

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

**Job 4021893**

District: <b>Grande Prairie, AB</b>	Skid No.
Facility: <b>South Wapiti Compressor Station</b>	Location (LSD): <b>10-01-68-09 W6M</b>
Vessel Name Equipment Number: <b>Inlet Separator</b>	
Orientation: <b>Horizontal</b>	
Status: <b>In Service</b>	<b>Regulatory Inspection</b>

**PRESSURE VESSEL NAMEPLATE DATA**

"A" or "G" or "S" (Sask.) or BC Registration Number. <b>A0554565</b>		CRN Number: T 3913.2	
Vessel serial number: 3783-1		Size: 48 in x 120 in	
Shell thickness: 57.2 mm		Shell material: SA 516 70N	
Head thickness: 54.6 mm		Head material: SA 516 70N	
Tube wall thickness:		Tube material:	
Tube diameter:		Tube length:	
Channel thickness:		Channel material:	
Design pressure	Shell: 9928 kPa	Operating pressure	Shell:
	Tubes:		Tubes:
Design Temp.	Shell: 54°C	Operating temperature	Shell:
	Tubes:		Tubes:
X-ray: RT-1		Heat treatment: HT	
Code parameters: ASME Section VIII Div 1		Coated: No	
Manufacturer: Moss Fabrication Ltd.		Year built: 2006	
Corrosion allowance: 1.6 mm		Manway: Yes	

**PRESSURE SAFETY VALVE NAMEPLATE DATA**

PSV Tag #	Manufacture / Model / Serial	Set Pressure (PSI / kPa)	Capacity (scfm)	Size	Block Valve	Location	Service by / Date
WAP 5015	Crosby / JOS-E-45-J /C05-34178	4516 kPa	4037 scfm	1.5 x 2	No	Outlet piping	Kings / 09/2014

**SERVICE CONDITIONS-INDICATE ALL THAT APPLY**

Sweet <input checked="" type="checkbox"/>	Sour	Oil	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 Canadian Natural Resources Limited'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

<b>External Inspection Items</b>	G	F	P	N/A	<b>Comments</b>
<b>Insulation</b> Verify sealed around manways, nozzles, no damage present, and there is no egress of moisture.	X				<b>Vessel is 10% insulated - no open or torn section – no exposed metal.</b> <b>No evidence of wet insulation – no stains on cladding.</b>
<b>External Condition</b> Assess paint condition, areas peeling, record any corrosion, damage, etc (record location, size and depth of corrosion or damage)	X				<b>Paint is in good overall condition – no exposed metal.</b>
<b>Leakage</b> Record any leakage at flanges, threaded joints, weep holes on repads, etc.	X				<b>No leaks observed.</b>
<b>Saddle/skirt</b> Assess condition of paint, fire protection, and 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				<b>Saddles: No distortion.</b> <b>No corrosion at saddle to shell area – no leaks.</b> <b>Skid Package is grounded.</b>
<b>Anchor Bolts</b> Hammer tap to ensure secure. Look for cracking in treads or signs of deformation.	X				<b>All bolts in place and secure.</b>
<b>Concrete foundation</b> Check for cracks, spalling, etc.				X	
<b>Ladder / Platform</b> Describe general condition, ensure support is secure to vessel, and describe any hazards.				X	<b>No ladder on this vessel</b>
<b>Nozzle</b> Assess paint, look for leakage, and ensure stud threads are fully engaged. Record any damage, deflection, etc. Are nozzles gusseted?	X				<b>Threaded and flanged connections fully engaged.</b> <b>No deflection – no leaks.</b> <b>No gussets.</b>
<b>Gauges</b> Ensure gauges are visible, working, no leakage, and suitable for range of MAWP/ Temp.	X				<b>Temperature gauge: -40 to 120°F</b> <b>Pressure gauge: 0 to 1500 PSI</b>
<b>External Piping</b> 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			<b>Piping is well supported; no deflection, all clamps and supports are in place.</b> <b>Paint is in fair condition – minor surface corrosion to outlet piping-no pitting.</b>
<b>Valving</b> Ensure no leaks are visible. Valves are properly supported and chained if necessary.	X				<b>Well supported – no leaks.</b>
<b>PSV</b> Ensure PSV is set at pressure at or below that of vessel.	X				<b>Located on outlet piping – set below MAWP of vessel.</b> <b>Discharge piping is same size as valve outlet.</b> <b>PSV seal in place.</b> <b>No block valve between vessel and PSV inlet.</b>

<b>NDE methods</b> Was UT/ MPI done on vessel (MI coordinator to review results)	X			<b>Ultrasonic corrosion survey carried out – pipe metal thickness detected below nominal minus corrosion allowance. Thickness calculations carried out:</b> <b>UT point 365 (2” elbow) – nominal thickness is 8.7mm / min thickness is 7.9mm / T min thickness is 2.5mm.</b> <b>2” nozzle – nominal thickness is 8.7mm / min thickness is 3.5mm / T min thickness is 2.5mm.</b> <b>3” nozzle – nominal thickness is 15.2mm / min thickness is 9.4mm / T min thickness is 3.1mm.</b>
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**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:** 1. Plan for nozzle replacements on this vessel in the future.

**Summary:** This vessel is in good condition, visual external and ultrasonic thickness inspection carried out –pipe metal thickness detected below nominal minus corrosion allowance. Thickness calculations carried out to ensure sufficient metal exists for safe operation.

**Corrosion rate based on greatest thickness loss (2 inch nozzle) 0.300mm per year. Retirement Date to “T”min is year 2023.**

**Vessel is Fit for Service**

**Inspected By:** Dellas Wiedman *D. Wiedman*

**Date:** July 16, 2020

API 20981 / IBPV 275

**Assistant:** Garrett Tatton

Internal Inspection Items	G	F	P	N/A	Comments
<b>Coating</b> Assess coating. Describe area coated, general condition of coating.				X	<b>No coating.</b>
<b>Anodes.</b> How many, type, condition. % consumed. Are they being replaced?				X	<b>No anodes in this vessel.</b>
<b>Internal Piping</b> 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				<b>No internal piping.</b>
<b>Trays</b> How many? Type of material. Are valves in place. Check for erosion/ corrosion; wear on tray valve legs. Cleanliness?				X	<b>No Trays.</b>
<b>Baffles, deflector plates, etc.</b> If present, describe condition. Look closely at welds attached to vessel wall.	X				<b>Inlet deflector firmly mounted to shell.</b>
<b>West Head</b> Note all corrosion, erosion or mechanical damage. (If vessel is horizontal identify direction of this head)	X				<b>Good condition – no scale, corrosion or pitting.</b>
<b>East Head</b> Note all corrosion, erosion or mechanical damage. (If vessel is horizontal identify direction of this head)	X				<b>Good condition – no scale, corrosion or pitting.</b>
<b>Shell Sections</b> 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				<b>2 shell sections – is in good condition – some thin, hard bonded scale along the 6:00 position but no corrosion or pitting.</b>

<b>Demister pad</b> Is it in place? Is it clean? If any corrosion is apparent in vessel, lift pad and check top head for corrosion.	X				<b>Demister pad removed from vessel and cleaned – is in as new condition and will be re installed.</b>
<b>Welds</b> Inspect all welds, including attachment welds. Record all service-related damages and if there is any discuss with Chief Inspector before closing.	X				<b>All welds are in good condition – no corrosion or pitting.</b>
<b>Repairs Required.</b> If yes, ensure procedure and copy of AB 40 is on file, and one sent to local ABSA, and Chief Inspector			X		<b>1. The 2 inch dead leg nozzle on the lower shell is scheduled for replacement during this outage.</b>
<b>NDE</b> Was any NDE done. ( MI coordinator to review results)			X		<b>No internal NDE.</b>
<b>Recommendations or corrective actions : (Vessel is Fit for Service or describe corrective actions required)</b> (MIC to review corrective actions with Operations, discuss with Chief Inspector where necessary, and get remedial action implemented) <b>Recommendations: 1. Follow repair plan provided for nozzle replacement.</b> <b>Summary:</b> Vessel is in good condition, visual internal inspection carried out – some thin scale on the bottom shell – no corrosion or pitting detected. <b>Vessel is fit for service</b>					

API 20981 / IBPV 275

Inspected By: Dellas Wiedman

*D. Wiedman*

Date: Sept 15, 2020



LSD



Data plate



Overview



Overview



**Wall to shell sealed**



**Wall to shell sealed**



**Saddle**



**Anchor bolts**



**South head**



**Bottom shell**



**Outlet piping – surface corrosion – no pitting**



**Ground cable attached**



**Liquid level**



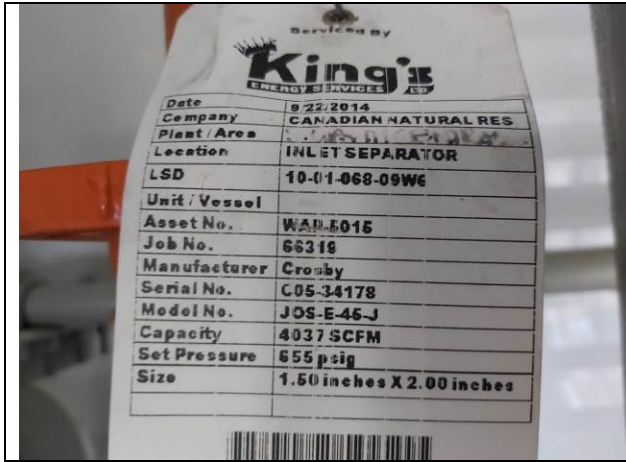
**Pressure gauge – 0-1500 PSI**



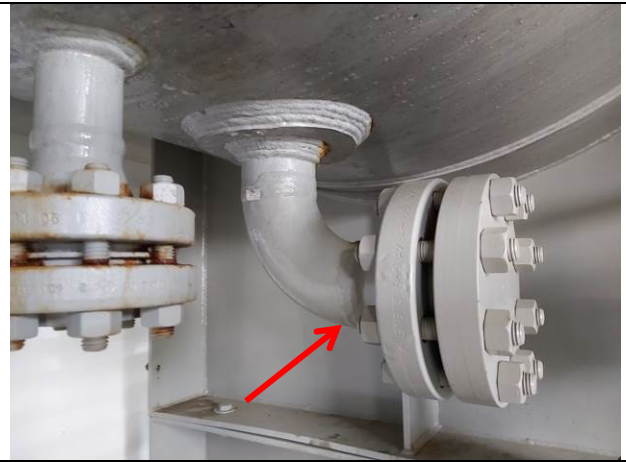
**Temperature gauge -40 to 120°F**



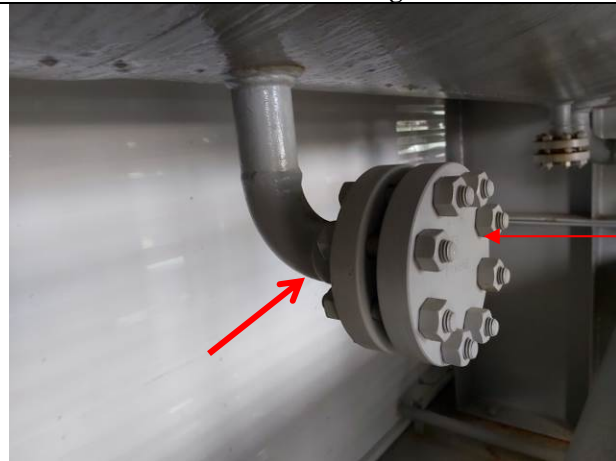
**PSV location**



PSV service tag



3 in xxs – 9.4/11.8mm isolated pit at DS weld



2 in 160 – 3.5/7.0mm isolated pit at DS weld

Elbow scheduled for replacement

Visual internal inspection Sept 15, 2020



Man way and davit arm



Man way gasket seating face



**Man way nozzle**



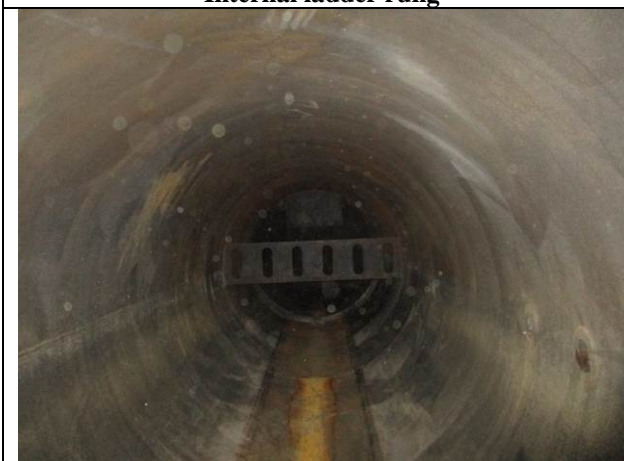
**Shell welds**



**Internal ladder rung**



**Inlet nozzle and deflector**



**Overview**



**Level column nozzles**

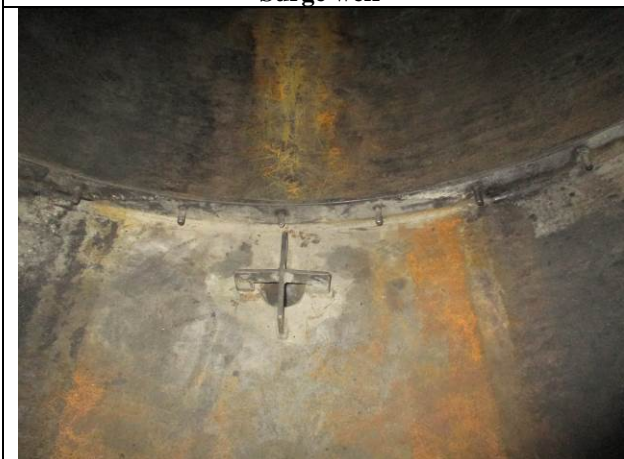




**Surge weir**



**2 inch nozzle scheduled for fitting replacement**



**Vortex breaker**



**Demister cage**



**Demister screen inside cage**



**Demister pad**



**Upper shell**



**Thin scale on bottom shell – no pitting**



**2 inch fitting cut from vessel – deep pitting detected on corrosion survey**



**2 inch fitting – deep pitting detected on corrosion survey**



**2 inch nozzle prepped for new fitting**



**New 2 inch fitting**



**New 2 inch flanged fitting**



**New 2 inch fitting tacked in place**



**New 2 inch fitting installed**



**Hydro test set up**



**Hydro test pressure 2160 PSI**

**Repair steps – 2 inch nozzle replacement**

<b>Steps</b>	<b>Comments</b>
<b>Cut off corroded nozzle</b>	<b>The corroded elbow was removed at the butt weld to nozzle</b>
<b>MTR reviewed</b>	<b>Reviewed and accepted</b>
<b>Prep weld areas</b>	<b>Existing nozzle prepped for new fitting</b>
<b>Fit up new fitting and tack in place</b>	<b>Fitting tack welded in place and checked for two hole and level</b>
<b>Install root of weld</b>	<b>Completed</b>
<b>Magnetic particle inspect root weld</b>	<b>Completed – Passed</b>
<b>Complete welding operation</b>	<b>Completed</b>

<b>Magnetic Particle inspected after weld completed</b>	<b>Completed – Passed</b>
<b>Radiographic inspection on completed weld</b>	<b>Completed – passed</b>
<b>Stress relieving operation</b>	<b>Stress relieving operation carried out at 1150 deg F</b>
<b>Magnetic particle inspection after 12 hour</b>	<b>Completed – no cracking detected</b>
<b>Hydro test</b>	<b>Hydro test pressure 2160 PSI – Held for 15 minutes - passed</b>