



146808

Field Inspection Report

Vessel # 146808

Client	Canadian Natural Resources Ltd.			Inspection Date	2003-07-22		
Prov. Reg.#	146808			Insp. Type	VENI/IUT		
Equipment	Amine Reboiler			Location	Westlock		
Tag/Equip. #				LSD	13-24-60-26W4		
Vessel Status	In Service			Comp./Unit			
Manufacturer	Cessco	Serial #		P2759	MAWP/Temp	65 psi	F
CRN #	D3934.2	Shell Material		SA-516-70	Shell Thick.	0.375 in	
Corrosion All.	0.125 in	Head Material		SA-516-70	Head Thick.	0.375 in	
Manway	Yes	Head Material 2			Head Thick. 2	in	
Coating	No	Channel Material			Channel Thick.	in	
Diameter	72 in	Length	336 in	Height	in	RT	1 HT Yes
Year Built	1979	Next Inspection		2006	Next Insp. Type	NA	
Service	Sour				Job #	03-251	

PSV #.	CE21124A10				
Mfg.	Farris	Serial #	CE21124A10	Set Pressure	30 psi
Type/Model	26KA10170	Capacity	4298 Lbs/hr	Size	3.000 in
Date of Service	2003-07-21	Next Service	2006	Service Co.	Powercomm

Observations:

External

Vessel is located outside on its own support. Support area is in good condition. Gauges are in good condition. Vessel is supported by 2 saddles that are bolted to the supports. PSV is located inside the building on the piping. PSV vents to a 4" header. Piping is well supported and in good condition. Data plate information and mounting is acceptable. No ground. No evidence of leaking at bolting and connections. Vessel is fully insulated - insulation is in good condition.

Field Inspection Report

Vessel # 146808

Internal

Vessel was clean and dry for inspection. Some small areas of pitting which gradually increase towards the firetubes on the upper 1/3 of the vessel. Corrosion does not appear to be active. No deformation noted or other corrosion.

Note: New firetubes are being installed in unit.

UT

Measurements in Inches

North Head - 0.480 - 0.496

South Head - 0.483 - 0.506

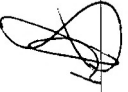
Shell - 0.363 - 0.384

4"- 150#, 120 (0.438) - 0.511 - 0.521

Recommendations:

1. Please send a copy of the PSV service report to RAE Engineering. Attention - Julio.
2. No further recommendations.

Inspector: Sean Zitaruk

Reviewed by: 

☐ AB-40 to be attached

POWERCOMM Inc.9333 - 37 Ave. Edm. AB. T6E 5N4 PH.(780)465-7038 FAX(780)465-0379

QR7INSPECTION AND TEST REPORT - PSV / PRV

Customer: CNRL- WESTLOCKEASTLocation: WESTLOCKEAST GAS PLANTCUST PO#:ASOC. Doc #:

SO#: 52 - 19270 . 25 . 265200CST Tag #: #25/RE-BOILERPCI ID: P12825Date: 03-07-21

Customer Instructions: REPAIR REQUIRED

Requested Completion Date: 03.07.24A#: 146808LSD: 13-24-60-26W4Contact:CC#:Phone:

Make: FARRISModel: 26KA10-170S/N: CE-21124-A10Shop #:CRN#:

Size: 3InK Orf. 4OutEnd Type: RFCap Assy.: OpenClosedLift Lever Adj. Screw Meas. 2640

Visual Condition: GoodFairPoorFoulingDirtyPluggedNewSample Taken: InletOutletNone

Seal Condition: Top: ACCBottom: ACCInsignia: PCILast Service Date: 01.05.14Data Plate Condition: GOOD

Op. Temp.: CCapacity: 4298 SCFM/AIRCode Symbol: VUVHVNoneOther

Set Press.: 30psig207kpagBack Press.: psigkpagCold Diff. Set: psigkpagInfo. Verification: ML

Set Pressure: 30psigkpagLeakage BPM @90%-ACCTesting Medium: AIRNo Rescat:

Comments: #1) 32 PSI #2) 32 PSI #3) 32 PSIRelieve Press.: 32psigkpagReseat Press.: 21psigkpag

LABOUR:

Disassemble: MLInspection: MLReassemble: ML

CONDITION CODES

ITEMDESCRIPTION

1Recondition & Test

2Priority Rate

3Certification Test Only

4Pre Pop Test

5Back Pressure Test

6Bellows Test

7Cap Assembly Mild Subst Sev

8Repack Lift Lever

9Adjusting Screw / Nut Mild Subst Sev

10Bonnet

11Spring / Number

12Spring Buttons

13Spindle / Stem Mild Subst Sev

14Stem Retainer Mild Subst Sev

15Guide Mild Subst Sev

16Bellows

17Ring Pin

18Blowdown Ring(s) Mild Subst Sev

19Disc Holder Mild Subst Sev

20Disc Mild Subst Sev

21Nozzle Mild Subst Sev

22Ball Keeper

23Keeper Seal

24Ball

25Ball / Seat Assembly

26Seat Frame

27Body

28Gaskets

29Machine End Connection Mild Subst Sev

30Lap Nozzle to Base

31Sub Contractor

WORK CODES

1- Replace

2- Renew Next Repair

3- Lapped & Machined

4- Machined

5- Lapped

6- Polished

7- Re-Aluminized

8- Left Alone

9- Repaired

10- Clean & Use

11- Welded

12- N/A

INTERNAL CONDITIONS

See SWI# 4043 on the left of this document for definitions.

CONDICIONCODES

WORKCODES

QTYITEMDESCRIPTIONQTYPCI P.O. #

1323 x 150 Gasket1S

334 x 150 Gasket1S

34

135

136

37

38Cap AssemblyAUG 18 2003

39Lift Lever

40Adjusting Screw / Nut

41Bonnet

42Spring / Number

43Spring Buttons

44Spindle / Stem

45Stem Retainer

46Guide

47Bellows

48Ring Pin

49Blowdown Ring

50Disc Holder

51Disc

52Nozzle

53Ball Keeper

54Keeper Seal

55Ball

56Ball / Seat Assembly

57Seat Frame

58Body

59Gasket Set1S

60Reset Tag (SPM 3.3 ; 3.4)

61Shop Supplies1

62Hazardous Waste Disposal1

COMMENTS

Additional: CleaningLapping NozzleLapping DiscLapping DiscPipe Fitting for Reassembly & TestRecommended Replacements

POST ASSEMBLY INSPECTION & SIGN OFF (Refer to QR8 #14): ML

DATE: 03.07.23

IM&T Equipment (REF. SPM 05)

Lineal# 3204Pressure# 3003/04Test Bench# 3308

MEASUREMENT DATA

Min. Man. Specified Dimensions

Disc Ht. 0.2960Step 0.0050

Nozzle Ht. 6.5460Step 0.0100

Dimensions As Found

Disc Ht. 0.3170Step 0.0170

Nozzle Ht. 6.6650Step 0.0220

TEST DATA

Definition Of Set Point: Pap

Set Pressure Change: YesNoNew SpringNon Code RepairQR018B Item #:QR018C Item #:

Set Pressure: 30psig207kpag

Back Pressure: psigkpag

Cold Diff. Set: psigkpag

Bellows Test @: psigkpag

Back Press. Test: 100psigkpag

Leakage @ 90%: 0BPM(Ref. API 527)

Comments:

Set Using: AirSteamH2OAir / H2O

Lock Nut Secured

Ring Pin Torqued

Lift Lever Assy Secured

Capacity: 4298 SCFM/AIR

Ring Setting: UpperLower

Date: 03.07.23

Tested By: CK

Witness: DR

Final Inspection: TB

cessco

Fabrication & Engineering Ltd.

7310 - 99 Street,
Edmonton Alberta T6E 3R8
Phone: (780) 433 9531
Fax: (780) 432 7899
Email: lindsay.baker@cessco.ca

TO: RAE Eng. & Insp. Ltd.

ATTN: Gerard V. D. B.

FROM: Lindsay Baker

DATE: Aug. 15 2003

FAX No. (780) 468 2422

OUR REF. S14183 A & B

YOUR REF.

Page 1 of 3

Gerard Please find the following AB-40 form as requested.

Lindsay Baker.


CESSCO QC

146808



BOILERS AND PRESSURE VESSELS REPAIR AND ALTERATION

(A) #: A146808

AB-40 (Side A) 02/05

REPORT OWNER EQUIP NO.: H1

REPAIR ☒

and/or

ALTERATION ☐Partial ☐Final ☐1. Name and Address of Organization doing Repair/Alteration CESSCO Fabrication & Engineering Ltd. 7310-99 St.Edmonton, Alberta, T6E 3R8AQP No. & Expiry Date 1014(S) Sept 30 2005Location of Installation Unknown2. Name of Owner Canadian Natural Resources

Address #200 - 24 Inglewood Drive

CRN D-3934.23. Boiler/Pressure Vessel Description Replacement FiretubeManufacturer's Name CESSCO Fabrication & Engineering Ltd. Serial No. S14183A&B

4. Design Conditions:

a) Vessel/Shellside/Boiler: Max Allowable Working Press. 65 psig Min/Max Design Temp 300/Deg. Fb) Jacket/Tubeside: Max Allowable Working Press. / Min/Max Design Temp /

5. Description of defects (location and types of deterioration that resulted in the repair/alteration).

Existing Firetubes Corroded beyond repair.6. ASME Code Edition and Addenda used for work: ASME Sect. VIII Year 2001 Addenda 20027. Repair/Alter. Description of Work. Step by step description of repair/alteration method, attach additional sheets as needed.
Note 1: Repair/Alteration Procedure to be accepted by Alberta Boilers Safety Association SCO prior to start of work.Cut Existing Firetubes from original firetube flanges.Fabricate new firetubes and conduct 100% Radiography on firetube miter welds and spliceFit and weld New firetubes to the original flanges.Conduct full PWHT of firetubes and flanges.

8. Material - List any material used in repair/alteration and any base material welded on:

Item	Mat'l Spec.	Thick/Sch	Diam	Item	Mat'l Spec.	Thick/Sch	Diam
Shell/Drum				Heads/ Ends			
Tubesheet				Tubes	SA 106 Gr B	Std Pipe	20"
Nozzles				Flanges/Fittings		Class	

9. Welding Procedure - Alberta Registration Number WP-218.2 WPS Numbers used: CWP102-PWHT Rev.110. Heat Treatment: Bake Out (Temp./Time) / Preheat Temp / Post Weld HT (Temp./Time) 1125/1 hr

11. Non Destructive Examination (Specify type and extent).

Radiography: % 100 all miter welds and 1 pipe splice on unit 'B' only100% Visual Inspection

(A) #: _____ OWNER EQUIP. NO. H1

12. Pressure Test	Vessel/Boiler/Shellside	Tubeside/Jacket
a) Hydrostatic	_____	_____
b) Other Test	_____	_____

13. **Welded Replacement Parts:** Attached are Manufacturer's Partial Data Reports or Repair/Alteration Reports properly identified and signed by Authorized Inspectors for the following items of this report: (Welded parts supplied by others).

14. **Responsibility Owner/Client.** Identify below items that the owner/client has assumed responsibility for. Note (2)

a) Design Submission _____ b) Repair/Alteration Procedure: _____ c) Material Control _____
 d) Welding Control _____ e) NDE _____ f) Heat Treatment _____ g) Pressure Test _____

Note 2: Owner/client must have a valid Alberta Quality Program (AQP), for the scope of work, to assume responsibility for function c, d, e, f, or g.

15. **REMARKS:** No Engineering functions by CESSCO

This Report covers Firetube Materials, Welding, Fabrication and radiography only

16. CERTIFICATE OF COMPLIANCE

We certify that the statements made in this Report are correct and that all design, material, construction and workmanship on this repair/alteration conform to the requirements of the Alberta Safety Codes Act and Regulations.

a) For all items except for items identified in 14:

Cessco Fabrication & Engineering Ltd

(Repair/Alteration Organization Name)

1014(S) Sept. 30 2005

(AQP Number & Expiry Date)

William A. Johnson August 24/03

(Signature & Date)

William A Johnson

(Print Name)

b) For items identified in 14 only:

(Owner/Client Organization Name)

(AQP Number & Expiry Date)

(Signature & Date)

(Print Name)

17. DATE WORK WAS COMPLETED: July 28/03

18. CERTIFICATE OF INSPECTION

I have inspected the repairs and/or alterations described in this report. To the best of my knowledge this work has been done in accordance with the Safety Codes Act and Regulations.

a) **Owner-User Inspection Certification (Field Only)**
 (Required when Owner-User Inspects the work under their ABSA Authorized Owner-User Quality Program).

b) **ABSA Safety Codes Officer Certification**
 (when work is inspected by ABSA).

Owner-User Inspector Signature & Date

Print Name

Owner-User AQP# & Expiry Date

Report Received by ABSA SCO _____ Date _____

R. Hayes July 24/03
 ABSA SCO Signature & Date
L. Hayes
 Print Name

Field Inspection Report

Vessel # 146808

Client	Canadian Natural Resources Ltd.			Inspection Date	2002/05/27		
Prov. Reg.#	146808			Location	Westlock East		
Equipment	Amine Reboiler			LSD	13-24-60-26W4		
Tag/Equip. #	H1			Comp./Unit			
Vessel Status	In Operation			Job #	02-258		
Manufacturer	Cessco	Serial #	P2759		MAWP/Temp	65 psi	302 F
CRN #	D3934.2	Shell Material	SA-516-70		Shell Thick.	0.375 in	
Corrosion All.	0.125 in	Head Material	SA-516-70		Head Thick.	0.375 in	
		Head Material 2			Head Thick. 2	in	
		Channel Material			Channel Thick.	in	
Diameter	72 in	Length	336 in	Height	in	RT	1 HT Yes
Year Built	1979	Next Inspection		2003		Insp. Type	VENI/UT
Service	Sour	Manway		Yes		Coating	No

PSV #.	CE21124A10						
Mfg.	Farris	Serial #	CE21124A10		Set Pressure	30 psi	
Type/Model	26KA10170	Capacity	4298 Lbs/hr		Size	3,000 in	
Date of Service	2001/05/01	Next Service	2003		Service Co.	Powercomm	

Observations:

General:

The two fretubes, East and West side of the reboiler were removed prior to inspection. The reboiler shell/head and longitudinal weld have isolated pits on vapor section; some are in clusters. Depth of pits about 0.015". The bottom section is in generally good condition. The previous weld repair on the fretube manways between head internal to manway opening are in good shape. According to the operator in charge the West side fretube is not being used, thorough inspection is not necessary. The East fretube was inspected in reference to RAE inspection procedure, except MPI was not performed as it was inspected last year per operator in charge.

External:

Fully clad vessel and piping. Generally in good shape since the last inspection 2001. Note: Discussion with plant operator in charge. The internal corrosion of fretube will not be repaired or welded at this time but location will be monitored.

☐ AB-40 to be attached

Field Inspection Report

Vessel # 146808

East Firetube External

A. Stack Side "A" - The surface is rough all throughout about/less than 0.010" depth. The welds are visually in good shape.
B. Section - Rough surface almost same as in 'A'
C. Section, Burner Side - Scattered corrosion pits mostly at 6 o'clock position about half of the tube length opening. Pit length approximately 0.060" up to 3/8" diameter.
Random UT Wall Thickness Readings:
Measurements in inches:
Test Point A - 0.280 to 0.292
Test Point B - 0.297 to 0.316
Test Point C - 0.290 to 0.295
End Plate - 0.618 to 1.625
See attached drawing for test point orientation.

Internal

No access on the firetube section (with arrestor assembly welded to end plate.)
On Firetube Stack - Scattered pits at bottom section, 6 o'clock position, close to the opening. Corrosion pit was measured about 0.100" depth. some pits less than 0.080" depth, area covered about 3 1/2" wide x 14" long. Adjacent UT ranged from 0.296" to 0.315" thick.
End Plate - Surface generally in good shape, has shallow pits not measurable.
Random UT Wall Thickness on Reboiler
Measurements in inches:
North head - 0.442 to 0.468
South head - 0.444 to 0.483
North Shell - 0.375 to 0.385
Shell Roof - 0.364 to 0.387

Recommendations:

1. Both firetubes may require extensive repairs or CNRL will plan for replacement where necessary on or before the next inspection due date.
2. Monitor internal corrosion pits on reboiler shell and head.

Inspector: Rex Sadaba

Reviewed by:



☐ AB-40 to be attached

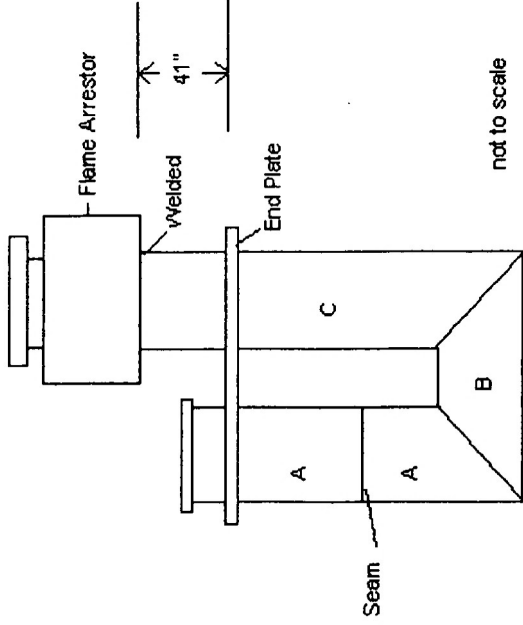
RAE Inspection Service (1979) Ltd.

#111, 4808 – 87 Street, Edmonton, Alberta T6E 5W3

Phone: (780) 469-2401 Fax: (780) 468-2422

Vessel Drawing
(not to scale)

Client	Canadian Natural Resources Ltd.		Location	Westlock East	
Prov. Reg.#	146808		LSD	13-24-60-26W4	
Equipment	Amine Reboiler				
Diameter	6 feet	Shell Material	SA-516-70	Shell Thickness	0.375"
Length/Height	28 feet	Head Material	SA-516-70	Head Thickness	0.375"



not to scale

**RAE Inspection Service (1979) Ltd.**

#111, 4808 - 87th Street, Edmonton, Alberta T6E 5W3
Telephone: (780) 469-2401 • Fax: (780) 468-2422

NCR 3642**NON CONFORMANCE REPORT**

Contractor McElroy & Associates Date: May 16/01
Client: _____
Provincial Registration #: 40 146808 RAE Job #: 01-285
Location: East Wretlock LSD: 13-24-60-24 W4M
Equipment: Welders Rod oven

Description of Non Conformance:

- 1) ~~One~~ Welders rod oven was found to be cold. Further inspection found the oven to be partially unplugged.
- 2) Welders rod oven is being left partially open.

Recommended Action: 1) Welder to watch oven temperature.2) Welder to open oven only as needed.

NCR to be Resolved Before: _____ Date: May 16/01
Signature Inspector: _____

Corrective Action Taken:Jobs CompletedClose NCR

Signature Client: _____ Date: _____
Signature Inspector: _____ Date: _____
Reviewed by Chief Inspector: [Signature] Date: 01-05-22

Field Inspection Report

Vessel # 146808

Client	Canadian Natural Resources Ltd.			Inspection Date	May 14, 2001		
Prov. Reg.#	146808			Location	Westlock East		
Equipment	Amine Reboiler			LSD	13-24-60-26W4		
Tag/Equip. #	H1			Comp./Unit #			
Vessel Status	In Operation			Job #	01-285		
Manufacturer	Cessco	Serial #		P2759	MAWP/Temp	448 KPa	150 °C
CRN#	D3934.2	Shell Material		SA-516-70	Shell Thickness	10 mm	
Corrosion All.	3 mm	Head Material		SA-516-70	Head Thickness	10 mm	
		Head Material 2			Head Thickness 2	mm	
		Channel Material			Channel Thickness	mm	
Diameter	1829 mm	Length	8534 mm	Height	mm	RT	1 HT Yes
Year Built	1979	Next Inspection		2002	Inspection Type	VE/II/UT	
Service	Sour	Manway		No	Coating	No	

PSV #.	CE21124A10		
Mfg.	Farris	Serial #	CE21124A10
Type/Model	26KA10170	Capacity	55 M ³ /Min
Date of Service	2001/05/01	Next Service	2003
		Set Pressure	207 KPa
		Size	76 mm
		Service Co.	Powercomm

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Phone: (780) 469-2401 Fax: (780) 468-2422

Field Inspection Report
Vessel A # 146808

Report # 3727

NCR # 3642 issued - Welders rod oven partially unplugged and left partially open. - Closed

Observations:

External Vessel shell and external piping are fully clad and in good condition. Vessel is resting on saddle of pedestal. Pedestal is resting on concrete piles, nuts are not tightened down. Gauges are in good condition. Piping in building is clad or painted blue and in good condition. Inspection ports are cut in cladding. Firetubes are removed for inspection – reported only east tube is being used.

Internal Minor immeasurable pitting throughout shell and internal appertanances. Back head has heavy scale with mild underlying corrosion. Some water and small amount of sludge on bottom of shell. No visible corrosion in these areas. Firetube nozzle welds are missing. Not able to determine if this is due to corrosion or manmade. These welds require repairs. Cavity is 11.43 mm deep.

Repairs to involve stringer bead procedure.

- 1) Sandblast welds.
- 2) Bake out.
- 3) Pre-heat.

UT (Measurements in mm)

Front head

Top – 12.32, 12.35, 12.36, 11.65

Mid – 11.75, 11.76, 12.54, 12.35

Bottom – cannot get measurements due to scale.

Shell

Bottom – 8.70, 8.60, 8.93, 8.91

Side – 9.21, 9.24, 9.24, 9.27

South Head – 11.53, 11.28, 12.04, 11.87

RAE Inspection Service (1979) Ltd.

#111, 4808 – 87 Street, Edmonton, Alberta T6E 5W3

Phone: (780) 469-2401 Fax: (780) 468-2422

**Field Inspection Report
Vessel A # 146808**

Firetube

(West) right tube – Continuous pitting throughout burner leg. Deepest 5 pits at 27” from flange at 2.29 mm deep. Pits noted at 6’ mark measure 1.65 mm deep. Average pit depth measured 1.52 mm deep.

Tube coated with black and copper film throughout.

Bottom of firetube has pitting throughout to 1.52 mm deep (several at 0.060” deep). Tube has a green/copper color with thin black deposits. Internal of stack leg has pitting to 24” from end at 6 o’clock. Pitting is maximum 3.175 mm deep.

MPI

Performed on all accessible welds of both tubes. No indications of cracks found.

Discussed repairs required with Len – ABSA rep to be informed 100² in. The corroded weld was sand blasted and MPI was performed on the remaining weld and on the outside weld. No indications of cracks were found. Repair and weld procedure were reviewed and accepted with a modification of the preheat temperature to 80 C.

Bake out was performed on May 15. Coils were wrapped on the outside with the Thermo couples on the inside surface. Baked at 345C for 2.5 hours. Chart review and accepted. Instruments calibrated April 27, 2001.

May 16

Review procedure with Melloy’s welder. Understood preheat to 80 C. Talked with Jim Randall, he said to go ahead with repairs and he would be coming to site today. MPI was performed after back gouging and found several small cracks which were ground and inspected until removed.

Jim Randall showed on site. Discussed repairs. He was satisfied with procedure and verbally waived hydrotest.

Welder is using ” E-7018-1 electrodes for majority of weld. Using 5/32” E-7018-1 electrodes in hard to reach areas.

Welder is using rod oven. Reminded welder to keep oven closed except when retrieving a new rod.

RAE Inspection Service (1979) Ltd.

#111, 4808 – 87 Street, Edmonton, Alberta T6E 5W3

Phone: (780) 469-2401 Fax: (780) 468-2422

**Field Inspection Report
Vessel A # 146808**

Current is set at approximately 150 amp using E-7018 electrode.

7:30 PM Change over to night shift welder. Safety meeting and orientation.

After 9 PM Inspection of weld and equipment was performed. It was found that the rod oven was not hot. The oven was partially unplugged. The welder informed me it must have happened during the changeover when moving cables around. The rod oven was also found left open approximately 6" while the welder went for a break. The welder was informed to watch the plug and to keep the oven closed. NCR # 3642 was written. Area to be repaired was sand blasted. Pictures were taken before and after. MPI was performed to internal and external weld surfaces. No indications of cracks were found.

Welder gouged the repair area and performed some grinding to prep weld surface.

MPI was performed to the back gouged area. Several small cracks were found. Cracks were ground, inspected until removed.

Welding completed at 2:30 AM. Torched to keep warm till heat treaters arrived.

MPI was performed May 17, 2001 to the completed weld. No indication of cracks found on the completed weld.

May 17

Welder completed welding at 2:30 AM. Heat was applied to the weld area to keep it warm until heat treaters were ready.

MPI was performed prior to heat treating. No indication of cracks found.

Heat treaters calibration records were checked against their equipment and acceptable. Heat chart was reviewed and accepted.

MPI was performed on May 18/01 approximately 30 hrs after welding was completed and 18 hrs after PWHT. No indications of cracks were found.

Vessel is now acceptable for continued service.

Vessel is to be inspected in 1 years time.

RAE Inspection Service (1979) Ltd.

#111, 4808 – 87 Street, Edmonton, Alberta T6E 5W3

Phone: (780) 469-2401 Fax: (780) 468-2422

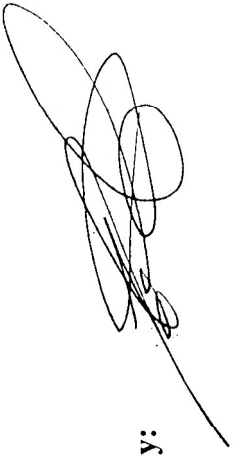
**Field Inspection Report
Vessel A # 146808**

May 18

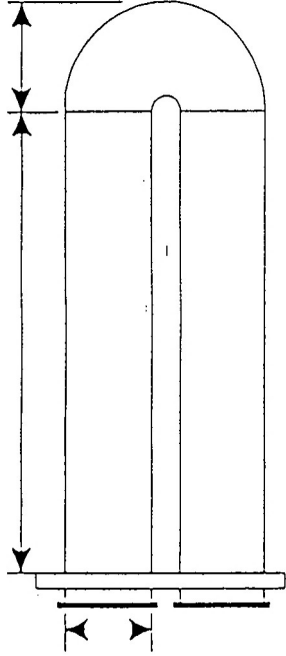
Final MPI inspection of the repair weld found no indications of cracks. Inspection was performed at approximately 30 hrs after welding was completed and 18 hrs after PWHT. Vessel is now acceptable for continued service.

Inspector: Trevor Paananen

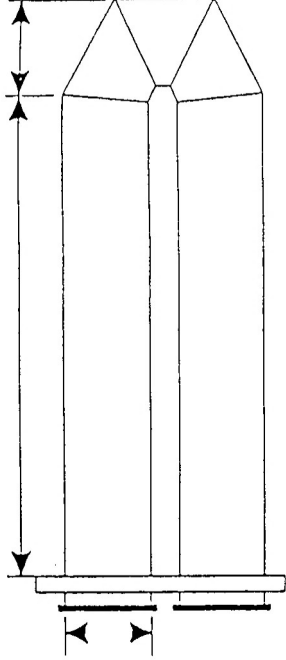
Reviewed By:



File Number	01-275	Firetube Number	4 West
Inspection Date	May 14/01	Inspector	Treure
Location	East WestLock		

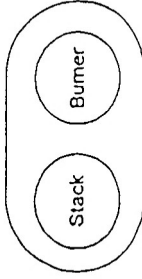


☐ Formed Return Bend

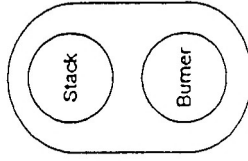


☐ Three Section Mitred Return Bend

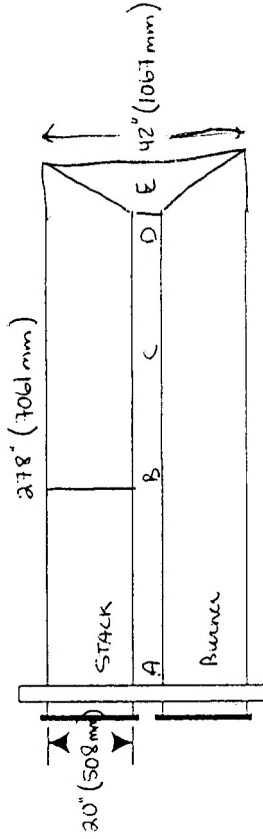
Flange Orientation:



☐ Horizontal



☒ Vertical



☒ Other (sketch return bend)

	Stack Leg				Burner Leg			
	3	6	9	12	3	6	9	12
A	7.67	7.12	7.19	7.74	7.61	7.88	7.89	7.91
B	7.94	7.93	7.60	7.86	7.47	7.59	8.24	7.59
C	7.86	8.00	7.88	7.70	7.40	8.36	8.12	7.61
D	8.10	8.32	7.81	7.89	6.98	8.00	7.53	8.30
E					7.98	7.97	7.33	7.86
F								
G								
H								
I								
J								
K								
L								
M								
N								
O								
P								
Q								

Thickness readings are in: ☒ mm ☐ 0.001"

Visual Inspection

See previous page

Magnetic Particle Investigation

Spacing Between Planes

Inspector Signature:

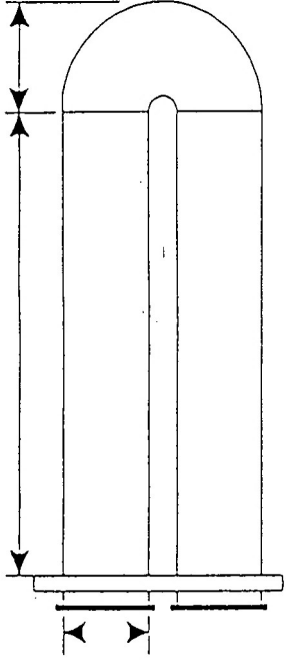
RAE Inspection Service (1979) Ltd.

#301, 8925 - 51 Avenue • Edmonton, Alberta, Canada T6E 5J3
Telephone: (403) 469-2401 • Facsimile: (403) 468-2422

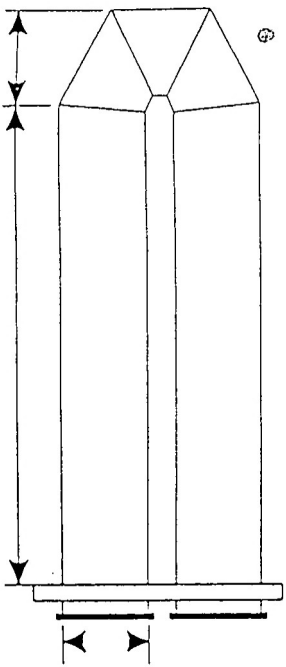
Firetube Inspection Report

Page 3 of

File Number	01-285	Firetube Number	EAST
Inspection Date	May 14/01	Inspector	TRIVIER
Location	EAST WESTLOCK		

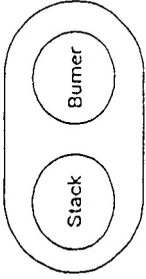


☐ Formed Return Bend

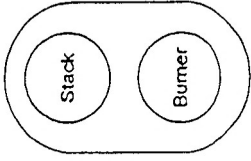


☐ Three Section Mitred Return Bend

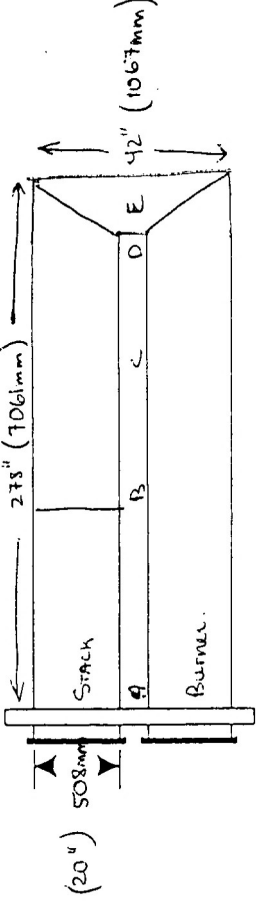
Flange Orientation:



☐ Horizontal



☐ Vertical



☒ Other (sketch return bend)

Stack Leg				Burner Leg			
3	6	9	12	3	6	9	12
A	7.03	7.05	7.55	7.04	7.93	7.89	7.23
B	7.69	7.48	7.57	7.17	7.13	7.53	7.67
C	7.73	7.85	8.02	7.58	7.16	7.71	7.21
D	6.93	7.81	7.90	7.52	7.64	7.87	7.62
E				7.10	7.61	7.76	7.63
F							
G							
H							
I							
J							
K							
L							
M							
N							
O							
P							
Q							

Thickness readings are in: ☒ mm ☐ 0.001"

Visual Inspection

See previous page

Magnetic Particle Investigation

Spacing Between Planes

Inspector Signature: _____

RAE Inspection Service (1979) Ltd.

#111, 4808 – 87 Street, Edmonton, Alberta T6E 5W3

Phone: (780) 469-2401 Fax: (780) 468-2422

**Field Inspection Report
Vessel A # 146808**

Client	Canadian Natural Resources				Date of Insp.		October 18, 1999			
Prov. Reg.#	146808				Location		Westlock East Gas Plant			
Equipment	Amine Reboiler				LSD		13-24-60-26-W4			
Tag/Equip. #	H-1				Comp./Unit #					
Vessel Status	In Operation				Job #		99-312			
Fabricator	Cessco				Serial #		P2759		MAWP/Temp	448kPa/ 149C
CRN#	D3934.2				Shell Mat'l		SA-516-70		Shell Thick	9.525mm
Corr. All.	3.175mm				Head Mat'l		SA-516-70		Head Thick	9.525mm
Diameter	1829mm				Length		8534mm	Height	RT	HT
Year Built	1979				Next Insp		2001		Insp. Type	VE/VI/UT
Service	Sour				Manway		Yes		Coating	No
PSV #.										
Mfg.	Farris				Serial #		CE21124-A10		Set Pressure	30psi
Type/Model	26KA10-140				Capacity		4298 #/hr		Size	3"
Date of Service	99/10/18				Next Service		2001		Service Co.	RMM

Report # 1956**Observations:**

External: Vessel 100% insulated and clad. Outside building in good condition, inside cladding in fair/good condition. Saddle supports/legs good condition bolted solid to cement pads. Chimneys rusty, flanges, elbow, rain caps and wind deflectors good condition. Burner assemblies in good condition.

Internal: Good condition, minor pitting at inlet pipe on shell to about 2mm.
No changes since 1997 inspection noted.
Firetubes are pitted to a maximum of 0.085" on burner sides (one location) and random to about 0.030" all over. No MPI done at this time.
NOTE: Appears internals are chrome colored with some copper noted.

RAE Inspection Service (1979) Ltd.
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Phone: (780) 469-2401 Fax: (780) 468-2422

Field Inspection Report
Vessel A # 146808

UT Readings

Readings taken on shell and head above nominals, firetubes minimum 0.375" (9.525mm).

Recommendations:

Next outage/shutdown sandblast firetubes for MPI inspection.



Inspector:

Jim Longstreet



Reviewed By:

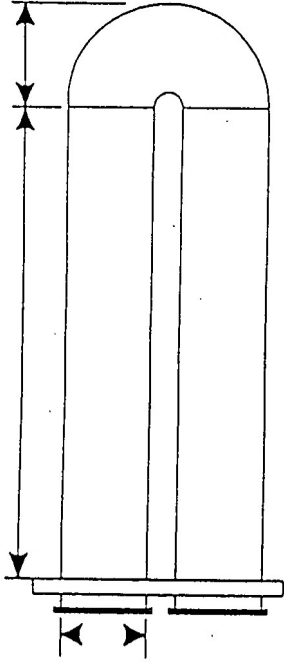
RAE Inspection Service (1979) Ltd.

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Telephone: (403) 469-2401 • Facsimile: (403) 468-2422

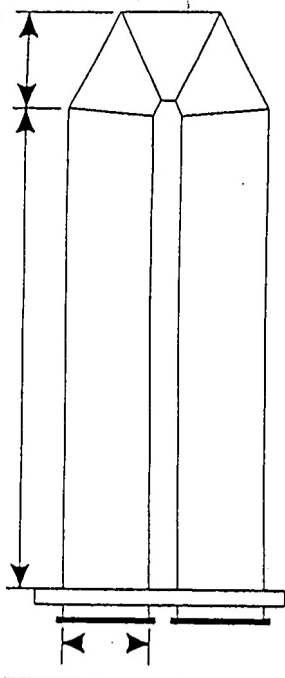
Firetube Inspection Report

Page 1 of 1

File Number	Firetube Number	#1 (EAST SIDE)
Inspection Date	Inspector	(A) 146808
Location		

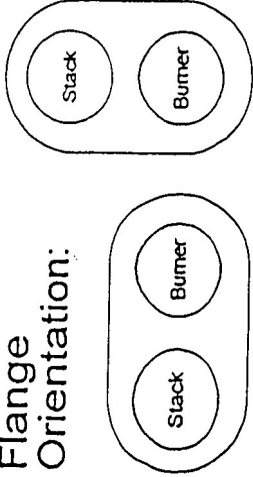


☐ Formed Return Bend



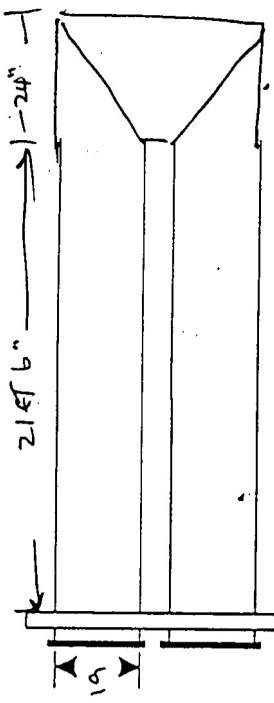
☐ Three Section Mitred Return Bend

Flange Orientation:



☐ Horizontal

☒ Vertical



☒ Other (sketch return bend)

	Stack Leg			Burner Leg				
	3	6	9	12	3	6	9	12
A								
B								
C								
D								
E								
F								
G								
H								
I								
J								
K								
L								
M								
N								
O								
P								
Q								

Thickness readings are in: ☐ mm ☐ 0.001"

Visual Inspection

STACKS REMAIN AS-BUILT WITH NO VISIBLE CORROSION (NOT #2)
- SAME AS #2 WITH CORROSION TO MAX 0.030"

Magnetic Particle Investigation

Spacing Between Planes

#1956

Inspector Signature: _____

07/5 1100A

RAE Inspection Service (1979) Ltd.

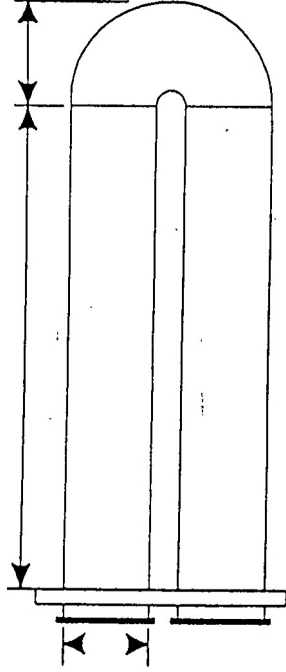
#301, 8925 - 51 Avenue • Edmonton, Alberta, Canada T6E 5J3
Telephone: (403) 469-2401 • Facsimile: (403) 468-2422

Firetube Inspection Report

Page of

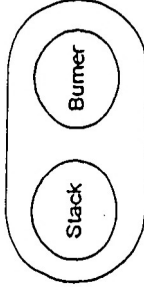
File Number	79-312	Firetube Number	# 2 (WEST SIDE)
Inspection Date	05/18/99	Inspector	
Location	13-24		

① 146808

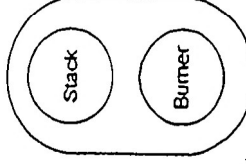


☐ Formed Return Bend

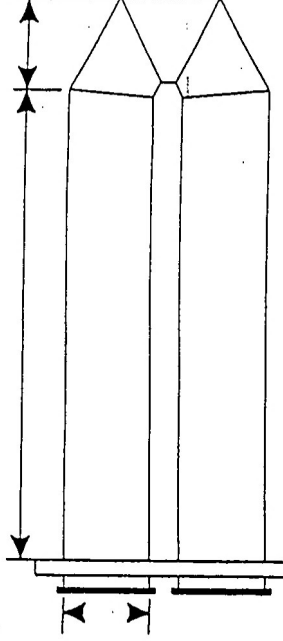
Flange Orientation:



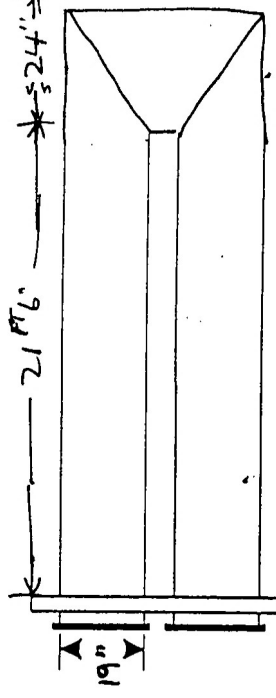
☐ Horizontal



☒ Vertical



☐ Three Section Mitred Return Bend



☒ Other (sketch return bend)

	Stack Leg			Burner Leg				
	3	6	9	12	3	6	9	12
A								
B								
C								
D								
E								
F								
G								
H								
I								
J								
K								
L								
M								
N								
O								
P								
Q								

Thickness readings are in: ☐ mm ☒ 0.001"

Visual Inspection

- Burner tube parted at random to max of 0.100 (approx 6' from flange blow pos, rest as a tube to max of 0.050" (nom. approx at 325" at random int. cuts)
- Tubes appear to have been magnified.

NOTE: NO CORROSION SINCE 5-27-97

REPORT 3140

Magnetic Particle Investigation

NO MAGNETIC PARTICLES

Spacing Between Planes

Inspector Signature: _____

25.4
3
762

#1958

firetube frm
revision 2.10, 20-Aug-93



146808

REDWATER MACHINING & MANUFACTURING CO. LTD.

QUALITY PROGRAM MANUAL

FORM #12 P.R.V. INSPECTION AND TEST REPORT				
DATE: OCT 18/99		R.M.M. JOB #: V10948		
CUSTOMER: CNRL		LOCATION: WESTLOCK EAST		
MAKE: FARRIS		TYPE/MODEL: 26KA10-140		
CONNECTION TYPE: FLGD		INLET SIZE: 3"		
SET PRESSURE: 30 PSI		BACK PRESS:		
COLD/DIFF SET PRESS:		TEMP:		
CODE SYMBOL: UV		RESET REQ.:		
NEW CAPACITY:		SEAL CONDITION: INT		
DATE OF LAST SERVICE: 97-5-27		RMM-943		
PRE-TEST:		DATA PLATE CONDITION: GOOD		
POP PRESSURE: 32 PSI		RESULTS: LEAKED		
I.D.#: RMM 706		PO: CE-21124 A10		
TAG/PSV: 4298 #/HR		CAP ASSY: PKD L.L.		
NEW SET PRESS:		INSIGNIA: RMM		
DATE OF LAST SERVICE: 97-5-27		DATA PLATE CONDITION: GOOD		
PRE-TEST:		RESULTS: LEAKED		
POP PRESSURE: 32 PSI		RESULTS: LEAKED		
COMPONENT	INSPECTION	CHECK	AS FOUND CONDITION	REPAIR ACTIONS
DISC	MIN	DIM	DENTED	ACT. LAP
NOZZLE	MIN	DIM	DENTED	ACT. LAP
DISC HOLDER	MIN	DIM	OILY	ACT.
GUIDE	MAX	DIM	OILY	ACT.
SPINDLE/STEM		VIS	OILY	
SPRING #/BUTTONS		VIS	OILY	#
LOWER RING		VIS	STARTING TO CORRODE	REPLACE NEXT SERVICE
BELLOWS		PER		
GASKETS		VIS	ACC	
OTHER		VIS		
OTHER		VIS		
OTHER		VIS		
DISASSEMBLY: STEVE	INSPECTION: DENNY		REASSEMBLY: STEVE	
MEDIUM: AIR	SET PRESS: 30 PSI		COLD SET:	
FINAL TEST: SIMMER: SET POINT: 30 PSI				
BACK PRESS TEST: 40 PSI LEAKAGE: 0 TEST GAUGE I.D.				
ADJ RING SETTING: UPPER: LOWER: -4				
TESTED BY: DENNY WITNESSED BY: MIKE				
PARTS REQ. NEXT: BLOWDOWN RING				
COMMENTS: TAG: A146808 AMINE REBOILER				
SHIPPING INSPECTION:				
FUNCTION		ACC.	FUNCTION	
Valve Painted	X		Penetrations Covered	X
Tags Intact	X		Lever Tied Down	X
Seals Intact	X		Packaging/Loading	X
Nameplate Attached	X			
SHIPPING DATA: SHIPPING CO.: RMM		DATE: OCT 20/99		
PACKING SLIP #: 13659		TECHNICIAN: DENNY DANCAUSE		



INSPECTION SERVICE (1979) LTD.

File #: 97-066 Report #: 3140
Client: CANADIAN NATURAL RESOURCES
Location: WESTLOCK EAST
LSD: 13-24-60-24W4
Distribution: Ken Harke

FIELD INSPECTION REPORT

Last Edited : 6/17/97

Date of Inspection: 05/27/97 Next Inspection Due: 05/27/98

EQUIPMENT INFORMATION:

Prov. Reg. #: 146808
Province of Registration: ALBERTA
Equipment Name: AMINE REBOILER
MAWP: 448 kPa 149 °C

CRN: D3934.2 Tag #:
Plant: WESTLOCK EAST
Manway: NO Coating: NO
Service: AMINE

ITEMS FROM PREVIOUS INSPECTIONS:

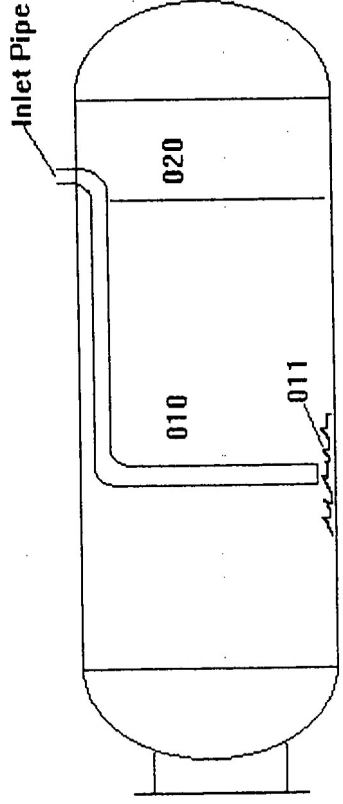
EXAMINATION METHODS: ☒ Visual ☐ UT ☐ MPI ☐ RT ☐ LPI ☐ PT Other:		ACCESS: ☒ Internal ☐ External	
INSPECTION: ☒ Initial ☐ Reinspection	CLEANING: ☒ Good ☐ Poor ☐ Unacceptable		
PRESSURE TESTS: ☐ Hydro ☐ Pneumatic Other:		Shell	Tube
MAWP (kPa)		SET PRESSURE(kPa)	CAPACITY(m ³ /min)
SAFETY VALVES:	PSV Tag No.		LOCATION
Shell Side:	448	PSV146808	54
		207	13-24-60-24W4
Tube Side:			



INSPECTION SERVICE
(1979) LTD.

Report No.: 3140

VESSEL SKETCH:



EXTERNAL CONDITION:



INSPECTION SERVICE
(1979) LTD.

Report No.: 3140

OBSERVATIONS:

AREA	COMMENTS
010	Visually inspected. Shell in good condition.
011	Pitting is present on an area approximately 1 m x 0.5 on the 4 to 6 o'clock zone, adjacent to the inlet piping.
020	Inaccessible for inspection.
Firetubes	Visually inspected. Both tubes show extensive corrosion on the external surface, mainly on the burner leg. The right hand tube is worse than the other, with pits up to 3mm deep. Extensive pitting was found on the internal surface of the LH tube, after removal of accumulated scale. This pitting is also in the order of 3mm.

ULTRASONIC THICKNESS RESULTS:

LOCATION	1	2	3	4	5	UNITS



INSPECTION SERVICE
(1979) LTD.

Report No.: 3140

DISCUSSION:

The location of the pitting on the shell, the more severe pitting on the firetube in this area, and the fact that only one firetube is in operation indicate that gas breakout is likely taking place in this area. The firetubes were most likely originally 3/8" thick, so the pitting has removed from 1/3 to (in some isolated spots) 1/2 of the firetube thickness.

RECOMMENDATIONS:

1. Reinspect in 12 months.
2. Plan to replace or extensively repair both firetubes at the next shutdown.
3. Investigate the feasibility of firing both firetubes at reduced rates rather than just one, in order to balance the heat input into the reboiler.
4. If balanced firing is not possible, use the left hand firetube until the next shut down.
5. Re-evaluate the corrosion on the shell at the next shut down.

INSPECTOR: I have witnessed/done the above inspections and certify that they have been done in accordance with our approved manual and that the information is accurate. I certify that the status of the Pressure equipment detailed here is:

Suitable to be returned to service	☒ YES	☐ NO
Repairs are still required	☐ YES	☒ NO
Repairs are complete (CB-40) attached	☐ YES	☐ NO
Suggested inspection interval		☒ N/A
		12 months

Hennie Prinsloo

Inspector

Signature

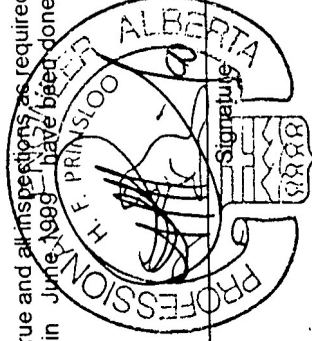
6/17/97

Date

CHIEF INSPECTOR: I certify that the information on this report is true and all inspections, as required by our Owner/User Quality Assurance Program # AQP 8039 which expires in June 1999, have been done.

Hennie Prinsloo

Chief Inspector



6/30/97

Date

RAE Inspection Service (1979) Ltd.

#301, 8925 - 51 Avenue, Edmonton, Alberta, Canada T6E 5J3
Telephone (403) 469-2401, Facsimile (403) 468-2422

Pressure Vessel Data Input Report

File Number: _____ Date: _____ Page _____ of _____

Equipment Identification

Owner		In Service	☒ Yes ☐ No
LSD			
Location Name			
Description	Anne related		
Manway	☒ No ☐ Yes - Number _____ Size _____	Coated Vessel	☐ Yes ☒ No

Provincial Number	(4) 146 808	CRN	P 3934-2
Tag Number		Serial Number	P 2359
Manufacturer	Casco	Year Built	1979
MAWP	448 kPa @ 149°C	MDMT	@
Test Pressure		U Stamp	☐ Yes ☐ No
Shell Material	SA 516-70	Thickness	9.525 in
Head Material	"	Thickness	"
Tube Material		Thickness	
Corrosion Allowance	3.175 mm	Diameter	1829 mm
Length	8534 mm	Height	
Volume	23.2 m ³	Radiography Code	RT - 1
Heat Treatment	Yes	Drawing Reference	F 2130.4.0
Flange Rating (ANSI)	Nozzles	Flange Rating (ANSI)	Manway
Support	☐ Skirt ☒ Saddle ☐ Other:		

Last Inspection		Next Insp.	1998
Inspection Type	☐ Inventory Only ☒ Visual ☐ RT ☐ MPT ☐ LPT ☐ Ultrasonic ☐ Coating ☒ Initial ☐ Reinspection		
Cleaning	☒ Good ☐ Poor ☐ Unacceptable	Access	☒ Internal ☐ External ☐ Manway ☒ Thru Nozzle
Service	☐ Steam ☐ LPG ☐ Oil ☐ Air ☐ Gas ☒ Sour Gas ☐ Multiphase Sour ☐ Water ☒ Other: amine		
PSV Off for Service	☒ YES - service report to be obtained ☐ NO - details to be included on reverse		

RMM TAG # 513	REDWATER MACHINE & MANUFACTURING CO. LTD. PRESSURE RELIEF VALVE INSPECTION & SERVICE REPORT	Work Order # V-9799
REFERENCE DATA History: <u>BLACK GOLD</u> Date: <u>9/94</u> Tag #: <u>E-22272</u>		
Customer: <u>C.N.R.L.</u> Location: <u>WESTLOCK EAST</u>		
Make: <u>FARRIS</u> Model#: <u>26KA10-170</u> Ser.#: <u>CE-21124-A10</u> Code Stamp: <u>UV</u>		
Set Press.: <u>30</u> PSI Back Press.: _____ Cold Set Press: _____		
Size: <u>3</u> K <u>4</u> Flanged: <u>X</u> Capacity: <u>4298</u> SAT/ PRV NO: _____		
AS RECEIVED CONDITION Visual: new _____ used <u>X</u> good <u>X</u> fair _____ poor _____ BER _____ Seals Broken: yes _____ no <u>X</u> Nameplate: yes <u>X</u> no _____ ADJ. SCREW SET: <u>1.585</u> UPPER BLOW DOWN SET: _____ INCHES		
PRE-TEST RELEASE: <u>30</u> PSI LEAKAGE TEST AS PER ANSI/API		
PRE-TEST BELLOW: _____ 527 BUBBLES/MIN <u>+20</u>		
LEAKED: YES _____ NO _____		
COMMENTS: <u>A#146808 AMINE REBOILER</u>		
TECHNICIAN: <u>MIKE</u> DATE: <u>MAY 26/97</u>		

COMPONENT INSPECTION				
COMPONENT	Acc.	Rej.	REPAIRS REQUIRED	PARTS REPLACED Part # / Material
Valve Body	X			
Inlet/Outlet	X			
Spindle	X			
Spring	X			
Guide	X			
Disc/Disc Holder	X			
Bellows	N/A			
Nozzle	X			
Adjustment Ring	X		BEGINNING TO WEAR - MAY REQUIRE REPLACEMENT NEXT SERVICE	
Ring Pin	X			
Sealing Surfaces	X			
Others		X	GASKETS - REPLACE	GSKT SET #2

DETAILS OF WORK PERFORMED: DISASSEMBLED, CLEANED & INSPECTED PARTS

Technician: MIKE

Inspected By: TIM

Date: MAY 27/97

SIDE: 2

REDWATER MACHINING & MANUFACTURING CO. LTD.

RMM- 513

PRESSURE RELIEF VALVE INSPECTION & SERVICE REPORT

MODIFICATIONS

Modifications Made: yes no XCustomer Approval Rec'd: yes New Spring Model: Original Set Press.: Revised Set Press.: Revised Valve Capacity: Remarks: Technician: Inspector: Date:

REASSEMBLY

Parts Cleaned: yes X Seating Surfaces Lapped: yes XValve painted: yes X Colour: PRIMER & GREYRemarks: Reassembled By: SHANNON Inspector: TOM Date: MAY 27/97

TEST DATA

Test Medium: air X water other Simmer Press.: Pop Press.: 30 PSI Reseat Press.: Leakage test as per ANSI/API 527 Bubbles/min 0 Temp. Adj. Made NOBack Press. Test Performed: yes X no Tested B.P. to 25 PSILOWER BLOW DOWN SETTING: -4 NOTCHES: REMARKS: Technician: SHANNON Witnessed By: TOM Date: MAY 27/97Customer Witness (if applicable):

SHIPPING INSPECTION

FUNCTION	Acc.	Rej.	NA	FUNCTION	Acc.	Rej.	NA
Valve Painted	X			Penetrations Covered	X		
Tags Intact	X			Lever Tied Down	X		
Seals Intact	X			Final Inspection	X		
Nameplate Attached	X			Packaging/Loading	X		

Technician: TOM Inspected By: SHANNON Date: MAY 28/97

SHIPPING DATA

Shipping Co.: THORHILD FREIGHT Date: MAY 28/97Packing Slip #: 5838 Technician: TIM KEARNS