Canadian Natural

PRESSURE VESSEL VISUAL INSPECTION REPORT

Report #:	156732-MD-39
Inspect Date:	06/06/2012
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Insp. Co. Job #:	156732

Criticality Designation: Yellow

Insp. Comp:	Matrix_Inspection	District:	Grande Prairie - North	Field:	North Hamburg
Location:	11-27-097-09W6	Unit / Skid #:	16715	LSD:	11-27-097-09W6
Jurisdiction #:	A3004667	Equip Tag #:	N/A	Serial #:	1369 V202
CRN #:	M5051.2	Nat'l Bd #:	N/A	Year Built:	1994
Manufacturer:	Plains Oil Ltd	Equipment Description:	Other: Inlet Separator		
Status:	In Service -	Equip. Type:	Vessel: Separator	Service:	Sweet
MAWP Shell:	9300 kPa @ 93 °C	Volume:		Code Stamp:	☒ Y ☐ N
MAWP Tube:	@	Height/Length:	16 Ft.	Insulated:	☐ Y ☒ N
MDMT:	-28 °C RT: RT-1	Size/Diameter.:	60 in. O.D.	PWHT:	☒ Y ☐ N
Support	Saddle	Vessel on Original CNRL Inventory List:	☐ Y ☒ N	Manway:	☒ Y ☐ N
C.A.:	1.59 mm	Coated: N/A	Clad: N/A	J.E.: 1.00	Remote Access: ☒ - Winter Road

	Component	Material	Nominal Thk	Diameter	OD/ID	Tube Side	Shell Side
1	Main - Shell	SA-516-70N	57.200 mm	60.000 in.	OD	☐	☒
2	East - Head	SA-516-70N	55.700 mm	60.000 in.	OD	☐	☒
3	West - Head	SA-516-70N	55.700 mm	60.000 in.	OD	☐	☒
4	Boot - Shell	SA-516-70 MT		20.000 in.	OD	☐	☒
5	Boot - Head	SA-516-70 MT	0.875 in.	20.000 in.	OD	☐	☒

Static Data: Confirmed ☐ Changed (See Comments) ☒

Comments:
Static data updated

PSV Static Data

PSV –1 Tag #:	G707411	Serial #:	510939-1-A10	CRN:	0G8442.5C
Model #:	26HA13-120	Capacity:	11076 SCFM	Set Pressure:	720 psi
Manufacturer:	Farris			Service Company:	Unified Valve
Inlet Size & Type:	2.00 in. - Flanged			Last Service Date:	10/06/2011
Outlet Size & Type:	3.00 in. - Flanged			Block Valve:	N/A - -
Carseal Intact:	Yes			Code Stamp:	Yes
Shell Side / Tube Side:	Shell Side	Out for Service During Insp.:	N	Location of PSV:	Upstream

PSV –2 Tag #:		Serial #:		CRN:	
Model #:		Capacity:		Set Pressure:	
Manufacturer:				Service Company:	
Inlet Size & Type:	-			Last Service Date:	
Outlet Size & Type:	-			Block Valve:	- -
Carseal Intact:				Code Stamp:	
Shell Side / Tube Side:		Out for Service During Insp.:		Location of PSV:	

PSV Comments

Set pressure is well below the MAWP

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External Inspection Results – VE External Inspection Performed

Item	N/A	Condition	Comment (Check Status Bar or Press F1 for Help)	NCR	Action Item Integrity	Action Item Maintenance
Nameplate	☐	Accept	Firmly affixed and legible	☐	☐	☐
Foundation and Supports	☐	Accept	Welded skirt anchored to skirt	☐	☐	☐
Anchor Bolts	☐	Accept	Well anchored with no deformation	☐	☐	☐
Grounding	☐	Accept	Grounded directly to East saddle	☐	☐	☐
Insulation Condition	☒		No insulation	☐	☐	☐
PSV	☐	Accept	Set pressure well below MAWP	☐	☐	☐
Shell Heads & Nozzles	☐	Accept	Mild surface corrosion noted throughout	☐	☐	☐
Metal Surfaces (Paint)	☐	Accept	Coating chipped on exposing base metal	☐	☐	☒
Aux Equipment	☐	Accept	Secure and well supported	☐	☐	☐
Cathodic Protection	☒		No external anode	☐	☐	☐
Alignment	☐	Accept	Level with skid	☐	☐	☐
Flange Connections	☐	Accept	Adequate threaded engagement	☐	☐	☐
Pressure Gauge	☐	Reject	0-7000 kPa: with broken needle	☐	☐	☒
Temperature Gauge	☐	Accept	-20-120°C: acceptable range	☐	☐	☐
Sight Glass	☐	Accept	Intact and visible liquid level	☐	☐	☐
Ladder / Platform	☒		No ladders or platform	☐	☐	☐
Leaks	☐	No	No leaks noted at time of inspection	☐	☐	☐
Piping from Vessel	☐	Accept	Adequately supported piping circuit			
Previous UT Survey	☐	Yes	Locations marked, no history provided	UT Company: N/A		

External Visual Observations

There is dirt on the top section of the shell from personnel walking on surface

There are 3 float cells with nameplates

The weep holes are open on the boot drain reinforcement pad with no evidence of leeks noted at the time of inspection

Mild surface corrosion noted throughout the heads, shells, nozzles, piping and between the flanges.

The pressure gauge is not within range of the MAWP and the needle is broken

The coating is chipped and flaked exposing the base metal to mild surface corrosion with evidence of shallow pitting noted. the maximum measured pit depth was 0.017" behind the nameplate on the shell

A UT corrosion survey was performed at the time of inspection with no significant wall losses recorded

Recommendations:

Clean loose coating and touch-up to aid in corrosion protection

Replace pressure gauge with one that is within range of the MAWP

TA Recommendation:
Open manway clean vessel and perform internal inspection

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Internal Inspection Results – VI Internal Inspection Performed

Item	N/A	Condition	Comment (Check Status Bar or Press F1 for Help)	NCR	Action Item Integrity	Action Item Maintenance
Shell	☐	Accept	Scale build-up noted in vapour section	☐	☐	☐
Heads	☐	Accept	No mechanical damage noted in heads	☐	☐	☐
Manway	☐	Accept	Minor surface corrosion noted	☐	☐	☐
Gasket Surfaces	☐	Accept	Adequate serrated sealing area	☐	☐	☐
Welds	☐	Accept	Minor pitting at 6 o'clock position	☐	☐	☐
Refractory	☒		Not applicable	☐	☐	☐
Heating Coils	☒		Not applicable	☐	☐	☐
Demister Pad	☐	Accept	Bent supports in demister pad cage	☐	☐	☒
Vane Pack	☒		Not applicable	☐	☐	☐
Baffles	☒		Not applicable	☐	☐	☐
Trays	☒		Not applicable	☐	☐	☐
Filter	☒		Not applicable	☐	☐	☐
Internal Coating	☒		Not applicable	☐	☐	☐
Tubesheet	☒		Not applicable	☐	☐	☐
Tube Bundle	☒		Not applicable	☐	☐	☐

Internal Visual Observations

An internal inspection was performed June 06 2012 during the 2012 TA

There was minor pitting noted on the shell to head circ seam 6 o'clock position no greater than 0.015" deep (within corrosion allowance)

There is scale (tubercle) formation noted in the vapour section of the shell. A random area had been cleaned to bare metal with no pitting recorded

There is a shallow ~ 0.022" deep gouge noted adjacent to the shell circ weld approximately 1.00" long

The coil inside the boot was found to be in good condition

Recommendations:

Consider to lightly remove sharp edges on the gouge to reduce fatique risks

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Firetube Static Data N/A (Not Applicable)

Diameter: Not Applicable Nom Thickness: Not Applicable Bend: Not Applicable

Length: Not Applicable Firetube Description: Not Applicable

Firetube NDE Performed:

UT ☐	Report#: Not Applicable		ET ☐	Report#: Not Applicable	
MT ☐	Report#: Not Applicable		RT ☐	Report#: Not Applicable	
PT ☐	Report#: Not Applicable		Other ☐	Report#: Not Applicable	

Firetube Inspection Results

Item	N/A	Condition	Comment (Check Status Bar or Press F1 for Help)	NCR	Action Item Integrity	Action Item Maintenance
Burner	☒		No Firetube Inspection Carried Out	☐	☐	☐
Stack	☒		No Firetube Inspection Carried Out	☐	☐	☐
Flange (Throat)	☒		No Firetube Inspection Carried Out	☐	☐	☐
Tube Sheet	☒		No Firetube Inspection Carried Out	☐	☐	☐
Hot Side	☒		No Firetube Inspection Carried Out	☐	☐	☐
Miter	☒		No Firetube Inspection Carried Out	☐	☐	☐
Return Bend	☒		No Firetube Inspection Carried Out	☐	☐	☐
Supports	☒		No Firetube Inspection Carried Out	☐	☐	☐
Butt Welds	☒		No Firetube Inspection Carried Out	☐	☐	☐
Fillet Welds	☒		No Firetube Inspection Carried Out	☐	☐	☐

Firetube Visual Observations

No Firetube Inspection Carried Out

Recommendations:

No Firetube Inspection Carried Out

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Vessel NDE and Final Summary:

NDE Performed:	UT	☒	Report#:		ET	☐	Report#:
	MT	☐	Report#:		RT	☐	Report#:
	PT	☐	Report#:		Other	☐	Report#:

Maxi-Trak Observations Summary (Summarize inspection results Max 255 Characters):

Mild surface corrosion throughout shells, heeds, nozzles, piping and between the flanges
Pressure gauge not within range of the vessel and the needle is broken
TA 2012 - 0.022" gouge adjacent to shell circ seam weld ~ 1.0" long

Maxi-Trak Recommendations Summary (Summarize Recommendations Max 255 Characters):

Clean loose coating and touch-up to aid in corrosion protection
Replace pressure gauge with one that is within range of the MAWP
TA 2012 - Consider carefully removing the sharp edges from the gouge

Actions Corrected at Time of Inspection: (If actions were corrected at the time of Inspection – note the corrected actions here.)

No actions were corrected at the time of inspection

Additional Visual Observations

No additional observations noted at the time of inspection

Any other safety concerns or observations from associated equipment: (for example associated piping, buildings, pumps etc…)

No safety concerns noted at the time of inspection

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Thickness and Remaining Life Evaluation *" Must be Completed"*

MUST BE COMPLETED AND RESOLVED WITH CNRL IMMEDIATELY UPON DISCOVERY OF LOW WALL THICKNESS AREAS

Step 1: Was any thickness measurement location found to be less than (Nominal WT – Corrosion Allowance)?: ***No***

If YES, proceed to Step 2; if NO, proceed to "Crack Evaluation" and "CNRL Criticality Designation".

Step 2: Which component(s) were found below (Nominal WT – Corrosion Allowance)?

Components found below Nom - CA:

Components
N/A - N/A
N/A - N/A
N/A - N/A
N/A - N/A
N/A - N/A

Perform Steps 3 – 8 for each component with actual thickness less than (Nominal WT – Corrosion Allowance).

Step 3: Describe Location and Extent of Corrosion*:*

Components	Location and Extent of Corrosion
N/A - N/A	Not Applicable for this Inspection
N/A - N/A	Not Applicable for this Inspection
N/A - N/A	Not Applicable for this Inspection
N/A - N/A	Not Applicable for this Inspection
N/A - N/A	Not Applicable for this Inspection

Notes:
Not Applicable for this Inspection

Step 4:

- For shells and nozzles, calculate minimum required thickness (T-min) as per ASME Section VIII UG-27.
- For heads, calculate minimum required thickness (T-min) as per ASME Section VIII UG-32.

Components	T-Min
N/A - N/A	N/A
N/A - N/A	N/A
N/A - N/A	N/A
N/A - N/A	N/A
N/A - N/A	N/A

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Thickness and Remaining Life Evaluation *(Continued)*

Step 5: Is any measured thickness less than calculated minimum required thickness (T-min)? ***N/A***

If YES, complete Step 6
If NO, proceed to Step 7..

Step 6: Is nature and extent of pitting acceptable as per API 510? ***N/A***

Step 7: Calculate Remaining Life as per API 510. How? (Find last reading; use nominal thickness if nothing available). Short Term Corrosion Rates and Long Term Corrosion Rates.

Components	Remaining Life (Yrs)
N/A - N/A	N/A
N/A - N/A	N/A
N/A - N/A	N/A
N/A - N/A	N/A
N/A - N/A	N/A

Step 8: Contact CNRL Integrity Coordinator to discuss above results.

- Name of CNRL contact: Not Applicable for this Inspection
- Date and time of conversation: Not Applicable for this Inspection

Summary/results of conversation:
Not Applicable for this Inspection

Crack Evaluation by Magnetic Particle or Alternative Inspection *" Must be Completed"*

MUST BE COMPLETED AND RESOLVED WITH CNRL IMMEDIATELY UPON DISCOVERY OF CRACK-LIKE INDICATIONS

Were any indications found to suggest the vessel contained cracks? ***N/A***

If NO, proceed to "CNRL Criticality Designation".

If YES, Contact CNRL Integrity Coordinator to discuss results.

- Name of CNRL contact: Not Applicable for this Inspection
- Date and time of conversation: Not Applicable for this Inspection

Summary/results of conversation:
Not Applicable for this Inspection

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CNRL Criticality Evaluation – *"MUST BE COMPLETED"*

The CNRL In-Service Pressure Vessel Inspector MUST answer all the following questions

1. Is the vessel fit-for-service? : ***Yes***
2. Was the measured thickness less than the calculated minimum required thickness (T-min) for any component?: ***No***
3. Were MT indications found?: ***N/A***
4. Was the remaining life less than 6 years for sour service vessels or less than 10 years for sweet service vessels?: ***No***
5. Were NCR's or Action Items generated as a result of the inspection? : ***Yes***
6. Were UT readings below (Nominal WT – Corrosion Allowance) found? : ***No***

Information on CNRL Owner User Program - Criticality Designation and Required Review

RED – Vessel Inspection Results are deemed RED if one of the following occurred:

- The measured thickness was less than the calculated minimum required thickness (T-min) for any component.
- MT indications were found.
- The remaining life was calculated to be less than 6 years for sour-service vessels or less than 10 years for sweet-service vessels.

RED inspection reports must be signed off by the CNRL Chief Inspector.

YELLOW – Vessel Inspection Results are deemed YELLOW if one or more of the following occurred:

- The vessel was declared NOT fit-for-service by the 3rd Party In-Service PV Inspector.
- NCR's or Action Items were generated as a result of the inspection.
- UT readings below (Nominal WT – Corrosion Allowance) were found.

YELLOW inspection reports must be signed off by the CNRL Pressure Equipment Integrity Coordinator.

GREEN – Vessel Inspection Results are deemed GREEN if all of the following are true:

- The vessel was declared fit-for-service by the 3rd Party In-Service PV Inspector.
- UT readings below (Nominal WT – Corrosion Allowance) were NOT found.
- MT indications were NOT found.
- NCR's or Action Items were NOT generated as a result of the VE inspection.

GREEN inspection reports must be signed off by the 3rd Party In-Service Pressure Vessel Inspector.

Criticality Designation				Yellow		

Vehicle #: 380 Kms:

Time In: 00:00 Time Out: 00:00 Hrs

Time In: 00:00 Time Out: 00:00 Hrs

Personnel: SR, LP

Billing Info: AFE :

Inspector (Name): Matthew B Dickinson PESL: 601

Inspector (Signature): Matthew Dickinson 2012.11.13 08:04:47 -07'00' API: 39483

CNRL Coordinator (Name):

CNRL Coordinator (Signature):

CNRL Chief Inspector (Signature): (I am in full agreement with report contents)

(I am in full agreement with report contents)

Equipment Photographs:

01 nameplate

02 overview

03 boot overview

04 manway overview

05 corrosion behind nameplate

06 broken temp gauge

07 coating deterioration

08 corrosion between flanges

09 PSV overview

Equipment Photographs:

10 internal overview

11 boot & coil overview

12 demister overview

13 bent supports

14 scale in vapour section

15 minor pitting on seam

16 gouge adjacent to weld