



**PRESSURE VESSEL  
VISUAL INSPECTION  
REPORT**

Report #: **156828-MD-30**  
 Inspect Date: 06/01/2012  
 Page: 1 of 14  
 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 #: A0058221 Equip Tag #: N/A Serial #: C 9173  
 CRN #: 8591.2 Nat'l Bd #: N/A Year Built: 1959  
 Manufacturer: B.S. & B Equipment Description: Other: Horizontal Inlet Separator  
 Status: In Service - Standby Equip. Type: Vessel: Separator Service: Sour  
 MAWP Shell: 1200 Psi @ 100 °F Volume: N/A Code Stamp:  Y  N  
 MAWP Tube: @ Height/Length: 20 Ft. Insulated:  Y  N  
 MDMT: N/A RT: N/A Size/Diameter.: 45 in. I.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.: N/A Remote Access:  -

Component	Material	Nominal Thk	Diameter	OD/ID	Tube Side	Shell Side
1 Main - Shell	A-212-B	1.625 in.	45.000 in.	ID	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2 East - Head	A-212-B	1.250 in.	45.000 in.	ID	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3 West - Head	A-212-B	1.250 in.	45.000 in.	ID	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4 -					<input type="checkbox"/>	<input type="checkbox"/>
5 -					<input type="checkbox"/>	<input type="checkbox"/>

Static Data: Confirmed  Changed (See Comments)

Comments:

Stamped XR & 70 ksi Tensile

**PSV Static Data**

PSV -1 Tag #: 21 Serial #: 77C5605 CRN: 01832.568312  
 Model #: 1912HC XSG Capacity: 19028 SCFM Set Pressure: 1200 psi  
 Manufacturer: Consolidated Service Company: Powell  
 Inlet Size & Type: 2.00 in. - Flanged Last Service Date: May 29 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



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**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	<input type="checkbox"/>	Accept	Legible and firmly affixed also stamped in shell	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Foundation and Supports	<input type="checkbox"/>	Accept	Welded saddles anchored to skid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Anchor Bolts	<input type="checkbox"/>	Accept	Secure with no deformation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grounding	<input type="checkbox"/>	Accept	Grounded by skid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Insulation Condition	<input type="checkbox"/>	Reject	Thru wall caulking seal is deteriorated	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PSV	<input type="checkbox"/>	Reject	Block valve is missing lock in closed position	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Shell Heads & Nozzles	<input type="checkbox"/>	Accept	Mechanical damage below coating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Metal Surfaces (Paint)	<input type="checkbox"/>	Reject	Chipped exposing primer and base metal	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Aux Equipment	<input type="checkbox"/>	Accept	Intact and well supported	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cathodic Protection	<input checked="" type="checkbox"/>		No external anode	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alignment	<input type="checkbox"/>	Accept	Aligned in an East to West direction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flange Connections	<input type="checkbox"/>	Reject	Missing hardware on instrumentation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pressure Gauge	<input type="checkbox"/>	Reject	0-1000 psi: not within range	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Temperature Gauge	<input type="checkbox"/>	Accept	0-120°C: acceptable range	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sight Glass	<input type="checkbox"/>	Accept	Intact with liquids in lower sight glass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ladder / Platform	<input checked="" type="checkbox"/>		No ladder or platform	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Leaks	<input type="checkbox"/>	No	No evidence of leaks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Piping from Vessel	<input type="checkbox"/>	Accept	Secure with riser saddle			
Previous UT Survey	<input type="checkbox"/>	Yes	Locations marked, no history provided	UT Company: N/A		

**External Visual Observations**

The separator was not in operation at the time of inspection

Dust and bird turds noted on top shell and head sections of the separator  
 The thru wall caulking seal is deteriorated allowing for moisture ingress

There are studs and nuts missing from the 2" sour water drains instrumentation flange connection

The pressure gauge is not within range of the MAWP

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

The coating is chipped and flaking on the heads and shells as well as between the flanges exposing the base metal to mild surface corrosion with evidence of near surface pitting.

Minor mechanical damage noted on shell below the coating approximately 0.070" deep

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 instrumentation flange  
 Confirm with operations that the vessel does not exceed gauge pressure, replace as required  
 Open block valve and install a lock  
 Reseal thru wall caulking



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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	<input checked="" type="checkbox"/>		No Internal Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heads	<input checked="" type="checkbox"/>		No Internal Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Manway	<input checked="" type="checkbox"/>		No Internal Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gasket Surfaces	<input checked="" type="checkbox"/>		No Internal Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Welds	<input checked="" type="checkbox"/>		No Internal Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Refractory	<input checked="" type="checkbox"/>		No Internal Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heating Coils	<input checked="" type="checkbox"/>		No Internal Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Demister Pad	<input checked="" type="checkbox"/>		No Internal Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vane Pack	<input checked="" type="checkbox"/>		No Internal Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baffles	<input checked="" type="checkbox"/>		No Internal Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trays	<input checked="" type="checkbox"/>		No Internal Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Filter	<input checked="" type="checkbox"/>		No Internal Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internal Coating	<input checked="" type="checkbox"/>		No Internal Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tubesheet	<input checked="" type="checkbox"/>		No Internal Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tube Bundle	<input checked="" type="checkbox"/>		No Internal Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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	<input checked="" type="checkbox"/>		No Firetube Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stack	<input checked="" type="checkbox"/>		No Firetube Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flange (Throat)	<input checked="" type="checkbox"/>		No Firetube Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tube Sheet	<input checked="" type="checkbox"/>		No Firetube Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hot Side	<input checked="" type="checkbox"/>		No Firetube Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Miter	<input checked="" type="checkbox"/>		No Firetube Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Return Bend	<input checked="" type="checkbox"/>		No Firetube Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supports	<input checked="" type="checkbox"/>		No Firetube Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Butt Welds	<input checked="" type="checkbox"/>		No Firetube Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fillet Welds	<input checked="" type="checkbox"/>		No Firetube Inspection Carried Out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**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 2" sour water flange Thru wall caulking seals are deteriorated  
Pressure gauge not within MAWP range  
PSV block valve is missing a lock and in the closed position

**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 Seal thru wall caulking  
Replace pressure gauge as required  
Open and lock block valve

**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 3<sup>rd</sup> 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 3<sup>rd</sup> 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 3<sup>rd</sup> 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): \_\_\_\_\_  
Inspector Signature  
 \_\_\_\_\_  
06/01/2010 08:43:20 am  
 CNRL Coordinator (Name): \_\_\_\_\_  
 CNRL Coordinator (Signature): \_\_\_\_\_  
Coordinator Signature  
 \_\_\_\_\_  
06/01/2010 08:44:03 am  
 CNRL Chief Inspector (Signature): \_\_\_\_\_  
 (I am in full agreement with report contents)  
Chief Inspector Signature  
 \_\_\_\_\_  
06/01/2010 08:45:29 am  
 (I am in full agreement with report contents)



Equipment Photographs:



01 nameplate



01.5 stamped static data



02 overview



03 not within range



**04 deteriorated caulking**



**05 missing hardware on flange**



**06 deteriorated coating**



**07 surface corrosion**



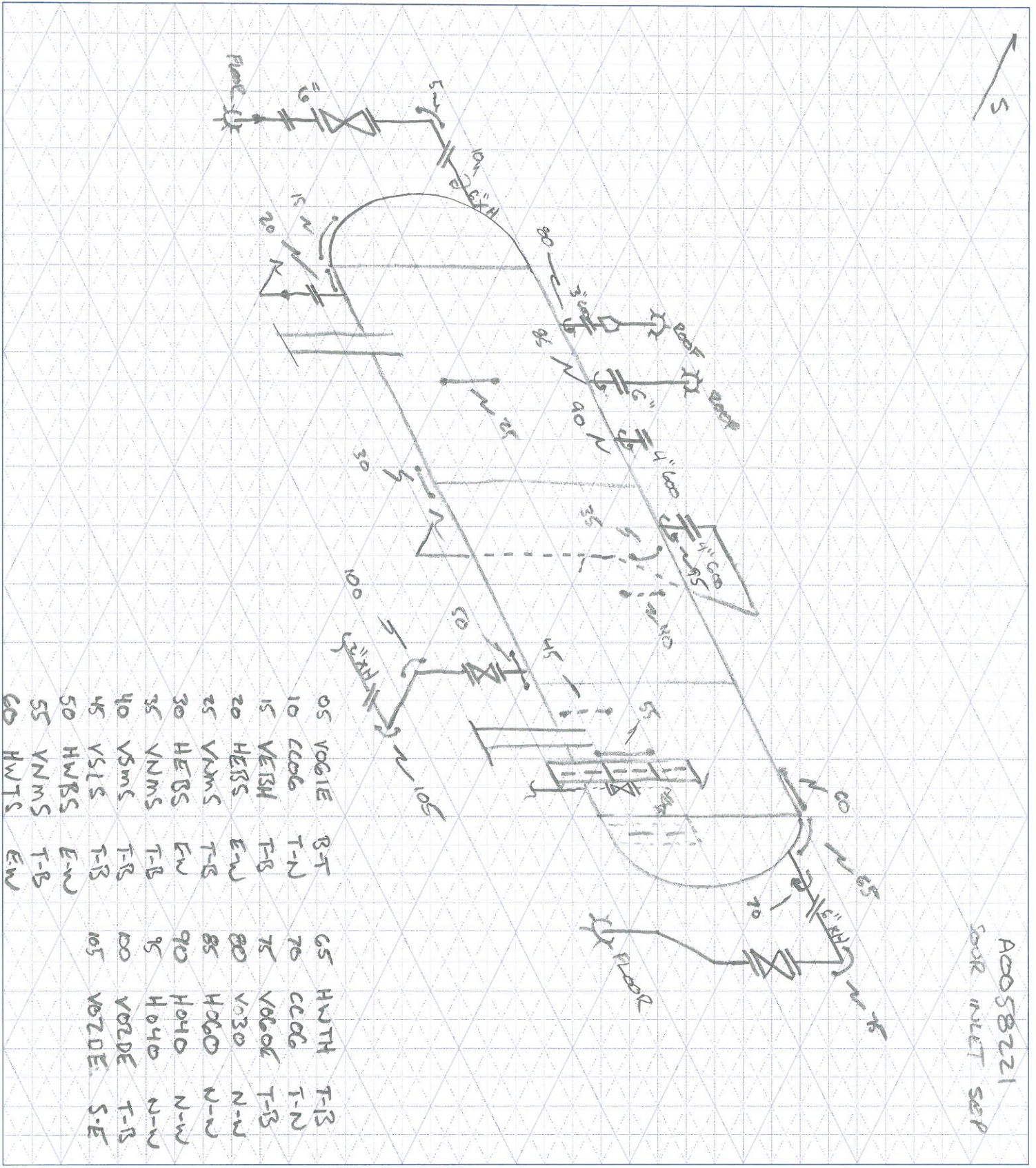
08 corrosion between flanges



09 PSV overview



10 missing lock



05	VOGIE	R-T	65	HWTH	T-13
10	CC06	T-N	70	CC06	T-N
15	VERSH	T-B	75	VOG06	T-B
20	HERS	E-W	80	VO30	N-W
25	VNMS	T-B	85	H060	N-W
30	HERS	E-W	90	H040	N-W
35	VNMS	T-B	95	H040	N-W
40	VSMS	T-B	100	VOZDE	T-B
45	VSLS	T-B	105	VOZDE	S-E
50	HWBS	E-W			
55	VNMS	T-B			
60	HWTS	E-W			

A0058221  
Sour Inlet SEP

CUSTOMER: CNRL FACILITY: NEVIS FIELD LSD: 05-11-39-22W4  
 P & ID: \_\_\_\_\_ DRAWN BY: IRIS DATE: JUNE 1 DRAWING NO. \_\_\_\_\_

**VESSEL DESCRIPTION:**  
 Equip. No. \_\_\_\_\_ Pro.Reg.No. (A) 0058221 C.R.N. \_\_\_\_\_ Serial No. \_\_\_\_\_ Yr. Inst. \_\_\_\_\_  
 Code/Div. \_\_\_\_\_ Size: 45" ID (OD) X 20' Manufacturer: \_\_\_\_\_ Yr. Blt. \_\_\_\_\_  
 C. Stamp \_\_\_\_\_ Service: \_\_\_\_\_ PWHT: \_\_\_\_\_ J.E.: \_\_\_\_\_ Radiography: \_\_\_\_\_ Insulated: \_\_\_\_\_

**HEAD** **SHELL:**  
 Top Mat'l \_\_\_\_\_ Top Nom. \_\_\_\_\_ Top C.A. \_\_\_\_\_ Material \_\_\_\_\_ Nominal \_\_\_\_\_ C.A. \_\_\_\_\_  
 Btm Mat'l \_\_\_\_\_ Btm Nom. \_\_\_\_\_ Btm C.A. \_\_\_\_\_ MDMT \_\_\_\_\_ @Temp \_\_\_\_\_

**BOOT** **CHANNEL:**  
 Head Mat'l \_\_\_\_\_ Head Nom. \_\_\_\_\_ Head C.A. \_\_\_\_\_ Top Mat'l \_\_\_\_\_ Top Nom. \_\_\_\_\_ Top C.A. \_\_\_\_\_  
 Shell Mat'l \_\_\_\_\_ Shell Nom. \_\_\_\_\_ Shell 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)**

A0058221

Readings in Inches

	PNT1	PNT2	PNT3
LOC5	0.288	0.273	0.244
LOC10	0.436	0.425	0.417
LOC15	1.604	1.741	1.604
LOC20	1.780	1.782	1.775
LOC25	1.786	1.787	1.786
LOC30	1.776	1.764	1.775
LOC35	1.748	1.769	1.732
LOC40	1.771	1.772	1.770
LOC45	1.781	1.786	1.780
LOC50	1.778	1.779	1.774
LOC55	1.789	1.786	1.783
LOC60	1.808	1.811	1.785
LOC65	1.805	1.779	1.614
LOC70	0.443	0.445	0.407
LOC75	0.267	0.262	0.249
LOC80	0.371	0.396	0.367
LOC85	0.448	0.452	0.439
LOC90	1.043	1.048	1.040
LOC95	1.027	1.025	1.015
LOC100	0.212	0.208	0.200
LOC105	0.203	0.212	0.201