

**BOILERS AND PRESSURE VESSELS
REPAIR OR ALTERATION REPORT**

AB-40 (Side A) 2015-11

(A) #: 607657

OWNER EQUIP. NO: 62066035

REPAIR ORG. JOB NO: _____

REPAIR ☒

and/or

ALTERATION ☐

Partial ☐

Final ☐

1. Name of Organization doing Repair/Alteration KRM WELDING SERVICES LTD.

Address 16232 - 83B STREET, EDMONTON, ALBERTA

AQP No. & Expiry Date AQP-21784 2017-06-04

2. Name of Owner Husky Oil Operations Limited,

Address 4429 44 St. Lloydminster, SK S9V 0Z8

Location of Installation Husky Oil Operations Limited, Morgan Battery (LSP 10-34-51-04-W4)

3. Boiler/Pressure Vessel Description OTS-150W (150 HP Water/Glycol Heating Boiler)

CRN U1463 23

Manufacturer's Name SASKATOON BOILER MFG. CO. LTD.

Serial No. 7119

4. Original Design Conditions:

a) Vessel/Shellside/Boiler: Max Allowable Working Press. 15 PSIG / 160PSIW Min/Max Design Temp 250 F/
b) Jacket/Tubeside: Max Allowable Working Press. _____ Min/Max Design Temp /

5. New Design Conditions:

a) Vessel/Shellside/Boiler: Max Allowable Working Press. _____ Min/Max Design Temp /
b) Jacket/Tubeside: Max Allowable Working Press. _____ Min/Max Design Temp /

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

7 tubes with linear indications (Transverse cracks in seal welds)

7. Original Code Edition and Addenda ASME Sect. IV Year 2007 Addenda A09

8. Code Edition and Addenda used for performing the work ASME Sect. IV Year 2015 Addenda _____

9. Description of Work performed. (Step by step description of repair/alteration method used. Attach additional pages as required, and reference any additional documents used to provide the required information; such as repair or alteration procedures, drawings, and specifications)

- 1) Perform MPI on tube to tube sheet welds to identify defects.
- 2) If MPI does not identify any defects perform hydro test at 240 psi (1655 kpa) to replicate leaks while in service.
- 3) Remove all tubes which have failed tube to tube sheet welds.
- 4) Perform WF MPI on tube sheet and tube holes to identify any additional defects.
- 5) Install new tubes, all tube ends to be expanded, beaded and seal welded.
- 6) Perform WF MPI on tube to tube sheet welds to identify defects.
- 7) Initial hydro test to verify tube seal welds
- 8) Re-expand the new seal welded tubes along with tubes that are adjacent to the new tubes.
- 9) Final hydro test at 240 psi (1655 kpa) for one hour (hydrotest to be witness by ABSA A.I.)

10. Heat Treatment: Preheat Temp 50F Post Weld HT (Temp./Time) _____ Other _____

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

Visual
- WF MPI after tube removal, after defect removal and after final welding and prior to hydrotesting.

12. Pressure Test

Vessel/Shellside/Boiler

Tubeside/Jacket

a) Hydrostatic 240 PSIG
b) Other Test _____

(A) #: 607657

OWNER EQUIP. NO. 62066035

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

Item	Material Specifications	Thickness / Schedule	Diameter	Item	Material Specifications	Thickness / Schedule	Diameter
Shell/Drums				Heads/ Ends		<i>Class</i>	
Tubesheet	SA-516-70	0.75"	60" OD	Tubes	SA-178-A	<i>0.495" Min. W</i>	2"
Nozzles				Flanges/Fittings		Class	

14. **Welding Procedures** - Alberta Registration Number WP- 2917.2

WPS Numbers used: KRM-2

15. **Welded Replacement Parts:** Attached are Manufacturer's Partial Data Reports or Repair/Alteration Reports properly identified and signed by Authorized Inspector for the following items of this report: (Welded parts supplied by others).16. **Responsibility Owner/Client.** Identify below items that the owner/client has assumed responsibility for. **Note (2)**

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

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.

17. **REMARKS:**

Grade B welder: KRM WELDING SERVICES LTD. Kevi Martin W-23568, P1-P1 F3/F4 Expires February 11, 2016.

18.

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 and the AB-513.

a) For all items except for items identified in 16:
KRM WELDING SERVICES LTD.

b) For items identified in 16 only:

(Repair/Alteration Organization Name)
21784 2017-06-04

(Owner/Client Organization Name)

(AQP Number & Expiry Date)

(AQP Number & Expiry Date)

(Signature & Date)

(Signature & Date)

(Print Name)

(Print Name)

19. DATE WORK WAS COMPLETED: Dec 30/15.

20.

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 and the requirements established in AB-513.

a) In-service Inspector (ISI) Certification

(When the repair is inspected by an ISI per the requirements established in AB-513)

b) ABSA Safety Codes Officer Certification

(When work is inspected by ABSA).

Owner-User/Inspection Company Name

AQP#

In-Service Inspector Signature & Date

In-Service Inspector Name (Please Print)

In-Service Inspector Alberta Cert #

ABSA SCO Signature & Date

Print Name

25 JUNE 2014

REPAIR/ALTERATION TRAVEL SHEET

PAGE 1 OF 1

Vessel Title	Manufacturer/Serial Number	Identification Number
Glycol Heating	Saskatoon 7119	607657
CODE INSPECTOR REVIEW:		REVIEW DATE:

Indicate Sequence Numbers And Hold Points Which Are Applicable By *

Seq.	Operations	Hold Points	Comments	Rep. Org.	Code Insp.	Owner Insp.	
1	Repair/Alteration Procedure Accepted by ABSA Safety Codes Officer/and OUP Inspector when applicable		Dec 28	KM	RA		
2	Welding Procedures Registered for Welding to be done		Dec 28	KM			
3	Welders have valid Alberta P.Q. Card for work to be done		Dec 28	KM			
4	Cracks MT/PT check after removal		Dec 29	KM			
5a	Materials to be used - checked against PO/Drawing		Dec 29	KM			
5b	- material identified with correct SA/SB specifications		Dec 28	KM			
5c	- material test reports checked against specifications			W/A			
6a	Fit up - shell courses-flush patches-heads			W/A			
6b	- tubesheet/shell - firetube		Dec 29	KM			
6c	- nozzles and fittings			W/A			
7	Radiographic Examination			W/A			
8	Ultrasonic Examination MT/PT		Dec 29	KM			
9	Internal Visual after welding			W/A			
10	External Visual after welding		Dec 29	KM			
11	Heat Treatment			W/A			
12	Hardness Tests			W/A			
13	Hydrostatic Pressure Test	240 psi	Gauge No.'s	KM	RA		
14	Alternative Test (Specify)			W/A			
15	Nonconformance Report # Cleared			W/A			
16	Pressure Vessel Repair or Alteration Report (AB 40) completed		Dec 28	KM	RA		
17	Repair/Alteration Nameplate attached			W/A			
OUTLINE SKETCH		MATERIAL USED IN REPAIR/ALTERATION					
(Record Welder's Symbols and Heat No.'s, Radiograph ID No.'s) Attach separate sketch if required.		Item	Mat.'l Spec	Plate & Heads Heat & Plate#	Thk/	Sch.	Rating
		Shell/Patches					
		Heads' End					
		Tubesheet					
		Firetube					
		Nozzles					
		Fittings					

IRISNDT

MAGNETIC PARTICLE INSPECTION REPORT

CA0131-MT-929
Page 1 of 1

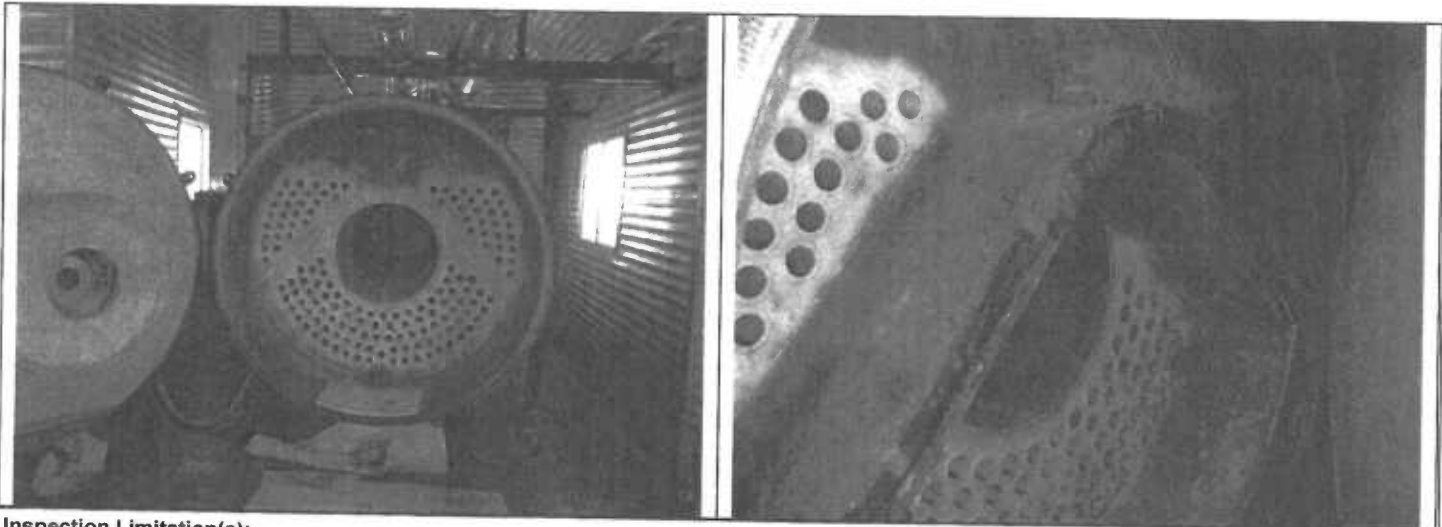
Procedure: 5.0 Technique: MT-2V Code: N/A ; CRACK DETECTION Other:	Rev 1.0	Client: HUSKY OPERATIONS IRISNDT #: LYD1501570 Location: HUSKY MORGAN BATTERY Item Inspected: GLYCOL BOILER ; SN# 7119	Date: 28-Dec-15 WO #: 60223014 PO #: 8400982914
Surface Condition: Painted <input type="checkbox"/> Sandblasted <input type="checkbox"/> Machined <input type="checkbox"/> As Cast <input type="checkbox"/> As Forged <input type="checkbox"/> Weldment <input checked="" type="checkbox"/> Other <input checked="" type="checkbox"/>			
Material: P1		Thickness: VARIOUS	Heat Treatment: AS WELDED
Magnetizing Equipment: Yoke <input checked="" type="checkbox"/> Coil <input type="checkbox"/> Permanent <input type="checkbox"/> IRISNDT #: 40099		Mfg: CON. PROBE	Calibration Date: 17-Nov-15
Method of Magnetization: AC <input checked="" type="checkbox"/> DC <input type="checkbox"/> Continuous <input checked="" type="checkbox"/>			
Blacklight: Y <input type="checkbox"/> N/A <input type="checkbox"/> IRISNDT #: Verification per ASME V Art 7 T.777.2		Blacklight Meter: IRISNDT #:	Calibration Date: - -
Whitelight: Y <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Verification per ASME V Art 7 T.777.1		Lighting Equipment: Yoke Light (10W)	
Magnetic Particles: Dry <input type="checkbox"/> Wet <input checked="" type="checkbox"/> Batch #: 301-12		Red <input type="checkbox"/> Grey <input type="checkbox"/> Black <input checked="" type="checkbox"/> Fluorescent <input type="checkbox"/> Mfg: MAGNAFLUX	Type: 7C
Background: <input checked="" type="checkbox"/> Batch #: 1333		Mfg: ARDROX	Type: 8901W

Inspection Results:

A MAGNETIC PARTICLE EXAMINATION WAS CARRIED OUT AS REQUESTED, 100% OF THE TUBE TO TUBESHEET FILLET WELDS (BOTH ENDS), ON GLYCOL BOILER.

RESULTS: NO CRACKS WERE FOUND DURING THE INSPECTION.

REQ. MARC CASE ; APP. MARC CASE ; 2Z-02018989 ; CC# 10063984 ; LSD: 10-34-51-04W4M



Inspection Limitation(s):

Unit#: 601 In: 1200 Out: 1600 Hrs: 4.0 In: _____ Out: _____ Hrs: _____ Personnel: RANDY TRADEWELL AMANDA DEWOLFE	Kilometers: 100 Consumables: MIN. 2-GAS MONITORS	Interpretation by: RANDY TRADEWELL (Print) <i>Randy Tradewell</i> (Signature) Client Representative: (Print) I am in full agreement with report contents (Sign) <i>Randy Tradewell</i>	SNT-TC-1A: II C.G.S.B.: II (Level) C.G.S.B. #: 5357
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5311- 86 Street, Edmonton, Alberta T6E 5T8 Phone: (780) 437-2022 fax: (780) 436-4873
Calgary (403) 279-6121 Cold Lake (780) 826-6105
Lloydminster (780) 875-6455 Fort McMurray (780) 743-1536
Barhead (780) 674-3018 Red Deer (403) 347-1742
Nisku (780) 955-7616
www.irisndt.com
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Engineering, Edmonton (780) 437-2022
Rope Access Services (780) 437-2022
Offices also located in USA and UK
IRISNDT-E-2003H

Procedure: 5.0 Rev 1.0

Technique: MT-2F

Code: N/A ; CRACK DETECTION

Other:

Client: HUSKY OPERATIONS

IRISNDT #: LYD1501575

Location: HUSKY MORGAN BATTERY

Item Inspected: GLYCOL BOILER ; SN# 7119 ; A#607657

Date: 29-Dec-15

WO #: 60223014

PO #: 8400982914

Surface Condition: Painted ☐ Sandblasted ☐ Machined ☐ As Cast ☐ As Forged ☐ Weldment ☐ Other ☒

Material: P1 Thickness: VARIOUS Heat Treatment: AS WELDED

Magnetizing Equipment: Yoke ☒ Coil ☐ Permanent ☐ IRISNDT #: 40099 Mfg: CON. PROBE Calibration Date: 17-Nov-15

Method of Magnetization: AC ☒ DC ☐ Continuous ☒

Blacklight: Y ☒ N/A ☐ IRISNDT #: 41018
Verification per ASME V Art 7 T.777.2

Blacklight Meter: IRISNDT #: 43073
Calibration Date: - -

Whitelight: Y ☒ N/A ☐ Verification per ASME V Art 7 T.777.1

Lighting Equipment: Yoke Light (10W)

Magnetic Particles: Dry ☐ Wet ☒ Red ☐ Grey ☐ Black ☐ Fluorescent ☒
Batch #: 1180 Mfg: MIGLOW Type: 810

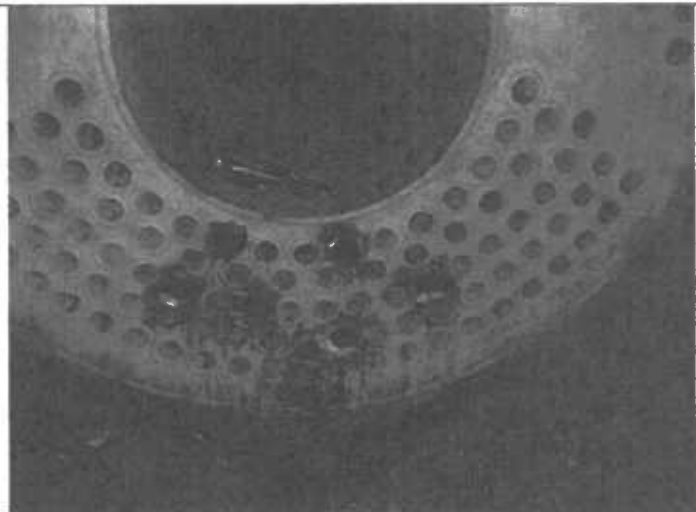
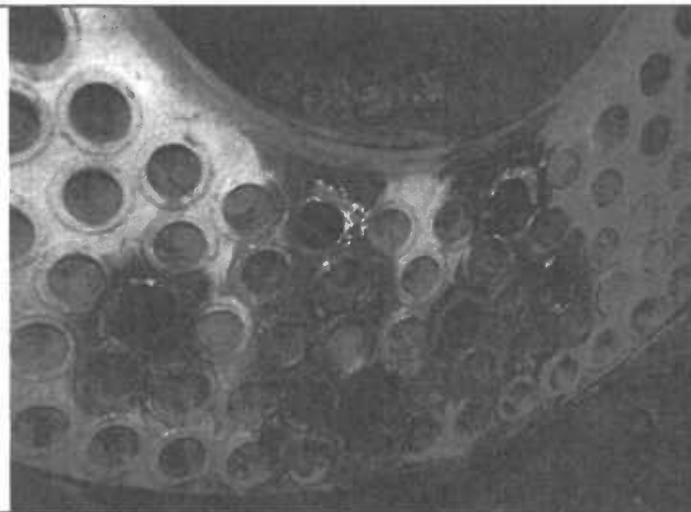
Background: ☐ Batch #: Mfg: Type:

Inspection Results:

A MAGNETIC PARTICLE EXAMINATION WAS CARRIED OUT AS REQUESTED, ON BOTH ENDS OF THE TUBESHEET, WHERE 7 TUBES HAD BEEN CUT OUT.

RESULTS: ALL INDICATIONS WERE REMOVED BY GRINDING.

REQ. MARC CASE ; APP. MARC CASE ; 2Z-02018989 ; CC# 10063984 ; LSD: 10-34-51-04W4M



Inspection Limitation(s):

Unit#: 601 Kilometers: 100 50

In: 1300 Out: 1600 Hrs: 3.0

In: Out: Hrs:

Personnel:
RANDY TRADEWELL
JORDAN ROSS

Consumables:
MIN.
2-GAS MONITORS

Interpretation by:

RANDY TRADEWELL SNT-TC-1A: II
(Print)

C.G.S.B.: II
(Level)

C.G.S.B. #: 5357

(Signature) Client Representative: (Print)

I am in full agreement with report contents (Sign)

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IRISNDT-E-2003H

Procedure: 5.0 Rev 1.0
Technique: MT-2F
Code: ASME SEC.IV
Other:

Client:	HUSKY OPERATIONS	Date:	29-Dec-15
IRISNDT #:	LYD1501575	WO #:	60223014
Location:	HUSKY MORGAN BATTERY	PO #:	8400982914
Item Inspected:	GLYCOL BOILER ; SN# 7119 ; A# 607657		

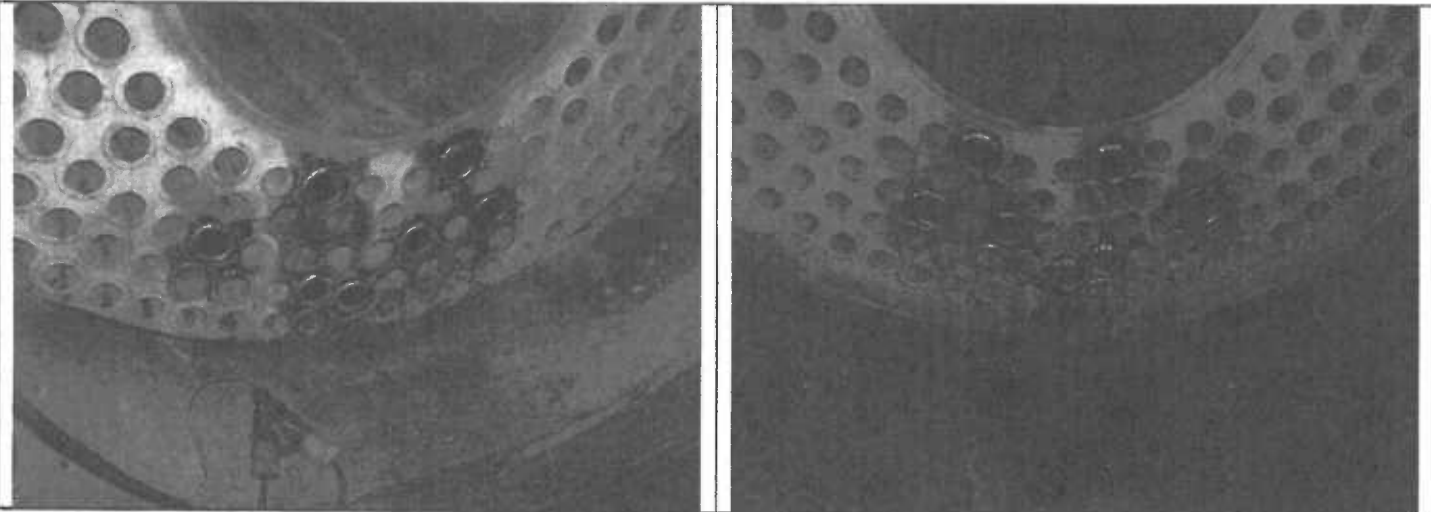
Surface Condition:		Painted <input type="checkbox"/>	Sandblasted <input type="checkbox"/>	Machined <input type="checkbox"/>	As Cast <input type="checkbox"/>	As Forged <input type="checkbox"/>	Weldment <input checked="" type="checkbox"/>	Other <input checked="" type="checkbox"/>
Material: P1		Thickness: VARIOUS			Heat Treatment: AS WELDED			
Magnetizing Equipment:		Yoke <input checked="" type="checkbox"/>	Coil <input type="checkbox"/>	Permanent <input type="checkbox"/>	IRISNDT #: 40099	Mfg: CON. PROBE	Calibration Date: 17-Nov-15	
Method of Magnetization:		AC <input checked="" type="checkbox"/>	DC <input type="checkbox"/>	Continuous <input checked="" type="checkbox"/>				
Blacklight: Y <input checked="" type="checkbox"/> N/A <input type="checkbox"/>		IRISNDT #: 41018 Verification per ASME V Art 7 T.777.2			Blacklight Meter: IRISNDT #: 43073 Calibration Date: - -			
Whitelight: Y <input checked="" type="checkbox"/> N/A <input type="checkbox"/>		Verification per ASME V Art 7 T.777.1			Lighting Equipment: Yoke Light (10W)			
Magnetic Particles:		Dry <input type="checkbox"/>	Wet <input checked="" type="checkbox"/>	Red <input type="checkbox"/>	Grey <input type="checkbox"/>	Black <input type="checkbox"/>	Fluorescent <input checked="" type="checkbox"/>	
		Batch #: 1180		Mfg: MIGLOW		Type: 810		
Background: <input type="checkbox"/>		Batch #:		Mfg:		Type:		

Inspection Results:

A MAGNETIC PARTICLE EXAMINATION WAS CARRIED OUT AS REQUESTED, ON BOTH ENDS OF 7 NEW TUBE TO TUBESHEET FILLET WELDS, ON GLYCOL BOILER. WELDER: KM

RESULTS: ACCEPTABLE TO CODE AT THE TIME OF EXAMINATION.

REQ. MARC CASE ; APP. MARC CASE ; 2Z-02018989 ; CC# 10063984 ; LSD: 10-34-51-04W4M



Inspection Limitation(s):

Unit#:	<u>601</u>	Kilometers:	<u>100 50</u>
In:	<u>1600</u>	Out:	<u>2030</u>
		Hrs:	<u>4.5</u>
In:	<u> </u>	Out:	<u> </u>
		Hrs:	<u> </u>

Personnel:
RANDY TRADEWELL
JORDAN ROSS
STANDBY TIME INCLUDED FOR WELDING

Consumables:
MIN.

Interpretation by:

RANDY TRADEWELL SNT-TC-1A. II
(Print)

C.G.S.B.: II
(Level)

Paul Shover C.G.S.B. # 5357

Client Representative:

I am in full agreement with report contents

(Sign)

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IRISNDT-E-2003H



PRESSURE EQUIPMENT REPAIR / ALTERATION PROCEDURE

Repair Request by		Ray Trachuk		Accepted by Operations Superintendent		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Plant Name		Morgan Battery		Location (LSD)		10-34-51-04W4M	
Job #				Equipment Description		150 HP 3 Pass Marine Boiler	
Tag #		n/a		Prov. Reg #		A607657	
Manufacturer		Saskatoon Boiler Mfg. Co. Ltd		Serial #		7119	
CRN		U1463.23		Work to be Performed is a		<input checked="" type="checkbox"/> Routine Repair <input type="checkbox"/> Non Routine Repair <input type="checkbox"/> Alteration	
Authorized Inspector Acceptance		Dave Amirault		Name		Signature	
A. I. Location		Edmonton AB.		Phone		(780) 996-1107	
Contractor Name & Address		KRM WELDING SERVICES LTD. 16232 - 83B STREET, EDMONTON, ALBERTA		A. I. Inspection waived		<input type="checkbox"/>	
Contractor Quality Program Reg. #		AQP-21784		Expiry Date		2017-06-04	
Work Start Date		2015-12-28		Contact		Kevin Martin	
Phone		(780) 233-1139		Code of Design		<input type="checkbox"/> ASME I <input checked="" type="checkbox"/> ASME IV <input type="checkbox"/> ASME VIII Div 1	
Shell Side Process Fluid		Glycol		<input checked="" type="checkbox"/> Sweet <input type="checkbox"/> Sour <input type="checkbox"/> Low Temp			
Tube Side Process Fluid				<input type="checkbox"/> Sweet <input type="checkbox"/> Sour <input type="checkbox"/> Low Temp			
Shell Side Design		MAWP 15 psi Steam, 160 psi Water		KPag @		103 kpa Steam, 1103 kpa Water	
<input type="checkbox"/> RT-1 <input type="checkbox"/> RT-2 <input type="checkbox"/> RT-3 <input type="checkbox"/> RT-4 PWHT <input type="checkbox"/> Yes <input type="checkbox"/> No Test Press							
Tube Side Design		MAWP 13790 (2000 PSI)		KPag @		371 (700F)	
<input type="checkbox"/> RT-1 <input type="checkbox"/> RT-2 <input type="checkbox"/> RT-3 <input type="checkbox"/> RT-4 PWHT <input type="checkbox"/> Yes <input type="checkbox"/> No Test Press							
Sketch (use space provided or attach an additional sketch to show details of repair/alteration) Separate Sketch attached <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No							

MATERIAL LIST

[illegible]

PRESSURE EQUIPMENT REPAIR / ALTERATION PROCEDURE**REPAIR PROCEDURE**

The following Husky Specifications form part of the requirements of this Procedure

Spec Number	Name	Spec Number	Name
PS-MW-01	Welding		

Repair Procedure (Additional Detailed Procedure Attached) ☐ Yes ☒ No

Magnetic Particle Inspection of the Boilers tube to tube sheet welds revealed seven welds/tubes which were cracked and in need of repair.

- 1) Perform MPI on tube to tube sheet welds to identify defects.
- 2) If MPI does not identify any defects perform hydro test at 240 psi (1655 kpa) to replicate leaks while in service.
- 3) Remove all tubes which have failed tube to tube sheet welds.
- 4) Perform MPI on tube sheet and tube holes to identify any additional defects.
- 5) Install new tubes, all tube ends to be expanded, beaded and seal welded.
- 6) Perform MPI on tube to tube sheet welds to identify defects.
- 7) Initial hydro test to verify tube seal welds
- 8) Re-expand the new seal welded tubes along with tubes that are adjacent to the new tubes.
- 9) Final hydro test at 240 psi (1655 kpa) for one hour (hydrotest to be witness by ABSA A.I.)

Activity Responsibilities

The following tasks are the Responsibility of

HUSKY

CONTRACTOR

Comments

Design Submission to AIA

☐☐

N/A

Repair Alteration Procedure -

☒☐

Material Control

☐☒

2" SA 178-A 0.095" mw

Welding Control

☐☒

NDE

☐☒

Heat Treatment

☐☐

N/A

Leak Test

☐☒**WELDING REQUIREMENTS**

Welding Procedure Specification Number KRM-2

Min Preheat Temp 10°C PWHT Required ☐ Yes (see PWHT Instruction Sheet) ☒ No**LEAK TEST REQUIREMENTS**☒ Hydro ☐ Pneumatic ☐ Service ☐ Alternate (see Alternative Test Report)

Required Test Pressure 240 psi (1655 kpa)

PROCEDURE PREPARED BY

Ray Trachuk

Print Name

Signature

2015-12-22

Date

Husky Field Contact Jessica Derouin / Marc Case

Phone # (780) 205-2377

ATTACHMENTS

The following Husky attached documents form part of the requirements of this Procedure

PS-MW-01

PRESSURE EQUIPMENT REPAIR / ALTERATION PROCEDURE**CRITICAL JOB ACTIVITIES**



AIA: ABSA/Sask. Boilers Branch (The AIA may identify hold points by initialing the task(s) they would like to witness)
 All activities are considered to be the responsibility of the Contractor and should be reflected / transferred to the required documentation referenced in their registered QA / QC Program Manual.

No.	Activity	Husky Energy	Contractor	AIA
1	In Process VT Completed	V	*	
	NDE Required			
2	100% MPI completed	V	*	
3	Hydrostatic test complete	V	*	*
4	NDE. Hydrotest & Repair reports complete	V	*	
	Document package provided to facility office.	V		
	Document package sent to Lloydminster Asset Integrity	V	*	
H = Hold V = Verify * = Required Inspection / Test / Activity (Can be indicated by % required)				

QUALITY DOCUMENTS

The following documents along with this Pressure Equipment Repair/Alteration Procedure shall be completed by the approved contractor and the completed "Quality Job File" submitted to the Facility Lead Inspector.
 For "Replacement In Kind", documentation is maintained at the facility office.

Document Name	Review for Acceptance prior to start of Repair / Alteration	Developed By
Jurisdictional Repair / Alteration Report	Yes	Contractor
Copy of QA Program Certificate (AQP)	Yes	Contractor
Copy of Weld Procedure(s) used	Yes	Contractor
Copy of Welder Certificates	Yes	Contractor
NDE Interpretation Reports	Yes	Contractor
Leak Test Reports	Yes	Contractor
Optional		

WELDING PROCEDURE SPECIFICATION

WPS No.: KRM-2 (Rev1)

SUPPORTING PQR No.(s): KRM-2A - KRM-2B
in accordance with

ASME Section I, IV, VIII, IX, B31.1 and B31.3
qualified for

Process(s): SMAW
Filler Metal F-No.: F3 / F4
AWS Classification: E6010 / E7018-1

Position(s): All
A-No.: A1
Weld Type(s): Groove / Fillet

Base Metal: P- 1

Thickness Ranges

As Welded Thermal Condition

	Without Impacts	Without Impacts
ASME BPV Section.VIII	0.0625"	0.375" to 0.750"
ASME BPV Section.I	0.0625" to 0.750"	0.375" to 0.750"
ASME BPV Section.IV	0.0625" to 0.750"	0.375" to 0.750"
ASME B31.1	0.0625" to 0.750"	0.375" to 0.750"
ASME B31.3	0.0625" to 0.750"	0.375" to 0.750"

Revision Content: Rev 1 Addition of Charpy and Vickers

Provincial Registrations:

ABSA	
SAFETY CODES ACT - PROVINCE OF ALBERTA	
WELDING PROCEDURE	
Reg. No. WP	2917.2
Spec. No.	KRM-2 (REV1)
Weld Process	SMAW
Matl. Gr. P No.	1 Gr 1+2 to P No. 1 Gr 1+2
Elec. Gr. F No.	3+4 A No. 1
Th. Qual. For	19.1mm P.W.H.T. NO
MIN TH. QUAL	9.5mm CVA -46°C
Val. Mo. 3 Day 16	Signed R. ROSEBERG, P.ENG.
	WELDING SPECIALIST

25 JUNE 2014

CONTRACT REVIEW

PAGE 3 OF 3

TURNOVER PACKAGE REQUIREMENTS

Number of Copies: Digital: 0Number of Copies: Paper: 1

Turnover package to be sent to: _____

TURNOVER PACKAGE CONTENTS

ITEM	REQUIRED BY CUSTOMER	Stored for 5 years by KRM Welding Services Ltd.
Contract Review Form	✓	✓
Design Specifications	X	✓
Drawings and Calculations	✓	✓
Physical test reports: charpy, hardness	✓	✓
Nonconformity Reports	X	✓
Materials Lists, Spool Lists, Purchase Orders generated by KRM Welding Services Ltd.	X	✓
Material Test Reports	X	✓
Materials Heat Number Identification Drawings	X	✓
NDE Location Map	✓	✓
Radiography Reports	X	✓
Radiographic Film	X	ASME B31.1 and B31.1 BEP only
Other NDE Reports, (MT, UT)	✓	✓
Welding Procedures	✓	✓
Welder Log and Tickets	✓	✓
Welder Identification Map	X	✓
Heat treatment records	X	✓
Heat Treatment Identification Drawings	X	✓
Examination Report(s) for Pressure Piping	X	✓
Pressure/ Temperature Gauge Calibration Records	✓	✓
Pressure test records	X	✓
AB-83, AB-83F, AB-83 Partial Data Report	X	✓
AB-81 Completion of Construction	X	✓
As Built Drawings	X	✓

✓ Designates documents to be stored by KRM Welding Services Ltd. for a minimum of 5 years.

Contract Review Notes acknowledged by the following parties:

Owner's Representative

Date

KRM Welding Services Ltd. Representative

Date

Date: Dec-28/15KRM Welding Services Ltd. Contact: Keun Martin Job Number: Dec 30, 2015Deliver Reports and Film To: KRM Welding Services

Inspection Method

Radiography: _____ Ultrasonic _____ Magnetic Particle ✓

Liquid Penetrant _____ Hardness Testing _____

Minimum Technician Qualification

CGSB Level II _____ SNT Level II _____

Acceptance Criteria:

ASME B31.3 _____ (Year) ASME B31.1 _____ (Year)

ASME B31.3 Service Category _____ (Normal, Cat. D, Cat. M, High Pressure, Sever Cyclic)

Customer Specification: _____

Maximum Allowable Hardness: _____

Joints to be tested (Attach NDE location drawing showing joints to be tested, welder names and any other information required to be on the test reports)

Quantity	Identification	Size and Schedule	Test Method
<u>9 each</u>	<u>sealwelds</u>	<u>2"</u>	<u>MT.</u>

Additional Instructions:

Note: Radiographic examination to comply with ASME Section V Article 2.

Ultrasonic examination to comply with ASME Section V Article 4

Liquid Penetrant examination to comply with ASME Section V Article 6

Magnetic Particle examination to comply with ASME Section V Article 7

Hardness testing to comply with written procedure _____

CONTRACT REVIEW

Job Number: Dec 30/15 Date: Dec 30/15Owner Company: Husky OilScope of Work: Boiler Repair

	OWNER	KRM WELDING SERVICES LTD.
Materials Receiving Inspection, Identification and Traceability	N/A	Km
Welding	N/A	Km
Site Control of Heat Treatment	N/A	N/A
Site Control of NDE	N/A	Km
Measuring and Test Equipment	N/A	Km
Witness of Pressure Tests	X NO	Km
Document & Data Control	N/A	Km
Preparing and Retention of Quality Control Records	X NO	Km

The Alberta Pressure Equipment Safety Regulation requires the Owner to have an ABSA authorized Quality Management System, if they assume any of the Quality Management System functions listed above.

A piping system over 500 litres in capacity must be registered with ABSA.

RESPONSIBLE FOR SUPPLY	OWNER	KRM WELDING SERVICES LTD.
Materials		
Design Registration with ABSA		
Design & Specifications		
Construction Drawings		
NDE		
Heat Treatment		
Pressure Testing		

Code of Construction:

ASME B31.3 Process Piping, Year _____ Fluid Service Category _____

ASME B31.1 Power Piping, Year _____ B31.1 Boiler External Piping, _____

ASME B31.5 Refrigeration Piping, Year _____

ASME B31.9 Building Services Piping, Year _____

Additional Customer Specifications: _____

KRM Welding Services Ltd. Representative's Initials:

Owner's Representative's Initials:

Km.
RO

25 JUNE 2014

PRESSURE TEST REPORT

PAGE 1 OF 1

HYDROSTATIC TESTPNEUMATIC TESTDate: Dec 30, 2015Job Number: Dec 30, 2015LSD: 10-34-51-04-W4Description of Product: Saskatoon BoilerTests Conducted By: Kevin MartinTest Pressure: 240 psi Test Temperature: 30°C

Test Medium: _____

Holding Time at Test Pressure: 10 minsResults: passedOwner's Inspector Witnessing Test: XGauge Number(s): 400-1
400-2 Dead Weight Number: WLAChart Recorder Number: WLARay Trachuk
Signature of Owner's Inspector2015.12.30
Date[Signature]
Signature of QC InspectorDec 30, 2015
Date

CERTIFYING STATEMENTDate Dec 28/15

I have reviewed the written practice, procedures, personnel records and certification of

IRIS WDT.

(Name of Subcontracted NDE Company)

In my opinion, they comply, in all respects, with requirements of ASME Section V Non-destructive Examination and the CGSB (Canadian General Standards Board) or ASNT (American Society for Non-Destructive Testing).

IRIS WDT.

(Name of Subcontracted NDE Company)

Are appointed to perform

MT.

Radiography (RT), Ultrasonics (UT), Liquid Penetrant (PT), Magnetic Particle (MT)

Non-destructive examinations for KRM Welding Services Ltd.

(Name of Subcontracted NDE companies Level III person)

Is by this statement, certified to act as the Level III person for KRM Welding Services Ltd. to be responsible for the following non-destructive examination.

MT

Radiography (RT), Ultrasonics (UT), Liquid Penetrant (PT), Magnetic Particle (MT)

Dec 28/15
Date

[Signature]
Signature of Quality Control Manager



Western Gauge and Instruments Ltd.

Certificate of Calibration

Number# C8613

Customer:	KRM WELDING	Manufacturer:	WIKA
Customer P/O:	KRM	Serial Number:	PG-400-2
Order:	OE0014859	Pressure Range:	0/400 PSI/KPA
Accuracy +/- :	1% OF FULL SCALE	Part Number:	
CALIBRATION DATE : October 6, 2015			

Test Equipment Used

Gauge: 3-D DIGITAL
Serial Number: AC 8780169

Date Calibrated: May 21/ 15
Range: 30"HG/500 PSI

Test Gauge	Upscale Pressure	Error + / -
0 PSI	0 PSI	0 PSI
50	52	2
100	100	0
200	200	0
300	300	0
400	400	0

Technician: Brentt Starratt
BRENTT-STARRATT

Q.C. Manager: Randy Gabruck
RANDY GABRUCK

Western Gauge and Instruments Ltd. Certifies that the above information is traceable to N.I.S.T.

6624 50 ST S.E. Edmonton, Alberta T6B 2N7 :780-463-3800, F: 780-463-3990.
E-Mail : brentt@wgiltld.ca



Western Gauge and Instruments Ltd.

Certificate of Calibration

Number# C8612

Customer:	KRM WELDING	Manufacturer:	WIKA
Customer P/O:	KRM	Serial Number:	PG-400-1
Order:	OE0014859	Pressure Range:	0/400 PSI/KPA
Accuracy +/- :	1% OF FULL SCALE	Part Number:	
CALIBRATION DATE : October 6, 2015			

Test Equipment Used

Gauge: 3-D DIGITAL
Serial Number: AC 8780169

Date Calibrated: May 21/ 15
Range: 30"HG/500 PSI

Test Gauge	Upscale Pressure	Error + / -
0 PSI	0 PSI	0 PSI
50	50	0
100	100	0
200	200	0
300	300	0
400	400	0

Technician: 
BRENTT STARRATT

Q.C. Manager: 
RANDY GABRUCK

Western Gauge and Instruments Ltd. Certifies that the above information is traceable to N.I.S.T.

6624 50 ST S.E. Edmonton, Alberta T6B 2N7 :780-463-3800, F: 780-463-3990.
E-Mail : brentt@wgiltld.ca



Marmon/Keystone Canada Inc.

SPECIALTY STEELS

7924 - 43 Street Leduc T9E 7E8
TEL (780) 986 2600 FAX (780) 986 9868

Shipping date..... 12/23/2015 PAGE.: 1

Name of Carrier.... Pick up 1L mtr's

F.O.B..... Here

UNION SHORT FORM OF STRAIGHT BILL OF LADING-EXPRESS SHIPPING CONTRACT ADOPTED BY RAIL FREIGHT AND EXPRESS CARRIERS SUBJECT TO THE JURISDICTION OF THE CANADIAN TRANSPORT COMMISSION ISSUED AT SHIPPER'S REQUEST.

It is mutually agreed, as to each carrier of all or any of said goods over all or any portion of said route to destination, and as to each party at any time interested in all or any of said goods, that every service to be performed hereunder shall be subjected to all the terms and conditions (which are hereby incorporated by reference and have the same force and effect as if the same were fully and specifically set forth herein).

1. approved by the board of transport commission for Canada by General Order No. T-5, dated February 1, 1965 set forth in the Canadian freight Classification and also available at all railway agency stations and freight offices upon request, when said goods are carried by rail carrier; or
2. of the bill of lading set forth in or prescribed by the relevant tariffs, classification, statutes and regulations motor carrier's services when said goods are carried by a motor carrier; or
3. of the bill of lading form prescribed by the regulations adopted by the order-in-council #986-79 dated April 4, 1979
4. of the Shipping Contract approved by the Board of Transport Commission for Canada by General Order No. t-43 dated September 18, 1967 and set forth in Express Traffic Association; Tariff 100 in effect on the date hereof, when said goods are carried by an express carrier subject to the jurisdiction of the said Board; and which are agreed to by the shipper and accepted for himself and his assigns.

Consigned to:

TUNDRA PROCESS SOLUTIONS LTD
3200 118TH AVENUE S.E.

Telephone: 403 255 5222 SO#: 7068410

CALGARY AB CAN T2Z 3X1

Customer order: W01894

Description of shipments and special marks	Weight	PCS	If charges are to be prepaid write or stamp here:
01-BOILER & PRESSURE TUBING CBP 2.000 .105 A17822 ACLE M 12/23/2015 10.000 PCS 9.000 FT 2 IN. / MM Country of Origin: USA HT#: 150829 Bin: SHPHS 10 pieces x 110 inch cuts will pick up at 2:00 PM	210.5	10	Pick Up
Thank you for your order			Received \$
ATTENTION TRANSPORT 1. Material must be protected from damage and weather conditions.**Tarps required** 2. *** No chains to be used on material *** No forks or hooks to be used inside tubes 3. This document must be delivered with shipment			To be applied in prepayment of the charges on the property described hereon.
			Agent or Cashier.
			Per.
			For carrier's use
			Advance and or beyond \$
			Misc. \$
			Suppl. Piece \$
			Suppl. Value \$
			Total \$
			Shipper show amount of C.O.D.
			C Amount \$
			O Fee \$
			D Total \$
1 Bundle	Total weight 210.5LB		Valuation
Dimensions	Where required by tariff shipper must complete the following. Total cubic feet	Dimensional weight	Customer
Shipper	Transport		



A Marmon Distribution Services/Berkshire Hathaway Company



Marmon/Keystone Canada Inc.
SPECIALTY STEELS

7924 - 43 Street
Leduc AB CAN T9E 7E8
TEL. 780/986-2600
FAX. 780/986-9868

PACKING SLIP

PAGE.: 1
Order : 7068410
Date.: 12/23/2015

SOLD TO: _____

TUNDRA PROCESS SOLUTIONS LTD
3200 118TH AVENUE S.E.

CALGARY AB CAN T2Z 3X1

SHIPPED TO: _____

TUNDRA PROCESS SOLUTIONS LTD
3200 118TH AVENUE S.E.

CALGARY AB CAN T2Z 3X1

SHIP VIA.....: Pick up 1L mtr's
F.O.B.....: Here
YOUR ORDER NO.....: W01894
SALESPERSON.....: Glenn F. Jones

Ordered	Description	Number Pieces	Quantity Shipped	Back Ordered
01 10 /PCS	BOILER & PRESSURE TUBING CBP 2.000 .105 A17822 ACLE M Tariff Number: 7306.30.00.22 Each Piece is: 9 FT 2 IN. / HT#.....: 150829 Total... 10 pieces x 110 inch cuts will pick up at 2:00 PM	10 10	10.000/PCS 10.000/PCS	

Packaging: 1 Bundle

Total Weight.....: 210.5

Customers.: _____



A Marmon Distribution Services/Berkshire Hathaway Company




METAL-MATIC, INC. STEEL TUBING

629 SECOND STREET S.E. MINNEAPOLIS, MINNESOTA 55414

TELEPHONE (612) 378-0411 FAX (612) 605-3496

Certificate of Compliance and Analysis

Consignee	MARCON/KEYSTONE CANADA INC			MMI Order #	215000	
				Bill of Lading #	439406	
Address	5904 50 STREET LEDUC AB T9E 0R6 Canada			Shipped Via	Will-Call, Middlet	
				Quantity Shipped	74 PC	
				Customer Order #	ES9120	
				Date Shipped	10/29/15	
Item #	353469	Customer P/N	CBP 2.00X.105MIN A1782	Customer Spec 1	SA178 MIN WALL	
Description	SA-178A 2.000ODX.105MINX266			Customer Spec 2		
Lot Numbers	04009299 04009301					
Steel Grade	.06/.18 CARBON					
Chemistry	Heat Number	Chemical Properties				
	150829	C-.092 MN-.380 P-.006 S-.015 AL-.043 CR-.042 MO-.007 NI-.023 CU-.052 TI-.002 N-.004				
<div style="text-align: right;"><div>MARCON / KEYSTONE Q.C. REVIEWED DATE 10/27/15 INITIAL RJ</div></div>						
Mechanical Properties	Heat Number	Supplier	Tensile Strength	Yield Strength	Elong	Hardness
	150829					
Tests Passed	EDDY CURRENT TEST FLANGE - ASTM A450 FLATTEN - ASTM A450 REV FLAT - ASTM A450					
Special Notes						
I Hereby Certify that all tubing was manufactured in the USA and conforms with applicable specification(s) listed above. All tests required by said specifications were successfully performed.						
Signed 			Quality Department		10/30/15 Date	

62046035

Job 10-32
OTS-150W

**FORM H-2 MANUFACTURER'S DATA REPORT FOR ALL TYPES OF BOILERS
EXCEPT WATERTUBE AND THOSE MADE OF CAST IRON
As Required by the Provisions of the ASME Code Rules, Section IV**

1. Manufactured and certified by Saskatoon Boiler Mfg. Co. Ltd., 2011 Quebec Avenue, Saskatoon, SK, S7K 1W5
(name and address of manufacturer)
2. Manufactured for Northern Blizzard Resources Inc., 5301 - 62nd Street, Lloydminster, AB, T9V 2E5
(name and address of purchaser)
3. Location of installation Northern Blizzard Resources Inc., Morgan 10-34-51-04 W4M Battery, AB
(name and address)
4. Unit Identification Marine Boiler 7119 U1463.23 B1659C(r0) 477 2011
(complete boiler, superheater, waterwall, economizer, etc.) (manufacturer's serial no.) (CRN) (drawing no.) (National Bd. no.) (year built)
5. The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER AND PRESSURE VESSEL CODE. The design, construction, and workmanship conform to ASME Code, Section IV, 2007 - A09
(year) (addenda (as applicable)(date)) (Code Case no.)
- Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of this report None

- (name of part, item number, manufacturer's name, and identifying stamp)
6. Shells or drums 1 SA-516-70 0.3125" 60" 105" TS/TS
(no.) (material spec., gr.) (thickness) (inside diameter) (length (overall))
(inside diameter) (length (overall))
7. Joints Double Butt Welded 85% Double Butt Welded Two
(long. (seamless, welded)) (eff. (compared to seamless)) (girth (seamless, welded)) (no. of shell courses)
8. Tubesheet SA-516-70 0.75" Tube holes 148 x 2.025"
(material spec., grade) (thickness) (number and diameter)
9. Tubes: No. SA-178-A Straight Diameter 2" Length 105.5" Gauge 0.095" mw
(material spec., grade) (straight or bent) (if various, give max. and min.) (or thickness)
10. Heads None
(material spec. no.) (thickness) (flat, dished, ellipsoidal) (radius of dish)
11. Furnace SA-53-B 0.50" Nom. 1 24" OD 105" Pressure Zone 105.75" Plain Seams ERW
(material spec., gr.) (thickness) (no.) (size (O.D. or W x H)) (length (each section)) (total) (type (plain, corrugated, etc.)) (type (seamless, welded))
12. Staybolts None
(no.) (size (diameter)) (material spec., gr.) (size) (bolt type) (net area) (pitch (horizontal and vertical)) (MAWP)
13. Stays or braces:

Location	Material Spec.	Type	Number and Size	Pitch	Total Net Area	Fig. HG-343 L/1	Dist. Tubes to Shell	MAWP
(a) F.H. above tubes	SA-36	Through	2 of 1.75"	11"	4.81 sq in	1.0	14"	160 psig
(b) R.H. above tubes	SA-36	Through	2 of 1.75"	11"	4.81 sq in	1.0	14"	160 psig
(c) F.H. below tubes								
(d) R.H. below tubes								
(e) Through stays	SA-36	Through	10 of 1.0"	7.188"	7.85 sq in	1.0		160 psig

14. Other parts: 1. Water Baffle Top & Btm Plates 2. Water Baffle Cap 3.
(brief description, i.e., dome, boiler piping)
1. SA-516-70, 11.625" x 74.688" Lg, 0.50" T, 15 psig Steam, 160 psig Water
2. SA-516-70, 3.313" x 74.688" Lg, 0.375" T, 15 psig Steam, 160 psig Water
3.
(material spec., grade, size, material thickness, MAWP)

15. Nozzles, inspection, and safety valve openings:

Purpose (inlet, outlet, drain, etc.)	No.	Diameter or Size	Type	How Attached	Material	Nominal Thickness	Reinforcement Material	Location
Handhole	8	2.75" x 3.5"	Oround	Bolted	NA	0.75" Cover	NA	Shell & TS
Manhole	None							
Outlet	1	6" 150#	RFSO	Welded	SA-106-B	0.280"	SA-516-70	Shell
Inlet	1	6" 150#	RFSO	Welded	SA-106-B	0.280"	SA-516-70	Shell
Safety Valve	1	2"	NPT Cplg	Welded	SA-105	3000#	NA	Shell
Drain	1	1-1/2"	NPT Cplg	Welded	SA-105	3000#	NA	Shell
Various	11	2" to 3/4"	NPT Cplg	Welded	SA-105	3000#	NA	Shell

FORM H-2 (Back)

16. Boiler supports 2 Saddles Welded
(no.) (type (saddles, legs, lugs)) (attachment (bolted or welded))
 17. MAWP 180 psig water Based on HW-701.3b Heating surface 707 sq. ft. Shop hydro. test 240 psig
(Code per. and/or formula) (total) (complete boiler)
 18. Maximum water temperature 250 deg F
 19. Remarks Handhole Covers: Saskatoon Boiler Mfg. Co. Ltd. 300 psig at 422 deg F, CRN 0H0655.324T157.

CERTIFICATE OF SHOP COMPLIANCE

We certify that the statements made in this data report are correct and that all details of design, material, construction, and workmanship of this boiler conform to Section IV of the ASME BOILER AND PRESSURE VESSEL CODE.

"H" Certificate of Authorization no. 7804 expires 28 February, 2012
 Date 9 FEB 2011 Signed [Signature] Name Saskatoon Boiler Mfg. Co. Ltd.
(by representative) (manufacturer that constructed and certified boiler)

CERTIFICATE OF SHOP INSPECTION

Boiler constructed by Saskatoon Boiler Mfg. Co. Ltd. at Saskatoon, Saskatchewan, Canada
 I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the state or province of Saskatchewan and employed by Technical Safety Authority of Saskatchewan

have inspected parts of this boiler referred to as data items 4, 6-11, 13-19 and have examined Manufacturers' Partial Data Reports for items _____ and state that, to the best of my knowledge and belief, the manufacturer has constructed this boiler in accordance with the applicable sections of the ASME BOILER AND PRESSURE VESSEL CODE.

By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the boiler described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 9 Feb 2011 Signed [Signature] Commissions SK/057 12287ANB
(Authorized Inspector) (National Bd. (incl. endorsements), state, prov., and no.)

CERTIFICATE OF FIELD ASSEMBLY COMPLIANCE

We certify that the field assembly construction of all parts of this boiler conforms with the requirements of Section IV of the ASME BOILER AND PRESSURE VESSEL CODE.

"H" Certificate of Authorization no. _____ expires _____
 Date _____ Signed _____ Name _____
(by representative) (assembler that certified and constructed field assembly)

CERTIFICATE OF FIELD ASSEMBLY INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the state or province of _____ and employed by _____

have compared the statements in this Manufacturer's Data Report with the described boiler and state that the parts referred to as data items _____, not included in the certificate of shop inspection, have been inspected by me and that to the best of my knowledge and belief the manufacturer and/or the assembler has constructed and assembled this boiler in accordance with the applicable sections of the ASME BOILER AND PRESSURE VESSEL CODE. The described boiler was inspected and subjected to a hydrostatic test of _____.

By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the boiler described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date _____ Signed _____ Commissions _____
(Authorized Inspector) (National Bd. (incl. endorsements), state, prov., and no.)

SASKATOON BOILER MFG. CO. LTD.

FACTORY INSPECTION AND FIRE TEST REPORT - GAS FIRED JOB NUMBER 10-32

USER: NORTHERN BLIZZARD RESOURCES INC.

DEL: OTS-G 150 W SERIAL NO. 7119 ULC NO: AR530050

PROGRAMMER: MODEL NO. E110, EPI60, ED510, EDVI SERIAL NO: 1046-04

BLOWER MOTOR: MODEL NO. BROOKS S/N ILL7285 TYPE: _____ FRAME: W-DA184T-S

VOLTS: 480 PH: 3 HP: 7.5 RPM: 3460 AMPS: 8.6 SF: 1.15

MAGNETIC STARTER: CT16 HEATERS: TI16C 8-12 AMPS

FIRE TESTS

	LOW	HIGH
Comb Eff%	<u>86.5</u>	<u>82.3</u>
Stack Temp	<u>213</u>	<u>366</u>
O ₂ %	<u>5.7</u>	<u>5.2</u>
CO PPM	<u>3</u>	<u>53</u>
CO ₂ %	<u>8.6</u>	<u>8.9</u>
Nox PPM	<u>61</u>	<u>49</u>
Input- CFH	<u>1200</u>	<u>6276</u>

BURNER MODEL CRG-165-Z

S/N 1110-405

WATER PUMP MODEL ULC # 95

S/N _____

VOLTS _____

AMPS _____

STARTER _____

HEATER _____

CONTROL TESTS

Hi Limit MR. OK

Opr Cont OK

Mod Cont OK

Lwco # 1 OK

Lwco # 2 —

Flame Monitor OK

Air Sw OK

Low Fire Sw OK

Hi Gas SW OK 28"

Low Gas SW OK 12"

Flow SW ✓

Hi Water —

Ind Lites OK

Alarms ✓

Dielectric Test OK

Remote S.D. ✓

Gas Leaks NIL

PRESSURES

	LOW	HIGH
Inlet ^{1/2" w/psl}	<u>5</u>	<u>5</u>
Reg ^{1/2" w/psl}	<u>1.0</u>	<u>0.9</u>
Gas Train ^{1/2" w/psl}	<u>24.5</u>	<u>17.4</u>
Manifold ^{1/2" w/psl}	<u>2</u>	<u>7.3</u>
Wind Box ^{1/2" w/psl}	<u>3</u>	<u>8.6</u>
Comb ^{1/2" w/psl}	_____	_____
Pilot ^{1/2" w/psl}	<u>4.2</u>	_____
Amps Blower	<u>4.7</u>	<u>7.8</u>
Amps Water Pump	_____	_____
Boiler Temp	<u>240</u>	_____
Pressure	<u>13</u>	_____
Purge Time	_____	<u>60</u>

Air Band 3/4" DIFF PL. Gas Head 1/2" IN Orifice Size 57 X 13/64 Ign Funnel _____ Baffle Plate 3" Choke Ring —

AIR BAFFLE 10 3/8 ODX B 3/8 ID, GAS SPREADING SOLID B 3/8 ODX 7/8 ID

DIFF. PLATE SCOTCH 6 3/8 ODX 3/4 ID G/W 4.6 MM HOLES

1'S BOILER HAS HONEYWELL MODULATING GAS VALVE

COMPLETED BY: Tygonna M. Williams DATE: Feb 18/11

SASKATOON BOILER MFG. CO. LTD.

Job #10-32

Date: March 14, 2011

SPARE PARTS LIST FOR: Northern Blizzard Resources, Lloydminster, AB

BOILER MODEL: OTS-G150W

SERIAL NO: 7119

The spare parts have been divided into three categories as follows:

RM - Routine Maintenance - Items which should be on site

CO - Items which should be stocked for Critical Operation

RL - Remote Locations - items to be stocked, where locations are more than a few hours delivery from Saskatoon

Burner: **CRG-165-2 S/N 1110-405**

RM	CO	RL	ITEM	PRICE
X				
X			Electrodes (set)	WP478C
X			Fuses	10 amp
X			Lubricant for plug valves	(3) 3/8" lube sticks
X			Inspection opening gaskets	(8) 2 1/2" x 3 1/2" OB
X			Rear Baffle Gasket	13 ft. Tadpole Tape
X			Burner Gasket	7" - 1 1/4" Rope
	X		Refractory Cement	6# Kel Seal
	X		Programming control	E110-ED510-EP160-EUV1
	X		Hi Limit Control	L4008E1040 Man.
	X		Operating Control	T775M 2048
	X		Modulating Control	T77M 2048
	X		Modulating Motor	M9484F001
	X		Low Level Control	3E2C
	X		Pump Control	N/A
	X		Linkage Arms	(2) 3 1/2" Lg.
	X		Rod Ends	(2) 1/4"
	X		Air Switch	AFS-A
	X		Safety Valve	9.9 x 5 x 1 1/2 Kunkle 927 set at 160 psi
	X		Blower Fan Wheel (1) set	10.6 x 4.5 x 1-1/8" Bore
	X		Door Gaskets	34 ft.
	X		Ignition Transformer	1092F
	X		Scanner Assembly	UV1A-6
	X		Pilot Solenoid Valve	(2) V4046C 1054 - 3/8"
	X		Main Gas Valve Actuator	(2) V4055D 1019
	X		Main Gas Valve Body	(2) V5055C 1000 & V5055A 1038
	X		Blower Motor	7 1/2 HP 480V-3-60
X			Burner Refractory	SBM
			Rear Sight Glass	#B-1740-5
			Valve	Honeywell 1 1/2" V51E 1000
FOR GAS/OIL OR OIL FIRED BOILERS				
X				N/A
X			Oil Nozzles	N/A
X			Cartridge for Oil Filter	N/A
X			Filter for air compressor	N/A
	X		Belts (set)	N/A
	X		Air compressor	N/A
	X		Oil Solenoid Valve	N/A
	X		Oil Pump	N/A
	X		Compressor &/or Pump motor	N/A
			Changeover switch	

Prices listed are effective for 30 days only, from date issued, FOB factory, Saskatoon
All applicable taxes extra

SK-1068

PREVENTATIVE MAINTENANCE

RECOMMENDED FOR

SASKATOON BOILERS - ALL TYPES - ALL SIZES - ALL FUELS
DISPLAY ONE OF THESE CARDS IN A VISIBLE LOCATION AS NEAR AS POSSIBLE TO THE BURNER. AN ADDITIONAL CARD SHOULD BE DISPLAYED IN THE BOILER ROOM WHERE IT WILL BE EASILY ACCESSIBLE IN AN EMERGENCY.

MAINTENANCE INSTRUCTIONS: A regular maintenance program is critical to ensure that your boiler will operate reliably and efficiently. Your maintenance program will consist of daily, weekly, monthly, semi-annual, and annual tests that will confirm that all parts of the boiler are operating as intended. The frequencies and tests recommended by **Saskatoon Boiler** are listed below. An experienced operator may have to increase the frequency or add additional checks depending on the actual operating conditions or jurisdictional requirements. The owner's safety program, maintenance lockout procedures and hazard assessment requirements must be followed.

DAILY

1. Blowdown the boiler through each blowdown connection for a minimum of five seconds.
2. While the boiler is operating, blowdown the water column(s) to the low water cut off point. If the unit does not shut down, correct the fault.
3. Check the stack temperature.
4. Verify that combustion gasses are not leaking from the boiler into the boiler room.
5. Verify that the boiler pressure or water temperature is not excessive.
6. Verify the fuel and water levels. The boiler must not run out of either during operation.
7. Add lubricating oil to the air compressor oil reservoir if low.

WEEKLY

1. Observe the operation of the electronic combustion control to ensure that it functions as described in the manufacturer's documentation.
2. Clean the boiler exterior so that oil and dust do not accumulate. Pay extra attention to the operating components.
3. Inspect the feedwater or circulation system and maintain it per the manufacturer's recommendations.
4. Steam Boilers - Test the feedwater and compare it against the water standards supplied by the water treatment company.
5. Turn the oil strainer(s).

MONTHLY

1. Perform a Try Lever Test; refer to the "SAFETY AND OPERATION CHECK PROCEDURES" section of the manual for the try lever test procedure.
2. Test the high limit control to be sure that it operates satisfactorily.
3. Inspect the burner air damper linkages and damper connections. Tighten if required.
4. Lubricate the blowdown valve(s).
5. Clean the air compressor intake filter.
6. Clear the electrode porcelain(s) of any carbon deposits.

SEMI-ANNUALLY

1. Thoroughly clean the furnace and tubes.
2. Check for any tube or boiler leaks.
3. Replace the gasket around the rear turn chamber with a new one.
4. Clean the sight glass in the rear door. Replace if necessary.
5. If the unit is equipped with a non-freeze siphon drain for the pressure controls, it must be disassembled and cleaned.
6. Inspect the fuel tank, water tank, lines and connections for leaks. Repair or tighten as necessary.
7. Flush the air compressor.
8. Drain and flush the oil strainer(s).

ANNUALLY

1. Remove all handhole and manway covers and inspect the waterside of the boiler for corrosion or scale buildup.
2. Flush the inside of the boiler with a hose, making sure to remove all sludge and deposits.
3. Return the handhole and manway covers with new gaskets.
4. Disconnect the piping on the discharge side of the feedwater pipe and inspect for scale buildup.
5. Inspect the check valve(s) in the feedwater system to determine that they are seating properly.
6. Lubricate the electric motors if they are equipped with grease fittings.
7. Replace the fusible plug if so equipped.
8. Inspect the fuel filter and replace if necessary.
9. Check the fuel pump pressure to ensure that the pressure conforms to the manufacturer's requirements, adjust or replace the fuel pump as required.
10. If the unit is equipped with probe type level controls, they should be removed and cleaned.
11. Verify that the safety valve(s) are in proper working condition.
12. Remove, inspect and clean all components of the burner oil nozzle assembly. See the "BURNER AND BURNER OIL ASSEMBLY SERVICING AND MAINTENANCE" section of the manual.
13. Lubricate the manual shut-off valve(s).

VERY IMPORTANT WARNINGS