PLANT ITEM MATERIAL SELECTION DATA SHEET

R10618387

PJV-VSL-00002 (PTF)
PJV Drain Collection Vessel

ISSUED BY
RPP-WTP PDC

- Design Temperature (°F)(max/min): 200/-20
- Design Pressure (psig) (internal/external): 15/FV
- Location: incell

Contents of this document are Dangerous Waste Permit affecting

Operating conditions are as stated on sheets 5 and 6

Options Considered:

- Vessel receives wash drains from PJV Demister elements
- Vessel receives condensate and flush drains from exhaust headers

Materials Considered:

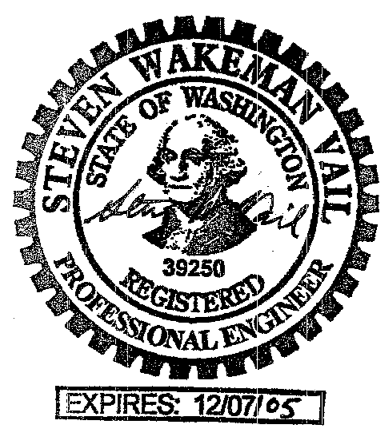
Material (UNS No,.)	Relative Cost	Acceptable Material	Unacceptable Material
Carbon Steel	0.23		X
304L (S30403)	1.00	X	
316L (S31603)	1.18	X	
6% Mo (N08367/N08926)	7.64	X	
Alloy 22 (N06022)	11.4	X	
Ti-2 (R50400)	10.1		X

Recommended Material: 304 (max 0.030% C; dual certified)

Recommended Corrosion Allowance: 0.040 inch (includes 0.024 inch corrosion allowance and 0.004 inch erosion allowance)

Process & Operations Limitations:

- None



8/22/05

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

This bound document contains a total of 6 sheets.

1	8/22/05	Issued for Permitting Use	[signature]	[signature]	[signature]
0	7/15/04	Issued for Permitting Use	DLA	JRD	APR
REV	**DATE**	**REASON FOR REVISION**	**PREPARER**	**CHECKER**	**APPROVER**

PLANT ITEM MATERIAL SELECTION DATA SHEET

Corrosion Considerations:

This vessel receives condensate collected in the headers of the PJV system.

a General Corrosion
Hamner (1981) lists corrosion rates in water for both 304L and 316L as < 2 mpy at temperatures up to 150°F. Similarly, corrosion rates in dilute caustic are less than 1 mpy.

Conclusion:
304L and 316L are expected to be sufficiently resistant with a probable general corrosion rate of less than 1 mpy at up to 200°F.

b Pitting Corrosion
Pitting should not be a concern for 304L or 316L at the stated low-chloride conditions and stated temperature.

Conclusion:
Under normal conditions, 304L is expected to be satisfactory.

c End Grain Corrosion
End grain corrosion only occurs in metal with exposed end grains and in highly oxidizing acid conditions.

Conclusion:
Not applicable to this system.

d Stress Corrosion Cracking
The exact amount of chloride required to cause stress corrosion cracking is unknown. In part this is because the amount varies with temperature, metal sensitization, and the environment. But it is also unknown because chloride tends to concentrate under heat transfer conditions, by evaporation, and electrochemically during a corrosion process. Hence, even as little as a few ppm can lead to cracking under some conditions. Generally, as seen in Sedriks (1996) and Davis (1987), chloride stress corrosion cracking does not usually occur below about 140°F. During the normal operations, either 304L or 316L are expected to be satisfactory.

Conclusion:
At the normal, stated, operating environment, 304L is satisfactory.

e Crevice Corrosion
See Pitting.

Conclusion:
See Pitting

f Corrosion at Welds
Corrosion at welds is not considered a problem in the proposed environment.

Conclusion:
Weld corrosion is not considered a problem for this system.

g Microbiologically Induced Corrosion (MIC)
The proposed operating temperatures are acceptable for microbial growth but there appears to be little chance of the introduction of microbes.

Conclusion:
MIC is not expected to be a problem.

h Fatigue/Corrosion Fatigue
Corrosion fatigue is not expected to be a problem in this vessel.

Conclusions
Not considered to be a problem.

i Vapor Phase Corrosion
Not considered to be a concern in this vessel.

Conclusion:
Not a concern.

PLANT ITEM MATERIAL SELECTION DATA SHEET

j Erosion
Velocities within the vessel are expected to be low. Erosion allowance of 0.004 inch is sufficient for components with low solids content (< 2 wt%) at low velocities.

Conclusion:
Not expected to be a concern.

k Galling of Moving Surfaces
Not applicable.

Conclusion:
Not applicable.

l Fretting/Wear
No contacting surfaces expected.

Conclusion:
Not applicable.

m Galvanic Corrosion
No dissimilar metals are present.

Conclusion:
Not applicable.

n Cavitation
None expected.

Conclusion:
Not believed to be of concern.

o Creep
The temperatures are too low to be a concern.

Conclusion:
Not applicable.

p Inadvertent Nitric Acid Addition
Higher chloride contents and higher temperatures usually require higher alloy materials. Nitrate ions inhibit the pitting and crevice corrosion of stainless alloys. Furthermore, nitric acid passivates these alloys; therefore, lower pH values brought about by increases in the nitric acid content of process fluid will not cause higher corrosion rates for these alloys. The upset condition that was most likely to occur is lowering of the pH of the vessel content by inadvertent addition of 0.5 M nitric acid. Lowering of pH may make a chloride-containing solution more likely to cause pitting of stainless alloys. Increasing the nitric acid content of the process fluid adds more of the pitting-inhibiting nitrate ion to the process fluid. In addition, adding the nitric acid solution to the stream will dilute the chloride content of the process fluid.

Conclusion:
The recommended materials will be able to withstand a plausible inadvertent addition of 0.5 M nitric acid.

PLANT ITEM MATERIAL SELECTION DATA SHEET

References:

1. Davis, JR (Ed), 1987, *Corrosion, Vol 13*, In "Metals Handbook", ASM International, Metals Park, OH 44073
2. Hamner, NE, 1981, *Corrosion Data Survey*, Metals Section, 5th Ed, NACE International, Houston, TX 77218
3. Sedriks, AJ, 1996, *Corrosion of Stainless Steels*, John Wiley & Sons, Inc., New York, NY 10158

Bibliography:

1. Agarwal, DC, *Nickel and Nickel Alloys*, In: Revie, WW, 2000. *Uhlig's Corrosion Handbook*, 2nd Edition, Wiley-Interscience, New York, NY 10158
2. Cole, HS, 1974, *Corrosion of Austenitic Stainless Steel Alloys Due to HNO_3 – HF Mixtures*, ICP-1036, Idaho Chemical Programs – Operations Office, Idaho Falls, ID
3. Davis, JR (Ed), 1994, *Stainless Steels*, In ASM Metals Handbook, ASM International, Metals Park, OH 44073
4. Jones, RH (Ed.), 1992, *Stress-Corrosion Cracking*, ASM International, Metals Park, OH 44073
5. Koch, GH, 1995, *Localized Corrosion in Halides Other Than Chlorides*, MTI Pub No. 41, Materials Technology Institute of the Chemical Process Industries, Inc, St Louis, MO 63141
6. Uhlig, HH, 1948, *Corrosion Handbook*, John Wiley & Sons, New York, NY 10158
7. Van Delinder, LS (Ed), 1984, *Corrosion Basics*, NACE International, Houston, TX 77084

PLANT ITEM MATERIAL SELECTION DATA SHEET

OPERATING CONDITIONS

PROCESS CORROSION DATA SHEETS

Component(s) (Name/ID #) PJV drain collection vessel (PJV-VSL-00002)

Facility PTF

In Black Cell? Yes

Chemicals	Unit[1]	Contract Max		Non-Routine		Notes
		Leach	No leach	Leach	No Leach	
Aluminum	g/l	9.77E-04	9.37E-04			
Chloride	g/l	4.31E-04	4.63E-04			
Fluoride	g/l	4.88E-04	5.24E-04			
Iron	g/l					
Nitrate	g/l	7.06E-03	7.49E-03			
Nitrite	g/l	2.23E-03	2.39E-03			
Phosphate	g/l	1.60E-03	1.69E-03			
Sulfate	g/l	8.58E-04	9.20E-04			
Mercury	g/l					
Carbonate	g/l	2.70E-03	2.79E-03			
Undissolved solids	wt%					
Other (NaMnO4, Pb,...)	g/l					
Other	g/l					
pH	N/A					Note 3
Temperature	°F					Note 2

List of Organic Species:

Notes:

1. Concentrations less than 1x 10^{-4} g/l do not need to be reported; list values to two significant digits max.
2. T operation 59 °F to 113 °F, nominal 113 °F
3. pH will be nominally 9 to 10 but could get as low as 7

Assumptions:

PLANT ITEM MATERIAL SELECTION DATA SHEET

4.7.1.2 PJV Drain Collection Vessel

Routine Operations

The low points of the inlet header and sub-headers of the PJV system are provided with drain lines that drain condensate collected in the header to the PJV drain collection vessel PJV-VSL-00002. The condensate is transferred from PJV-VSL-00002 to PWD-VSL-00044.

Non-Routine Operations that Could Affect Corrosion/Erosion

None identified.