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**Ultrasonic
 Inspection Report**

UT_Knopcik Sour_nov2011
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Client: Canadian Natural Resources			Equipment Owner: Canadian Natural Resources			Date: Nov 2011			
Item Inspected: Pressure Vessel and piping			Acceptance Code: ASME VIII & B31.3			Job #			
Location: Knopcik Sour			LSD: see below			WO#			
Procedure: ASME-UT-03		Surface Preparation: Painted		Method: Contact Scanning		Temperature: 0 to 20°C		AFE:	
Ultrasonic Inspection Equipment: Digital Flaw Detector			Manufacturer: Panametrics		Serial # 060024009		Cal. Due: Apr 16, 2012		
Transducer	Angle	Type	Size	Frequency	Manufacturer	Serial #	Range	Ref dB	Scan dB
1.	0'	Dual	0.250"	5.0 MHz	Stresstel	01PWRJ	25 mm	50	56
2.	0'	P/E	0.500"	5.0 MHz	Panametrics	72754	50 mm	48	54
3.	0'	Dual	0.250"	5.0 MHz	Panametrics	504002	25 mm	54	58
Cal. Standard 1		Step Wedge	5 to 20mm	Serial # 3750	Cable 1	BNC to Microdot x 1.83m		Couplant: K.K / UTX	

Job Scope: To perform an ultrasonic thickness survey on various pressure vessels and associated piping at 03-21-74-10, 03-29-74-10, 04-27-74-10, 05-25-74-12, 07-23-74-10, 09-29-74-10, 11-28-74-10, 12-23-74-10, 12-26-74-10, 14-24-74-10, 14-27-74-10 and 16-15-74-12 w6m.

Results: See attached UTS drawing and data sheets for all point locations and recorded thickness measurements.

Client Representative: Terry Aickelin	Contractor Representative:
Technician: Lance Smith	Assistant: Nathan Hubert



**Canadian Natural Resources
Knopcik Sour**

LSD	Drawing #	Item Description	Reg A#	Serial #	Manufacturer	Flagged Items
03-21-74-10 w6m	1	Wellhead Piping	n/a	n/a	n/a	105
	2	Line Heater Piping	3129054	95-C3163-3001	Maloney Steel	
	3	Vertical Separator	3129023	95-C3163-3002	Maloney Steel	
03-29-74-10 w6m	1	Wellhead Piping	n/a	n/a	n/a	
	2	Line Heater Piping	439083	H02828A/B	Opsco Ind.	220, 225
	3	Vertical Separator	439118	V-2828	Opsco Ind.	
	4	Fuel Gas Scrubber	C 75802	04-2902-14	Opsco Ind.	
04-27-74-10 w6m	1	Wellhead Piping	n/a	n/a	n/a	120
	2	Line Heater Piping	3113855	95-C3162-3001-B	Maloney Steel	
	3	Vertical Separator	3113848	95-C3162-3002-B	Maloney Steel	
05-25-74-12 w6m	1	Wellhead Piping	n/a	n/a	n/a	120
07-23-74-10 w6m	1	Wellhead Piping	n/a	n/a	n/a	
09-29-74-10 w6m	1	Wellhead Piping	n/a	n/a	n/a	
	2	Line Heater Piping	3113862	98-C3162-3001-C	Maloney Steel	
	3	Vertical Separator	3121609	95-C3162-3002-D	Maloney Steel	305, 345, 355
11-28-74-10 w6m (wellsite)	1	Wellhead Piping	n/a	n/a	n/a	
	2	Line Heater Piping	3113305	95-C3162-3001-A	Maloney Steel	
	3	Vertical Separator	3113635	95-C3162-3002-A	Maloney Steel	360
11-28-74-10 w6m (central)	1	Horizontal Inlet Separator	433615	V-2699A	Opsco Ind.	185, 190
	2	Vertical Blowcase	433616	V-2699B	Opsco Ind.	205, 207
	3	Inlet Scrubber	482859	97-3202F-1	Petro Equip.	380
	4	1st Stage Suction Bottle	466698	050393-02	EFX Compression	
	5	1st Stage Discharge Bottle	466699	050393-03	EFX Compression	
	6	2nd Stage Suction Scrubber	466697	050393-01	EFX Compression	605
	7	2nd Stage Suction Bottle	466700	050393-04	EFX Compression	
	8	2nd Stage Discharge Bottle	433602	97025-05	Enerflex Mfg.	
	9	Compressor Coolers	n/a	see drawing	Air X Changers	
	10	Fuel Gas Scrubber	421802	972589-13	Enerflex Mfg.	
12-23-74-10 w6m	1	Wellhead Piping	n/a	n/a	n/a	
	2	Line Heater Piping	420492	HO-2612-A/B	Opsco Ind.	220
	3	Fuel Gas Scrubber	C 75803	FGS.2681.1	Opsco Ind.	



Canadian Natural Resources
Knopcik Sour

LSD	Drawing #	Item Description	Reg A#	Serial #	Manufacturer	Flagged Items
12-26-74-10 w6m	1	Wellhead Piping	n/a	n/a	n/a	110, 120
	2	Line Heater Piping	3113879	95-C3162-3001-D	Maloney Steel	
	3	Vertical Separator	3124509	95-C3162-3002-C	Maloney Steel	345
14-24-74-10 w6m	1	Wellhead Piping	n/a	n/a	n/a	
14-27-74-10 w6m	1	Wellhead Piping	n/a	n/a	n/a	
16-15-74-12 w6m	1	Wellhead Piping	n/a	n/a	n/a	120
	3	Line Heater Piping	3151624	HC-48-2000-2334-AB	Opsco Ind.	
	4	Fuel Gas Scrubber	C 75806	FGS-2329-4	Opsco Ind.	
	5	Inlet Filter Separator	525825	04.338	Sunwell Ind.	
	6	Horizontal Blowcase	522640	04.339	Sunwell Ind.	
	7	Vertical Discharge Separator	525826	04.340	Sunwell Ind.	
	8	Fuel Gas Scrubber	C 75808	8600.21	Lo Tech Mfg.	



Customer: CANADIAN NATURAL RES. Description: WELLHEAD & INLET PIPING

Facility: KNOPCIK SOUR Location: 03-21-74-10 W6M

Reg A#: _____ Serial #: _____ Drawing#: 1

CRN #: _____ Manufacturer: _____ Unit #: _____ Year Built: _____

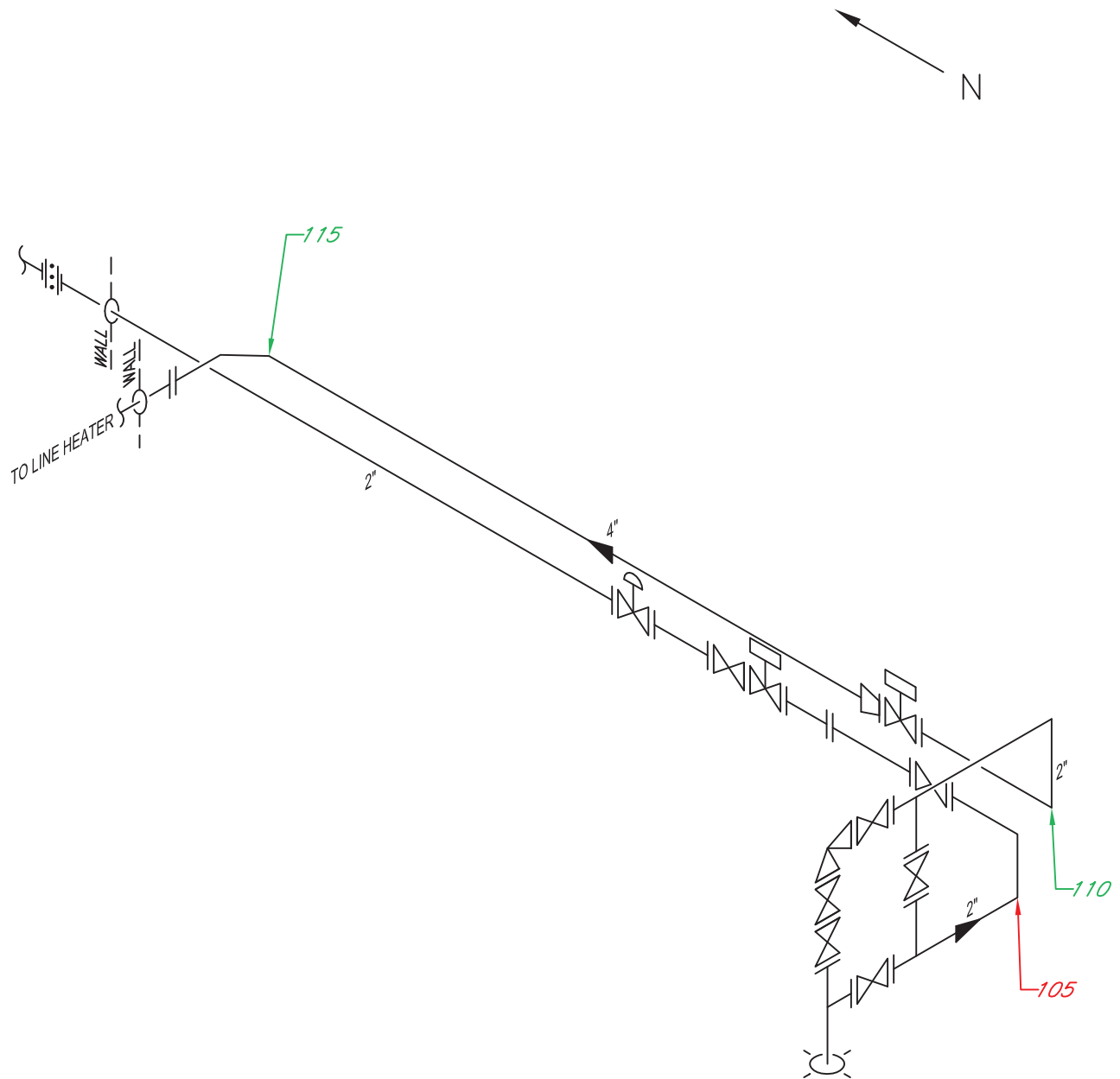
Shell MAWP: _____ Shell MAWT: _____ Shell Material: _____ Nominal: _____ CA: _____

Tube "A" MAWP: _____ Tube "A" MAWT: _____ Head Material: _____ Nominal: _____ CA: _____

Tube "B" MAWP: _____ Tube "B" MAWT: _____ Tube Material: _____ Nominal: _____ CA: _____

Size: _____ Manway: _____ MDMT: _____ Boot Shell Mat: _____ Nominal: _____ CA: _____

Insulated: _____ C Stamp: _____ RT: _____ PWHT: _____ Boot Head Mat: _____ Nominal: _____ CA: _____





UTS Data Sheet

Client: **Canadian Natural Resources**
 Facility: **Knopcik Sour**
 LSD: **03-21-74-10 w6m**
 Equip Description: **Wellhead & Inlet Piping**
 Reg A#: **n/a**
 Drawing #: **1**

			Nominal Thickness (mm)	Corrosion Allowance (mm)	Flag Thickness (mm)
105	Description: 2" 90° Elbow		8.7	1.1	7.6
	Date: Sept 22, 08	Nov 14, 11			
	Minimum: 7.7	7.6			
	Average: 8.3	8.2			
	Comments:				
110	Description: 2" 90° Elbow		8.7	1.1	7.6
	Date: Sept 22, 08	Nov 14, 11			
	Minimum: 8.0	7.8			
	Average: 8.5	8.1			
	Comments: <i>Min scan at mid elbow.</i>				
115	Description: 4" 90° Elbow		13.5	1.7	11.8
	Date: Sept 22, 08	Nov 14, 11			
	Minimum: 13.5	13.4			
	Average: 13.8	13.7			
	Comments:				



Customer: CANADIAN NATURAL RES. Description: LINE HEATER PIPING

Facility: KNOPCIK SOUR Location: 03-21-74-10 W6M

Reg A#: 3129054 Serial #: 95-C3163-3001 Drawing#: 2

CRN #: M8878.2 Manufacturer: MALONEY STEEL Unit #: N/A Year Built: 1995

Shell MAWP: _____ Shell MAWT: _____ Shell Material: _____ Nominal: 9.5mm CA: 3.2mm

Tube "A" MAWP: 21370 kPa Tube "A" MAWT: 93°C Head Material: _____ Nominal: _____ CA: _____

Tube "B" MAWP: 13960 kPa Tube "B" MAWT: 93°C Tube Material: SA 106 B Nominal: SEE BELOW CA: SEE BELOW

Size: SEE BELOW Manway: N/A MDMT: N/S Boot Shell Mat: _____ Nominal: _____ CA: _____

Insulated: YES C Stamp: NO RT: 100% PWHT: YES Boot Head Mat: _____ Nominal: _____ CA: _____

PSV DATA

Manufacturer: FARRIS Serviced By: TYCO
 Model: 1850 Service Date: JUNE 30/09
 Serial: CE-24249-R1 Code Stamp: UV
 Set Pressure: 1034 kPa CRN: OG2367.5C
 Capacity: 516 scfm Location: LP FUEL GAS
 Tag: EK-2 Inlet Size: 3/4" M.T
 Flows To: FLARE Outlet Size: 1" F.T

COIL A

NOMINAL: 11.1mm
 CA: 3.2mm
 SIZE: 3"

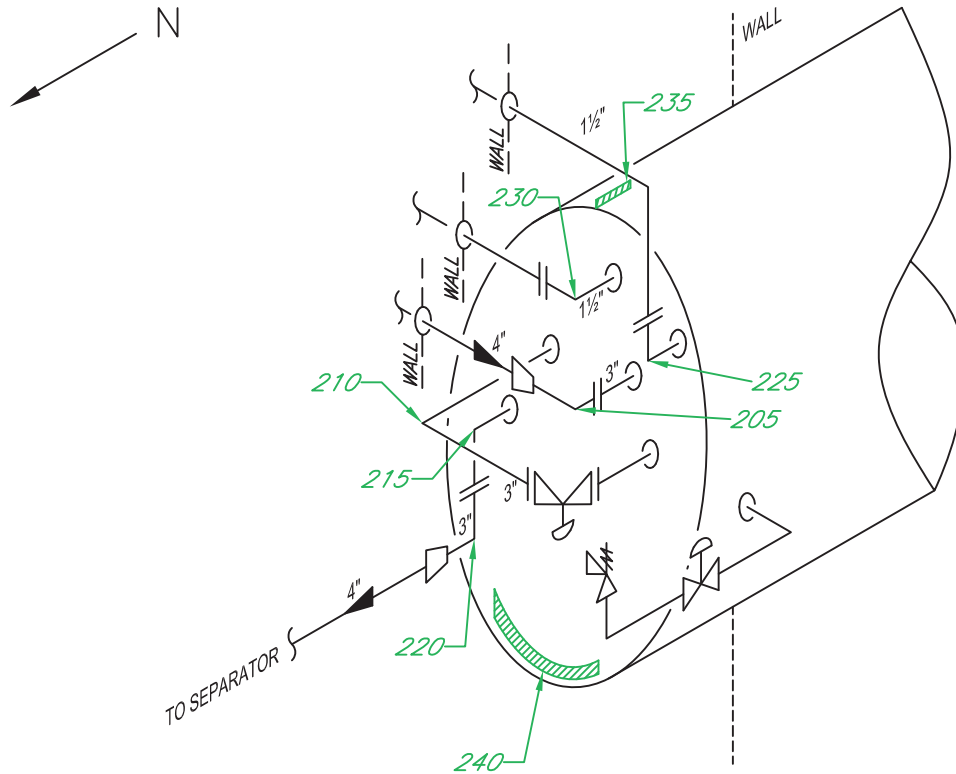
COIL B

NOMINAL: 11.1mm
 CA: 3.2mm
 SIZE: 3"

COIL C

MAWP: 4654 kPa
 MAWT: 93°C
 NOMINAL: 5.1mm
 CA: 1.6mm
 SIZE: 1½"

NOTE: SHELL NOMINAL AND CORROSION ALLOWANCE ASSUMED.





UTS Data Sheet

Client: **Canadian Natural Resources**
 Facility: **Knopcik Sour**
 LSD: **03-21-74-10 w6m**
 Equip Description: **Line Heater Piping**
 Reg A#: **3129054**
 Drawing #: **2**

			Nominal Thickness (mm)	Corrosion Allowance (mm)	Flag Thickness (mm)
205	Description: 3" 90° Elbow		11.1	1.4	9.7
	Date: Sept 22, 08	Nov 14, 11			
	Minimum: 10.4	10.4			
	Average: 10.9	10.9			
	Comments:				
210	Description: 3" 90° Nozzle		11.1	3.2	7.9
	Date: Sept 22, 08	Nov 14, 11			
	Minimum: 9.8	9.8			
	Average: 10.5	10.5			
	Comments: <i>Min scan at mid nozzle.</i>				
215	Description: 3" 90° Nozzle		11.1	3.2	7.9
	Date: Sept 22, 08	Nov 14, 11			
	Minimum: 9.9	9.9			
	Average: 10.5	10.5			
	Comments: <i>Min scan at mid nozzle.</i>				
220	Description: 3" 90° Elbow		7.6	1.0	6.6
	Date: Sept 22, 08	Nov 14, 11			
	Minimum: 6.7	6.7			
	Average: 7.3	7.3			
	Comments: <i>Min scan at mid elbow.</i>				
225	Description: 1½" 90° Nozzle		5.1	1.6	3.5
	Date: Sept 22, 08	Nov 14, 11			
	Minimum: 4.6	4.6			
	Average: 5.0	5.0			
	Comments:				
230	Description: 1½" 90° Nozzle		5.1	1.6	3.5
	Date: Sept 22, 08	Nov 14, 11			
	Minimum: 4.8	4.7			
	Average: 5.0	4.9			
	Comments:				
235	Description: Top Shell		9.5	3.2	6.3
	Date: Sept 22, 08	Nov 14, 11			
	Minimum: 9.7	9.7			
	Average: 9.8	9.8			
	Comments:				
240	Description: Bottom Shell		9.5	3.2	6.3
	Date: Sept 22, 08	Nov 14, 11			
	Minimum: 9.7	9.7			
	Average: 9.9	9.9			
	Comments:				