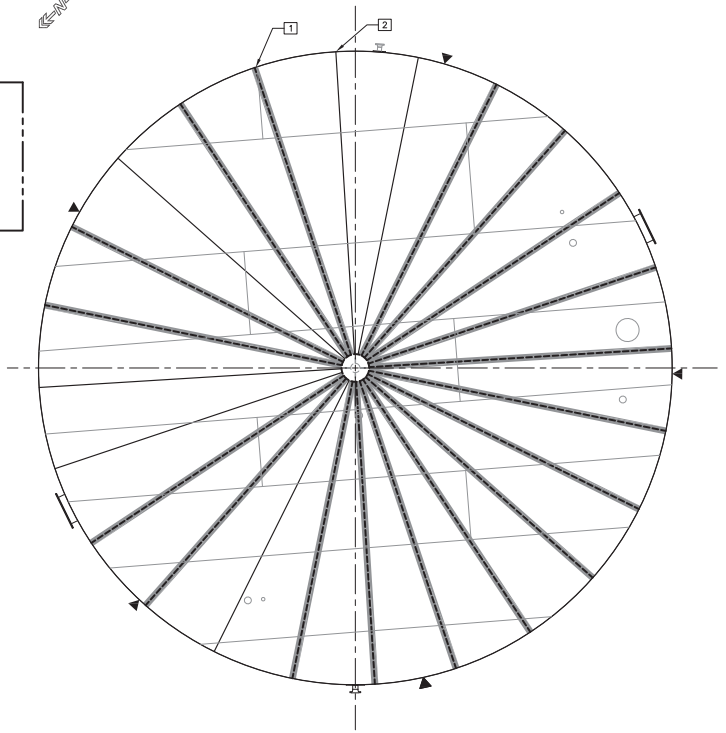
RAFTER CLIP – SHELL RAFTER CLIP – COLUMN

NOTES:
1. REPLACE EXISTING RAFTER WITH NEW. PROVIDE NEW CLIPS AND BOLTING MATERIAL AS PER DETAILS THIS SHEET. 18 TOTAL TO BE REPLACED.
2. EXISTING RAFTER TO REMAIN, 6 TOTAL.

CAUTION:
1. NEW RAFTER SIZE IS BASED UPON API CODE REQUIREMENTS AND ESTIMATION FROM API INSPECTION PHOTOS. CONFIRM EXACT SIZES ON SITE AND NOTIFY ENGINEER OF DISCREPANCY PRIOR TO START OF WORK.
2. IF RAFTER SIZE DIFFERS FROM SPECIFIED MATERIAL, NOTIFY ENGINEER FOR REQUIRED FIELD MODIFICATIONS TO COLUMN RAFTER CLIP DETAIL.
3. CONFIRM EXACT NUMBER AND LOCATION OF RAFTERS TO BE REPLACED WITH ENGINEER PRIOR TO START OF WORK.

BILL OF MATERIALS

TAG	QTY.	SIZE	DESCRIPTION	MATERIAL SPEC
1	130m	C250x30	STEEL CHANNEL	G40.21, Gr. 260WT
2	1	20x25	PRESSURE SAFETY VALVE	SEE SPEC
3	1m	20	PIPE, PE, SCH 80	A333, Gr. 6
4	3m	25	PIPE, PE, SCH 80	A333, Gr. 6
5	2	25	90 ELBOW, SW, 3000LB	A105N
6	2	20	FLG, RF, SW, 150 LB	A350, LF2
7	3	25	FLG, RF, SW, 150 LB	A350, LF2
8	1	20	BALL VALVE, SW, RB FLOATING	SEE SPEC
9	1	25	BALL VALVE, FLG, RF, RB FLOATING	SEE SPEC
10	1	20	GASKET & STUD BOLT SET, 4 – 13mm x 64mm	A320 L7/A194 Gr.4 316 S.S. c/w FLEX. GRAPHITE
11	3	25	GASKET & STUD BOLT SET, 4 – 13mm x 70mm	A320 L7/A194 Gr.4 316 S.S. c/w FLEX. GRAPHITE
12	2m	100	PIPE, PE, SCH 40	A333, Gr. 6
13	3	100	FLG, RF, WN, 150 LB	A350, LF2
14	1	100	S.S. FLEX CONNECTOR, FLG, 150 LB, 500 LG	316 S.S. BRAIDED
15	2	100	45 ELBOW, BE, SCH 40	A105N
16	1	100	GATE VALVE, FLG, 150 LB	SEE SPEC
17	1	150x20	SOCK-O-LET, 3000 LB	A105N
18	4	100	GASKET & STUD BOLT SET, 8 – 16mm x 95mm	A320 L7/A194 Gr.4 316 S.S. c/w FLEX. GRAPHITE
19	18	250x150x10	STEEL PLATE, COPED FOR ROOF RING	G40.21, Gr. 260WT
20	18	150x100x10	STEEL PLATE	G40.21, Gr. 260WT
21	72	16ø x 40	HEAVY DUTY BOLTS	A320 L7/A194 Gr.4



1 / M102 ROOF RAFTER AND PLATE LAYOUT
SCALE 1:50

0 0.5m 1m 1.5m 2m 2.5m
1:50

NOTES:
1. CONFIRM DIMENSIONS PRIOR TO FABRICATION AND NOTIFY ENGINEER OF ANY DISCREPANCIES.
2. PROVIDE NEW CERTIFIED STRAPPING CHARTS TO OWNER AFTER SUCCESSFUL COMPLETION OF HYDROTEST.

LEGEND
(1) NOTE REFERENCE
(Y) TANK APPURTENANCE
DETAIL REFERENCE

STAMP STAMP

APP'D	NO.	DETAILS	DATE
JPD	B	ISSUED FOR TENDER	02.24.2015
JPD	A	ISSUED FOR REVIEW	01.29.2015

REVISIONS

DWG. NO.	DESCRIPTION	DATE

REFERENCES

PROJECT: CORAL HARBOUR FUEL STORAGE TANK 3 BOTTOM REPLACEMENT

SITE ADDRESS: CORAL HARBOUR, NUNAVUT

CLIENT: DEPARTMENT OF COMMUNITY GOVERNMENT SERVICES, GOVERNMENT OF NUNAVUT

JOB No.:	SCALE:	DATE:
122510497	AS NOTED	01/20/2015

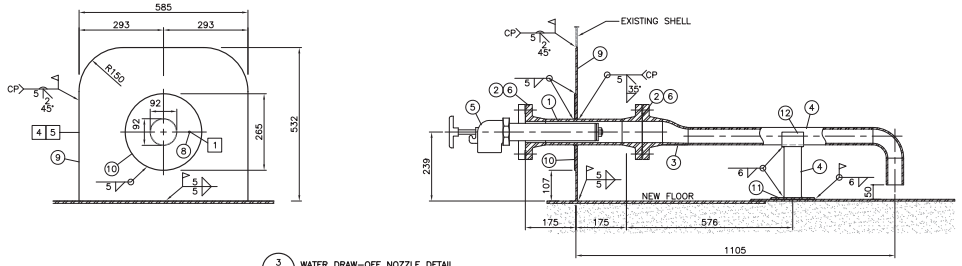
DRAWN BY	DESIGNED BY:	APPROVED BY
BJL	JPD	IF

DRAWING TITLE: **RAFTER LAYOUT AND PIPING DETAILS**

DRAWING No.:	REVISION No.
M102	B

NUNAMI STANTEC LIMITED

NOTES:
1. DRILL AND TAP A 6mm TELLTALE HOLE IN NEW REPAD AND INSTALL A 6mm PLUG.
2. WHEN WELDING FLOOR PLATES TO SHELL, LEAVE A MINIMUM OF 300mm UN-WELDED ON BOTH SIDES OF THE VERTICAL JOIN OF THE NEW INSERT PLATE. ONCE INSERT PLATE IS INSTALLED, PROCEED WITH WELDING AS PER NOTE 3 BELOW.
3. WELDIN SEQUENCE OF INSERT PLATE INTO SHELL SHOULD BE AS FOLLOWS:
   - VERTICAL JOINTS
   - HORIZONTAL JOINTS
   - SHELL TO FLOOR JOINTS
4. MAINTAIN A MINIMUM OF 175mm BETWEEN INSERT PLATE WELDS AND VERTICAL AND HORIZONTAL SHELL JOINTS.
5. ROLL INSERT PLATE TO TANK RADIUS.



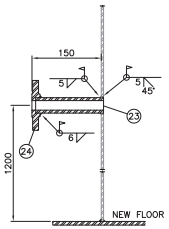
3 / M501 WATER DRAW-OFF NOZZLE DETAIL
SCALE 1:8

BILL OF MATERIALS

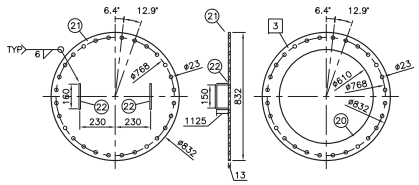
TAG	QTY.	SIZE	DESCRIPTION	MATERIAL SPEC
1	0.5m	80	PIPE, SMLS, PE, SCH 80	A333, Gr. 6
2	1	80	FLANGE, RF, WN, 150LB	A350, LF2
3	1	80x50	REDUCER, ECC, SMLS, SCH 80	A234, Gr. B
4	2m	50	PIPE, SMLS, PE, SCH 80	A333, Gr. 6
5	1	50	WATER DRAW-OFF VALVE	SHAND & JURS 96181-02-01
6	2	80	GASKET AND STUD BOLT SET, 4 - 16mm x 95mm	A320 L7/A194 Gr.4 316 S.S. c/w FLEX. GRAPHITE
7			NOT USED	
8	4	6	THREADED PLUG	A105N
9	1	585x532x5	STEEL PLATE, CUT PER DETAIL 3	G40.21, Gr. 260WT
10	1	265øx5	STEEL PLATE, CUT PER DETAIL 3	G40.21, Gr. 260WT
11	1	150x150x6	STEEL PLATE, CUT PER DETAIL 3	G40.21, Gr. 260WT
12	1	C100x8	STEEL CHANNEL, 100mm LONG	G40.21, Gr. 260WT
13	1	305øx5	STEEL PLATE, CUT PER DETAIL 2	G40.21, Gr. 260WT
14	1	655x502x5	STEEL INSERT PLATE, CUT PER DETAIL 2	G40.21, Gr. 260WT
15	0.5m	100	PIPE, SMLS, PE, SCH 80	A333, Gr. 6
16	1	100	FLANGE, RF, WN, 150LB	A350, LF2
17	1	300x300x5	STEEL PLATE, CUT PER DETAIL 1	G40.21, Gr. 260WT
18	2	1258x1255x5	STEEL PLATE, CUT AS PER DETAIL 4	G40.21, Gr. 260WT
19	2	1605x1358x5	STEEL INSERT PLATE, CUT PER DETAIL 4	G40.21, Gr. 260WT
20	2	ø832x10	STEEL PLATE, MANWAY FLANGE	G40.21, Gr. 260WT
21	2	ø832x13	STEEL PLATE, MANWAY COVER	G40.21, Gr. 260WT
22	4	ø10x320LG.	STEEL BAR	G40.21, Gr. 260WT
23	0.5m	25	PIPE, SMLS, PE, SCH 160	A333, Gr. 6
24	1	25	FLG, RF, SW, CL150	A350, LF2
25	5	75x65x6	STAINLESS STEEL PLATE, CUT PER DETAIL 6	316 S.S.
26				
27				
28				

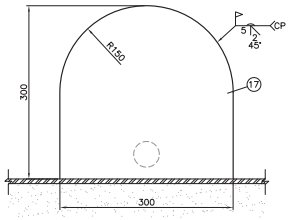
NOTES:
1. CONFIRM DIMENSIONS PRIOR TO FABRICATION AND NOTIFY ENGINEER OF ANY DISCREPANCIES.
2. PROVIDE NEW CERTIFIED STRAPPING CHARTS TO OWNER AFTER SUCCESSFUL COMPLETION OF HYDROTEST.
3. BOLTING FLANGE SHALL HAVE A MACHINED FACE WITH SURFACE PROFILE TO API STANDARD WITH MINIMUM FINISHED THICKNESS OF 10mm.

LEGEND
(1) NOTE REFERENCE
(Y) TANK APPURTENANCE
⊕ DETAIL REFERENCE

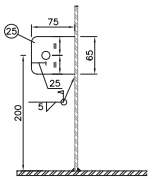


5 / M501 DN25 NOZZLE DETAIL
SCALE NTS

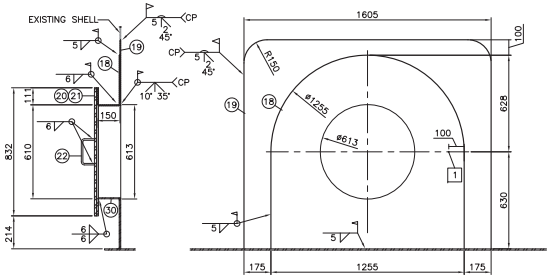




1 / M501 INSERT PLATE DETAIL
SCALE 1:4

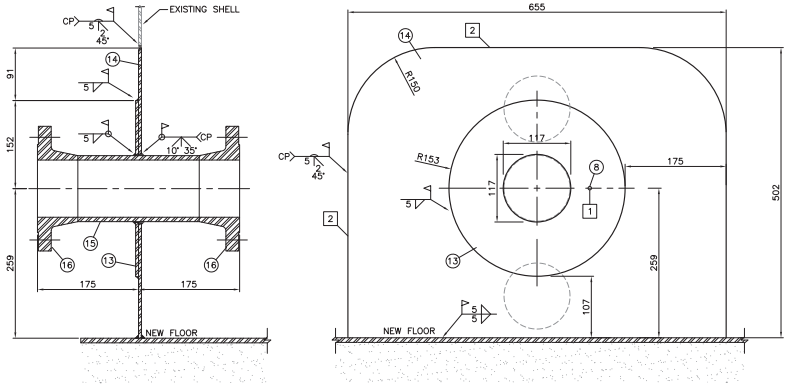


6 / M501 GROUND LUG DETAIL
SCALE NTS



4 / M501 DN600 MANWAY DETAIL
SCALE NTS

NOTES:
1. DRILL AND TAP A 6mm TELLTALE HOLE IN NEW REPAD AND INSTALL A 6mm PLUG.
2. MAINTAIN A MINIMUM OF 175mm BETWEEN REPAD WELDS AND VERTICAL AND HORIZONTAL SHELL JOINTS.



2 / M501 DN100 NOZZLE DETAIL
SCALE 1:4

STAMP

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NOTE: THIS DRAWING ILLUSTRATES INFORMATION SPECIFIC TO A STANTEC CONSULTING LIMITED PROJECT AND MUST NOT BE USED FOR OTHER PURPOSES.

APP'D	NO.	DETAILS	DATE
JPD	B	ISSUED FOR TENDER	02.24.2015
JPD	A	ISSUED FOR REVIEW	01.29.2015

REVISIONS

DWG. NO.	DESCRIPTION	DATE

REFERENCES

PROJECT: CORAL HARBOUR FUEL STORAGE TANK 3 BOTTOM REPLACEMENT

SITE ADDRESS: CORAL HARBOUR, NUNAVUT

CLIENT: DEPARTMENT OF COMMUNITY GOVERNMENT SERVICES, GOVERNMENT OF NUNAVUT

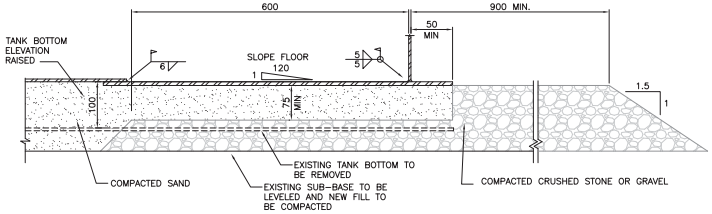
JOB No.:	SCALE:	DATE:
122510497	AS NOTED	01/20/2015
DRAWN BY: BJL	DESIGNED BY: JPD	APPROVED BY: IF

DRAWING TITLE: **NOZZLE DETAILS**

DRAWING No.:	REVISION No.
M501	B

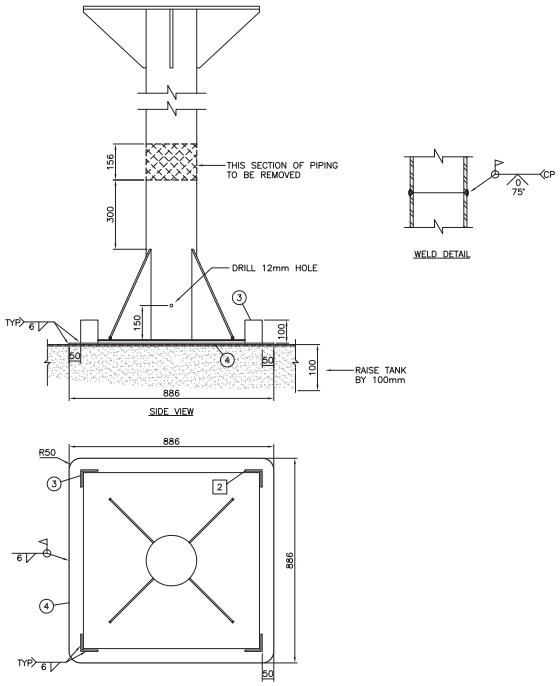
NUNAMI STANTEC LIMITED

NOTES:
1. REMOVE UNSUITABLE FILL MATERIAL AND REPLACE WITH NEW THOROUGHLY COMPACTED FILL MATERIAL AS PER API 650 REQUIREMENTS.

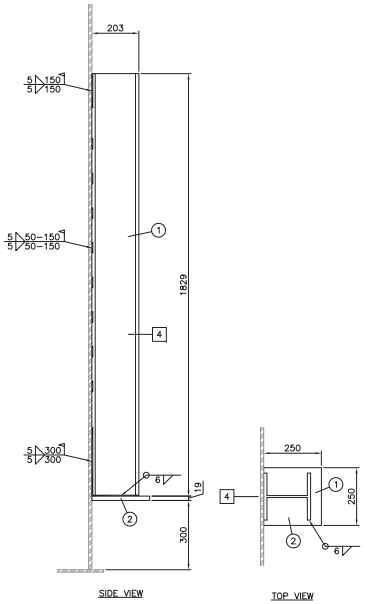


4 / M502 RAISED TANK FOUNDATION DETAIL
SCALE NTS

NOTES:
1. TEMPORARILY SUPPORT UPPER PORTION OF COLUMN DURING MODIFICATIONS TO LOWER PORTION.
2. PROVIDE A MIN OF 2mm CLEARANCE BETWEEN BASEPLATE AND GUIDES.



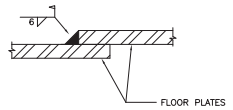
5 / M502 TANK COLUMN MODIFICATIONS
SCALE NTS



3 / M502 JACKING LUG DETAIL
SCALE NTS

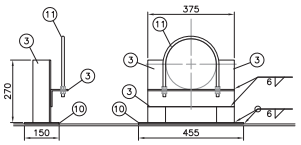
BILL OF MATERIALS

TAG	QTY.	SIZE	DESCRIPTION	MATERIAL SPEC
1	16m	W200x52	STEEL BEAM, JACKING LUG COLUMN	G40.21, Gr. 260WT
2	8	250x250x19	STEEL PLATE, JACKING LUG BASE	G40.21, Gr. 260WT
3	3m	75x75x6mm	STEEL ANGLE	G40.21, Gr. 260WT
4	1	886x886x6	STEEL PLATE, AS PER DETAIL 5	G40.21, Gr. 260WT
5	1m	100	PIPE, PE, SCH 40	A333, Gr. 6
6	2.5m	200	PIPE, PE, SCH 40	A333, Gr. 6
7	1	100	FLG, RF, WN, 150 LB	A350, LF2
8	1	200x100	REDUCER, BE, SCH 40	A105N
9	1	219ø x 6	STEEL PLATE, END CAP	G40.21, Gr. 260WT
10	2	455x150x6	STEEL PLATE, AS PER DETAIL 2	G40.21, Gr. 260WT
11	2	200	U-BOLT C/W 4 HD HEX NUTS	A325
12	4	100	GASKET & STUD BOLT SET, 8 – 16mm x 95mm	A320 L7/A194 Gr.4 316 S.S. c/w FLEX. GRAPHITE
13				
14				
15				
16				
17				
18				
19				
20				

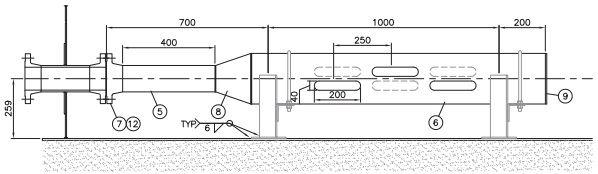


1 / M502 LAP WELD DETAIL
SCALE NTS

NOTES:
1. CUT 6 200x40 HOLES, 3 PER SIDE AND OFFSET AS INDICATED.



SUPPORT DETAILS



SIDE VIEW

2 / M502 DN100 INLET DIFFUSER
SCALE 1:4

NOTES:
1. CONFIRM DIMENSIONS PRIOR TO FABRICATION AND NOTIFY ENGINEER OF ANY DISCREPANCIES.
2. PROVIDE NEW CERTIFIED STRAPPING CHARTS TO OWNER AFTER SUCCESSFUL COMPLETION OF HYDROTEST.
3. THERE SHALL BE A 3mm MINIMUM GAP BETWEEN NEW COLUMN BASE PLATE AND VERTICAL GUIDES.
4. JACKING LUGS SHALL NOT BE SPACED MORE THAN 6m APART FROM EACH OTHER.
5. ALL WORK TO BE DONE AS PER API 650/653 TANK CODES.

LEGEND
1 NOTE REFERENCE
Y TANK APPURTENANCE
DETAIL REFERENCE

STAMP

STAMP

APP'D	NO.	DETAILS	DATE
JPD	B	ISSUED FOR TENDER	02.24.2015
JPD	A	ISSUED FOR REVIEW	01.29.2015

REVISIONS

DWG. NO.	DESCRIPTION	DATE

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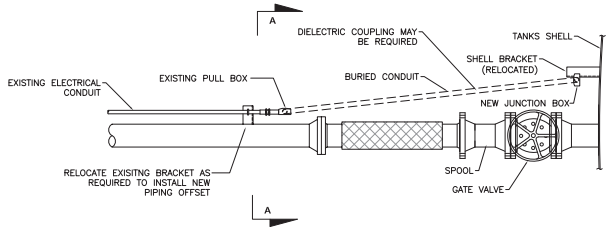
CLIENT: DEPARTMENT OF COMMUNITY GOVERNMENT SERVICES, GOVERNMENT OF NUNAVUT

JOB No.:	SCALE:	DATE:
122510497	AS NOTED	01/20/2015
DRAWN BY: BJL	DESIGNED BY: JPD	APPROVED BY: IF

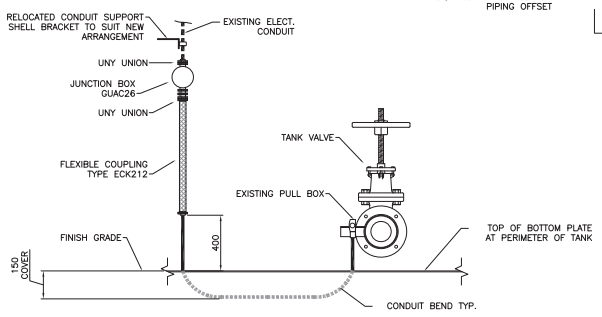
DRAWING TITLE: **TANK DETAILS**

DRAWING No.:	REVISION No.
M502	B

NUNAMI STANTEC LIMITED



PLAN VIEW

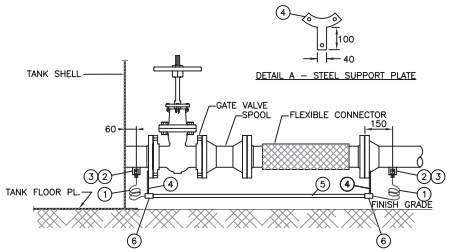


SECTION A–A

3 / M503 LIGHTING POWER MODIFICATIONS
SCALE NTS

BILL OF MATERIALS

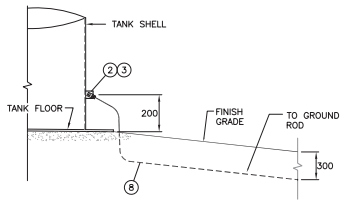
TAG	QTY.	DESCRIPTION
1	3m	#4 STRANDED INSULATED COPPER GROUND WIRE
2	6	BURNDY CONNECTOR SCRULUGS TYPE KPA c/w BRASS BOLT & NUTS
3	5	BONDING LUG PLATE, SEE DETAIL 6 ON M501
4	2	STEEL SUPPORT PLATE FOR BOND CABLE
5	3m	25ø CONDUIT
6	5	CONDUIT CONNECTOR
7	3	GROUND ROD 19ø x 3,050 LONG BLACKBURN #7510 COPPER–STEEL
8	30m	#4 STRANDED BARE COPPER GROUND WIRE
9		
10		
11		



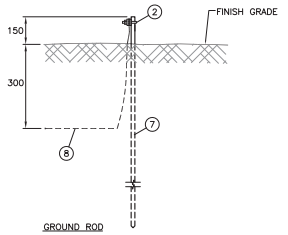
1 / M503 GROUNDING VALVES SPOOL PIECES & FLEXIBLE CONNECTORS
SCALE NTS

NOTES:
1. CONFIRM DIMENSIONS PRIOR TO FABRICATION AND NOTIFY ENGINEER OF ANY DISCREPANCIES.
2. ALL WORK TO BE DONE AS PER API 650/653 TANK CODES.

LEGEND
(1) NOTE REFERENCE
(Y) TANK APPURTENANCE
DETAIL REFERENCE



TANK CONNECTION



GROUND ROD

2 / M503 TANK GROUNDING DETAIL
SCALE NTS

STAMP

STAMP

NOTE: THIS DRAWING ILLUSTRATES INFORMATION SPECIFIC TO A STANTEC CONSULTING LIMITED PROJECT AND MUST NOT BE USED FOR OTHER PURPOSES.

JPD	A	ISSUED FOR TENDER	02.24.2015
APP'D	NO.	DETAILS	DATE

REVISIONS

DWG. NO.	DESCRIPTION	DATE

REFERENCES

PROJECT: CORAL HARBOUR FUEL STORAGE TANK 3 BOTTOM REPLACEMENT

SITE ADDRESS: CORAL HARBOUR, NUNAVUT

CLIENT: DEPARTMENT OF COMMUNITY GOVERNMENT SERVICES, GOVERNMENT OF NUNAVUT

JOB No.:	SCALE:	DATE:
122510497	AS NOTED	01/20/2015
DRAWN BY: BJL	DESIGNED BY: JPD	APPROVED BY: IF

DRAWING TITLE: **ELECTRICAL DETAILS**

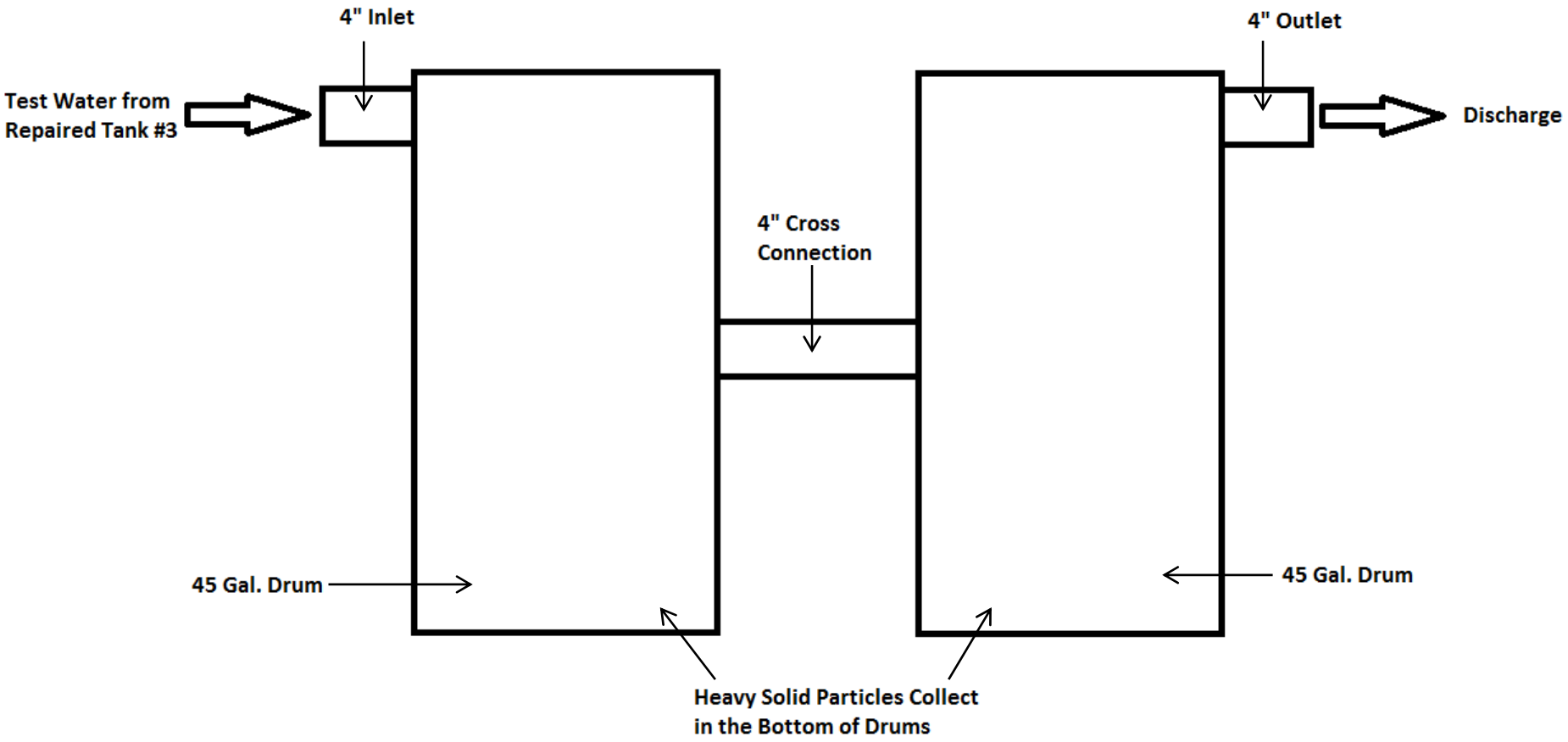
DRAWING No.:	REVISION No.
M503	A

NUNAMI STANTEC LIMITED

Appendix C

Solid Particle Collector

Appendix C – Solid Particle Collector



Note: Final design of the Solid Particle Collector will be confirmed by the Contractor.

Appendix D

API Inspection Report, Tank #3
Coral Harbour

SNC·LAVALIN

API 653 - INTERNAL / OUT OF SERVICE INSPECTION PROGRAM

Above Ground Storage Tank 3
Coral Harbour, Nunavut

Inukshuk Construction Ltd.

INFRASTRUCTURE AND BUILDINGS

24 | 09 | 2014

REPORT > Client ref. 620224
Rev. 1 > Internal ref. 620224-0002-T-NT-REP-0001 > Volume 1/1

Coral Harbour, NU Aboveground Storage Tanks – Tank 3

SLI Project #: 620224

Prepared for:

Inukshuk Construction Ltd.
Rankin Inlet, NU X0C 0G0
Via Mosher Engineering
Mosher Engineering Limited/Inukshuk Construction Limited
Tel: (902) 429-0272
Fax: (902) 429-7762

Prepared by:

Geocon Atlantic
SNC-LAVALIN INC.
40 Fielding Avenue
Dartmouth, NS B3B 1E4

October 2014

Revision:	Date (y/m/d):	Prepared By: / initials	Reviewed By: / initials	Approved By: / initials	Date (y/m/d):
C01	2014-10-02	Christa Rafuse	C. Rafuse	Christa Rafuse	2014-10-02
C01	2014-10-02	Randall Arenburg	Randall Arenburg	Randall Arenburg	2014-10-02

TABLE OF CONTENTS

APPENDICIES

This report shall not be construed as a warranty or underwriting of the conformity or fitness of the goods it pertains to. It is rather the expression of the professional opinion of Geocon Atlantic, in light of information made available to, and inspection and analyses performed by Geocon, as to the conformity of the goods, or deviation from the drawings, specifications, codes and standards listed herein, and no other criteria. Reliance on this report may only be assessed and made after review of the scope of Geocon's mandate, and of the inherent limitations in light of the methodology, procedures, sampling and inspection techniques used. This report is issued for the sole use of the client and for the purpose stated in the agreement.

1 GENERAL INFORMATION

Client:	Inukshuk Construction Ltd PO Box 645 Rankin Inlet, NU X0C 0G0	**Report No:**	622024-0002-T-NT-REP-0001 **Rev.** 0
Description:	Tank 3 Coral Harbour Fuel Storage Facility AST Condition Survey API 653 internal/out-of-service inspection program.	**Codes/ Specifications:**	Technical Examination API 653 Add.3, 2013- Sect. 6.4 Internal Inspection
		Insp. Date:	August, 2014 **API 653 Inspector:** R. Arenburg Cert. # 3016

1.1 Scope

SNC-Lavalin (Geocon Atlantic business unit) was retained by Inukshuk Construction Ltd. to carry out an API 653 internal / out-of-service inspection for:

- Tank 3, located at the Coral Harbour, NU - Fuel Storage Facility.
- The tanks at the fuel storage facility were placed there between 1960 and the 1980's, and one new tank under construction. Tank 3 had been moved or relocated at some point in its history.

Examinations were carried out to determine the present condition of the tank foundation, bottom, shell, roof and appurtenances/attachments.

1.2 Tank Description

Tank No:	3	**Construction Date:**	1980
Owner:	GN	**Present Product:**	Gasoline Hydrocarbons
Diameter:	45' (13.7m)	**Height:**	30' (9.15m)
Safe Fill Height:	Not marked	**Name Plate/Draw. Data?**	Name-plate info only per photo attached
Code of Construction:	API 650 (nameplate)	**Last Int. Inspection?**	Not known
Fabricator/Erector:	Bird Oil Equipment	**Material:**	Unknown
Internal floating roof?	No		

Additional Notes:

- No drawings available for the tank.
- No lining (internal protective coating).
- No cathodic protection of tank bottom.
- Original bottom plate, no annular ring plate or thickened sketch plates.

1.3 Component/Procedure Description

Bottom/Floor Plate Scan (MFE) With Back Up UT / Thickness	Yes	X	No	
Ultrasonic Thickness Survey (shell, bottom)	Yes	X	No	
Ultrasonic Thickness Survey (roof)	Yes	X	No	
Bottom/Shell Profile/Settlement Survey	Yes	X	No	
General Visual of Welding/Complete Tank	Yes	X	No	
Tank Condition Checklist	Yes	X	No	
MPI of Repair Welds & Patch Welds	Yes	X*	No	
Vacuum test floor plate lap welds (by contractor)	Yes	X	No	
Additional Work Requested	Yes		No	X

**pit repairs on floor*

2 GENERAL METHODOLOGY

Inspection / testing consisted of the following:

- general visual internal and external examinations of complete tank as access permitted;
- close-up examination of internal and external bottom to shell weld areas, nozzles, and other attachments per inspection checklist (App. D) API 653 requirements;
- ultrasonic testing (UT) of each shell plate course from spiral stairway access, each 1st course plate; second course plates and top course as access permitted; all bottom, and roof plates;
- bottom magnetic flux leakage (MFL) scan carried out;
- laser level settlement survey of bottom and shell; and,
- vacuum box testing of bottom plate lap welds.

2.1 Equipment Used

- UT- Krautkramer DMS2 Topcoat unit ID # 054, SN: 01Y19C
- Laser level- Inukshuk Construction supplied
- MFE- Silverwing MFL2000, SN: 1700713

2.2 Inspection Summary

The following sections provide a summary of all inspected areas and recommendations. Detailed inspection notes and test data are provided in the appendices (App. A through F) of this report and referenced in the following sections.

2.2.1 Foundation

Tank 3 is situated in a relocated tank farm/facility with tanks ranging in ages between the 1960's - 1980's. It has a gravel/sand type base pad construction with no concrete ring wall and no cathodic protection system installed. Visual inspection of the foundation revealed it to be in fair condition with some minor vegetation above the bottom plate projection. No large washouts or visible areas of poor shell support were noted around the tank bottom. However tank shell/bottom settlement was evident internally.

Recommendations

- Based on the external inspection, the foundation appeared acceptable, although the settlement/profile of base is not acceptable, as noted in section 2.2.3.
- Maintenance / on-going clean-up of moss and light vegetation and repacking of base material around the bottom plate projection is recommended on a regular basis/annually.

2.2.2 Bottom Plates

All bottom (floor) plates are original construction. All plates should have been ¼" nominal thickness with no annular plates or thickened sketch (outer edge) plates present, but one plate (marked number 6) on centre line of bottom was 3/16" when new, not ¼" thickness. After the roof inspection, it was determined that a roof plate and floor plate had been installed in wrong locations (switched by mistake most likely) resulting in a thinner bottom plate than normally installed in most tanks.

All plates were examined for general thickness (UT), general and pit type top side corrosion (VT), underside/soil side pitting (VT/UT/MFL), and profile elevation measurements (survey laser level) as per attached data/note sheets.

External bottom plate projection (chime) in fair condition, around the tank perimeter, no significant underside/topside corrosion noted at plate projection, some bent/deformed areas noted at projecting plate likely from jacking or moving the tank in past years, see attached photographs (App. E).

The internal top product sides of the bottom plates were inspected visually as well as with ultrasonic (UT) and magnetic flux leakage (MFL) methods. UT thickness survey conducted with five readings per plate. MFL of all accessible plate surfaces at 40% scanning level.

Light to moderate localized pit type corrosion was observed throughout most plates – top side, with 0.020" - 0.066" of thickness loss or wastage. Pits were measured and recorded as part of the inspection, for future reference, the remaining life assessments and "*minimum remaining thickness"* (MRT) calculations.

The soil side of the internal bottom plates were inspected visually and by magnetic flux leakage examination. Underside visual examination was carried out where the drain nozzle area was excavated to help drain the tank- no significant underside corrosion noted. MFL scan of bottom plates resulted in no detectable underside pitting.

Minor pitting, and more generally corroded (corrosion at more than 2" in 8" linear measurement) was noted in the critical zone (or first 3") topside as per above information. Note that critical zone remaining thickness requirement per API 653 section 4.4.5.4, is greater in this area (0.125") and became the overriding factor in MRT calculations for "*remaining useful life*" (RUL) estimations. Lowest UT general thickness readings recorded in the critical zone were 0.182" (at plate 6 where 3/16" nominal thickness) and 0.229" (plate 7, 1/4" nominal plate) with additional top side random pitting measured in the order of 0.020"-0.050". Pitting 0.030" and deeper was repaired throughout the bottom to increase calculated remaining life.

API 653 MRT calculations revealed a 10 year service period until next internal inspection. Being constructed without thicker sketch plates or an annular ring brings up a calculated fact that pitting or general corrosion in the critical zone (0-3" from shell attachment fillet weld), becomes more important than the interior plate corrosion due to the fact that 0.125" must remain at the end of the next in-service period, as compared to 0.1" away from the critical zone. It should be noted that inspection of the critical zone is never 100% due to limitations of all NDT equipment/test methods.

Recommendations/Actions

- Based on inspections completed, the tank bottom plate remaining thickness was acceptable for return to service for a ten year period.
- To extend the remaining useful life (especially because one plate was thinner than normal) all top side pits deeper than 0.030" were repair welded at time of inspection.

2.2.3 Bottom/Edge Settlement:

An elevation/profile survey was carried out using a survey laser level and visual examination for bottom plate edge settlement, bulges/depressions, etc. Eight radial lines were used at shell reference points/stations. See attached "Tank Bottom Settlement Survey" data sheet and graph (App. C).

Physical examination of bottom plate at shell revealed significant settlement at first 3' of bottom plate inward from shell. Edge settlement concern starts at 2" settlement in first 1.5' from shell and varies depending on tank diameter and bottom plate weld angles per the API 653, Annex B (figures B11 and B12).

Laser survey measurements revealed up to 4.5" at 2' and 4.8" at 3', about double the allowable limits- and therefore not acceptable at this distance. See edge settlement graph, areas above dotted and dashed acceptance lines (App. C).

Without some documented history it is assumed that all settlement happened during the life of the tank and was set true and level when fabricated/erected.

API 653 states/requires MPI of fillet/lap welds in the areas over 75% of the maximum allowances, and detailed analysis (engineering evaluation) of areas exceeding 100% of API limits, if not repaired.

Recommendations/Actions

- Based on bottom plate examinations/survey, additional magnetic particle inspection (MT) was carried out at areas exceeding 75% of allowable settlement at time of inspection with no crack indications noted.
- Foundation levelling and bottom plate replacement is recommended, or a detailed engineering analysis in areas exceeding 100% of allowable limits if not repaired. Note that one centreline bottom plate is only 3/16" thick and should be considered for replacement along with the other excessively deformed plates. A complete bottom replacement would facilitate under-floor foundation/shell re-levelling.

2.2.4 Shell Settlement Evaluation:

Shell 1st to 2nd course circ weld and or bottom 0' point laser level measurements were recorded as per data sheet information attached. Settlement evaluated per API 653 appendix B for maximum planar and out of plane settlement and deflection, see attached settlement evaluation and graph.

Based on calculations per API 653 Annex B, the tank out of plane settlement allowable limit was 0.0744'; the maximum settlement measured/calculated was 0.0247', which was acceptable.

Recommendations

- Based on survey results, API 653 shell settlement/deflection limits were found acceptable.

2.2.5 Shell Plate:

Shell plates/welds were examined visually (as access allowed) and with UT thickness survey per attached shell measurement data. UT data was collected from the stairway, external and internal access to determine shell plate condition.

Old nozzle insert plate noted above fill line with coupling welded in insert, not per current API, and was MT tested per API 653 (Section 4.3.9.1), for close weld spacing.

Shell plates generally in fair to good condition with minimal internal corrosion noted, minor random pits 0.050" and less near bottom to shell fillet weld.

Random pits with area less than 2" over 8" of vertical height are not structurally significant unless they are 50% of minimum shell plate thickness. All random pits observed/measured were below these values of concern.

External protective coating was noted in poor condition, faded and worn, with some bare lightly corroded areas.

Some deformations noted first foot from bottom, from previous tank moving- dented areas from cable being used around shell to haul tank.

Bottom-to shell fillet welds examined inside and out with no areas of concern noted visually.

Recommendations/Actions

- Exterior protective coating should be renewed.
- Non-standard insert welds above fill line were MT tested at time of inspection with acceptable results.

2.2.6 External / Fixed Roof Plates and Structure:

Roof examined from exterior visually and with UT and interior visually from roof openings and from floor level. Exterior inspection revealed two nominal plate thicknesses, nominal 3/16" (0.1875") with 0.194" lowest UT measured thickness; and at plates 6, 12, and 13 nominal ¼" (0.250") with lowest UT thickness 0.246". Only light corrosion noted underside (rusty brown colour). Exterior coating was noted in fair condition with top coat worn through.

Rafters noted bowed/deformed as per photos attached (Appendix E), estimated up to 6" bow/distortion at several rafters. All rafters appeared welded or attached at both ends.

The top plate of the centre column (rafters are welded to) was bent downward significantly at the edge.

Column 8" diameter welded solid to bottom support plate and sealed.

Recommendations

- Based on inspections carried out for the exterior/interior of roof plate, structure was in fair condition. The underside support structure with rafter deformations should be reviewed by engineering for structural adequacy.
- Renew column base per API 650, during bottom plate renewal.
- External protective coating should be renewed.

2.2.7 Internal Floating Roof (IFR):

None installed to date

Recommendations

- None

2.2.8 Nozzles/Manways:

Nozzles and manways were visually examined, and with UT measurement for remaining thickness/corrosion concerns. Internal light pitting was noted/measured at nozzle necks up to 0.020" deep, no other anomalies noted.

Recommendations/Actions

- None

3 CONCLUSIONS

Based on inspections carried out August 2014 as detailed above, we find that Tank 3 requires structural repairs to bottom plates and tank bottom/shell levelling. Repair of bottom plate top side pits and magnetic particle inspection of settled bottom plate welds/areas was carried out at time of inspection to give reasonable assurance that the tank would be safe to operate for an additional year. An engineering analysis of the current condition- roof, shell and bottom anomalies- should be carried out to help determine a course of action: be it complete bottom replacement and levelling/grading of shell and foundation, and coating renewal, or as determined by engineering analysis.

Feasibility/cost of refurbishment should be weighed against the age and general condition of the tank, and tank farm requirements.

4 LIST OF RECOMMENDATIONS

1. Review findings with a tank engineer for additional analysis, comment or concurrence.
2. If repaired/refurbished- replace all tank bottom plates, reset centre column base, all as per current API 650/653 requirements.
3. Re-level tank and grade foundation under bottom during bottom replacement.
4. Recoat tank exterior shell and roof.
5. Maintenance/on-going clean-up of moss and light vegetation, etc.

A REPAIR RECOMMENDATIONS

SNC·LAVALIN

INFRASTRUCTURE AND BUILDINGS

Coral Harbour Aboveground Storage Tank

Geocon Atlantic

API 653 Out of Service Inspection Programme

DEFICIENCY REPAIR LIST
RECOMMENDATIONS - REPAIRS COMPLETED

Client: Inukshuk Construction	**Project/Area:** Coral Harbour, NU Tank 3	**Date:** Aug 26-28, 2014

Item No:	Location or area	Deficiency or Non-conformance:	Recommended Disposition:	Disposition- as noted- at time of inspection:
1	Tank bottom plates	Random top side pitting 0.030”-0.066” deep, 16 locations across most plates.	Weld overlay repair per API 653 sect 9- test by MT and vacuum box leak test (no patch plates required)	Repaired Aug. 27/14, MT and Vacuum test completed- OK
2	Tank bottom plates	Excessive edge settlement at floor plates 1, 2 , 12, 13, 14	MT test welds at areas over 75% of allowable limits. (Engineering review/ analysis of areas over 100% at later date also recommended)	MT of welds at areas over 75% completed at time of inspection- OK- no cracks. MT worst plate deformation at plate 1- no crack indications observed.
3	Tank 3	Per written general report recommendations section 4	Review by owner / engineering at later date to determine a long term maintenance/repair plan	

INSPECTOR: R. Arenburg

40 Fielding Avenue, Dartmouth, Nova Scotia Phone: 902-468-6230 Fax: 902-468-7864

Geocon Atlantic

MAGNETIC PARTICLE INSPECTION REPORT

Client: Inukshuk Construction		**Contractor:** Inukshuk Construction	
Description: Coral Harbour Tank 3 Bottom plates/welds		**Test Procedure/ Code:** ASTM E709	
		Acceptance Code: CSA W59 clause 12	
		Inspector: R. Arenburg ASNT/CGSB level II	
Material Temp: 15˚C	**Weldment:** X	**Casting:**	**Forging:**

MPI TEST EQUIPMENT: Yoke Make/ SN: Parker 9966

CONSUMABLES: Particle Brand: Magnaflux yellow II (dry)
Contrast Paint: Magnaflux WCP2

Particle		Colour				Method			Current:	Demag.	
Wet	**Dry**	**Red**	**Yellow**	**Black**	**Fluor**	**Yoke**	**Prod**	**Coil**	**A/C**	**Done**	**N/A**
	X		X			X			X		X

Areas Tested:

1. Bottom plate pit welding repairs across most plates- 16 areas in total.
2. Bottom plate lap welds at deformed areas plates 1, 2, 12, 13, and 14.
3. Bottom plate 1 at worst deformed area (area of worst settlement).

Results:

- No crack indications observed- acceptable

Inspector: R. Arenburg ASNT/ CGSB MT Level II

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B TANK DRAWINGS

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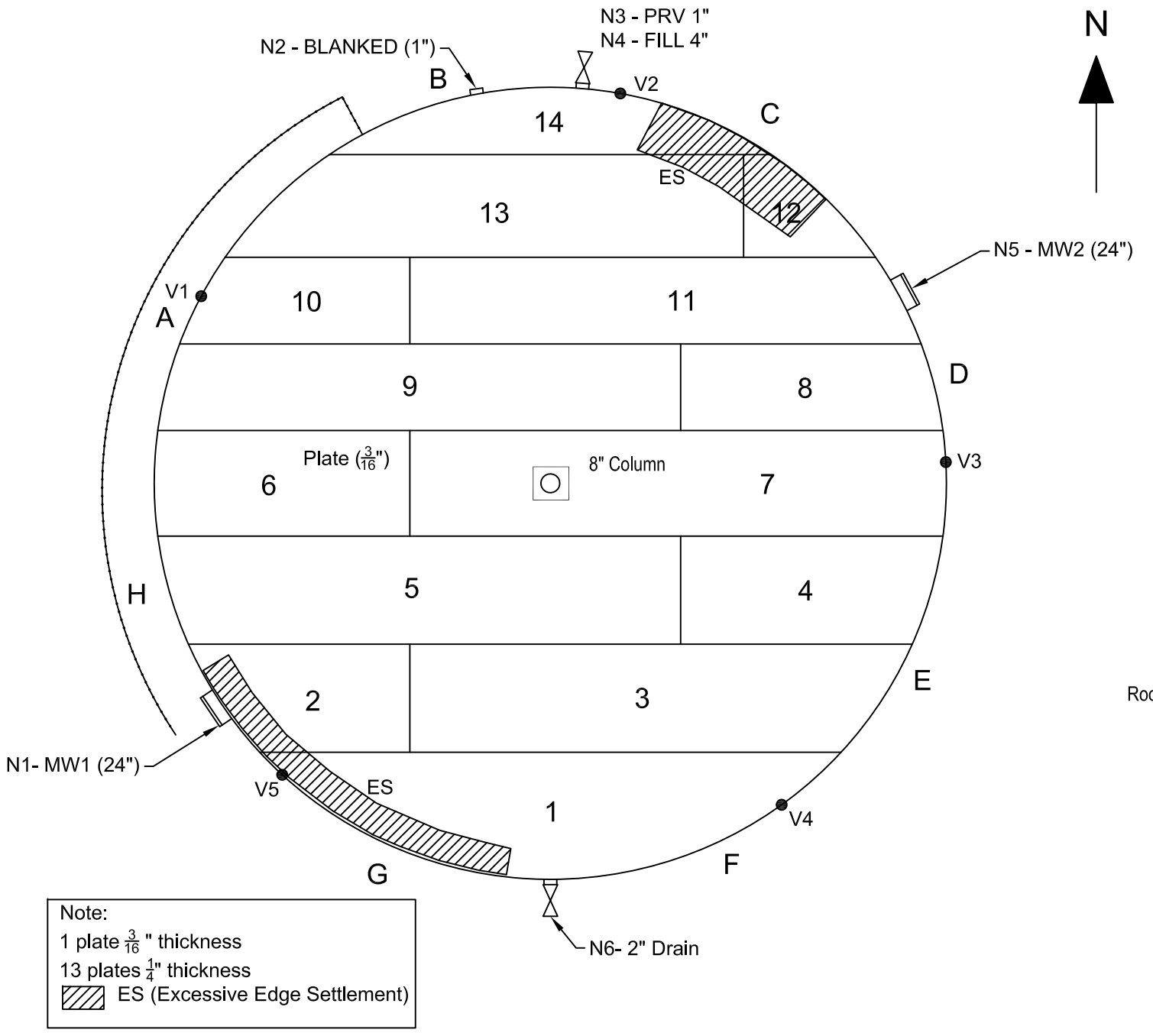
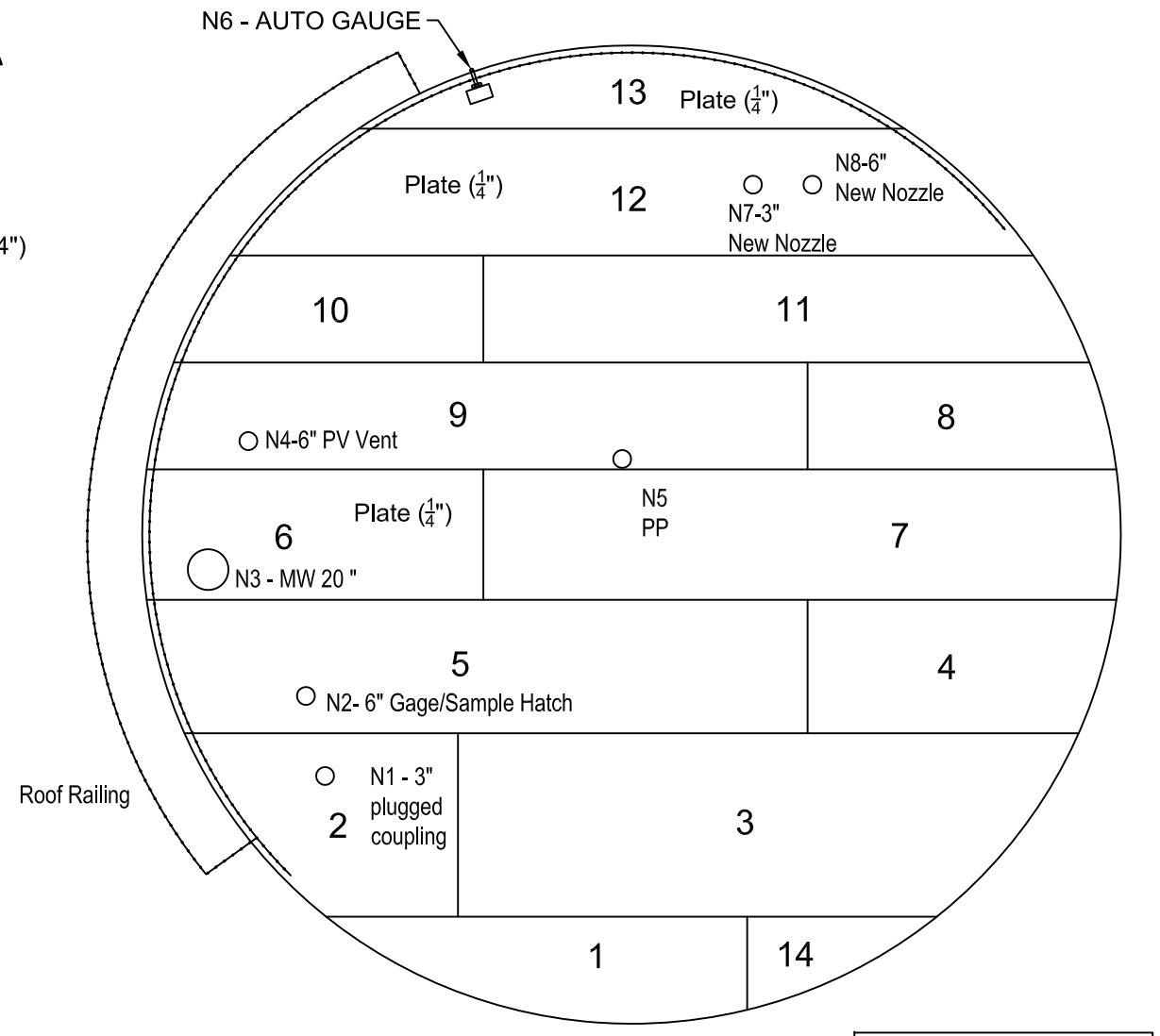
INFRASTRUCTURE AND BUILDINGS

Coral Harbour Aboveground Storage Tank

TANK 3



BOTTOM (FLOOR) - 45 ' Diameter Tank



ROOF - 45' Diameter Tank

SNC•LAVALIN
SNC•LAVALIN Inc.
Halifax, Nova Scotia, Canada
Telephone: (902) 492-4544
Fax: (902) 492-4540
Member of the SNC•LAVALIN Group

DESIGNED: CR	PROJECT #: 620224-0002	PROJECT: CORAL HARBOUR, NUNAVUT API 653 TANK INSPECTION	DRAWING #: TANK # 3
DRAWN: CR	SCALE: NTS	DRAWING TITLE: ROOF AND FLOOR DETAILS	
CHECKED: RA	DATE: 22 SEP 2014		

C TANK SHELL & BOTTOM EVALUATIONS

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INFRASTRUCTURE AND BUILDINGS

Coral Harbour Aboveground Storage Tank

Geocon Atlantic

INSPECTION DATA / NOTES

Client:	**Item No:**	**Inspection Date(s):**
Inukshuk Construction Ltd	Coral Harbour, NU Tank 3	August 2014

Bottom Plate Evaluation Data (45' dia.,)

1. **External bottom plate projection (chime):**
   - Bottom plate original nominal thickness: 0.250 (1/4") Tank age: 34 years minimum
   - Min. thickness required next inspection per API 653 = 0.1" at 3/8" from weld toe
   - Minimum thickness this inspection 3/16" (plate 6 nominal 3/16" not ¼")
   - Estimated/measured original thickness ¼" and 3/16" at plate 6.
   - Corrosion rate: nil.
   - Remaining useful life: >40 yrs.

2. **Critical zone of bottom plate (0-3"inward from shell) plate 6 nominal 3/16" rules:**
   - Min. required per API 653- smaller of ½ original thick or ½ tmin. of shell 1st course = 0.125"
   - Pits noted, deeper pits greater than 0.030" depth repaired weld overlay / minimum unrepaired thickness this inspection 0.162"
   - Maximum corrosion rate 0.0006"/yr (at unrepaired areas).
   - Remaining useful life: 10 years

3. **General bottom plate minimum remaining thickness, plate 6 rules (MRT per API 653 = 0.1"at next insp.):**
   - Corrosion rates: top side 0.0006"/yr, bottom side 0.0029"/yr.
   - Calculated MRT = 0.127" at next inspection of 10 years – which is greater than 0.1" minimum, therefore: acceptable for > 10 years.

Notes:

1. No internal coatings/linings to date. No cathodic protection.
2. No significant bottom/soil side corrosion at bottom plate projection area noted underside of bottom plates and into critical zone maximum loss estimated 0.020".
3. Top side: widespread small diameter pitting noted throughout most bottom plates as evident from UT readings and visual observations. Pit repairs carried out all areas deeper than 0.030" due to plate 6 being under normal thickness when new.
4. Bottom side: MFL scan completed at 40% reference level with no reportable indications detected.
5. Sump: no sump.

Inspector: RA

40 Fielding Avenue, Dartmouth, Nova Scotia Phone: 902-468-6230 Fax: 902-468-7864

Geocon Atlantic

INSPECTION DATA / NOTES

Report No: 620224-0002-T-NT-REP-0001 **Page:** 1 of 1

Client: Inukshuk Construction Ltd	**Item No:** Coral Harbour, NU Tank 3	**Inspection Date(s):** August 2014

Shell Evaluation Data **(45' dia., Values in inches- unless noted)**

Course	Material	Nominal Wall thick. (est. or from info.)	Min. Remaining (From UT data)	Required Thickness (Calculated* or min. per code)	Corrosion Rate est.	Remaining Corrosion Allowance	Projected Life (Years)
1	unknown	3/16 (.1875)	0.182	0.175	0.00018	0.007	>35
2	"	3/16 (.1875)	0.188	0.138	nil	0.050	>40
3	"	3/16 (.1875)	0.188	0.1	nil	0.088	>40
4	"	3/16 (.1875)	0.191	0.1	nil	0.091	>40
5	"	3/16 (.1875)	0.188	0.1	nil	0.088	>40

Notes:

1. No significant shell corrosion noted by UT or visual observations.
2. External surfaces- coating poor condition generally, no significant corrosion loss to date.
3. Internal surfaces- not coated, very light surface corrosion (brown rust) only, no scale build-up noted.
4. No internal floating roof.
5. Tank age estimated minimum 34 years (from nameplate info).
6. *Unknown material/joint efficiency use for calculations, required thickness stated could be less/thinner if more material and tank details were known or made available.
7. Minor/small diameter pits do not effect strength calculations per API 653 (less than 2" in 8" vertical height).

Inspector: RA

40 Fielding Avenue, Dartmouth, Nova Scotia Phone: 902-468-6230 Fax: 902-468-7864

D API 653 CHECKLIST

SNC·LAVALIN

INFRASTRUCTURE AND BUILDINGS

Coral Harbour Aboveground Storage Tank

Geocon Atlantic

Tank ID: **Above-ground Petroleum Storage Tank No. 3** **Insp. Date: Aug 2014**
Tank Owner/Location: **GN Coral Harbour, NU**

API 653 Tank Out of Service Inspection Checklist

Item		Completed (✓)	Comments
C.2.1	**Overview**		
	a) Check that tank has been cleaned, is gas free and safe for entry.	✓	OK
	b) Check that tank is completely isolated from product lines, all electrical power and steam lines.	✓	OK
	c) Check that roof is adequately supported, including fixed roof structure and floating roof legs.	✓	OK
	d) Check for presence of falling object hazards, such as corroded-through roof rafters, asphalt stalactites, and trapped hydrocarbon in unopened or plugged equipment or appurtenances, ledges etc.	✓	OK
	e) Inspect for slipping hazards on the bottom and roof decks.	✓	OK
	f) Inspect structural welds on access ways and clips.	✓	OK
	g) Check surfaces needing inspection for a heavy scale build up and check weld seams and oily surfaces where welding is to be done. Note areas needing more cleaning, including blasting.	✓	Light rust/scale on floor
	h) Review cathodic protection potential readings.	✓	No cathodic protection on tank
C.2.2	**Tank Exterior**		
	a) Inspect appurtenances opened during cleaning such as lower floating swing sheave assemblies, nozzle interiors (after removal of valves).	✓	None opened, looked inside fill from inside, OK
	b) Hammer test or ultrasonically test the roof.	✓	OK , See UT data sheet, thick plates noted ¼", not 3/16" at several plates Plates not flat on rafters, distorted
	c) Enter and inspect the floating roof pontoon compartments.	n/a	No floating roof
C.2.3	**Bottom Interior Surface**		
	a) Using a flashlight held close to and parallel to the bottom plates, and using the bottom plate layout as a guide, visually inspect and hammer test the entire bottom.	✓	UT, MFL scan/tests info attached, edge settlement/distorted floor plate issues noted, see settlement survey data
	b) Measure the depth of pitting and describe the pitting appearance (sharp edged, lake type, dense, scattered, etc)	✓	Pits 0.020-.067" at random, several needed to be repaired, so all marked or notable were repaired at same time, nothing deeper than about 0.030" topside left
	c) Mark areas requiring patching or further inspection.	✓	Pit welding only as noted above, no patches required
	d) Mark locations for turning coupons for inspection.	✓	None
	e) Inspect all welds for corrosion and leaks, particularly the shell-to-bottom weld.	✓	OK

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Item	Completed (✓)	Comments
f) Inspect sketch plates for corrosion.	✓	Minimal general corrosion random pitting not repaired 0.030" topside
g) Check condition of internal sump, if applicable. Standing liquid should be removed from the sump to allow for complete inspection and vacuum testing of weld seams as appropriate. Sump bottom and sidewall plate and seams need to be evaluated for both product side and soil side corrosion.	✓	No sumps
h) Locate and mark voids under the bottom.	✓	Rippled undulating plates noted that could possibly be related to settlement at perimeter of floor/sketch plates or tank relocation and rough moving
i) Record bottom data on a layout sketch using the existing bottom plates as a grid. List the number and sizes of patches required.	✓	Drawn
j) Vacuum test the bottom lap welds.	✓	Completed by Mosher personnel- OK no leaks, pit repairs also tested
k) Hammer test or ultrasonically examine any slightly discolored spots or damp areas.	✓	none
l) Check for reinforcing pads under all bottom attached clips, brackets and supports.	✓	No attachments on floor except centre column welded down to floor repad
m) Inspect floating roof leg pads for pitting or cutting, and excessive dimpling (indicating excessive loading).	n/a	No floating roof
n) Check the column bases of fixed roof supports for adequate pads and restraining clips.	✓	- Centre pipe column 8" dia. welded to base plate welded solid to floor- no movement possible
o) In earthquake Zones 3 & 4, check that roof supports are not welded down to the tank bottom, but are only restrained from horizontal movement.	✓	Welded solid as noted above, not in earthquake area
p) Check area beneath swing line cable for indications of cable cutting or dragging.	n/a	None
q) Mark old oil and air test connection for removal and patching.	✓	None
r) Identify and report low areas on the bottom that do not drain adequately.	✓	Significant / rejectable settlement noted at shell/floor, per survey results attached

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Item	Completed (✓)	Comments
s) Inspect coating for holes, disbonding, deterioration and discoloration.	✓	No interior lining
C.2.4 Shell Seams and Plate		
a) On cone up bottoms, closely inspect and gauge the depth of metal loss on the lower 2 in. to 4 in. of the shell (area of standing water).	✓	Cone up originally/ most likely, no significant pitting at shell plates
b) Measure the depth of pitting on each course.	✓	Light corrosion /pitting - none significant-several random exterior gouge/fabrication marks up to 0.040”
c) Inspect and estimate the amount of metal loss on the heads of rivets and bolts.	n/a	
d) Inspect shell to bottom riveted lap joints.	n/a	
e) Inspect for vertical grooving damage from seal assembly protrusions.	n/a	
f) Inspect existing protective coatings for damage, deterioration and disbonding.	✓	ext. fair to poor, last painted 1995
g) Check for areas of rubbing (indicating too much pressure by the seal assembly shoes or inadequate annular space).	n/a	
h) Visually inspect the shell plates and seams for indications of leakage.	✓	OK
i) If the shell has riveted or bolted seams, record the leak locations by film or chart in case the locations are lost during surface preparation for painting.	n/a	
j) Measure annular space at 40-ft intervals.	n/a	
k) Survey the shell to check for roundness and plumb.	✓	Lower 6” of shell distorted inward ½” from settlement issue in some areas
C.2.5 Shell-mounted Overflows		
a) Inspect overflow for corrosion and adequate screening.	n/a	
b) Check location of overflow that it is not above any tank valves or equipment.	n/a	
C.2.6 Roof Interior Surface		
C.2.6.1 General		
a) Visually inspect the underside surface of the roof plates for holes, scale buildup and pitting.	✓	Roof plate/rafters little corrosion evident underside, several rafters bowed up to about 6” end to end, see photos
b) Hammer test or ultrasonically examine to check for thin areas, particularly in the vapor space of floating roofs and at edge of roof on cone roof tank.	✓	UT data attached OK no significant corrosion
c) Check all clips, brackets, braces etc. welded to the roof deck plate for welded reinforcing pads and see that they have not broken free.	✓	OK from floor view, and telephoto shots

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Item		Completed (✓)	Comments
	d) If no pad is present, Penetrant test for cracking of the weld or deck plate.	✓	OK visually
	e) Inspect protective coating for breaks, disbondment and deterioration.	✓	Ext. paint only
	f) Spark test the interior surface coating if recoating is not planned.	n/a	
C.2.6.2	**Fixed Roof Support Structure**		
	a) Inspect the support columns for thinning in the upper 2ft.	✓	OK from floor view
	b) On API columns (two channels welded together) check for corrosion scale breaking the tack welds, unless the joint between the channels is completely seal welded.	n/a	Pipe column 8" sealed no openings
	c) Check that the reinforcing pad on the bottom is seal-welded to the tank bottom with horizontal movement restraining clips welded to the pad.	✓	Welded solid as noted above C.2.3
	d) Determine if pipe column supports are concrete filled or open pipe. If open pipe, check for a drain opening in the bottom of the pipe.	✓	Pipe- not open
	e) Inspect and gauge rafters for thinning, particularly near the center of the roof. Report metal loss.	✓	No significant corrosion as viewed from roof openings and floor
	f) Check for loose or twisted rafters.	✓	Bowed/distorted as noted above, but appear attached to clips and centre column plate
	g) Inspect girders for thinning and check that they are attached securely to the top of the columns.	✓	No girders
	h) Report if the columns have cross bracing in the area between the low pump out of the top of the shell (for future internal floating roof installation).	✓	No cross bracing
	i) Inspect and report presence of any roof-mounted swing line bumpers.	✓	None
	j) Photograph the roof structure if no rafter layout drawing exists.	✓	done
C.2.7	**Fixed Roof Appurtenances**		
C.2.7.1	**Inspection and Light Hatches**		
	a) Inspect the hatches for corrosion, paint and coating failures, holes & cover sealing.	✓	OK
	b) On loose covers, check for a safety chain in good condition.	✓	None
	c) On light hatches over 30 in. across, check for safety rods.	✓	None
	d) Inspect the condition of the gaskets on bolted or latched down hatch covers.	✓	None
C.2.7.2	**Staging Support Connection**		
	Inspect the condition of the staging support for corrosion.	✓	OK
C.2.7.3	**Breathers and Vents**		
	a) Inspect and service the breather.	✓	Visually OK
	b) Inspect screens on vents and breathers.	✓	Visually OK
C.2.7.4	**Emergency P/V Hatches**		
	a) Inspect and service pressure/vacuum hatches. (Setting should be high enough to prevent chattering of breather during normal operation. See breather manufacturer's guide).	n/a	
	b) Inspect liquid seal hatches for corrosion and proper liquid level in the seat.	n/a	
C.2.7.5	**Sample Hatch**		
	a) Inspect sample hatch for corrosion.	✓	OK
	b) Check that the cover operates properly.	✓	OK
	c) If the tank has no gauge well, check for a hold-off distance marker and check measurement.	n/a	

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	Item	Completed (✓)	Comments
C.2.8	**Floating Roof**		No floating roof
C.2.8.1	**Roof Deck**		
	a) Hammer test the area between roof rim and shell. (if access for hammer testing is inadequate, measure the distance from the bottom edge of the roof to the corroded area and then hammer test from inside the pontoon).	n/a	
	b) In sour water service, clean and test all deck plate weld seams for cracking unless the lower laps have been seal welded.	n/a	
	c) Check that either the roof drain is open or the drain plug in the roof is open in case of unexpected rain.	n/a	
	d) On flat bottom and cone bottom roof decks, check for a vapor dam around the periphery of the roof. The dam should be continuous without break to prevent escape of vapors to the seal from under the center of the roof.	n/a	
C.2.8.2	**Floating Roof Pontoons**	n/a	
	a) Visually inspect each pontoon for liquid leakage.	n/a	
	b) Run a light wire through the gooseneck vents on locked down inspection hatch covers to make sure they are open.	n/a	
	c) Inspect lockdown latches on each cover.	n/a	
	d) Check and report if each pontoon is:	n/a	
	1. vapor tight (bulkhead seal welded on one side on bottom, sides and top).	n/a	
	2. liquid tight (seal welded on bottom and sides only), or	n/a	
	3. unacceptable (minimum acceptable condition is liquid tight).	n/a	
C.2.8.3	**Floating Roof Cutouts**		
	a) Inspect underside of cutouts for mechanical damage.	n/a	
	b) Inspect welds for cracks.	n/a	
	c) Inspect plate for thinning pitting and erosion.	n/a	
	d) Measure mixer cutouts and record plate thickness for future mixer installation or replacement. Plate thickness _____ .	n/a	
C.2.8.4	**Floating Roof Supports**		
	a) Inspect fixed low and removable high floating roof legs for thinning.	n/a	
	b) Inspect for notching at bottom of legs for drainage.	n/a	
	c) Inspect for leg buckling or felling at bottom.	n/a	
	d) Inspect pin hole in roof guide for tears.	n/a	
	e) Check plumb of all legs.	n/a	
	f) Inspect for adequate reinforcing gussets on all legs through a single portion of the roof.	n/a	
	g) Inspect the area around the roof legs for cracking if there is no internal reinforcing pad or if the topside pad is not welded to the deck plate on the underside.	n/a	
	h) Inspect the sealing system on the two-position legs and the vapor plugs in the fixed low leg for deterioration of the gaskets.	n/a	
	i) On shell-mounted roof supports, check for adequate clearance based on the maximum floating roof movement as determined by the position of the roof relative to the gauge well and/or counter-rotational device.	n/a	
C.2.9	**Floating Roof Seal Assemblies**		
C.2.9.1	**Primary Shoe Assembly**		
	a) Remove four sections of foam log (foam filled sealed) for inspection on 90° locations.	n/a	

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Item		Completed (✓)	Comments
	b) Inspect hanger attachment to roof rim for thinning, bending, broken welds and wear of pin holes.	n/a	
	c) Inspect clips welded to roof rim for thinning.	n/a	
	d) Shoes – inspect for thinning and holes in shoes.	n/a	
	e) Inspect for bit-metal bolts, clips, and attachments.	n/a	
	f) Seal fabric – inspect for deterioration, stiffening, holes and tears in fabric.	n/a	
	g) Measure length of fabric from top of shoe to roof rim, and check against maximum anticipated annular space as roof operates.	n/a	
	h) Inspect any modification of shoes over shell nozzles, mixers, etc for clearance.	n/a	
	i) Inspect shoes for damage caused by striking shell nozzles, mixers, etc.	n/a	
C.2.9.2	**Primary Toroidal Assembly**		
	a) Inspect seal fabric for wear, deterioration, holes and tears.	n/a	
	b) Inspect hold down system for buckling or bending.	n/a	
	c) Inspect foam for liquid absorption and deterioration.	n/a	
C.2.9.3	**Rim-mounted Secondaries**		
	a) Inspect the rim-mounted bolting bar for corrosion and broken welds.	n/a	
	b) Measure and chart seal-to-shell gaps.	n/a	
	c) Visually inspect seam from below, looking for holes as evidenced by light.	n/a	
	d) Inspect fabric for deterioration and stiffness.	n/a	
	e) Inspect for mechanical damage, corrosion and wear on tip in contact with shell.	n/a	
	f) Inspect for contact with obstructions above top of shell.	n/a	
C.2.10	**Floating Roof Appurtenances**		
C.2.10.1	**Roof Manways**		
	a) Inspect walls of manways for pitting and thinning.	n/a	
	b) On tanks with interface auto gauges, check seal around gauge tape cable and guide wires through manway cover.	n/a	
	c) Inspect cover gasket and bolts.	n/a	
C.2.10.2	**Rim Vent**		
	a) Check rim vent for pitting and holes.	n/a	
	b) Check vent for condition of screen.	n/a	
	c) On floating roof tanks where the environmental rules require closing off the vent, check the vent pipe for corrosion at the pipe-to-rim joint and check that the blinding is adequate.	n/a	
C.2.10.3	**Vacuum Breaker, Breather Type**		
	a) Service and check operation of breather valve.	n/a	
	b) Check that nozzle pipe projects no more than ½" below roof deck	n/a	
C.2.10.4	**Vacuum Breaker, Mechanical Type**		
	Inspect the stem for thinning. Measure how far the vacuum breaker cover is raised off the pipe when the roof is resting on high or low legs.	n/a	
	a) On high legs: _____ .	n/a	
	b) On low legs: _____ .	n/a	
C.2.10.5	**Roof Drains: Open Systems, Including Emergency Drains**		
	a) Check liquid level inside open roof drains for adequate freeboard. Report if there is insufficient distance between liquid level and top of drain.	n/a	
	b) If tank comes under Air Quality Manual District rules, inspect the roof drain vapor plug.	n/a	
	c) If emergency drain is not at the center of the roof, check that there are at least three emergency drains.	n/a	

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Item	Completed (✓)	Comments
C.2.10.6 Closed Drain Systems: Drain Basins		
a) Inspect for thinning and pitting.	n/a	
b) Inspect protective coating (topside).	n/a	
c) Inspect basin cover or screen for corrosion.	n/a	
d) Test operation of check valve.	n/a	
e) Check for presence of check valve where bottom of basin is below product level.	n/a	
f) Inspect drain basin (s) to roof deck welds for cracking.	n/a	
g) Check drain basin (s) outlet pipe for adequate reinforcement to roof deck (including reinforcing pad).	n/a	
C.2.10.7 Closed Drain Systems: Fixed Drain Line on Tank Bottom		
a) Hammer test fixed drain line on tank bottom for thinning and scale/debris plugging.	n/a	
b) Inspect supports and reinforcing pads for weld failures and corrosion.	n/a	
c) Check that pipe is guided, not rigidly locked to support, to avoid tearing of tank bottom plate.	n/a	
C.2.10.8 Closed Drain Systems: Flexible Pipe Drain		
a) Inspect for damage to exterior of pipe.	n/a	
b) Check for obstructions that pipe could catch on.	n/a	
c) Inspect shields to protect pipe from snagging.	n/a	
d) Inspect results of hydrostatic test on flexible roof drain system.	n/a	
C.2.10.9 Closed Drain Systems: Articulated Joint Drain		
a) Hammer test rigid pipe in flexible joint systems for thinning and scale/debris plugging.	n/a	
b) Inspect system for signs of bending or strain.	n/a	
c) Inspect results of system hydrostatic test.	n/a	
d) Inspect landing leg and pad.	n/a	
C.2.10.10 Auto gauge System and Alarms		
a) Check freedom of movement of tape through auto gauge tape guide.	n/a	
b) Inspect sheaves for freedom of movement.	n/a	
c) Test operation checker.	n/a	
d) Inspect tape and tape cable for twisting and fraying.	n/a	
e) Test the tape's freedom of movement through guide sheaves and tape guide pipe.	n/a	
f) On open-top tanks, check that gate tapes with cables have no more than one foot of tape exposed with float at lowest point.	n/a	
g) Check float for leakage.	n/a	
h) Test float guide wire anchors for spring action by pulling on wire and releasing.	n/a	
i) Inspect floatwells in floating roofs for thinning and pitting of walls just above the liquid level.	n/a	
j) Check that the auto gauge tape is firmly attached to the float.	n/a	
k) Inspect the tape cable and float guide wire fabric seals through the float well cover.	n/a	
l) Inspect the bottom guide wire attachment clip: inspect for a temporary weighted bar instead of a permanent welded down clip.	n/a	
m) Inspect board type auto gauge indicators for legibility and freedom of movement of indicator.	n/a	
n) Measure and record these distances to determine if seal damage will occur if tank is run over from:	n/a	
1) Shell top angle to underside of tape guide system.	n/a	
2) Liquid level on floating top to top of secondary seal.	n/a	
o) Identify floating roofs where the tape is connected directly to the roof.	n/a	

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Item	Completed (✓)	Comments
p) Overfill alarm: Inspect tank overfill prevention alarm switches for proper operation.	n/a	
C.2.11 Common Tank Appurtenances		
C.2.11.1 Gauge Well		
a) Inspect gate well pipe for thinning at about two-thirds distance above the bottom: look for thinning at the edge of the slots.	n/a	
b) Check for corrosion on the pipe joint. Check that sample cords, weights, thermometers, etc., have been removed from the pipe.	n/a	
c) Check for cone at bottom end of pipe about one foot above the bottom.	n/a	
d) Check condition of well washer pipe and that its flared end is directed at the near side of the hold off pad.	n/a	
e) Check that supports for gauge well are welded to pad or to shell and not directly to bottom plate.	n/a	
f) Check operation of gauge well cover.	n/a	
g) Check presence of a hold-off distance marker in well pipe and record hold-off distance. Hold-off distance _____	n/a	
h) Identify and report size and pipe schedule, and whether pipe is solid or slotted. Report slot size.	n/a	
i) Check that the hold-off distance plate is seal-welded to the bottom and that any gauge well supports are welded to the plate and not directly to the bottom.	n/a	
j) Inspect vapor control float and cable.	n/a	
k) Check for presence and condition of gauge well washer.	n/a	
l) Check for bull plug or plate blind on gauge well washer valve.	n/a	
m) Inspect gauge well guide in floating roof for pitting and thinning.	n/a	
n) Inspect the guide rollers and sliding plates for freedom of movement.	n/a	
o) Inspect condition of gauge well pipe seal system.	n/a	
p) On black oil and diesel services: if gauge well is also used for sampling, check for presence of a thief-and-gauge-type hatch to avoid spillage.	n/a	
q) Visually inspect inside of pipe for pipe weld protrusions which could catch or damage vapor control float.	n/a	
C.2.11.2 Sampling Systems: Roof Sample Hatches		
a) Inspect roof mounted sample hatches for reinforcing pads and cracking..	✓	OK
b) Inspect cover for operation.	✓	OK
c) For tanks complying with Air Quality Monitoring District rules, inspect sample hatch covers for adequate sealing.	✓	OK
d) Check horizontal alignment of internal floating roof sample hatches under fixed roof hatches.	n/a	
e) Inspect the sealing system on the internal floating roof sample hatch cover.	n/a	
f) Inspect floating roof sample hatch cover recoil reel and rope.	n/a	
C.2.11.3 Shell Nozzles		
a) Inspect shell nozzles for thinning and pitting.	✓	Very light internal pitting corrosion 0.020", see attached UT info
b) Inspect hot tap nozzles for trimming of holes.	n/a	
c) Identify type of shell nozzles.	✓	Per data sheets

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Item	Completed (✓)	Comments
d) Identify and describe internal piping, including elbow-up and elbow-down types.	✓	One water draw-off elbow down, short straight fill/suction, little protrusion into tank.
C.2.11.4 For Nozzles Extended Into the Tank		
a) Inspect pipe support pads welded to tank bottom.	✓	None
b) Inspect to see that pipe is free to move along support without strain or tearing action on bottom plate.	n/a	
c) Inspect nozzle valves for packing leaks and damaged flange faces.	✓	OK
d) Inspect heater stream nozzle flanges and valves for wire cutting.	n/a	
e) Report which nozzles have thermal pressure relief bosses and valves.	✓	New fill line PRV/ check installed
f) In internal elbow-down fill line nozzles, inspect the wear plate on the tank bottom.	n/a	none
g) On elbow-up fill lines in floating roof tanks, check that opening is directed against underside of roof, not against vapor space. Inspect impact are for erosion.	n/a	
C.2.11.5 Diffusers and Air Rolling Systems		
a) Inspect diffuser pipe for erosion and thinning.	n/a	
b) Check holes in diffuser for excessive wear and enlargement.	n/a	
c) Inspect diffuser supports for damage and corrosion.	n/a	
d) Check that diffuser supports restrain, not anchor, longitudinal line movement.	n/a	
e) Inspect air spiders on bottom of lube oil tanks for plugging and damaged or broken threaded joints.	n/a	
C.2.11.6 Swing Lines		
a) Inspect flexible joint for cracks and leaks.	n/a	
b) Scribe the flexible joint across the two moving faces and raise end of swing line to check the joint's freedom of movement, indicated by separation of scribe marks.	n/a	
c) Check that flexible joints over 6" are supported.	n/a	
d) Inspect the swing pipe for deep pitting and weld corrosion.	n/a	
e) Loosen the vent plugs in the pontoons and listen for a vacuum. Lack of a vacuum indicates a leaking pontoon.	n/a	
f) Check the results of air test on pontoons during repairs.	n/a	
g) Inspect the pontoons for pitting.	n/a	
h) Inspect the pull-down cable connections to the swing.	n/a	
i) Inspect the condition of the bottom-mounted support, fixed roof limiting bumper, or shell-mounted limiting bumper for wood condition, weld and bolt corrosion, and seal welding to bottom or shell.	n/a	
j) Inspect safety hold-down chain for corrosion and weak links.	n/a	
k) Check that there is a welded reinforcing pad where the chain connects to the bottom.	n/a	
l) If the floating swing in a floating or internal floating roof tank does not have a limiting device preventing the swing from exceeding 60 degrees, measure and calculate the maximum angle possible with the roof on overflow. Max. angle on overflow _____ (if the calculated angle exceeds 65 degrees, recommend installation of a limiting bracket).	n/a	
m) Inspect pull down cable for fraying.	n/a	

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Item	Completed (✓)	Comments
n) Inspect for three cable clamps where cable attaches to end of swing line (single-reeved) or to roof assembly (double-reeved). Inspect sheaves for freedom of movement.	n/a	
o) Inspect winch operation and check the height indicator for legibility and accuracy.	n/a	
p) Inspect bottom-mounted sheave assembly at end of pontoon for freedom of rotation of sheave.	n/a	
q) Inspect shell-mounted lower sheave assembly for freedom of rotation of sheave, corrosion thinning, and pitting of sheave housing.	n/a	
r) Inspect upper sheave assembly for freedom of movement of sheave.	n/a	
s) Inspect the cable counterbalance assembly for corrosion and freedom of operation.	n/a	
C.2.11.7 Manway Heater Racks		
a) Inspect the manway heater racks for broken welds and bending of the sliding rails.	n/a	
b) Measure and record the length of the heater and the length of the track.	n/a	
C.2.11.8 Mixer Wear Plates and Deflector Strands		
a) Inspect bottom and shell plates and deflector stands.	n/a	
b) Inspect for erosion and corrosion on the wear plates. Inspect for rigidity, structural soundness, corrosion, and erosion of deck plates and reinforcing pads that are seal welded to the bottom under the deflector stand legs.	n/a	
c) Measure for propeller clearance between the bottom of deflector stand and roof when the roof is on low legs.	n/a	
C.2.12 Access Structures		
C.1.12.1 Handrails		
a) Identify and report type (steel pipe, galvanized pipe, square tube, angle) and size of handrails.	✓	OK
b) Inspect for pitting and holes, paint failure.	✓	OK
c) Inspect attachment welds.	✓	OK
d) Identify cold joints and sharp edges. Inspect the handrails and midrails.	✓	OK
e) Inspect safety drop bar (or safety chain) for corrosion, functioning and length.	✓	No drop bar
f) Inspect the handrail between the rolling ladder and the gauging platform for a hazardous opening when the floating roof is at its lowest level.	n/a	
C.2.12.2 Platform Frame		
a) Inspect frame for corrosion and paint failure.	✓	Stairway landing at top
b) Inspect the attachment of frame to supports and supports to tank for corrosion and weld failure.	✓	OK
c) Check reinforcing pads where supports are attached to shell or not.	✓	No pads
d) Inspect the surface that deck plate or grating rests on, for thinning and holes.	✓	OK
e) Check that flat-surface-to-flat-surface junctures are seal-welded.	n/a	
C.2.12.3 Deck Plate and Grating		
a) Inspect deck plate for corrosion-caused thinning or holes (not drain holes) and paint failure.	n/a	
b) Inspect plate-to-frame weld for rust scale buildup.	n/a	
c) Inspect grating for corrosion-caused thinning of bars and failure of welds.	✓	OK
d) Check grating tile down clips. Where grating has been retrofitted to replace plate, measure the rise of the step below and above the grating surface and compare with other risers on the stairway.	n/a	
C.2.12.4 Stairway Stringers		

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Item	Completed (✓)	Comments
a) Inspect spiral stairway stringers for corrosion, paint failure and weld failure. Inspect attachment of stairway treads to stringer.	n/a	No stringers
b) Inspect stairway supports to shell welds and reinforcing pads.	✓	No re-pads
c) Inspect steel support attachment to concrete base for corrosion.	n/a	
C.2.12.5 Rolling Ladder		
a) Inspect rolling ladder stringers for corrosion.	n/a	
b) Identify and inspect ladder fixed rungs (square bar, round bar, angles) for weld attachments to stringers and corrosion, particularly where angle rungs are welded to stringers.	n/a	
c) Check for wear and corrosion where rolling ladder attached to gauging platform.	n/a	
d) Inspect pivot bar for wear and secureness.	n/a	
e) Inspect operation of self-leveling stairway treads.	n/a	
f) Inspect for corrosion and wear on moving parts.	n/a	
g) Inspect rolling ladder wheels for freedom of movement, flat spots & wear on axle.	n/a	
h) Inspect alignment of rolling ladder with roof rack.	n/a	
i) Inspect top surface of rolling ladder track for wear by wheels to assure at least 18" of unworn track (track long enough).	n/a	
j) Inspect rolling ladder track welds for corrosion.	n/a	
k) Inspect track supports on roof for re-enforcing pads seal-welded to deck plate.	n/a	
l) Check by dimensioning, the maximum angle of the rolling ladder when the roof is on low legs. Max. Angle:	n/a	
m) If rolling ladder track extends to within 5ft of the edge of the roof on the far side check for a handrail on the top of the shell on that side.	n/a	
Auto Gauge Assembly	✓	Auto-gauge float appeared functional.
NOTES: 1. As per API 653 Annex C commentary- provided API 653 checklists are general items that should be considered for internal and external inspection of tanks, to be used as guidance to the owner/operator for developing an inspection assessment schedule to a specific tank. 2. Inspected/noted item deficiencies or anomalies are commented on in written report, test/data sheets and photos attached. 3. Minor repairs were carried out at time of inspection- pit repairs. 4. No major repairs attempted (settlement/distortion issues as noted above require review/further analysis to determine a repair plan)		

E PHOTOGRAPHS

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INFRASTRUCTURE AND BUILDINGS

Coral Harbour Aboveground Storage Tank

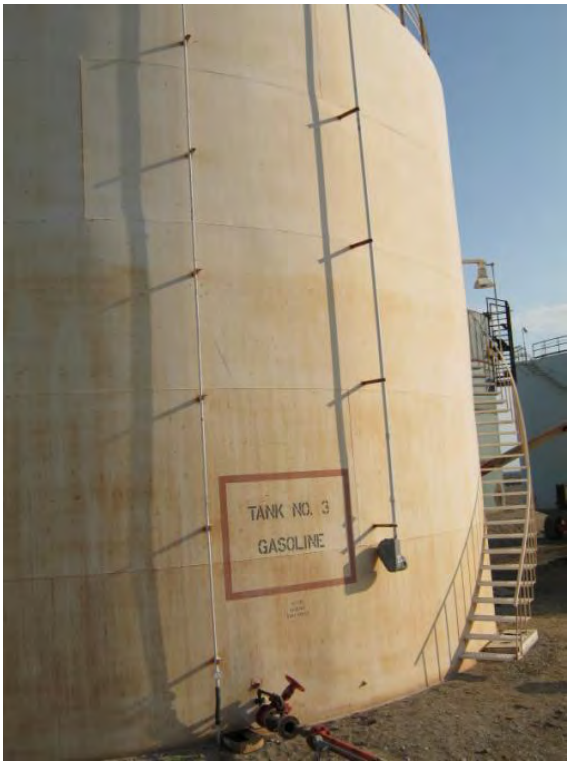

Photo 1713: Tank 3 Exterior View – Protective coating worn, light rusting.

Photo 1714: Tank 3 Exterior View – Protective coating worn, light rusting.

Photo 1716: Manway/Nameplate

Photo 1711: Close-up of Nameplate

Photo 1718: Close-up of coating condition of shell, typical throughout.

Photo 1719: Close-up of shell to bottom plate projection, coating peeling and light corrosion.

Photo 1720: Drain nozzle area excavated for draining tank

Photo 1723: View under tank bottom plate, minimal corrosion noted <0.020".

Photo 1724: Minor vegetation at foundation.

Photo 1728: Deformations at bottom plate projection at random.

Photo 1729: Stairway attachments to tank.

Photo 1731: Stairway up shell.

Photo 1732: Auto-gage assembly.

Photo 1738: Fill/discharge line nozzle, non-standard shell insert above, later cleaned and MT tested.

Photo 1774: Shell interior in good general condition, some minor shell denting/distortion at lower 1 foot from moving operations in the past.

Photo 1777: Close-up of shell distortion noted above.

Photo 1775: Bottom/floor plate settlement distortion plate 13 and 14 area.

Photo 1751: Edge settlement plate 1 areas, 4”-5” first 3’ from shell.

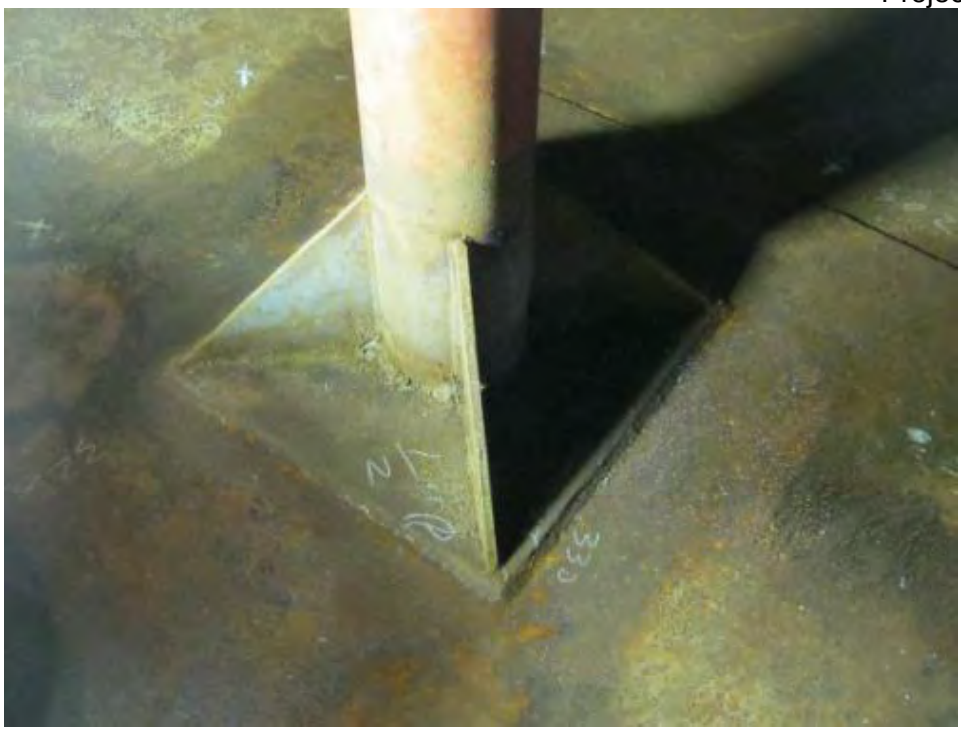

Photo 1752: Column base welded to floor, no significant settlement/heave issue noted.

Photo 1756: Pit at bottom plate – repair welded.

Photo 1757: Random/isolated deeper pit 0.065".

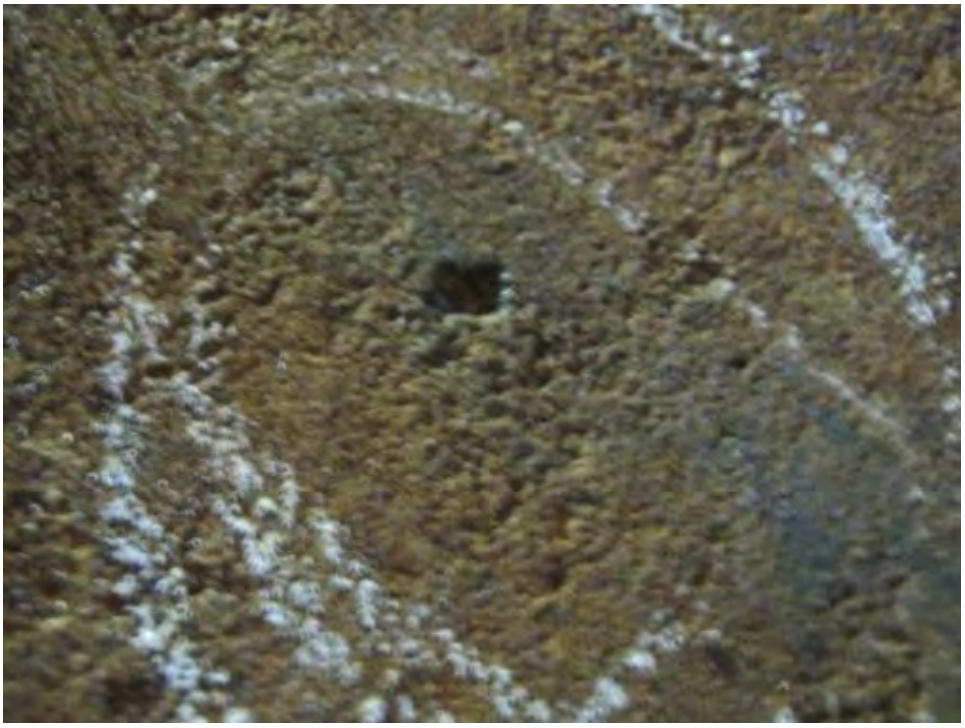

Photo 1759: As above deep pit repair welded, general shallow pitting corrosion 0.030" and less, around deeper pit.

Photo 1810: View of roof rafter deformations, estimated up to 6”.

Photo 1808: As above, opposite side of roof.

Photo 1801: View of rafters on column top plate, note roof plate not laying flat on rafters.

Photo 1799: Rafter close-up, no significant corrosion.

Photo 1745: Bent area at edge on column centre plate.

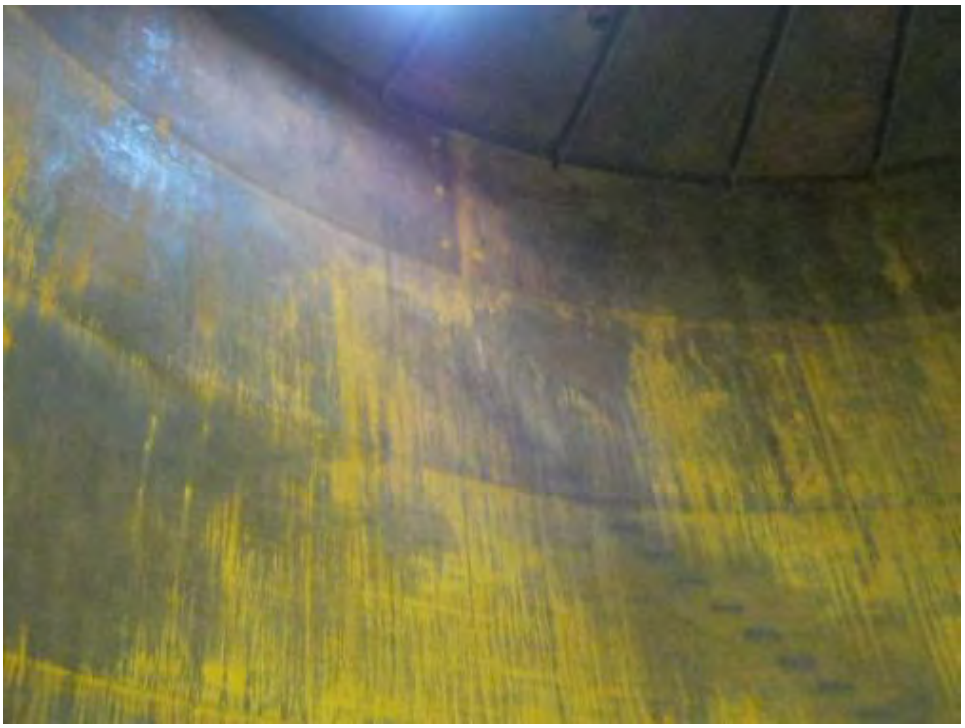

Photo 1746: Upper shell to roof, no significant corrosion noted.

Photo 1780: Roof exterior view, new nozzle installed near far edge.

Photo 1781: Roof plate undulating not flat on rafters as noted in photo 1801.

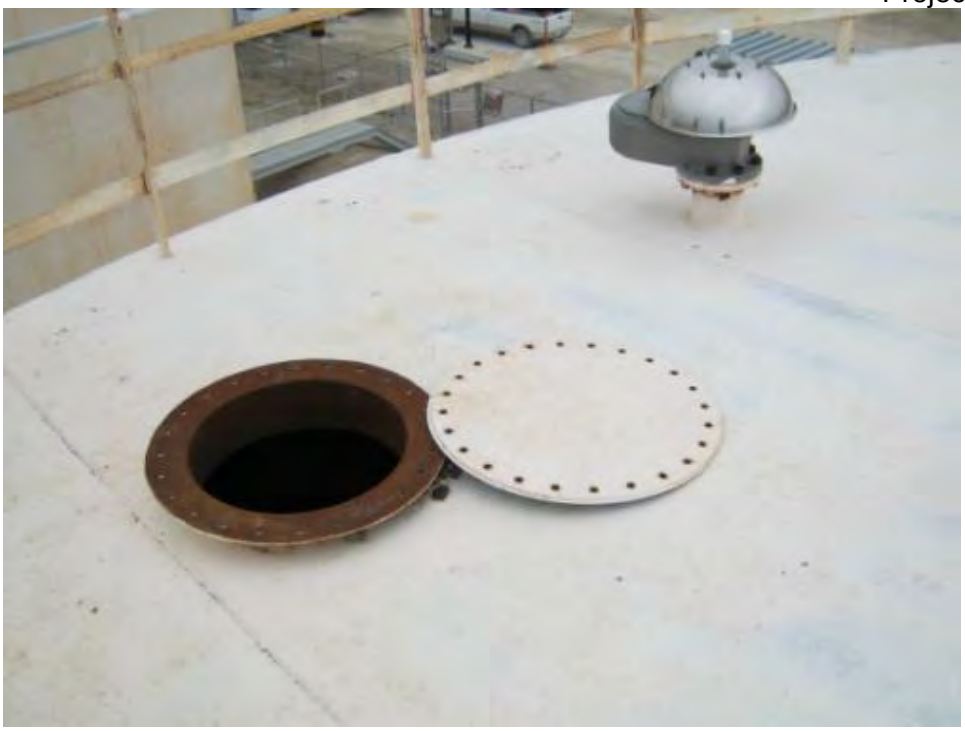

Photo 1787: Roof PV vent and manway, note roof plate protective coating worn.

Photo 1788: Sample hatch nozzle.

F TEST DATA / NOTE SHEETS

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INFRASTRUCTURE AND BUILDINGS

Coral Harbour Aboveground Storage Tank

SHELL SETTLEMENT

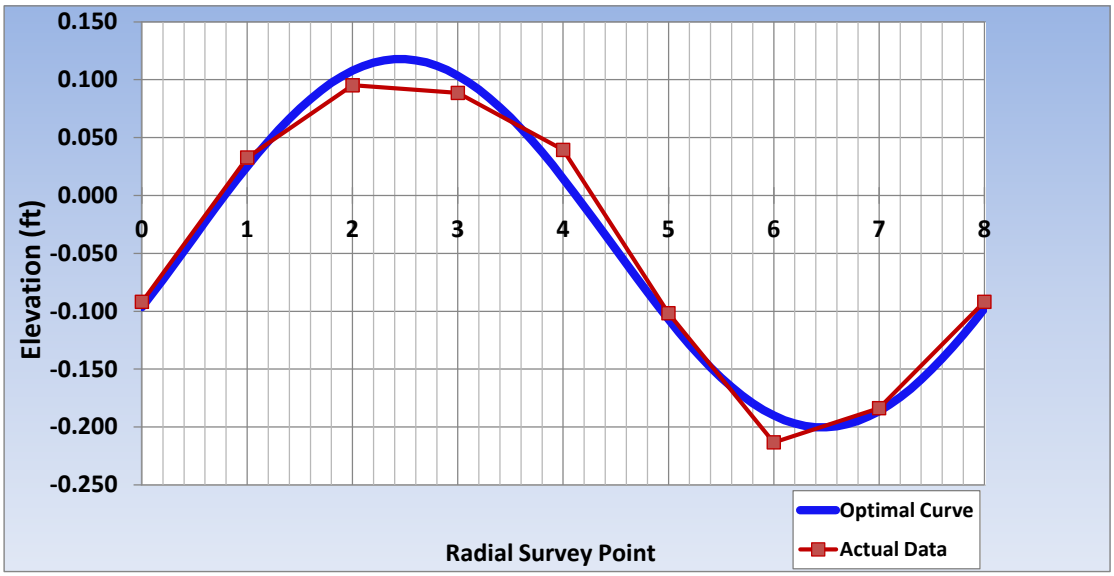
Radial Line	Graph Position	Angular Location	Actual Elevation (mm)	Actual Elevation (ft)	Edge Elev. Rel. to Centre	Optimal Elevation	Out of Plane Settle (Ui)	Out of Plane Deflect (Si)
H	*0*	*360*	360	*1.1811*	*-0.0919*			
A	1	0	322	1.0564	0.0328	0.0249	0.0079	0.0113
B	2	45	303	0.9941	0.0951	0.1078	-0.0127	-0.0091
C	3	90	305	1.0007	0.0886	0.1035	-0.0150	-0.0210
D	4	135	320	1.0499	0.0394	0.0146	0.0247	0.0296
E	5	180	363	1.1909	-0.1017	-0.1069	0.0052	0.0044
F	6	225	397	1.3025	-0.2133	-0.1901	-0.0232	-0.0270
G	7	270	388	1.2730	-0.1837	-0.1863	0.0025	0.0112
H	8	315	360	1.1811	-0.0919	-0.0977	0.0058	0.0006

Centre Elevation = *332* 1.0892

Optimized Fit: y=a+b*cos(cx+d)

Standard Error: *0.0184*
Correlation Coeff: *0.9920*

a = -4.12E-02
b = 1.59E-01
c = 7.85E-01
d = -1.93E+00

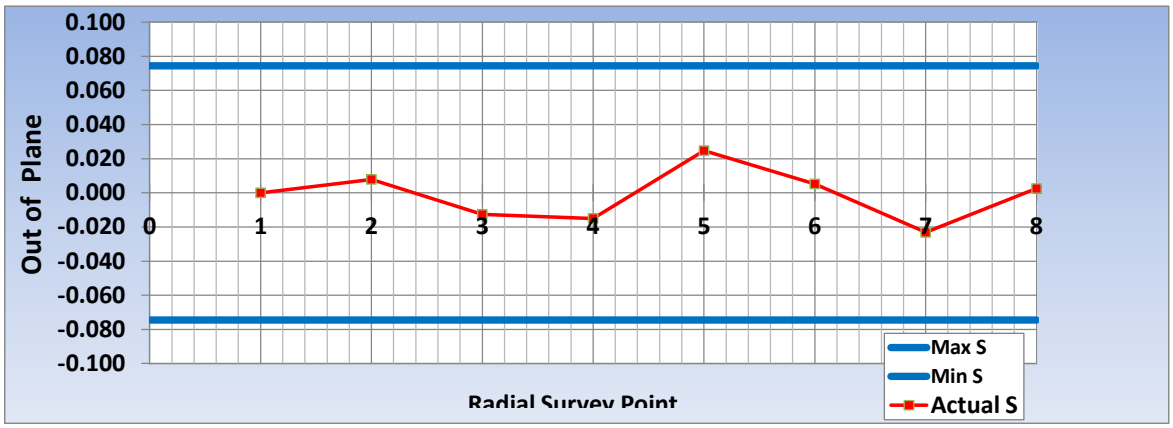


Permissible out of plane settlement = Smax,ft = (L^2 * Y * 11) / 2*(E*H) = 0.0744

Max out of Plane Settlement = 0.0247

L = arc length = 17.67
Y = yield strength = 37700
E = Young's Modulus = 29,000,000
H = Tank Height = 30

Permissible out of plane settlement = Smax,ft = (L^2 * Y * 11) / 2*(E*H) = 0.0744
Max out of Plane Settlement = **0.0247**



Diameter of Tank	45 ft
Radius of Tank	22.5 ft
Circumference of Tank	141.4 ft
Number of Points / Arcs	8
Arc Length	**17.67**

	Max S	Min S	Ui
0	0.0744	-0.074427	0.0000
1	0.0744	-0.074427	0.0079
2	0.0744	-0.074427	-0.0127
3	0.0744	-0.074427	-0.0150
4	0.0744	-0.074427	0.0247
5	0.0744	-0.074427	0.0052
6	0.0744	-0.074427	-0.0232
7	0.0744	-0.074427	0.0025
8	0.0744	-0.074427	0.0058

Sinusoidal Fit: y=a+b*cos(cx+d)
Coefficient Data:

a =	-4.12E-02
b =	1.59E-01
c =	7.85E-01
d =	-1.93E+00

Geocon Atlantic

Client: Inukshuk Construction
Location: Coral Harbour, Nunavut
Asset Description: Tank 3

INSPECTION DATA / NOTES

EDGE SETTLEMENT

Recorded Elevation

Line	0'	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	20'	CENTRE
A	322	313	305	300	300	305	305	308	306	304	302	310	
B	303	280	268	272	275	292	302	310	315	306	296	318	
C	305	272	244	234	232	245	265	283	296	305	312	302	
D	320	302	284	268	262	270	285	300	312	320	325	338	332
E	363	338	322	306	302	295	294	293	296	302	307	319	
F	397	388	385	381	365	346	326	299	279	274	284	329	
G	388	308	274	266	266	278	280	283	291	299	306	328	
H	360	340	326	322	327	333	332	329	330	322	313	330	

Tank BTM Sump Lip (no sump)	
Center Elevation	332
Minimum Edge Elevation	303

Elevation above edge (mm)

Line	0'	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	20'	CENTRE
A	0	9	17	22	22	17	17	14	16	18	20	12	-10
B	0	23	35	31	28	11	1	-7	-12	-3	7	-15	-29
C	0	33	61	71	73	60	40	22	9	0	-7	3	-27
D	0	18	36	52	58	50	35	20	8	0	-5	-18	-12
E	0	25	41	57	61	68	69	70	67	61	56	44	31
F	0	9	12	16	32	51	71	98	118	123	113	68	65
G	0	80	114	122	122	110	108	105	97	89	82	60	56
H	0	20	34	38	33	27	28	31	30	38	47	30	28

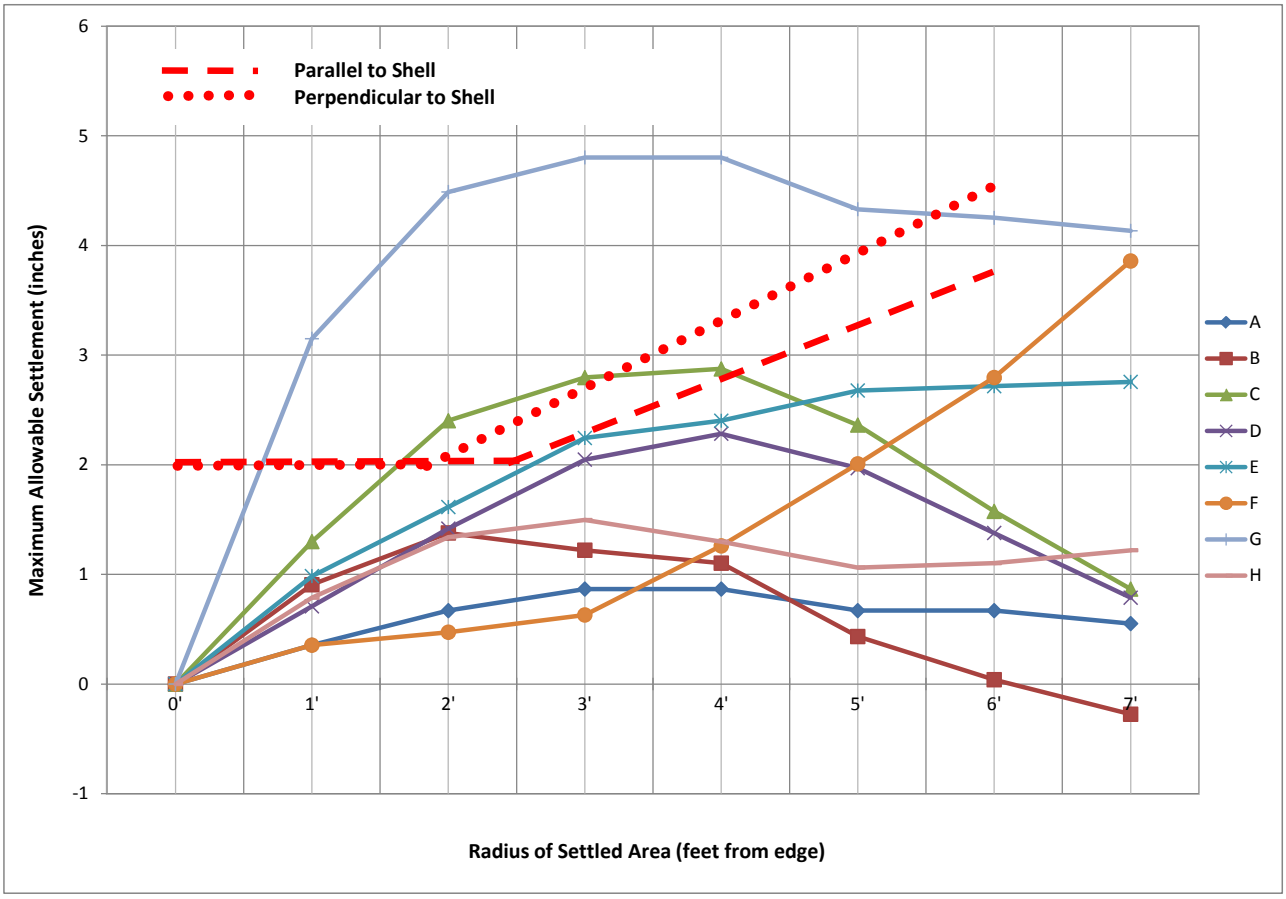
	13070.83
	11929.1

Elevation Above Edge (inches)

Line	0'	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	20'	Centre
A	0	0.35433	0.66929	0.86614	0.86614	0.66929	0.66929	0.55118	0.62992	0.70866	0.7874	0.47244	-0.3937
B	0	0.90551	1.37795	1.22047	1.10236	0.43307	0.03937	-0.2756	-0.4724	-0.1181	0.27559	-0.5906	-1.14173
C	0	1.29921	2.40157	2.79528	2.87402	2.3622	1.5748	0.86614	0.35433	0	-0.2756	0.11811	-1.06299
D	0	0.70866	1.41732	2.04724	2.28346	1.9685	1.37795	0.7874	0.31496	0	-0.1969	-0.7087	-0.47244
E	0	0.98425	1.61417	2.24409	2.40157	2.67717	2.71654	2.75591	2.6378	2.40157	2.20472	1.73228	1.22047
F	0	0.35433	0.47244	0.62992	1.25984	2.00787	2.79528	3.85827	4.64567	4.84252	4.44882	2.67717	2.55906
G	0	3.14961	4.48819	4.80315	4.80315	4.33071	4.25197	4.13386	3.8189	3.50394	3.22835	2.3622	2.20472
H	0	0.7874	1.33858	1.49606	1.29921	1.06299	1.10236	1.22047	1.1811	1.49606	1.85039	1.1811	1.10236

INSPECTION DATA / NOTES

Maximum Allowable Edge Settlement



SHELL UT - Up Stairway

Elevation (ft)	Course 1	Course 2	Course 3	Course 4	Course 5
6'	192	196	189	192	188
5'	193	195	192	195	195
4'	197	196	193	196	197
3'	198	196	192	196	196
2'	197	196	192	195	196
1'	196	195	191	191	195
0'	186	193	188	191	190

Note:
Readings in thousandths of an inch
All plates 3/16" nominal thickness

Roof UT

Plate	A	B
1	197	197
2	199	197
3	197	199
4	194	196
5	198	198
6	246	248
7	194	196
8	197	197
9	196	197
10	197	198
11	197	197
12	252	256
13	248	252
14	195	195

Minimum Reading:	194

Note:
Readings in thousandths of an inch
Roof plates nominal 3/16" and 1/4" mixed

Nozzles

Location	Nominal Diameter	UT Thickness Reading (inches)				
Per Draw	Clockwise	0°	90°	180°	270°	Pitting/Notes:
N1	Manway 1 24 "	383	383	375	375	0.020 int., repad 249; cover 394; flg. 387
N2	Coupling 1"					Too short - UT not possible.
N3	Coupling 1"					Too short - UT not possible.
N4	Fill 4" Neck	335	342	350	342	Repad 320
N5	Manway 2 24"	245	245	246	248	0.026 int.; repad 244; cover 420; flg 420
N6	Drain 2"	326		330	335	0.020 int.

Comments:

Readings in thousandths of an inch (0.XXX")

Manways differ in thicknesses, same diameter

Shell Course - UT

Shell Course 1 - Bottom

Line	V1-V2	V2-V3	V3-V4	V4-V5	V5-V1
6'	192	189	191	196	193
3'	195	194	193	197	195
1'	191	191	191	193	192
6"	189	187	186	192	187
0"	182	187	186	185	185

Shell Course 2

Line	V1-V2	V2-V3	V3-V4	V4-V5	V5-V1
6"	193	193	194	193	194
0	188	189	190	191	192

Shell Course 5 - Top

Line	V1-V2	V2-V3	V3-V4	V4-V5	V5-V1
6'	192	194	195	192	193

Note: Readings in thousandths of an inch (0.XXX")

Minimum Reading:	182

UT THICKNESS OF BOTTOM PLATE (FLOOR)

Plate	NE		NW		C		SE		SW		Notes
1	269	NTS	259	NTS	279		263	NTS	267	NTS	pits .030- .050 (all top side)
2	245		231	NTS	245		244		245	NTS	pits .020
3	239	NTS	238		242		234	NTS	234		pits .040
4	243	NTS	242		243		238	NTS	243		pits .040- .054
5	243		233	NTS	246		242		240	NTS	pits .020
6	184		184	NTS	188		185		184	NTS	pits .050
7	229	NTS	242		244		237	NTS	236		pits .035- .066
8	239	NTS	236		243		241	NTS	238		pits .035- .056
9	244		244	NTS	236		238		246	NTS	pits .030
10	238		243	NTS	242		240		246	NTS	pits .065
11	230	NTS	238		242		233	NTS	230		pits .020
12	236	NTS	242		243		234	NTS	246		pits .020
13	244		244	NTS	242		246		244	NTS	pits .020
14	240	NTS	276	NTS	260	NTS	256		268	NTS	pits .020

Note:

Readings in thousandths of an inch (0.XXX")

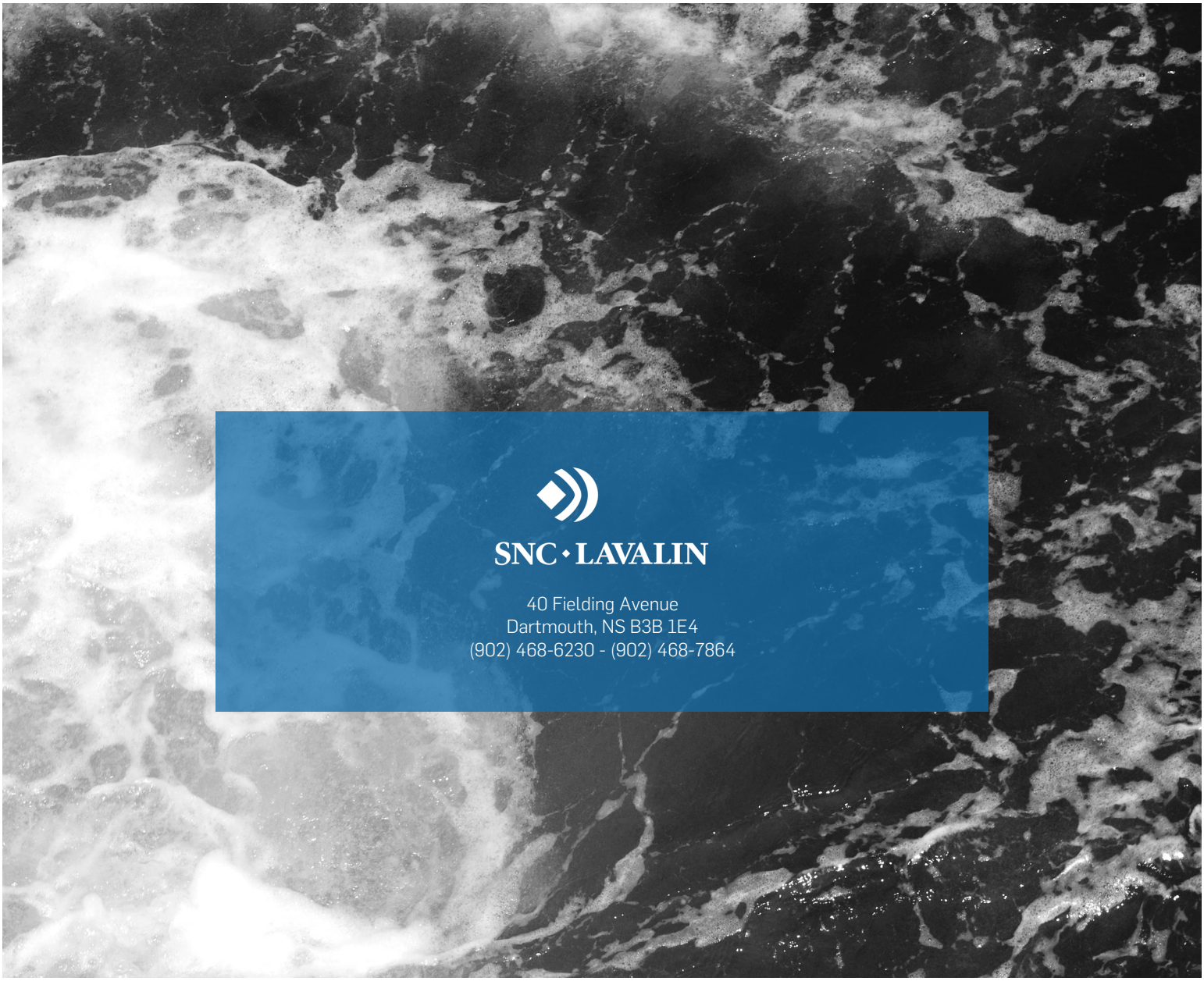
Plate 6 only 3/16" nominal thickness

All top side pits deeper than approximately 0.030" were repaired at time of inspection

NTS = next to shell in critical zone

Column Thickness					
Column	**Height**	**0°**	**90°**	**180°**	**270°**
C1	5'	333	325	318	328
	6"	334	325	318	324

Note: Readings in thousandths of an inch (0.xxx")



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