Canadian Natural

PRESSURE VESSEL VISUAL INSPECTION REPORT

Report #:	156828-MD-31
Inspect Date:	06/01/2012
Page:	1 of 13
Insp. Co. Job #:	156828

Criticality Designation: Yellow

Insp. Comp:	Matrix_Inspection	District:	St Albert - South	Field:	Nevis
Location:	05-11-039-22W4	Unit / Skid #:	N/A	LSD:	05-11-039-22W4
Jurisdiction #:	A0083030	Equip Tag #:	4439	Serial #:	C 4439
CRN #:	A5739.2	Nat'l Bd #:	N/A	Year Built:	1966
Manufacturer:	CESSCO	Equipment Description:	Other: Horizontal Inlet Separator		
Status:	Out of Service - 888 - Standby	Equip. Type:	Vessel: Separator	Service:	Sour
MAWP Shell:	1200 Psi @ 150 °F	Volume:	235 ft³	Code Stamp:	☒ Y ☐ N
MAWP Tube:	@	Height/Length:	20 Ft.	Insulated:	☒ Y ☐ N
MDMT:	N/A RT: N/A	Size/Diameter.:	48 in. O.D.	PWHT:	☒ Y ☐ N
Support	Saddle	Vessel on Original CNRL Inventory List:	☒ Y ☐ N	Manway:	☒ Y ☐ N
C.A.:		Coated: N/A	Clad: N/A	J.E.: 1.00	Remote Access: ☐ -

	Component	Material	Nominal Thk	Diameter	OD/ID	Tube Side	Shell Side
1	Main - Shell	A-212-B	1.688 in.	48.000 in.	OD	☐	☒
2	East - Head	A-212-B	1.813 in.	48.000 in.	OD	☐	☒
3	West - Head	A-212-B	1.813 in.	48.000 in.	OD	☐	☒
4	-					☐	☐
5	-					☐	☐

Static Data: Confirmed ☐ Changed (See Comments) ☒

Comments:
Repair/ Alteration made 1993 by Melloy & Associates Ltd.
Install new nozzle 'D'
Note: no reference to a hydrostatic test performed

PSV Static Data

PSV –1 Tag #:	22	Serial #:	66C2082	CRN:	01832.568312
Model #:	1912HC/SI	Capacity:	19028 SCFM	Set Pressure:	1200 psi
Manufacturer:	Consolidated			Service Company:	Powell
Inlet Size & Type:	2.00 in. - Flanged			Last Service Date:	May 2012
Outlet Size & Type:	3.00 in. - Flanged			Block Valve:	Upstream - Lock Missing - Closed
Carseal Intact:	Yes			Code Stamp:	Yes
Shell Side / Tube Side:	Shell Side	Out for Service During Insp.:	N	Location of PSV:	On Vessel

PSV –2 Tag #:		Serial #:		CRN:	
Model #:		Capacity:		Set Pressure:	
Manufacturer:				Service Company:	
Inlet Size & Type:	-			Last Service Date:	
Outlet Size & Type:	-			Block Valve:	- -
Carseal Intact:				Code Stamp:	
Shell Side / Tube Side:		Out for Service During Insp.:		Location of PSV:	

PSV Comments

Block valve is missing lock and in closed position

Insp. Company: Matrix_Inspection LSD: 05-11-039-22W4 Jurisdiction #: A0083030

External Inspection Results – VE External Inspection Performed

Item	N/A	Condition	Comment (Check Status Bar or Press F1 for Help)	NCR	Action Item Integrity	Action Item Maintenance
Nameplate	☐	Accept	Legible and firmly affixed	☐	☐	☐
Foundation and Supports	☐	Accept	Welded saddles one end anchored to skid	☐	☐	☐
Anchor Bolts	☐	Reject	Anchor bolts missing on East saddle	☐	☐	☒
Grounding	☐	Accept	Grounded to East skid	☐	☐	☐
Insulation Condition	☐	Accept	Damaged and bent with caulking repairs	☐	☐	☐
PSV	☐	Reject	Block valve is missing lock in closed position	☐	☐	☒
Shell Heads & Nozzles	☐	Accept	Minor surface corrosion	☐	☐	☐
Metal Surfaces (Paint)	☐	Reject	Chipped exposing primer and base metal	☐	☐	☒
Aux Equipment	☐	Accept	Intact and well supported	☐	☐	☐
Cathodic Protection	☒		No external anode	☐	☐	☐
Alignment	☐	Accept	Aligned in an East to West direction	☐	☐	☐
Flange Connections	☐	Reject	Missing hardware on 6" inlet piping	☐	☐	☒
Pressure Gauge	☒		No pressure gauge	☐	☐	☐
Temperature Gauge	☐	Accept	-10-110°C: acceptable range	☐	☐	☐
Sight Glass	☐	Accept	Intact with staining noted in both sight glasses	☐	☐	☐
Ladder / Platform	☒		No ladder or platform	☐	☐	☐
Leaks	☐	No	No evidence of leaks	☐	☐	☐
Piping from Vessel	☐	Accept	Secure with riser saddle			
Previous UT Survey	☐	Yes	Locations marked, no history provided	UT Company: N/A		

External Visual Observations

The separator was not in operation at the time of inspection and labeled out of service

The East saddle support is missing the anchor bolts

The separator is approximately 50% outdoors and insulated
The cladding is bent and damaged with loose banding

Dust and bird turds noted on top shell and head sections of the separator

There are studs and nuts missing from the 6" sour gas inlet flange connection

The PSV block valve is missing a lock and in the closed position

The coating is chipped and flaking on the head and shell as well as between the flanges exposing the base metal to minor surface corrosion with evidence no evidence of pitting.

A UT corrosion survey was performed at the time of inspection with no significant wall losses recorded, but it should be noted that the steel is old and contains multiple inclusions and laminations.

Recommendations:

Clean and touch up the coating to aid in the protection against corrosion
Install missing studs on the 6" flange
Open block valve and install a lock
Anchor the East saddle

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Internal Inspection Results – VI N/A (Not Applicable)

Item	N/A	Condition	Comment (Check Status Bar or Press F1 for Help)	NCR	Action Item Integrity	Action Item Maintenance
Shell	☒		No Internal Inspection Carried Out	☐	☐	☐
Heads	☒		No Internal Inspection Carried Out	☐	☐	☐
Manway	☒		No Internal Inspection Carried Out	☐	☐	☐
Gasket Surfaces	☒		No Internal Inspection Carried Out	☐	☐	☐
Welds	☒		No Internal Inspection Carried Out	☐	☐	☐
Refractory	☒		No Internal Inspection Carried Out	☐	☐	☐
Heating Coils	☒		No Internal Inspection Carried Out	☐	☐	☐
Demister Pad	☒		No Internal Inspection Carried Out	☐	☐	☐
Vane Pack	☒		No Internal Inspection Carried Out	☐	☐	☐
Baffles	☒		No Internal Inspection Carried Out	☐	☐	☐
Trays	☒		No Internal Inspection Carried Out	☐	☐	☐
Filter	☒		No Internal Inspection Carried Out	☐	☐	☐
Internal Coating	☒		No Internal Inspection Carried Out	☐	☐	☐
Tubesheet	☒		No Internal Inspection Carried Out	☐	☐	☐
Tube Bundle	☒		No Internal Inspection Carried Out	☐	☐	☐

Internal Visual Observations

No Internal Inspection Carried Out

Recommendations:

No Internal Inspection Carried Out

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Firetube Static Data N/A (Not Applicable)

Diameter: Not Applicable Nom Thickness: Not Applicable Bend: Not Applicable

Length: Not Applicable Firetube Description: Not Applicable

Firetube NDE Performed:

UT ☐	Report#: Not Applicable		ET ☐	Report#: Not Applicable	
MT ☐	Report#: Not Applicable		RT ☐	Report#: Not Applicable	
PT ☐	Report#: Not Applicable		Other ☐	Report#: Not Applicable	

Firetube Inspection Results

Item	N/A	Condition	Comment (Check Status Bar or Press F1 for Help)	NCR	Action Item Integrity	Action Item Maintenance
Burner	☒		No Firetube Inspection Carried Out	☐	☐	☐
Stack	☒		No Firetube Inspection Carried Out	☐	☐	☐
Flange (Throat)	☒		No Firetube Inspection Carried Out	☐	☐	☐
Tube Sheet	☒		No Firetube Inspection Carried Out	☐	☐	☐
Hot Side	☒		No Firetube Inspection Carried Out	☐	☐	☐
Miter	☒		No Firetube Inspection Carried Out	☐	☐	☐
Return Bend	☒		No Firetube Inspection Carried Out	☐	☐	☐
Supports	☒		No Firetube Inspection Carried Out	☐	☐	☐
Butt Welds	☒		No Firetube Inspection Carried Out	☐	☐	☐
Fillet Welds	☒		No Firetube Inspection Carried Out	☐	☐	☐

Firetube Visual Observations

No Firetube Inspection Carried Out

Recommendations:

No Firetube Inspection Carried Out

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Vessel NDE and Final Summary:

NDE Performed:	UT ☒	Report#:	ET ☐	Report#:	
	MT ☐	Report#:	RT ☐	Report#:	
	PT ☐	Report#:	Other ☐	Report#:	

Maxi-Trak Observations Summary (Summarize inspection results Max 255 Characters):

Coating is deteriorated exposing base metal to mild surface corrosion
Missing studs on 6" sour gas flange
PSV block valve is missing a lock and in the closed position
Missing anchor bolts on East saddle

Maxi-Trak Recommendations Summary (Summarize Recommendations Max 255 Characters):

Clean and touch up the coating to aid in the protection against corrosion
Install missing studs in flange
Open and lock block valve
Install missing anchor bolts

Actions Corrected at Time of Inspection: (If actions were corrected at the time of Inspection – note the corrected actions here.)

No actions were corrected at the time of inspection

Additional Visual Observations

No additional observations

Any other safety concerns or observations from associated equipment: (for example associated piping, buildings, pumps etc…)

No safety concerns noted at the time of inspection

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Thickness and Remaining Life Evaluation *" Must be Completed"*

MUST BE COMPLETED AND RESOLVED WITH CNRL IMMEDIATELY UPON DISCOVERY OF LOW WALL THICKNESS AREAS

Step 1: Was any thickness measurement location found to be less than (Nominal WT – Corrosion Allowance)?: ***No***

If YES, proceed to Step 2; if NO, proceed to "Crack Evaluation" and "CNRL Criticality Designation".

Step 2: Which component(s) were found below (Nominal WT – Corrosion Allowance)?

Components found below Nom - CA:

Components
N/A - N/A
N/A - N/A
N/A - N/A
N/A - N/A
N/A - N/A

Perform Steps 3 – 8 for each component with actual thickness less than (Nominal WT – Corrosion Allowance).

Step 3: Describe Location and Extent of Corrosion*:*

Components	Location and Extent of Corrosion
N/A - N/A	Not Applicable for this Inspection
N/A - N/A	Not Applicable for this Inspection
N/A - N/A	Not Applicable for this Inspection
N/A - N/A	Not Applicable for this Inspection
N/A - N/A	Not Applicable for this Inspection

Notes:
Not Applicable for this Inspection

Step 4:

- For shells and nozzles, calculate minimum required thickness (T-min) as per ASME Section VIII UG-27.
- For heads, calculate minimum required thickness (T-min) as per ASME Section VIII UG-32.

Components	T-Min
N/A - N/A	N/A
N/A - N/A	N/A
N/A - N/A	N/A
N/A - N/A	N/A
N/A - N/A	N/A

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Thickness and Remaining Life Evaluation *(Continued)*

Step 5: Is any measured thickness less than calculated minimum required thickness (T-min)? ***N/A***

If YES, complete Step 6
If NO, proceed to Step 7..

Step 6: Is nature and extent of pitting acceptable as per API 510? ***N/A***

Step 7: Calculate Remaining Life as per API 510. How? (Find last reading; use nominal thickness if nothing available). Short Term Corrosion Rates and Long Term Corrosion Rates.

Components	Remaining Life (Yrs)
N/A - N/A	N/A
N/A - N/A	N/A
N/A - N/A	N/A
N/A - N/A	N/A
N/A - N/A	N/A

Step 8: Contact CNRL Integrity Coordinator to discuss above results.

- Name of CNRL contact: Not Applicable for this Inspection
- Date and time of conversation: Not Applicable for this Inspection

Summary/results of conversation:
Not Applicable for this Inspection

Crack Evaluation by Magnetic Particle or Alternative Inspection *" Must be Completed"*

MUST BE COMPLETED AND RESOLVED WITH CNRL IMMEDIATELY UPON DISCOVERY OF CRACK-LIKE INDICATIONS

Were any indications found to suggest the vessel contained cracks? ***N/A***

If NO, proceed to "CNRL Criticality Designation".

If YES, Contact CNRL Integrity Coordinator to discuss results.

- Name of CNRL contact: Not Applicable for this Inspection
- Date and time of conversation: Not Applicable for this Inspection

Summary/results of conversation:
Not Applicable for this Inspection

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CNRL Criticality Evaluation – *"MUST BE COMPLETED"*

The CNRL In-Service Pressure Vessel Inspector MUST answer all the following questions

1. Is the vessel fit-for-service? : ***Yes***
2. Was the measured thickness less than the calculated minimum required thickness (T-min) for any component?: ***No***
3. Were MT indications found?: ***N/A***
4. Was the remaining life less than 6 years for sour service vessels or less than 10 years for sweet service vessels?: ***No***
5. Were NCR's or Action Items generated as a result of the inspection? : ***Yes***
6. Were UT readings below (Nominal WT – Corrosion Allowance) found? : ***No***

Information on CNRL Owner User Program - Criticality Designation and Required Review

RED – Vessel Inspection Results are deemed RED if one of the following occurred:

- The measured thickness was less than the calculated minimum required thickness (T-min) for any component.
- MT indications were found.
- The remaining life was calculated to be less than 6 years for sour-service vessels or less than 10 years for sweet-service vessels.

RED inspection reports must be signed off by the CNRL Chief Inspector.

YELLOW – Vessel Inspection Results are deemed YELLOW if one or more of the following occurred:

- The vessel was declared NOT fit-for-service by the 3rd Party In-Service PV Inspector.
- NCR's or Action Items were generated as a result of the inspection.
- UT readings below (Nominal WT – Corrosion Allowance) were found.

YELLOW inspection reports must be signed off by the CNRL Pressure Equipment Integrity Coordinator.

GREEN – Vessel Inspection Results are deemed GREEN if all of the following are true:

- The vessel was declared fit-for-service by the 3rd Party In-Service PV Inspector.
- UT readings below (Nominal WT – Corrosion Allowance) were NOT found.
- MT indications were NOT found.
- NCR's or Action Items were NOT generated as a result of the VE inspection.

GREEN inspection reports must be signed off by the 3rd Party In-Service Pressure Vessel Inspector.

Criticality Designation Yellow

Vehicle #: 380 Kms:

Time In: 00:00 Time Out: 00:00 Hrs

Time In: 00:00 Time Out: 00:00 Hrs

Personnel: SR

Billing Info: AFE :

Inspector (Name): Matthew B Dickinson PESL: 601

Inspector (Signature): Matt Dickinson Inspector Signature 2012.08.16 14:54:08 -06'00' 06/30/2010 08:43:20 am API: 39483

CNRL Coordinator (Name):

CNRL Coordinator (Signature): Coordinator Signature

CNRL Chief Inspector (Signature): 06/30/2010 08:44:03 am (I am in full agreement with report contents) Chief Inspector Signature

06/30/2010 08:45:29 am (I am in full agreement with report contents)

Equipment Photographs:

01 nameplate

02 repair nameplate

03 overview indoors

04 overview outdoors

05 missing hardware inlet piping

06 damaged cladding

07 missing anchor bolts

08 PSV overview

09 missing lock

IRISNDT

CORROSION INSPECTION SERVICES

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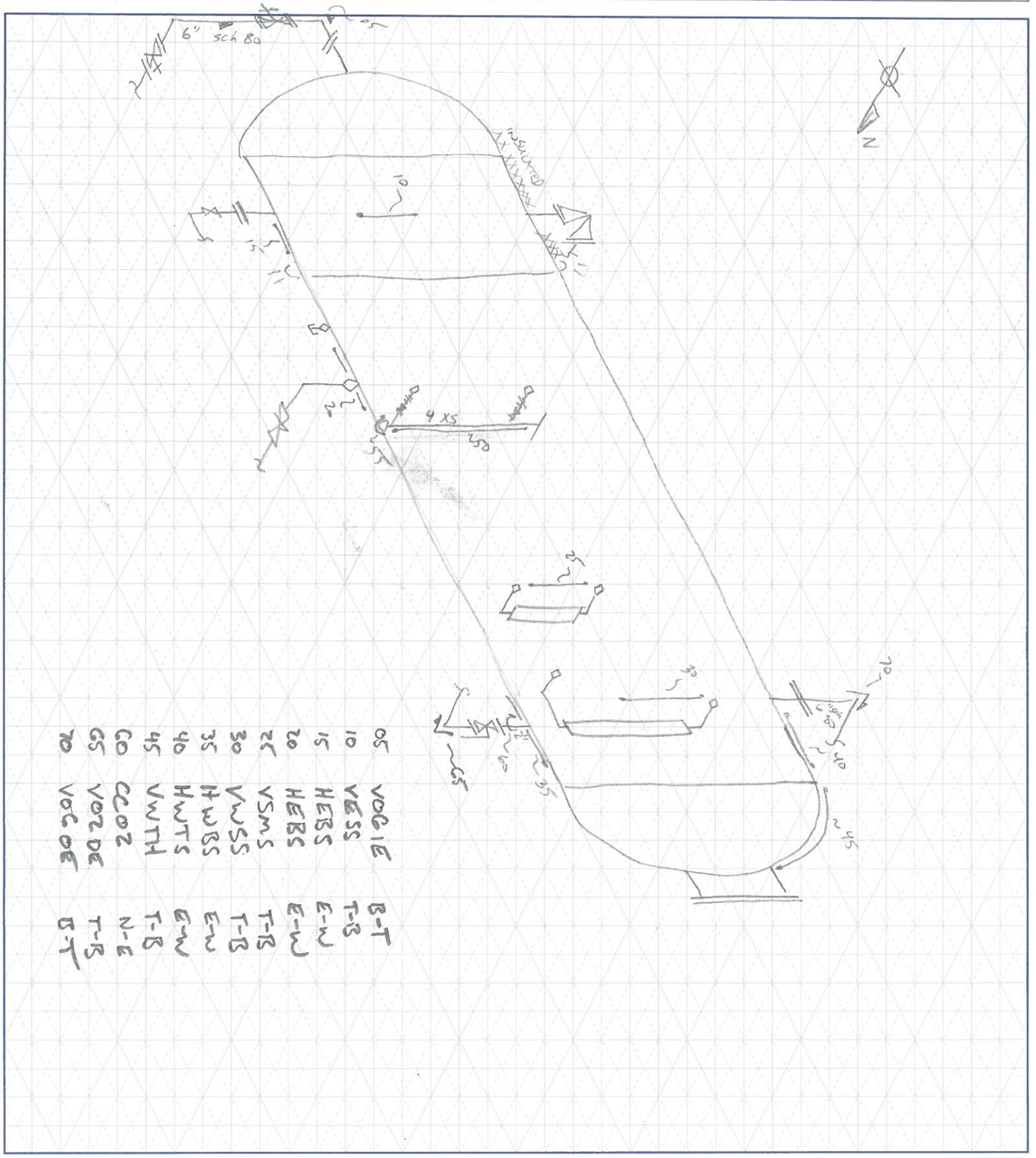

CUSTOMER: CNRL **FACILITY:** Neil's - Bonnyville **LSD:** 05-11-039-22W4

P & ID: _____ **DRAWN BY:** _____ **DATE:** _____ **DRAWING NO.** _____

VESSEL INFORMATION: HORZ SEP

Equip. No. _____ Pro. Reg. No. (A) 06830 C.R.N. _____ Serial No. _____ Yr. Inst. _____

Code/Div. _____ Size: 48" ID / OD X: 20' Manufacturer: _____ Yr. Blt. _____

C. Stamp: _____ Service: _____ PWHT: _____ J.E.: _____ Radiography: _____ Insulated: _____

HEAD:

Top Mat'l. _____ Top Nom. _____ Top C.A. _____

Btm Mat'l. _____ Btm Nom. _____ Btm C.A. _____

SHELL:

Material: _____ Nominal: _____ C.A. _____

BOOT:

Head Mat'l. _____ Head Nom. _____ Head C.A. _____

Shell Mat'l. _____ Shell Nom. _____ Shell C.A. _____

CHANNEL:

Top Mat'l. _____ Top Nom. _____ Top C.A. _____

Btm Mat'l. _____ Btm Nom. _____ Btm C.A. _____

MAWP Shell Side: _____ @ Temp. _____ MAWP Tube Side: _____ @ Temp. _____

PIPING INFORMATION:

Circuit. No. _____ Line No. (s) **(PLEASE PUT LINE NUMBERS ON APPLICABLE LINES ON THE DRAWING)**

Piping Class: _____ Service: _____ Yr. Blt. _____

MAWP: _____ @ Temp. _____ Size & Schedule of Piping **(PLEASE PUT APPROPRIATE SIZES AND SCHEDULES OF PIPING ON DRAWING)**

A0083030
Readings in Inches

	PNT1	PNT2	PNT3
LOC5	0.475	0.470	0.446
LOC10	1.698	1.693	1.686
LOC15	1.694	1.693	1.691
LOC20	1.720	1.721	1.716
LOC25	1.718	1.713	1.713
LOC30	1.728	1.720	1.719
LOC35	1.717	1.714	1.709
LOC40	1.726	1.721	1.719
LOC45	2.042	1.924	1.912
LOC50	0.355	0.351	0.350
LOC55	0.416	0.353	0.331
LOC60	0.232	0.236	0.227
LOC65	0.214	0.200	0.199
LOC70	0.285	0.282	0.266