

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

Job #10.110763

District: Grande Prairie AB	Skid No.
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Facility: Chinchaga Gas Plant	Location (LSD): 01-24-96-05 W6M
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Vessel Name Equipment Number: **Line Heater (Braescan)**

Orientation: **Horizontal**

Status: In Service	Regulatory Inspection
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PRESSURE VESSEL NAMEPLATE DATA

“A” or “G” or “S” (Sask.) or BC Registration Number. A0170474	CRN Number: D 8639.2
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Vessel serial number: B1140	Size: 96 in. X 29 ft.
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Shell thickness:	Shell material: A 36
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Head thickness:	Head material: A 36
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Tube wall thickness:	Tube material: SA 106-B
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Tube diameter:	Tube length:
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Channel thickness:	Channel material:
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Design pressure	Shell:	Operating pressure	Shell:
	Tubes: 3300 PSI		Tubes:

Design Temp.	Shell:	Operating temperature	Shell: 0 – 250 Deg F.
	Tubes: 200 Deg F.		Tubes:

X-ray: RT 1	Heat treatment: HT
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Code parameters: ASME VIII, Div 1	Coated: No
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Manufacturer: Presson	Year built: 1981
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Corrosion allowance: 1.6 mm	Manway: No
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PRESSURE SAFETY VALVE DATA

PSV Tag Shell	Manufacture // Model // Serial	Set Pressure (PSI / kPa)	Capacity (scfm / usgpm)	Block Valve	Size	Location	Service by / Date

PSV Tag Tube	Manufacture // Model // Serial	Set Pressure (PSI / kPa)	Capacity (scfm / usgpm)	Block Valve	Size	Location	Service by / Date

SERVICE CONDITIONS-INDICATE ALL THAT APPLY

Sweet X	Sour	Oil	Gas X	Water X
Amine	LPG	Condensate X	Air	Glycol X

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				No torn or open sections. All straps in place and secure. Sealed around nozzles and man way.
External Condition Assess paint condition, areas peeling, record any corrosion, damage, etc (record location, size and depth of corrosion or damage)	X				Paint in good condition – no exposed metal.
Leakage Record any leakage at flanges, threaded joints, weep holes on repads, etc.	X				No leaks observed.
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: bolted directly to skid frame. No buckling or dents. No corrosion at attachment welds to vessel Ground wire attached to skid.
Anchor Bolts Hammer tap to ensure secure. Look for cracking in treads or signs of deformation.	X				Securely fastened – no deformation.
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				Stud threads are fully engaged to nuts. No leaks, no damage or deflection. No short bolting. Nozzles are not gusseted.
Gauges Ensure gauges are visible, working, no leakage, and suitable for range of MAWP/ Temp.	X				Clear and clean, no leakage. Suitable for operational range of vessel. Temperature gauge 0 – 250 Deg F.
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				Well supported – all clamps and supports are in place. No structural overloads or deflection. Paint in good condition – no exposed metal.
Valving Ensure no leaks are visible. Valves are properly supported and chained if necessary.	X				No leaks are visible- valves are supported properly.
PSV Ensure PSV is set at pressure at or below that of vessel. Seal intact? Location? Discharge to safe location?,				X	No PSV on system.
NDE methods Was UT/ MPI / PT completed on vessel? (MI coordinator to review results)		X			Ultrasonic thickness inspection carried out on inlet and outlet piping – general corrosion on external surface – 6 inch nominal thickness is 11.0 mm / min thickness is 8.7 mm / T min thickness is 5.1 mm – Calculations carried out using Separator MAWP – 1150 PSI.
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)					
See internal inspection for recommendations and summary					

Inspected By: Gerry Avery

Date: September 22, 2011

Internal Inspection Items	G	F	P	N/A	Comments
Coating Assess coating. Describe area coated, general condition of coating.				X	Vessel not coated.
Anodes. How many, type, condition. % consumed. Are they being replaced?				X	None.
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				Gas Coil: The tubes have been subject to microbe attack. There is minor pitting throughout with deep pits at the baffle plates. Several locations were scraped and the largest pit was approximately 0.100" deep and 0.25" diameter. It was not possible to visually examine the areas directly under the baffle plates.
Trays How many? Type of material. Are valves in place. Check for erosion/ corrosion; wear on tray valve legs. Cleanliness?				X	No trays.
Baffles, deflector plates, etc. If present, describe condition. Look closely at welds attached to vessel wall.	X				Baffle plates are straight. They are subject to microbe attack especially in the areas next to the tubes. Metal loss at this time is not critical.
East Head Note all corrosion, erosion or mechanical damage. (If vessel is horizontal identify direction of this head)	X				Minor microbe damage.
West Head Note all corrosion, erosion or mechanical damage. (If vessel is horizontal identify direction of this head)	X				Minor microbe damage.
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				The shell had general pitting corrosion in the 4 to 8 o'clock positions for the full length. Pit depth is estimated at an average of 0.030" with one 1" diameter isolated pit measured at 0.100". Shell nominal is 0.25". The shell is in non-pressure service. There is also extensive microbe attack along the top of the shell.
Fire tube: Pitting / corrosion?		X			The fire tube is in generally good condition although there are some areas of pitting near the return bend in the tube, welds and HAZ. The deepest were measured at 0.025" deep. The fire tube does not have any flat spots indicative of overheating. The stack end of the tube has general corrosion on the inside extending about 3' along the tube.
Welds Inspect all welds, including attachment welds. Record all service-related damages and if there is any discuss with Chief Inspector before closing.	X				Welds are in good condition – no evidence of corrosion or erosion.
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. Weld pitting on gas coil.
NDE Was any NDE done. (MI coordinator to review results)	X				Magnetic particle inspection carried out on fire tube welds – no cracking detected.
<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. Conduct a full assessment of the amount of damage to the gas tube OD at the baffles by removing the gas coil, shifting the support plates approximately 2 inches, cleaning the tube areas under the plates and mapping all pitting. Then conduct a fitness for service evaluation. 2. Use biocides to control the microbes</p> <p>Summary: This line heater is in fair condition, visual inspection carried out – corrosion detected on gas coil at baffle supports – weld repairs carried out and line heater was returned to service.</p> <p>Vessel is fit for service for one year. Conduct a full assessment of the condition of the gas coil before further service.</p>					

Inspected By: Len Semanuk

Date: September 23, 2011

Photo Table



Vessel data plate



Vessel head



Vessel fire tube bolting flange



Vessel temperature gauge



Vessel tube coil



Vessel overview



Firetube



Corrosion along top of firetube in tube, weld and HAZ.



Corrosion along top of firetube.



Corrosion along bottom ID of exhaust end of firetube.



Pitting along the bottom of the shell (glycol side.)



Same pitting with oblique lighting.



Pits at bottom of shell.

Pitting at bottom of shell.



“Carbuncles” (???) along top of shell.



Corrosion of the gas tube OD at the support plates.