



Canadian Natural

PRESSURE EQUIPMENT INSPECTION INTERVAL APPROVAL

Part 1 – Facility and Equipment Information

Facility / Field Name: South Bulrush Gas Plant and Oil Battery	Location: b-88-F/94-A-16, a-89-F/94-A-16
--	--

Part 2 - Assessment Type

Interval assessment has been performed as per TC-OVR-PRO-INT-000036 – check applicable box

Individual Equipment: <input type="checkbox"/>	Provide the equipment number: _____
Multiple Equipment: <input checked="" type="checkbox"/> Refer to Section 4	Provide the equipment numbers or refer to Section 4 for the file location: _____
Like Service Comparison: <input type="checkbox"/>	Provide the equipment numbers or refer to Section 4 for the file location: _____

Part 3 – Summary of Findings / Issues / Action Items

The majority of the vessels at b-88-F and a-89-F were found to be in good condition and acceptable for a Grade 3 inspection interval with the one exception noted below. All Grade 3 pressure vessels will be put on a **6 year (72 month)** inspection interval.

The following pressure vessel was found to be lower than Grade 3

- Fuel Gas Scrubber NB2066 – Only one complete inspection was performed in 2008. **5 year (60 month) interval**

The following pressure vessels were found to be overdue for inspection even on a Grade 3 inspection interval and are to be inspected in 2016:

- Fuel Gas Scrubber NB2066 – b-88-F/94-A-16
- Inlet Separator RAE479 – a-89-F/94-A-16
- Fuel Gas Scrubber C3549 – a-89-F/94-A-16
- Separator CN96069 – a-89-F/94-A-16

Discrepancies were found within Maxitrak for location and service data. These errors will be corrected in Maxitrak to reflect the proper data.

PSV's were found to be acceptable for **5 Year (60 month)** and **6 Year (72 month)** intervals based on service history. Most valves will not be serviced in 2018 based on their new intervals. Some select valves were missing pre-pop data or had unacceptable pre-pop information and will be left on a 4 year interval and serviced in 2016.

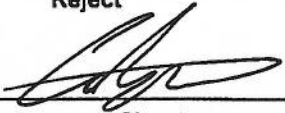

- Filter Piping PSV SN# 16304 – **4 Year (48 month)** – Discs missing and body loose, possibly due to excessive vibration
- FG Dehy Glycol Contactor PSV SN# C008901 – **4 year (48 month)** - No pre-pop in 2012 with valve BER
- Sales Dehy Glycol Contactor PSV SN# CE-42794-1-A10 – **4 year (48 month)** – No pre-pop in 2012 with valve BER and significant damage found on servicing.
- Sales Header FG Scrubber PSV SN#19740 – **4 year (48 month)** – No service since 2004.

Part 4 – Inspection Interval

Previous Interval: All Vessels: 4 years	New Interval: Pressure Vessels: 6 years * PSV: Sweet/Sour-5/6 years* *exceptions noted above.	Assessment Spreadsheet File or Form Location: <u>R:\Integrity\FSJ-C\Bulrush\1060 Vessel Integrity\03 Risk Management\01 RBI Process\2016 Interval Revision</u>
--	---	--

Note: If the assigned inspection interval is not the same for all equipment being assessed, the interval may be identified on the assessment Form or Spreadsheet.

Part 5 – Approvals / Rejection

Final Approval: Asset Integrity Name: <u>Cody Scheu</u> Cert. #: <u>IBPV#453</u>	Comments: Complete required inspections and update assessment.	<input checked="" type="radio"/> Accept <input type="radio"/> Reject  Signature
Final Approval: Operations (Foreman level or above) Name: <u>Marcel Johnson</u> Position: <u>Foreman</u>	Comments:	<input checked="" type="checkbox"/> Accept <input type="checkbox"/> Reject  Signature

Note: Excursion of the typical plant or field operating /production conditions (temperature, pressure, equipment failure) requires an Asset Integrity review of the original inspection interval assessment to confirm that the assigned inspection interval is still valid.

Inspection Summary			Maxitruk Export Information							Manually Enter This Data (U1A/Nameplate)											Ultrasonic Thickness Inspection Data						Inspection Company Input														
#	UNIT	Cracking Detected? (Yes/No/N/A)	U1A (Yes/No)	Inspections Required (UT/VE/MT)	Inspections Performed (UT/VE/MT)	Jurisdiction	Equipment Description	Manway (Y/N)	Year Built	MAWP (psi)	Sweet's Sour	Shell Material	Head Material	Nozzle Material	Piping Material	Head Type	Joint Efficiency (E)	MAWT (barrel)	Shell Nominal Thickness (inches)	Head Nominal Thickness (inches)	Nozzle Nominal Thickness (inches)	Piping Nominal Thickness (inches)	Corrosion Allowance (inches)	Shell Outer Diameter (inches)	Nozzle Outer Diameter (inches)	Piping Outer Diameter (inches)	CML Location (Shell, Head, Nozzle or Piping)	CML	Previous Year	Current Year	Previous Thickness (inches)	Current Thickness (inches)	Thin (inches)	Corrosion Rate (inches/year)	Remaining Life (years)	Comments	Review Comments	New Inspection Interval (Months)	Deficiency/Action Items		
1	Sales Compressor #1	No	Yes	UT/VE/MT	UT/VE/MT	A2984731	1ST STAGE SUCTION BOTTLE	N	1994	720	SOUR	SA516-70	SA516-70	SA105	SA106-B	Ellipsoidal (2:1)	1.00	200	0.625	0.563	0.662	0.280	0.125	20.000	6.625	6.625	Shell 415 2008 2011 0.634 0.634 0.401 0.000 100.0										MT found no cracking. UT found wall loss on piping below nominal minus corrosion allowance. Wall loss occurred between 2004 and 2008 but has been stable for last 2 inspections, talked to Ops b-9-A94-H-1 compressor was shut in between 2004 and 2008, change in flow might have caused corrosion, at same time 2 CI pumps were installed. Visual found no issues (Grade 3)	No concerns, vessel good for Grade 3	72		
2	Sales Compressor #1	No	Yes	UT/VE/MT	UT/VE/MT	A2984748	1ST STAGE DISCHARGE BOTTLE	N	1994	1315	SOUR	SA106-B	SA516-70	SA105	SA106-B	Ellipsoidal (2:1)	1.00	300	1.156	0.938	0.718	0.339	0.125	18.000	6.625	6.625	Shell 510 2008 2011 1.213 1.213 0.737 0.000 100.0										MT found no cracking. UT found no wall loss below nominal. Visual found no issues (Grade 3)	No concerns, vessel good for Grade 3	72		
3	Sales Compressor #1	No	Yes	UT/VE/MT	UT/VE/MT	A2984755	2ND STAGE SUCTION BOTTLE	N	1994	1315	SOUR	SA106-B	SA516-70	SA105	SA106-B	Ellipsoidal (2:1)	1.00	300	1.156	0.938	0.531	0.299	0.125	18.000	4.500	4.500	Shell 715 2008 2011 1.142 1.142 0.737 0.000 100.0										MT found no cracking. UT found wall loss on piping below nominal minus corrosion allowance. Visual found no issues (Grade 3)	No concerns. Piping remaining life greater than 15 years. Grade 3	72		
4	Sales Compressor #1	No	Yes	UT/VE/MT	UT/VE/MT	A2984762	2ND STAGE DISCHARGE BOTTLE	N	1994	1600	SOUR	SA106-B	SA516-70	SA105	SA106-B	Ellipsoidal (2:1)	1.00	300	1.031	0.813	0.674	0.437	0.125	16.000	4.500	4.500	Head 720 2008 2011 0.937 0.937 0.603 0.000 100.0										MT found no cracking. UT minor wall loss with all readings above nominal. Visual found deteriorated paint to 25% vessel, no previous corrosion (Grade 3)	No concerns, vessel good for Grade 3	72	Grill blast and paint	
5	Fuel Gas Dehydrator	N/A	No	UT/VE	UT/VE	A0164200	GLYCOL CONTACTOR	N	1979	1200	SOUR	SA106-B	SA516-70	SA106-B	SA106-B	Ellipsoidal (2:1)	1.00	100	0.689	0.508	0.181		0.075	12.750	1.315	1.315	Shell 1005 2008 2011 0.665 0.665 0.510 0.000 100.0										UT found no wall loss below nominal minus corrosion allowance. Visual found no issues (Grade 3)	No concerns, vessel good for Grade 3	72	replace 1 missing anchor bolt	
6	Dehydrator	N/A	No	UT/VE	UT/VE	A3098509	GLYCOL CONTACTOR	N	1995	1440	SOUR	SA516-70	SA516-70	SA106-B	SA106-B	Ellipsoidal (2:1)	1.00	100	1.126	1.213	0.339	0.354	0.126	24.000	2.375	4.500	Head 820 2008 2011 1.161 1.161 0.913 0.000 100.0										UT found no wall loss below nominal minus corrosion allowance. Visual found no issues (Grade 3)	No concerns, vessel good for Grade 3	72		
7	Sales Compressor #1	N/A	No	UT/VE	UT/VE	C10143	2ND STAGE COOLER	N	1994	1600	SOUR	SA516-70	SA516-70	SA106-B	SA106-B	Flat, Unstayed, Bolted	0.70	300							7.500			Shell 810 2008 2011 1.102 1.102 0.909 0.000 100.0										UT survey found no issues. Visual found no issues (Grade 3)	No concerns, vessel good for Grade 3	72	Collect info on vessel for upcoming inspection
8	Sales Compressor #1	N/A	No	UT/VE	UT/VE	C34468	1ST STAGE COOLER	N	1994	1315	SOUR	SA516-70	SA516-70	SA106-B	SA106-B	Flat, Unstayed, Bolted	0.70	300							7.500			Head 815 2008 2011 0.819 0.819 0.655 0.000 100.0										UT survey found no issues. Visual found no issues (Grade 3)	No concerns, vessel good for Grade 3	72	Collect info on vessel for upcoming inspection
9	Sales Header	N/A	No	UT/VE	UT	N62066	FUEL GAS SCRUBBER	N	1958	50	SOUR	SA53-B	SA53-B	SA106-B		Flat, Unstayed, Bolted	0.70	200	0.150	0.374					10.750			Shell 820 2008 2011 0.448 0.448 0.221 0.000 100.0										UT found no wall loss below nominal. Visual not performed in 2011, 2008 visual found no issues (Grade 2)	No concerns. Vessel only good for Grade 2 with one inspection. Will require a visual external at next inspection	60	Perform VE during next inspection
10	Dehydrator	N/A	No	UT/VE	UT/VE	C34469	GLYCOL FILTER POT	N	2006	275	SWEET	SA106-B	SA516-70	SA106-B		Ellipsoidal (2:1)	1.00	150	0.323	0.752			0.063	8.625	1.315	1.315	Shell 1705 2008 2011 0.327 0.327 0.096 0.000 100.0										UT found no wall loss below nominal. Visual found vessel not anchored to skid floor. See's sour service (Grade 3)	No concerns, vessel good for Grade 3. Change service in Maxitruk	72	Look at changing to sour service classification. Mount vessel to floor	
11	Dehydrator	N/A	No	UT/VE	UT/VE	C34470	GLYCOL FILTER POT	N	2006	150	SWEET	SA53-B	SA234 WPB	SA106-B	SA106-B	Ellipsoidal (2:1)	1.00	100	0.189	0.189	0.154		0.063	6.625	2.375	2.375	Head 830 2008 2011 0.339 0.339 0.209 0.000 100.0										UT found wall loss below nominal minus corrosion allowance. consistent for 2 UT surveys, unlikely this is corrosion. Visual found vessel not anchored to floor, found PSV set above MAWP of vessel at 1207KPA, see's sour service (Grade 3)	No concerns, vessel good for Grade 3	72	PSV reset in 2013 to vessel MAWP. UT survey was consistent between 2009 and 2011 and still well above lower PSV to MAWP of vessel-150psi	
12	Dehydrator	N/A	No	UT/VE	UT/VE	C10149	GLYCOL REBOILER	N	1995	15	SOUR	SA36	SA36	SA106-B	SA106-B	Flat, Unstayed, Bolted	0.70		0.252	0.252			0.063	24.000				Shell 1210 2008 2011 0.244 0.244 0.011 0.000 100.0										UT found wall loss below nominal minus corrosion allowance, wall loss occurred between 2004 and 2008 and consistent for last 2 surveys, talked to Ops b-9-A94-H-1 compressor was shut in between 2004 and 2008, change in flow might have caused corrosion, at same time 2 CI pumps were installed. Visual found data plate attached but no info to vessel (Grade 3)	Minor wall loss that occurred between 2004 and 2008. Readings stabilized. Vessel is non-code with 6.2mm of wall left. No concerns, good for Grade 3	72	Find and secure data plate to vessel
13	Fuel Gas Dehydrator	N/A	No	UT/VE	UT/VE	C3565	GLYCOL REBOILER	N	1979	15	SOUR	SA53-B	SA36	SA106-B	SA106-B	Flat, Unstayed, Bolted	0.70		0.252	0.252			0.063	18.000	2.375	2.375	Head 1305 2008 2011 0.228 0.228 0.000 0.000 100.0										UT found wall loss below nominal minus corrosion allowance, wall loss occurred between 2004 and 2008 and consistent for last 2 surveys, talked to Ops b-9-A94-H-1 compressor was shut in between 2004 and 2008, change in flow might have caused corrosion, at same time 2 CI pumps were installed. Visual found no vessel MAWT, minor surface corrosion on accumulator (Grade 3)	Minor wall loss that occurred between 2004 and 2008. Readings stabilized. Vessel is non-code with 5.8 mm of wall left. No concerns, good for Grade 3	72	repair caulking to the shell, grill blast and repair accumulator	
14	Inlet	N/A	No	UT/VE	UT/VE	CN69070	FUEL GAS SCRUBBER	N	1995	245	SOUR	SA106-B	SA516-70	SA106-B		Flat, Unstayed, Bolted	0.70	150	0.248	0.626					8.625	1.315	1.315	Shell 1505 2008 2011 0.264 0.264 0.096 0.000 100.0										UT found no wall loss below nominal. Visual found no issues (Grade 3)	No concerns, vessel good for Grade 3	72	
15	Sales Compressor #1	N/A	Yes	UT/VE	UT/VE	A2984717	1ST STAGE SCRUBBER	N	1994	720	SOUR	SA516-70	SA516-70	SA105	SA106-B	Ellipsoidal (2:1)	1.00	150	0.625	0.563	0.563	0.563	0.125	20.000	6.625	6.625	Head 310 2008 2011 0.602 0.602 0.362 0.000 100.0										UT found no wall loss below nominal. Visual found external surface corrosion to 30% of piping and minor corrosion on vessel (Grade 3)	No concerns, vessel good for Grade 3	72	Grill blast and repair vessel and piping	
16	Sales Compressor #1	N/A	Yes	UT/VE	UT/VE	A2984724	2ND STAGE SUCTION SCRUBBER	N	1994	1315	SOUR	SA516-70	SA516-70	SA105	SA106-B	Ellipsoidal (2:1)	1.00	300	0.875	0.938	0.674		0.125	18.000	4.500	4.500	Head 630 2008 2011 0.564 0.564 0.355 0.000 100.0										UT found wall loss below nominal minus corrosion allowance on Nozzle 605, has been consistent for last 3 UT surveys, unlikely to be corrosion, have found some wall loss between 2004 and 2008 on some vessels, talked to Ops b-9-A94-H-1 compressor was shut in between 2004 and 2008, change in flow might have caused corrosion, at same time 2 CI pumps were installed. Visual found no issues (Grade 3)	No concerns, vessel does not appear to have active corrosion. Plenty of wall remaining in nozzle. Vessel good for Grade 3	72		
17	Inlet	N/A	Yes	UT/VE	UT/VE	A3098523	INLET SEPARATOR	N	1995	720	SOUR	SA516-70	SA516-70	SA105	SA106-B	Ellipsoidal (2:1)	1.00	100	0.875	0.970	0.343	0.433	0.126	36.000	2.375	6.625	Shell 235 2008 2011 1.016 1.016 0.713 0.000 100.0										UT found wall loss on piping and nozzle below nominal minus corrosion allowance, remaining life calc done on piping 205 = 48 years retirement date= 2065, should be noted major corrosion loss between 2004 and 2008 on piping 210 and nozzle 235 between 2004/2008, consistent since 210 is 8.4mm from being below corrosion allowance. Visual found 20% surface corrosion on vessel and piping (Grade 3)	No concerns, remaining life greater than 15 years. Vessel good for grade 3	72	Grill blast and repair vessel and piping, replace gauge with proper one for operating conditions	
18	Dehydrator	N/A	Yes	UT/VE	UT/VE	A3120213	FUEL GAS SCRUBBER	N	1995	250	SWEET	SA53-B	SA516-70	SA105	SA106-B	Ellipsoidal (2:1)	1.00	200	0.375	0.345	0.250	0.154	0.063	24.000	1.315	2.375	Head 1410 2008 2011 0.354 0.354 0.167 0.000 100.0										UT found wall loss on bottom head 1425 below nominal minus corrosion allowance, has been consistent last 2 UT surveys. Visual found no issues, run in sour service (Grade 3)	No concerns, remaining life greater than 15 years. Vessel good for grade 3. Update Maxitruk service.	72	Look at changing to sour service classification	
19	Sales Compressor #1	N/A	No	UT/VE	UT/VE	C3566	FUEL GAS SCRUBBER	N	1994	165	SWEET	SA106-B	SA105	SA106-B	SA106-B	Flat, Unstayed, Bolted	0.70	150	0.280	1.000			0.000	6.625	1.900	1.900	Shell 1440 2008 2011 0.154 0.154 0.018 0.000 100.0										UT found no wall loss below nominal. Visual found no issues. See's sour service (Grade 3)	No concerns, vessel good for Grade 3. Update service in Maxitruk.	72	Look at changing to sour service classification	
a-89-F/94-A-16 Oil Battery																																									
21	Inlet	N/A	No	UT/VE	UT/VE	C34471	FUEL GAS SCRUBBER	N	2004	975		SA106-B	SA105	SA106-B		Ellipsoidal (2:1)	1.00	150	0.280	0.280			0.063	6.625			Shell 710 2008 2011 0.293 0.293 0.163 0.000 100.0										Vessel Out of Service, only one inspection record	Out of Service			
22	Compressor	No				8P56789C	DISCHARGE BOTTLE	N	1966	1400	SOUR					Ellipsoidal (2:1)	1.00	100	0.500	0.500					9.000			Head 1425 2008 2011 0.366 0.366 0.197 0.000 100.0										Vessel Out of Service, only one inspection record from 2000	Out of Service		
23		N/A	No	UT/VE		C3550	LINE HEATER	N	0	103																	Head 1430 2008 2011 0.252 0.252 0.007 0.000 100.0										Vessel Out of Service, no longer on site	Out of Service			
24	Compressor	N/A	No	UT/VE		CN69047	FUEL GAS SCRUBBER	N	1962	50	SOUR	SA283-C	SA283-C						200	0.135	0.375					11.000	Head 1440 2008 2011 0.154 0.154 0.018 0.000 100.0										Vessel Out of Service, one visual inspection from 1996	Out of Service			
25	Inlet	N/A	No	UT/VE	UT/VE	RAE479	INLET SEPARATOR	N	1966	1000	SOUR	SA53-B	SA109-B			Ellipsoidal (2:1)	1.00	100	0.937	0.768	0.217	0.217			24.000	3.500	2.375	Shell 115 2004 2008 0.937 0.937 0.768 0.000 100.0										UT found no wall loss below nominal. Visual found external surface corrosion to 40% of vessel/piping. PSV has no code stamp on the PSV Data plate, last inspection 2008 (Grade 3)	No concerns, vessel good for Grade 3. PSV serviced in 2012 and confirmed to be code compliant.	72	Inspection overdue on vessel
26	Compressor	N/A	No				SCRUBBER	N	1966	720	SOUR																Head 140 2008 2011 0.224 0.224 0.000 0.000 100.0										Vessel Out of Service, no info on vessel	Out of Service			
27	Inlet	N/A	No	UT/VE	UT/VE	A0068497	INLET SEPARATOR	N	1966	125	SOUR	SA283-C	SA106-B			Ellipsoidal (2:1)	1.00	600	0.252	0.189					30.000			Shell 140 2008 2011 0.154 0.154 0.018 0.000 100.0										Vessel Out of Service, no longer on site	Out of Service		
28	Inlet	N/A	No	UT/VE	UT/VE	A0068498	INLET SEPARATOR	N	1966	125	SOUR	SA283-C	SA106-B			Ellipsoidal (2:1)	1.00	600	0.250	0.313					30.000																

