

GENERAL INSPECTION FORM						
District: Hamburg			Skid No. :			
Facility: Mearon Gas Gathering			Location (LSD) Surface: 04 -30- 94 - 12 - W6M			
Vessel Name & Equipment Number: Sweetening Tower						
Orientation: Horizontal <input type="checkbox"/> or Vertical <input checked="" type="checkbox"/>			Location (LSD) Downhole:			
Status: In Service <input checked="" type="checkbox"/> or Out of Service (blinded / fully isolated) <input type="checkbox"/>			Commissioning Inspection <input type="checkbox"/> or Regulatory Inspection <input checked="" type="checkbox"/>			
PRESSURE VESSEL NAMEPLATE DATA						
"A" or "G" or "S" (Sask.) or BC Registration Number. A 0481551			CRN Number P 7904.2			
Vessel serial number: 2002-011-6A			Size (diameter x length- estimate if necessary): 60 in x 288 in			
Shell thickness: 76.2 mm			Shell material: SA 516 70N			
Head thickness: 73.0 mm			Head material: SA 516 70N			
Tube wall thickness:			Tube material:			
Tube diameter:			Tube length:			
Channel thickness:			Channel material:			
MAWP	Shell: 1440 PSI		Operating pressure	Shell:		
	Tubes:			Tubes:		
Design Temp.	Shell: 125 deg F		Operating temperature	Shell:		
	Tubes:			Tubes:		
X-ray: RT 1			Heat treatment? yes <input checked="" type="checkbox"/> no			
Code parameters: ASME VIII, Div 1			Joint efficiency (if on nameplate):			
Manufacturer: Kanbuilt Industries			Year built: 2002			
Corrosion allowance: 3.2 mm			Manway? Yes <input checked="" type="checkbox"/> No			
PRESSURE SAFETY VALVE NAMEPLATE DATA						
Tag Number(s)	Set Pressure	CRN #	Manufacturer/ Model / Serial / Code Stamp	Capacity (Scfm)	Size (Inlet x Outlet)	Set Date (mm/dd/yyyy)
Shell Side G# 736265	1440 PSI		Consolidated / 1912-00EC-2-CC / TR 02266 / UV	5717	1 x 2	
Tube Side G#						
SERVICE CONDITIONS-INDICATE ALL THAT APPLY						
Sweet <input type="checkbox"/>	Sour <input checked="" type="checkbox"/>	Oil <input type="checkbox"/>	Gas <input checked="" type="checkbox"/>	Water <input checked="" type="checkbox"/>		
Amine <input type="checkbox"/>	LPG <input type="checkbox"/>	Condensate <input type="checkbox"/>	Air <input type="checkbox"/>	Glycol <input type="checkbox"/>		
Other (Describe):						

Inspection Interval N/A - repairs needed PSV Service Interval N/A

(Determined by integrity specialist in conjunction with Chief Inspector following guidelines of ConocoPhillips Canada Owner-User Inspection Program)
Reports reviewed and accepted by: **Barry Throness**

Integrity Specialist **RESL Cert # 77** Date March 19, 2010

Fill out all forms as completely as possible. All information is important! Use back of sheets to record additional information or sketch if required.

External Inspection Items	G	F	P	N/A	Comments
Insulation Verify sealed around manways, nozzles, no damage present, and there is no egress of moisture. Are straps secure?	X				This vessel is fully insulated – no open or torn sections – no wet insulation or stains to indicate wet insulation.
External Condition Assess paint condition, areas peeling, record any corrosion, damage, distortion etc (record location, size and depth of corrosion or damage)	X				Skirt is painted – Is in good condition – no exposed metal. No previous corrosion.
Leakage Record any leakage at flanges, threaded joints, weep holes on repads, etc.	X				No leaking detected.
Skirt/ Saddle Assess condition of paint, fire protection, concrete. Look for corrosion, buckling, dents, etc. Look at vessel surface area near supports. Verify no signs of leakage at attachment to vessel and attachment welds are acceptable. Is ground wire attached?	X				Skirt: No distortion, no leaks at skirt to shell welds – no stains. Paint is in good condition, no exposed metal – no previous corrosion. Skid package is grounded.
Anchor Bolts Hammer tap to ensure secure. Look for corrosion, cracking in threads or signs of deformation.	X				Firmly bolted to skid deck and skid deck is welded to piling supports.
Concrete foundation Check for cracks, spalling, etc.				X	
Ladder / Platform Describe general condition, ensure support is secure to vessel, describe any hazards.				X	
Nozzle Assess paint, look for leakage, and ensure stud threads are fully engaged. Record any damage, deflection, etc. Are nozzles gusseted? Inspect gussets for cracking.	X				All studs fully engaged to nuts – no short bolts. No distortion – no leaks. Nozzles are not gusseted.
Gauges Ensure gauges are visible, working, no leakage, and suitable for range of MAWP/ Temp.				X	No gauges.
External Piping Ensure pipe is well supported. All clamps, supports, shoes, etc. in place. Look for evidence of structural overload, deflection, etc. Paint condition, external corrosion?	X				Well supported, no deflection, all clamps and supports in place. Paint is in good condition, no exposed metal – no corrosion.
Valving Ensure no leaks are visible. Valves are properly supported and chained if necessary.	X				Well supported – no leaking.
PSV Ensure PSV is set at pressure at or below that of vessel. Discharge piping is same size as valve outlet and is properly supported and routed. Are PSV seals in place? Ensure no block valves between PSV and vessel, or if there are ensure they are locked/sealed open.	X				Shell Side: Located on top head – set at MAWP of vessel. Seals are intact. There is a block valve between the PSV and the vessel and is locked open. Inlet stem smaller diameter and discharge piping is same size as outlet orifice.
NDE methods Was UT/ MPI done on vessel	X				Ultrasonic thickness survey carried out in 2006 – no metal thickness detected below nominal minus corrosion allowance. No pitting.
Other Observations:					
See internal for summary and recommendations.					

Inspected By: Dellas Wiedman
(Please Print)

Date: January 18 - 2010

Internal Inspection Items	G	F	P	N/A	Comments
Coatings Assess coating. Describe area coated, general condition of coating. Look at nozzles, coupling, and areas of most severe corrosion to ensure coating is intact. If coating is in poor condition make decision <u>now</u> if re-coating necessary? If so, when?			X		The internal of this vessel is coated with epoxy – The coating in the lower 3 rd of the vessel is in poor condition – scattered chips throughout this area with surface corrosion – no pitting. The man way nozzle is missing almost all the coating with scattered pits on the lower 3 rd max depths to .100 inches.
Anodes. How many, type, condition. % consumed. Are they being replaced?				X	No anodes inside this vessel.
Internal Piping Is there any? If so, carbon or stainless steel. Describe condition, dents, corrosion, erosion, etc. Ensure supports are secure and any bolts are suitable for future use.			X		The outlet gas stem was broken from the flanged section of the outlet nozzle and the nozzle was broken from the shell at the inside weld.
Trays How many? Type of material. Are valves in place. Check for erosion/ corrosion; wear on tray valve legs. Cleanliness?			X		The full tray section on the lower head that supports the catalyst bed was completely broken from the anchors and damaged beyond repair.
Baffles, deflector plates, etc. If present, describe condition. Look closely at welds attached to vessel wall.	X				Gas inlet diffuser in the upper shell is intact and in place.
Top Head Note all corrosion, erosion or mechanical damage. (If vessel is horizontal identify direction of this head)	X				This area is coated with epoxy and is still in good condition – no exposed metal.
Bottom Head Note all corrosion, erosion or mechanical damage. (If vessel is horizontal identify direction of this head)	X				Coated with epoxy – there are a large number of sections that are missing coating due to impact damage from tray grating when it was dislodged from anchors. There is no corrosion or pitting to these exposed areas.
Shell Sections Record number of shell sections. Record location, size and depth of all erosion, corrosion or mechanical damage. Describe general condition. If any corrosion greater than corrosion allowance is observed in either shell or head, discuss with Chief Inspector before closing vessel.	X				4 can sections. The full internal is coated with epoxy – the lower 3 rd section has approximately 30% of the coating missing – surface corrosion to this area but no measureable pitting. The upper 2/3 rd of the shell has no exposed metal and no previous signs of corrosion or pitting.
Demister pad Is it in place? Is it clean? If any corrosion is apparent in vessel, lift pad and check top head for corrosion.				X	No demister pad or cage.
Welds Inspect all welds, including attachment welds. Record all service-related damages and if there is any discuss with Chief Inspector before closing.	X				All welds are coated with epoxy – some failed areas with shell but no pitting.
Repairs Required. If yes, ensure procedure and copy of AB-40 is on file, and one sent to local ABSA Inspector	X				<ol style="list-style-type: none"> 1. Replace tray support ring in lower head area. (Catalyst support) 2. Replace catalyst support grating. 3. Install new inlet nozzle stem where 16 inch long section was broken from shell. This should be shorter with 150 lb flange to attach extension. 4. Replace outlet piping extension.
NDE Was any NDE done.				X	No internal NDE at this time.
Other Observations Thermal well: Intact and in place. Recommendations: 1. See repairs required. Summary: This vessel is in good condition, visual external and internal carried out – the tray supports, the grating and the 6 inch outlet nozzle are all damaged and need replacement. Vessel is not fit for service in current condition					

Inspected By: Dellas Wiedman
API 510 cert: 20981
ABSA cert: 000117

(Please Print)

Date: Jan 18 - 2010

Summary of damage and recommendations for repair.

Damage:

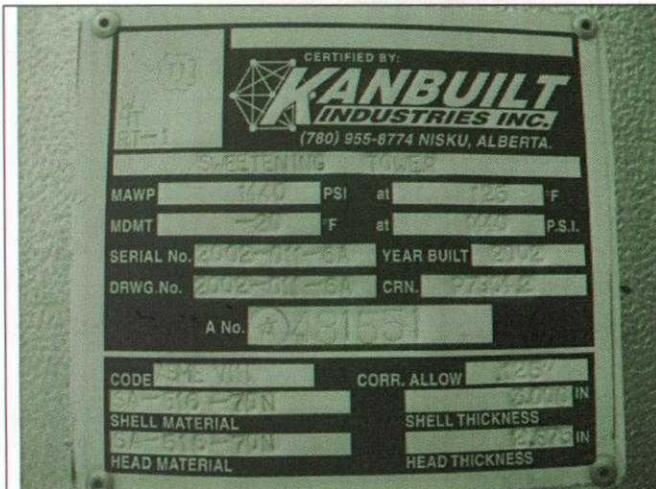
1. Tray sections (Includes grating and cross supports) completely destroyed.
2. Outlet nozzle protrusion broken from shell at back weld on internal of vessel. This is 6 inch schedule 160 stub with a 150 lb flange, approximately 16 inches in length.
3. Tray support ring bent and buckled – not broken from shell. This is a .375 inch thick plate, 4 inches wide, full circumference.
4. Gas outlet pipe extension distorted and buckled. This is a 6 inch schedule 40 pipe with a 150 lb flange, approximately 30 inches in length.
5. Tray supports to shell – vertical stubs, .750 inches thick, welded to shell. These have some worn holes and have a little bit of distortion but are firmly attached to shell.

Recommendations for repair:

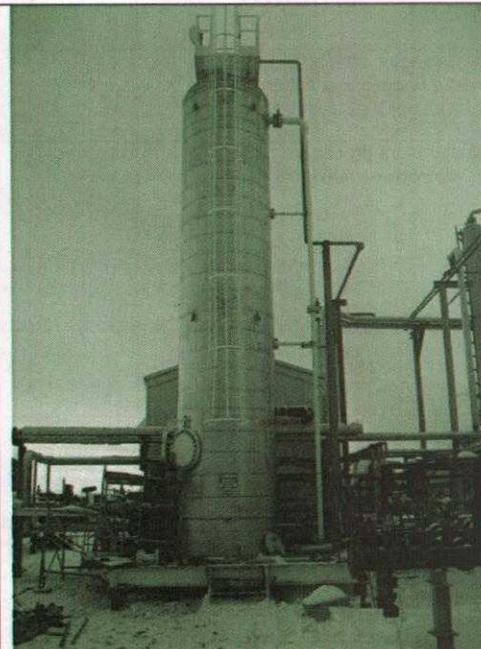
1. Build new tray / grating sections for installation into tower.
2. Manufacture new stub (6 inches long – 6 inches diameter schedule 160 with a 150 lb flange for the new gas pipe extension to attach to) and weld onto existing back welded nozzle section. There should be enough to weld to with weld prep on one side of the new stub. The 6 inch nozzle should not require a protrusion for reinforcement as the shell is 76.2 mm thick and the nozzle is 22.2 mm thick. A temper bead weld procedure could be used for this. Alternatively the area could be stress relieved.
3. Install new tray support ring – full circumference. The ring is still welded to the shell and the weld could be left bonded to the shell and the new ring welded to it. As the weld would not come in contact with the shell – stress relieving could be avoided.
4. Gas pipe extension: This would need to be manufactured and bolted to the nozzle extension – 6 inch schedule 40 with a 150 lb flange.
5. The support brackets can have the holes / slots welded up where they are worn and ground to original size – this can be done in situ.

Note:

- a. The area of the lower shell and bottom head will need to be grit blasted in prep for repairs.
- b. The repair prep areas will require magnetic particle inspection prior to repairs to determine if any associated cracking exists.
- c. The completed weld repairs will require magnetic particle inspection.
- d. A modified temper bead weld repair procedure with higher preheat can be used for welding of the nozzle to the existing opening of the shell in lieu of stress relieving.
- e. Localized bake out using tiger torch can be used in lieu of stress relieving coils for the nozzle stub to shell opening.



Data Plate



Over view of vessel.

1221840



Ground cable



Drain valve inside skirt



Outlet gas stem and nozzle pulled from vessel.



Tray sections removed from vessel.



Outlet nozzle on external of vessel.



Over view of outlet nozzle back weld. There is still metal above back weld. This could have a shorter protrusion welded to it. The original protrusion was excessively long - 16 inches.



Outlet nozzle protrusion broken from shell



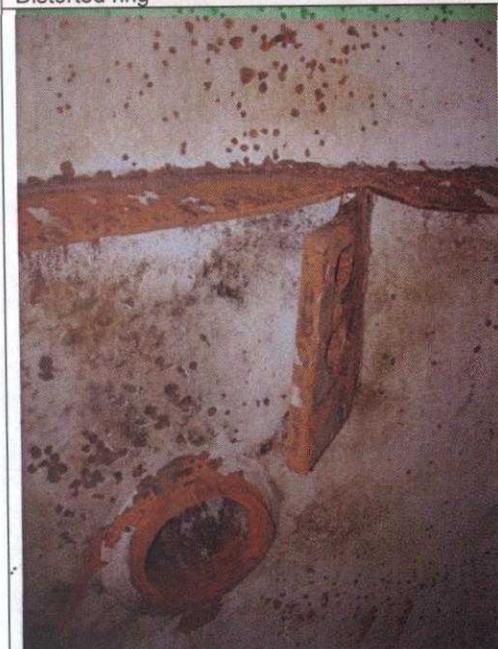
Outlet nozzle back weld on inside of vessel – this is the area where the protrusion broke off.



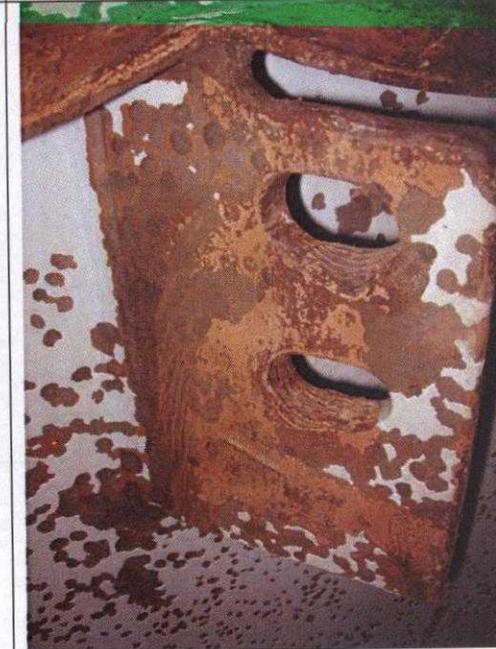
Distorted ring



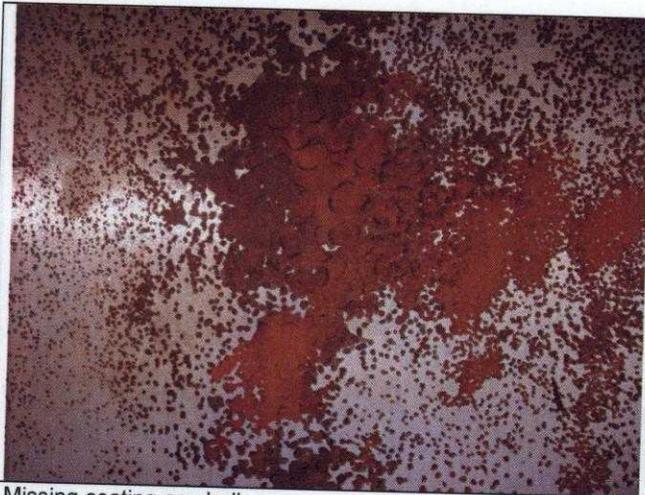
Distorted ring



Distorted support ring and nozzle attachment



Grating supports – elongated holes from wear



Missing coating on shell



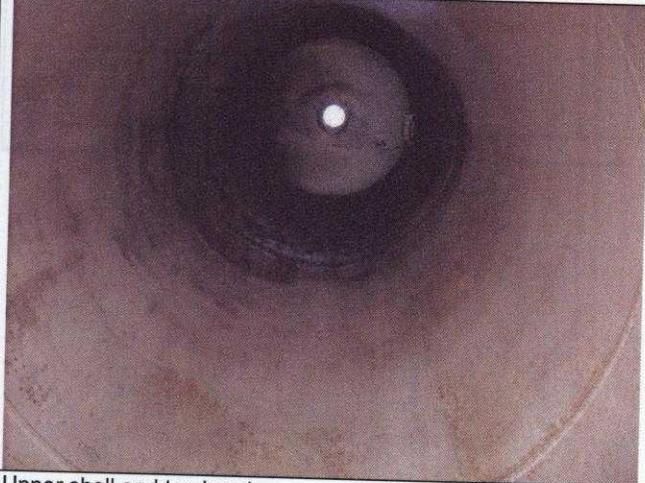
Man way nozzle – isolated pitting to .100 inches deep



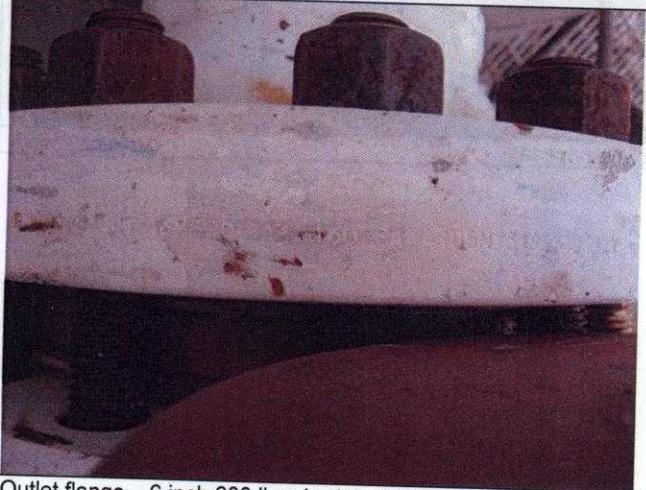
Coating damage on bottom head



Missing coating on shell



Upper shell and top head



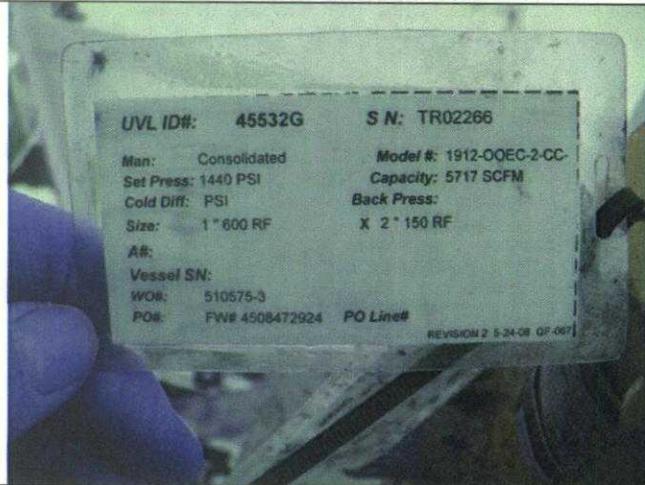
Outlet flange – 6 inch 600 lb schedule 160



PSV



PSV G Tag



PSV service tag