PLANT ITEM MATERIAL SELECTION DATA SHEET

R10422910

HSH-TK-00001 & 2 (HLW)
DECONTAMINATION TANK MELTER CAVE 1 AND 2

- Design Temperature (°F)(max/min): 212/59
- Design Pressure (psig): vented
- Location: outcell

ISSUED BY
RPP-WTP PDC

Contents of this document are Dangerous Waste Permit affecting

Operating conditions are as stated on sheet 5

Operating Modes Considered:

- The tank is expected to contain nitric acid up to 2 M Other chemicals may be used in the future requiring further evaluation.
- Evaluation based on the assumption that chlorides, including HCl, will not be added to the tank

Materials Considered:

Material	Relative Cost	Acceptable Material	Unacceptable Material
Carbon Steel	0 23		X
304L	1 00		X
316L	1.18	X	
6% Mo	7.64	X	
Alloy 22	11.4	X	
Ti-2	10 1	X	

Recommended Material: 316L

Recommended Corrosion Allowance: 0.04 inch (includes 0.0 inch erosion allowance)

Process & Operations Limitations:

- None identified at this time

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11/11/04

EXPIRES: 12/07/05

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This bound document contains a total of 5 sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	APPROVER
0	4/6/04	Issued for Permitting Use			

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Corrosion Considerations:

a General Corrosion
Hamner (1981) lists a corrosion rate for 304 (and 304L) in 2 M HNO_3 of less than 2 mpy. Davis (1994) states the corrosion rate for 304L in 12% HNO_3 will be less than about 1 mpy up to about 212°F. 316L should have similar corrosion rates in similar conditions.

Conclusion:
At the proposed temperature range, either 304L or 316L is expected to be sufficiently resistant to the anticipated acid solution with a probable general corrosion rate of less than 1 mpy. A minimum corrosion allowance of 0.04 inch is recommended.

b Pitting Corrosion
At the concentrations and temperatures used, nitric acid will not pit 304L and 316L is more resistant than 304L.

Conclusion:
Pitting is not considered a problem for either 304L or 316L.

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

Conclusion:
Not expected in this system.

d Stress Corrosion Cracking
The exact amount of chloride required to stress corrosion crack stainless steel is unknown. In part this is because the amount varies with temperature, metal sensitization, the environment and because chloride tends to concentrate under heat transfer conditions, by evaporation, and electrochemically during a corrosion process. Hence, even as little as 10 ppm can lead to cracking under some conditions. Generally, as seen in Sedriks (1996) and Davis (1994), stress corrosion cracking does not usually occur below about 140°F. Further, the use of "L" grade stainless reduces the opportunity for sensitization and, therefore, the likelihood of cracking. These tanks are not expected to have significant concentrations of chlorides present and the normal operating temperature should not be high enough to cause concern.

Conclusion:
The use of 304L and 316L are expected to be acceptable with 316L marginally better.

e Crevice Corrosion
See Pitting.

Conclusion:
See Pitting

f Corrosion at Welds
Weld corrosion 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 conditions are not conducive to microbial growth.

Conclusion:
MIC is not considered a problem.

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

Conclusions
Not expected to be a concern.

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i Vapor Phase Corrosion
Not considered to be a concern.

Conclusion
Not a problem.

j Erosion
Velocities within the vessel are expected to be low

Conclusion
Not expected to be of concern.

k Galling of Moving Surfaces
Tank contains remotely removable spray ring assembly Components have been designed to minimize the possibility of galling.

Conclusion
Design of components is such as to eliminate concern.

l Fretting/Wear
Removable strainer basket is present. Components have been designed to minimize the possibility of fretting.

Conclusion.
Design of components is such as to eliminate concern.

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 Addition of Nitric Acid
These tanks contain normally contain nitric acid.

Conclusion.
Not applicable.

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References:

1. Davis, JR (Ed), 1994, *Stainless Steels*, In ASM 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. Davis, JR (Ed), 1987, *Corrosion, Vol 13*, In "Metals Handbook", ASM International, Metals Park, OH 44073
2. Jones, RH (Ed), 1992, *Stress-Corrosion Cracking*, ASM International, Metals Park, OH 44073
3. Uhlig, HH, 1948, *Corrosion Handbook*, John Wiley & Sons, New York, NY 10158

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OPERATING CONDITIONS

Component(s) (Name/ID #) DECONTAMINATION TANK MELTER CAVE 1 AND 2 (HSH-TK-00001/2)

Facility HLW

In Black Cell? No

Chemicals	Unit[1]	Contract Maximum		Non-Routine		Notes
		Leach	No leach	Leach	No Leach	
Aluminum	g/l					
Chloride	g/l					
Fluoride	g/l					
Iron	g/l					
Nitrate	g/l					
Nitrite	g/l					
Phosphate	g/l					
Sulfate	g/l					
Mercury	g/l					
Carbonate	g/l					
Undissolved solids	wt %					
Other (NaMnO4, Pb,...)	g/l					
Other	g/l					
pH	N/A					Assumption 1
Temperature	°F					Assumption 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

Assumptions

1. Assume pH near 0
2. Tmin 59 °F, Tnorm 95 °F, Tmax 212 °F