

**Canadian Natural Resources Limited
GENERAL PRESSURE VESSEL INFORMATION**

Job # 105.00774 / 10.110433

District: Ft St John B.C.	Skid No.
Facility: Halfway Battery	Location (LSD): 05-12-87-25-W6M
Vessel Name & Equipment Number: Group Separator	
Orientation: Horizontal	
Status: In service	Regulatory Inspection

PRESSURE VESSEL NAMEPLATE DATA

Registration Number A0439359		CRN Number L 2812. 213	
Vessel serial number: 012941-1		Size: 46 in x 175 in	
Shell thickness: 50.8 mm		Shell material: SA 516 70 N	
Head thickness: 50.4 mm		Head material: SA 516 70 N	
Tube wall thickness:		Tube material:	
Tube diameter:		Tube length:	
Channel thickness:		Channel material:	
Design pressure	Shell: 1345 PSI	Operating pressure	Shell:
	Tubes:		Tubes:
Design Temp.	Shell: 200 deg. F	Operating temperature	Shell:
	Tubes:		Tubes:
X-ray: RT-1		Heat treatment: Yes	
Code parameters: ASME VIII Div. 1		Coated: No	
Manufacturer: Opsco		Year built: 1998	
Corrosion allowance: 3.2 mm		Manway: Yes	

PRESSURE SAFETY VALVE NAMEPLATE DATA

PSV Tag #	Manufacture	Model #	Serial #	Set Pressure	Capacity (scfm)	Set Date
8242F	Farris	27FA45-M20/S7	CE-403771-3-KE	1345 PSI	8410	06/2008
CRN #	Service By	Block Valve	Location	Size	Code Stamp	
0G0386.9C	UFL	NO	TOP SHELL	1.5" X 2"	UV	

SERVICE CONDITIONS-INDICATE ALL THAT APPLY

Sweet	Sour X	Oil X	Gas X	Water X
Amine	LPG	Condensate X	Air	Glycol
Other (Describe):				

Inspection Interval _____ **PSV Service Interval** _____

(Determined by MIC in conjunction with Chief Inspector following guidelines of CNRL's Owner-User Inspection Program)

Reports reviewed and accepted by:

Mechanical Integrity Coordinator _____ **Date** _____

Fill out all forms as completely as possible. **All information** is important! Use back of sheets to record additional information or sketch if required. Copy of report to be filed by MIC at site, and copy sent to Chief Inspector

External Inspection Items	G	F	P	N/A	Comments
Insulation Verify sealed around manways, nozzles, no damage present, and there is no egress of moisture.				X	Vessel is not insulated.
External Condition Assess paint condition, areas peeling, record any corrosion, damage, etc (record location, size and depth of corrosion or damage)		X			Paint is in fair overall condition; Exposed metal with volcanic corrosion is present to approx 30% of the shell, as best effort pitting was noted to approx 0.020" deep.
Leakage Record any leakage at flanges, threaded joints, weep holes on repads, etc.	X				No leaks observed.
Saddle: Assess condition of paint, fire protection, concrete. Look for corrosion, buckling, dents, etc. Look at vessel surface area near supports. Verify no signs of leakage at attachment to vessel and attachment welds are acceptable. Ground wire attached?	X				Saddle: This vessel Saddle is in good condition, no signs of damage or leakage to attachment welds. Ground firmly secured to skid unit.
Anchor Bolts Hammer tap to ensure secure. Look for cracking in treads or signs of deformation.	X				Firmly bolted to the skid floor. No signs of deformation.
Concrete foundation Check for cracks, spalling, etc.				X	None.
Ladder / Platform Describe general condition, ensure support is secure to vessel, describe any hazards.				X	None.
Nozzle Assess paint, look for leakage, and ensure stud threads are fully engaged. Record any damage, deflection, etc. Are nozzles gusseted?	X				Stud threads are fully engaged to nuts. No damage or deflections observed – no leaks. Paint in good condition. Nozzles are not gusseted.
Gauges Ensure gauges are visible, working, no leakage, and suitable for range of MAWP/Temp.	X				Gauges visible, appears to be functional, no leaks and suitable for range of MAWP/Temp. Pressure gauge: 0-1500 PSI / 100 PSI @ gauge. Temperature gauge: 0-250 deg F / 50 deg F @ gauge.
External Piping Ensure pipe is well supported. All clamps, supports, shoes, etc. in place. Look for evidence of structural overload, deflection, etc. Paint condition, external corrosion?		X			Piping is well supported; all clamps, supports, and shoes are in place. No structural overloads or deflections noted. Exposed metal with volcanic corrosion is present to approx 30% of all piping, as best effort pitting was noted to approx 0.020" deep.
Valving Ensure no leaks are visible. Valves are properly supported and chained if necessary.	X				Valves are properly supported. No leaks are visible.
PSV Ensure PSV is set at pressure at or below that of vessel.	X				Located on the Upper Shell - set at the MAWP. Discharge piping is larger than the inlet to PSV. No block valve present. Seal is intact. PSV vents to flare.

<p>NDE methods Was UT/ MPI done on vessel (MI coordinator to review results)</p>	X			<p>Ultrasonic thickness survey carried out – pipe metal thickness detected below nominal minus corrosion allowance. Thickness calculations carried out – 2 inch 90 degree elbow - nominal thickness is 5.5 mm, min thickness is 3.6 mm, T min thickness is 2.6 mm.</p> <p>The float column has some internal corrosion as well – determined to be 8 inches diameter and 8.2 mm thick – At current MAWP, this column does not have sufficient metal for safe operation – Nominal thickness is 8.2 mm, min thickness is 6.6 mm, T min thickness is 6.4 mm.</p> <p>Note: There appears to be a general corrosion problem with the drain and dump piping – however not much change from the 2008 corrosion survey.</p>
<p>Recommendations or corrective actions : Vessel is Fit for Service or describe corrective actions required) (MIC to review corrective actions with Operations, discuss with Chief Inspector where necessary, and get remedial action implemented)</p> <p>Recommendations: 1. Grit blast and repaint this vessel & all corroded piping. 2. Reduce the moisture content inside this building. 3. Plan for corrosion monitoring on the dump and drain piping every 1 to 2 years. 4. Replace 8 inch float column – corrosion throughout.</p> <p>Summary: This vessel is in good over all condition, visual external and ultrasonic thickness survey carried out - pipe metal thickness detected below nominal minus corrosion allowance. Thickness calculations carried out to ensure sufficient metal exists for safe operation.</p> <p>Vessel is fit for continued service.</p>				

Inspected By: Joseph Holdstock

Date: Aug 09, 2010.

Internal Inspection Items	G	F	P	N/A	Comments
<p>Coating Assess coating. Describe area coated, general condition of coating.</p>				X	Vessel is not coated
<p>Anodes. How many, type, condition. % consumed. Are they being replaced?</p>				X	No anodes.
<p>Internal Piping</p>				X	None
<p>Trays How many? Type of material. Are valves in place. Check for erosion/ corrosion; wear on tray valve legs. Cleanliness?</p>				X	No trays.
<p>Baffles, deflector plates, etc. If present, describe condition. Look closely at welds attached to vessel wall.</p>				X	Inlet deflector, baffle plate and weir plate - All in good condition - intact and in place. Minor surface corrosion.
<p>North Head (Manway) Note all corrosion, erosion or mechanical damage. (If vessel is horizontal identify direction of this head)</p>	X				General corrosion to 5:00 to 7:00 position to 0.070 inch. No mechanical damage.
<p>South Head Note all corrosion, erosion or mechanical damage. (If vessel is horizontal identify direction of this head)</p>	X				Good condition. No corrosion. No pitting
<p>Shell Sections Record number of shell sections. Record location, size and depth of all erosion, corrosion or mechanical damage. Describe General condition.</p>		X			2 shell sections. Water side of vessel has corrosion at the 5:00 to 7:00 position to 0.150 inch mainly in two localized areas: 1. 10" x 10" area 27 inches from north head to shell weld. 2. 16" x 18" area located at the mid shell drain nozzles. Calculations carried out: Nominal thickness 50.8 mm. Min thickness is 46.8 mm. T _{min} =42.9 mm
<p>Demister pad Is it in place? Is it clean? If any corrosion is apparent in vessel, lift pad and check top head for corrosion.</p>		X			The demister pad is compacted and out of place. Operations notified.

Welds Inspect all welds, including attachment welds. Record all service-related damages and if there is any discuss with Chief Inspector before closing.	X			All welds on the water side at 5:00 to 7:00 position are corroded 0.030 – 0.050 inch South head – welds in good condition, no measureable corrosion.
Repairs Required. If yes, ensure procedure and copy of AB 40 is on file, and one sent to local ABSA, and Chief Inspector	X			None at this time.
Other			X	
NDE Inspections	X			No internal NDE at this time.
Recommendations or corrective actions (indicate if fit for service)				
Recommendations: 1. Grit blast and coat the lower half of vessel with epoxy. 2. Repair compressed demister pad.				
Summary: This vessel is in good overall condition, visual external, internal and ultrasonic thickness survey carried out. Vessel is fit for service.				

Inspected By: Chris Maxsom

Date: June 20, 2011



LSD Location



Site overview



Data plate



Vessel overview



External corrosion to 30% of shell



External corrosion to 30% of the piping surfaces



Pressure gauge



Temperature gauge



PSV service tag



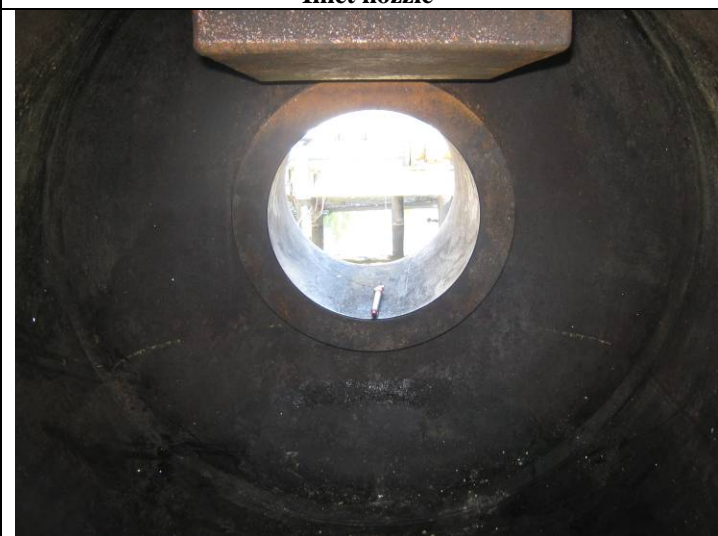
PSV service tag



Inlet nozzle



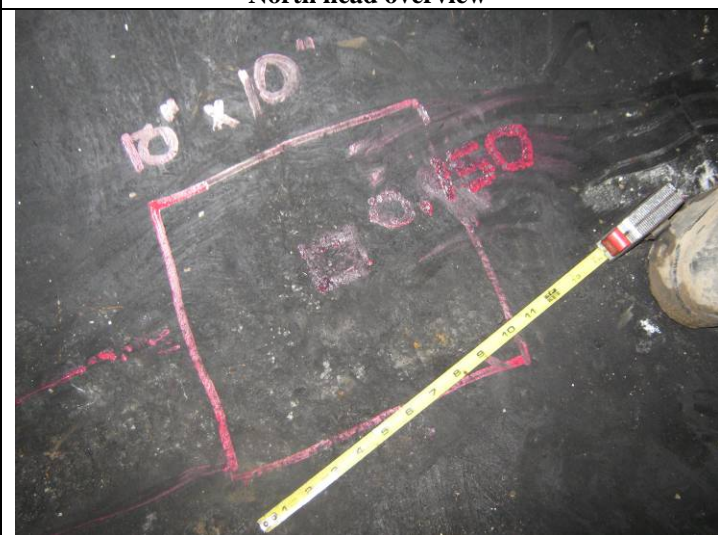
Inlet baffle plate



North head overview



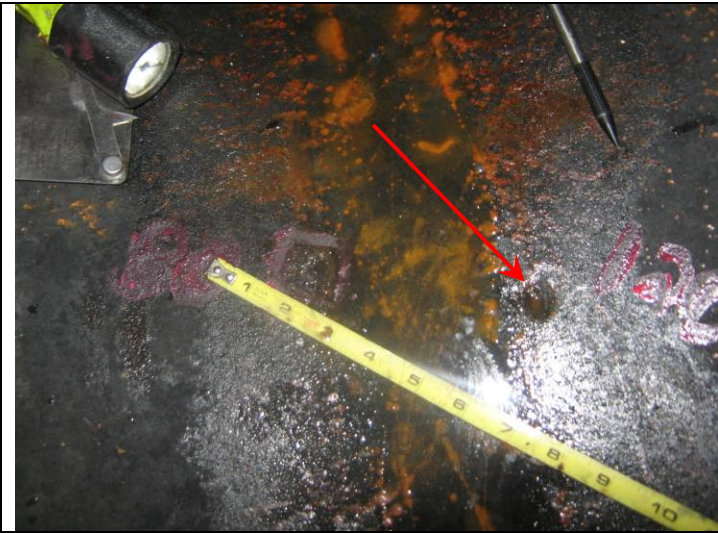
Corrosion at north head to shell weld



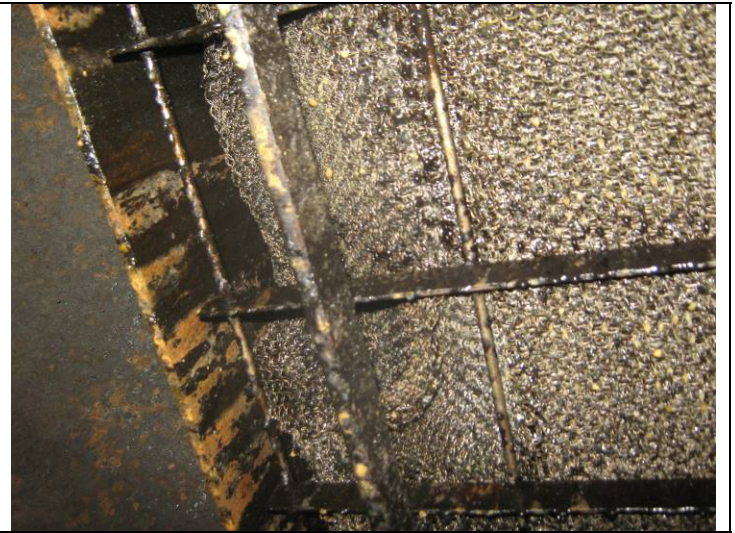
Water side corrosion to max depth of 0.150 inch



Water side corrosion at weir plate to max depth of 0.150 inch



Oil side isolated pitting to 0.120 inch



Demister pad partially compressed



South head overview



South head weld – minimal corrosion



Upper shell overview



Lower half of vessel internally coated