

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

Job # 10.112250

District: GP South	Equipment number:
Facility: Firebird Battery	Location (LSD): 08-11-98-08 W6M
Vessel Name Equipment Number: Oil Treater	
Orientation: Horizontal	
Status: In service	Regulatory Inspection

PRESSURE VESSEL NAMEPLATE DATA

"A" or "G" or "S" (Sask.) or BC Registration Number. A0191862		CRN Number: E 1466.2	
Vessel serial number: 81-7900-A		Size: 12 ft x 40 ft	
Shell thickness: 12.7 mm		Shell material: SA 516 70 N	
Head thickness: Back end: 15.87 mm // Fire tube end: 28.57mm		Head material: SA 516 70 N	
Tube wall thickness:		Tube material:	
Tube diameter:		Tube length:	
Channel thickness:		Channel material:	
Design pressure	Shell: 75 PSI	Operating pressure	Shell:
	Tubes:		Tubes:
Design Temp.	Shell: 200 ° F	Operating temperature	Shell:
	Tubes:		Tubes:
X-ray: Full Part		Heat treatment: Nil	
Code parameters: ASME VIII Div 1		Coated: Yes	
Manufacturer: Maloney Steel Ltd.		Year built: 1981	
Corrosion allowance: 3.18 mm		Manway: Yes	

PRESSURE SAFETY VALVE NAMEPLATE DATA

PSV Tag #	Manufacture	Model #	Serial #	Set Pressure	Capacity (scfm)	Service Date
No Access						
CRN #	Service By	Block Valve	Location	Size	Code Stamp	

SERVICE CONDITIONS-INDICATE ALL THAT APPLY

Sweet <input checked="" type="checkbox"/>	Sour	Oil <input checked="" type="checkbox"/>	Gas <input checked="" type="checkbox"/>	Water <input checked="" type="checkbox"/>
Amine	LPG	Condensate <input checked="" type="checkbox"/>	Air	Glycol

Other (Describe):

Inspection Interval _____ **PSV Service Interval** _____

(Determined by MIC in conjunction with Chief Inspector following guidelines of Enerplus Resources 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				Insulation Present to 70% of shell surface. No damage to cladding present.
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 good condition. No corrosion or damage present.
Leakage Record any leakage at flanges, threaded joints, weep holes on repads, etc.	X				No Leaks Present. Thread joints are not leaking
Saddle/Skirt 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 is welded to skid; paint is in good condition, no signs of corrosion, buckling or dents present. No leakage present at attachment welds to vessel. Attachment welds are acceptable. Skid is grounded.
Anchor Bolts Hammer tap to ensure secure. Look for cracking in treads or signs of deformation.	X				Saddle is welded to skid floor no anchor bolts present.
Concrete foundation Check for cracks, spalling, etc.				X	
Ladder / Platform Describe general condition, ensure support is secure to vessel, describe any hazards.				X	
Nozzle Assess paint, look for leakage, and ensure stud threads are fully engaged. Record any damage, deflection, etc. Are nozzles gusseted?	X				Nozzle paint is in good condition, no stud threads present, threaded fittings fully engaged,, no damage or deflection present. No gussets present.
Gauges Ensure gauges are visible, working, no leakage, and suitable for range of MAWP/ Temp.	X				Temperature Gauge 0 – 250 F. Suitable for Temp Range
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 and in place. No evidence of structural overload or deflection. Paint is in good condition. No signs of leaking.
Valving Ensure no leaks are visible. Valves are properly supported and chained if necessary.	X				Valves are properly supported, no leaks present.
PSV Ensure PSV is set at pressure at or below that of vessel. Discharge piping is same size as inlet to valve and is properly supported and routed. Ensure no block valves between PSV and vessel or if there are they are locked open.	X				PSV located on top off gas boot. No block valves present. Piping is properly routed and supported.

NDE methods Was UT/ MPI done on vessel (MI coordinator to review results)	X				Ultrasonic corrosion survey carried out – pipe metal thickness detected below nominal minus corrosion allowance. Thickness calculations carried out: 4” Elbow – nominal thickness is 6.0mm / min thickness is 5.4mm / T min thickness is 1.6mm.
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) Recommendations: None at this time. Summary: Vessel is in overall good condition, visual external inspection and ultrasonic corrosion survey performed - pipe metal thickness detected below nominal minus the corrosion allowance. Thickness calculations carried out to ensure sufficient metal exists for safe operation. Short term corrosion rate based on greatest thickness loss (shell) 0.250mm per year. Retirement Date to “T”min is year 2026. Vessel is fit for service.					

Inspected By: Mike Dutcher

Date: September 28, 2012

Internal Inspection Items	G	F	P	N/A	Comments
Coating Assess coating. Describe area coated, general condition of coating.		X			Coating failures noted on floor around the 6 o'clock position. Corrosion present.
Anodes. How many, type, condition. % consumed. Are they being replaced?			X		2 anodes in the front end and 2 in the back end. The two front end anodes are completely consumed. The 2 back end anodes are 30% consumed.
Internal Piping Is there any? If so, carbon or stainless steel. Describe condition, dents, corrosion, erosion, etc. Ensure supports are secure and any bolts are suitable for future use.	X				No signs of deflection. Coating is intact.
Trays How many? Type of material. Are valves in place. Check for erosion/ corrosion; wear on tray valve legs. Cleanliness?	X				There is a single strainer tray section in the back end but all other trays and grid sections have been removed in the past. There are 2 sparging chutes in the back end – these are in place, well supported, and coated with epoxy.
Baffles, deflector plates, etc. If present, describe condition. Look closely at welds attached to vessel wall.	X				Inlet diffuser / chute and weir are intact and in place – coated with epoxy – no failed areas. Both are bent and distorted from upset process conditions – the sparging chutes are bent and distorted as well. The vortex breaker in the front end has a calcium buildup and is almost blocked off.
Control valves / floats etc... : Ensure all control floats move freely and the nozzle is free of obstructions.	X				Both water and oil level control floats are intact.
Back end / Stagnant Head Note all corrosion, erosion or mechanical damage. (If vessel is horizontal identify direction of this head)		X			Coating failures at lower shell 6 o'clock position. No signs of mechanical damage or distortion
Front end / Fire tube Head Note all corrosion, erosion or mechanical damage. (If vessel is horizontal identify direction of this head)	X				Limited access with fire tubes installed. No signs of damage or distortion.
Shell Sections Record number of shell sections. Record location, size and depth of all erosion, corrosion or mechanical damage. Describe general condition. If any corrosion greater than corrosion allowance is observed in either shell or head, discuss with Chief Inspector before closing vessel.		X			4 Shell sections. Internal is 100% coated with. Coating failures noted at lower shell around 6 o'clock. Man way access in good condition – no chipped coating.
Nozzles: Any obstructions? Coated? Corrosion?		X			Limited access to nozzles. Coated with epoxy – no failures noted.

					Oil drain has calcium buildup restricting flow. Sample points have buildup of asphaltenes.
Demister pad Is it in place? Is it clean? If any corrosion is apparent in vessel, lift pad and check top head for corrosion.				X	No access to vapour boot.
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 are coated, no corrosion staining or peeling at welds.
Fire Tubes: Pitting? General corrosion – spot check with ultrasonic thickness to ensure sufficient metal exists for operation.	X				Fire tubes were installed for this internal inspection resulting in a limited access. No signs of damage or distortion. No corrosion or pitting observed.
Repairs Required. If yes, ensure procedure and copy of AB 40 is on file, and one sent to local ABSA, and Chief Inspector	X				1. Coating repair patches required. 2. Clean out all nozzles of obstructions. 3. Replace anodes.
NDE Was any NDE done. (coordinator to review results)				X	None at this time.
<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) Recommendations: See repairs required.</p> <p>Summary: Vessel in fair overall condition, visual internal and external inspections carried out – coating failures noted at lower shell locations with signs of corrosion. There has been some deformation of the internal chutes and weir as noted in previous T/A 2010 inspection.</p> <p>Vessel is fit for service.</p>					

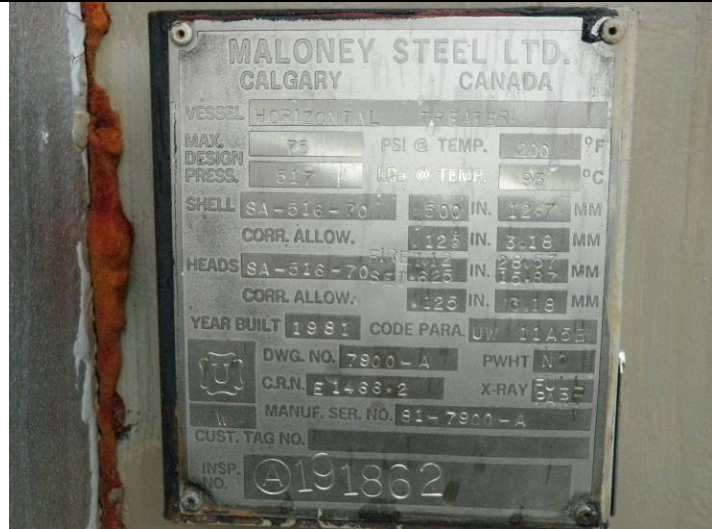
Inspected By: Mike Dutcher

Date: September 28, 2012



LSD

Overview



Data Plate

Skid & pilings



Manway access

Vapour boot & PSV



Overview



Overview



Saddle



Saddle



Manway nozzle



Anode - 100% loss (looking towards Fire Tube end)



Coating failures



Corrosion present



Top shell & fire tubes



Lower shell and fire tubes



Fire tube mounting



Fire tube mounting



Anode – 100% loss



Oil drain/vortex – calcium buildup – flow restricted



Fire tube support & rollers



Fire tube support & rollers



Oil level float and weir



Internal weir manway



Manway nozzle at rear head



Lower shell



Overview of rear shell, piping and weir



Lower head



Anodes - 30% loss - coating failures



Behind weir



Float level (behind weir)