



Nameplate / PRD Audit Form						
Equipment Nameplate						
Tag / Eqpt #:		Built:	March 1980			
Asset #:		MWP:	517 kPa @ 93°C	MDMT:		
Vessel Name:	Free Water Knockout #2		RT:	RT-2	JE:	100%
Reg. No.:	A0161444		C.A.:	NIL		
S/N:	LM-1671		Dia. Shell	96" I.D.	Dia. Boot:	
NB #:		Dia. Accumulator		Dia. Gas Dome:	No Access	
CRN:	C-8805.2		Heat Treatment	Unknown		
	Nominal	Material		Nominal	Material	
Shell 1:	7.93 mm	SA-285-C	Head 1:	12.70 mm	SA-285-C	
Shell 2:			Head 2:	15 mm	SA-285-C	
Manufacturer:	C.E. Natco Limited					
PRD Information						
PRD S/N:		Model of PRD:				
Tag #:		Colour of PRD:	Blue			
Set Pressure:		Inlet / Outlet Size:	3" / 3"			
Capacity:		Connection Type:	Threaded			
Date of Last Service:		Code Stamp:				
Asset #:		Block Valve Exists:	No			
CRN:		PRD Location	Vessel			
Manufacturer:						
PRD Inspection						
			Yes	No	N/A	
Was the MAWP of the vessel greater or equal to the PRD set pressure?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Has the PRD been serviced within the past 6 years?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were the bonnet seal and blowdown adjustment seal wires still intact?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was the PRD installed vertically?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was the CRN registered in the appropriate province?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If the valve was a pilot operated valve, was the pilot vent plug removed?			<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
If there was an isolating valve on the PRD inlet or outlet, was it properly car-sealed open or was there an electronic interlock in place?			<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Was the inlet piping diameter equal to or greater than the PRD inlet?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was there discharge piping attached to the PRD?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was the discharge piping free from obstruction?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was the discharge piping free of pocketed areas?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was the discharge piping diameter equal to or greater than the PRD discharge size?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was the discharge piping downstream from the PRD free from reductions in size or restrictions?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was the PRD discharge piping self-draining either by design or with a weep hole?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was the discharge piping independently supported and anchored properly?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was the PRD discharge piping assembled so that it will not unthread during a PRD release?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was the final discharge directed to a safe location and not impinging upon other equipment or personnel?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was the PRD service tag attached to the PRD and was the service tag legible?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Did any lifting levers appear to be operable and positioned correctly?			<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Did the PRD appear to be free from excessive vibration?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Did the PRD appear to be installed properly and was the PRD housing free of any mechanical damage?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

## Detailed Inspection Comments

### Inspection Scope:

- An API-510 external inspection was completed on the Free Water Knockout #2.
- The vessel was inspected to meet regulatory requirements.
- Partial access was available to the vessel for external visual inspection.
- The internal condition of the vessel was assessed using ultrasonic thickness measurements.
- The vessel was operating at the time of inspection.

### External Inspection Comments:

#### *Vessel:*

- The nameplate was found and appeared to be secure and legible. All tack welds were in place.
- The ASME stamp and A# were found stamped on the nameplate and were legible.
- The CRN appeared to be registered in Alberta.
- The vessel was painted. The paint appeared to be well bonded and in good condition. No indications of external corrosion or rust stains were present on the vessel.
- The vessel was insulated. [The cladding was not sealed against the west insulation ring around the circumference of the vessel. The cladding was no longer properly sealed against the nozzles, manway and building walls. The cladding was deteriorated on the top east head.](#) No indications of external corrosion under insulation were visible.
- The shell and heads appeared to be in good condition. No dents, bulges or other distortions were visible.
- All vessel welds appeared to be of good quality and in good condition. No indications of misalignment or other rejectable welding defects were visible.
- All nozzles appeared to be in good condition and no evidence of undue stress appeared to be present.
- The vessel and associated components did not appear to be subject to excessive vibration. No indications of fretting were seen.
- The vessel has no handholes or inspection openings.
- The vessel has one, 16" O.D. manway, and it appeared to be in good condition. The manway has no support arm.
- Access to the inside of the vessel was also available through a flanged opening in the end of the vessel.
- The vessel was supported by support saddles. [There was crevice corrosion occurring between the saddle supports base and the building floor. The corrosion appears to be wrapping the base of the supports and was corroding the anchor welds as well.](#)
- The vessel sat on a concrete and steel foundation and floor. The foundation and floor appeared to be in good condition. The vessel appeared to sit level and did not appear to lean. [There were cracks on the south east side of the concrete foundation.](#)
- The ground cable was found attached to the support and appeared to be secure and intact.
- All anode connection wires appeared to be secure and properly installed, with isolation kits present on the flange bolting.

## *Piping and Instrumentation:*

- The piping was painted. Minor paint deterioration and rusting were present; however, no measureable external corrosion was visible.
- The piping was also insulated. The insulation cladding appeared to be in good condition. All edges and supports appeared to be properly sealed. No indications of external corrosion under insulation were visible.
- All piping appeared to be adequately supported and in good condition. All supports and support shoes were in place and appeared to be in good condition.
- [There were no piping support U-bolts installed on the pipe shoes located inside the building.](#)
- All flange bolting was in place and appeared to be properly engaged.
- All threaded connections appeared to be in good condition. No signs of cross-threading were visible.
- [A slow leak was noted from the west flange of the control valve located on the produced water outlet piping.](#)
- All gauges, sight glasses, thermometers, control valves, meter run and associated instrumentation appeared to be in good condition.
- The vessel operating temperature and pressure, as read on the gauges, were below the nameplate design values.
- The piping and associated components did not appear to be subject to excessive vibration. No indications of fretting were visible.
- All branch connections appeared to be in good condition and no evidence of undue stress appeared to be present.

## *Overpressure Protection:*

- The vessel was protected by one PRD. No block valves were present.
- The PRD was attached to the vessel.
- All flange bolting was in place and appeared to be properly engaged.
- The PRD was painted blue.
- The PRD was discharging to the system.
- [There was no safe access to the PRD at the time of inspection. The PRD service records should be reviewed to verify the set pressure and last serviced date.](#)

**Ultrasonic Corrosion Survey Comments:**

The internal condition of the vessel was assessed via an ultrasonic corrosion survey on a representative sample of the vessel and the associated piping. The UT data has been evaluated based on a T-min value calculated via ASME Code Calculation.

Results of the corrosion survey found no indications of internal corrosion and all areas that were inspected appeared to be in good condition.

Please refer to the attached corrosion survey report for further details of the inspection results.

**UT THICKNESS INSPECTION RESULTS**

Tab	TML Description	Material	Nominal	Diameter	ID/OD	C.A.	Low Reading	Calculated T-min	Life Expectancy	Comments
			in	in		in	in	Years		
<b>Inlet Building</b>										
4 Free Water Knockout #2										
(a) Vessel										
	400 Bottom East Head	SA 285 C	0.500	96.000	OD	0.000	0.557	0.260	100+	
	410 Upper North Shell (west end)	SA 285 C	0.312	96.000	OD	0.000	0.350	0.260	100+	
	415 Upper North Shell (east of center)	SA 285 C	0.312	96.000	OD	0.000	0.348	0.260	100+	
	420 Middle North Shell (east of center)	SA 285 C	0.312	96.000	OD	0.000	0.344	0.260	100+	
	425 Bottom Shell (east end)	SA 285 C	0.312	96.000	OD	0.000	0.341	0.260	100+	
	430 Bottom Shell (west end)	SA 285 C	0.312	96.000	OD	0.000	0.345	0.260	100+	
	435 Bottom West Head	SA 285 C	0.591	96.000	OD	0.000	0.683	0.260	100+	
(b) Nozzles										
	470 6" Outlet Elbow (short radius)	SA 234 WPB	0.432	6.625	OD	0.000	0.440	0.245	100+	
										Indications of internal corrosion and pitting appear to be occurring in the elbow to a low of .246". Nominal thickness is .300".
	480 3" Outlet Elbow	SA 234 WPB	0.300	3.500	OD	0.000	0.246	0.189	37.8	
(c) Outlet Piping										
	460 4" Outlet Elbow	SA 234 WPB	0.237	4.500	OD	0.063	0.252	0.090	100+	
										Indications of internal corrosion appear to be occurring in the elbow to a low of .190". Nominal thickness is .237".
	465 4" Outlet Elbow	SA 234 WPB	0.237	4.500	OD	0.063	0.190	0.090	76.2	
(d) Outlet Piping										
	475 4" Outlet Elbow (short radius)	SA 234 WPB	0.237	4.500	OD	0.063	0.194	0.090	86.6	
										Indications of internal corrosion and pitting appear to be occurring in the elbow to a low of .194". Nominal thickness is .237".
	477 3" Outlet Elbow	SA 234 WPB	0.300	3.500	OD	0.063	0.251	0.080	100+	
										Possible indications of internal corrosion may be occurring in the elbow to a low of .251". Nominal thickness is .300".

(e) Outlet Piping

485 3" Outlet Elbow	SA 234 WPB	0.216	3.500	OD	0.063	0.188	0.080	100+	Indications of internal corrosion and pitting appear to be occurring in the elbow to a low of .188". Nominal thickness is .216".
487 Bottom of 3" Outlet Pipe	SA 106 B	0.216	3.500	OD	0.063	0.180	0.080	100+	Indications of internal corrosion appear to be occurring in the bottom of the pipe to a low of .180". Nominal thickness is .216".
489 Bottom of 3" Outlet Pipe	SA 106 B	0.216	3.500	OD	0.063	0.193	0.080	100+	Indications of internal corrosion appear to be occurring in the bottom of the pipe to a low of .193". Nominal thickness is .216".

All static information in the report was obtained from the vessel nameplate. The only blanket assumption made in the report is all piping and fittings are assumed to be either SA-106B or SA-234WPB material with a joint efficiency of 1.00, operate at the same pressure and temperature as the associated vessel, and were manufactured at the same time as the associated vessel.

The remaining life expectancies in this report should only be used as a general guide and may or may not be entirely accurate.

Pictures



General view of LSD sign



Vessel nameplate



*General view of vessel*



*General view of vessel (2)*



*Insulation not sealed on west head*



*Insulation not sealed on west anode nozzle*



*Missing cladding on top east head*



*Vessel not sealed against east building wall*



*Close view of crevice corrosion on east saddle support*



*Crevice corrosion on west saddle support*



*Crevice corrosion on east saddle support*



*Insulation not sealed against manway*



*Cracking in concrete foundation*



*General view of control valve with leaking flange connection*



*West flange connection leak on produced water control valve*



*Example of missing pipe clamps on various piping*



*Example of missing pipe clamps on various piping(2)*



*General view of PRD*

**Inspection Summary**

**External Summary:**

- The cladding was not sealed against the west insulation ring around the circumference of the vessel, nozzles, manway, and building walls; the cladding was deteriorated on the top east head.
- Crevice corrosion was occurring between the saddle supports base and the building floor, wrapping the base of the supports and corroding the anchor welds as well.
- Minor cracks were seen on the south east side of the concrete foundation.
- There was no piping support U-bolts installed on the pipe shoes located inside the building.
- There was no safe access to the PRD at the time of inspection. The PRD service records should be reviewed to verify the set pressure and next service date.
- A slow leak was noted from the west flange of the control valve located on the produced water outlet piping.

**Internal Summary:**

The internal condition of the vessel was assessed via an ultrasonic corrosion survey. Results of the corrosion survey found no indications of internal corrosion and all areas that were inspected appeared to be in good condition.



# TABLE OF CONTENTS

Tab #	Tag	Description	Reg #	Serial #	NB #
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## Inlet Building

### 4 Free Water Knockout #2

- (a) Vessel
- (b) Nozzles
- (c) Outlet Piping
- (d) Outlet Piping
- (e) Outlet Piping

A0161444	LM-1671	



# ITEM LIST

Tab	TML	Description	Dec 2015																		Next Inspect
-----	-----	-------------	----------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--------------

ITEMS	Total	Last Inspection
Equipments	1	1
Vessel components	1	1
Piping components	4	4
Accessory components	0	0
TML's in the facility	16	16

# CONDITION INDICATOR

Tab	TML	Description	Last Inspection Date	Nominal Thickness in	Thinnest Reading in	Critical Thickness in	Corrosion Rate in/yr	Condition Indicator Years
<b><u>Inlet Building</u></b>								
<b>4 Free Water Knockout #2</b>								
<b>(a) Vessel</b>								
		400 Bottom East Head	Dec 2015	0.500	0.558	0.260	0.000	100+
		410 Upper North Shell (west end)	Dec 2015	0.312	0.350	0.260	0.000	100+
		415 Upper North Shell (east of center)	Dec 2015	0.312	0.348	0.260	0.000	100+
		420 Middle North Shell (east of center)	Dec 2015	0.312	0.344	0.260	0.000	100+
		425 Bottom Shell (east end)	Dec 2015	0.312	0.341	0.260	0.000	100+
		430 Bottom Shell (west end)	Dec 2015	0.312	0.345	0.260	0.000	100+
		435 Bottom West Head	Dec 2015	0.591	0.684	0.260	0.000	100+
<b>(b) Nozzles</b>								
		470 6" Outlet Elbow (short radius)	Dec 2015	0.432	0.440	0.245	0.000	100+
		480 3" Outlet Elbow	Dec 2015	0.300	0.246	0.189	0.002	37.8
<b>(c) Outlet Piping</b>								
		460 4" Outlet Elbow	Dec 2015	0.237	0.252	0.090	0.000	100+
		465 4" Outlet Elbow	Dec 2015	0.237	0.190	0.090	0.001	76.2
<b>(d) Outlet Piping</b>								
		475 4" Outlet Elbow (short radius)	Dec 2015	0.237	0.194	0.090	0.001	86.6
		477 3" Outlet Elbow	Dec 2015	0.300	0.251	0.080	0.001	100+
<b>(e) Outlet Piping</b>								
		485 3" Outlet Elbow	Dec 2015	0.216	0.188	0.080	0.001	100+
		487 Bottom of 3" Outlet Pipe	Dec 2015	0.216	0.180	0.080	0.001	100+
		489 Bottom of 3" Outlet Pipe	Dec 2015	0.216	0.193	0.080	0.001	100+

# COMMENT LIST

Tab Equipment

Date Inspected	Comments	Condition indicator
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## Inlet Building

### 4 Free Water Knockout #2

(b) Nozzles

480 3" Outlet Elbow

Dec 2015	Indications of internal corrosion and pitting appear to be occurring in the elbow to a low of .246". Nominal thickness is .300".	37.8
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(c) Outlet Piping

465 4" Outlet Elbow

Dec 2015	Indications of internal corrosion appear to be occurring in the elbow to a low of .190". Nominal thickness is .237".	76.2
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(d) Outlet Piping

475 4" Outlet Elbow (short radius)

Dec 2015	Indications of internal corrosion and pitting appear to be occurring in the elbow to a low of .194". Nominal thickness is .237".	86.6
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477 3" Outlet Elbow

Dec 2015	Possible indications of internal corrosion may be occurring in the elbow to a low of .251". Nominal thickness is .300".	
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(e) Outlet Piping

485 3" Outlet Elbow

Dec 2015	Indications of internal corrosion and pitting appear to be occurring in the elbow to a low of .188". Nominal thickness is .216".	
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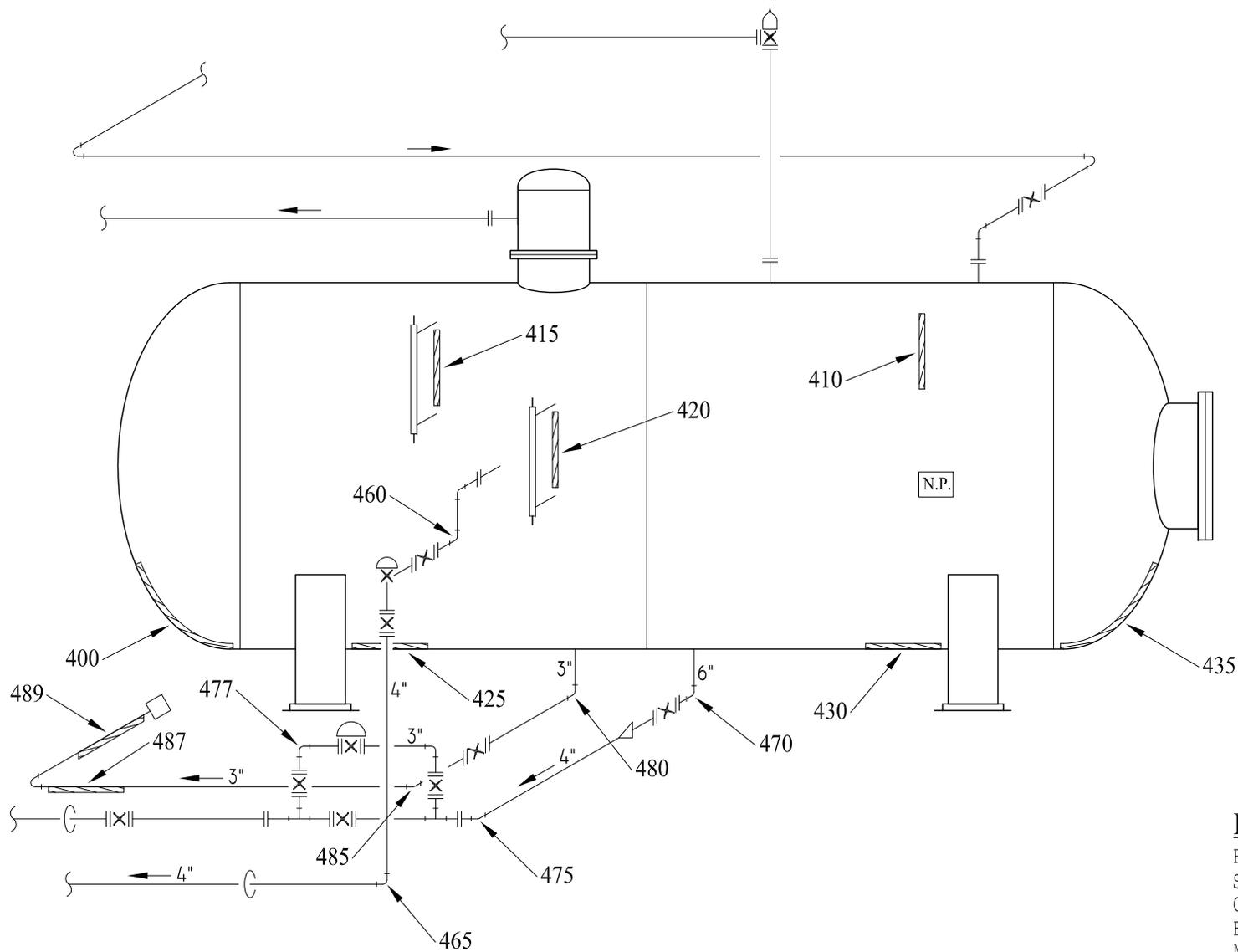
487 Bottom of 3" Outlet Pipe

Dec 2015	Indications of internal corrosion appear to be occurring in the bottom of the pipe to a low of .180". Nominal thickness is .216".	
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489 Bottom of 3" Outlet Pipe

Dec 2015	Indications of internal corrosion appear to be occurring in the bottom of the pipe to a low of .193". Nominal thickness is .216".	
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Inlet



**Free Water Knock Out # 2**

Reg. No. : ① 0161444  
 S/N : LM-1671  
 CRN : C-8805.2  
 Built : March 1980  
 MWP : 75 PSI @ 181°F  
 Dia. : 96" ID  
 C.A. : NIL  
 J.E. : RT-2 / 100%  
 Shell : 0.312" SA 285-C  
 Head No.1: 0.500" SA 285-C  
 Head No.2: 0.590" SA 285-C  
 Built By : C.E. Natco Limited

Canadian Natural Resources Ltd.  
 Grand Forks 04-01 Battery  
 04-01-013-13 W4M

**SUMMIT** Inspection Services Ltd.

Sketched: **TM** Date: **01/2016**

AutoCad: **SH** Revised:

Dwg: **4** Items: **400 - 489**

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<b>Index: 4</b>	<b>Free Water Knockout #2</b>	<b>Product:</b>	<b>JE:</b> 100%
<b>Component:</b> (a)	Vessel	<b>Drawing:</b> 4	<b>Dia:</b> 96 (in) OD
<b>TML:</b>	400 Bottom East Head	<b>MfgDate:</b> Mar 1980	<b>CA:</b> 0.000 (in)
<b>Registration:</b> A0161444		<b>Material:</b> SA 285 C	<b>Nominal:</b> 0.500 (in)
<b>CRN:</b> C-8805.2		<b>MWP:</b> 75 psi @ 181 °F	<b>T-min:</b> 0.260 (in)

	1	2	3	4	5	6	7	8	9	10	11	12	Total Loss (in)	Loss Rate (in/yr)	Condition Indicator
<b>Inspection Dates</b>	Dec														
	2015														
<b>Temperature °F</b>	55														
<b>Top</b>	1 0.581	2 0.580	3 0.581	4 0.577	5 <b>0.558</b>	6 0.562	7 0.576	8 0.595							
<b>Bottom</b>															
<b>Comments:</b>															
<b>Scan Minimum (in)</b>	0.558														
<b>Avg Thickness (in)</b>	0.576														
<b>Avg Loss</b>															
<b>Avg Loss Rate</b>															
<b>Max Loss Rate</b>															
<b>Avg.Condition Indicator</b>															
<b>Min.Condition Indicator</b>															

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<b>Index: 4</b>	<b>Free Water Knockout #2</b>	<b>Product:</b>	<b>JE:</b> 100%
<b>Component:</b> (a)	Vessel	<b>Drawing:</b> 4	<b>Dia:</b> 96 (in) OD
<b>TML:</b>	410 Upper North Shell (west end)	<b>MfgDate:</b> Mar 1980	<b>CA:</b> 0.000 (in)
<b>Registration:</b> A0161444		<b>Material:</b> SA 285 C	<b>Nominal:</b> 0.312 (in)
<b>CRN:</b> C-8805.2		<b>MWP:</b> 75 psi @ 181 °F	<b>T-min:</b> 0.260 (in)

	1	2	3	4	5	6	7	8	9	10	11	12	Total Loss (in)	Loss Rate (in/yr)	Condition Indicator
<b>Inspection Dates</b>	Dec														
	2015														
<b>Temperature °F</b>	70														
<b>Top</b>	1 0.357	2 0.357	3 0.358	4 0.352	5 0.353	6 0.352	7 <b>0.350</b>	8 <b>0.350</b>	9 <b>0.350</b>	10 <b>0.350</b>	11 0.351	12 0.352			
<b>Bottom</b>															
<b>Comments:</b>															
<b>Scan Minimum (in)</b>	0.350														
<b>Avg Thickness (in)</b>	0.353														
<b>Avg Loss</b>															
<b>Avg Loss Rate</b>															
<b>Max Loss Rate</b>															
<b>Avg.Condition Indicator</b>															
<b>Min.Condition Indicator</b>															

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<b>Index: 4</b>	<b>Free Water Knockout #2</b>	<b>Product:</b>	<b>JE:</b> 100%
<b>Component:</b> (a)	Vessel	<b>Drawing:</b> 4	<b>Dia:</b> 96 (in) OD
<b>TML:</b>	415 Upper North Shell (east of center)	<b>MfgDate:</b> Mar 1980	<b>CA:</b> 0.000 (in)
<b>Registration:</b> A0161444		<b>Material:</b> SA 285 C	<b>Nominal:</b> 0.312 (in)
<b>CRN:</b> C-8805.2		<b>MWP:</b> 75 psi @ 181 °F	<b>T-min:</b> 0.260 (in)

	1	2	3	4	5	6	7	8	9	10	11	12	Total Loss (in)	Loss Rate (in/yr)	Condition Indicator
<b>Inspection Dates</b>	Dec 2015														
<b>Temperature °F</b>	70														
<b>Top</b>	1	0.356													
	2	0.353													
	3	0.353													
	4	0.355													
	5	0.356													
	6	0.358													
	7	0.351													
	8	0.351													
	9	0.350													
	10	0.350													
	11	0.351													
<b>Bottom</b>	12	<b>0.348</b>													
<b>Comments:</b>															
<b>Scan Minimum (in)</b>	0.348														
<b>Avg Thickness (in)</b>	0.353														
<b>Avg Loss</b>															
<b>Avg Loss Rate</b>															
<b>Max Loss Rate</b>															
<b>Avg.Condition Indicator</b>															
<b>Min.Condition Indicator</b>															

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<b>Index: 4</b>	<b>Free Water Knockout #2</b>	<b>Product:</b>	<b>JE:</b> 100%
<b>Component:</b> (a)	Vessel	<b>Drawing:</b> 4	<b>Dia:</b> 96 (in) OD
<b>TML:</b>	420 Middle North Shell (east of center)	<b>MfgDate:</b> Mar 1980	<b>CA:</b> 0.000 (in)
<b>Registration:</b> A0161444		<b>Material:</b> SA 285 C	<b>Nominal:</b> 0.312 (in)
<b>CRN:</b> C-8805.2		<b>MWP:</b> 75 psi @ 181 °F	<b>T-min:</b> 0.260 (in)

	1	2	3	4	5	6	7	8	9	10	11	12	Total Loss (in)	Loss Rate (in/yr)	Condition Indicator
<b>Inspection Dates</b>	Dec 2015														
<b>Temperature °F</b>	70														
<b>Top</b>	1	0.347													
	2	0.348													
	3	0.350													
	4	0.348													
	5	<b>0.344</b>													
	6	<b>0.344</b>													
	7	0.346													
	8	0.347													
	9	0.348													
	10	0.351													
	11	0.352													
<b>Bottom</b>	12	0.352													
<b>Comments:</b>															
<b>Scan Minimum (in)</b>	0.344														
<b>Avg Thickness (in)</b>	0.348														
<b>Avg Loss</b>															
<b>Avg Loss Rate</b>															
<b>Max Loss Rate</b>															
<b>Avg.Condition Indicator</b>															
<b>Min.Condition Indicator</b>															

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<b>Index: 4</b>	<b>Free Water Knockout #2</b>	<b>Product:</b>	<b>JE:</b> 100%
<b>Component:</b> (a)	Vessel	<b>Drawing:</b> 4	<b>Dia:</b> 96 (in) OD
<b>TML:</b>	425 Bottom Shell (east end)	<b>MfgDate:</b> Mar 1980	<b>CA:</b> 0.000 (in)
<b>Registration:</b> A0161444		<b>Material:</b> SA 285 C	<b>Nominal:</b> 0.312 (in)
<b>CRN:</b> C-8805.2		<b>MWP:</b> 75 psi @ 181 °F	<b>T-min:</b> 0.260 (in)

	1	2	3	4	5	6	7	8	9	10	11	12	Total Loss (in)	Loss Rate (in/yr)	Condition Indicator												
<b>Inspection Dates</b>	Dec 2015																										
<b>Temperature °F</b>	70																										
<b>East</b>	1	0.344	2	0.343	3	0.345	4	0.343	5	0.344	6	0.351	7	0.345	8	0.345	9	0.346	10	0.344	11	<b>0.341</b>	12	<b>0.341</b>			
<b>West</b>	12	<b>0.341</b>																									
<b>Comments:</b>																											
<b>Scan Minimum (in)</b>	0.341																										
<b>Avg Thickness (in)</b>	0.344																										
<b>Avg Loss</b>																											
<b>Avg Loss Rate</b>																											
<b>Max Loss Rate</b>																											
<b>Avg.Condition Indicator</b>																											
<b>Min.Condition Indicator</b>																											

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<b>Index: 4</b>	<b>Free Water Knockout #2</b>	<b>Product:</b>	<b>JE:</b> 100%
<b>Component:</b> (a)	Vessel	<b>Drawing:</b> 4	<b>Dia:</b> 96 (in) OD
<b>TML:</b>	430 Bottom Shell (west end)	<b>MfgDate:</b> Mar 1980	<b>CA:</b> 0.000 (in)
<b>Registration:</b> A0161444		<b>Material:</b> SA 285 C	<b>Nominal:</b> 0.312 (in)
<b>CRN:</b> C-8805.2		<b>MWP:</b> 75 psi @ 181 °F	<b>T-min:</b> 0.260 (in)

	1	2	3	4	5	6	7	8	9	10	11	12	Total Loss (in)	Loss Rate (in/yr)	Condition Indicator
<b>Inspection Dates</b>	Dec 2015														
<b>Temperature °F</b>	70														
<b>East</b>	1	0.360													
	2	0.351													
	3	0.350													
	4	0.347													
	5	0.347													
	6	0.346													
	7	0.349													
	8	0.350													
	9	0.348													
	10	<b>0.345</b>													
	11	0.347													
<b>West</b>	12	0.352													
<b>Comments:</b>															
<b>Scan Minimum (in)</b>	0.345														
<b>Avg Thickness (in)</b>	0.349														
<b>Avg Loss</b>															
<b>Avg Loss Rate</b>															
<b>Max Loss Rate</b>															
<b>Avg.Condition Indicator</b>															
<b>Min.Condition Indicator</b>															

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<b>Index: 4</b>	<b>Free Water Knockout #2</b>	<b>Product:</b>	<b>JE:</b> 100%
<b>Component:</b> (a)	Vessel	<b>Drawing:</b> 4	<b>Dia:</b> 96 (in) OD
<b>TML:</b>	435 Bottom West Head	<b>MfgDate:</b> Mar 1980	<b>CA:</b> 0.000 (in)
<b>Registration:</b> A0161444		<b>Material:</b> SA 285 C	<b>Nominal:</b> 0.591 (in)
<b>CRN:</b> C-8805.2		<b>MWP:</b> 75 psi @ 181 °F	<b>T-min:</b> 0.260 (in)

	1	2	3	4	5	6	7	8	9	10	11	12	Total Loss (in)	Loss Rate (in/yr)	Condition Indicator
<b>Inspection Dates</b>	Dec														
	2015														
<b>Temperature °F</b>	55														
<b>Top</b>	1 0.693	2 0.695	3 0.699	4 0.699	5 0.702	6 0.703	7 0.707	8 0.691	9 <b>0.684</b>	10 0.694	11 0.692	12 0.700			
<b>Bottom</b>															
<b>Comments:</b>															
<b>Scan Minimum (in)</b>	0.684														
<b>Avg Thickness (in)</b>	0.697														
<b>Avg Loss</b>															
<b>Avg Loss Rate</b>															
<b>Max Loss Rate</b>															
<b>Avg.Condition Indicator</b>															
<b>Min.Condition Indicator</b>															

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<b>Index: 4</b>	<b>Free Water Knockout #2</b>	<b>Product:</b>	<b>JE:</b> 100%
<b>Component: (c)</b>	Outlet Piping	<b>Drawing: 4</b>	<b>Dia:</b> 4.500 (in) OD
<b>TML:</b>	460 4" Outlet Elbow	<b>MfgDate:</b> Mar 1980	<b>CA:</b> 0.063 (in)
<b>Registration:</b>		<b>Material:</b> SA 234 WPB	<b>Nominal:</b> 0.237 (in)
<b>CRN:</b>		<b>MWP:</b> 75 psi @ 181 °F	<b>T-min:</b> 0.090 (in)

	1	2	3	4	5	6	7	8	9	10	11	12	Total Loss (in)	Loss Rate (in/yr)	Condition Indicator
<b>Inspection Dates</b>	Dec 2015														
<b>Temperature °F</b>	70														
<b>Top</b>	1	0.261													
	2	<b>0.252</b>													
	3	<b>0.252</b>													
	4	0.258													
	5	0.258													
	6	0.255													
	7	0.260													
<b>Bottom</b>	8	0.256													
<b>Comments:</b>															
<b>Scan Minimum (in)</b>	0.252														
<b>Avg Thickness (in)</b>	0.257														
<b>Avg Loss</b>															
<b>Avg Loss Rate</b>															
<b>Max Loss Rate</b>															
<b>Avg.Condition Indicator</b>															
<b>Min.Condition Indicator</b>															

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<b>Index: 4</b>	<b>Free Water Knockout #2</b>	<b>Product:</b>	<b>JE:</b> 100%
<b>Component: (c)</b>	Outlet Piping	<b>Drawing: 4</b>	<b>Dia:</b> 4.500 (in) OD
<b>TML:</b>	465 4" Outlet Elbow	<b>MfgDate: Mar 1980</b>	<b>CA:</b> 0.063 (in)
<b>Registration:</b>		<b>Material: SA 234 WPB</b>	<b>Nominal:</b> 0.237 (in)
<b>CRN:</b>		<b>MWP: 75 psi @ 181 °F</b>	<b>T-min:</b> 0.090 (in)

	1	2	3	4	5	6	7	8	9	10	11	12	Total Loss (in)	Loss Rate (in/yr)	Condition Indicator
<b>Inspection Dates</b>	Dec 2015														
<b>Temperature °F</b>	70														
<b>Top</b>	1	0.214											0.023	0.001	100+
	2	0.202											0.035	0.001	100+
	3	0.201											0.036	0.001	100+
	4	0.194											0.043	0.001	86.5
	5	<b>0.190</b>											<b>0.047</b>	0.001	76.1
	6	0.192											0.045	0.001	81.1
	7	0.198											0.039	0.001	99.1
<b>Bottom</b>	8	0.210											0.027	0.001	100+
<b>Comments:</b>	9	0.210											0.027	0.001	100+

Dec 2015 Band: Indications of internal corrosion appear to be occurring in the elbow to a low of .190". Nominal thickness is .237".

<b>Scan Minimum (in)</b>	0.190
<b>Avg Thickness (in)</b>	0.201
<b>Avg Loss</b>	0.036
<b>Avg Loss Rate</b>	0.001
<b>Max Loss Rate</b>	0.001
<b>Avg.Condition Indicator</b>	
<b>Min.Condition Indicator</b>	76.2



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<b>Index: 4</b>	<b>Free Water Knockout #2</b>	<b>Product:</b>	<b>JE:</b> 100%
<b>Component:</b> (b)	Nozzles	<b>Drawing:</b> 4	<b>Dia:</b> 6.625 (in) OD
<b>TML:</b>	470 6" Outlet Elbow (short radius)	<b>MfgDate:</b> Mar 1980	<b>CA:</b> 0.000 (in)
<b>Registration:</b>		<b>Material:</b> SA 234 WPB	<b>Nominal:</b> 0.432 (in)
<b>CRN:</b>		<b>MWP:</b> 75 psi @ 181 °F	<b>T-min:</b> 0.245 (in)

	1	2	3	4	5	6	7	8	9	10	11	12	Total Loss (in)	Loss Rate (in/yr)	Condition Indicator
<b>Inspection Dates</b>	Dec 2015														
<b>Temperature °F</b>	70														
<b>Top</b>	1	0.482													
	2	0.469													
	3	0.467													
	4	0.462													
	5	0.461													
	6	0.452													
	7	<b>0.440</b>													
	8	0.450													
	9	0.448													
	10	0.455													
<b>Bottom</b>	11	0.455													
<b>Comments:</b>															
<b>Scan Minimum (in)</b>	0.440														
<b>Avg Thickness (in)</b>	0.458														
<b>Avg Loss</b>															
<b>Avg Loss Rate</b>															
<b>Max Loss Rate</b>															
<b>Avg.Condition Indicator</b>															
<b>Min.Condition Indicator</b>															

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<b>Index: 4</b>	<b>Free Water Knockout #2</b>	<b>Product:</b>	<b>JE:</b> 100%
<b>Component: (d)</b>	Outlet Piping	<b>Drawing: 4</b>	<b>Dia:</b> 4.500 (in) OD
<b>TML:</b>	475 4" Outlet Elbow (short radius)	<b>MfgDate: Mar 1980</b>	<b>CA:</b> 0.063 (in)
<b>Registration:</b>		<b>Material: SA 234 WPB</b>	<b>Nominal:</b> 0.237 (in)
<b>CRN:</b>		<b>MWP: 75 psi @ 181 °F</b>	<b>T-min:</b> 0.090 (in)

	1	2	3	4	5	6	7	8	9	10	11	12	Total Loss (in)	Loss Rate (in/yr)	Condition Indicator
<b>Inspection Dates</b>	Dec 2015														
<b>Temperature °F</b>	70														
<b>South</b>	1	0.208											0.029	0.001	100+
	2	0.209											0.028	0.001	100+
	3	0.213											0.024	0.001	100+
	4	0.213											0.024	0.001	100+
	5	0.216											0.021	0.001	100+
<b>Pit</b>	6	<b>0.194</b>											<b>0.043</b>	0.001	86.5
<b>East Pit</b>	7	0.196											0.041	0.001	92.5

**Comments:**  
 Dec 2015 Band: Indications of internal corrosion and pitting appear to be occurring in the elbow to a low of .194". Nominal thickness is .237".

<b>Scan Minimum (in)</b>	0.194
<b>Avg Thickness (in)</b>	0.207
<b>Avg Loss</b>	0.030
<b>Avg Loss Rate</b>	0.001
<b>Max Loss Rate</b>	0.001
<b>Avg.Condition Indicator</b>	
<b>Min.Condition Indicator</b>	86.6

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<b>Index: 4</b>	<b>Free Water Knockout #2</b>	<b>Product:</b>	<b>JE:</b> 100%
<b>Component:</b> (d)	Outlet Piping	<b>Drawing:</b> 4	<b>Dia:</b> 3.500 (in) OD
<b>TML:</b>	477 3" Outlet Elbow	<b>MfgDate:</b> Mar 1980	<b>CA:</b> 0.063 (in)
<b>Registration:</b>		<b>Material:</b> SA 234 WPB	<b>Nominal:</b> 0.300 (in)
<b>CRN:</b>		<b>MWP:</b> 75 psi @ 181 °F	<b>T-min:</b> 0.080 (in)

	1	2	3	4	5	6	7	8	9	10	11	12	Total Loss (in)	Loss Rate (in/yr)	Condition Indicator
<b>Inspection Dates</b>	Dec 2015														
<b>Temperature °F</b>	70														
<b>Top</b>	1	0.281											0.019	0.001	100+
	2	0.278											0.022	0.001	100+
	3	0.276											0.024	0.001	100+
	4	0.269											0.031	0.001	100+
	5	<b>0.253</b>											<b>0.047</b>	0.001	100+
	6	0.273											0.027	0.001	100+
<b>Bottom</b>	7	0.272											0.028	0.001	100+
<b>Comments:</b>	Dec 2015 Band: Possible indications of internal corrosion may be occurring in the elbow to a low of .251". Nominal thickness is .300".														
<b>Scan Minimum (in)</b>	0.251														
<b>Avg Thickness (in)</b>	0.272														
<b>Avg Loss</b>	0.028														
<b>Avg Loss Rate</b>	0.001														
<b>Max Loss Rate</b>	0.001														
<b>Avg.Condition Indicator</b>															
<b>Min.Condition Indicator</b>															

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<b>Index: 4</b>	<b>Free Water Knockout #2</b>	<b>Product:</b>	<b>JE:</b> 100%
<b>Component: (b)</b>	Nozzles	<b>Drawing: 4</b>	<b>Dia:</b> 3.500 (in) OD
<b>TML:</b>	480 3" Outlet Elbow	<b>MfgDate:</b> Mar 1980	<b>CA:</b> 0.000 (in)
<b>Registration:</b>		<b>Material:</b> SA 234 WPB	<b>Nominal:</b> 0.300 (in)
<b>CRN:</b>		<b>MWP:</b> 75 psi @ 181 °F	<b>T-min:</b> 0.189 (in)

	1	2	3	4	5	6	7	8	9	10	11	12	Total Loss (in)	Loss Rate (in/yr)	Condition Indicator
<b>Inspection Dates</b>	Dec 2015														
<b>Temperature °F</b>	70														
<b>Top</b>	1	0.303													
	2	0.282											0.018	0.001	100+
	3	0.274											0.026	0.001	100+
	4	0.261											0.039	0.001	66.0
<b>Pit</b>	5	<b>0.246</b>											<b>0.054</b>	0.002	37.8
	6	0.273											0.027	0.001	100+
<b>Bottom</b>	7	0.279											0.021	0.001	100+

**Comments:**  
 Dec 2015 Band: Indications of internal corrosion and pitting appear to be occurring in the elbow to a low of .246". Nominal thickness is .300".

<b>Scan Minimum (in)</b>	0.246
<b>Avg Thickness (in)</b>	0.274
<b>Avg Loss</b>	0.026
<b>Avg Loss Rate</b>	0.001
<b>Max Loss Rate</b>	0.002
<b>Avg.Condition Indicator</b>	78.5
<b>Min.Condition Indicator</b>	37.8

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<b>Index:</b> 4	<b>Free Water Knockout #2</b>	<b>Product:</b>	<b>JE:</b> 100%
<b>Component:</b> (e)	Outlet Piping	<b>Drawing:</b> 4	<b>Dia:</b> 3.500 (in) OD
<b>TML:</b>	485 3" Outlet Elbow	<b>MfgDate:</b> Mar 1980	<b>CA:</b> 0.063 (in)
<b>Registration:</b>		<b>Material:</b> SA 234 WPB	<b>Nominal:</b> 0.216 (in)
<b>CRN:</b>		<b>MWP:</b> 75 psi @ 181 °F	<b>T-min:</b> 0.080 (in)

	1	2	3	4	5	6	7	8	9	10	11	12	Total Loss (in)	Loss Rate (in/yr)	Condition Indicator
<b>Inspection Dates</b>	Dec 2015														
<b>Temperature °F</b>	70														
<b>Top</b>	1	0.256													
	2	0.221													
<b>Pit</b>	3	<b>0.188</b>											<b>0.028</b>	0.001	100+
	4	0.195											0.021	0.001	100+
	5	0.202											0.014	0.000	100+
<b>Bottom</b>	6	0.228													
	7	0.226													
<b>Comments:</b>	Dec 2015 Band: Indications of internal corrosion and pitting appear to be occurring in the elbow to a low of .188". Nominal thickness is .216".														
<b>Scan Minimum (in)</b>	0.188														
<b>Avg Thickness (in)</b>	0.217														
<b>Avg Loss</b>															
<b>Avg Loss Rate</b>															
<b>Max Loss Rate</b>	0.001														
<b>Avg.Condition Indicator</b>															
<b>Min.Condition Indicator</b>															

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<b>Index: 4</b>	<b>Free Water Knockout #2</b>	<b>Product:</b>	<b>JE:</b> 100%
<b>Component: (e)</b>	Outlet Piping	<b>Drawing: 4</b>	<b>Dia:</b> 3.500 (in) OD
<b>TML:</b>	487 Bottom of 3" Outlet Pipe	<b>MfgDate: Mar 1980</b>	<b>CA:</b> 0.063 (in)
<b>Registration:</b>		<b>Material: SA 106 B</b>	<b>Nominal:</b> 0.216 (in)
<b>CRN:</b>		<b>MWP: 75 psi @ 181 °F</b>	<b>T-min:</b> 0.080 (in)

	1	2	3	4	5	6	7	8	9	10	11	12	Total Loss (in)	Loss Rate (in/yr)	Condition Indicator
<b>Inspection Dates</b>	Dec 2015														
<b>Temperature °F</b>	55														
<b>East</b>	1	0.183											0.033	0.001	100+
	2	0.183											0.033	0.001	100+
	3	0.199											0.017	0.000	100+
	4	0.195											0.021	0.001	100+
	5	0.202											0.014	0.000	100+
	6	0.188											0.028	0.001	100+
	7	0.194											0.022	0.001	100+
	8	0.191											0.025	0.001	100+
	9	<b>0.181</b>											<b>0.035</b>	0.001	100+
	10	0.191											0.025	0.001	100+
	11	0.182											0.034	0.001	100+
<b>West</b>	12	0.184											0.032	0.001	100+

**Comments:**

Dec 2015 Band: Indications of internal corrosion appear to be occurring in the bottom of the pipe to a low of .180". Nominal thickness is .216".

<b>Scan Minimum (in)</b>	0.180
<b>Avg Thickness (in)</b>	0.190
<b>Avg Loss</b>	0.026
<b>Avg Loss Rate</b>	0.001
<b>Max Loss Rate</b>	0.001
<b>Avg.Condition Indicator</b>	
<b>Min.Condition Indicator</b>	

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<b>Index: 4</b>	<b>Free Water Knockout #2</b>	<b>Product:</b>	<b>JE:</b> 100%
<b>Component: (e)</b>	Outlet Piping	<b>Drawing: 4</b>	<b>Dia:</b> 3.500 (in) OD
<b>TML:</b>	489 Bottom of 3" Outlet Pipe	<b>MfgDate:</b> Mar 1980	<b>CA:</b> 0.063 (in)
<b>Registration:</b>		<b>Material:</b> SA 106 B	<b>Nominal:</b> 0.216 (in)
<b>CRN:</b>		<b>MWP:</b> 75 psi @ 181 °F	<b>T-min:</b> 0.080 (in)

	1	2	3	4	5	6	7	8	9	10	11	12	Total Loss (in)	Loss Rate (in/yr)	Condition Indicator
<b>Inspection Dates</b>	Dec 2015														
<b>Temperature °F</b>	55														
<b>North</b>	1	0.217													
	2	0.204											0.012	0.000	100+
	3	<b>0.193</b>											<b>0.023</b>	0.001	100+
	4	0.203											0.013	0.000	100+
	5	0.196											0.020	0.001	100+
	6	0.198											0.018	0.000	100+
	7	0.204											0.012	0.000	100+
	8	0.220													
	9	0.216													
	10	0.210											0.006	0.000	100+
	11	0.206											0.010	0.000	100+
<b>South</b>	12	0.211											0.005	0.000	100+

**Comments:**

Dec 2015 Band: Indications of internal corrosion appear to be occurring in the bottom of the pipe to a low of .193". Nominal thickness is .216".

<b>Scan Minimum (in)</b>	0.193
<b>Avg Thickness (in)</b>	0.207
<b>Avg Loss</b>	0.009
<b>Avg Loss Rate</b>	0.000
<b>Max Loss Rate</b>	0.001
<b>Avg.Condition Indicator</b>	
<b>Min.Condition Indicator</b>	