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DEPT. OF ENVIRON. QLTY

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tel 918-582-9595 *fax* 918-560-5252

September 22, 2025

Ms. Hillary Young, P.E.
Chief Engineer
Department of Environmental Quality
Land Protection Division
707 North Robinson Ave.
Oklahoma City, OK 73102

Subject: Response to July 28, 2025 Technical Review - Notice of Deficiency Letter
US Ecology Tulsa Permit Modification Application
EPA #OKD000402396, Permit #000402396

Dear Ms. Young:

US Ecology Tulsa (USE Tulsa) has prepared this letter in response to the July 28, 2025 Notice of Deficiency (NOD) letter from Ms. Hillary Young, P.E., Chief Engineer, of the Oklahoma Department of Environmental Quality (DEQ) Land Protection Division to Mr. Dan Cavanaugh, Environmental Compliance Manager, of the USE Tulsa facility (facility) regarding the above Class 2, Tier I Permit Modification Application. Each DEQ comment listed in the letter is presented below in italics and is followed by USE Tulsa's response.

SECTION A – PART A APPLICATION

COMMENT No 1. RCRA SUBTITLE C SITE IDENTIFICATION FORM *(Page 5 of 8) – Please remove U202 as a waste code for federally regulated hazardous waste handled at US Ecology. U202 is the waste code for saccharin and its salts, which was removed as a U-listed hazardous waste on December 17, 2010.*

RESPONSE No. 1. Waste code U202 has been removed from page 5 of 8 of the RCRA Subtitle C Site Identification Form. Due to this update, USE Tulsa's certification on page 8 of this form has also been updated.

COMMENT No. 2. Section A - Part A Application - Hazardous Waste Permit Part A Form, Section 7. - Description of Hazardous Wastes *(Pages 2-16) The Hazardous Waste*

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Permit Part A Form lists T01 as a process code for all waste codes. Please remove T01 as a process code for the waste codes that are not permitted for treatment in tanks.

RESPONSE No. 2. Based on Attachment 2 (Waste Characteristics and Waste Analysis Plan), T01 is a permitted process code for the D-series hazardous waste codes (i.e., D001 to D043) but not for the F, K, P, and U waste codes. Therefore, the T01 code has been removed as a process code for the K, P, and U waste codes on pages 3-16 of the Part A Form.

SECTION T- INFORMATION REQUIREMENTS FOR TANK SYSTEMS

COMMENT No. 3. Section T.4 - Diagram of Piping, Instrumentation, and Process Flow for Each Tank System: 40 CFR 270.16(d) *(Page T-3) Please provide a diagram of the proposed piping, instrumentation, and process flow for TF-4, TA-2b, and TA-2c as applicable.*

RESPONSE No. 3. As described in Section T.4, the process flow for the "proposed TF-4 for a bulk shipment is summarized as follows: the truck is unloaded by connecting a flexible hose with quick disconnect couplings into one of the storage tanks directly or through a tank manifold system." "In addition to bulk waste, containerized waste may also be pumped into the tanks." A process diagram for proposed Tank Farm 4 (TF-4) has been added as Appendix 4-A. This diagram is similar to the one shown in Appendix 2 for TF-1.

As described in Section T.4, the process flow for the "proposed TA-2b and TA-2c treatment tanks for bulk shipment is summarized as follows: the truck is unloaded by connecting a flexible hose with quick disconnect couplings and transferring the material directly into the designated treatment tank. Roll off boxes are unloaded in TA-2a, TA-2b, and TA-2c by dumping directly into the treatment tank". The treatment tanks also receive bulk waste that has been unloaded to TF-4 and containerized waste approved for treatment. As requested by DEQ, a process diagram to show the transfer of waste to TA-2b and TA-2c by a flexible hose or dumping from a roll off box or container has been added as Appendix 6-A.

COMMENT No. 4. Section T.7 - Detailed Plans and Description of the Secondary Containment System in Compliance with 264.193(a)(b)(c)(d)(e)(f): 40 CFR 270.16(g) *(Page T-6) Please provide a description of the impermeable interior coating or lining that is compatible with the stored waste and that will prevent migration of waste into the concrete for the proposed secondary containment for tanks TA-2b and TA-2c, in accordance with 40 C.F.R. §264.193(e)(2)(iv).*

RESPONSE No. 4. A description of the concrete treatment [Xypex Admix produced by Xypex Chemical Company or an equivalent product)] that is proposed for the concrete secondary containment has been added to Section T.7. As stated on page T-69, "The design of the reinforced concrete is enhanced by the addition of a Xypex

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additive (or equivalent) to decrease the permeability of the concrete and increase its chemical resistance". Also, from Note 1 on Figure T-3 "All interior concrete containment slab features and mixing pit foundations shall be amended with Xypex additive to permanently retard permeability." Manufacturer information on the Xypex Admix C-Series has been added to new Appendix 11 in Section T.

COMMENT No. 5. Appendix 6 - Proposed Treatment Tanks Detailed Information *(Page T-67) DEQ does not consider the information provided in Appendix 6 to be sufficient. Please provide a more detailed description of the basic design parameters, dimensions, materials of construction, the containment, the control of run-on and run-off, the tank management processes, the leak detection for ancillary equipment, and the containment calculations for proposed treatment tanks TA-2b and TA-2c. Please provide this information in a format that is similar to the information provided in Appendices 3, 4, and 5 of Section T of the proposed permit modification. Additionally, the proposed cumulative permitted treatment daily capacity of 164,000 gallons per day for TA-2b and TA-2c does not correlate to the quantities stated in T-71 and Att. 10-19.*

RESPONSE No. 5. Section T, Appendix 6 has been updated by adding copies of the relevant information from Sections T.2, T.4, T.5, and T.7; Section T, Appendix 8; and Attachment 10, Section 2.D into a template based on Section T, Appendix 4 for the proposed TF-4. Section T, Appendices 3 and 5 for the existing units contain more information than Appendices 4 and 6 because they include as-built information for the constructed units. Proposed TF-4 and proposed TA-2b and TA-2c have not yet been constructed and do not include as-built information. Also note that per page T-70, "The only access point consists of a 4-inch leak detection inspection port extending from the surface of the treatment tanks to a depth slightly elevated from the tank bottom. The are no piping systems, fittings, or other openings in the walls of the tanks".

The quantities stated in Section T, Appendix 7 (page T-77, previously T-71) and Attachment 10, page Att. 10-20 (previously Att. 10-19) have been updated to match the proposed cumulative permitted treatment daily capacity of 164,000 gallons per day for TA-2b and TA-2c in Appendix 6. The 164,000 gallons per day treatment capacity is calculated from the limited process volume (20,500 gallons) and the number of processes anticipated throughout a day. Tanks TA-2a and TA-2b have process volume limits less than the total capacity provided by the secondary containment to meet operation requirements of 40 CFR §264.193(e), §264.194(b)(2), and §264.194(b)(3) as stated in the notes section of Appendix 7. This operation will allow for the concrete secondary containment to hold a minimum 100% of the mixing volume (waste and reagent) and the volume in the containment occupied by the treatment tank.

COMMENT No. 6. Appendix 7 - Permitted Hazardous Waste Tank System Table *(Page T-71) The maximum capacity and secondary containment capacity for proposed tanks TA-2b and TA- 2c is not the same quantity as described in Section T, Appendix 8 (Page T-73).*

Additionally, the attached Process Description (Att. 10-19) states that TA-2b and TA-2c are both 229.2 yd3 and 42,500 gallons. Please review the stated capacities and make revisions as necessary.

RESPONSE No. 6. The documents referenced have been updated as such that the maximum capacity of TA-2b and TA-2c are 219.19 yd^3 (or ≈ 44,267 gallons) each, the secondary containment volume of TA-2b and TA-2c is 47,573 gallons each, and the process volume for each tank will be limited to 20,500 gallons per process. The maximum capacity for TA-2a and TA-2b in Appendix 7 will be limited to a process volume of 20,500 gallons per treatment process, which is less than half the calculated maximum capacity (44,267 gallons). Please see Response No. 5 for additional information.

COMMENT No. 7. Appendix 8 - Assessment of Proposed Tanks - Description of Tanks - Treatment Tanks *(Page T-73) There is no description of an impermeable interior coating or lining for the vault that is compatible with the stored waste and that will prevent migration of the waste into the concrete.*

RESPONSE No. 7. A description of the concrete treatment [Xypex Admix C-Series produced by Xypex Chemical Company or an equivalent product)] that is proposed for the concrete secondary containment has been added to Appendix 8. As stated on page T-80, "The design of the reinforced concrete is enhanced by the addition of a Xypex additive (or equivalent) to decrease the permeability of the concrete and increase its chemical resistance". From Note 1 on Figure T-3 "All interior concrete containment stab features and mixing pit foundations shall be amended with Xypex additive to permanently retard permeability."

As stated on page T-81, "The design of the reinforced concrete is enhanced by the addition of a Xypex additive (or equivalent) to decrease the permeability of the concrete and increase its chemical resistance". Also, from Note 1 on Figure T-3 "All interior concrete containment slab features and mixing pit foundations shall be amended with Xypex additive to permanently retard permeability." Manufacturer information on the Xypex Admix C-Series has been added to new Appendix 11 in Section T.

COMMENT No. 8. Appendix 8 - Assessment of Proposed Tanks - Description of Tanks - Treatment Tanks *(Page T-73) The general dimensions of the proposed treatment tanks provided in Section T, Appendix 7 (Page T-71) are not the same as described in this paragraph or in Att. 10-19.*

RESPONSE No. 8. The general dimensions of the proposed treatment tanks is described as 20'x25'x13' in Appendix 7. Section T, Appendix 8 and Attachment 10, page Att. 10-20 (previously Att. 10-19) do not give any other dimensions of the proposed treatment tanks. If volume is meant by "dimensions", please reference Responses 5 and 6.

COMMENT No. 9. Appendix 8 - Assessment of Proposed Tanks - Hazardous Characteristics of the Wastes to be Handled (40 CFR 264.192(a)(2)) -Treatment Tanks *(Page T-74) The language in this section states that prohibited waste types managed in the Facility's treatment tanks include D003 reactives that are explosives or any self-detonating wastes, self-heating wastes, and pyrophoric wastes. DEQ has only approved a limited subset of D003 wastes to be treated at US Ecology. The above language should be revised to state that only the currently approved D003 reactive wastes are not prohibited.*

RESPONSE No. 9. Please see the Response to Comment 10 as it relates to Attachment 2: Waste Characteristics and Waste Analysis Plan. Section T, Appendix 8 has been simplified (p. T-80) to remove language relating to waste treatment and refer to Attachment 2, where this is addressed.

ATTACHMENT 2 - WASTE CHARACTERISTICS AND WASTE ANALYSIS PLAN

COMMENT No. 10. Section 2e(iv)1 - Waste Prohibited from Treatment *(Page Att 2-22) (Notice of Deficiency Item 17) The language in this section states that prohibited waste types include D003 reactives that are explosives or any self-detonating wastes, self-heating wastes, and pyrophoric wastes. DEQ has only approved a limited subset of D003 wastes to be treated at US Ecology. The above language should be revised to state that only the currently approved D003 reactive wastes are not prohibited, and a description of these currently approved D003 reactive wastes should be included.*

RESPONSE No. 10. Section 2e(iv)1 of Attachment 2 (Waste Characteristics and Waste Analysis Plan) includes a list of waste types and codes prohibited from treatment due to the current treatment technologies at the facility and applicable regulations. In the above-referenced response to Notice of Deficiency Item 17, USE Tulsa clarified that they were not going to treat three of the four D003 waste types that DEQ cited: "pyrophoric, …, self-heating, and explosives." The facility is intending to treat water reactive waste and has already incorporated information on the waste treatment processes, safety procedures, and emission controls for D003 water reactive waste into Attachment 10, Section 2. To further identify the types of D003 that USE Tulsa will not treat at the facility, the properties of these wastes relative to those listed for D003 in 40 CFR §261.23 has been added to Section 2e(iv)1 of Attachment 2. The facility will not treat D003 wastes having any of the following properties:

- Pyrophoric wastes (such as most organometallic compounds or alkali metals) and any other reactive wastes having the properties described in 40 CFR §261.23(a)(1);
- Self-heating wastes and any other reactive wastes having the properties described in 40 CFR §261.23(a)(6); and

- Explosives, any self-detonating wastes, wastes that form potentially explosive reactions with water, and any other reactive wastes having the properties described in 40 CFR §261.23(a)(3), 40 CFR §261.23(a)(7), or 40 CFR §261.23(a)(8).

The facility will treat a subset of D003 wastes having the properties described in 40 CFR §261.23(a)(2), 40 CFR §261.23(a)(4), or 40 CFR §261.23(a)(5) and approved by DEQ. The facility's D003 waste streams list for treatment is provided in Attachment 2, Appendix 1.

ATTACHMENT 10 - PROCESS DESCRIPTION

COMMENT No. 11. Section 2.d - Description of Feed Systems, Safety Cutoff, Bypass Systems, and Pressure Controls *(Page Att. 10-17) (Notice of Deficiency Item 25) No description of the feed systems, safety cutoff, bypass systems, or pressure controls for proposed treatment tanks TA-2a, TA-2b, or TA-2c have been provided. Please add additional information to this section in accordance with 40 C.F.R. § 264.194(b) for TA-2a, TA-2b, and TA-2c.*

RESPONSE No. 11. Section 2.d of Attachment 10 has been updated to describe the above items or indicate they are not applicable to the operations of the treatment tanks at the facility. In addition, the same information has been added to Section T.3.

COMMENT No. 12. Section 2.f – Treatment in TA-2a, TA-2b, and TA-2c *(Att. 10-19) The final paragraph of page Att. 10-19 states that the liquid processing volume for tanks TA-2b and TA-2c will be limited to 21,250 gallons which will allow for the outer containment volume to hold 100% of the treatment tank volume while allowing for the volume displacement of the box. Please clarify what is meant by "the box". Additionally, please refer to comments 4, 5, and 7 regarding differences in the stated dimensions of the tanks and secondary containment.*

RESPONSE No. 12. The referenced paragraph has been revised to describe the containment volume in a different way (…to hold 100% of the mixing volume and the volume in the containment occupied by the steel tank and associated framing members), and the dimensions and volumes of the tanks and secondary containment referred to in comments 5, 6, and 8 have been checked for consistency and clarified or modified as described in Responses No. 5, No. 6, and No. 8. The language usage of "the box" has been removed for clarity and the language "treatment tank" has been used in all other instances for consistency throughout.

COMMENT No. 13. Section 2.f-Treatment in TA-2a, TA-2b, and TA-2c *(Att. 10-20 and 10-21) (Notice of Deficiency Item 27) Please provide the design capacity of the grinder in accordance with 40 C.F.R. § 270.13(i).*

RESPONSE No. 13. The design capacity of the grinder is 55-gallons. This information has been added to Section 2.f of Attachment 10.

COMMENT No. 14. Appendix 1 – Proposed Storage and Treatment Increases *(Att. 10-23) Please refer to comments 4, 5, 7, and 12 regarding proposed daily treatment amounts for TA-2b and TA-2c. The proposed liquid processing volume of 21,250 gallons per tank per shift does not add up to 82,000 gallons per day.*

RESPONSE No. 14. The proposed liquid processing volume has been updated and will be limited to 20,500 gallons of waste per process. The limit of 20,500 gallons will allow for approximately an equal amount of reagent to be added for the mixing process without exceeding the maximum capacity (44,267 gallons) of the mixing tank.

ATTACHMENT C REDLINE/STRIKETHROUGH PAGES AND REPLACEMENT PAGES FOR PART A FORM IN ATTACHMENT 13 OF CURRENT PERMIT

COMMENT No. 15. Hazardous Waste Permit Part A Form, Section 6 – Process Codes and Design Capacities *(Page 2) Please revise the line numbers to be sequential. Please remove the lines for TA-2a and TA-2b indicating storage is occurring in these tanks. Please revise the process total number of units for TA-2a and TA-2b from 2 to 1.*

RESPONSE No. 15. The line numbers have been revised to be sequential, the lines indicating storage for TA-2a and TA-2b have been removed, and the process total number of units for TA-2a and TA-2b has been reduced from 2 to 1.

COMMENT No. 16. Attachment C Redline/Strikethrough Pages and Replacement Pages for Part A Form in Attachment 13 of Current Permit, Section *7.* ***– Description of Hazardous Wastes*** *(Pages 2-16) The Hazardous Waste Permit Part A Form lists T01 as a process code for all waste codes. Please remove T01 as a process code for the waste codes that are not permitted for treatment in tanks.*

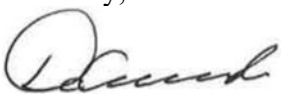
RESPONSE No. 16. T01 has been removed as a process code for F, K, P, and U waste codes.

CLOSING

The Permit Modification Application has been revised as described above. Redline/strikethrough pages for the Permit Modification Application are provided in Attachment A of this letter to document changes and facilitate DEQ's review. Replacement Sections and Attachments for the Permit Modification Application that incorporate the replacement pages are provided in Attachment B of this letter. Redline/strikethrough pages for the updated Part A Form in Attachment 13 of the current permit and a replacement Part A Form for Attachment 13 of the current permit are provided in Attachment C of this letter.

Should you have any questions regarding this letter or require additional information, please do not hesitate to contact me at (918) 560-5260 or dcavanaugh@republicservices.com.

Sincerely,



Dan Cavanaugh
Environmental Compliance Manager

Copy to: Brigette Haley, Department of Environmental Quality

Attachment A: Redline/Strikethrough Pages for Permit Modification Application
Attachment B: Replacement Sections and Attachments for Permit Modification Application
Attachment C: Redline/Strikethrough Pages and Replacement Pages for Part A Form in Attachment 13 of Current Permit

ATTACHMENT A
REDLINE/STRIKETHROUGH PAGES FOR PERMIT MODIFICATION APPLICATION

Section A – Part A Application
Section T – Information Requirements for Tank Systems
Attachment 2 – Waste Characteristics and Waste Analysis Plan
Attachment 10 – Process Description

United States Environmental Protection Agency
RCRA SUBTITLE C SITE IDENTIFICATION FORM

1. Reason for Submittal (Select only one.)

☐	Obtaining or updating an EPA ID number for on-going regulated activities (Items 10-17) that will continue for a period of time.
☐	Submitting as a component of the Hazardous Waste Report for _____(Reporting Year)
	☐ Site was a TSD facility and/or generator of ≥ 1,000 kg of non-acute hazardous waste, >1 kg of acute hazardous waste, or > 100 kg of acute hazardous waste spill cleanup in **o**ne or more months of the reporting year (or State equivalent LQG regulations)
☐	Notifying that regulated activity is no longer occurring at this Site
☐	Obtaining or updating an EPA ID number for conducting Electronic Manifest Broker activities
☒	Submitting a new or revised Part A Form

2. Site EPA ID Number

O	K	D	0	0	0	4	0	2	3	9	6

3. Site Name

US Ecology Tulsa, Inc.

4. Site Location Address

Street Address: 2700 S. 25th W. Ave.		
City, Town, or Village: Tulsa		Tulsa
State: Oklahoma	Country: USA	Zip Code: 74104
Latitude: 36.121574	Longitude: -96.020577	☐ Use Lat/Long as Primary Address

5. Site Mailing Address ☒ **Same as Location Address**

Street Address		
City, Town, or Village		
State	Country	Zip Code

6. Site Land Type

☒Private ☐County ☐District ☐Federal ☐Tribal ☐Municipal ☐Other

7. North American Industry Classification System (NAICS) Code(s) for the Site (at least 5-digit codes)

A. (Primary) 562211	C.
B.	D.

8. Site Contact Information ☒ **Same as Location Address**

First Name: Dan	MI:	Last Name: Cavanaugh
Title: Environmental Compliance Manager		
Street Address:		
City, Town, or Village:		
State:	Country:	Zip Code:
Email: dcavanaugh@republicservices.com		
Phone: 918-808-1100	Ext	Fax: 918-560-5252

9. Legal Owner and Operator of the Site

A. Name of Site's Legal Owner ☒ **Same as Location Address**

Full Name: US Ecology Tulsa Inc.		Date Became Owner (mm/dd/yyyy) 6/18/2014
Owner Type ☒Private ☐County ☐District ☐Federal ☐Tribal ☐Municipal ☐State ☐Other		
Street Address:		
City, Town, or Village		
State	Country	Zip Code
Email		
Phone: (918) 582-9595	Ext	Fax
Comments		

B. Name of Site's Legal Operator ☒ **Same as Location Address**

Full Name: US Ecology Tulsa Inc.		Date Became Owner (mm/dd/yyyy):
Owner Type ☒Private ☐County ☐District ☐Federal ☐Tribal ☐Municipal ☐State ☐Other		
Street Address		
City, Town, or Village		
State	Country	Zip Code
Email		
Phone: (918) 582-9595	Ext	Fax
Comments		

10. Type of Regulated Waste Activity (at your site)

Mark "Yes" or "No" for all current activities (as of the date submitting the form); complete any additional boxes as instructed.

A. Hazardous Waste Activities

☒Y ☐N	1. Generator of Hazardous Waste—If "Yes", mark only one of the following—a, b, c	
☒	a. LQG	- Generates, in any calendar month, 1,000 kg/mo (2,200 lb/mo) or more of non-acute hazardous waste (includes quantities imported by importer site); or - Generates, in any calendar month, or accumulates at any time, more than 1 kg/mo (2.2 lb/mo) of acute hazardous waste; or - Generates, in any calendar month or accumulates at any time, more than 100 kg/mo (220 lb/mo) of acute hazardous spill cleanup material.
☐	b. SQG	100 to 1,000 kg/mo (220-2,200 lb/mo) of non-acute hazardous waste and no more than 1 kg (2.2 lb) of acute hazardous waste and no more than 100 kg (220 lb) of any acute hazardous spill cleanup material.
☐	c. VSQG	Less than or equal to 100 kg/mo (220 lb/mo) of non-acute hazardous waste.
☐Y ☒N	2. Short-Term Generator (generates from a short-term or one-time event and not from on-going processes). If "Yes", provide an explanation in the Comments section. *Note: If "Yes", you MUST indicate that you are a Generator of Hazardous Waste in Item 10.A.1 above.*	
☒Y ☐N	3. Treater, Storer or Disposer of Hazardous Waste—Note: Part B of a hazardous waste permit is required for these activities.	
☒Y ☐N	4. Receives Hazardous Waste from Off-site	
☒Y ☐N	5. Recycler of Hazardous Waste	
☒	a. Recycler who stores prior to recycling	
☐	b. Recycler who does not store prior to recycling	
☐Y ☒N	6. Exempt Boiler and/or Industrial Furnace—If "Yes", mark all that apply.	
☐	a. Small Quantity On-site Burner Exemption	
☐	b. Smelting, Melting, and Refining Furnace Exemption	

B. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g. D001, D003, F007, U112). Use an additional page if more spaces are needed.

D001	D002	D003	D004	D005	D006	D007
D008	D009	D010	D011	D012	D013	D014
D015	D016	D017	D018	D019	D020	D021
D022	D023	D024	D025	D026	D027	D028
D029	D030	D031	D032	D033	D034	D035

C. Waste Codes for State Regulated (non-Federal) Hazardous Wastes. Please list the waste codes of the State hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed.

10B. **Waste Codes for Federally Regulated Hazardous Wastes.** (continued)

D036	D037	D038	D039	D040	D041	D042
D043						
F001	F002	F003	F004	F005	F006	F007
F008	F009	F010	F011	F012	F019	F020
F021	F022	F023	F024	F025	F026	F027
F028	F032	F034	F035	F037	F038	F039
K001	K002	K003	K004	K005	K006	K007
K008	K009	K010	K011	K013	K014	K015
K016	K017	K018	K019	K020	K021	K022
K023	K024	K025	K026	K027	K028	K029
K030	K031	K032	K033	K034	K035	K036
K037	K038	K039	K040	K041	K042	K043
K044	K045	K046	K047	K048	K049	K050
K051	K052	K060	K061	K062	K069	K071
K073	K083	K084	K085	K086	K087	K088
K093	K094	K095	K096	K097	K098	K099
K100	K101	K102	K103	K104	K105	K106
K107	K108	K109	K110	K111	K112	K113
K114	K115	K116	K117	K118	K123	K124
K125	K126	K131	K132	K136	K141	K142
K143	K144	K145	K147	K148	K149	K150
K151		K156	K157	K158	K159	K161
K169	K170	K171	K172	K174	K175	K176
K177	K178	K181				
P001	P002	P003	P004	P005	P006	P007
P008	P009	P010	P011	P012	P013	P014
P015	P016	P017	P018	P020	P021	P022
P023	P024		P026	P027	P028	P029
P030	P031	P033	P034	P036	P037	P038
P039	P040	P041	P042	P043	P044	P045
P046	P047	P048	P049	P050	P051	P054
P056	P057	P058	P059	P060	P062	P063
P064	P065	P066	P067	P068	P069	P070
P071	P072	P073	P074	P075	P076	P077
P078	P081	P082	P084	P085	P087	P088
P089	P092	P093	P094	P095	P096	P097
P098	P099	P101	P102	P103	P104	P105
P106	P108	P109	P110	P111	P112	P113
P114	P115	P116		P118	P119	P120
P121	P122	P123	P127	P128	P185	P188
P189	P190	P191	P192	P194	P196	P197
P198	P199	P201	P202	P203	P204	P205
U001	U002	U003	U004	U005	U006	U007

U008	U009	U010	U011	U012	U014	U015
U016	U017	U018	U019	U020	U021	U022
U023	U024	U025	U026	U027	U028	U029
U030	U031	U032	U033	U034	U035	U036
U037	U038	U039	U041	U042	U043	U044
U045	U046	U047	U048	U049	U050	U051
U052	U053	U055	U056	U057	U058	U059
U060	U061	U062	U063	U064	U066	U067
U068	U069	U070	U071	U072	U073	U074
U075	U076	U077	U078	U079	U080	U081
U082	U083	U084	U085	U086	U087	U088
U089	U090	U091	U092	U093	U094	U095
U096	U097	U098	U099	U101	U102	U103
U105	U106	U107	U108	U109	U110	U111
U112	U113	U114	U115	U116	U117	U118
U119	U120	U121	U122	U123	U124	U125
U126	U127	U128	U129	U130	U131	U132
U133	U134	U135	U136	U137	U138	U140
U141	U142	U143	U144	U145	U146	U147
U148	U149	U150	U151	U152	U153	U154
U155	U156	U157	U158	U159	U160	U161
U162	U163	U164	U165	U166	U167	U168
U169	U170	U171	U172	U173	U174	U176
U177	U178	U179	U180	U181	U182	U183
U184	U185	U186	U187	U188	U189	U190
U191	U192	U193	U194	U196	U197	U200
U201	~~U202~~	U203	U204	U205	U206	U207
U208	U209	U210	U211	U213	U214	U215
U216	U217	U218	U219	U220	U221	U222
U223	U225	U226	U227	U228	U234	U235
U236	U237	U238	U239	U240	U243	U244
U246	U247	U248	U249	U271	U278	U279
U280	U328	U353	U359	U364	U367	U372
U373	U387	U389	U394	U395	U404	U409
U410	U411					

11. Additional Regulated Waste Activities (NOTE: Refer to your State regulations to determine if a separate permit is required.)

A. Other Waste Activities

☒Y ☐N	1. Transporter of Hazardous Waste—If "Yes", mark all that apply.
☒	a. Transporter
☒	b. Transfer facility (at your site)
☐Y ☒N	2. Underground Injection Control
☒Y ☐N	3. United States Importer of Hazardous Waste
☐Y ☒N	4. Recognized Trader – If "Yes", mark all that apply.
☐	a. Importer
☐	b. Exporter
☒Y ☐N	5. Importer/Exporter of Spent Lead-Acid Batteries (SLABs) under 40 CFR 266 Subpart G—If "Yes", mark all that apply.
☒	a. Importer
☒	b. Exporter

B. Universal Waste Activities

☒Y ☐N	1. Large Quantity Handler of Universal Waste (you accumulate 5,000 kg or more) - If "Yes" mark all that apply. Note: Refer to your State regulations to determine what is regulated.
☒	a. Batteries
☒	b. Pesticides
☒	c. Mercury Containing Equipment
☒	d. Lamps
☒	e. Aerosol Cans
☐	f. Other (specify) _____
☐	g. Other (specify) _____
☒Y ☐N	2. Destination Facility for Universal Waste. Note: A hazardous waste permit may be required for this activity.

C. Used Oil Activities

☒Y ☐N	1. Used Oil Transporter—If "Yes", mark all that apply.
☒	a. Transporter
☒	b. Transfer facility (at your site)
☐Y ☒N	2. Used Oil Processor and/or Re-refiner – If "Yes", mark all that apply
☐	a. Processor
☐	b. Re-refiner
☐Y ☒N	3. Off-Specification Used Oil Burner
☐Y ☒N	4. Used Oil Fuel Marketer – If "Yes", mark all that apply
☐	a. Marketer Who Directs Shipments of Off-Specification Used Oil to Off-Specification Used Oil Burner
☐	b. Marketer Who First Claims the Used Oil Meets the Specifications

D. Pharmaceutical Activities

☒Y ☐N	1. Operating under 40 CFR Part 266, Subpart P for the management of hazardous waste pharmaceuticals – If "Yes", mark only one. Note: See the Item-by-Item Instructions for definitions of healthcare facility and reverse distributor..
☐	a. Healthcare Facility
☒	b. Reverse Distributor
☐Y ☒N	2. Withdrawing from operating under 40 CFR 266, Subpart P for the management of hazardous waste pharmaceuticals. Note: You may only withdraw if you are a healthcare facility that is a VSQG for all of your hazardous waste, including hazardous waste pharmaceuticals.

12. Eligible Academic Entities with Laboratories – Notification for opting into or withdrawing from managing laboratory hazardous waste pursuant to 40 CFR Part 262, Subpart K.

☐Y ☒N	A. Opting into or currently operating under 40 CFR 262 Subpart K for the management of hazardous wastes in laboratories—If "Yes", mark all that apply. Note: See the item-by-item instructions for definitions of types of eligible academic entities.
☐	1. College or University
☐	2. Teaching Hospital that is owned by or has a formal written affiliation with a college or university
☐	3. Non-profit Institute that is owned by or has a formal written affiliation with a college or university
☐Y ☒N	B. Withdrawing from 40 CFR 262 Subpart K for the management of hazardous wastes in laboratories.

13. Episodic Generation

☐Y ☒N	Are you an SQG or VSQG generating hazardous waste from a planned or unplanned episodic event, lasting no more than 60 days, that moves you to a higher generator category. If "Yes", you must fill out the Addendum for Episodic Generator.

14. LQG Consolidation of VSQG Hazardous Waste

☐Y ☒N	A. Are you an LQG notifying of consolidating VSQG Hazardous Waste Under the Control of the Same Person pursuant to 40 CFR 262.17(f)? If "Yes", you must fill out the Addendum for LQG Consolidation of VSQG hazardous waste.

15. Notification of LQG Site Closure for a Central Accumulation Area (CAA) (optional) OR Entire Facility (required)

☐Y ☒N LQG Site Closure of a Central Accumulation Area (CAA) or Entire Facility..
☐ A. Central Accumulation Area (CAA) or ☐ Entire Facility
B. Expected closure date:_____mm/dd/yyyy
C. Requesting new closure date:_____mm/dd/yyyy
D. Date closed : _____mm/dd/yyyy ☐ 1. In compliance with the closure performance standards 40 CFR 262.17(a)(8) ☐ 2. Not in compliance with the closure performance standards 40 CFR 262.17(a)(8)

16. Notification of Hazardous Secondary Material (HSM) Activity

☐Y ☒N	Are you notifying under 40 CFR 260.42 that you will begin managing, are managing, or will stop managing hazardous secondary material under 40 CFR 260.30, 40 CFR 261.4(a)(23), (24), (25) or (27)? If "Yes", you must fill out the Addendum to the Site Identification Form for Managing Hazardous Secondary Material.

17. Electronic Manifest Broker

☐Y ☒N	Are you notifying as a person, as defined in 40 CFR 260.10, electing to use the EPA electronic manifest system to obtain, complete, and transmit an electronic manifest under a contractual relationship with a hazardous waste generator?

18. Comments (Include the item number for each comment)

Additional page attached for section 10b. – Waste Codes for Federally Regulated Hazardous Waste (pages 4 and 5 of 8).

19. Certification I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. **Note: For the RCRA Hazardous Waste Part A Permit Application, all owners and operators must sign (see 40 CFR 270.10(b) and 270.11)**.

Signature of legal owner, operator or authorized representative	Date (mm/dd/yyyy) 9/15/2025
Printed Name (First, Middle Initial Last) Vincent Scheerer	Title Area President
Email vscheerer@republicservices.com	

Signature of legal owner, operator or authorized representative	Date (mm/dd/yyyy)
	5/20/2025
Printed Name (First, Middle Initial Last) Vince Scheerer	Title Vice President
Email vince.scheerer@usecology.com	

EPA ID Number	O	K	D	0	0	0	4	0	2	3	9	6

OMB# 2050-0024; Expires 04/30/2024

United States Environmental Protection Agency
HAZARDOUS WASTE PERMIT PART A FORM

1. Facility Permit Contact

First Name Dan	MI:	Last Name Cavanaugh
Title Environmental Compliance Manager		
Email dcavanaugh@republicservices.com		
Phone 918-560-5260	Ext	Fax 918-560-5252

2. Facility Permit Contact Mailing Address

Street Address 2700 S. 25th W. Ave.		
City, Town, or Village Tulsa		
State Oklahoma	Country USA	Zip Code 74107

3. Facility Existence Date (mm/dd/yyyy)

1972

4. Other Environmental Permits

A. Permit Type	B. Permit Number	C. Description
E	201-082-O	Synthetic Minor Source Air Permit

5. Nature of Business

US Ecology Tulsa, Inc. is a Treatment, Storage, and Disposal Facility (TSDF) for hazardous and solid waste.

6. Process Codes and Design Capacities (See Appendix 1 in Attachment 10 for reference)

Line Number		A. Process Code			B. Process Design Capacity		C. Process Total Number of Units	D. Unit Name
					(1) Amount	(2) Unit of Measure		
0	1	S	0	1	33,000	G	1	CMA-1
0	2	S	0	1	4,840	G	1	CMA-2
0	3	S	0	1	30,560	G	1	CMA-3
0	4	S	0	2	19,960	G	1	T-407
0	5	S	0	2	19,960	G	1	T-408
0	6	S	0	2	19,960	G	1	T-409
0	7	S	0	2	19,960	G	1	T-410
0	8	T	0	1	12,000	U	1	TA-2a
0	9	T	0	1	82,000	U	1	TA-2b
1	0	T	0	1	82,000	U	1	TA-2c
1	1	S	0	1	900 (181,776)	Y (G)	1	CMA-4

7. Description of Hazardous Wastes (Enter codes for Items 7.A, 7.C and 7.D(1))

Line No.			A. EPA Hazardous Waste No.				B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes									
									(1) Process Codes									(2) Process Description (if code is not entered in 7.D1))
0	0	1	D	0	0	1	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	2	D	0	0	2	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	3	D	0	0	3	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	4	D	0	0	4	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	5	D	0	0	5	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	6	D	0	0	6	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	7	D	0	0	7	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	8	D	0	0	8	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	9	D	0	0	9	15,000	T	S	0	1	S	0	2	T	0	1	
0	1	0	D	0	1	0	15,000	T	S	0	1	S	0	2	T	0	1	
0	1	1	D	0	1	1	15,000	T	S	0	1	S	0	2	T	0	1	
0	1	2	D	0	1	2	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	3	D	0	1	3	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	4	D	0	1	4	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	5	D	0	1	5	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	6	D	0	1	6	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	7	D	0	1	7	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	8	D	0	1	8	50,000	T	S	0	1	S	0	2	T	0	1	
0	1	9	D	0	1	9	25,000	T	S	0	1	S	0	2	T	0	1	
0	2	0	D	0	2	0	25,000	T	S	0	1	S	0	2	T	0	1	
0	2	1	D	0	2	1	25,000	T	S	0	1	S	0	2	T	0	1	
0	2	2	D	0	2	2	25,000	T	S	0	1	S	0	2	T	0	1	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
023	D023	25,000	T	S01 S02 T01	
024	D024	25,000	T	S01 S02 T01	
025	D025	25,000	T	S01 S02 T01	
026	D026	25,000	T	S01 S02 T01	
027	D027	25,000	T	S01 S02 T01	
028	D028	25,000	T	S01 S02 T01	
029	D029	25,000	T	S01 S02 T01	
030	D030	25,000	T	S01 S02 T01	
031	D031	25,000	T	S01 S02 T01	
032	D032	25,000	T	S01 S02 T01	
033	D033	25,000	T	S01 S02 T01	
034	D034	25,000	T	S01 S02 T01	
035	D035	25,000	T	S01 S02 T01	
036	D036	25,000	T	S01 S02 T01	
037	D037	25,000	T	S01 S02 T01	
038	D038	25,000	T	S01 S02 T01	
039	D039	25,000	T	S01 S02 T01	
040	D040	25,000	T	S01 S02 T01	
041	D041	25,000	T	S01 S02 T01	
042	D042	25,000	T	S01 S02 T01	
043	D043	25,000	T	S01 S02 T01	
044	F001	25,000	T	S01 S02 T01	
045	F002	25,000	T	S01 S02 T01	
046	F003	25,000	T	S01 S02 T01	
047	F004	25,000	T	S01 S02 T01	
048	F005	25,000	T	S01 S02 T01	
049	F006	50,000	T	S01 S02 T01	
050	F007	2,000	T	S01 S02 T01	
051	F008	2,000	T	S01 S02 T01	
052	F009	2,000	T	S01 S02 T01	
053	F010	2,000	T	S01 S02 T01	
054	F011	2,000	T	S01 S02 T01	
055	F012	2,000	T	S01 S02 T01	
056	F019	10,000	T	S01 S02 T01	
057	F020	2,000	T	S01 S02 T01	
058	F021	2,000	T	S01 S02 T01	
059	F022	2,000	T	S01 S02 T01	
060	F023	2,000	T	S01 S02 T01	
061	F024	2,000	T	S01 S02 T01	
062	F025	2,000	T	S01 S02 T01	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
036	F026	2,000	T	S01 S02 T01	
037	F027	2,000	T	S01 S02 T01	
038	F028	2,000	T	S01 S02 T01	
039	F032	2,000	T	S01 S02 T01	
040	F034	2,000	T	S01 S02 T01	
041	F035	2,000	T	S01 S02 T01	
042	F037	2,000	T	S01 S02 T01	
043	F038	2,000	T	S01 S02 T01	
044	F039	2,000	T	S01 S02 T01	
045	K001	2,000	T	S01 S02 T01	
046	K002	2,000	T	S01 S02 T01	
047	K003	2,000	T	S01 S02 T01	
048	K004	2,000	T	S01 S02 T01	
049	K005	2,000	T	S01 S02 T01	
050	K006	2,000	T	S01 S02 T01	
051	K007	2,000	T	S01 S02 T01	
052	K008	2,000	T	S01 S02 T01	
053	K009	2,000	T	S01 S02 T01	
054	K010	2,000	T	S01 S02 T01	
055	K011	2,000	T	S01 S02 T01	
056	K013	2,000	T	S01 S02 T01	
057	K014	2,000	T	S01 S02 T01	
058	K015	2,000	T	S01 S02 T01	
059	K016	2,000	T	S01 S02 T01	
060	K017	2,000	T	S01 S02 T01	
061	K018	2,000	T	S01 S02 T01	
062	K019	2,000	T	S01 S02 T01	
063	K020	2,000	T	S01 S02 T01	
064	K021	2,000	T	S01 S02 T01	
065	K022	2,000	T	S01 S02 T01	
066	K023	2,000	T	S01 S02 T01	
067	K024	2,000	T	S01 S02 T01	
068	K025	2,000	T	S01 S02 T01	
069	K026	2,000	T	S01 S02 T01	
070	K027	2,000	T	S01 S02 T01	
071	K028	2,000	T	S01 S02 T01	
072	K029	2,000	T	S01 S02 T01	
073	K030	2,000	T	S01 S02 T01	
074	K031	2,000	T	S01 S02 T01	
075	K032	2,000	T	S01 S02 T01	
076	K033	2,000	T	S01 S02 T01	
077	K034	2,000	T	S01 S02 T01	
078	K035	2,000	T	S01 S02 T01	
079	K036	2,000	T	S01 S02 T01	
080	K037	2,000	T	S01 S02 T01	
081	K038	2,000	T	S01 S02 T01	
082	K039	2,000	T	S01 S02 T01	
083	K040	2,000	T	S01 S02 T01	
084	K041	2,000	T	S01 S02 T01	
085	K042	2,000	T	S01 S02 T01	
086	K043	2,000	T	S01 S02 T01	
087	K044	2,000	T	S01 S02 T01	
088	K045	2,000	T	S01 S02 T01	
089	K046	2,000	T	S01 S02 T01	
090	K047	2,000	T	S01 S02 T01	
091	K048	2,000	T	S01 S02 T01	
092	K049	2,000	T	S01 S02 T01	
093	K050	2,000	T	S01 S02 T01	
094	K051	2,000	T	S01 S02 T01	
095	K052	2,000	T	S01 S02 T01	
096	K053	2,000	T	S01 S02 T01	
097	K054	2,000	T	S01 S02 T01	
098	K055	2,000	T	S01 S02 T01	
099	K056	2,000	T	S01 S02 T01	
100	K057	2,000	T	S01 S02 T01	
101	K058	2,000	T	S01 S02 T01	
102	K059	2,000	T	S01 S02 T01	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
103	K033	2,000	T	S01 S02 T01	
104	K034	2,000	T	S01 S02 T01	
105	K035	2,000	T	S01 S02 T01	
106	K036	2,000	T	S01 S02 T01	
107	K037	2,000	T	S01 S02 T01	
108	K038	2,000	T	S01 S02 T01	
109	K039	2,000	T	S01 S02 T01	
110	K040	2,000	T	S01 S02 T01	
111	K041	2,000	T	S01 S02 T01	
112	K042	2,000	T	S01 S02 T01	
113	K043	2,000	T	S01 S02 T01	
114	K044	2,000	T	S01 S02 T01	
115	K045	2,000	T	S01 S02 T01	
116	K046	2,000	T	S01 S02 T01	
117	K047	2,000	T	S01 S02 T01	
118	K048	50,000	T	S01 S02 T01	
119	K049	50,000	T	S01 S02 T01	
120	K050	50,000	T	S01 S02 T01	
121	K051	50,000	T	S01 S02 T01	
122	K052	50,000	T	S01 S02 T01	
123	K060	10,000	T	S01 S02 T01	
124	K061	2,000	T	S01 S02 T01	
125	K062	50,000	T	S01 S02 T01	
126	K069	2,000	T	S01 S02 T01	
127	K071	2,000	T	S01 S02 T01	
12S	K073	2,000	T	S01 S02 T01	
129	K083	2,000	T	S01 S02 T01	
130	K084	2,000	T	S01 S02 T01	
131	K085	2,000	T	S01 S02 T01	
132	K086	2,000	T	S01 S02 T01	
133	K087	10,000	T	S01 S02 T01	
134	K088	2,000	T	S01 S02 T01	
13S	K093	2,000	T	S01 S02 T01	
136	K094	2,000	T	S01 S02 T01	
137	K095	2,000	T	S01 S02 T01	
13S	K096	2,000	T	S01 S02 T01	
139	K097	2,000	T	S01 S02 T01	
140	K098	2,000	T	S01 S02 T01	
141	K099	2,000	T	S01 S02 T01	
142	K100	2,000	T	S01 S02 T01	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
143	K101	2,000	T	S01 S02 T01	
144	K102	2,000	T	S01 S02 T01	
145	K103	2,000	T	S01 S02 T01	
146	K104	2,000	T	S01 S02 T01	
147	K105	2,000	T	S01 S02 T01	
148	K106	2,000	T	S01 S02 T01	
149	K107	2,000	T	S01 S02 T01	
150	K108	2,000	T	S01 S02 T01	
151	K109	2,000	T	S01 S02 T01	
152	K110	2,000	T	S01 S02 T01	
153	K111	2,000	T	S01 S02 T01	
154	K112	2,000	T	S01 S02 T01	
155	K113	2,000	T	S01 S02 T01	
156	K114	2,000	T	S01 S02 T01	
157	K115	2,000	T	S01 S02 T01	
158	K116	2,000	T	S01 S02 T01	
159	K117	2,000	T	S01 S02 T01	
160	K118	2,000	T	S01 S02 T01	
161	K123	2,000	T	S01 S02 T01	
162	K124	2,000	T	S01 S02 T01	
163	K125	2,000	T	S01 S02 T01	
164	K126	2,000	T	S01 S02 T01	
165	K131	2,000	T	S01 S02 T01	
166	K132	2,000	T	S01 S02 T01	
167	K136	2,000	T	S01 S02 T01	
168	K141	10,000	T	S01 S02 T01	
169	K142	10,000	T	S01 S02 T01	
170	K143	10,000	T	S01 S02 T01	
171	K144	10,000	T	S01 S02 T01	
172	K145	10,000	T	S01 S02 T01	
173	K147	10,000	T	S01 S02 T01	
174	K148	10,000	T	S01 S02 T01	
175	K149	10,000	T	S01 S02 T01	
176	K150	10,000	T	S01 S02 T01	
177	K151	10,000	T	S01 S02 T01	
178	K156	10,000	T	S01 S02 T01	
179	K157	10,000	T	S01 S02 T01	
180	K158	10,000	T	S01 S02 T01	
181	K159	10,000	T	S01 S02 T01	
182	K161	10,000	T	S01 S02 T01	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
183	K169	10,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
184	K170	10,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
185	K171	10,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
186	K172	10,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
187	K174	10,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
188	K175	10,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
189	K176	10,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
190	K177	10,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
191	K178	10,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
192	K181	10,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
193	P001	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
194	P002	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
195	P003	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
196	P004	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
197	P005	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
198	P006	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
199	P007	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
200	P008	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
201	P009	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
202	P010	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
203	P011	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
204	P012	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
205	P013	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
206	P014	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
207	P015	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
208	P016	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
209	P017	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
210	P018	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
211	P020	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
212	P021	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
213	P022	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
214	P023	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
215	P024	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
216	P026	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
217	P027	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
218	P028	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
219	P029	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
220	P030	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
221	P031	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
222	P033	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
223	P034	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
224	P036	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
225	P037	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
226	P038	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
227	P039	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
228	P040	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
229	P041	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
230	P042	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
231	P043	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
232	P044	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
233	P045	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
234	P046	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
235	P047	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
236	P048	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
237	P049	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
238	P050	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
239	P051	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
240	P054	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
241	P056	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
242	P057	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
243	P058	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
244	P059	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
245	P060	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
246	P062	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
247	P063	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
248	P064	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
249	P065	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
250	P066	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
251	P067	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
252	P068	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
253	P069	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
254	P070	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
255	P071	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
256	P072	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
257	P073	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
258	P074	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
259	P075	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
260	P076	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
261	P077	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
262	P078	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
263	P081	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
264	P082	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
265	P084	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
266	P085	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
267	P087	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
268	P088	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
269	P089	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
270	P092	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
271	P093	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
272	P094	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
273	P095	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
274	P096	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
275	P097	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
276	P098	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
277	P099	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
278	P101	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
279	P102	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
280	P103	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
281	P104	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
282	P105	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
283	P106	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
284	P107	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
285	P108	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
286	P109	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
287	P110	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
288	P111	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
289	P112	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
290	P113	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
291	P114	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
292	P115	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
293	P116	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
294	P117	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
295	P118	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
296	P119	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
297	P120	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
298	P121	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
299	P122	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
300	P123	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
223	P034	2,000	T	S01 S02 T01	
224	P036	2,000	T	S01 S02 T01	
225	P037	2,000	T	S01 S02 T01	
226	P038	2,000	T	S01 S02 T01	
227	P039	2,000	T	S01 S02 T01	
228	P040	2,000	T	S01 S02 T01	
229	P041	2,000	T	S01 S02 T01	
230	P042	2,000	T	S01 S02 T01	
231	P043	2,000	T	S01 S02 T01	
232	P044	2,000	T	S01 S02 T01	
233	P045	2,000	T	S01 S02 T01	
234	P046	2,000	T	S01 S02 T01	
235	P047	2,000	T	S01 S02 T01	
236	P048	2,000	T	S01 S02 T01	
237	P049	2,000	T	S01 S02 T01	
238	P050	2,000	T	S01 S02 T01	
239	P051	2,000	T	S01 S02 T01	
240	P054	2,000	T	S01 S02 T01	
241	P056	2,000	T	S01 S02 T01	
242	P057	2,000	T	S01 S02 T01	
243	P058	2,000	T	S01 S02 T01	
244	P059	2,000	T	S01 S02 T01	
245	P060	2,000	T	S01 S02 T01	
246	P062	2,000	T	S01 S02 T01	
247	P063	2,000	T	S01 S02 T01	
248	P064	2,000	T	S01 S02 T01	
249	P065	2,000	T	S01 S02 T01	
250	P066	2,000	T	S01 S02 T01	
251	P067	2,000	T	S01 S02 T01	
252	P068	2,000	T	S01 S02 T01	
253	P069	2,000	T	S01 S02 T01	
254	P070	2,000	T	S01 S02 T01	
255	P071	2,000	T	S01 S02 T01	
256	P072	2,000	T	S01 S02 T01	
257	P073	2,000	T	S01 S02 T01	
258	P074	2,000	T	S01 S02 T01	
259	P075	2,000	T	S01 S02 T01	
260	P076	2,000	T	S01 S02 T01	
261	P077	2,000	T	S01 S02 T01	
262	P078	2,000	T	S01 S02 T01	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
263	P081	2,000	T	S01 S02 T01	
264	P082	2,000	T	S01 S02 T01	
265	P084	2,000	T	S01 S02 T01	
266	P085	2,000	T	S01 S02 T01	
267	P087	2,000	T	S01 S02 T01	
268	P088	2,000	T	S01 S02 T01	
269	P089	2,000	T	S01 S02 T01	
270	P092	2,000	T	S01 S02 T01	
271	P093	2,000	T	S01 S02 T01	
272	P094	2,000	T	S01 S02 T01	
273	P095	2,000	T	S01 S02 T01	
274	P096	2,000	T	S01 S02 T01	
275	P097	2,000	T	S01 S02 T01	
276	P098	2,000	T	S01 S02 T01	
277	P099	2,000	T	S01 S02 T01	
278	P101	2,000	T	S01 S02 T01	
279	P102	2,000	T	S01 S02 T01	
280	P103	2,000	T	S01 S02 T01	
281	P104	2,000	T	S01 S02 T01	
282	P105	2,000	T	S01 S02 T01	
283	P106	2,000	T	S01 S02 T01	
284	P108	2,000	T	S01 S02 T01	
285	P109	2,000	T	S01 S02 T01	
286	P110	2,000	T	S01 S02 T01	
287	P111	2,000	T	S01 S02 T01	
288	P112	2,000	T	S01 S02 T01	
289	P113	2,000	T	S01 S02 T01	
290	P114	2,000	T	S01 S02 T01	
291	P115	2,000	T	S01 S02 T01	
292	P116	2,000	T	S01 S02 T01	
293					
294	P118	2,000	T	S01 S02 T01	
295	P119	2,000	T	S01 S02 T01	
296	P120	2,000	T	S01 S02 T01	
297	P121	2,000	T	S01 S02 T01	
298	P122	2,000	T	S01 S02 T01	
299	P123	2,000	T	S01 S02 T01	
300	P127	2,000	T	S01 S02 T01	
301	P128	2,000	T	S01 S02 T01	
302	P185	2,000	T	S01 S02 T01	
303	P188	2,000	T	S01 S02 T01	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
304	P189	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
305	P190	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
306	P191	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
307	P192	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
308	P194	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
309	P196	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
310	P197	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
311	P198	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
312	P199	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
313	P201	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
314	P202	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
315	P203	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
316	P204	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
317	P205	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
318	U000	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
319	U001	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
320	U002	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
321	U003	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
322	U004	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
323	U005	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
324	U006	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
325	U007	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
326	U008	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
327	U009	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
328	U010	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
329	U011	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
330	U012	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
331	U014	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
332	U015	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
333	U016	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
334	U017	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
335	U018	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
336	U019	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
337	U020	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
338	U021	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
339	U022	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
340	U023	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
341	U024	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
342	U025	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
343	U026	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
344	U027	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
345	U028	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
346	U029	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
347	U030	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
348	U031	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
349	U032	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
350	U033	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
351	U034	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
352	U035	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
353	U036	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
354	U037	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
355	U038	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
356	U039	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
357	U041	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
358	U042	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
359	U043	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
360	U044	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
361	U045	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
362	U046	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
363	U047	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
364	U048	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
345	U029	2,000	T	S01 S02 ~~T01~~	
346	U030	2,000	T	S01 S02 ~~T01~~	
347	U031	2,000	T	S01 S02 ~~T01~~	
348	U032	2,000	T	S01 S02 ~~T01~~	
349	U033	2,000	T	S01 S02 ~~T01~~	
350	U034	2,000	T	S01 S02 ~~T01~~	
351	U035	2,000	T	S01 S02 ~~T01~~	
352	U036	2,000	T	S01 S02 ~~T01~~	
353	U037	2,000	T	S01 S02 ~~T01~~	
354	U038	2,000	T	S01 S02 ~~T01~~	
355	U039	2,000	T	S01 S02 ~~T01~~	
356	U041	2,000	T	S01 S02 ~~T01~~	
357	U042	2,000	T	S01 S02 ~~T01~~	
358	U043	2,000	T	S01 S02 ~~T01~~	
359	U044	2,000	T	S01 S02 ~~T01~~	
360	U045	2,000	T	S01 S02 ~~T01~~	
361	U046	2,000	T	S01 S02 ~~T01~~	
362	U047	2,000	T	S01 S02 ~~T01~~	
363	U048	2,000	T	S01 S02 ~~T01~~	
364	U049	2,000	T	S01 S02 ~~T01~~	
365	U050	2,000	T	S01 S02 ~~T01~~	
366	U051	2,000	T	S01 S02 ~~T01~~	
367	U052	2,000	T	S01 S02 ~~T01~~	
368	U053	2,000	T	S01 S02 ~~T01~~	
369	U055	2,000	T	S01 S02 ~~T01~~	
370	U056	2,000	T	S01 S02 ~~T01~~	
371	U057	2,000	T	S01 S02 ~~T01~~	
372	U058	2,000	T	S01 S02 ~~T01~~	
373	U059	2,000	T	S01 S02 ~~T01~~	
374	U060	2,000	T	S01 S02 ~~T01~~	
375	U061	2,000	T	S01 S02 ~~T01~~	
376	U062	2,000	T	S01 S02 ~~T01~~	
377	U063	2,000	T	S01 S02 ~~T01~~	
378	U064	2,000	T	S01 S02 ~~T01~~	
379	U066	2,000	T	S01 S02 ~~T01~~	
380	U067	2,000	T	S01 S02 ~~T01~~	
381	U068	2,000	T	S01 S02 ~~T01~~	
382	U069	2,000	T	S01 S02 ~~T01~~	
383	U070	2,000	T	S01 S02 ~~T01~~	
384	U071	2,000	T	S01 S02 ~~T01~~	
385	U072	2,000	T	S01 S02 ~~T01~~	
386	U073	2,000	T	S01 S02 ~~T01~~	
387	U074	2,000	T	S01 S02 ~~T01~~	
388	U075	2,000	T	S01 S02 ~~T01~~	
389	U076	2,000	T	S01 S02 ~~T01~~	
390	U077	2,000	T	S01 S02 ~~T01~~	
391	U078	2,000	T	S01 S02 ~~T01~~	
392	U079	2,000	T	S01 S02 ~~T01~~	
393	U080	2,000	T	S01 S02 ~~T01~~	
394	U081	2,000	T	S01 S02 ~~T01~~	
395	U082	2,000	T	S01 S02 ~~T01~~	
396	U083	2,000	T	S01 S02 ~~T01~~	
397	U084	2,000	T	S01 S02 ~~T01~~	
398	U085	2,000	T	S01 S02 ~~T01~~	
399	U086	2,000	T	S01 S02 ~~T01~~	
3100	U087	2,000	T	S01 S02 ~~T01~~	
3101	U088	2,000	T	S01 S02 ~~T01~~	
3102	U089	2,000	T	S01 S02 ~~T01~~	
3103	U090	2,000	T	S01 S02 ~~T01~~	
3104	U091	2,000	T	S01 S02 ~~T01~~	
3105	U092	2,000	T	S01 S02 ~~T01~~	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
3 8 6	U 0 7 3	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
3 8 7	U 0 7 4	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
3 8 8	U 0 7 5	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
3 8 9	U 0 7 6	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
3 9 0	U 0 7 7	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
3 9 1	U 0 7 8	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
3 9 2	U 0 7 9	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
3 9 3	U 0 8 0	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
3 9 4	U 0 8 1	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
3 9 5	U 0 8 2	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
3 9 6	U 0 8 3	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
3 9 7	U 0 8 4	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
3 9 8	U 0 8 5	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
3 9 9	U 0 8 6	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 0 0	U 0 8 7	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 0 1	U 0 8 8	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 0 2	U 0 8 9	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 0 3	U 0 9 0	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 0 4	U 0 9 1	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 0 5	U 0 9 2	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 0 6	U 0 9 3	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 0 7	U 0 9 4	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 0 8	U 0 9 5	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 0 9	U 0 9 6	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 1 0	U 0 9 7	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 1 1	U 0 9 8	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 1 2	U 0 9 9	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 1 3	U 1 0 1	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 1 4	U 1 0 2	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 1 5	U 1 0 3	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 1 6	U 1 0 5	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 1 7	U 1 0 6	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 1 8	U 1 0 7	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 1 9	U 1 0 8	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 2 0	U 1 0 9	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 2 1	U 1 1 0	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 2 2	U 1 1 1	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 2 3	U 1 1 2	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 2 4	U 1 1 3	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 2 5	U 1 1 4	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
4 2 6	U 1 1 5	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
427	U116	2,000	T	S01 S02 T0 1	
428	U117	2,000	T	S01 S02 T0 1	
429	U118	2,000	T	S01 S02 T0 1	
430	U119	2,000	T	S01 S02 T0 1	
431	U120	2,000	T	S01 S02 T0 1	
432	U121	2,000	T	S01 S02 T0 1	
433	U122	2,000	T	S01 S02 T0 1	
434	U123	2,000	T	S01 S02 T0 1	
435	U124	2,000	T	S01 S02 T0 1	
436	U125	2,000	T	S01 S02 T0 1	
437	U126	2,000	T	S01 S02 T0 1	
438	U127	2,000	T	S01 S02 T0 1	
439	U128	2,000	T	S01 S02 T0 1	
440	U129	2,000	T	S01 S02 T0 1	
441	U130	2,000	T	S01 S02 T0 1	
442	U131	2,000	T	S01 S02 T0 1	
443	U132	2,000	T	S01 S02 T0 1	
444	U133	2,000	T	S01 S02 T0 1	
445	U134	2,000	T	S01 S02 T0 1	
446	U135	2,000	T	S01 S02 T0 1	
447	U136	2,000	T	S01 S02 T0 1	
448	U137	2,000	T	S01 S02 T0 1	
449	U138	2,000	T	S01 S02 T0 1	
450	U139	2,000	T	S01 S02 T0 1	
451	U140	2,000	T	S01 S02 T0 1	
452	U141	2,000	T	S01 S02 T0 1	
453	U142	2,000	T	S01 S02 T0 1	
454	U143	2,000	T	S01 S02 T0 1	
455	U144	2,000	T	S01 S02 T0 1	
456	U145	2,000	T	S01 S02 T0 1	
457	U146	2,000	T	S01 S02 T0 1	
458	U147	2,000	T	S01 S02 T0 1	
459	U148	2,000	T	S01 S02 T0 1	
460	U149	2,000	T	S01 S02 T0 1	
461	U150	2,000	T	S01 S02 T0 1	
462	U151	2,000	T	S01 S02 T0 1	
463	U152	2,000	T	S01 S02 T0 1	
464	U153	2,000	T	S01 S02 T0 1	
465	U154	2,000	T	S01 S02 T0 1	
466	U155	2,000	T	S01 S02 T0 1	
467	U156	2,000	T	S01 S02 T0 1	
468	U157	2,000	T	S01 S02 T0 1	
469	U158	2,000	T	S01 S02 T0 1	
470	U159	2,000	T	S01 S02 T0 1	
471	U160	2,000	T	S01 S02 T0 1	
472	U161	2,000	T	S01 S02 T0 1	
473	U162	2,000	T	S01 S02 T0 1	
474	U163	2,000	T	S01 S02 T0 1	
475	U164	2,000	T	S01 S02 T0 1	
476	U165	2,000	T	S01 S02 T0 1	
477	U166	2,000	T	S01 S02 T0 1	
478	U167	2,000	T	S01 S02 T0 1	
479	U168	2,000	T	S01 S02 T0 1	
480	U169	2,000	T	S01 S02 T0 1	
481	U170	2,000	T	S01 S02 T0 1	
482	U171	2,000	T	S01 S02 T0 1	
483	U172	2,000	T	S01 S02 T0 1	
484	U173	2,000	T	S01 S02 T0 1	
485	U174	2,000	T	S01 S02 T0 1	
486	U175	2,000	T	S01 S02 T0 1	
487	U176	2,000	T	S01 S02 T0 1	
488	U177	2,000	T	S01 S02 T0 1	
489	U178	2,000	T	S01 S02 T0 1	
490	U179	2,000	T	S01 S02 T0 1	
491	U180	2,000	T	S01 S02 T0 1	
492	U181	2,000	T	S01 S02 T0 1	
493	U182	2,000	T	S01 S02 T0 1	
494	U183	2,000	T	S01 S02 T0 1	
495	U184	2,000	T	S01 S02 T0 1	
496	U185	2,000	T	S01 S02 T0 1	
497	U186	2,000	T	S01 S02 T0 1	
498	U187	2,000	T	S01 S02 T0 1	
499	U188	2,000	T	S01 S02 T0 1	
4100	U189	2,000	T	S01 S02 T0 1	
4101	U190	2,000	T	S01 S02 T0 1	
4102

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
468	U158	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
469	U159	20,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
470	U160	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
471	U161	20,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
472	U162	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
473	U163	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
474	U164	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
475	U165	20,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
476	U166	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
477	U167	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
478	U168	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
479	U169	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
480	U170	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
481	U171	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
482	U172	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
483	U173	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
484	U174	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
485	U176	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
486	U177	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
487	U178	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
488	U179	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
489	U180	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
490	U181	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
491	U182	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
492	U183	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
493	U184	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
494	U185	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
495	U186	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
496	U187	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
497	U188	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
498	U189	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
499	U190	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
500	U191	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
501	U192	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
502	U193	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
503	U194	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
504	U196	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
505	U197	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
506	U200	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
507	U201	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
508					

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
509	U203	2,000	T	S01 S02 T01	
510	U204	2,000	T	S01 S02 T01	
511	U205	2,000	T	S01 S02 T01	
512	U206	2,000	T	S01 S02 T01	
513	U207	2,000	T	S01 S02 T01	
514	U208	2,000	T	S01 S02 T01	
515	U209	2,000	T	S01 S02 T01	
516	U210	20,000	T	S01 S02 T01	
517	U211	2,000	T	S01 S02 T01	
518	U213	2,000	T	S01 S02 T01	
519	U214	2,000	T	S01 S02 T01	
520	U215	2,000	T	S01 S02 T01	
521	U216	2,000	T	S01 S02 T01	
522	U217	2,000	T	S01 S02 T01	
523	U218	2,000	T	S01 S02 T01	
524	U219	2,000	T	S01 S02 T01	
525	U220	20,000	T	S01 S02 T01	
526	U221	2,000	T	S01 S02 T01	
527	U222	2,000	T	S01 S02 T01	
528	U223	2,000	T	S01 S02 T01	
529	U225	2,000	T	S01 S02 T01	
530	U226	2,000	T	S01 S02 T01	
531	U227	20,000	T	S01 S02 T01	
532	U228	20,000	T	S01 S02 T01	
533	U234	2,000	T	S01 S02 T01	
534	U235	2,000	T	S01 S02 T01	
535	U236	2,000	T	S01 S02 T01	
536	U237	2,000	T	S01 S02 T01	
537	U238	2,000	T	S01 S02 T01	
538	U239	20,000	T	S01 S02 T01	
539	U240	20,000	T	S01 S02 T01	
540	U243	2,000	T	S01 S02 T01	
541	U244	2,000	T	S01 S02 T01	
542	U246	2,000	T	S01 S02 T01	
543	U247	2,000	T	S01 S02 T01	
544	U248	2,000	T	S01 S02 T01	
545	U249	20,000	T	S01 S02 T01	
546	U271	2,000	T	S01 S02 T01	
547	U278	2,000	T	S01 S02 T01	
548	U279	2,000	T	S01 S02 T01	
549	U280	20,000	T	S01 S02 T01	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
5 5 0	U 3 2 8	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 1	U 3 5 3	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 2	U 3 5 9	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 3	U 3 6 4	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 4	U 3 6 7	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 5	U 3 7 2	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 6	U 3 7 3	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 7	U 3 8 7	20,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 8	U 3 8 9	20,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 9	U 3 9 4	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 6 0	U 3 9 5	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 6 1	U 4 0 4	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 6 2	U 4 0 9	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 6 3	U 4 1 0	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 6 4	U 4 1 1	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	

8. Map

Attach to this application a topographical map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all spring, rivers, and other surface water bodies in this map area. See instructions for precise requirements.

See Appendix A-1 for area and site topographic maps.

9. Facility Drawing

All existing facilities must include a scale drawing of the facility. See instructions for more detail.

See Appendix A-2 for the facility drawings.

10. Photographs

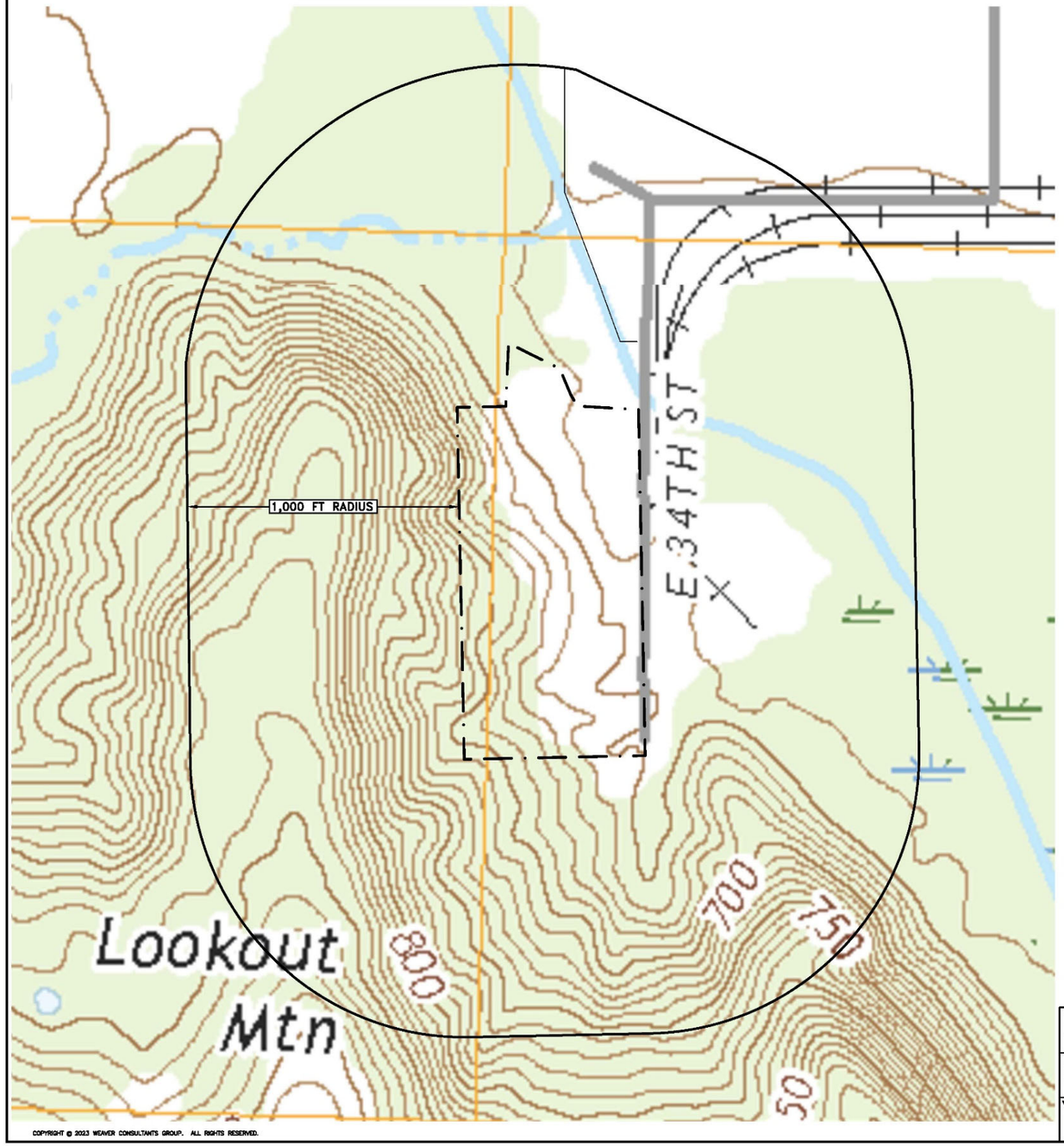
All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment, and disposal areas; and sites of future storage, treatment, or disposal areas. See instructions for more detail.

See Appendix A-3 for site photographs.

11. Comments

Appendix A-1 (Section 8)

Topographic Maps



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N

0 200 400
SCALE IN FEET

LEGEND

PROPERTY BOUNDARY

ROAD CLASSIFICATION

Expressway	Local Connector
Secondary Hwy	Local Road
Ramp	4WD

Interstate Route US Route State Route

SAND SPRINGS, OK
2022

SAPULPA NORTH, OK
2022

SOURCE: US GEOLOGICAL SOCIETY (USGS), TOPOBUILDER V.1.5.6. AUGUST 7, 2024.

Figure from November 2024 Operations Permit

- [ ] DRAFT
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION

DATE: 08/2024
FILE: 0120-045-11-00
CAD: 3A-USGS MAP.DWG

DRAWN BY: JDW
DESIGN BY: JAE
REVIEWED BY: JAE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
US ECOLOGY TULSA, INC.

REVISIONS

NO.	DATE	DESCRIPTION

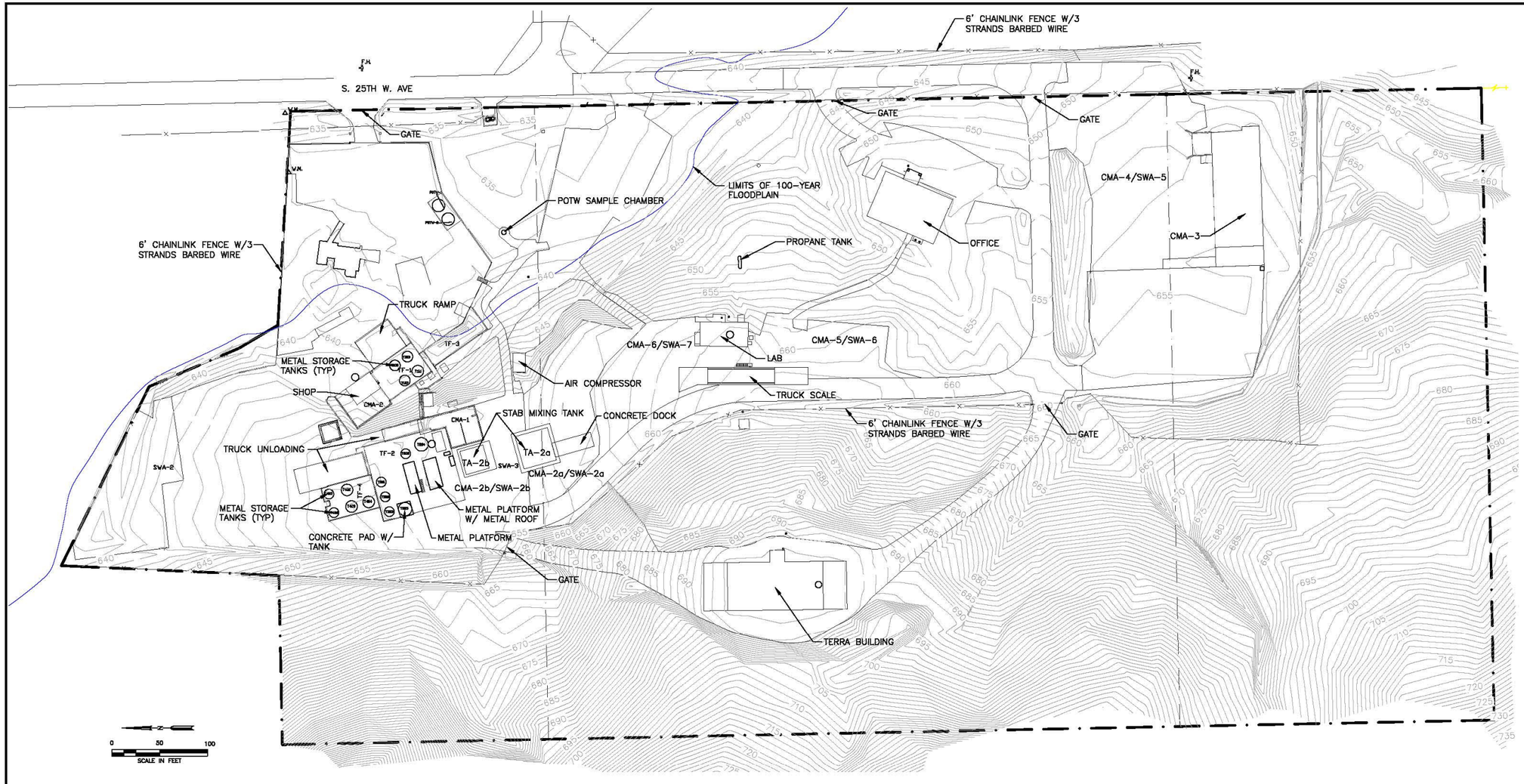
TOPOGRAPHIC MAP–1,000' RADIUS
PART B PERMIT APPLICATION
ATTACHMENT 1–MAPS AND FIGURES

US ECOLOGY TRANSFER STATION
TULSA, OKLAHOMA

WWW.WCGRP.COM

FIGURE B-2

G:\0120\45\PERMIT DRAWINGS\3A-USGS MAP.dwg, jwilson, 1:2



SWMU Number

S-1 (CMA-1T)
S-3 (WDW-1)
S-4 (Historic SI/NPA-1)
S-6 (TF-0)
S-8 (Laboratory Tank)
S-9 (TF-1)
S-10 (CMA-2)

LEGEND

PROPERTY BOUNDARY

Figure from November 2024 Operations Permit

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- [ ] DRAFT
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION

DATE: 10/2023
FILE: 0120-045-11-00
CAD: G-3 EMERGENCY.DWG
DRAWN BY: JDW
DESIGN BY: JAE
REVIEWED BY: JAE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
US ECOLOGY TULSA, INC.

REVISIONS		
NO.	DATE	DESCRIPTION

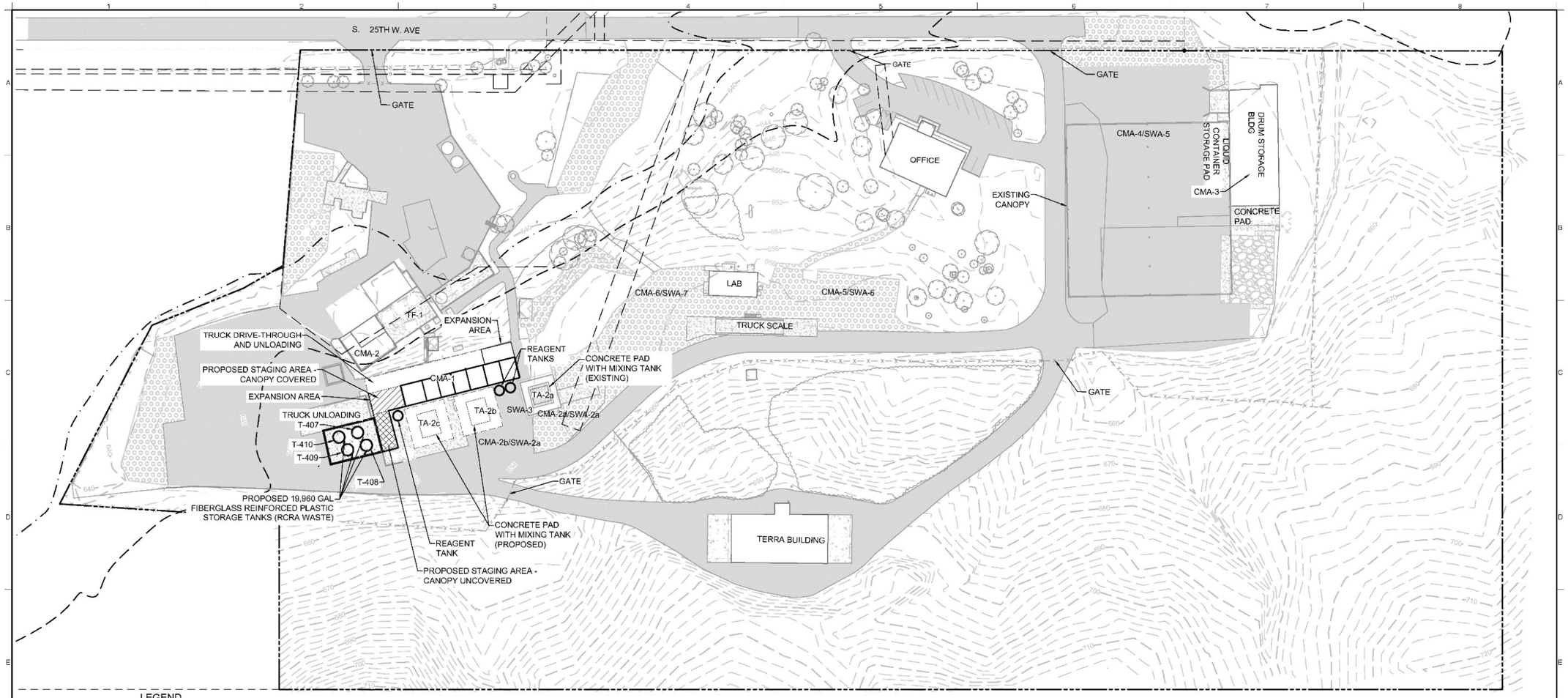
TOPOGRAPHIC SITE MAP
PART B PERMIT APPLICATION
ATTACHMENT 1-MAPS AND FIGURES

US ECOLOGY TRANSFER STATION
TULSA, OKLAHOMA

WWW.WCGRP.COM

FIGURE B-2a

O:\0120\45\PERMIT DRAWINGS\B-2_Topo Map.dwg, jwilson, 1:2



LEGEND

- EXISTING GROUND MAJOR CONTOUR (10') (NOTE 1)
- EXISTING GROUND MINOR CONTOUR (2') (NOTE 1)
- EXISTING SITE ACCESS ROAD
- EXISTING FENCE
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING BUILDING / TANK
- VEGETATION / TREE
- 100 YEAR FLOODPLAIN
- 500 YEAR FLOODPLAIN
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- PROPOSED FACILITY
- PROPOSED CANOPY COVER
- PROPOSED STAGING AREA - COVERED
- PROPOSED STAGING AREA - UNCOVERED
- PROPOSED GRADING MAJOR CONTOURS (10')
- PROPOSED GRADING MINOR CONTOURS (2')
- PROPOSED GRADING LIMIT

N

0 50 100
SCALE IN FEET

NOTES:

1. EXISTING SITE PLAN FEATURES PROVIDED BY US ECOLOGY AND COMPILED FROM PERMIT DRAWINGS PREPARED IN 2023 BY WEAVER CONSULTANTS GROUP.
2. ELEVATION DATA AND CONTOURS TAKEN FROM "TOPOGRAPHIC SITE MAP" PART B PERMIT DRAWING B-2 PREPARED IN 2023 BY WEAVER CONSULTANTS GROUP.

FOR PERMIT PURPOSES ONLY

REV	DATE	DESCRIPTION	DRN	APP

Geosyntec consultants
OKLAHOMA CERTIFICATE OF AUTHORIZATION NO. 1999 EXP. 06/30/2026
10777 WESTHEIMER RD, SUITE 900
HOUSTON, TEXAS 77042 USA
TELEPHONE: 281.920.4661

US ECOLOGY TULSA, INC.
2700 S 25TH W. AVENUE
TULSA, OKLAHOMA 74104 USA

TITLE: TOPOGRAPHIC SITE MAP (PROPOSED SITE PLAN)

PROJECT: PERMIT MODIFICATION APPLICATION

SITE: US ECOLOGY TULSA, INC. TULSA, OKLAHOMA

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

SIGNATURE

DATE

LICENSED PROFESSIONAL ENGINEER — JEREMY L. YEGLIN — 28976 — OKLAHOMA

DESIGN BY:	LMS	DATE: JANUARY 2025	
DRAWN BY:	JJV,AM	PROJECT NO.:	TXR10979
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REVIEWED BY:	JY	FIGURE NO.:	B-2b
APPROVED BY:	JY		

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Figure from November 2024 Operations Permit

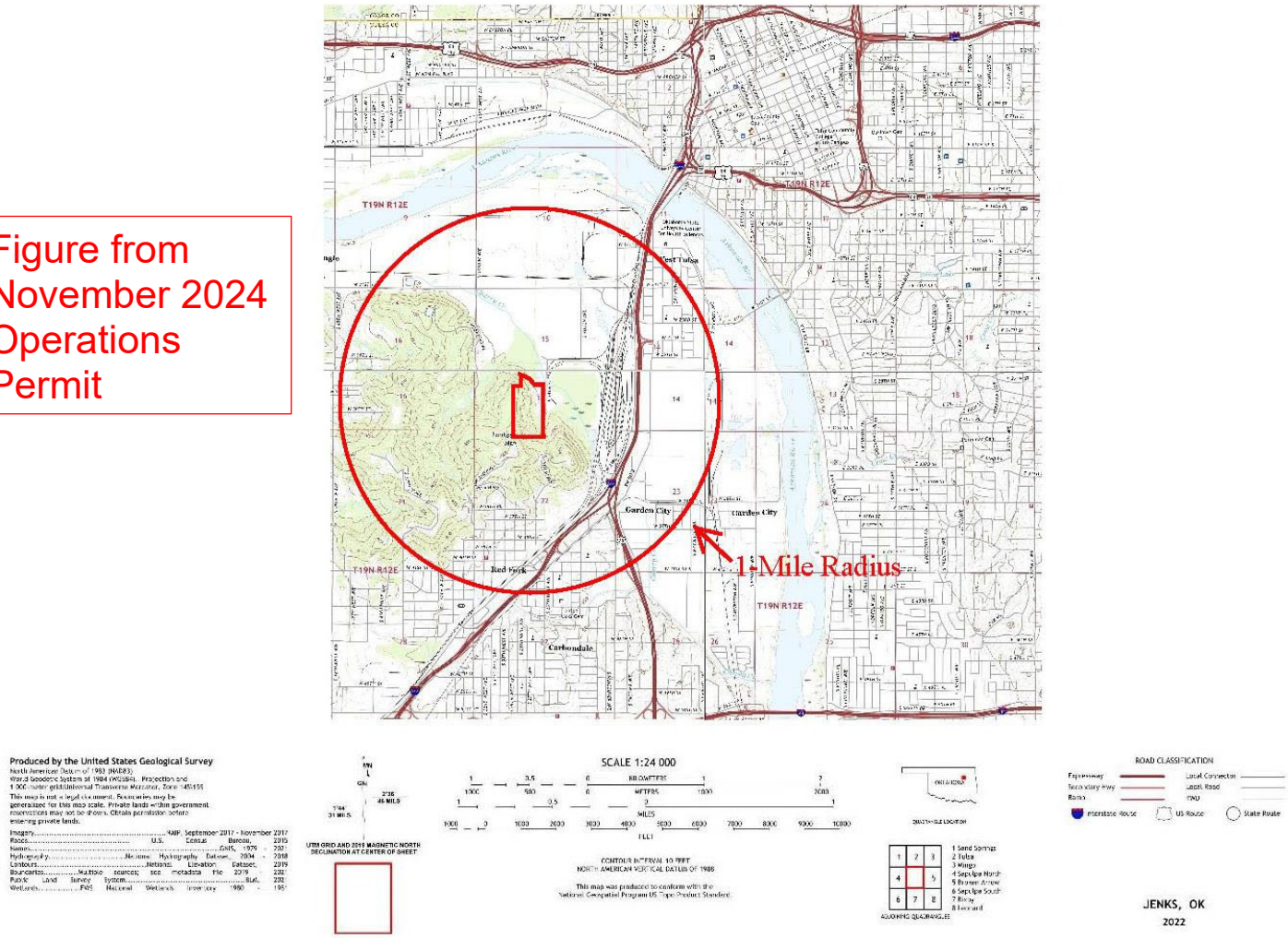
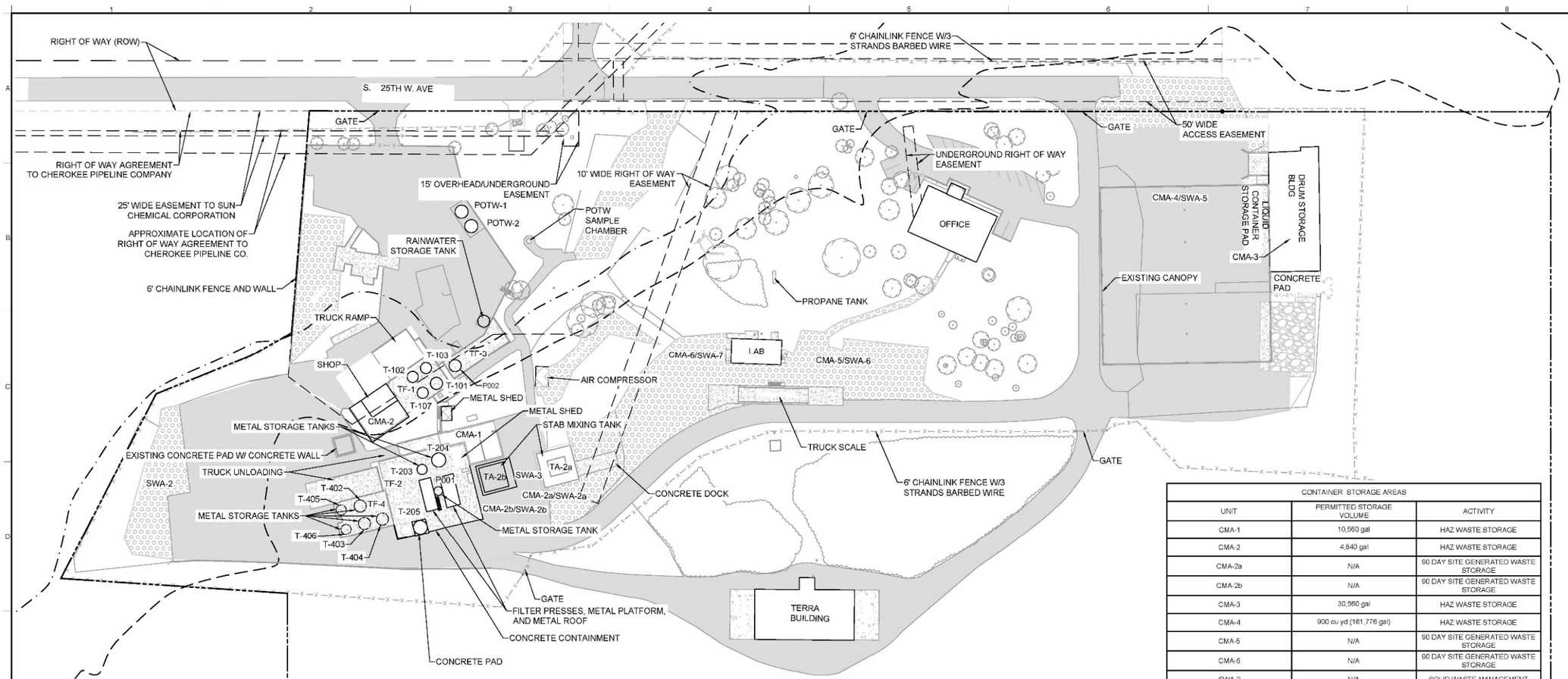


Fig. – USGS Topographic Map Showing 1-Mile Radius From Facility
(Based on portions of Sand Springs, Sapulpa, Tulsa, and Jenks Topo Maps)

Appendix A-2 (Section 9)

Facility Drawings



CONTAINER STORAGE AREAS		
UNIT	PERMITTED STORAGE VOLUME	ACTIVITY
CMA-1	10,560 gal	HAZ WASTE STORAGE
CMA-2	4,840 gal	HAZ WASTE STORAGE
CMA-2a	N/A	90 DAY SITE GENERATED WASTE STORAGE
CMA-2b	N/A	90 DAY SITE GENERATED WASTE STORAGE
CMA-3	30,560 gal	HAZ WASTE STORAGE
CMA-4	900 cu yd (181,776 gal)	HAZ WASTE STORAGE
CMA-5	N/A	90 DAY SITE GENERATED WASTE STORAGE
CMA-6	N/A	90 DAY SITE GENERATED WASTE STORAGE
SWA-2	N/A	SOLID WASTE MANAGEMENT
SWA-3	N/A	SOLID WASTE MANAGEMENT
SWA-5	N/A	SOLID WASTE MANAGEMENT
SWA-6	N/A	SOLID WASTE MANAGEMENT
SWA-7	N/A	SOLID WASTE MANAGEMENT

LEGEND

- EXISTING SITE ACCESS ROAD
- EXISTING FENCE
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING BUILDING / TANK
- VEGETATION / TREE
- 100 YEAR FLOODPLAIN
- 500 YEAR FLOODPLAIN
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL

N

0 50 100
SCALE IN FEET

NOTES:

1. EXISTING SITE PLAN FEATURES PROVIDED BY US ECOLOGY AND COMPILED FROM PERMIT DRAWINGS PREPARED IN 2023 BY WEAVER CONSULTANTS GROUP.

TANK SCHEDULE HAZARDOUS WASTE TREATMENT		
UNIT	VOLUME	CONTENTS
T-101	16,800 gal	HAZARDOUS WASTE LIQUID
T-102	19,960 gal	HAZARDOUS WASTE LIQUID
T-103	19,960 gal	HAZARDOUS WASTE LIQUID
T-107	13,077 gal	HAZARDOUS WASTE LIQUID
TA-2a	25,851 gal	HAZARDOUS WASTE LIQUID
TA-2b	21,991 gal	HAZARDOUS WASTE LIQUID

CLEAN WATER ACT TREATMENT TANKS		
UNIT I	VOLUME I	CONTENTS
POTW-1	20,000 gal	OUT OF SERVICE
POTW-2	20,000 gal	OUT OF SERVICE

PRODUCT TANK TANK SCHEDULE		
UNIT I	VOLUME I	CONTENTS
T-405	5,000 gal	DIESEL VOLUME

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Geosyntec consultants
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US ecology
US ECOLOGY TULSA, INC.
2700 S 25TH W. AVENUE
TULSA, OKLAHOMA 74104 USA

TITLE: GENERAL FACILITY LAYOUT (EXISTING CONDITIONS)

PROJECT: PERMIT MODIFICATION APPLICATION

SITE: US ECOLOGY TULSA, INC.
TULSA, OKLAHOMA

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REVIEWED BY:	JY	FIGURE NO.:	A-2
APPROVED BY:	JY		

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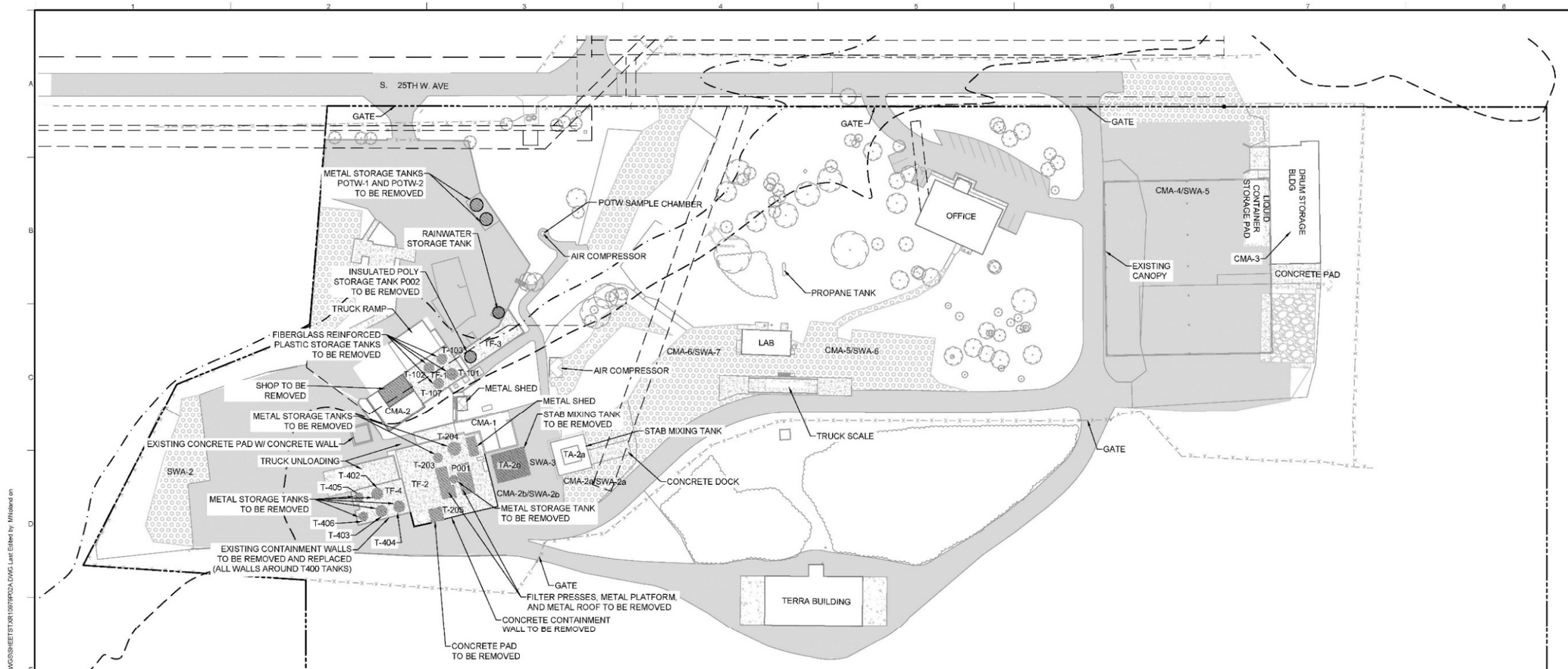

LEGEND

- EXISTING SITE ACCESS ROAD
- EXISTING FENCE
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING BUILDING / TANK
- VEGETATION / TREE
- 100 YEAR FLOODPLAIN
- 500 YEAR FLOODPLAIN
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- FACILITY TO BE REMOVED

N

0 50 100

SCALE IN FEET

NOTES:

1. EXISTING SITE PLAN FEATURES PROVIDED BY US ECOLOGY AND COMPILED FROM PERMIT DRAWINGS PREPARED IN 2023 BY WEAVER CONSULTANTS GROUP.

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2709 S 25TH W. AVENUE
TULSA, OKLAHOMA 74104 USA

TITLE: GENERAL FACILITY LAYOUT (DEMOLITION PLAN)

PROJECT: PERMIT MODIFICATION APPLICATION

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TULSA, OKLAHOMA

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APPROVED BY:	JY		

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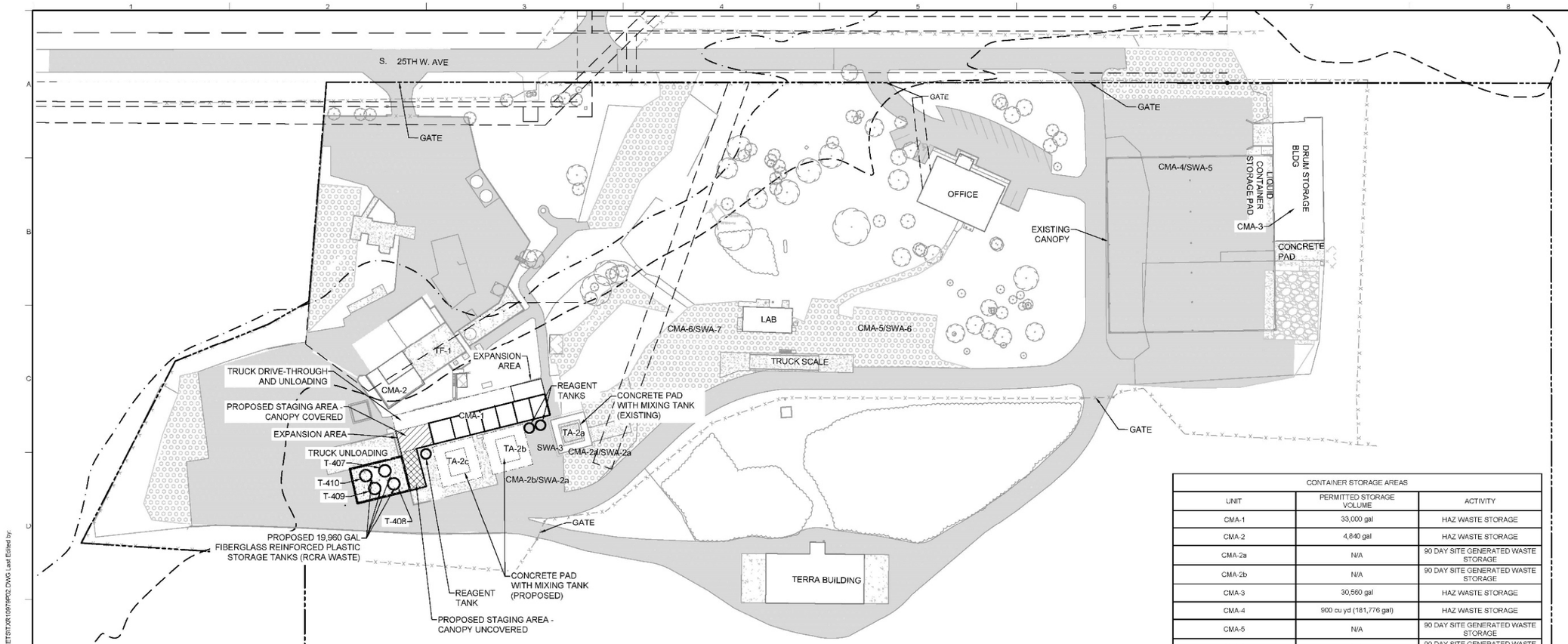

CONTAINER STORAGE AREAS		
UNIT	PERMITTED STORAGE VOLUME	ACTIVITY
CMA-1	33,000 gal	HAZ WASTE STORAGE
CMA-2	4,840 gal	HAZ WASTE STORAGE
CMA-2a	N/A	90 DAY SITE GENERATED WASTE STORAGE
CMA-2b	N/A	90 DAY SITE GENERATED WASTE STORAGE
CMA-3	30,560 gal	HAZ WASTE STORAGE
CMA-4	900 cu yd (181,776 gal)	HAZ WASTE STORAGE
CMA-5	N/A	90 DAY SITE GENERATED WASTE STORAGE
CMA-6	N/A	90 DAY SITE GENERATED WASTE STORAGE
SWA-2	N/A	SOLID WASTE MANAGEMENT
SWA-3	N/A	SOLID WASTE MANAGEMENT
SWA-5	N/A	SOLID WASTE MANAGEMENT
SWA-6	N/A	SOLID WASTE MANAGEMENT
SWA-7	N/A	SOLID WASTE MANAGEMENT

LEGEND

- EXISTING SITE ACCESS ROAD
- EXISTING FENCE
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING BUILDING / TANK
- VEGETATION / TREE
- 100 YEAR FLOODPLAIN
- 500 YEAR FLOODPLAIN
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- PROPOSED FACILITY
- PROPOSED CANOPY COVER
- PROPOSED STAGING AREA - COVERED
- PROPOSED STAGING AREA - UNCOVERED
- 310 PROPOSED GRADING MAJOR CONTOURS (10')
- 312 PROPOSED GRADING MINOR CONTOURS (2')
- PROPOSED GRADING LIMIT

N

0 50 100
SCALE IN FEET

NOTES:

1. EXISTING SITE PLAN FEATURES PROVIDED BY US ECOLOGY AND COMPILED FROM PERMIT DRAWINGS PREPARED IN 2023 BY WEAVER CONSULTANTS GROUP.

TANK SCHEDULE HAZARDOUS WASTE STORAGE		
UNIT	VOLUME	CONTENTS
T-407	19,960 gal	HAZARDOUS WASTE LIQUID
T-408	19,960 gal	HAZARDOUS WASTE LIQUID
T-409	19,960 gal	HAZARDOUS WASTE LIQUID
T-410	19,960 gal	HAZARDOUS WASTE LIQUID

TANK SCHEDULE HAZARDOUS WASTE TREATMENT		
UNIT	VOLUME	CONTENTS
TA-2a	12,000 gal	HAZARDOUS WASTE LIQUID
TA-2b	82,000 gal	HAZARDOUS WASTE LIQUID
TA-2c	82,000 gal	HAZARDOUS WASTE LIQUID

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2700 S 25TH W. AVENUE
TULSA, OKLAHOMA 74104 USA

TITLE: GENERAL FACILITY LAYOUT (PROPOSED SITE PLAN)

PROJECT: PERMIT MODIFICATION APPLICATION

SITE: US ECOLOGY TULSA, INC. TULSA, OKLAHOMA

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LICENSED PROFESSIONAL ENGINEER JEREMY L. YEGLIN 28976 OKLAHOMA

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CHECKED BY:	BG	FILE: TXR10979P02.dwg	
REVIEWED BY:	JY	FIGURE NO.: A-2b	
APPROVED BY:	JY		

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Appendix A-3 (Section 10)

Photographs

US Ecology Tulsa, Inc.

EPA ID: OKD00D402396

US Ecology Tulsa, Inc. Photos for Part A Application Section 10

Access controlled main gate to facility

Additional photos of access controlled main gate

Main Office entrance

Unloading dock for Container Management Area 3 (CMA-3)

North lot outside CMA-3 (storage of nonhazardous and solid hazardous waste)

Indoor trailer unloading area
outside CMA-3

Container Management Area 3 (CMA-3)

Additional photo of Container Management Area 3 (CMA-3)

Storage Area in CMA-3 with concrete berm

Drum storage yard with canopy cover

Holding area for treated waste
awaiting lab results south of laboratory

Main entrance to laboratory and laboratory supply storage

Stabilization treatment tank TA-2a

Stabilization treatment tank TA-2b

South side of Container Management Area 1

Container Management Area 1 (CMA-1)

Loading dock for CMA-1 Area

SWA-2 at north end of facility with empty roll-offs and roll-offs with solid waste.

Container management Area 2 and Tank Farm 1 unloading area (empty containers storage as well)

Container Management Area 2.

Tank Farm 1 (Containment area for T-101, T-102, T-103, and T-107)

West side of Tank Farm 1

100- year flood zone area of facility (no waste activities occur in this area. Only empty container storage)

Expansion Area south of CMA-1

Expansion Area south of CMA-1. TA-2a and TA-2b (to be removed and reconstructed)

Inside of the proposed TF-4 containment area

Looking south at the proposed TF-4 containment area

Expansion Area north of CMA-1

SECTION T ~~(Rev.)~~

RCRA Part B Permit Application

INFORMATION REQUIREMENTS FOR TANK SYSTEMS

40 CFR 270.16

US Ecology Tulsa

Tulsa, Oklahoma

Permit Modification Application ~~June~~September **2025**

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SECTION T - Information Requirements for Tank Systems

This section will provide the information required for hazardous waste storage and treatment in tank systems at US Ecology Tulsa (USE Tulsa) per 40 CFR 270.16 and 40 CFR 264 requirements. USE Tulsa utilizes tank systems in the area designated as Tank Farm 1 (TF-1), which includes tanks T-101, T-102, T-103, and T-107 for waste storage and treatment. Proposed modifications to the site include the demolition/removal of Tank Farm 1, the demolition/removal of the tanks in Tank Farm 4 (currently used for non-hazardous waste), the improvement of the Tank Farm 4 containment, and the construction of four (4) new tanks in the Tank Farm 4 location. USE Tulsa also uses stabilization tanks in the TA-2a and TA-2b area for hazardous waste treatment. The proposed changes to the site include the removal and reconstruction of TA-2b to increase the capacity of TA-2b and the addition of TA-2c. A map of the location of current Tank Farm 1, proposed Tank Farm 4, current TA-2a and 2b treatment tanks, and proposed TA-2a, TA-2b, and TA-2c treatment tanks is provided in Figures 1, 1a, and 1b presented in Attachment 1 - Maps and Figures. Additional details concerning tank system processes are provided in Attachment 10 - Process Description.

1) WRITTEN ASSESSMENT BY INDEPENDENT P.E. CERTIFYING STRUCTURAL INTEGRITY AND SUITABILITY FOR HANDLING OF HAZARDOUS WASTES OF EACH TANK SYSTEM AS REQUIRED UNDER 40 CFR 264.191 & 192: 40 CFR 207.16(a)

A copy of the Professional Engineer (P.E.) written assessment for equipment within Tank Farm 1 is provided in Appendix 1 of this attachment, and a copy of the PE assessment for existing treatment tanks TA-2a and TA-2b is provided in Appendix 5. For the proposed tanks, aA P.E. written assessment for modified Tank Farm 4 (with its improved containment system and four [4] new hazardous waste tanks) and the proposed treatment tanks (TA-2b and TA-2c), is provided in Appendix 8 of this attachment.

2) DIMENSIONS AND CAPACITY OF EACH TANK: 40 CFR 270.16(b)

The information for the dimensions and capacity of each tank located in TF-1 and existing TA-2a and TA-2b stabilization treatment tanks are below:

a) Tank T-101: T-101 has a diameter of 12’ and a height of 20’. The capacity of T-101 is 16,800 gallons.

b) Tank T-102: T-102 has a diameter of 14’ and a height of 20’. The capacity of T-102 is 19,960 gallons.

c) Tank T-103: T-103 has a diameter of 14’ and a height of 20’. The capacity of T-103 is 19,960 gallons.

d) Tank T-107: T-107 has a diameter of 12’ and a height of 18.4’. The capacity of T-107 is 13,077 gallons.

e) TA-2a (existing): TA-2a is a steel treatment tank with dimensions of 16’ x 18’ x 4’. It is surrounded by a shallow steel containment box with the dimensions of 35.25’ x 35.25’ x 1’. TA-2a has a permitted treatment capacity of 25,851 gallons per day based on treating multiple processes per day.

f) TA-2b (existing): TA-2b is a steel treatment tank with dimensions of 14’x 14’ x 5’. It is surrounded by a relatively shallow steel containment box with the dimensions of 24.25’ x 24.25’ x 2.5.’ TA-2b has a treatment capacity of 21,991 gallons per day based on treating multiple processes per day.

The information for the dimensions and capacity of each proposed tank located in TF-4 and the proposed TA-2b and TA-2c stabilization treatment tanks are below (only a change in the treatment capacity for TA-2a is proposed):

g) Tank T-407: T-407 has a diameter of 12’ and a height of 32’10.5”. The capacity of T-407 is 19,960 gallons.

h) Tank T-408: T-408 has a diameter of 12’ and a height of 32’10.5”. The capacity of T-408 is 19,960 gallons.

i) Tank T-409: T-409 has a diameter of 12’ and a height of 32’10.5”. The capacity of T-409 is 19,960 gallons.

j) Tank T-410: T-410 has a diameter of 12’ and a height of 32’10.5”. The capacity of T-410 is 19,960 gallons.

k) TA-2a: TA-2a is a steel treatment tank with dimensions of 16’ x 18’ x 4’. It is surrounded by a shallow steel containment box with the dimensions of 35.25’ x 35.25’ x 1’. TA-2a has a proposed treatment capacity of up to 12,000 gallons per day based on treating multiple processes per day.

l) TA-2b: TA-2b is a ~~concrete~~ treatment tank with a steel tank (liner) within a concrete structure that provides structural support and secondary containment.~~and~~ The bottom of the steel tank is curved in one direction (e.g., horseshoe shaped) with dimensions of 20’ x 25’ x 13’. TA-2b has a proposed treatment capacity of up to 82,000 gallons per day based on treating multiple processes per day.

m) TA-2c: TA-2c is a ~~concrete~~ treatment tank with a steel tank (liner) within a concrete structure that provides structural support and secondary containment. The~~and~~ bottom of the steel tank is curved in one direction (e.g., horseshoe shaped) with dimensions of 20’ x 25’ x 13’. TA-2c has a proposed treatment capacity of up to 82,000 gallons per day based on treating multiple processes per day.

3) DESCRIPTION OF FEED SYSTEMS, SAFETY CUTOFFS, BYPASS SYSTEMS, AND PRESSURE CONTROL: 40 CFR 270.16(c)

USE Tulsa uses closed top tanks for storing liquid hazardous waste which are equipped with loading and unloading ports and vents. Tank details for existing tanks (to be decommissioned and removed) T-101, T-102, T-103, and T-107 are provided in Appendices 1 to 3 of this document. Tank details for proposed tanks T-407, T-408, T-409, and T-410 are provided in Appendix 4. These tanks on-site are typically loaded using top fill lines and unloaded through bottom discharge lines or loaded/unloaded from bottom fill/discharge lines. Where present, manholes are used for inspection and cleaning operations. Discharge lines from the tanks are regulated by valves (or equivalent device). Chemical resistant flexible hoses are used for unloading of tank trucks. Typically, the rigid fill lines are attached to the tanks by flange couplings. Flexible lines with quick couplings are used to connect the inlet of a tank or tank manifold system to the outlet of a tank truck. The pressure control systems on tanks are the vents and thief hatches.

USE Tulsa uses open-top atmospheric tanks for treating hazardous wastes. Tank details for existing treatment tanks TA-2a and TA-2b and proposed treatment tanks TA-2b and TA-2c are

provided in Appendices 4 and 5, respectively, of this document. Bulk and containerized waste is transferred into the tanks manually by facility personnel during operations. Overfill is prevented via manual control. Based on the above operations, automated feed systems, safety cutoffs, and bypass systems, and pressure control systems are not needed. Waste loads from roll-offs are dumped into TA-2a.

4) DIAGRAM OF PIPING, INSTRUMENTATION, AND PROCESS FLOW FOR EACH TANK SYSTEM: 40 CFR 270.16(d)

Details of piping, instrumentation, and process flow for the TF-1 tank systems are provided in Appendix 2 of this attachment. The normal process flow for TF-1 and proposed process flow for TF-4 for a bulk shipment is summarized as follows: the truck is unloaded by connecting a flexible hose with quick disconnect couplings into one of the storage tanks directly or through a tank manifold system. In addition to bulk waste, containerized waste may also be pumped into the tanks. TF-1 is proposed to be decommissioned and removed from the hazardous waste management system and replaced by proposed hazardous waste TF-4. A process flow diagram for proposed TF-4 is provided in Appendix 4-A.

The normal process flow for the TA-2a and TA-2b treatment tanks and proposed process flows for TA-2a, TA-2b, and TA-2c treatment tanks for containerized shipments is summarized as follows: the containers that are approved for treatment in the stabilization area are delivered to the staging area and segregated via permitted waste codes that can be treated in the designated tank. The normal process flow for the TA-2a and TA-2b treatment tanks and proposed TA-2a, TA-2b, and TA-2c treatment tanks for bulk shipment is summarized as follows: the truck is unloaded by connecting a flexible hose with quick disconnect couplings and transferring the material directly into the designated treatment tank. Roll off boxes are unloaded in TA-2a, TA-2b, and TA-2c by using the ramp on the south side to dumping directly into the treatment tank. The treatment tanks also receive bulk waste that has been delivered to TF-4. A process flow diagram for proposed TA-2ba and TA-2cb is provided in Appendix 6-A.

5) DESCRIPTION OF CORROSION PROTECTION SYSTEM AS REQUIRED UNDER 264.192(a)(3)(ii): 40 CFR 270.16(e)

Tanks T-101, T-102, T-103, and T-107 are constructed of fiberglass, which is resistant to corrosion and satisfies requirements for 264.192(a)(3)(ii). Proposed tanks T-407, T-408, T-409, and T-410 will be constructed of fiberglass as well.

Existing treatment tanks TA-2a and TA-2b (existing TA-2b to be removed), proposed mixing tanks (TA-2b and TA-2c), and their ~~secondary~~ primary containment steel liners are monitored for corrosion by performing periodic thickness testing, and results are recorded and compared to previous results to determine if tanks are maintained at a thickness that will prevent leaks or containment failures. Thickness testing for TA-2a and existing TA-2b will be performed on the accessible exterior walls of the treatment tanks using an ultrasonic thickness gauge, or equivalent technology, and thickness testing of the proposed TA-2b and TA-2c tanks will be conducted on interior walls. The frequency of the testing will be according to the following chart:

Measurement (inches)	Subsequent Testing Frequency	Status
≥0.600	Annual	In Service
≥0.500	Semi-Annual	In Service
≥0.400	Quarterly	In Service
≤0.250	NA	Out of service

The treatment tanks will be constructed with one (1) inch thickness metal at a minimum and will be taken out of service when the exterior wall thickness is noted as being less than 0.250". For the proposed TA-2b and TA-2c steel liners, the curved bottom portion of the steel liner will be constructed with 1.25 inch minimum thickness and the upper vertical faces of the steel liner will be 1 inch minimum thickness. When applicable, wear plates will not be included in the thickness testing but visual inspections of those plates will be documented in the inspection of the treatment tanks as well as the secondary containments. The guidelines in 40 CFR part 264.196 will be followed regarding the repair of the treatment tanks.

6) INSTALLATION OF NEW TANK SYSTEMS IN COMPLIANCE WITH 264.192(b)(c)(d)(e): 40 CFR 270.16(f)

USE Tulsa is proposing to install a new hazardous tanks and tank system in the existing TF-4 area that meets the requirements of 40 CFR 264.192(b) to (e). The existing TF-4 tanks will be decommissioned and removed. For the new TF-4, the existing tanks containment system will be improved, and four (4) new fiberglass tanks (T-407, T-408, T-409, and T-410) will be constructed and installed in the TF-4 area. The tanks will be 12-foot in diameter, flat top, cone bottom, and supported on legs (see Appendix 4).

Additionally, USE Tulsa is proposing to install two new treatment tanks in the same general vicinity of the existing TA-2a treatment tank. The new treatment tanks (TA-2b and TA-2c) will be installed in a manner that meets the requirements of 40 CFR 264.192(c). The tanks will be backfilled with a clean, structural fill that is a noncorrosive, porous, homogeneous substance that is placed completely around the tanks and compacted to 95% of Standard Proctor (ASTM 698).

7) DETAILED PLANS AND DESCRIPTION OF THE SECONDARY CONTAINMENT SYSTEM IN COMPLIANCE WITH 264.193(a)(b)(c)(d)(e)(f): 40 CFR 270.16(g)

Details of the containment systems for Tank Farm 1 and Tank Farm 4 are provided in Appendices 3 and 4 respectively of this section. USE Tulsa operating procedures include inspections designed to identify accumulated liquids in a timely manner (inspection schedule and criteria are outlined in Section 4 - Inspection Schedules and Forms). The containment system for TF-1 is coated with an impervious, chemically resistant material. The existing containment system for TF-4 is constructed of a concrete slab and cinder blocks for walls. USE Tulsa plans to demolish the cinderblock containment wall and reconstruct as a solid concrete wall. USE Tulsa then plans to add a coating with an impervious, chemically resistant material to seal the secondary containment structure. USE Tulsa will use an industrial spray coating, SC-3900 from Basic Concepts, Inc. or an equivalent coating, to seal the secondary containment. Manufacturer information for this product is provided in Appendix 9.

The containment systems for TA-2a and existing TA-2b are constructed of steel. The proposed modifications/additions to the USE Tulsa facility consists of removing existing TA-2b and constructing a new TA-2b and TA-2c with a steel liner acting as the primary containment and 1-foot thick concrete walls as the secondary containment. The concrete will be amended with Xypex Chemical Corporation Xypex Admix or an equivalent product to create an impervious, chemically resistant material that prevents migration of waste into the concrete. USE Tulsa operating procedures include inspections designed to identify accumulated liquids in a timely manner (inspection schedule and criteria are outlined in Section 4 - Inspection Schedules and Forms). Additional information about TA-2a, TA-2b, and TA-2c are provided in Appendices 5 and 6 of this section.

The existing TA units are inspected daily for any breaches or additional issues, and the proposed TA units will also be inspected this way. When identified, spilled or leaked waste and/or accumulated precipitation will be removed from the unit ~~or sump/collection area~~via the inspection ports, if present, in as timely a manner as is necessary to prevent overflow of the unit or sump/collection system. Accumulated liquids will be identified by visual observation, review of facility records, and (if necessary) by chemical analysis. If required, analyses will be conducted and material will be processed in accordance with Attachment 4 - Waste Characteristics and Waste Analysis Plan.

----------END OF SECTION----------

Appendix 1- Tank Farm 1 Certification Documents

T101

Finite Composites Consulting
248.808.3283
Steve@FiniteCC.com
FiniteCC.com

FINITE
COMPOSITES CONSULTING

Date: 10 July 2020

To: Mark Wagner
Wagner Enterprise

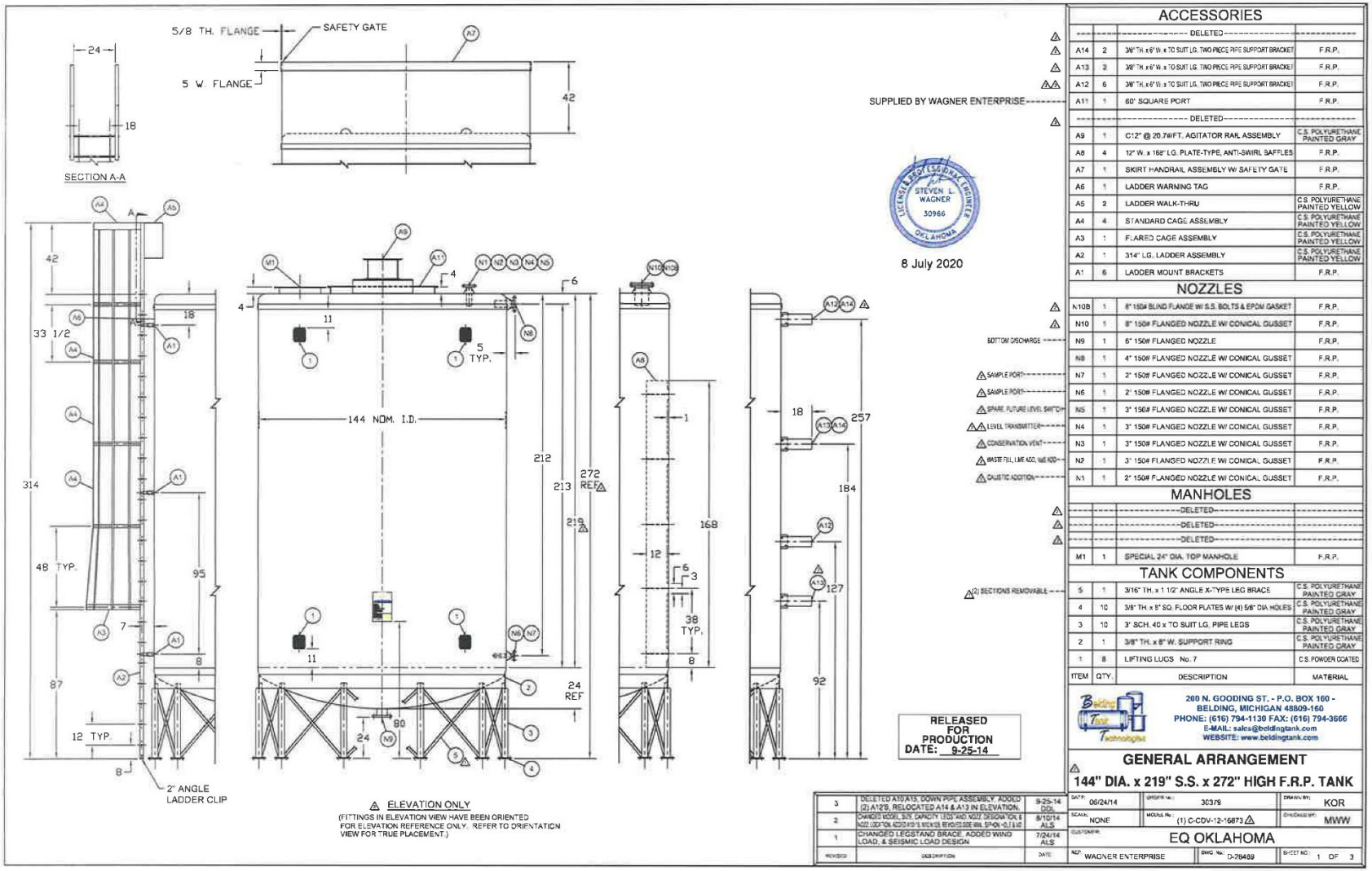
Re: Belding Tank Technologies Project Reference 30379

Mark

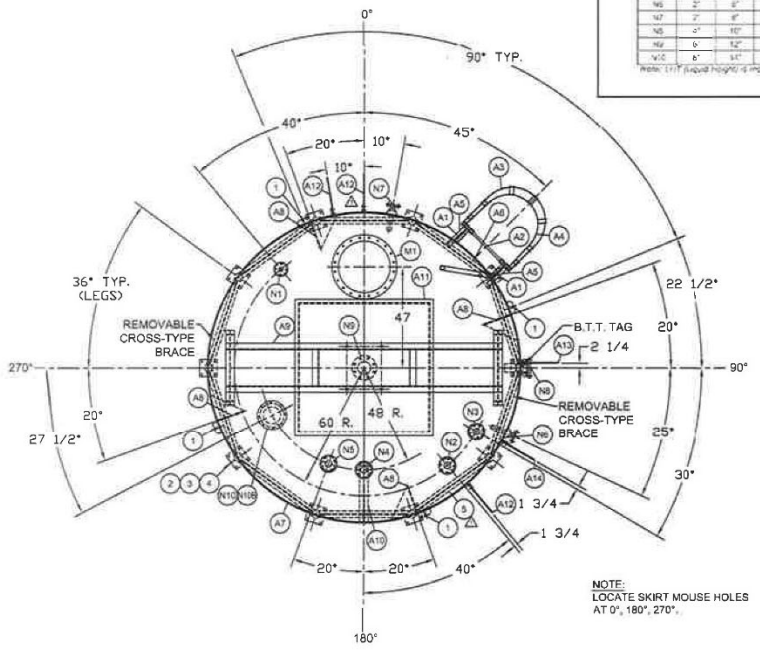
Included are the stamped drawings for the above referenced project. Please note, the design and drawings are approved for this vessel as originally designed and built. I cannot be liable for the current condition of the vessel because the tank has been in service for approximately 7 years.

Best Regards,

Steven Wagner, PE
Principal Engineer
Finite Composites Consulting

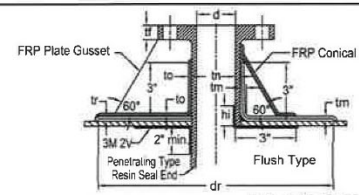

5/8 TH. FLANGE
SAFETY GATE
5 W. FLANGE
SECTION A-A
144 NOM. I.D.
2" ANGLE LADDER CLIP
ELEVATION ONLY
(FITTINGS IN ELEVATION VIEW HAVE BEEN ORIENTED FOR ELEVATION REFERENCE ONLY. REFER TO ORIENTATION VIEW FOR "TRUE PLACEMENT.")
STEVEN L. WAGNER 30966 OKLAHOMA
8 July 2020
RELEASED FOR PRODUCTION DATE: 9-25-14
ACCESSORIES
SUPPLIED BY WAGNER ENTERPRISE
A14 2 3/8" TH. x 6" W. x TO SUIT LG. TWO PIECE PIPE SUPPORT BRACKET F.R.P.
A13 2 3/8" TH. x 6" W. x TO SUIT LG. TWO PIECE PIPE SUPPORT BRACKET F.R.P.
A12 6 3/8" TH. x 6" W. x TO SUIT LG. TWO PIECE PIPE SUPPORT BRACKET F.R.P.
A11 1 60° SQUARE PORT F.R.P.
A9 1 C12" @ 20.7#/FT. AGITATOR RAIL ASSEMBLY C.S. POLYURETHANE PAINTED GRAY
A8 4 12" W. x 168" LG. PLATE-TYPE, ANTI-SWIRL BAFFLES F.R.P.
A7 1 SKIRT HANDRAIL ASSEMBLY W/ SAFETY GATE F.R.P.
A6 1 LADDER WARNING TAG F.R.P.
A5 2 LADDER WALK-THRU C.S. POLYURETHANE PAINTED YELLOW
A4 4 STANDARD CAGE ASSEMBLY C.S. POLYURETHANE PAINTED YELLOW
A3 1 FLARED CAGE ASSEMBLY C.S. POLYURETHANE PAINTED YELLOW
A2 1 314" LG. LADDER ASSEMBLY C.S. POLYURETHANE PAINTED YELLOW
A1 6 LADDER MOUNT BRACKETS F.R.P.
NOZZLES
N10B 1 8" 150# BLIND FLANGE W/ S.S. BOLTS & EPDM GASKET F.R.P.
N10 1 8" 150# FLANGED NOZZLE W/ CONICAL GUSSET F.R.P.
BOTTOM DISCHARGE N9 1 6" 150# FLANGED NOZZLE F.R.P.
N8 1 4" 150# FLANGED NOZZLE W/ CONICAL GUSSET F.R.P.
SAMPLE PORT N7 1 2" 150# FLANGED NOZZLE W/ CONICAL GUSSET F.R.P.
SAMPLE PORT N6 1 2" 150# FLANGED NOZZLE W/ CONICAL GUSSET F.R.P.
SPARE, FUTURE LEVEL SWITCH N5 1 3" 150# FLANGED NOZZLE W/ CONICAL GUSSET F.R.P.
LEVEL TRANSMITTER N4 1 3" 150# FLANGED NOZZLE W/ CONICAL GUSSET F.R.P.
CONSERVATION VENT N3 1 3" 150# FLANGED NOZZLE W/ CONICAL GUSSET F.R.P.
WASTE FILL LINE ADD, N2 ADD N2 1 3" 150# FLANGED NOZZLE W/ CONICAL GUSSET F.R.P.
CAUSTIC ADDITION N1 1 2" 150# FLANGED NOZZLE W/ CONICAL GUSSET F.R.P.
MANHOLES
DELETED
DELETED
DELETED
M1 1 SPECIAL 24" DIA. TOP MANHOLE F.R.P.
TANK COMPONENTS
(2) SECTIONS REMOVABLE
5 1 3/16" TH. x 1 1/2" ANGLE X-TYPE LEG BRACE C.S. POLYURETHANE PAINTED GRAY
4 10 3/8" TH. x 8" SQ. FLOOR PLATES W/ (4) 5/8" DIA HOLES C.S. POLYURETHANE PAINTED GRAY
3 10 3" SCH. 40 x TO SUIT LG. PIPE LEGS C.S. POLYURETHANE PAINTED GRAY
2 1 3/8" TH. x 8" W. SUPPORT RING C.S. POLYURETHANE PAINTED GRAY
1 8 LIFTING LUGS No. 7 C.S. POWDER COATED
ITEM QTY. DESCRIPTION MATERIAL
280 N. GOODING ST. - P.O. BOX 160 - BELDING, MICHIGAN 48809-160
PHONE: (616) 794-1130 FAX: (616) 794-3666
E-MAIL: sales@beldingtank.com
WEBSITE: www.beldingtank.com
GENERAL ARRANGEMENT
144" DIA. x 219" S.S. x 272" HIGH F.R.P. TANK
3 DELETED A10/A15, DOWN PIPE ASSEMBLY, ADDED (2) A12'S, RELOCATED A14 & A13 IN ELEVATION. 9-25-14 DDL
2 CHANGED MODEL NO'S, CAPACITY, LEGS AND NOZZ. DESIGNATION, & NOZZ LOCATION 8/10/14 ALS
1 CHANGED LEGS AND BRACE, ADDED WIND LOAD, & SEISMIC LOAD DESIGN 7/24/14 ALS
DATE: 06/24/14 ORDER No.: 3039 DRAWN BY: KOR
SCALE: NONE MODEL No.: (1) C-CDV-12-1687 CHECKED BY: MWW
CUSTOMER: EQ OKLAHOMA
REF: WAGNER ENTERPRISE DWG No.: D-26489 SHEET NO.: 1 OF 3

PROJECT NOTES
1. WHITE (WJ-480) EXTERIOR GEL COAT WITH U.V. INHIBITOR REQUIRED.
2. (4) HOUR POST HEAT CURE REQUIRED FOR SERVICE.
3. BELDING TANK RECOMMENDS THE VENT BE EQUAL TO OR LAGER THAN THE LARGEST INLET OR OUTLET.
4. 60" SQUARE PORT SUPPLIED BY WAGNER ENTERPRISE INSTALLED BY B.T.T.
5. ALL CROSS BRACING MUST BE IN PLACE PRIOR TO OPERATION THE TANK.



NOTE:
LOCATE SKIRT MOUSE HOLES AT 0°, 180°, 270°.

△ TRUE FITTING ORIENTATION



Item	d	dr	ht	tn	Gusset	Lift	tn Mat'l Pipe	to Mat'l Pipe	tr Material Pipe	tf	Rating
N1	24"	30"	1"	3/16"	None	0	5		0	3/16"	Atm
N2	2"	8"	1"	1/4"	CG	0	5		0	11/16"	125 psi
N3	3"	9"	1-1/2"	5/16"	CG	0	5		0	13/16"	125 psi
N4	3"	9"	1-1/2"	5/16"	CG	0	5		0	13/16"	125 psi
N5	3"	9"	1-1/2"	5/16"	CG	0	5		0	13/16"	125 psi
N6	3"	9"	1-1/2"	5/16"	CG	0	5		0	13/16"	125 psi
N6	2"	8"	1"	1/4"	CG	2'-2		5	1	11/16"	125 psi
N7	2"	8"	1"	1/4"	CG	2'-2		5	1	11/16"	125 psi
N8	3"	10"	2"	5/16"	None	0	5		0	15/16"	125 psi
N9	6"	12"	3"	5/16"	None	2ea		5	6	1"	100 psi
N10	8"	14"	3"	5/16"	CG	0	5		0	13/16"	50 psi

Note: (1) Liquid height is measured from item to Top of Tank Straight Side

△ ATTACHMENT CHART

OWNER: EQ OKLAHOMA
P.O. NO.: 11048
EQUIP. NO.:
SERVICE: WASTEWATER (WITH TRACE AMOUNTS, LESS THAN 10 PPM, OF VARIOUS CHEMICALS)

DESIGN DATA

DESIGN STANDARD	ASTM D 3299-10
MAX. PRESSURE	ATMOSPHERIC
VACUUM	NONE
MAX. TEMP. (F)	AMBIENT
SPECIFIC GRAVITY	1.5 MAX
SEISMIC CODE	△ ASCE 7-05 (SITE CLASS = D)
SEISMIC DESIGN	△ OCCUPANCY CATEGORY = II SDS =0.139 SD1 =0.110
WIND LOAD	△ 90 MPH
APPROX. EMPTY WEIGHT (LBS)	7,600
NOM. CAPACITY (GALS)	△16,673
INTERIOR CATALYST	Co/MEKP
EXTERIOR CATALYST	Co/MEKP
LINER RESIN	DERAKANE 441-400
STRUCTURAL RESIN	DERAKANE 441-400
EXTERIOR LAYER RESIN	DERAKANE 441-400
COLOR	WHITE (WJ-480)
VEIL	DOUBLE NEXUS

LAMINATE CHART

LAMINATE SEQUENCE	THICKNESS
V = 1 LAYER VEIL	.010"
M = 1 1/2 OZ/FT SQ. CHOPPED STRAND	.043"
FM = FABMAT 1524	.076"
R = 24 OZ/YD SQ. WOVEN ROVING	.033"
CP = CHOPPED STRAND ROVING	
HW = HELICAL WINDING	.033"
CH = CHOP-HOOP WINDING	.033"
SW = STRAIGHT WIND	.022"
U = 15 1/2 OZ/YD. SQ. UNIDIRECTIONAL	.025"

FLAT TOP: .520" NOM. TH.
2V CP(.100) 3(CP(.030) R) CP(.211)

FLAT TOP JOINT: .321" NOM. TH.
INTERIOR: 3M 2V EXTERIOR: 4M

SIDEWALL: .318" NOM. TH. TAPERED TO .274" NOM. TH.
2V CP(.100) 2SW 4HW

DISH BOTTOM: 1.121" NOM. TH.
2V CP(.100) 8(CP(.030) R) CP(.497)

LEG STAND ATTACHMENT: .390" NOM. TH.
4FM 2M

STEVEN L. WAGNER 30966 OKLAHOMA LICENSED PROFESSIONAL ENGINEER
8 July 2020

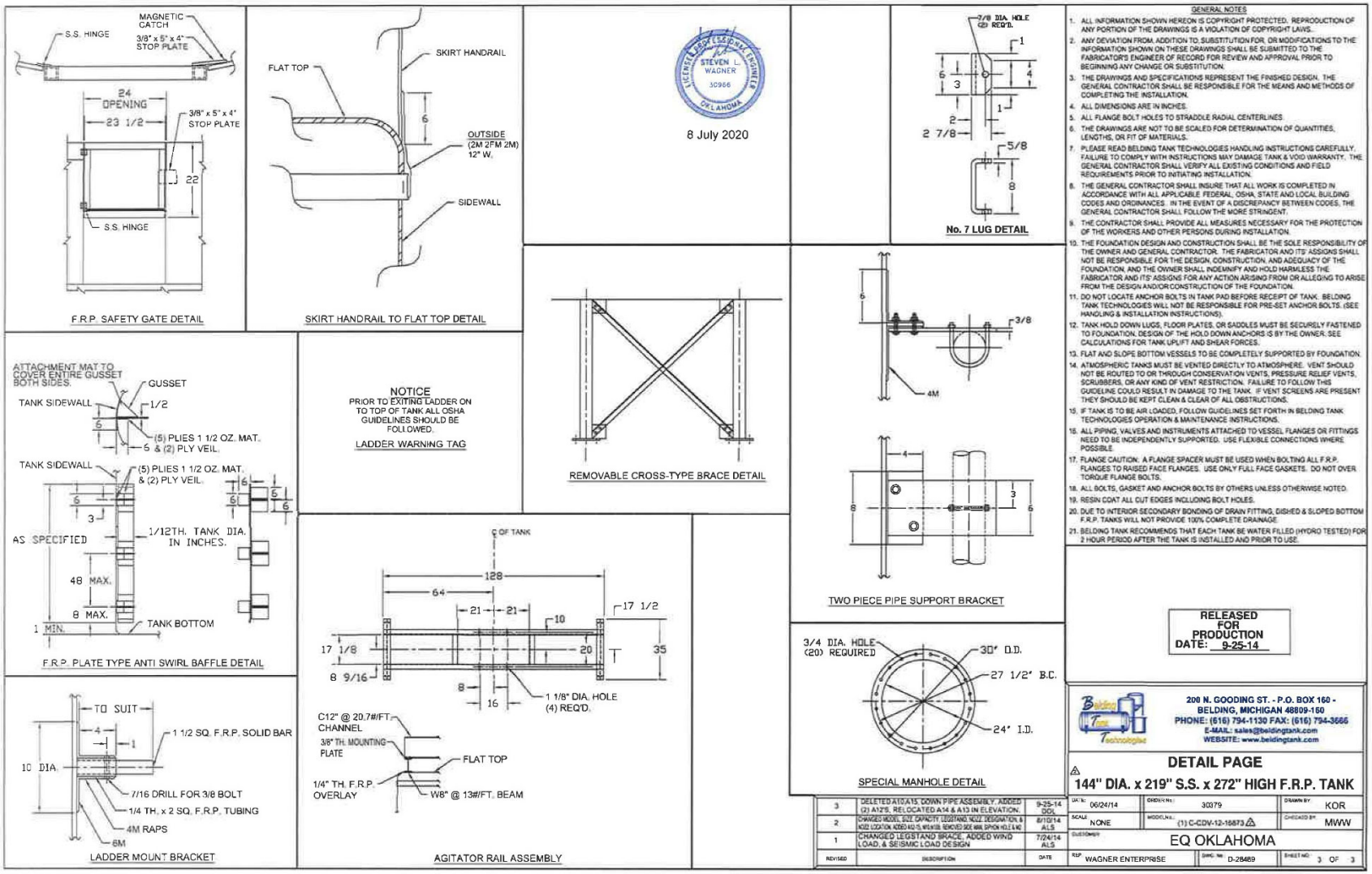
RELEASED FOR PRODUCTION
DATE: 9-25-14

Belding Tank Technologies
200 N. GOODING ST. - P.O. BOX 160 -
BELDING, MICHIGAN 48809-160
PHONE: (616) 794-1130 FAX: (616) 794-3666
E-MAIL: sales@beldingtank.com
WEBSITE: www.beldingtank.com

△ ORIENTATION & DETAIL PAGE
144" DIA. x 219" S.S. x 272" HIGH F.R.P. TANK

REVISED	DESCRIPTION	DATE
3	DELETED A10,A15, DOWN PIPE ASSEMBLY, ADDED (2) A12'S, RELOCATED A14 & A13 IN ELEVATION.	9-25-14 DCL
2	CHANGED MODEL SIZE, CAPACITY, LEGSTAND, NOZZ DESIGNATION, & NOZZ LOCATION, ADDED A12-15, W/A16, REMOVED DOG WAL, SIPHON HOLE, & NC	8/10/14 ALS
1	CHANGED LEGSTAND BRACE, ADDED WIND LOAD, & SEISMIC LOAD DESIGN	7/24/14 ALS

DATE: 06/24/14	ORDER No.: 30379
SCALE: NONE	MODEL No.: (1) C-CDV-12-16873 △
CUSTOMER: EQ OKLAHOMA	
REP: WAGNER ENTERPRISE	DWG. No.: D-28489
DRAWN BY: KOR	CHECKED BY: MWW
SHEET No.: 2 OF 3	


MAGNETIC CATCH
S.S. HINGE
3/8" x 5" x 4" STOP PLATE
24 OPENING
23 1/2
22
S.S. HINGE
F.R.P. SAFETY GATE DETAIL
FLAT TOP
SKIRT HANDRAIL
6
OUTSIDE (2M 2FM 2M) 12" W.
SIDEWALL
SKIRT HANDRAIL TO FLAT TOP DETAIL
STEVEN L WAGNER 30966 OKLAHOMA
8 July 2020
7/8 DIA. HOLE (2) REQ'D.
No. 7 LUG DETAIL
GENERAL NOTES
1. ALL INFORMATION SHOWN HEREON IS COPYRIGHT PROTECTED. REPRODUCTION OF ANY PORTION OF THE DRAWINGS IS A VIOLATION OF COPYRIGHT LAWS.
2. ANY DEVIATION FROM, ADDITION TO, SUBSTITUTION FOR, OR MODIFICATIONS TO THE INFORMATION SHOWN ON THESE DRAWINGS SHALL BE SUBMITTED TO THE FABRICATOR'S ENGINEER OF RECORD FOR REVIEW AND APPROVAL PRIOR TO BEGINNING ANY CHANGE OR SUBSTITUTION.
3. THE DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED DESIGN. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE MEANS AND METHODS OF COMPLETING THE INSTALLATION.
4. ALL DIMENSIONS ARE IN INCHES.
5. ALL FLANGE BOLT HOLES TO STRADDLE RADIAL CENTERLINES.
6. THE DRAWINGS ARE NOT TO BE SCALED FOR DETERMINATION OF QUANTITIES, LENGTHS, OR FIT OF MATERIALS.
7. PLEASE READ BELDING TANK TECHNOLOGIES HANDLING INSTRUCTIONS CAREFULLY. FAILURE TO COMPLY WITH INSTRUCTIONS MAY DAMAGE TANK & VOID WARRANTY. THE GENERAL CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND FIELD REQUIREMENTS PRIOR TO INITIATING INSTALLATION.
8. THE GENERAL CONTRACTOR SHALL INSURE THAT ALL WORK IS COMPLETED IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, OSHA, STATE AND LOCAL BUILDING CODES AND ORDINANCES. IN THE EVENT OF A DISCREPANCY BETWEEN CODES, THE GENERAL CONTRACTOR SHALL FOLLOW THE MORE STRINGENT.
9. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY FOR THE PROTECTION OF THE WORKERS AND OTHER PERSONS DURING INSTALLATION.
10. THE FOUNDATION DESIGN AND CONSTRUCTION SHALL BE THE SOLE RESPONSIBILITY OF THE OWNER AND GENERAL CONTRACTOR. THE FABRICATOR AND ITS' ASSIGNS SHALL NOT BE RESPONSIBLE FOR THE DESIGN, CONSTRUCTION, AND ADEQUACY OF THE FOUNDATION, AND THE OWNER SHALL INDEMNIFY AND HOLD HARMLESS THE FABRICATOR AND ITS' ASSIGNS FOR ANY ACTION ARISING FROM OR ALLEGING TO ARISE FROM THE DESIGN AND/OR CONSTRUCTION OF THE FOUNDATION.
11. DO NOT LOCATE ANCHOR BOLTS IN TANK PAD BEFORE RECEIPT OF TANK. BELDING TANK TECHNOLOGIES WILL NOT BE RESPONSIBLE FOR PRE-SET ANCHOR BOLTS. (SEE HANDLING & INSTALLATION INSTRUCTIONS).
12. TANK HOLD DOWN LUGS, FLOOR PLATES, OR SADDLES MUST BE SECURELY FASTENED TO FOUNDATION. DESIGN OF THE HOLD DOWN ANCHORS IS BY THE OWNER. SEE CALCULATIONS FOR TANK UPLIFT AND SHEAR FORCES.
13. FLAT AND SLOPE BOTTOM VESSELS TO BE COMPLETELY SUPPORTED BY FOUNDATION.
14. ATMOSPHERIC TANKS MUST BE VENTED DIRECTLY TO ATMOSPHERE. VENT SHOULD NOT BE ROUTED TO OR THROUGH CONSERVATION VENTS, PRESSURE RELIEF VENTS, SCRUBBERS, OR ANY KIND OF VENT RESTRICTION. FAILURE TO FOLLOW THIS GUIDELINE COULD RESULT IN DAMAGE TO THE TANK. IF VENT SCREENS ARE PRESENT THEY SHOULD BE KEPT CLEAN & CLEAR OF ALL OBSTRUCTIONS.
15. IF TANK IS TO BE AIR LOADED, FOLLOW GUIDELINES SET FORTH IN BELDING TANK TECHNOLOGIES OPERATION & MAINTENANCE INSTRUCTIONS.
16. ALL PIPING, VALVES AND INSTRUMENTS ATTACHED TO VESSEL FLANGES OR FITTINGS NEED TO BE INDEPENDENTLY SUPPORTED. USE FLEXIBLE CONNECTIONS WHERE POSSIBLE.
17. FLANGE CAUTION: A FLANGE SPACER MUST BE USED WHEN BOLTING ALL F.R.P. FLANGES TO RAISED FACE FLANGES. USE ONLY FULL FACE GASKETS. DO NOT OVER TORQUE FLANGE BOLTS.
18. ALL BOLTS, GASKET AND ANCHOR BOLTS BY OTHERS UNLESS OTHERWISE NOTED.
19. RESIN COAT ALL CUT EDGES INCLUDING BOLT HOLES.
20. DUE TO INTERIOR SECONDARY BONDING OF DRAIN FITTING, DISHED & SLOPED BOTTOM F.R.P. TANKS WILL NOT PROVIDE 100% COMPLETE DRAINAGE.
21. BELDING TANK RECOMMENDS THAT EACH TANK BE WATER FILLED (HYDRO TESTED) FOR 2 HOUR PERIOD AFTER THE TANK IS INSTALLED AND PRIOR TO USE.
ATTACHMENT MAT TO COVER ENTIRE GUSSET BOTH SIDES.
GUSSET
TANK SIDEWALL
1/2
(5) PLIES 1 1/2 OZ. MAT. & (2) PLY VEIL.
TANK SIDEWALL
(5) PLIES 1 1/2 OZ. MAT. & (2) PLY VEIL.
AS SPECIFIED
1/12TH. TANK DIA. IN INCHES.
48 MAX.
8 MAX.
1 MIN.
TANK BOTTOM
F.R.P. PLATE TYPE ANTI SWIRL BAFFLE DETAIL
NOTICE
PRIOR TO EXITING LADDER ON TO TOP OF TANK ALL OSHA GUIDELINES SHOULD BE FOLLOWED.
LADDER WARNING TAG
REMOVABLE CROSS-TYPE BRACE DETAIL
3/8
4M
TWO PIECE PIPE SUPPORT BRACKET
RELEASED FOR PRODUCTION
DATE: 9-25-14
3/4 DIA. HOLE (20) REQUIRED
30" O.D.
27 1/2" B.C.
24" I.D.
SPECIAL MANHOLE DETAIL
TO SUIT
1 1/2 SQ. F.R.P. SOLID BAR
10 DIA.
7/16 DRILL FOR 3/8 BOLT
1/4 TH. x 2 SQ. F.R.P. TUBING
4M RAPS
6M
LADDER MOUNT BRACKET
℄ OF TANK
128
64
21
21
10
17 1/2
17 1/8
20
35
8 9/16
8
16
1 1/8" DIA. HOLE (4) REQ'D.
C12" @ 20.7#/FT. CHANNEL
3/8" TH. MOUNTING PLATE
1/4" TH. F.R.P. OVERLAY
FLAT TOP
W8" @ 13#/FT. BEAM
AGITATOR RAIL ASSEMBLY
200 N. GOODING ST. - P.O. BOX 160 - BELDING, MICHIGAN 48809-160
PHONE: (616) 794-1130 FAX: (616) 794-3666
E-MAIL: sales@beldingtank.com
WEBSITE: www.beldingtank.com
DETAIL PAGE
144" DIA. x 219" S.S. x 272" HIGH F.R.P. TANK
3 DELETED A10/A15 "DOWN PIPE ASSEMBLY", ADDED (2) A12'S, RELOCATED A14 & A13 IN ELEVATION. 9-25-14 DDL
2 CHANGED MODEL SIZE CAPACITY LEGSTAND, NOZZ DESIGNATION, & NOZZ LOCATION. ADDED A10-15, A16/A18, REMOVED SEE A9A, EPOXY HOLE LINE 8/10/14 ALS
1 CHANGED LEGSTAND BRACE, ADDED WIND LOAD, & SEISMIC LOAD DESIGN 7/24/14 ALS
REVISED DESCRIPTION DATE
DATE: 06/24/14
ORDER No.: 30379
DRAWN BY: KOR
SCALE: NONE
MODEL No.: (1) C-CDV-12-16873
CHECKED BY: MWW
CUSTOMER: EQ OKLAHOMA
REP: WAGNER ENTERPRISE
DWG. No.: D-28489
SHEET NO.: 3 OF 3

Note- There have been no significant changes to T102 or T103 since the 2007 certification.

TCI Tank Consultants, Inc.

April 20, 2007

Mr. Danny Rokisky
PermaFix Environmental Services
2700 South 25th West Avenue
Tulsa, Oklahoma 74107

Re: Certification of Tanks T-101, T-102 & T-103
2700 South 25th West Avenue
Tulsa, Oklahoma 74104

Dear Mr. Rokisky

In accordance with your request, we have the reviewed the design, fabrication and installation of the above referenced tanks and associated facilities located at the above stated address. We hereby summarize our assessment of the tank system in compliance with 40 CFR Part 265 Subpart J – Tank Systems that are used to store or treat hazardous waste.

1. The Tank System and secondary containment was originally designed by Williams Brothers Engineering of Tulsa which prepared a Certification Report on the initial installation including the existing tanks in 1990. Currently there are two (2) existing tanks within the secondary containment; Tanks T-104 and T-107. Since these tanks were covered by a previous Certification Report, they are not included in this report.

2. This Certification Report covers Two (2) new Tanks T-102 & T-103; and one (1) used Tank T-101 to be installed in the existing Secondary Containment with the two (2) existing Tanks T-104 and T-107.

3. The Tanks T-102 & T-103 were constructed in 2002 by Palmer Manufacturing & Tank, Inc. of Garden City, Kansas with corrosion-resistant fiberglass reinforced plastic (FRP) and is lined with Hetron 980 and appear to be suitable for its intended service.

4. The Tank T-101 was constructed approximately 20 years ago (exact age unknown) by Atlas Tank Company with corrosion-resistant fiberglass reinforced plastic (FRP) and is lined with Dion 6694 / 6060 and appears to be suitable for its intended service.

5. FRP is compatible with the wastewater to be stored in the tanks and provides maximum corrosion resistance. The interior corrosion barrier of the tanks is compatible with the specified compositions and concentrations of wastewater.

6. None of the tank system components are located underground or in a buried installation.

7. The design of the tanks was reviewed for compliance with ASME RTP-1 Reinforced Thermoset Plastic Corrosion Resistant Equipment under applicable load conditions as

•4333 W. 21st St. • Tulsa, Oklahoma 74107 • (918) 583) 3968 • FAX (918) 583-3966 • www.tank-consultants.com •
Consulting Engineering, Environmental, and Inspection Services for Storage Tanks

TCI Tank Consultants, Inc.

specified in ASCE 7-02 Minimum Design Loads for Buildings and Other Structures. The structural steel supports for the tanks were reviewed for compliance with AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

8. The modifications to Tanks T-101, T-102 & T-103 that were performed by PermaFix, including the addition of nozzles and the pressure containing covers, will not affect the structural integrity of the tanks. The design of the tanks was evaluated for a maximum internal pressure 0.50 oz per square inch. The design of the tanks appears to be adequate to contain the specified internal pressure without failure and without any leaks.

9. The tanks are equipped with hold-down anchors to the reinforced concrete foundation that will prevent floatation or dislodgment. The tanks are installed on a reinforced concrete foundation which is part of the secondary containment.

10. The reinforced concrete foundation was reviewed in accordance with ACI-318 Building Code Requirements for Structural Concrete and appears to be of sufficient thickness and contains sufficient steel reinforcing to adequately support the weight of tanks when fully loaded with wastewater. Per the original certification, the reinforced concrete foundation is 10" thick and is placed on a 12" aggregate base course. The load bearing surface is below the frost depth and the concrete structure should not be affected by frost heave. Since the tanks are anchored to the concrete foundation, the tank system should not be affected by frost heave. The containment structure has been in place for several years and no concrete damage from frost heave is visible.

11. The secondary containment was constructed of reinforced concrete of sufficient thickness to form an impervious barrier. Construction joints in the concrete included a shear key with a PVC water stop. The secondary containment area is coated with an epoxy corrosion-resistant material to prevent migration of spilled liquids through the concrete into the subsurface.

12. The secondary containment plus overflow area provides adequate capacity to contain a total spill of the largest tank plus a 25 year, 24-hour rainfall event equal to 7-inch of water. The two (2) existing drain holes in the wall of the Storage Tank Containment shall remain open to permit overflow into the Drum Storage area. The Drum Storage area shall be restricted to a maximum of eighty-eight (88) 55 Gallon Drums or Twenty-Two (22) Pallet Equivalents, where one Pallet Equivalent equals four (4) 55 Gallon Drums. See the attached spreadsheet for Containment Volume Calculations.

13. The piping system is constructed of Driscopipe 6400 and 8000 which is compatible with the wastewater and it appears to be properly installed and adequately supported in accordance with ASME B31.3 Process Piping Code.

14. The tanks were recently inspected by TCI and appear to be free of defects and are in good condition. There were no signs of structural damage or inadequate construction or improper installation. See attached TCI Tank Inspection Report.

• 4333 W. 21st St. • Tulsa, Oklahoma 74107 • (918) 583) 3968 • FAX (918) 583-3966 • www.tank-consultants.com
Consulting Engineering, Environmental, and Inspection Services for Storage Tanks

TCI Tank Consultants, Inc.

15. The tanks were recently hydrotested for leaks. The tanks were filled with water to above the roof line and to a height that would adequately test the pressure holding capability of the tanks to contain 0.50 oz per square inch internal pressure. The liquid level was observed while the test was maintained for 4 hours and the tanks appeared to be structurally sound without any leaks. See attached TCI Tank Hydrotest Report.

The tank system is not leaking and is fit for service and the design for this installation meets or exceeds the requirements of 40 CFR Part 265 Subpart J – Tank Systems as related to the treatment and storage of liquids that at times may exhibit the characteristics of a hazardous waste.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Please contact me if you have any questions or concerns regarding this transmittal.

Sincerely,

Ronald Dean Davis

Ronald Dean Davis

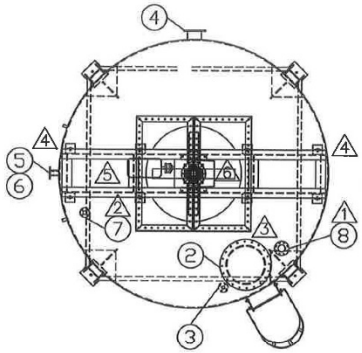
Oklahoma P.E. 11210

Attach: Containment Calculations
Inspection Reports
Hydrotest Reports

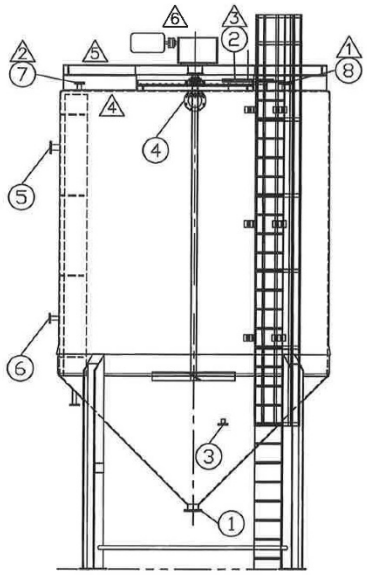
REGISTERED PROFESSIONAL ENGINEER
RONALD DEAN DAVIS
11210
OKLAHOMA

Ronald Dean Davis
4/20/07

•4333 W. 21st St. • Tulsa, Oklahoma 74107 • (918) 583) 3968 • FAX (918) 583-3966 • www.tank-consultants.com •
Consulting Engineering, Environmental, and Inspection Services for Storage Tanks



PLAN VIEW
(TRUE ORIENTATION)



ELEVATION VIEW

Bill of materials

Description	Material	Thickness
14' diameter cone bottom	Fiberglass (Hetron 980 Resin)	0.790"
14'diameter shell	Fiberglass (Hetron 980 Resin)	0.446"
14'diameter flat top	Fiberglass (Hetron 980 Resin)	0.519"

Schedule of Fittings

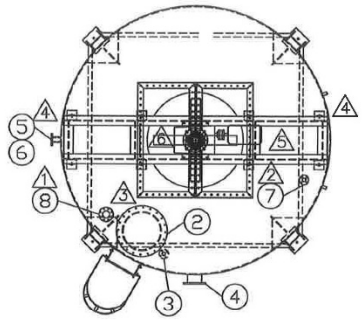
SYMBOL	Description	Material
1	6" RF Flange	Fiberglass (Hetron 980 Resin)
2	24" Flange	Fiberglass (Hetron 980 Resin)
3	2" RF Flange	Fiberglass (Hetron 980 Resin)
4	8" RF Flange	Fiberglass (Hetron 980 Resin)
5	3" RF Flange	Fiberglass (Hetron 980 Resin)
6	2" RF Flange	Fiberglass (Hetron 980 Resin)
7	3" RF Flange	Fiberglass (Hetron 980 Resin)
8	4" RF Flange	Fiberglass (Hetron 980 Resin)

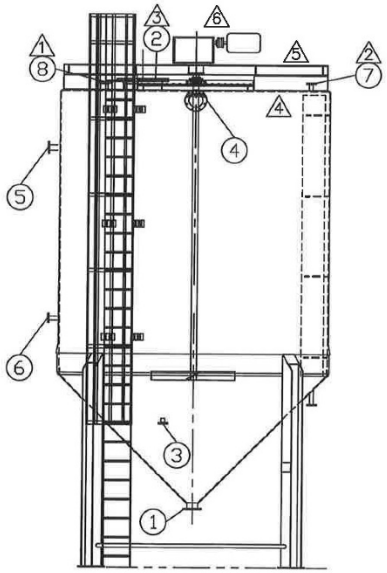
SYM.	DRAWING REVISIONS	CHKD. BY	DATE	DWN. BY
6	Added Chemineer Model 5HTD-20 Mixer w/25HP motor to top of tank			
5	Added Mixer frame to top of tank			
4	Added W10x39 Mixer frame support to top of tank			
3	Added 24" Protectoseal emergency pressure relief manway 316 stainless steel pressure set @ +3" WC, mates w/ASA flange			
2	Added 3" -RF Fiberglass flange w/ Hetron resin to top of tank		02/11/03	DM
1	Added 4" -RF Fiberglass flange w/ Hetron resin to top of tank		12/07/02	DM

TITLE: T102, FIGURE E-9.3

PREPARED FOR:
PERMA-FIX TREATMENT SERVICES
2700 S. 25th West Ave * Tulsa, Oklahoma 74107

SCALE: No Scale	APPROVED BY:	DRAWN: GDN
DATE: 5/01/06	D. Roklsky	REVISED: 2/28/07
AUTOCAD FILE: C:\MyFiles\Tulsa\Sub-Part BB		DRAWING NUMBER: T102





Bill of materials

Description	Material	Thickness
14' diameter cone bottom	Fiberglass (Hetron 980 Resin)	0.790"
14'diameter shell	Fiberglass (Hetron 980 Resin)	0.446"
14'diameter flat top	Fiberglass (Hetron 980 Resin)	0.519"

Schedule of Fittings

SYMBOL	Description	Material
1	6" RF Flange	Fiberglass (Hetron 980 Resin)
2	24" Flange	Fiberglass (Hetron 980 Resin)
3	2" RF Flange	Fiberglass (Hetron 980 Resin)
4	8" RF Flange	Fiberglass (Hetron 980 Resin)
5	3" RF Flange	Fiberglass (Hetron 980 Resin)
6	2" RF Flange	Fiberglass (Hetron 980 Resin)
7	3" RF Flange	Fiberglass (Hetron 980 Resin)
8	4" RF Flange	Fiberglass (Hetron 980 Resin)

SYM.	DRAWING REVISIONS	CHKD. BY	DATE	DWN. BY
6	Added Chemineer Model 5HTD-20 Mixer w/25HP motor to top of tank			
5	Added Mixer frame to top of tank			
4	Added W10x39 Mixer frame support to top of tank			
3	Added 24" Protectoseal emergency pressure relief manway 316 stainless steel pressure set @ +3" WC, mates w/ASA flange			
2	Added 3" -RF Fiberglass flange w/ Hetron resin to top of tank		02/11/03	DM
1	Added 4" -RF Fiberglass flange w/ Hetron resin to top of tank		12/07/02	DM

TITLE: T103, FIGURE E-9.4

PREPARED FOR: PERMA-FIX TREATMENT SERVICES
2700 S. 25th West Ave * Tulsa, Oklahoma 74107

SCALE: No Scale	APPROVED BY: D. Rokisky	DRAWN: GDN
DATE: 5/01/06		REVISED: 2/28/07
AUTOCAD FILE: C:\MyFiles\Tulsa\Sub-Part BB		DRAWING NUMBER: T102

Daryl Worley
2655 SE Evergreen Dr.
Bartlesville, OK 74006
Phone 918-333-2292
Mobile 918-440-3186
daryl_worley@sbcglobal.net

T107

Mr. Rob Boyd
A Clean Environment
2700 South 25th West Ave
Tulsa, OK 74107

RE: Tank 107 Certification

Dear Mr. Boyd:

In accordance with your request I have reviewed the design and made a visual inspection of the above referenced tank.

The tank was filled with water. The liquid level was measured and recorded. Twenty-four hours later the liquid level was again measured. This measurement revealed the tank was not leaking.

A visual examination of the tank was made. This visual examination did not reveal any signs of leaks. The structural integrity of the tank did not appear to be compromised.

Per the documents provided by you to me the tank is constructed of Fiberglass and lined with C-Veil. The material the tank is constructed and lined with is compatible with the material that will be contained in the tank.

At the time of the inspection no piping was connected to the tank.

Information provided by A Clean Environment did not indicate the tank would be operated above normal atmospheric pressures. The sustained temperature should not exceed 160° F. The tank should not be allowed to exceed 200° F for more than 1 hr.

No inspection of the secondary containment was made. The containment was also not evaluated as to the capacity. The tank appears to be structurally sound and is fit for service at normal atmospheric pressures.

I certify under penalty of law this document was prepared under my direction or supervision according to a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief true, accurate, and complete. I am aware there significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Please contact me if you have questions concerning this letter.

Sincerely,

Daryl Worley

Daryl Worley, P.E.
Oklahoma PE 19305
6-6-2009

REGISTERED PROFESSIONAL ENGINEER
DARYL LEE WORLEY
19305
OKLAHOMA

Daryl Worley 6-6-2009

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Assessment of Tank T-107 Replacement; Tank Design, Foundation, Connections, Controls, Compatibility

The Replacement, In Kind, of Tank T-107 located in Tulsa Acid Neutralization Facility has been evaluated and assessed according to 40 CFR 264.192.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

DocuSigned by
Brad Cummock
Brad Cummock, PE
Project Engineer
(OII # 82599)

DocuSigned by
Vaughn Thurgood
Vaughn Thurgood, PE
VP Engineering
(OK # 29507)

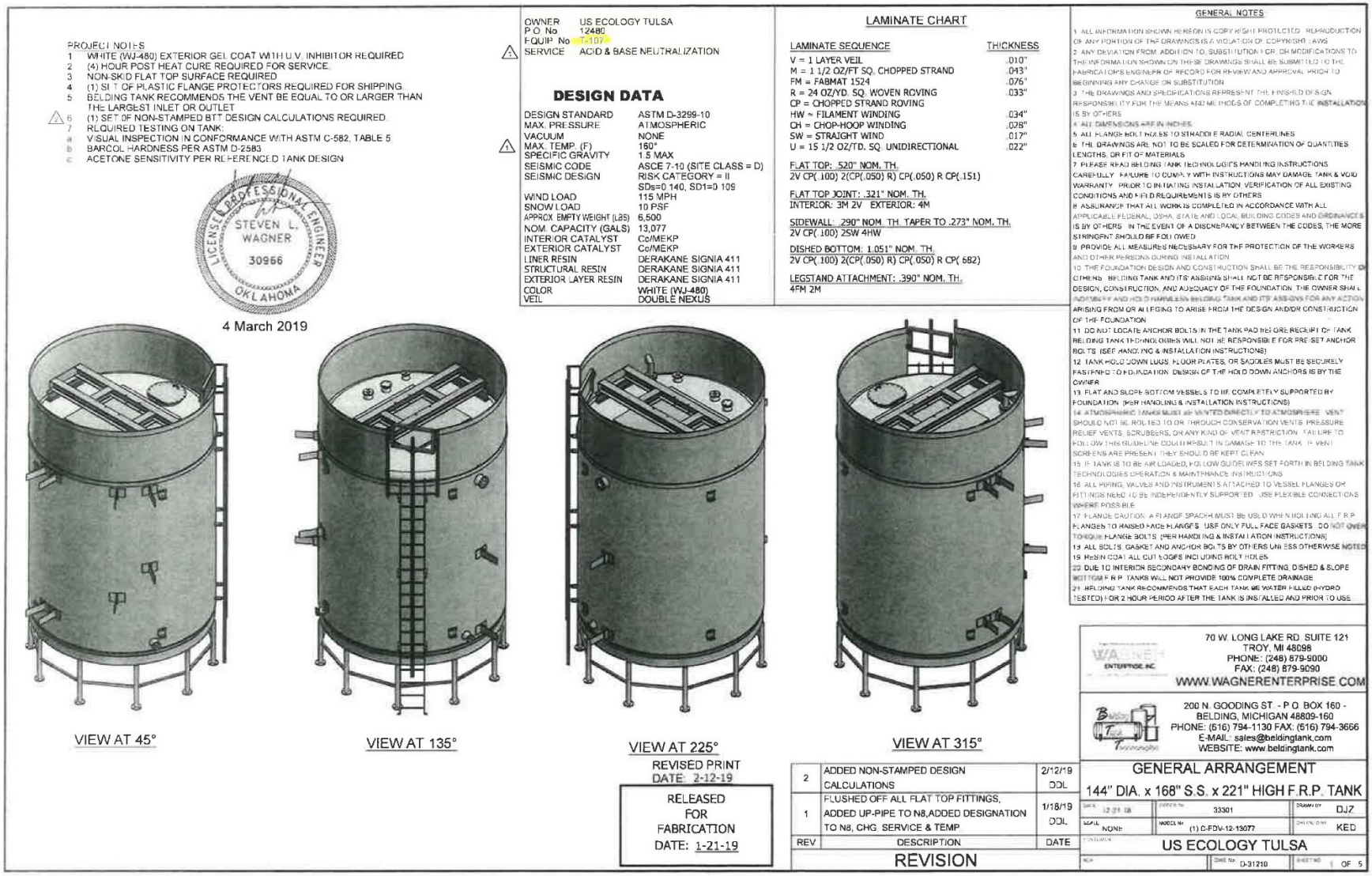
Referenced Documents:

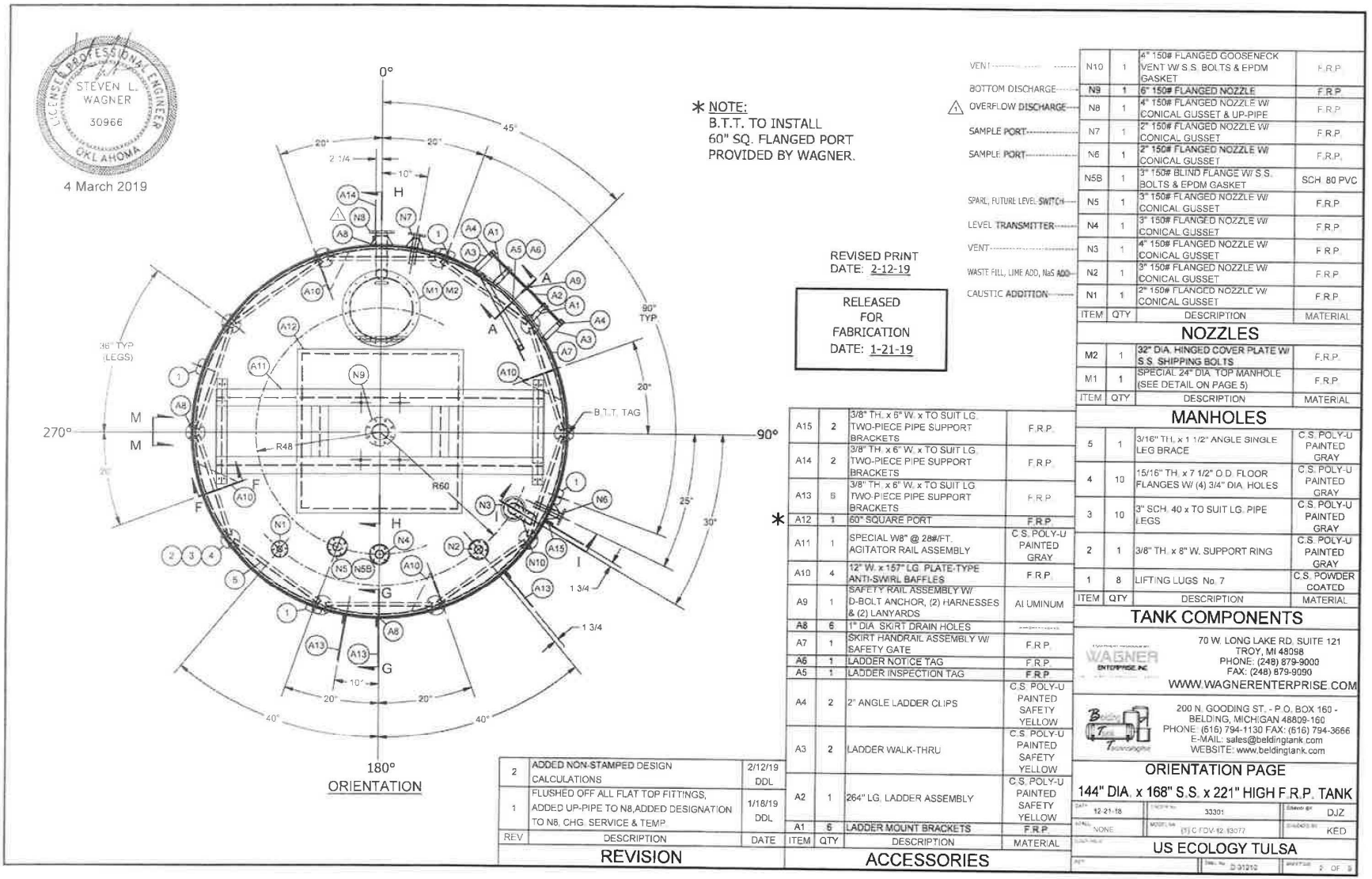
1. Tank and Pipe Assessment – Brad Cummock (Revised 3-7-19)
2. Facility Foundation Assessment – Williams Brothers Engineering (Revised Dec 1990)
3. Tank 107 Foundation Load - Brad Cummock (Revised 3-7-19)
4. Tank Manufacturer Design Drawings – Wagner Enterprise (Revised 2-12-19)
5. Tank Design Calculations – Belding Tank Technologies (Revised 3-4-19)
6. Legacy Tank Foundation Drawings - Williams Brothers (1990)

DocuSign Envelope ID: 63158181-4B1D-4657-8C91-723B029EB8C7

US ecology

7. Mixer Detail Drawing – Brawn Mixer (Revised 11-28-18)
8. Legacy Tank Display Panel – SW Controls (Revised 7-23-14)
9. Legacy Tank Layout – Perma Fix (Revised 5-1-06)
10. Legacy 1997 Tank Name Plate (image)
11. Dekrane Resin Selection Guide – Ashland (2018)
12. Hetron Resin Selection Guide – Ashland (2010)
13. Dekrane Chemical Resistance Summary – Ashland (2018)
14. Pure Flex Control Valve Order - Control Process Systems (Revised 10-16-18)
15. Pure Flex 400 Series Valve Material Specs – PureFlex Inc. (Downloaded 2019)
16. 40 CFR §264.192 citation from ODEQ (1-18-19)
17. 40 CFR §270.11 citation from EPA (7-1-12)


PROJECT NOTES
1 WHITE (WJ-480) EXTERIOR GEL COAT WITH U.V. INHIBITOR REQUIRED
2 (4) HOUR POST HEAT CURE REQUIRED FOR SERVICE.
3 NON-SKID FLAT TOP SURFACE REQUIRED
4 (1) SET OF PLASTIC FLANGE PROTECTORS REQUIRED FOR SHIPPING.
5 BELDING TANK RECOMMENDS THE VENT BE EQUAL TO OR LARGER THAN THE LARGEST INLET OR OUTLET
6 (1) SET OF NON-STAMPED BTT DESIGN CALCULATIONS REQUIRED.
7 REQUIRED TESTING ON TANK:
a VISUAL INSPECTION IN CONFORMANCE WITH ASTM C-582, TABLE 5
b BARCOL HARDNESS PER ASTM D-2583
c ACETONE SENSITIVITY PER REFERENCED TANK DESIGN
STEVEN L. WAGNER
30966
LICENSED PROFESSIONAL ENGINEER
OKLAHOMA
4 March 2019
OWNER US ECOLOGY TULSA
P.O. No 12480
EQUIP No T-107
SERVICE ACID & BASE NEUTRALIZATION
DESIGN DATA
DESIGN STANDARD ASTM D-3299-10
MAX. PRESSURE ATMOSPHERIC
VACUUM NONE
MAX. TEMP. (F) 160°
SPECIFIC GRAVITY 1.5 MAX
SEISMIC CODE ASCE 7-10 (SITE CLASS = D)
SEISMIC DESIGN RISK CATEGORY = II
SDs=0.140, SD1=0.109
WIND LOAD 115 MPH
SNOW LOAD 10 PSF
APPROX. EMPTY WEIGHT (LBS) 6,500
NOM. CAPACITY (GALS) 13,077
INTERIOR CATALYST Co/MEKP
EXTERIOR CATALYST Co/MEKP
LINER RESIN DERAKANE SIGNIA 411
STRUCTURAL RESIN DERAKANE SIGNIA 411
EXTERIOR LAYER RESIN DERAKANE SIGNIA 411
COLOR WHITE (WJ-480)
VEIL DOUBLE NEXUS
LAMINATE CHART
LAMINATE SEQUENCE THICKNESS
V = 1 LAYER VEIL .010"
M = 1 1/2 OZ/FT SQ. CHOPPED STRAND .043"
FM = FABMAT 1524 .076"
R = 24 OZ/YD. SQ. WOVEN ROVING .033"
CP = CHOPPED STRAND ROVING
HW = FILAMENT WINDING .034"
CH = CHOP-HOOP WINDING .028"
SW = STRAIGHT WIND .017"
U = 15 1/2 OZ/TD. SQ. UNIDIRECTIONAL .022"
FLAT TOP: .520" NOM. TH.
2V CP(.100) 2(CP(.050) R) CP(.050) R CP(.151)
FLAT TOP JOINT: .321" NOM. TH.
INTERIOR: 3M 2V EXTERIOR: 4M
SIDEWALL: .290" NOM. TH. TAPER TO .273" NOM. TH.
2V CP(.100) 2SW 4HW
DISHED BOTTOM: 1.051" NOM. TH.
2V CP(.100) 2(CP(.050) R) CP(.050) R CP(.682)
LEGS/AND ATTACHMENT: .390" NOM. TH.
4FM 2M
GENERAL NOTES
1 ALL INFORMATION SHOWN HEREON IS COPYRIGHT PROTECTED. REPRODUCTION OF ANY PORTION OF THE DRAWINGS IS A VIOLATION OF COPYRIGHT LAWS
2 ANY DEVIATION FROM, ADDITION TO, SUBSTITUTION FOR, OR MODIFICATIONS TO THE INFORMATION SHOWN ON THESE DRAWINGS SHALL BE SUBMITTED TO THE FABRICATOR'S ENGINEER OF RECORD FOR REVIEW AND APPROVAL PRIOR TO BEGINNING ANY CHANGE OR SUBSTITUTION
3 THE DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED DESIGN. RESPONSIBILITY FOR THE MEANS AND METHODS OF COMPLETING THE INSTALLATION IS BY OTHERS
4 ALL DIMENSIONS ARE IN INCHES.
5 ALL FLANGE BOLT HOLES TO STRADDLE RADIAL CENTERLINES
6 THE DRAWINGS ARE NOT TO BE SCALED FOR DETERMINATION OF QUANTITIES, LENGTHS, OR FIT OF MATERIALS
7 PLEASE READ BELDING TANK TECHNOLOGIES HANDLING INSTRUCTIONS CAREFULLY. FAILURE TO COMPLY WITH INSTRUCTIONS MAY DAMAGE TANK & VOID WARRANTY. PRIOR TO INITIATING INSTALLATION, VERIFICATION OF ALL EXISTING CONDITIONS AND FIELD REQUIREMENTS IS BY OTHERS
8 ASSURANCE THAT ALL WORK IS COMPLETED IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, OSHA, STATE AND LOCAL BUILDING CODES AND ORDINANCES IS BY OTHERS. IN THE EVENT OF A DISCREPANCY BETWEEN THE CODES, THE MORE STRINGENT SHOULD BE FOLLOWED
9 PROVIDE ALL MEASURES NECESSARY FOR THE PROTECTION OF THE WORKERS AND OTHER PERSONS DURING INSTALLATION
10 THE FOUNDATION DESIGN AND CONSTRUCTION SHALL BE THE RESPONSIBILITY OF OTHERS. BELDING TANK AND ITS' ASSIGNS SHALL NOT BE RESPONSIBLE FOR THE DESIGN, CONSTRUCTION, AND ADEQUACY OF THE FOUNDATION. THE OWNER SHALL INDEMNIFY AND HOLD HARMLESS BELDING TANK AND ITS' ASSIGNS FOR ANY ACTION ARISING FROM OR ALLEGING TO ARISE FROM THE DESIGN AND/OR CONSTRUCTION OF THE FOUNDATION
11 DO NOT LOCATE ANCHOR BOLTS IN THE TANK PAD BEFORE RECEIPT OF TANK. BELDING TANK TECHNOLOGIES WILL NOT BE RESPONSIBLE FOR PRE-SET ANCHOR BOLTS. (SEE HANDLING & INSTALLATION INSTRUCTIONS)
12 TANK HOLD DOWN LUGS, FLOOR PLATES, OR SADDLES MUST BE SECURELY FASTENED TO FOUNDATION. DESIGN OF THE HOLD DOWN ANCHORS IS BY THE OWNER
13 FLAT AND SLOPE BOTTOM VESSELS TO BE COMPLETELY SUPPORTED BY FOUNDATION. (PER HANDLING & INSTALLATION INSTRUCTIONS)
14 ATMOSPHERIC TANKS MUST BE VENTED DIRECTLY TO ATMOSPHERE. VENT SHOULD NOT BE ROUTED TO OR THROUGH CONSERVATION VENTS, PRESSURE RELIEF VENTS, SCRUBBERS, OR ANY KIND OF VENT RESTRICTION. FAILURE TO FOLLOW THIS GUIDELINE COULD RESULT IN DAMAGE TO THE TANK. IF VENT SCREENS ARE PRESENT, THEY SHOULD BE KEPT CLEAN
15 IF TANK IS TO BE AIR LOADED, FOLLOW GUIDELINES SET FORTH IN BELDING TANK TECHNOLOGIES OPERATION & MAINTENANCE INSTRUCTIONS
16 ALL PIPING, VALVES AND INSTRUMENTS ATTACHED TO VESSEL FLANGES OR FITTINGS NEED TO BE INDEPENDENTLY SUPPORTED. USE FLEXIBLE CONNECTIONS WHERE POSSIBLE
17 FLANGE CAUTION: A FLANGE SPACER MUST BE USED WHEN BOLTING ALL F.R.P. FLANGES TO RAISED FACE FLANGES. USE ONLY FULL FACE GASKETS. DO NOT OVER TORQUE FLANGE BOLTS. (PER HANDLING & INSTALLATION INSTRUCTIONS)
18 ALL BOLTS, GASKET AND ANCHOR BOLTS BY OTHERS UNLESS OTHERWISE NOTED
19 RESIN COAT ALL CUT EDGES INCLUDING BOLT HOLES
20 DUE TO INTERIOR SECONDARY BONDING OF DRAIN FITTING, DISHED & SLOPE BOTTOM F.R.P. TANKS WILL NOT PROVIDE 100% COMPLETE DRAINAGE
21 BELDING TANK RECOMMENDS THAT EACH TANK BE WATER FILLED (HYDRO TESTED) FOR 2 HOUR PERIOD AFTER THE TANK IS INSTALLED AND PRIOR TO USE
VIEW AT 45°
VIEW AT 135°
VIEW AT 225°
VIEW AT 315°
REVISED PRINT
DATE: 2-12-19
RELEASED FOR FABRICATION
DATE: 1-21-19
REV DESCRIPTION DATE
2 ADDED NON-STAMPED DESIGN CALCULATIONS 2/12/19 DDL
1 FLUSHED OFF ALL FLAT TOP FITTINGS, ADDED UP-PIPE TO N8,ADDED DESIGNATION TO N8, CHG. SERVICE & TEMP. 1/18/19 DDL
REVISION
WAGNER ENTERPRISE, INC.
70 W. LONG LAKE RD. SUITE 121
TROY, MI 48098
PHONE: (248) 879-9000
FAX: (248) 879-9090
WWW.WAGNERENTERPRISE.COM
BELDING TANK TECHNOLOGIES
200 N. GOODING ST. - P.O. BOX 160 -
BELDING, MICHIGAN 48809-160
PHONE: (616) 794-1130 FAX: (616) 794-3666
E-MAIL: sales@beldingtank.com
WEBSITE: www.beldingtank.com
GENERAL ARRANGEMENT
144" DIA. x 168" S.S. x 221" HIGH F.R.P. TANK
DATE 12-21-18 ORDER No 33301 DRAWN BY DJZ
SCALE NONE MODEL No (1) C-FDV-12-13077 CHECKED BY KED
CUSTOMER US ECOLOGY TULSA
JOB No D-31210 SHEET NO 1 OF 5



ITEM	QTY	DESCRIPTION	MATERIAL
N10	1	4" 150# FLANGED GOOSENECK VENT W/ S.S. BOLTS & EPDM GASKET	F.R.P.
N9	1	6" 150# FLANGED NOZZLE	F.R.P.
N8	1	4" 150# FLANGED NOZZLE W/ CONICAL GUSSET & UP-PIPE	F.R.P.
N7	1	2" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N6	1	2" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N5B	1	3" 150# BLIND FLANGE W/ S.S. BOLTS & EPDM GASKET	SCH. 80 PVC
N5	1	3" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N4	1	3" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N3	1	4" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N2	1	3" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N1	1	2" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.

NOZZLES

ITEM	QTY	DESCRIPTION	MATERIAL
M2	1	32" DIA. HINGED COVER PLATE W/ S.S. SHIPPING BOLTS	F.R.P.
M1	1	SPECIAL 24" DIA. TOP MANHOLE (SEE DETAIL ON PAGE 5)	F.R.P.

MANHOLES

ITEM	QTY	DESCRIPTION	MATERIAL
5	1	3/16" TH. x 1 1/2" ANGLE SINGLE LEG BRACE	C.S. POLY-U PAINTED GRAY
4	10	15/16" TH. x 7 1/2" O.D. FLOOR FLANGES W/ (4) 3/4" DIA. HOLES	C.S. POLY-U PAINTED GRAY
3	10	3" SCH. 40 x TO SUIT LG. PIPE LEGS	C.S. POLY-U PAINTED GRAY
2	1	3/8" TH. x 8" W. SUPPORT RING	C.S. POLY-U PAINTED GRAY
1	8	LIFTING LUGS No. 7	C.S. POWDER COATED

TANK COMPONENTS

ITEM	QTY	DESCRIPTION	MATERIAL
A15	2	3/8" TH. x 6" W. x TO SUIT LG. TWO-PIECE PIPE SUPPORT BRACKETS	F.R.P.
A14	2	3/8" TH. x 6" W. x TO SUIT LG. TWO-PIECE PIPE SUPPORT BRACKETS	F.R.P.
A13	8	3/8" TH. x 6" W. x TO SUIT LG. TWO-PIECE PIPE SUPPORT BRACKETS	F.R.P.
A12	1	60" SQUARE PORT	F.R.P.
A11	1	SPECIAL W8" @ 28#/FT. AGITATOR RAIL ASSEMBLY	C.S. POLY-U PAINTED GRAY
A10	4	12" W. x 157" LG. PLATE-TYPE ANTI-SWIRL BAFFLES	F.R.P.
A9	1	SAFETY RAIL ASSEMBLY W/ D-BOLT ANCHOR, (2) HARNESSES & (2) LANYARDS	ALUMINUM
A8	6	1" DIA. SKIRT DRAIN HOLES	---
A7	1	SKIRT HANDRAIL ASSEMBLY W/ SAFETY GATE	F.R.P.
A6	1	LADDER NOTICE TAG	F.R.P.
A5	1	LADDER INSPECTION TAG	F.R.P.
A4	2	2' ANGLE LADDER CLIPS	C.S. POLY-U PAINTED SAFETY YELLOW
A3	2	LADDER WALK-THRU	C.S. POLY-U PAINTED SAFETY YELLOW
A2	1	264" LG. LADDER ASSEMBLY	C.S. POLY-U PAINTED SAFETY YELLOW
A1	6	LADDER MOUNT BRACKETS	F.R.P.

ACCESSORIES

REV	DESCRIPTION	DATE
2	ADDED NON-STAMPED DESIGN CALCULATIONS	2/12/19 DDL
1	FLUSHED OFF ALL FLAT TOP FITTINGS, ADDED UP-PIPE TO N8, ADDED DESIGNATION TO N8, CHG. SERVICE & TEMP.	1/18/19 DDL

REVISION

WAGNER ENTERPRISE, INC.
70 W. LONG LAKE RD. SUITE 121
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PHONE: (248) 879-9000
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E-MAIL: sales@beldingtank.com
WEBSITE: www.beldingtank.com

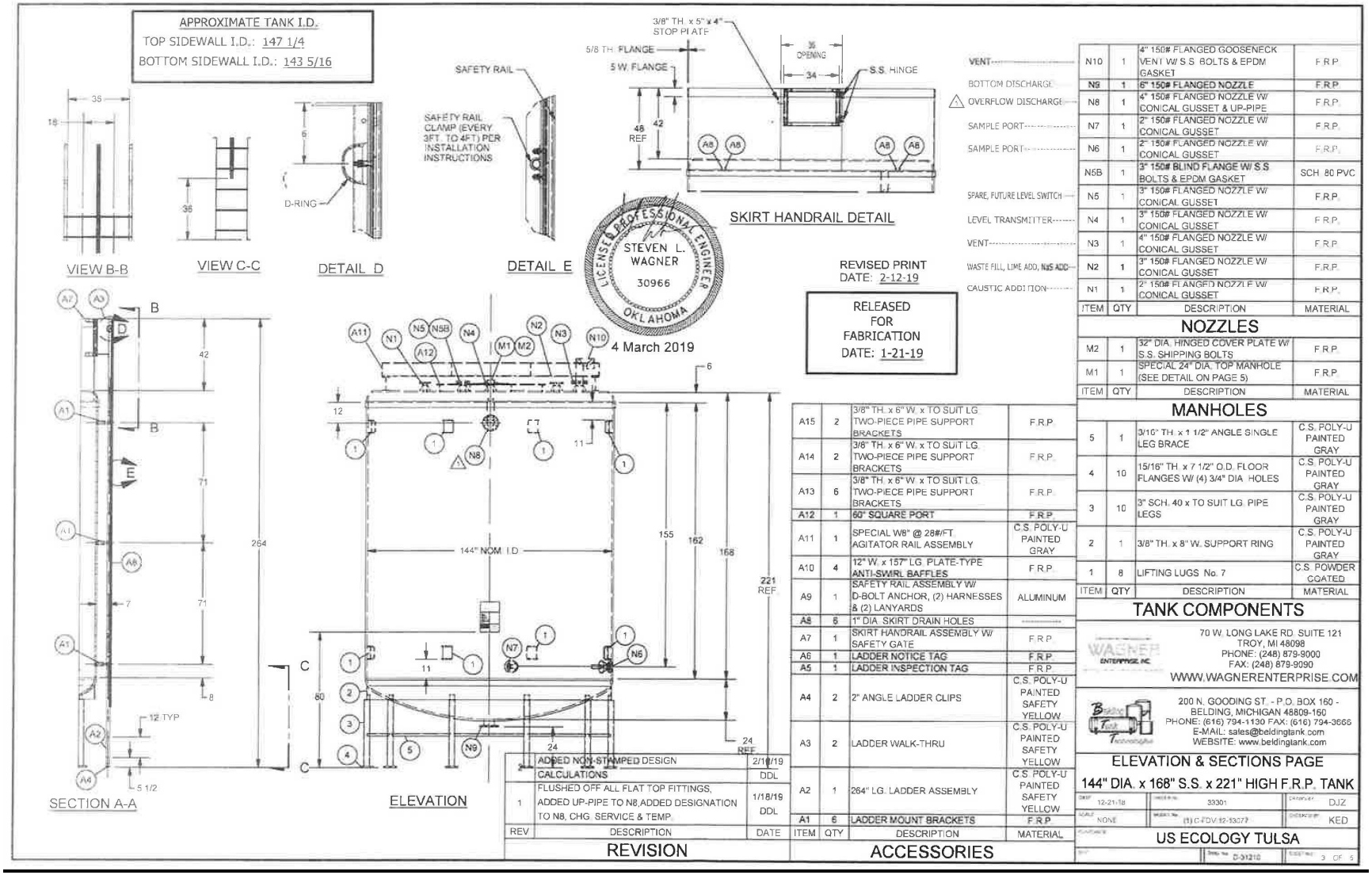
ORIENTATION PAGE

144" DIA. x 168" S.S. x 221" HIGH F.R.P. TANK

DATE	ENGR. NO.	DRAWN BY
12-21-18	33301	DJZ
MATL.	MODEL No.	CHECKED BY
NONE	[T] C FDV-12-33072	KED

US ECOLOGY TULSA

SHT. No. D-91212 SHEET 2 OF 5



ITEM	QTY	DESCRIPTION	MATERIAL
N10	1	4" 150# FLANGED GOOSENECK VENT W/ S.S. BOLTS & EPDM GASKET	F.R.P.
N9	1	6" 150# FLANGED NOZZLE	F.R.P.
N8	1	4" 150# FLANGED NOZZLE W/ CONICAL GUSSET & UP-PIPE	F.R.P.
N7	1	2" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N6	1	2" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N5B	1	3" 150# BLIND FLANGE W/ S.S. BOLTS & EPDM GASKET	SCH. 80 PVC
N5	1	3" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N4	1	3" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N3	1	4" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N2	1	3" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N1	1	2" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.

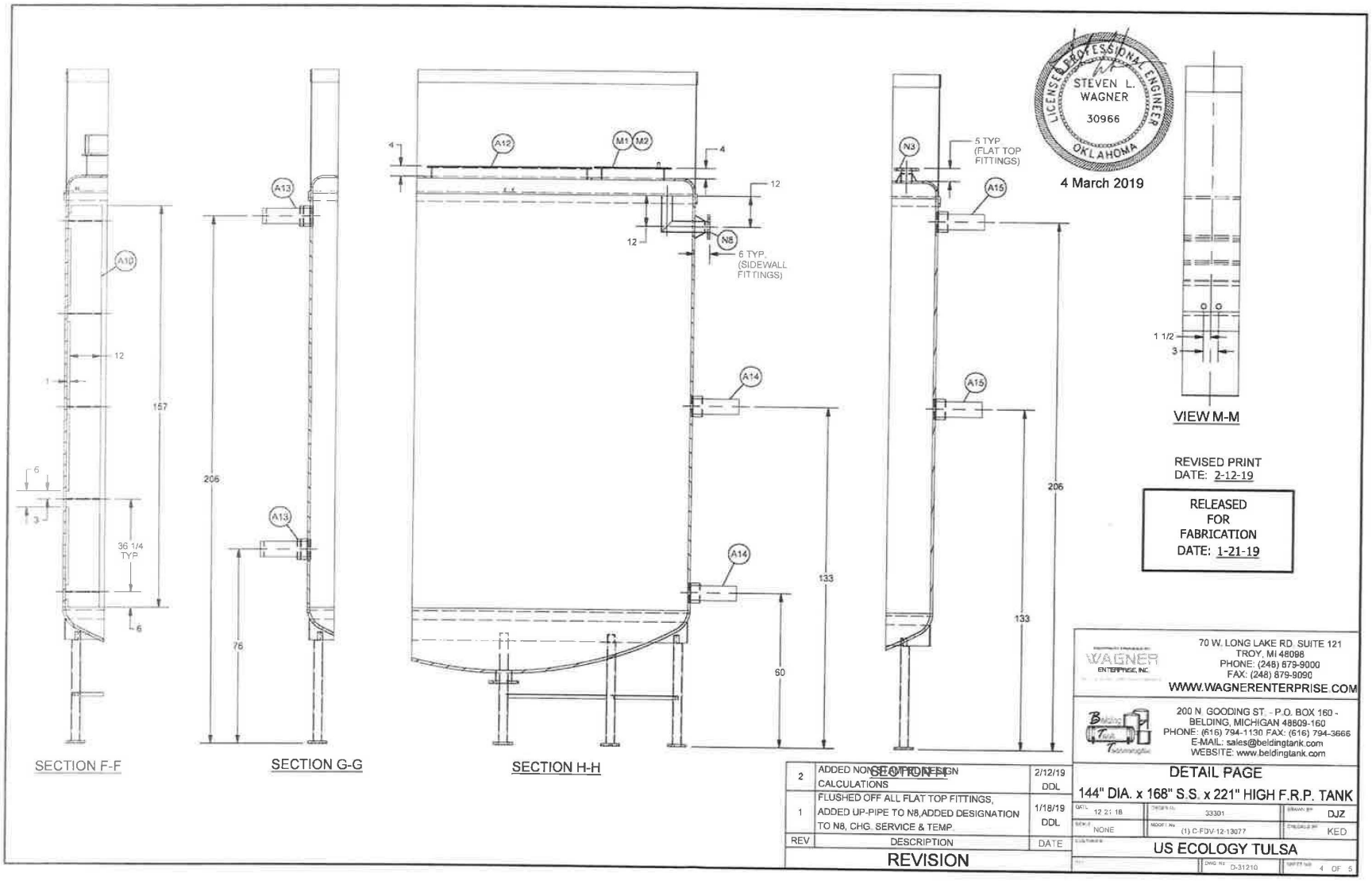
ITEM	QTY	DESCRIPTION	MATERIAL
M2	1	32" DIA. HINGED COVER PLATE W/ S.S. SHIPPING BOLTS	F.R.P.
M1	1	SPECIAL 24" DIA. TOP MANHOLE (SEE DETAIL ON PAGE 5)	F.R.P.

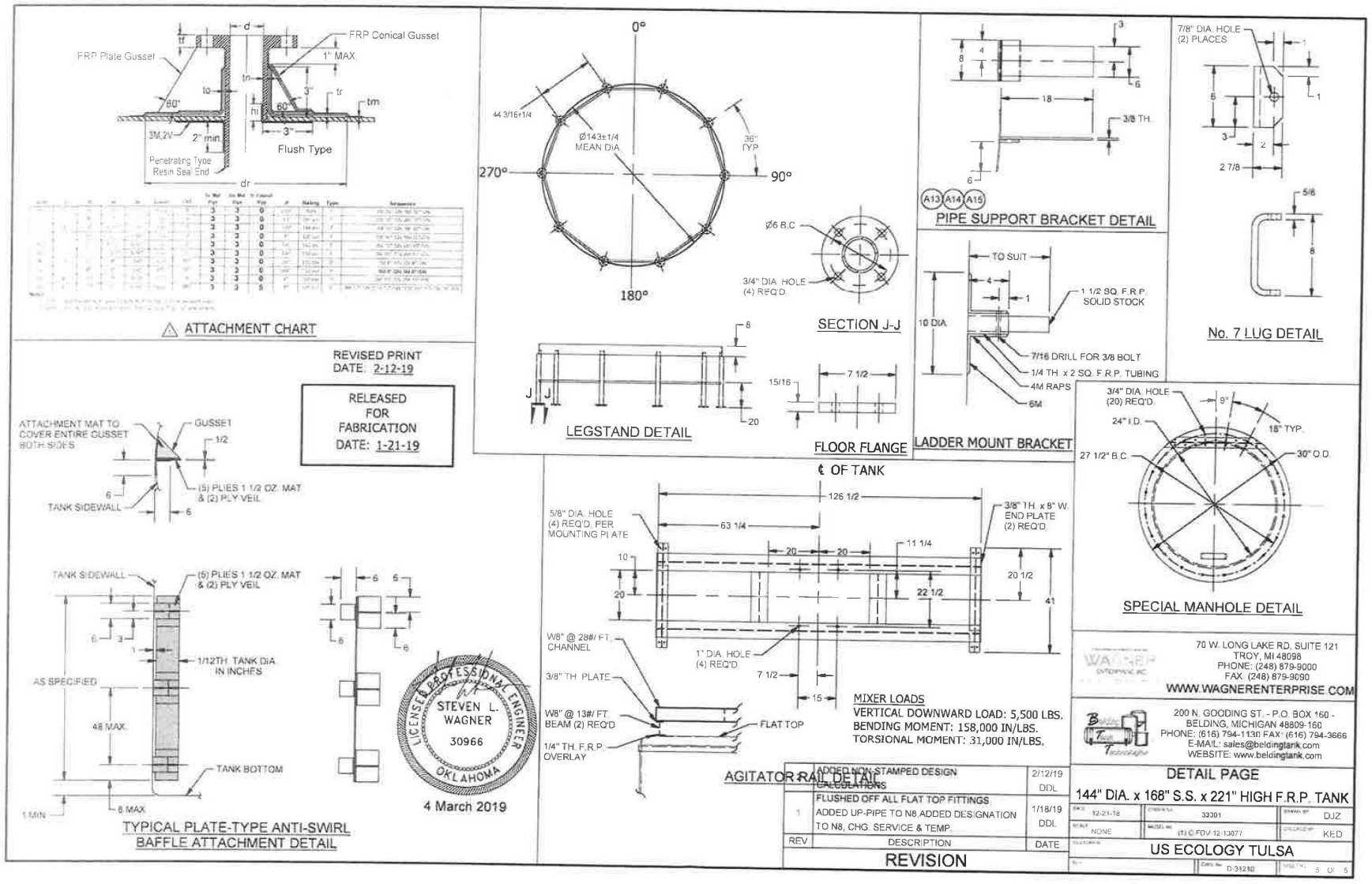
ITEM	QTY	DESCRIPTION	MATERIAL
5	1	3/16" TH. x 1 1/2" ANGLE SINGLE LEG BRACE	C.S. POLY-U PAINTED GRAY
4	10	15/16" TH. x 7 1/2" O.D. FLOOR FLANGES W/ (4) 3/4" DIA. HOLES	C.S. POLY-U PAINTED GRAY
3	10	3" SCH. 40 x TO SUIT LG. PIPE LEGS	C.S. POLY-U PAINTED GRAY
2	1	3/8" TH. x 8" W. SUPPORT RING	C.S. POLY-U PAINTED GRAY
1	8	LIFTING LUGS No. 7	C.S. POWDER COATED

ITEM	QTY	DESCRIPTION	MATERIAL
A15	2	3/8" TH. x 6" W. x TO SUIT LG. TWO-PIECE PIPE SUPPORT BRACKETS	F.R.P.
A14	2	3/8" TH. x 6" W. x TO SUIT LG. TWO-PIECE PIPE SUPPORT BRACKETS	F.R.P.
A13	6	3/8" TH. x 6" W. x TO SUIT LG. TWO-PIECE PIPE SUPPORT BRACKETS	F.R.P.
A12	1	60" SQUARE PORT	F.R.P.
A11	1	SPECIAL W8" @ 28#/FT. AGITATOR RAIL ASSEMBLY	C.S. POLY-U PAINTED GRAY
A10	4	12" W. x 157" LG. PLATE-TYPE ANTI-SWIRL BAFFLES	F.R.P.
A9	1	SAFETY RAIL ASSEMBLY W/ D-BOLT ANCHOR, (2) HARNESSES & (2) LANYARDS	ALUMINUM
A8	6	1" DIA. SKIRT DRAIN HOLES	
A7	1	SKIRT HANDRAIL ASSEMBLY W/ SAFETY GATE	F.R.P.
A6	1	LADDER NOTICE TAG	F.R.P.
A5	1	LADDER INSPECTION TAG	F.R.P.
A4	2	2" ANGLE LADDER CLIPS	C.S. POLY-U PAINTED SAFETY YELLOW
A3	2	LADDER WALK-THRU	C.S. POLY-U PAINTED SAFETY YELLOW
A2	1	264" LG. LADDER ASSEMBLY	C.S. POLY-U PAINTED SAFETY YELLOW
A1	6	LADDER MOUNT BRACKETS	F.R.P.

REV	DESCRIPTION	DATE
2	ADDED NON-STAMPED DESIGN	2/19/19
	CALCULATIONS	DDL
1	FLUSHED OFF ALL FLAT TOP FITTINGS, ADDED UP-PIPE TO N8,ADDED DESIGNATION TO N8, CHG. SERVICE & TEMP.	1/18/19 DDL

DATE	DRAWING No.	DRAWN BY
12-21-18	33301	DJZ
SCALE NONE	WORK No. (S) C-FDV-12-13077	CHECKED BY KED
PURCHASE No.	JOB No. D-31218	SHEET No. 3 OF 5


SECTION F-F
SECTION G-G
SECTION H-H
VIEW M-M
LICENSED PROFESSIONAL ENGINEER
STEVEN L. WAGNER
30966
OKLAHOMA
4 March 2019
REVISED PRINT
DATE: 2-12-19
RELEASED
FOR
FABRICATION
DATE: 1-21-19
5 TYP (FLAT TOP FITTINGS)
6 TYP. (SIDEWALL FITTINGS)
36 1/4 TYP
206
157
133
60
76
70 W. LONG LAKE RD. SUITE 121
TROY, MI 48098
PHONE: (248) 879-9000
FAX: (248) 879-9090
WWW.WAGNERENTERPRISE.COM
200 N. GOODING ST. - P.O. BOX 160 -
BELDING, MICHIGAN 48809-160
PHONE: (616) 794-1130 FAX: (616) 794-3666
E-MAIL: sales@beldingtank.com
WEBSITE: www.beldingtank.com
DETAIL PAGE
144" DIA. x 168" S.S. x 221" HIGH F.R.P. TANK
US ECOLOGY TULSA
REVISION
2 ADDED NOZZLE DESIGN CALCULATIONS 2/12/19 DDL
1 FLUSHED OFF ALL FLAT TOP FITTINGS, ADDED UP-PIPE TO N8,ADDED DESIGNATION TO N8, CHG. SERVICE & TEMP. 1/18/19 DDL
REV DESCRIPTION DATE


ATTACHMENT CHART
REVISED PRINT
DATE: 2-12-19
RELEASED
FOR
FABRICATION
DATE: 1-21-19
FRP Plate Gusset
FRP Conical Gusset
Flush Type
Penetrating Tyoe
Resin Seal End
LEGSTAND DETAIL
SECTION J-J
FLOOR FLANGE
PIPE SUPPORT BRACKET DETAIL
LADDER MOUNT BRACKET
No. 7 LUG DETAIL
SPECIAL MANHOLE DETAIL
¢ OF TANK
AGITATOR RAIL DETAIL
MIXER LOADS
VERTICAL DOWNWARD LOAD: 5,500 LBS.
BENDING MOMENT: 158,000 IN/LBS.
TORSIONAL MOMENT: 31,000 IN/LBS.
TYPICAL PLATE-TYPE ANTI-SWIRL
BAFFLE ATTACHMENT DETAIL
4 March 2019
STEVEN L. WAGNER
30966
OKLAHOMA
70 W. LONG LAKE RD, SUITE 121
TROY, MI 48098
PHONE: (248) 879-9000
FAX: (248) 879-9090
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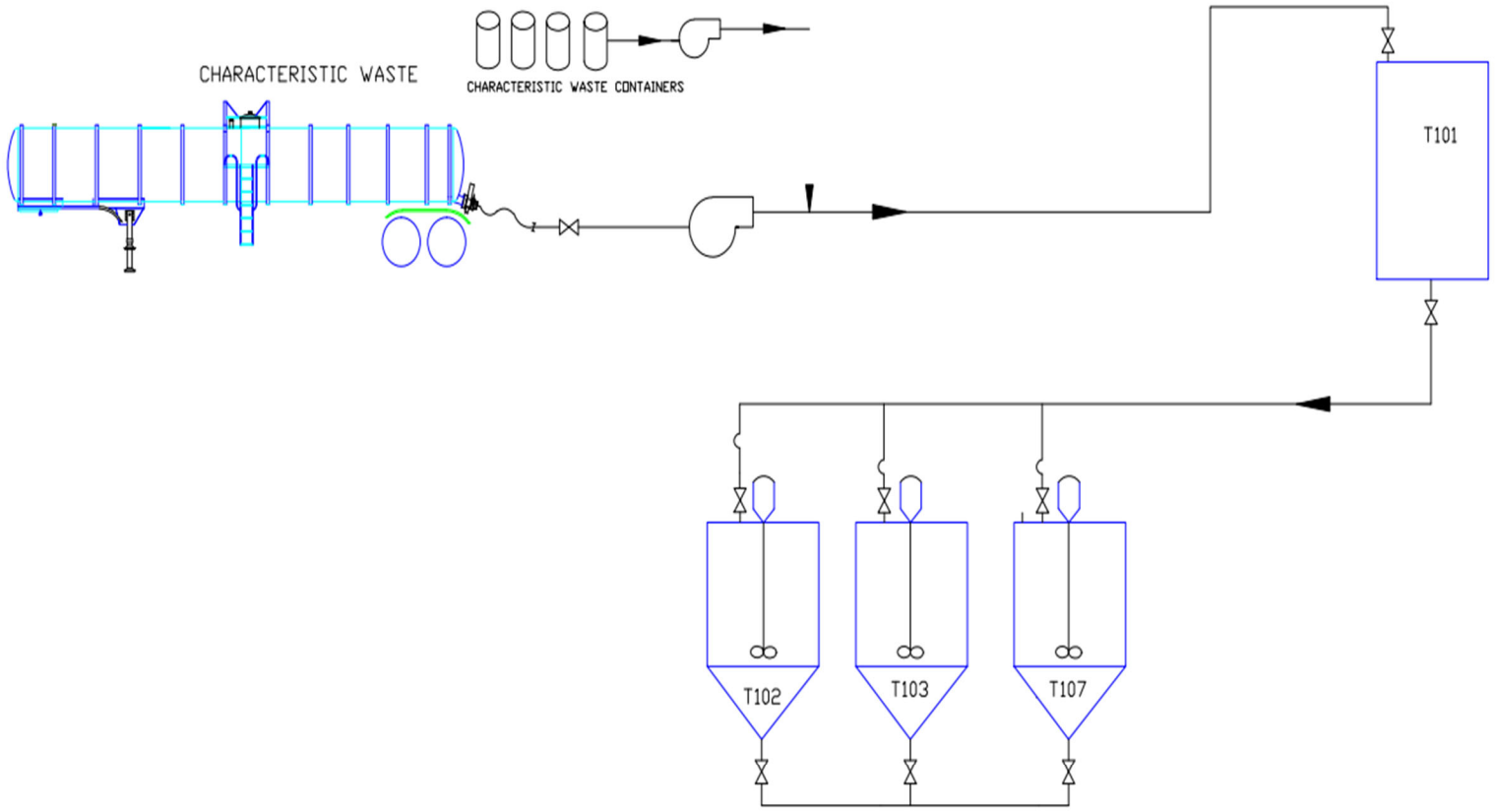
144" DIA. x 168" S.S. x 221" HIGH F.R.P. TANK
US ECOLOGY TULSA
REVISION
2/12/19 DDL ADDED NON-STAMPED DESIGN CALCULATIONS
1/18/19 DDL 1 FLUSHED OFF ALL FLAT TOP FITTINGS. ADDED UP-PIPE TO N8.ADDED DESIGNATION TO N8, CHG. SERVICE & TEMP.
REV DESCRIPTION DATE

Appendix 2- Process Diagram for Tank Farm 1 Tank System



Waste is transferred to storage tanks from tankers or containers using compatible hoses and pump transfer systems. After this, the waste is stored and/or treated.

Appendix 3 - Tank Farm 1 (TF-1) Detailed Information

I. Unit Description

The US Ecology Tulsa, Inc. (USE Tulsa) hazardous waste Tank Farm 1 (TF-1) has a permitted storage capacity for 69,797 gallons of hazardous waste liquids. Containment requirements are based on storage of liquid hazardous wastes. Information regarding tank designation, material of construction, tank age, and nominal capacity for TF-1 is summarized in Appendix 7 - Hazardous Waste Tank System Summary which is presented at the end of this appendix.

Tank farm TF-1 has four (4) vertical above ground tanks, designated for hazardous waste service, which are located in a secondary containment system. Tank T-101 is a fiberglass, elevated cone bottom tank. Tanks T-102 and T-103 are cone bottom tanks set on legs and are fiberglass lined with C-Viel (vinylester). Tanks 102 and 103 are equipped with top beam mounted mixers. Chemical and heat resistance are provided by the structural and lining material. Tank T-107 is a fiberglass cone bottom tank on legs.

II. Basic Design Parameters, Dimensions, and Materials of Construction

Tank T-101 was manufactured by Atlas Tank Company of Yale, Oklahoma. A visual inspection was performed on all tanks during installation by a Williams Brothers Engineering Company representative. No evidence of punctures, scrapes, cracks, or other structural damage was identified by the inspection which might result in premature failure. After the tank was placed on its foundation, it was filled to capacity with water and held for a period of 24 hours. No leaks and/or evidence of leaks were detected, in T-101 as indicated by a Williams Brothers Engineering Company representative.

Tanks T-102 and T-103 were manufactured by Palmer Manufacturing and Tank, Inc. A visual inspection was performed on T-102 and T-103 after installation by the certifying engineer. No evidence of punctures, scrapes, cracks, or other structural damage was identified by the inspection which might result in premature failure. Tanks T-101, T-102, T-103 and T-107 are elevated cone-bottom tanks, and thus leak inspection is easily available.

Fiberglass material (T-101, T-102, T-103 and T-107) is compatible with alkaline, ignitable, reactive, organic, and acidic wastes.

Tanks taken out of hazardous waste service may undergo partial closure, and subsequently, be used for storage of non-hazardous wastes, product, or stormwater.

III. Containment

TF-1 is equipped with a secondary containment system meeting the requirements of 40 CFR 264.193. Containment calculations are part of this attachment. Details regarding the leak detection system for TF-1 are part of the tank assessment document.

TF-1 is equipped with a leak detection system; the secondary containment system is coated with an impervious, chemically resistant material.

IV. Control of Run-On and Run-Off

TF-1 is equipped with secondary containment structures which will control run-on and run-off.

V. Tank Management Processes

Process equipment located in and adjacent to TF-1 is ancillary to hazardous waste tank management operations. Specifically, ancillary equipment may include portable pumps, screen and canister bag filters (or other filtration equipment), mixing equipment, and other treatment equipment as deemed appropriate.

When service of tanks is changed, USE Tulsa will evaluate the need for decontamination procedures. The tank will be decontaminated when evidence of visual contamination is identified or when "knowledge of process" based on tank usage indicates decontamination is appropriate. Decontamination procedures will consist of one to two washes with water or other appropriate cleaning agent. Wash water will be disposed of in accordance with state and federal regulations.

The tanks are compatible with the waste stored. The facility inspection schedule (presented in Attachment 4 - Inspection Schedules and Forms and Attachment 6- Procedures to Prevent Hazardous) includes inspection of tank systems.

VI. Leak Detection for Ancillary Equipment

Ancillary equipment for tanks T-101, T-102, T-103 and T-107 is located above ground in the secondary containment area which is coated with an impervious coating. The equipment is inspected daily.

VII. Containment Calculations for TF – 1

Note: Containment areas for TF- 1 and CMA-2 are joined. The containment system for CMA-2 has sufficient capacity to contain the total volume of capacity required for container storage (i.e., 10% of total container capacity) plus the excess containment required for TF-1.

GIVEN:

TF-1 average wall height	=	1.77 ft
TF-1 wall length	=	52.8 ft
TF-1 wall width	=	36.0 ft
Tank radius (T-101)	=	6.0 ft
CMA-2 volume	=	1,121 ft3
CMA-2 average wall height	=	12.4 in
Drum radius	=	1.0 ft
Pallet length and width	=	4.0 ft
Pallet height (maximum)	=	8.0 in
25-year, 24-hour rainfall event	=	7 in

CONTAINMENT CAPACITY REQUIRED FOR TF-1:

Volume of largest tank or 10% of total volume of tanks (whichever is greater) + rainfall:

Largest tank	=	19,960 gal
10% of total volume of tanks = 10% x (56,720 gal)	=	5,672 gal

Rainfall:

(7 in)(1 ft/12 in)(52.8 ft)(36.0 ft)(7.48 gal/ft3)	=	8,294 gal

Total requirement:

19,960 gal + 8,294 gal	=	28,254gal

CONTAINMENT CAPACITY AVAILABLE FROM TF-1:

Volume inside containment wall:

(1.77 ft)(52.8 ft)(36.0 ft)(7.48 gal/ft3) = 25,166 gal

Volume displaced by one tank (T-101) to wall height :

[(6.0 ft)2(1.77 ft)(7.48 gal/ft3)]π = 1,497 gal

Volume displaced by other foundations:

(14 ft3)(7.48 gal/ft3) = 105 gal

Total capacity available:

25,166 gal - (1,497 gal + 105 gal) = 23,564 gal

CONTAINMENT CAPACITY REQUIRED FOR CMA-2:

Volume of largest container or 10% of total volume of containers (whichever is greater):

Largest container = 330 gal

10% of total volume of containers = 10% (4,840 gal) = 484 gal

Total requirement: = 484 gal

CONTAINMENT CAPACITY AVAILABLE FOR CMA-2:

Volume inside containment wall:

(1,121 ft3)(7.48 gal/ft3) = 8,385 gal

Volume displaced by drums and pallets to wall height (there is physically only room to fit 14 pallets on the ground, which will hold 56 drums, the remaining volume of drums will be double stacked - above the containment wall height):

[14(4 ft)(4 ft)(8 in)(1 ft/12 in) + 56π(1 ft)2(12.4 in - 8 in)(1 ft/12 in)](7.48 gal/ft3)

= 1,599 gal

Total capacity available:

8,385 gal - 1,599 gal = 6,786 gal

CONTAINMENT CAPACITY AVAILABLE FROM TF-1 AND CMA-2:

23,564 gal + 6,786 gal	=	30,350 gal

CONTAINMENT CAPACITY REQUIRED FOR TF-1 AND CMA-2:

28,254 gal + 484 gal	=	28,738 gal

EXCESS CONTAINMENT:

30,350 gal - 28,738 gal	=	1,612 gal

Appendix 4 - Proposed Tank Farm 4 (TF-4) Detailed Information

I. Unit Description

The US Ecology Tulsa, Inc. (USE Tulsa) hazardous waste Tank Farm 4 (TF-4) has a proposed permitted capacity for 79,840 gallons of hazardous waste liquids. Containment requirements are based on storage of liquid hazardous wastes. Information regarding tank designation, material of construction, tank age, and nominal capacity for TF-4 is summarized in Appendix 7 – Permitted Hazardous Waste Tank System Information Table which is presented at the end of Section T.

Tank farm TF-4 has four (4) proposed vertical above ground tanks, designated for hazardous waste service, which are located in a secondary containment system. Tanks T-407, T-408, T-409, and T-410 are proposed to be -fiber reinforced plastic (FRP) lined with vinyl ester thermoset resin. Chemical and heat resistance are provided by the structural and lining material. The tanks will have a flat top and cone bottom and will be supported on legs. Additional information on these tanks is presented below and in Appendix 8.

II. Basic Design Parameters, Dimensions, and Materials of Construction

Tanks T-407, T-408, T-409, and T-410 will be manufactured by a qualified third-party tank contractor. A visual inspection will be performed on all tanks during installation by a qualified contractor representative. Any evidence of punctures, scrapes, cracks, or other structural damage which might result in premature failure will be identified and noted by the inspector. After the tank is placed on its foundation, it will be filled to capacity with water and held for a period of 24 hours. A manufacturer representative will be on site to observe any leaks or evidence of leaks. Tanks T-407, T-408, T-409, and T-410 are elevated cone-bottom tanks, and thus, leak inspection will be easily available.

Fiberglass material (T-407, T-408, T-409, and T-410) is compatible with alkaline, ignitable, reactive, organic, and acidic wastes. As stated in Appendix 8, the proposed FRP tanks will be constructed to design standard ASTM D3299. This design standard applies to cylindrical corrosion-resistant tanks made of commercial-grade glass-fiber-reinforced polyester or vinyl ester thermoset resin fabricated by filament winding for above-ground vertical installation to contain aggressive chemicals at atmospheric pressure. Vinyl ester resin is specified for the structural component of the tanks and also the liner as it is chemically compatible with the anticipated wastes. USE Tulsa will use the Derakane Series 470 epoxy

vinyl ester resin from INEOS Composites, or an equivalent epoxy vinyl ester resin, to line the fiberglass tanks. Manufacturer information on the compatibility of this tank and lining material with an array of chemicals is provided in Appendix 10 of Section T. Because the tanks are designed to contain aggressive chemicals, the addition of an epoxy vinyl ester resin liner will further protect the tanks from degradation as stated in ASTM D3299.

Tanks taken out hazardous waste service may undergo partial closure, and subsequently, be used for storage of non-hazardous wastes, product, or stormwater.

III. Containment

TF-4 will be equipped with a secondary containment system meeting the requirements of 40 CFR 264.193. The secondary containment system is coated with an impervious, chemically resistant material. Containment calculations are part of this attachment. Details regarding the leak detection system for TF-4 are part of the tank assessment document.

TF-4 is equipped with a leak detection system. The concrete pad for TF-4 is designed with a sump for liquids collection and removal. The sump size (approx. 12 inches in diameter by 14 inches deep) and sump location have been added to drawing T-1. USE Tulsa utilizes the containment sump to remove accumulated liquids (precipitation and spilled or leaked waste) by pump and dispose of in an appropriate manner within 24 hours. Procedures for evaluating liquids removed from permitted secondary containment areas are provided in Appendix 4.V of Section T.7 and Section 2 of Attachment 6. When necessary, USE Tulsa's on-site laboratory will analyze the accumulated liquids to determine if it is hazardous waste or non-hazardous waste and how it should be managed or disposed of in accordance with state and federal regulations.

IV. Control of Run-On and Run-Off

TF-4 will be equipped with secondary containment structures which will control run-on and run-off.

V. Tank Management Processes

Process equipment located in and adjacent to TF-4 is ancillary to hazardous waste tank management operations. Specifically, ancillary equipment may include portable pumps, screen and canister bag filters (or other filtration equipment), mixing equipment, and other treatment equipment as deemed appropriate.

When a different hazardous waste will be stored in a tank, USE Tulsa will evaluate the need for decontamination procedures for tanks that previously held an incompatible waste or material. The tank will be decontaminated when evidence of visual contamination is identified or when "knowledge of process" based on tank usage indicates decontamination is appropriate. Decontamination procedures will consist of one to two washes with water or other appropriate cleaning agent. Wash water will be disposed of in accordance with state and federal regulations.

The tanks are compatible with the waste stored. The facility inspection schedule (presented in Attachment 4 - Inspection Schedules and Forms and Attachment 6 - Procedures to Prevent Hazardous) includes inspection of tank systems.

VI. Leak Detection for Ancillary Equipment

Ancillary equipment for tanks T-407, T-408, T-409, and T-410 will be located above ground in the secondary containment area which is coated with an impervious coating. The equipment is to be inspected daily.

VII. Containment Calculations for TF–4

Note: Tanks T-407, T-408, T-409, and T-410 will all be constructed of the same material and all designed to the same dimensions. Therefore, the calculations below apply to all four (4) tanks.

GIVEN:

TF-4 average wall height	=	3 ft
TF-4 wall length	=	53.6 ft
TF-4 wall width	=	35.1 ft
Tank radius	=	6 ft
25-year, 24-hour rainfall event	=	7.91 in

CONTAINMENT CAPACITY REQUIRED FOR TF-4:

Volume of largest tank or 10% of total volume of tanks (whichever is greater) + rainfall:

Largest tank	=	19,960 gal
10% of total volume of tanks = 10% x (79,840 gal)	=	7,984 gal

Rainfall:

(7.91 in)(1 ft/12 in)(53.6 ft)(35.1 ft)(7.48 gal/ft3) = 9,276 gal

CONTAINMENT CAPACITY REQUIRED FOR PROPOSED TF-4:

19,960 gal + 9,276 gal = 29,236 gal

CONTAINMENT CAPACITY AVAILABLE FROM TF-4:

Volume inside containment wall:

(3 ft)(53.6 ft)(35.1 ft)(7.48 gal/ft^3) = 42,218 gal

Volume displaced by four tanks to wall height (bottom of tank is at or above the top of the containment wall):

[(6.0 $ft)^2$(0 ft)(7.48 gal/ft3)]π = 0 gal

Volume displaced by other foundations (legs of tanks):

(3 ft)(1 ft^2)(4 legs/tank)(4 tanks)(7.48 gal/ft3) = 359 gal

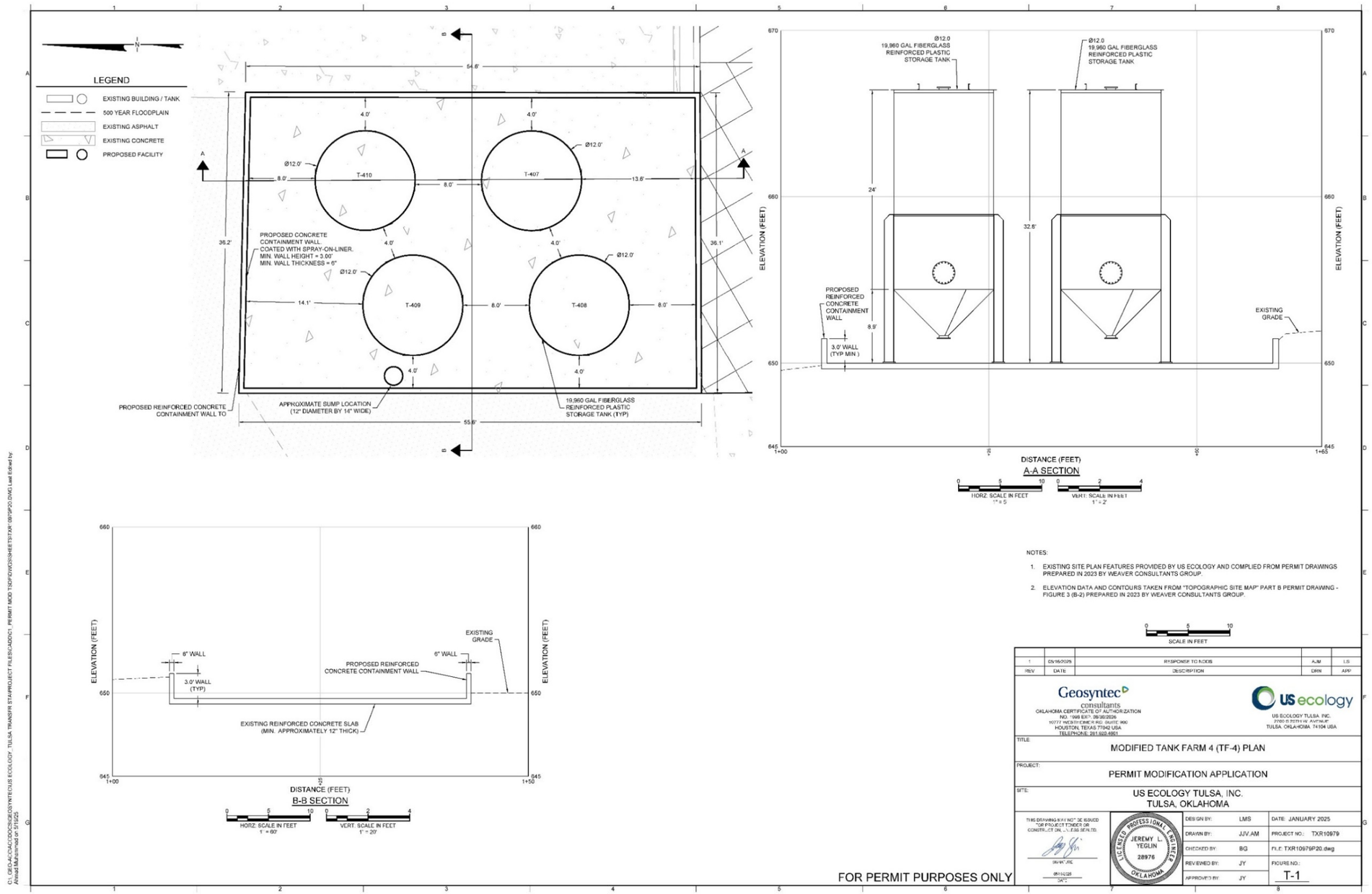
Total capacity available:

42,218 gal - (0 gal + 359 gal) = 41,859 gal

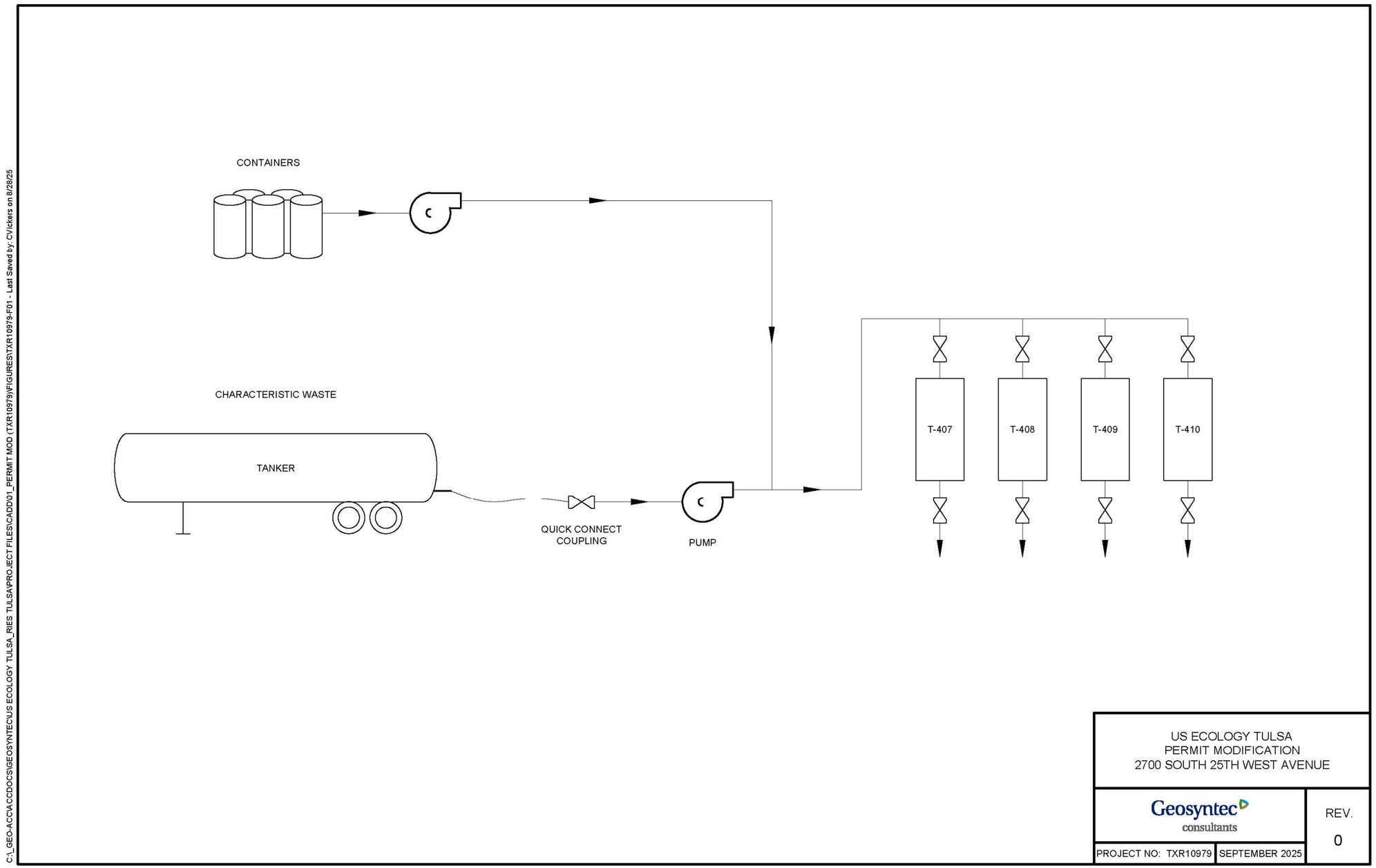
EXCESS CONTAINMENT:

41,859 gal – 29,236 gal = 12,623 gal

Figure T-1: Modified Tank Farm 4 (TF-4) Plan



Appendix 4-A - Process Diagram for Tank Farm 4 Tank System



Appendix 5 – Existing Treatment Tanks Detailed Information

Unit Description

The US Ecology Tulsa, Inc. (USE Tulsa) hazardous waste Treatment Tanks TA-2a and TA-2b have a cumulative permitted storage capacity of 79 cubic yards of hazardous waste and a cumulative daily treatment capacity of 47,842 gallons per day based on treating one tank volume per shift for 3 shifts per day. The tanks sit in similar sized secondary containment steel liners.

RCRA TANK SYSTEM CERTIFICATION
TA-2A & TA-2B

US Ecology Tulsa
2700 South 25th West Ave

Prepared By:

Kyle R. Dunn, P.E. – Managing Consultant

TRINITY CONSULTANTS
5801 E. 41st St.
Tulsa, OK 74135
(918) 622-7111

November 2023

Trinity Consultants

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1. EXECUTIVE SUMMARY

US Ecology operates Tanks TA-2A and TA-2B as hazardous waste storage tanks under the Resource Conservation and Recovery Act (RCRA) regulations. Each tank system was inspected and found to meet the requirements of 40 CFR 264.192.

PROFESSIONAL ENGINEERING CERTIFICATION

I certify that I have examined the design and installation of Tanks TA-2A and TA-2B and their ancillary equipment located at the US Ecology facility in Tulsa, OK. My duty was to provide an engineering assessment of these systems as they relate to the applicable engineering guidance for such systems. Based on the information provided and the assessment performed herein, I certify this system was designed and constructed in accordance with the stated engineering guidance documents. Therefore, based on the attached assessment, the tank systems are safe to operate in their intended use.

The information and engineering assessment presented in this report are the result of field investigations, a representative data search, and sound engineering practices and judgment. Additionally, this assessment is made solely on the information collected and reported to Trinity Consultants (Trinity) by either verbal accounts, existing reports, or existing design and construction documents.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

November 1, 2023
Date

Signature – Kyle R. Dunn, P.E.

Managing Consultant
Title

28041
Registration Number

Trinity Consultants
Company

5801 E. 41st Street, Suite 450, Tulsa, OK 74135
Address

2. INTRODUCTION

US Ecology owns and operates a hazardous waste treatment facility located in Tulsa, OK. Hazardous waste treatment is conducted in both Tanks TA-2A and TA-2B, and since these tank systems are intended to manage material classified as hazardous wastes, as defined in Appendix VIII to Part 261, a certification of the tank systems must be performed under the requirements of 40 CFR 264.192. A copy of the applicable text is included in Appendix B. Specifically, the assessment includes:

- Description and review of the design criteria used for the tank systems
- Review of the hazardous waste characteristics in reference to the tank systems' materials of construction
- Assessment of any corrosion potential for the tank systems due to contact with soil or water
- Review of vehicular traffic patterns that could damage any of the tank systems' components
- Results of a tank integrity inspections
- Assessment of other design considerations specifically included in the regulation

3. DESIGN REVIEW

3.1 Design Standards

TA-2A and TA-2B are open-top, atmospheric tanks that are constructed of 1" carbon steel, and each tank has reinforced welds on the side that receives most of the contact with the excavator bucket used for mixing and loadout. Both containers have metal secondary containment that is sufficient for holding the contents of the tanks in the event of tank failure and a significant rainfall event. There are no piping systems or ancillary equipment associated with either tank. No specific design standards were provided for the tank, but the tank drawings were reviewed and approved by a Professional Engineer. Tank design drawings are included in Appendix A.

3.2 Hazardous Waste Characteristics

TA-2A is typically used to treat acidic material, basic material, and metal bearing wastes. To minimize corrosion on the container, acidic wastes are immediately neutralized by using either reagents (e.g., lime or fly ash) or compatible wastes (e.g., caustic wastes) so the treatment mix is kept at a neutral-to-basic pH during the treatment process.

TA-2B is typically used to treat persulfate wastes which tend to be on the acidic side. However, as part of the treatment, water is used to allow the solid material to dissolve, and lime is also used to bring the material to a basic pH during treatment.

In accordance with data found in the National Association of Corrosion Engineers (NACE), *Corrosion Data Survey – Metals Section*, the carbon steel tanks are found to be compatible with the neutralized constituents found in the waste streams. Additionally, based on interviews with staff onsite, each batch is formulated in the onsite laboratory prior to transferring into the tanks. This formulation considers potential compatibility issues with carbon steel. Once the formulation of wastes and neutralizing material is approved, the operations staff visually inspects the transfer and notes if there are any unexpected reactions that occur. A water spray system is also in place to manually quench the material in the tanks, if needed.

3.3 Soil and Water Contact

The tanks systems are located aboveground and within metal containment, which is located on top of an asphalt foundation. Any water that collects in the containment drains to a sump, which is pumped into the tanks and mixed in with the waste. Therefore, extended contact with soil and water is not likely and will not result in an accelerated corrosion rate.

3.4 Vehicular Traffic Issues

There are no piping systems associated with the tank systems. Waste is transferred into the tank via forklift or manual dumping and is removed from the tank via an excavator. There are bumpers/barriers next to the tanks to prevent accidental damage from the forklifts and excavators.

3.5 Design Considerations

The following are additional design considerations that were reviewed in order to complete the RCRA tank system certification.

3.5.1 Tank Foundations

The foundation appears to be adequate. The tanks are located within metal containment, which is located on top of an asphalt foundation. There does not appear to be settling or cracking associated with the foundation.

3.5.2 Tank Flotation

The tanks are aboveground and are of sufficient size and weight such that collection of fluids in the secondary containment system will not cause flotation of the tanks.

3.5.3 Frost Heave

The tanks are not directly connected to any foundation, and they are located on an extensive asphalt foundation such that any frost heave would not affect the tanks.

4. TANK INSPECTION REVIEW

Trinity reviewed the API 653 and API 575 inspection reports and associated testing results from October 2023 (included in Appendix C). The reports indicate that all inspection points have adequate wall thickness and that the tanks are suitable for continued service. Trinity also visually inspected the tank installation and found the system to be free of weld breaks, punctures, cracks, corrosion, structural damage, and inadequate construction/installation.

5. UNDERGRGOUND TANK BACKFILLING PROVISIONS

No portions of the tank systems are located underground, so backfilling provisions are not required. No other underground components are presently associated with the tank systems being reviewed and certified by this report.

6. TANK SYSTEM TIGHTNESS

The tank systems are currently in operation and no visible leaks were identified.

7. ANCILLARY EQUIPMENT PROTECTION

There is no notable ancillary equipment associated with either tank. There are no piping systems, fittings, access points, or other openings in the tank.

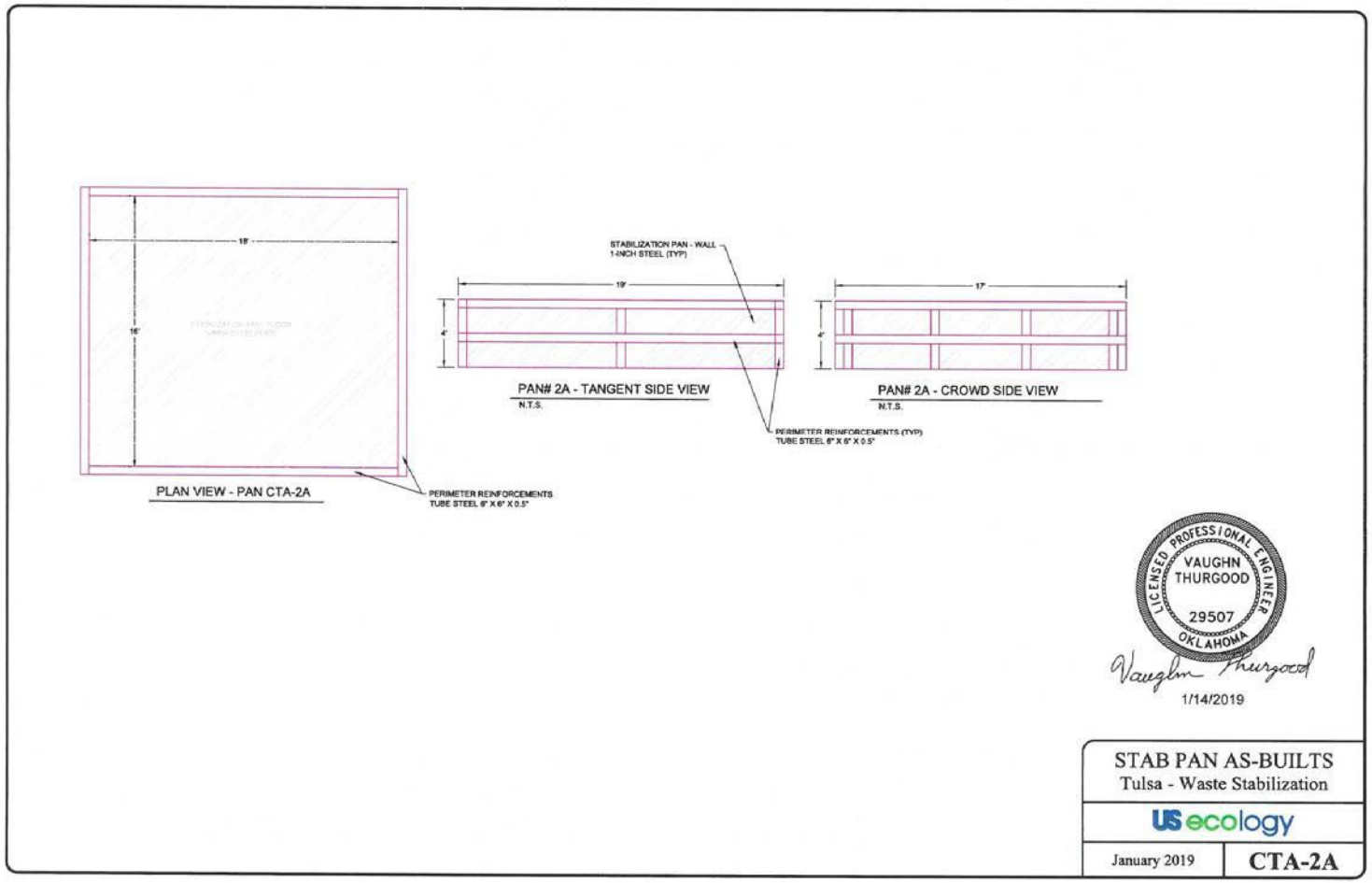
8. TANK SYSTEM CORROSION PROTECTION

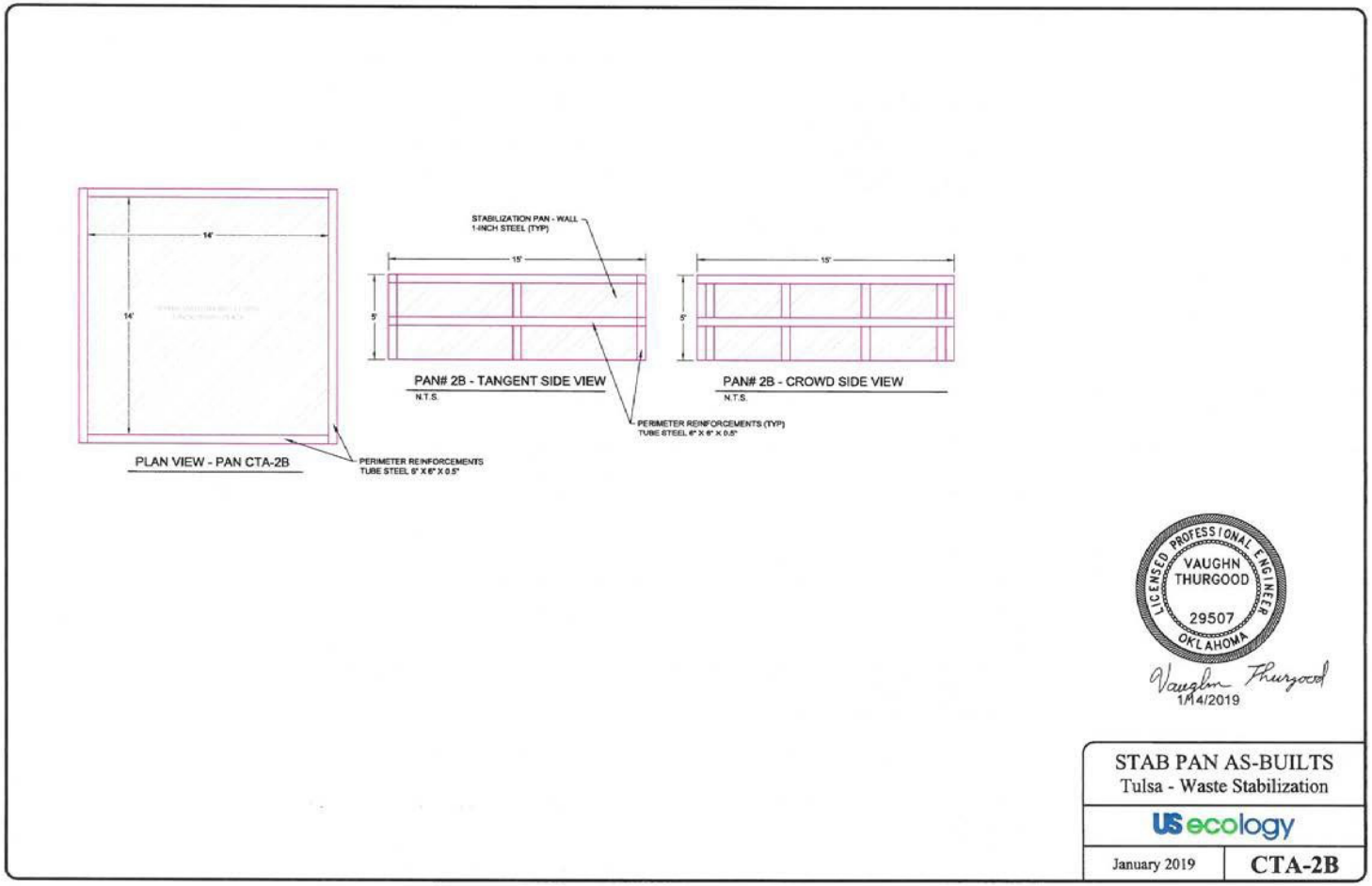
As stated in Section 3.3, the tank systems are not expected to contact soil or water in a manner that will accelerate the corrosion rate. Based on information provided by staff onsite, the metal thickness of each tank is also checked periodically.

9. TANK DESIGN AND CERTIFICATION

US Ecology will maintain this RCRA certification and all other written statements by those who have designed, constructed, or inspected the above-described tank system in the facility operating record.

APPENDIX A. TANK DRAWINGS


18'
16'
PLAN VIEW - PAN CTA-2A
PERIMETER REINFORCEMENTS
TUBE STEEL 6" X 6" X 0.5"
STABILIZATION PAN - WALL
1-INCH STEEL (TYP)
19'
4'
PAN# 2A - TANGENT SIDE VIEW
N.T.S.
PERIMETER REINFORCEMENTS (TYP)
TUBE STEEL 6" X 6" X 0.5"
17'
4'
PAN# 2A - CROWD SIDE VIEW
N.T.S.
LICENSED PROFESSIONAL ENGINEER
VAUGHN
THURGOOD
29507
OKLAHOMA
1/14/2019
STAB PAN AS-BUILTS
Tulsa - Waste Stabilization
US ecology
January 2019
CTA-2A


14'
14'
PLAN VIEW - PAN CTA-2B
PERIMETER REINFORCEMENTS
TUBE STEEL 6" X 6" X 0.5"
STABILIZATION PAN - WALL
1/4INCH STEEL (TYP)
15'
5'
PAN# 2B - TANGENT SIDE VIEW
N.T.S.
PERIMETER REINFORCEMENTS (TYP)
TUBE STEEL 6" X 6" X 0.5"
15'
5'
PAN# 2B - CROWD SIDE VIEW
N.T.S.
LICENSED PROFESSIONAL ENGINEER
VAUGHN
THURGOOD
29507
OKLAHOMA
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STAB PAN AS-BUILTS
Tulsa - Waste Stabilization
US ecology
January 2019
CTA-2B

APPENDIX B. REGULATORY REFERENCES

40 CFR 264.192 Design and installation of new tank systems or components

(a) Owners or operators of new tank systems or components must obtain and submit to the Regional Administrator, at time of submittal of part B information, a written assessment, reviewed and certified by a qualified Professional Engineer, in accordance with § 270.11(d) of this chapter, attesting that the tank system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste. The assessment must show that the foundation, structural support, seams, connections, and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail. This assessment, which will be used by the Regional Administrator to review and approve or disapprove the acceptability of the tank system design, must include, at a minimum, the following information:

(1) Design standard(s) according to which tank(s) and/or the ancillary equipment are constructed;

(2) Hazardous characteristics of the waste(s) to be handled;

(3) For new tank systems or components in which the external shell of a metal tank or any external metal component of the tank system will be in contact with the soil or with water, a determination by a corrosion expert of:

(i) Factors affecting the potential for corrosion, including but not limited to:

(A) Soil moisture content;
(B) Soil pH;
(C) Soil sulfides level;
(D) Soil resistivity;
(E) Structure to soil potential;
(F) Influence of nearby underground metal structures (e.g., piping);
(G) Existence of stray electric current;
(H) Existing corrosion-protection measures (e.g., coating, cathodic protection), and

(ii) The type and degree of external corrosion protection that are needed to ensure the integrity of the tank system during the use of the tank system or component, consisting of one or more of the following:

(A) Corrosion-resistant materials of construction such as special alloys, fiberglass reinforced plastic, etc.;
(B) Corrosion-resistant coating (such as epoxy, fiberglass, etc.) with cathodic protection (e.g., impressed current or sacrificial anodes); and
(C) Electrical isolation devices such as insulating joints, flanges, etc.

Note: The practices described in the National Association of Corrosion Engineers (NACE) standard, "Recommended Practice (RP-02-85) - Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems," and the American Petroleum Institute (API) Publication 1632, "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems," may be used, where applicable, as guidelines in providing corrosion protection for tank systems.

(4) For underground tank system components that are likely to be adversely affected by vehicular traffic, a determination of design or operational measures that will protect the tank system against potential damage; and

(5) Design considerations to ensure that:

(i) Tank foundations will maintain the load of a full tank;
(ii) Tank systems will be anchored to prevent flotation or dislodgment where the tank system is placed in a saturated zone, or is located within a seismic fault zone subject to the standards of § 264.18(a); and
(iii) Tank systems will withstand the effects of frost heave.

(b) The owner or operator of a new tank system must ensure that proper handling procedures are adhered to in order to prevent damage to the system during installation. Prior to covering, enclosing, or placing a new tank system or component in use, an independent, qualified, installation inspector or a qualified Professional Engineer, either of whom is trained and experienced in the proper installation of tanks systems or components, must inspect the system for the presence of any of the following items:

(1) Weld breaks;
(2) Punctures;
(3) Scrapes of protective coatings;
(4) Cracks;
(5) Corrosion;
(6) Other structural damage or inadequate construction/installation.

All discrepancies must be remedied before the tank system is covered, enclosed, or placed in use.

(c) New tank systems or components that are placed underground and that are backfilled must be provided with a backfill material that is a noncorrosive, porous, homogeneous substance and that is installed so that the backfill is placed completely around the tank and compacted to ensure that the tank and piping are fully and uniformly supported.

(d) All new tanks and ancillary equipment must be tested for tightness prior to being covered, enclosed, or placed in use. If a tank system is found not to be tight, all repairs necessary to remedy the leak(s) in the system must be performed prior to the tank system being covered, enclosed, or placed into use.

(e) Ancillary equipment must be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.
Note: The piping system installation procedures described in American Petroleum Institute (API) Publication 1615 (November 1979), "Installation of Underground Petroleum Storage Systems," or ANSI Standard B31.3, "Petroleum Refinery Piping," and ANSI Standard B31.4 "Liquid Petroleum Transportation Piping System," may be used, where applicable, as guidelines for proper installation of piping systems.

(f) The owner or operator must provide the type and degree of corrosion protection recommended by an independent corrosion expert, based on the information provided under paragraph (a)(3) of this section, or other corrosion protection if the Regional Administrator believes other corrosion protection is necessary to ensure the integrity of the tank system during use of the tank system. The installation of a corrosion protection system that is field fabricated must be supervised by an independent corrosion expert to ensure proper installation.

(g) The owner or operator must obtain and keep on file at the facility written statements by those persons required to certify the design of the tank system and supervise the installation of the tank system in accordance with the requirements of paragraphs (b) through (f) of this section, that attest that the tank system was properly designed and installed and that repairs, pursuant to paragraphs (b) and (d) of this section, were performed. These written statements must also include the certification statement as required in § 270.11(d) of this chapter.

APPENDIX C. TANK INSPECTION REPORTS

SPECIAL INSPECTIONS & DESIGN

MECHANICAL INTEGRITY INSPECTION
for
ABOVEGROUND CHEMICAL
STABILIZATION PAN TA-2A
at
US ECOLOGY
2700 S 25th STREET, TULSA, OK 74107

STABILIZATION PAN TA-2A

Inspection Date: October 8, 2023
Report Number: SP-23393.2A

Inspection and Report By:
Steven C. Fults
Professional Engineer
API 653 #6122
AWS-CWI #05080851
ASNT NDT Level III Cert #21968

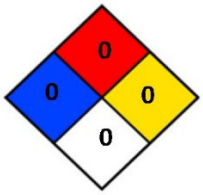
General Information

Manufacturer: Unknown
Mfg. City & State: Unknown
Date Manufactured: 1995 (estimated)
Governing Code or Standard: API 653
Capacity: 42.5 yd^3
Dimensions: 192" (E-W) x 215" (N-S)
Depth: 48 inches (wall height)
Design Pressure: Atmospheric
Design Temperature: NA
Design Specific Gravity: NA

Made-Available Information

As-Built Drawing:	NO
Fabrication Reports:	NO
Baseline Data:	YES
Previous Operational Reports:	Verbal
Maintenance History:	Verbal
Previous Inspection Reports:	NO

PRESENT: NO
NFPA LABEL



IBC/AWS/CWB/ASCE/ASME/ANSI/API/AISC Codes 314-240-0179 www.SIDengineers.com

Tank ID / Name:	STABILIZATION PAN TA-2A			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Stored:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2A

Executive Summary

The stabilization pan listed in this report was inspected in general accordance with API 653, the *Tank Inspection, Repair, Alteration, and Reconstruction Standard* and API 575 *Inspection Practices for Atmospheric and Low-Pressure Storage Tanks*. These Standards where followed as they prescribe inspection methods for the configuration and function similar to a stabilization pan. There is not a specific Code or standard that addresses stabilization pans. In summary, stabilization pan TA-2A is suitable for continued service, similar to past, based on this inspection. See attached checklist, ultrasonic thickness data report and photographs for detailed inspection results.

Deficiency List

1. No structural or mechanical deficiencies were observed that warrant repair or change of use.

Recommendations

1. Continue to monitor plate thickness annually using a calibrated digital ultrasonic thickness gauge.
2. Plate quality to be reaccessed in 10 years or earlier if backhoe damage occurs.

Per API 653, Next Inspection Due:

Routine In-service Inspection by Owner/Operator Personnel:	Monthly
External Inspection by an Authorized Inspector:	10 years
Ultrasonic Thickness Inspection by a Qualified Examiner:	10 years
Internal Inspection by an Authorized Inspector:	10 years

Limits of Liability

The professional opinions and judgments contained in this report are based on the site conditions as they existed at the time of inspection. No warranty expressed or implied is made as to the conclusions and professional advice included in this report. This report was prepared exclusively for the use and benefit of US Ecology and Trinity Consultants. Unauthorized use of content or formatting is strictly prohibited.

Please contact the undersigned if you have any questions or require additional information.

Report By:
SPECIAL INSPECTIONS & DESIGN

Steven Fults, PE
API 653 #6122
ASNT NDT Level III #21968
AWS-CWI #05080851

Tank ID / Name:	STABILIZATION PAN TA-2A			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Mixed:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2A

ABOVEGROUND STORAGE TANK EXTERNAL INSPECTION CHECKLIST

LEGEND: ✓ = ACCEPTABLE ☒ = ITEM of CONCERN NA = NOT APPLICABLE NI = NOT INSPECTED

LABELING		COMMENTS
• Nameplate	✓	No Identification posted
• Contents and capacity	✓	Not posted
• NFPA diamond	✓	Not posted
FOUNDATION & SUPPORTS		COMMENTS
• Foundation type Ring ☐ Full Pad ☑ Saddles ☐	✓	Soil and/or rock subgrade
• Levelness and uniform support	✓	Subgrade is continuous, solid, stable
• Soil settlement around pan	✓	No measurable settlement
• Drainage away from pan	✓	Adequate drainage
• Steel leg / saddle / skid supports (bent, distorted, corroded)	✓	Containment area walls are braced.
• Anchor bolts / chairs (loose, bent, corroded, missing)	✓	Gravity holds containment and pan in place
CONTAINMENT AREA Steel ☑ Concrete ☐ Trench ☐		COMMENTS
• Impervious	✓	Continuous 1/4" or 5/16" steel plate, welded joints
• Housekeeping (debris, vegetation, ponding)	✓	Minimal debris present
INSULATION / PROTECTIVE COATINGS		COMMENTS
• Lagging / sheeting (loose, missing, damaged)	NA	Not insulated
• Caulking at penetrations and supports	NA	Not insulated
• Insulation condition (CUI, wet, missing, deteriorated)	NA	Not insulated
• Coatings (blistering, peeling, chalking, holidays)	NA	No paint, thin surface corrosion present
• Seal between bottom and foundation	✓	No seal but not needed
SHELL, BOTTOM & ROOF Carbon Steel ☑ Alloy Steel ☐		COMMENTS
• Deformation / distortions (peaking, blisters, bulges, flats)	✓	Walls and Floor and relatively flat
• Shell seam welds / evidence of leaks	✓	Welds are good quality, large in size, full length & contiguous
• Shell vertical / horizontal alignment	✓	Walls are near plumb & floor plates flat
• Deformation at wall, floor, or reinforcement	✓	No significant scars or gouges from backhoe bucket mixing
• Corrosion or thinning of shell, bottom or roof	✓	No significant corrosion, surface patina only
• Roof (slope, ponding, corrosion)	✓	Pan does not have a cover, there is a sunscreen roof 20' above
• Evidence of previous repairs	✓	Repair underway to reattach lip plate, good quality welds
MANWAYS, NOZZLES & REINFORCEMENT		COMMENTS
• Maintenance of hatches, manways, covers	NA	None
• Nozzle rigidity (deformation, expansion joints)	NA	None
• Weld condition	✓	Exterior reinforcement welds are good quality, adequate size
• Bolts or studs at flanged connections	NA	No bolted connections, joints are welded
• Gasket condition / evidence of leaks	✓	No leaks or evidence found
• Condition of sump, piping manifolds, height gage, etc.	✓	PVC tubing and water spray nozzles above north wall
• Static ground wire	✓	No ground wire present, nor needed
• Venting (normal, emergency, pressure/vacuum)	✓	Open air
• Overfill protection (level gauge, alarm, automatic shutoff)	✓	Visual by operator
ACCESS STRUCTURE		COMMENTS
• Ladders (fasteners, welds, corrosion, brackets, rungs)	NA	Pan is 48 inches tall, step ladder used to enter
• Cages (fasteners, welds, brackets, corrosion)	NA	None
• Stairways (treads, fasteners, handrails, welds, stringers)	NA	None
• Platform (grating, clips, welds, corrosion, thinning)	NA	None
• Handrail (corrosion, welds, fasteners, stiffeners)	NA	None
• General condition of coatings (blistering, peeling, failure)	NA	None
OTHER		COMMENTS
• Nuts were tack welded to wall exteriors to be used as an ultrasonic thickness measurement monitoring locations.		
•		
•		

Tank ID / Name:	STABILIZATION PAN TA-2A			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Stored:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2A

Containment area wall plate is 11 to 12 inches tall

Stabilization pan TA-2A walls are 48 inches tall.

Overall containment area measures 425" (E-W) X 410" (N-S) X 11" (tall). No voids/gaps/holes were present in visually accessible areas. Containment area floor plate is believed to be continuous beneath the pan.

Containment area wall and floor plate are nominal 0.250" or 0.300" carbon steel plate.

Tank ID / Name:	STABILIZATION PAN TA-2A			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Stored:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2A

Repairs were underway to reattach & reinforce the south-side lip plate that was torn upwards by the backhoe bucket. The welder was skilled. Oscar deposted good quality weld and was effective to secure the existing plate & new plate.

UTT thickness measurements were taken at 24 locations per wall. Minor wall loss has occurred.

Floor plate thickness range measured was 0.812" to 0.925". No significant pitting or general corrosion was

Enclosed area west of the stab pan TA-2A was observed and structural members were intact. No

Weld quality was good. The 6x6 tube reinforcement is robust and very stable.

Tank ID / Name:	STABILIZATION PAN TA-2A			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Stored:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2A

ULTRASONIC THICKNESS MEASUREMENT DATA

Remaining metal thickness was measured nondestructively with straight beam ultrasonic thickness testing (UTT). A dual-element 2.25MHz transducer was used. The measurement ranges are shown below.

Pan TA-2A **floor plate** thickness was measured at 24 areas throughout the plate:
Thinnest measurement: 0.812", Thickest measurement: 0.925"

Pan TA-2A **wall plate** thickness was measured at 96 areas throughout the plates:
North wall 24 measurement locations
Thinnest measurement: 0.972", Thickest measurement: 1.018"
East wall 24 measurement locations
Thinnest measurement: 0.995", Thickest measurement: 1.012"
South wall 24 measurement locations
Thinnest measurement: 0.912", Thickest measurement: 1.011"
East wall 24 measurement locations
Thinnest measurement: 0.995", Thickest measurement: 1.012"

Pan TA-2A **containment area** wall and floor plate thickness was measured at 12 areas throughout the plates:
Thinnest measurement: 0.248", Thickest measurement: 0.344"

Measurement data and visual observation show minor product attack on the wall and floor plate. There was not a significant thickness difference in the upper and lower wall plate sections as was prevalent in Stab Pan TA-2B. The corrosion rate is approximately 0.005" IPY, based on a 20 year age. Given the facility operations guideline minimum allowable floor or wall plate thickness of 0.250", the wall and floor plate may need to be replaced or reinforced in 20 years, provided mechanical impact damage is minimal and mixing chemicals are similar to past. Plate quality to be reaccessed in 10 years or earlier if backhoe damage occurs.

US Ecology has established UTT monitoring locations by welding nuts onto the wall plate outer face. Annual measurements should be taken and documented by a competent maintained person so the plate thickness and corrosion rate are known.

SPECIAL INSPECTIONS & DESIGN

MECHANICAL INTEGRITY INSPECTION
for
ABOVEGROUND CHEMICAL
STABILIZATION PAN TA-2B
at
US ECOLOGY
2700 S 25th STREET, TULSA, OK 74107

STABILIZATION PAN TA-2B

Inspection Date: October 8, 2023
Report Number: SP-23393.2B

Inspection and Report By:
Steven C. Fults
Professional Engineer
API 653 #6122
AWS-CWI #05080851
ASNT NDT Level III Cert #21968

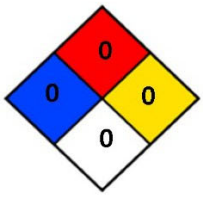
General Information

Manufacturer: Unknown
Mfg. City & State: Unknown
Date Manufactured: 1995 (estimated)
Governing Code or Standard: API 653
Capacity: 35 yd^3
Dimensions: 165" x 165"
Depth: 60 inches (wall height)
Design Pressure: Atmospheric
Design Temperature: NA
Design Specific Gravity: NA

Made-Available Information

As-Built Drawing:	NO
Fabrication Reports:	NO
Baseline Data:	YES
Previous Operational Reports:	Verbal
Maintenance History:	Verbal
Previous Inspection Reports:	NO

PRESENT: NO
NFPA LABEL



IBC/AWS/CWB/ASCE/ASME/ANSI/API/AISC Codes 314-240-0179 www.SIDengineers.com

Tank ID / Name:	STABILIZATION PAN TA-2B			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Stored:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2B

Executive Summary

The stabilization pan listed in this report was inspected in general accordance with API 653, the *Tank Inspection, Repair, Alteration, and Reconstruction Standard* and API 575 *Inspection Practices for Atmospheric and Low-Pressure Storage Tanks*. These Standards where followed as they prescribe inspection methods appropriate to the configuration and function similar to a stabilization pan. There is not a specific Code or standard that addresses stabilization pans. In summary, Stab Pan TA-2B is suitable for continued service, similar to past, based on this inspection. See attached checklist, UTT data, and photographs.

Deficiency List

1. No structural or mechanical deficiencies were observed that warrant repair or change of use.

Recommendations

1. Continue to monitor plate thickness annually using a calibrated digital ultrasonic thickness gauge.
2. Wall and plate integrity to be reassessed in 10 years or earlier if backhoe damage occurs.

Per API 653, Next Inspection Due:

Routine In-service Inspection by Owner/Operator Personnel:	Monthly
External Inspection by an Authorized Inspector:	10 years
Ultrasonic Thickness Inspection by a Qualified Examiner:	10 years
Internal Inspection by an Authorized Inspector:	10 years

Limits of Liability

The professional opinions and judgments contained in this report are based on the site conditions as they existed at the time of inspection. No warranty expressed or implied is made as to the conclusions and professional advice included in this report. This report was prepared exclusively for the use and benefit of US Ecology and Trinity Consultants. Unauthorized use of content or formatting is strictly prohibited.

Please contact the undersigned if you have any questions or require additional information.

Report By:
SPECIAL INSPECTIONS & DESIGN

Steven Fults, PE
API 653 #6122
ASNT NDT Level III #21968
AWS-CWI #05080851

Tank ID / Name:	STABILIZATION PAN TA-2B			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Mixed:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2B

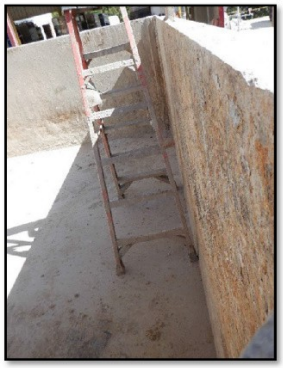
ABOVEGROUND STORAGE TANK EXTERNAL INSPECTION CHECKLIST

LEGEND: ✓ = ACCEPTABLE ☒ = ITEM of CONCERN NA = NOT APPLICABLE NI = NOT INSPECTED

LABELING		COMMENTS
• Nameplate	✓	No Identification posted
• Contents and capacity	✓	Not posted
• NFPA diamond	✓	Not posted
FOUNDATION & SUPPORTS		COMMENTS
• Foundation type Ring ☐ Full Pad ☑ Saddles ☐	✓	Soil and/or rock subgrade
• Levelness and uniform support	✓	Subgrade is continuous, solid, stable
• Soil settlement around pan	✓	No measurable settlement
• Drainage away from pan	✓	Adequate drainage
• Steel leg / saddle / skid supports (bent, distorted, corroded)	✓	Containment area walls wavy from contact with backhoe
• Anchor bolts / chairs (loose, bent, corroded, missing)	✓	Gravity holds containment and pan in place
CONTAINMENT AREA Steel ☑ Concrete ☐ Trench ☐		COMMENTS
• Impervious	✓	Continuous 1/4" steel plate containment, welded joints
• Housekeeping (debris, vegetation, ponding)	✓	No debris present
INSULATION / PROTECTIVE COATINGS		COMMENTS
• Lagging / sheeting (loose, missing, damaged)	NA	Not insulated
• Caulking at penetrations and supports	NA	Not insulated
• Insulation condition (CUI, wet, missing, deteriorated)	NA	Not insulated
• Coatings (blistering, peeling, chalking, holidays)	NA	No paint, thin surface corrosion present
• Seal between bottom and foundation	✓	No seal but not needed
SHELL, BOTTOM & ROOF Carbon Steel ☑ Alloy Steel ☐		COMMENTS
• Deformation / distortions (peaking, blisters, bulges, flats)	✓	Walls and Floor and relatively flat
• Shell seam welds / evidence of leaks	✓	Welds are good quality, large in size, full length & contiguous
• Shell vertical / horizontal alignment	✓	Walls are near plumb & floor plates flat
• Deformation at wall, floor, or reinforcement	✓	No significant scars or gouges from backhoe bucket mixing
• Corrosion or thinning of shell, bottom or roof	✓	No significant corrosion, surface patina only
• Roof (slope, ponding, corrosion)	✓	Pan does not have a cover, there is a sunscreen roof 20' above
• Evidence of previous repairs	✓	1-inch plate added to west wall over bulge
MANWAYS, NOZZLES & REINFORCEMENT		COMMENTS
• Maintenance of hatches, manways, covers	NA	None
• Nozzle rigidity (deformation, expansion joints)	NA	None
• Weld condition	✓	Exterior reinforcement welds are good quality, adequate size
• Bolts or studs at flanged connections	NA	No bolted connections, joints are welded
• Gasket condition / evidence of leaks	✓	No leaks or evidence found.
• Condition of sump, piping manifolds, height gage, etc.	✓	PVC tubing and water spray nozzles above north wall
• Static ground wire	✓	No ground wire present, nor needed
• Venting (normal, emergency, pressure/vacuum)	✓	Open air
• Overfill protection (level gauge, alarm, automatic shutoff)	✓	Visual by operator
ACCESS STRUCTURE		COMMENTS
• Ladders (fasteners, welds, corrosion, brackets, rungs)	NA	Pan is 61 inches tall, step ladder used to enter
• Cages (fasteners, welds, brackets, corrosion)	NA	None
• Stairways (treads, fasteners, handrails, welds, stringers)	NA	None
• Platform (grating, clips, welds, corrosion, thinning)	NA	None
• Handrail (corrosion, welds, fasteners, stiffeners)	NA	None
• General condition of coatings (blistering, peeling, failure)	NA	None
OTHER		COMMENTS
• Nuts were tack welded to wall exteriors to be used as an ultrasonic thickness measurement monitoring locations.		
•		
•		

Tank ID / Name:	STABILIZATION PAN TA-2B			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Stored:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2B

Continment area wall plate is 30 to 32 inches tall



Stabilization pan TA-2B walls are 60 inches tall.

Overall containment area measures 166.5" x 166.5", No voids were present in visually accessible areas.
Containment area floor plate is believed to be continuous beneath the pan.

Containment area wall plate measuring 0.290 inches thick

Tank ID / Name:	STABILIZATION PAN TA-2B			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Stored:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2B

A ten-foot long 1-inch thick plate was added to the inside of the TA-2B west wall, Continuous fillet welds secure all sides of the added plate. This plate was added to cover a bulge caused by the backhoe bucket. See orange area below.

1-inch plate was added to cover bulge in original wall plate caused by a backhoe bucket.

Floor plate thickness range measured was 0.669" to 0.868". No significant pitting or general corrosion was observed.

Reinforcement plates have been added across top of walls as needed. Walls are very stable.

Weld quality was good, welds are continuous with no gaps or voids.

Tank ID / Name:	STABILIZATION PAN TA-2B			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Stored:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2B

ULTRASONIC THICKNESS TESTING MEASUREMENT DATA

Remaining metal thickness was measured nondestructively with straight beam ultrasonic thickness testing (UTT) using a dual-element 2.25MHz transducer. The measurement ranges are shown below.

Pan TA-2B **floor plate** thickness was measured at 24 areas throughout the plate:
Thinnest measurement: 0.669", Thickest measurement: 0.868"

Pan TA-2B **wall plate** thickness was measured at 36 areas throughout the plates (added 1" plate is excluded):
Eighteen places in the **upper** 30" of wall plate
Thinnest measurement: 0.815", Thickest measurement: 0.908"
Eighteen places in the l**ower** 30" of wall plate
Thinnest measurement: 0.635", Thickest measurement: 0.844"

Pan TA-2B **containment area** wall and floor plate thickness was measured at 18 areas throughout the plates:
Thinnest measurement: 0.268", Thickest measurement: 0.317"

Measurement data and visual observation show moderate product attack on the lower 30 inches of wall plate interior surface, resulting in a corrosion rate of approximately 0.025" IPY, based on a 20 year age. Given the facility operations guideline minimum allowable floor or wall plate thickness of 0.250", the lower plate will need to be replaced or reinforced in 15 years, provided mechanical impact damage is minimal and mixing chemicals are similar to past.

The west wall was reinforced by adding/welding the 1-inch steel plate to the original west wall inside face. The lower west wall original plate steel was apparently hit by the backhoe bucket and bulged outwards. Thickness of the bulged plate measured 0.348". This area was effectively covered/reinforced by the 1" plate so the bulged area is of no consequence now.

US Ecology has established UTT monitoring locations by welding nuts onto the wall plate outer face. Annual measurements should be taken and documented by a competent maintained person so the plate thickness and corrosion rate are known.

Appendix 6 – Proposed Treatment Tanks Detailed Information

I. Unit Description

The US Ecology Tulsa, Inc. (USE Tulsa) proposed hazardous waste Treatment Tanks TA-2b and TA-2c have a proposed cumulative permitted daily treatment capacity of 164,000 gallons per day based on treating one tank volume per shift for multiple shifts per day. ~~No structural modifications to TA-2a are proposed.~~ Considering the existing TA-2a as well, t~~T~~he proposed cumulative daily treatment capacity of TA-2a, TA-2b, and TA-2c ~~becomes~~ is 176,000 gallons ~~per day based on treating each tank volume per shift for multiple shifts per day~~. No structural modifications to TA-2a are proposed. Detailed information on existing Tank TA-2a is provided in Appendix 5.

This appendix presents detailed information for proposed tanks TA-2b and TA-2c. These tanks have the same design as one another. Secondary c~~C~~ontainment requirements are based on the full volume of the proposed treatment tank. ~~The tanks sit in similar sized primary containment liners and secondary containment concrete tanks.~~ Information regarding tank design~~ation~~, material of construction, and nominal capacity for TA-2b and TA-2c is summarized in Appendix 7 – Permitted Hazardous Waste Tank System Information.

TA-2b and TA-2c each consist of a 1-inch thick (minimum) mild carbon steel tank (liner) within a 1-foot (minimum) thick reinforced concrete secondary containment vault amended with Xypex Admix (or equivalent). The bottom of the steel tank is curved in one direction (e.g., horseshoe shaped) with dimensions of 20’ x 25’ x 13’. Chemical and heat resistance are provided by the structural and lining material of the tank system (~~reinforced concrete and~~ carbon steel and reinforced concrete). Additional information on these tanks is presented below and in Appendix 8.

II. Basic Design Parameters, Dimensions, and Materials of Construction

Tanks TA-2b and TA-2c will be constructed by a qualified third-party contractor. A visual inspection will be performed on all tanks during installation by an independent, qualified installation inspector or a qualified Professional Engineer Any evidence of punctures, scrapes, cracks, or other structural damage which might result in premature failure will be identified and

noted by the inspector. After each tank is constructed, it will be filled to capacity with water and held for a period of 24 hours. A qualified contractor representative will be on site to observe any leaks or evidence of leaks via observation of liquid levels in a tank and secondary containment inspection port.

The treatment tanks are compatible with the anticipated wastes. The design of the reinforced concrete is enhanced by the addition of a Xypex Admix (or equivalent) to decrease the permeability of the concrete and increase its chemical resistance. The steel liner is compatible with the wastes it is authorized to receive and treat, including alkaline, reactive, organic, and acidic wastes. To minimize any potential internal corrosion, acidic wastes are treated immediately to raise their pH. Further, the steel liner of the tanks are monitored by performing periodic thickness testing at the frequency noted in Section T.5, and the results are evaluated to confirm that the treatment tanks are at a minimum thickness that will prevent leaks or containment failures.

Tanks taken out hazardous waste service may undergo partial closure, and subsequently, be used for storage of non-hazardous wastes, product, or stormwater.

III. Containment

The proposed treatment tanks will be located under canopy cover and equipped with a secondary containment system meeting the requirements of 40 CFR 264.193. The secondary containment consists of a 1-foot (minimum) thick reinforced concrete secondary containment. The concrete will be amended with Xypex Admix (or equivalent) at the time it is batched to generate a non-soluble, chemically resistant crystalline structure throughout the pores and capillary tracts of the concrete that prevents the penetration of waste into the concrete. All interior construction joints of the concrete structure will be sealed with a chemically resistant polyethylene (or equivalent) waterstop. Details regarding the leak detection system for ~~TF-4~~TA-2b and TA-2c are provided in Appendix 8~~part of the tank assessment document~~.

USE Tulsa utilizes the leak detection ~~containment sump~~inspection port for periodic inspections and to remove accumulated liquids (~~precipitation and~~ spilled or leaked waste) by pump and dispose of in an appropriate manner within 24 hours. Procedures for evaluating liquids removed from permitted secondary containment areas are provided in Section T.7 and Section 2 of Attachment

6. When necessary, USE Tulsa's ~~-~~on-site laboratory will analyze the accumulated liquids to determine if it is hazardous waste ~~-~~or non-hazardous waste and how it should be managed or disposed of in accordance with state and federal regulations.

IV. Control of Run-On and Run-Off

The tanks will ~~be elevated from the~~be provided with curbing at the ground surface~~ adjacent areas~~, which will control run-on. The tanks will be located under canopy cover and operated with freeboard, which will control potential run-off.

V. Tank Management Processes

Quick-connect couplings and flexible hose will be used when offloading tanker trucks into the treatment tanks. ~~There is no notable ancillary equipment associated with either tank. There are no piping systems, fittings, access points, or other openings in the walls of the tanks~~The only access point consists of a 4-inch leak detection inspection port extending from the surface of the treatment tanks to a depth slightly elevated from tank bottom. The are no piping systems, fittings, or other openings in the walls of the tanks. ~~-~~The inspection port is located between the steel liner and the concrete secondary containment. Tanker trucks will be offloading waste into the tanks via quick-connect couplings and flexible hose.

When a different hazardous waste is treated in a tank, USE Tulsa will evaluate the need for decontamination procedures for tanks that previously held an incompatible waste or material. The tank will be decontaminated when evidence of visual contamination is identified or when "knowledge of process" based on tank usage indicates decontamination is appropriate. Decontamination procedures will consist of one to two washes with water or other appropriate cleaning agents. Wash water will be disposed of in accordance with state and federal regulations.

The tanks are compatible with the waste ~~stored~~treated. The facility inspection schedule (presented in Attachment 4 - Inspection Schedules and Forms and Attachment 6 - Procedures to Prevent Hazardous) includes inspection of tank systems.

VI. Leak Detection for Ancillary Equipment

~~There is no~~The only notable ancillary equipment associated with either tank is the 4-inch leak detection inspection port extending from the surface of the treatment tanks to a depth slightly

elevated from tank bottom.~~.~~ Tanker trucks will be offloading waste into the tanks via quick-connect couplings and flexible hose.~~There are no piping systems, fittings, access points, or other openings in the walls of the tanks.~~

VII. Containment Calculations for Proposed TA-2b and TA-2c

Note: Proposed tanks TA-2b and TA-2c will be constructed of the same material and all designed to the same dimensions. Therefore, the calculations below apply to both tanks.

GIVEN:

Tank length (N/S)	=	20 ft
Tank width (E/W)	=	25 ft
Top Elevation	=	99.27 ft
Bottom Elevation	=	96.55 ft
Tank Depth	=	12.72 ft (~13 ft)
Width of left quadrant steel liner (horseshoe)	=	62.6 in
Heigh of left quadrant steel liner (horseshoe)	=	62.9 in
Width of right quadrant steel liner (horseshoe)	=	66.4 in
Height of right quadrant steel liner (horseshoe)	=	64.2 in
Arc radius of steel liner	=	60 in

SECONDARY CONTAINMENT CAPACITY AVAILABLE FROM TA-2b/TA-2c:

Volume inside secondary containment:

(20 ft)(25ft)(12.72 ft)	=	6,360 ft^3
(6,360 ft^3)(7.48 gal/ft^3)	=	47,573 gal
Total capacity available:	=	47,573 gal

CONTAINMENT CAPACITY REQUIRED FOR TA-2b/TA-2c:

Not Applicable as the primary containment is located fully within the concrete secondary containment for TA-2b/TA-2c. As long as the primary containment (steel tank~~liner~~) fits within the secondary containment (concrete containment) the capacity required is met.

Area of left quadrant of steel liner:

$(62.6\text{ in})(62.9\text{ in})/(144\text{ in}^2) = 27.34\text{ ft}^2$

Area of right quadrant of steel liner:

$(66.4\text{ in})(64.2\text{ in})/(144\text{ in}^2) = 29.60\text{ ft}^2$

Interior arc area of left quadrant steel liner:

$[\pi(60\text{ in})(60\text{ in})/4]/(144\text{ in}^2) = 19.63\text{ ft}^2$

Interior arc area of right quadrant steel liner:

$[\pi(60\text{ in})(60\text{ in})/4]/(144\text{ in}^2) = 19.63\text{ ft}^2$

Left quadrant area between concrete containment and steel liner:

$(27.34\text{ ft}^2) - (19.63\text{ ft}^2) = 7.71\text{ ft}^2$

Right quadrant area between concrete containment and steel liner:

$(29.60\text{ ft}^2) - (19.63\text{ ft}^2) = 9.97\text{ ft}^2$

Left quadrant volume between concrete containment and steel liner:

$(7.71\text{ ft}^2)(25\text{ ft}) = 192.73\text{ ft}^3$

Right quadrant volume between concrete containment and steel liner:

$(9.97\text{ ft}^2)(25\text{ ft}) = 249.21\text{ ft}^3$

Total capacity required:

$(6{,}360\text{ ft}^3) - (192.73\text{ ft}^3 + 249.21\text{ ft}^3) = 5{,}918.06\text{ ft}^3$

$(5{,}918.06\text{ ft}^3)(7.48\text{ gal/ft}^3) = 44{,}267\text{ gal}$

Total maximum capacity required: = 44,267 gal

EXCESS CONTAINMENT:

47,573 gal – 44,267 gal = 3,306 gal

Figure T-2: Modified Tank Area 2b and 2c (TA-2b) (TA-2c)

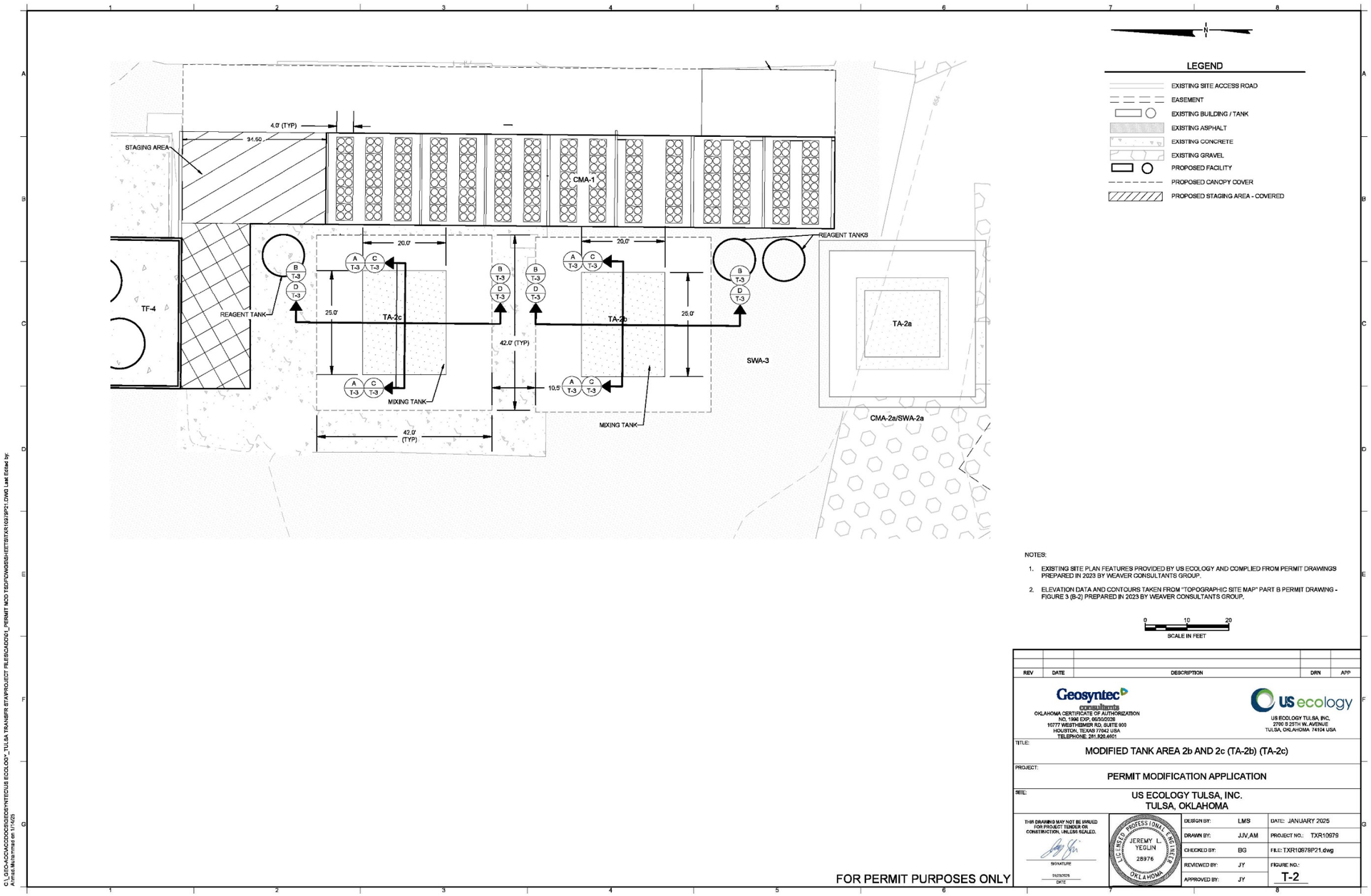


Figure T-3: TA-2 Tank Details I

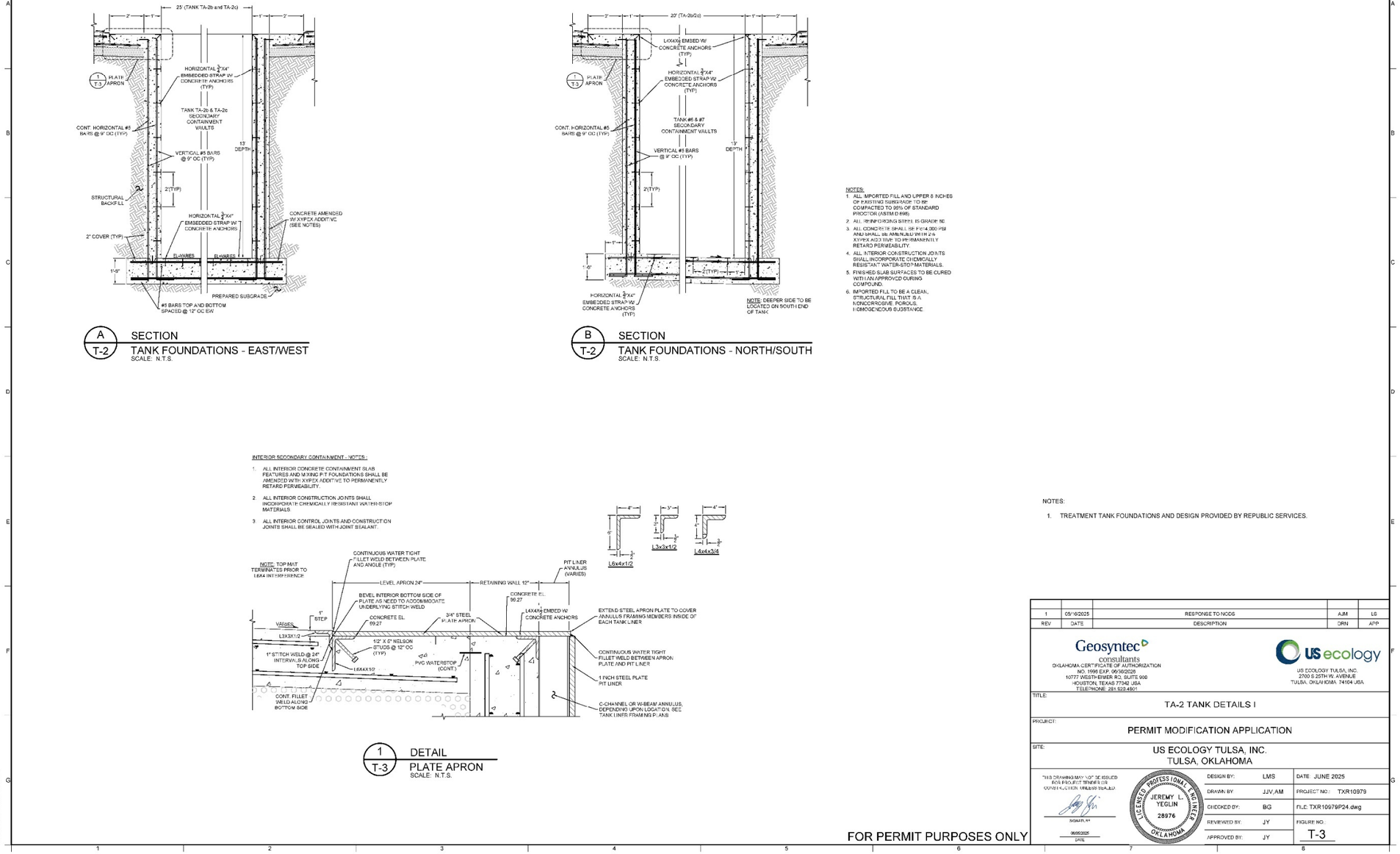
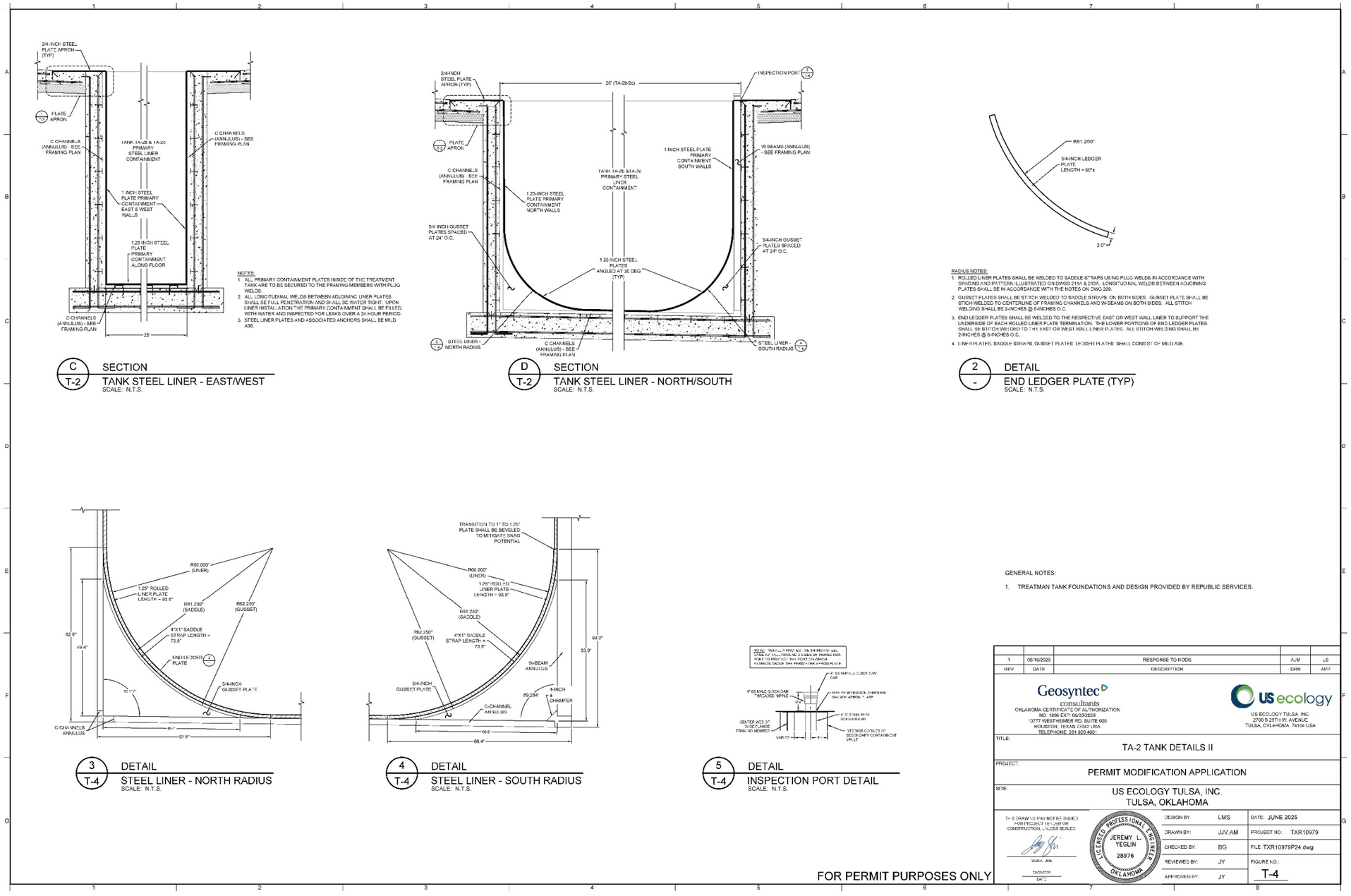
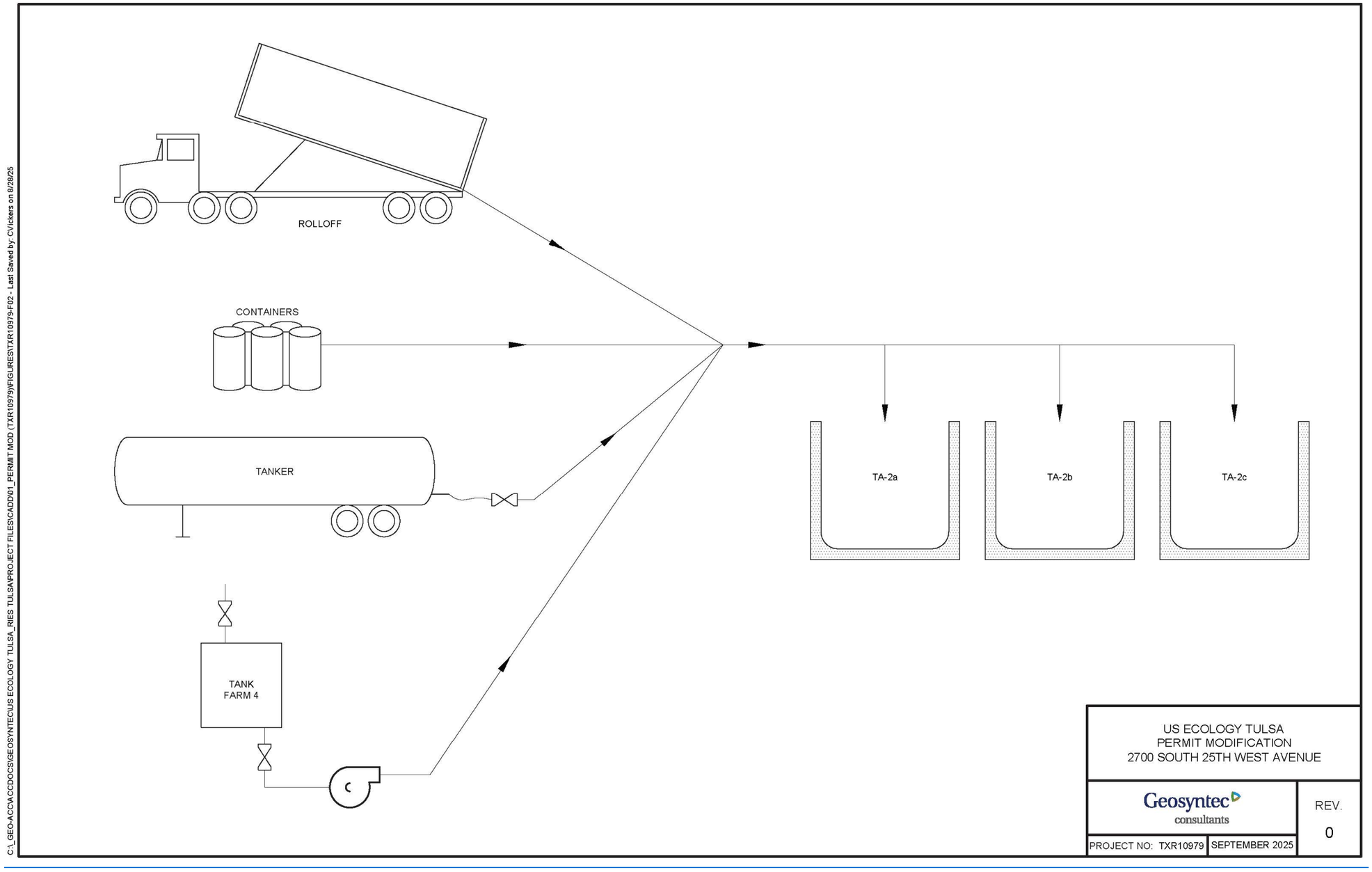


Figure T-4: TA-2 Tank Details II



Appendix 6-A - Process Diagram for Treatment Tanks TA-2b and TA-2c



Appendix 7 – Permitted Hazardous Waste Tank System Table

	Tank	Maximum Capacity (Gallons)	Material of Construction	Installation/Construction Date	Dimensions of Tank	Secondary Containment Capacity (Gallons)	Waste Types
Existing	T-101	16,800	Fiberglass	7/1990	12'Dx20'H	30,350*	Liquids
	T-102	19,960	Fiberglass	6/2005	14'Dx20'H	30,350*	Liquids
	T-103	19,960	Fiberglass	6/2005	14'Dx20'H	30,350*	Liquids
	T-107	13,077	Fiberglass	Pre-2007	12'Dx18.4'H	30,350*	Liquids
	TA-2a	4,000**	Reinforced Concrete and Steel Liner Tank	2015	16'x18'x4'H	9,296	Liquids & Solids
	TA-2b	3,500**	Reinforced Concrete and Steel Liner Tank	2015	14'x14'x5'H	10,998	Liquids & Solids
Proposed	T-407	19,960	Fiberglass	N/A	12'Dx32'10.5"H***	40,512*	Liquids
	T-408	19,960	Fiberglass	N/A	12'Dx32'10.5"H***	40,512*	Liquids
	T-409	19,960	Fiberglass	N/A	12'Dx32'10.5"H***	40,512*	Liquids
	T-410	19,960	Fiberglass	N/A	12'Dx32'10.5"H***	40,512*	Liquids
	TA-2a	No structural modifications					
	TA-2b	21,25020,500**	Reinforced Concrete and Steel Liner	N/A	20'x25'x13'H	44,26747,573	Liquids & Solids
	TA-2c	21,25020,500**	Reinforced Concrete and Steel Liner	N/A	20'x25'x13'H	47,57344,267	Liquids & Solids

Notes:

*Total secondary containment capacity for Tank Farm 1 or Tank Farm 4.
**Tanks TA-2a & TA-2b have treatment volume limits less than total capacity to meet secondary containment and operation requirements of 40 CFR 264.193(e), 264.194(b)(2) and 264.194(b)(3).
***Total height includes the legs supporting the tanks.

Appendix 8 – Assessment of Proposed Tanks

This written assessment has been prepared in accordance with Title 40, Code of Federal Regulations (CFR) §270.16(a) to provide the information required under §264.192(a)(1) through (5) for the proposed six (6) new tanks at US Ecology Tulsa (USE Tulsa or Facility). Specifically, as shown below, this assessment demonstrates that the proposed tank systems have sufficient structural integrity and suitability for handling hazardous waste. This assessment describes how the foundations, structural supports, seams, connections, and pressure controls are adequately designed and that the tank systems have sufficient structural stability, waste compatibility, and corrosion protection to ensure they will not collapse, rupture, or fail.

The remainder of this report provides the written assessment for the proposed tanks as required by §264.192(a), which has been reviewed and certified by a qualified Professional Engineer (P.E.) in accordance with §270.11(a) attesting that the tank systems have sufficient structural integrity and are acceptable for the storing and treating of hazardous waste.

Description of Tanks

Tank Farm 4 Storage Tanks

The proposed tank system at the Tank Farm 4 location of the Facility consists of four (4) vertical aboveground, closed top, fiberglass reinforced plastic (FRP) tanks lined with epoxy vinyl ester resin (T-407, T-408, T-409, and T-410) located within an existing reinforced concrete secondary containment structure. The waste containment capacity of each of the tanks (T-407 to T-410) is approximately 19,960 gallons. The general dimensions of the proposed storage tanks are provided in Section T, Appendix 7. The proposed storage tanks have a flat top and cone bottom and are supported on legs secured to the reinforced concrete floor of the secondary containment structure. The floor and walls of the concrete containment structure are designed to be coated with an impervious, chemical resistant material.

Treatment Tanks

The treatment tank system includes the existing TA-2a and the proposed addition of new TA-2b and TA-2c. Only the new treatment tanks are discussed herein. Proposed treatment tanks TA-2b

and TA-2c each consist of an open-top, below-grade, 1-foot (minimum) thick reinforced concrete secondary containment amended with Xypex additive Admix C-Series (or equivalent) and lined with a 1-inch (minimum) thick mild carbon steel tank designated for hazardous waste service. The total waste containment capacity of the tanks (TA-2b and TA-2c) is approximately 44,267 gallons each, although the tanks are used for treatment purposes only and are not used for storage of hazardous waste. The total waste containment capacity of the secondary containment is approximately 48,623 47,573 gallons each. The general dimensions of the proposed treatment tanks are provided in Section T, Appendix 7.

Design Standards (40 CFR §264.192(a)(1))

Tank Farm 4 Storage Tanks

The proposed storage tanks meet the design standards of ASTM D3299 (Standard Specification for Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks). This standard is applicable to cylindrical corrosion-resistance tanks made of commercial-grade glass-fiber-reinforced polyester or vinyl ester thermoset resin fabricated by filament winding for aboveground vertical installation to contain aggressive chemicals at atmospheric pressure. Vinyl ester thermoset resin is specified for the structural component of the tanks and also the liner as it has a higher chemical resistance than polyester resin and it is chemically compatible with the anticipated wastes. The design standard includes appropriate requirements for tank materials, properties, design, construction, dimensions, tolerances, workmanship, and appearance. The ASTM D3299 standard also addresses tank seams, connections, and vents to control pressures. Further, the design criteria for the proposed tanks includes design loads based on the American Society of Civil Engineers (ASCE) 7-22 Standard (Minimum Design Loads and Associated Criteria for Buildings and Other Structures). The proposed storage tanks are adequately designed.

Treatment Tanks

There is no specific design standard applicable for the proposed treatment tanks. However, the tank drawings are reviewed and certified by a licensed P.E. to ensure they are appropriately designed for their intended use. The proposed treatment tanks are designed with reinforced concrete and carbon steel as previously described. The treatment tanks include a curved steel

liner in the north-south direction. The curved liner shape reduces the potential for contact between the liner and the excavator bucket used for mixing and loadout, as well as improves operational waste mixing efficiency. The proposed treatment tanks are adequately designed.

Hazardous Characteristics of the Wastes to be Handled (40 CFR §264.192(a)(2))

The waste streams accepted at the Facility include a wide variety of non-hazardous wastes and Resource Conservation and Recovery Act (RCRA) listed and characteristic hazardous wastes. The full list of RCRA hazardous waste codes handled at the Facility is provided in Section A of the Facility permit.

Tank Farm 4 Storage Tanks

Bulk liquid non-hazardous waste and bulk liquid hazardous waste having a RCRA waste code that is listed in Section A of the Facility permit may be stored in the Tank Farm 4 tanks. The proposed tank materials, FRP and lined with epoxy vinyl ester resin, were selected for their chemical compatibility with the anticipated hazardous and non-hazardous wastes. The tank system materials for the proposed tanks are compatible with the anticipated wastes.

Treatment Tanks

Bulk liquid non-hazardous waste and bulk liquid hazardous waste having a RCRA waste code that is listed in Section A of the Facility permit may be offloaded into the treatment tanks if the waste requires treatment and if the Facility permit allows treatment of the RCRA waste code in treatment tanks. Containerized waste meeting these criteria may also be placed in the treatment tanks. See Attachment 2 for details. Current technologies and regulations prevent treatment of certain types of waste at USE Tulsa. These prohibited waste types include:

- D001 ignitable waste;
- The following D003 reactives:
  - Explosives or any self-detonating wastes
  - Self-heating wastes
  - Pyrophoric wastes (such as most organometallic compounds or alkali metals);
- Waste that carries F, P, K, or U codes; and

Waste prohibited from land disposal as listed in 40 CFR §268, Subpart C.

*Subject to change as updated treatment capabilities become available. If updated treatment capabilities become available, USE Tulsa will initiate the appropriate permit modification process.

Chemical and heat resistance of the treatment tanks are provided by the structural and lining materials (reinforced concrete and carbon steel). The design of the reinforced concrete is enhanced by the addition of a Xypex additive Admix C-Series (or equivalent) to decrease the permeability of the concrete and increase its chemical resistance. The steel liner is compatible with the wastes it is authorized to receive and treat, including alkaline, reactive, organic, and acidic wastes. To minimize any potential internal corrosion, acidic wastes are treated immediately to raise their pH. Further, the steel liner of the tanks are monitored by performing periodic thickness testing at the frequency noted in Section T, Item 5, and the results are evaluated to confirm that the treatment tanks are at a minimum thickness that will prevent leaks or containment failures. The tank system materials for the proposed tanks are compatible with the anticipated wastes.

Corrosion Resistance for Tanks in Contact with Water or Soil (40 CFR §264.192(a)(3))

Tank Farm 4 Storage Tanks

The proposed storage tanks are constructed of corrosion resistant FRP with an internal epoxy resin lining. There are no external metal components of the tank systems that are in direct contact with the soil or with water. Therefore, this regulation does not apply.

Treatment Tanks

The proposed treatment tanks are constructed of a concrete exterior and internal steel liner. The proposed treatment tank systems are located belowgroundbelow ground within the concrete containment vault and are provided with a covered roof structure. There are no external metal components of the treatment tank systems that are in direct contact with the soil or with water. Therefore, this regulation does not apply.

Vehicular Protection for Underground Tanks (40 CFR §264.192(a)(4))

Tank Farm 4 Storage Tank

This regulation does not apply since the storage tank systems are installed aboveground and within a concrete secondary containment structure.

Treatment Tanks

There are no piping systems or ancillary equipment associated with the treatment tanks. Waste is transferred into the tanks by mechanical equipment or manual dumping and is removed by excavator bucket. There are physical barriers present, such as curbing, bollards, and visual signs to prevent accidental damage from any hazardous waste vehicular traffic. Sufficient vehicular protection is provided for the proposed treatment tanks.

Design Considerations (40 CFR §264.192(a)(5))

Tank Farm 4 Storage Tanks

The tank foundations are designed to support the load of the full tanks. As previously described, USE Tulsa is intending to retrofit the existing reinforced concrete secondary containment structure for use with the proposed storage tanks. Based on a visual inspection, the existing foundation appears to be in good condition and has been supporting the existing non-hazardous storage tanks present at the Facility with little to no settlement or cracking to date. Further, the secondary containment structure is designed to be coated with an impervious, chemical resistant material to seal and prevent any cracks in the existing foundation. It is anticipated that the existing foundation is safe for the proposed storage tanks, which will be confirmed prior to tank installation.

As previously noted, the legs of the tanks are designed to be anchored and secured to the concrete foundation. This will prevent flotation and control movements under potential seismic loading. It is noted, however, that the tank farm is not located over a saturated zone or within a seismic fault zone (within 200 feet of a fault which has displacement in Holocene time).

The foundation of the tank farm is designed to withstand the effects of frost heave. No visible foundation cracking was observed for the existing containment structure during inspection.

Because the proposed tanks are anchored to the foundation, they are not susceptible to frost heave individually.

Treatment Tanks

The reinforced concrete containment/foundation for the treatment tanks is designed to support the load of the full tanks. The thickness of the reinforced concrete structure is 12 inches on the side walls and 18 inches on the bottom floor. Further, the tanks are of sufficient size and weight such that collection of fluids in the secondary containment system will not cause flotation.

The steel liner (primary containment) is designed to be anchored to the concrete foundation (secondary containment) to limit movement or dislodgement during seismic activity. The treatment tanks are also monitored periodically for any sign of settlement or cracking associated with the foundation. It is noted that the proposed treatment tanks are not located in or over a saturated zone or within a seismic fault zone (within 200 feet of a fault which has displacement in Holocene time).

The steel liners are located on an extensive concrete foundation that is designed to withstand the effects of frost heave. Frost heave is not anticipated to be an issue for the proposed tanks based on the performance of the existing similar treatment tank foundations at the Facility.

Professional Engineer Attestation (40 CFR §270.11(a))

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Jeremy L. Yeglin

Name

~~6/5/~~9/172025

Date

Appendix 9 – Manufacturer Information for Basic Concepts, Inc. SC 3900 Industrial Spray Coating

BASIC CONCEPTS INC
Justrite Safety Group

Industrial Spray Coating System, SC-3900

Product Images

Short Description

- Fast setting to allow final coating thickness to be achieved in one application.
- 100% solid, no solvents, and zero VOCs.
- High-dry-temperature-stability-to-250°F-(121°C)-with intermittent temperatures to 300°F (148°C).
- High abrasion resistance.
- High elongation for bridging cracks.
- Excellent encapsulation characteristics.
- Load-Bearing Capacity - > 3,900 psi (27 MPa)
- Application - Coating for all types of steel infrastructure, including pipes, bridges, power line poles and structures, transportation and rail systems, as protection from corrosion; concrete tank, floor, pond, dike, tunnel, and bridge lining; existing membrane repair; asbestos and lead encapsulation; onshore

and offshore marine and high salt corrosion protection; and more.
- Compliance - Compliant with FDA/USDA for incidental food contact. Contact BCI for more information.
- Packaging - This product is sold in standard 110 gallon drum sets and 550 gallon tote sets. Available in other container sizes.
- Color - SC-3900 UB is available in standard colors (Sand, Medium Grey, and Black). Custom colors available upon request.

Description

SC-3900 is a high-strength flexible coating that can be used on a wide variety of substrates. With 3900 psi tensile strength and 300% elongation properties, SC-3900 is a good choice for concrete and steel applications that require strength and flexibility. Typical uses are concrete crack repair in secondary containment systems, internal tank coatings, loading rack containment, and rehabilitation of rail track pans.

SC-3900 UB is a fast-set, high performance, spray-applied, plural component, 100% pure urea-based elastomer. This system is based on amine-terminated polyether resins, amine chain extenders, and prepolymers. It provides a cost effective flexible, tough, resilient monolithic membrane with water and chemical resistance.

SC-3900 UB is available with cutting-edge Ultra Bond™ technology. Advanced Ultra Bond™ chemistry is coined “the duct tape molecule”. Ultra Bond™ has the unique advantage of adhering to most properly prepared organic and inorganic (new and aged) surfaces without requiring a primer. Like duct tape, SC-3900 UB with Ultra Bond™ gains adhesion over time.

As with most coatings, there is a re-coat window that presents a lack of inter-coat adhesion. The UB™ molecule mitigates this risk during installation.

Specifications

SKU	SC-3900

BASIC CONCEPTS INC
Justrite Safety Group

SC-3900 UB

HIGH STRENGTH, CHEMICAL RESISTANCE
STRUCTURAL COATINGS DIVISION

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FEATURES

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- Fast setting to allow final coating thickness to be achieved in one application.
- 100% solid, no solvents, and zero VOCs.
- High dry temperature stability to 250°F (121°C) with intermittent temperatures to 300°F (148°C).
- High abrasion resistance.
- High elongation for bridging cracks.
- Excellent encapsulation characteristics.
- Compliant with FDA/USDA for incidental food contact. Contact BCI for more information.

RECOMMENDED USES

- Coating for all types of steel infrastructure, including pipes, bridges, power line poles and structures, transportation and rail systems, and other urban applications such as rebar, guardrails, signage, grates, valves, and tanks, to protect from corrosion.
- Coating over geotextile for such applications as earthen containment, primary and secondary containment, etc.
- Can be used as liner for concrete tanks, floors, ponds, reservoirs, dikes, tunnels, bridges, and other concrete infrastructure.
- Apply as a topcoat to existing membranes, or use to repair inferior or degraded membranes.
- Encapsulate asbestos, lead paint, or other dry hazardous materials.
- Re-coat over other polymer based substrates and/or coatings.
- Concrete parking decks, garages, and other structures.
- Repair polyurea, polyurethane hybrid, and other lining types.
- Rock shield for pipelines.
- Bedliners, trailers, and SUV's.
- Wastewater infrastructure, such as protecting from H^2S gas.
- Onshore and offshore marine and high salt environment corrosion and current protection.

TYPICAL PHYSICAL PROPERTIES*

@ 70 mils ± 20 (1.7 mm)	
Tensile Strength ASTM D412-06a	> 3,900 psi (27 MPa)
Elongation ASTM D412-06a	> 325%
Hardness (Shore A) ASTM D2240	96 ± 5
Hardness (Shore D) ASTM D2240	50 ± 5
100% Modulus ASTM D412	1,200 psi ± 100 (8 MPa)
300 % Modulus ASTM D412	3,010 psi ± 100 (21 MPa)
Tear Resistance ASTM D624	370 PLI ± 50 (64 KN/m)
Exposure Temperature**	-50 - +200°F (-45 - +93°C)

CURING SCHEDULE

Gel	± 5 sec.
Tack Free	± 7 sec.
Post Cure***	24 hour
Recoat	0 - 12 hours

* All cured film properties are approximate since processing parameters, ad-mixture types, and quantities change physical properties of the cured elastomer. Elevated temperatures will accelerate the curing process and shorten the re-coat window.

** Test performed in a dry, static environment.

*** Complete polymerization to achieve final strength can take up to several days or weeks, depending on a variety of conditions or product type. All samples for above tests were force cured 48 hours or aged for more than three weeks. **It is recommended that the user perform their own independent testing**.

The samples for all tests on this technical data sheet were sprayed with Graco HXP3 @ 2,800 psi (19 MPa) dynamic pressure at the gun. Proportioning machine primary heater and hose heat - 170°F (77°C) Graco MP Fusion gun with 29/29 mixing chamber with .040 ceramtip.

TEST INFORMATION

Surface Resistance of Static Dissipative ASTM D257	5.469E^{8} - 9.434E^{9} ohms/square	
Crack Bridging Property BS EN 1062-7 Method B31	Passed	
Abrasion Resistance ASTM D4060 1000 g - 1000 cycles	H-18	147 mg loss
	CS-17	6 mg loss

WET PROPERTIES

Solids by Volume	100%
Solids by Weight	100%
Volatile Organic Compounds	0 lbs./gal. (0 g/l)
Theoretical Coverage DFT	100 sq. ft. @ 16 mils/gal
Weight per gallon (approx.)	8.8 lbs. (4.0 kg)
Number of coats	1 - 2 as needed
Mix Ratio (by volume)	1 "A" : 1 "B"
Viscosity 77°F (25°C)	A: 400 ± 25 cPs B: 425 ± 25 cPs
Shelf Life Unopened Containers at 60 - 90°F (15 - 32°C)	6 Months
Minimum material/container temperature is 70°F (21°C).	

COLORS

SC-3900 UB is available in standard colors (Sand, Medium Grey, and Black). Custom colors available upon request. Note: SC-3900 UB is an aromatic polyurea. Therefore, with all aromatics, color change and superficial oxidation will occur. Aliphatic polyurea, urethane, polyaspartic, and other suitable topcoats can be used where long-term color stability and increased longevity in full sun exposure are of critical importance.

PACKAGING

This product is sold in standard 110 gallon drum sets and 550 gallon tote sets. Available in other container sizes. Contact BCI sales representative for further information. Non-standard containers may require a longer lead time.

GENERAL APPLICATION INSTRUCTIONS

Apply SC-3900 UB only to clean, dry, sound, surfaces free of loose particles or other foreign matter. SC-3900 UB can be sprayed over a broad range of ambient and substrate temperatures. It is recommended that SC-3900 UB be sprayed in multi-directional (north/south - east/west) passes to ensure uniform thickness.

Contact BCI technical service personnel for specific surface preparation for your application.

COMMON SUBSTRATES:

STEEL: 4-5 mil anchor profile is best for maximum adhesion and varies per application and conditions; adhere to proper SSPC standards.

WOOD: Apply urea onto a clean, dry, and sanded surface; free from burrs, splinters and loose debris. (It is recommended to prime wood and other porous surfaces before application of heated, fast-set polyureas to reduce pin holing).

CONCRETE: Prepare concrete in accordance with SSPC/NACE Standards and Concrete Prep Guide.

PREVIOUSLY APPLIED COATINGS: BCI recommends UB™ (ULTRA BOND™) products over existing coatings that are past the recoat window and/or application over other coatings. Contact BCI for additional information.

NOTE: It is recommended that existing surfaces be power washed with 2500—3500 psi water pressure to enhance adhesion of SC-3900 UB. If there is a possibility of surface contamination, scrub with a solution of 1/4 tsp Dawn detergent and 1 tbsp of vinegar, per 1 gallon of warm water. Follow with a thorough water rinse. If there is oxidation on the surface of the existing substrate; it must be removed prior to application of SC-3900 UB. Removal of oxidation can be done via mechanical methods to insure the SC-3900 UB has a sound substrate to adhere to. The use of SPI Prep Wipe™ solution will tack up the existing polyurea coating and help promote bonding of the SC-3900 UB.

On all above listed substrates and others, please contact Sales or Technical Support for more information specific to your application, including industry standards such as SSPC and NACE. **Adhesion tests are always recommended prior to application.**

MIXING & THINNING

Thoroughly agitate the "B" components of this product prior to application. Use a folding blade mixer or equivalent equipment approved by BCI. Install mixer through the extra air specific 2" bung hole provided on all "B" drums. Care must be taken not to cross contaminate the individual components with the mixing equipment; for best mixing results, supply the mixer with 25 cfm of air at 100 psi. Thinning is not required. Using any thinner may adversely affect product performance.

PROCESSING EQUIPMENT & SETTINGS

MACHINES:		
GRACO (Gusmer, Glass-craft)	• A-25* • A-XP1 • E-10 HP • E-20* • E-30* • E-XP1 • E-XP2 • H-20/35 Pro • H-25* • H3500 • H-40*	• H-50* • HV-20/35 • H-XP2 • H-XP3 • Reactor2 E-XP2 • Reactor2 H-XP2 • Reactor2 H-XP3 • Reactor2 E-30* • Reactor2 H-30* • Reactor2 H-40* • Reactor2 H-50*

PMC	• GH-25* • GH-40* • PA-25* • PAX-25 • PH-2* • PH-25*	• PH-40* • PHX-2 • PHX-25 • PHX-40 • PMCA-20
SPRAY FOAM EQUIP & MFG	• 5/12K* • 6/6K*	• 6/12K
*2,000 psi machines		
GUNS:		
GRACO (Gusmer, Glass-craft)	• Fusion AP • Fusion MP • GAP Pro • GX7-DI • GX-8 Pro	• GX7-400 • P2 • P2 Elite • P2 Elite "C" • D7
PMC	• AP-2	
SPRAY FOAM EQUIP & MFG	• Boss	

- Standard 1:1 ratio, heated, plural-component equipment developing a minimum of 1700 psi (11.72 MPa) dynamic pressure at the gun with heating capabilities to 170°F (77°C) will adequately spray SC-3900 UB.
- Machines capable of producing a higher dynamic psi may be required depending on the service environment the SC-3900 UB will be exposed to. Consult SPI technical service personnel for additional information.
- Proportioning machine primary heater temperature for application is 70°F (21°C).
- Hose temperature 160-170°F (71-77°C). A hose thermometer inserted under the insulation near the gun should read a minimum of 145-155°F (63-68°C).
- Physical properties will be enhanced when sprayed at higher pressure (3000 psi or more); utilizing an impingement mix gun such as MP Fusion or GX7-DI gun.
- Do not use mixing chambers with output greater than 1.5 gallons per minute. Consult SPI technical service personnel for additional information.

If you own a machine that is not listed above please contact your SPI representative for information and instructions.

PARAMETERS & LIMITATIONS

- SC-3900 UB is for professional use only. User must be proficient in the application of SC-3900 UB and the use of the high pressure heated plural component equipment used to apply it.
- SC-3900 UB must be stored at temperatures between 60—90°F (15—32°C).
- Liquid temperature in containers/drums during application 70—100°F (21—38°C).
- Apply SC-3900 UB when surface and air temperatures are above 40°F (5°C) and the surface temperature is at least 5°F (3°C) above dew point and rising.
- Avoid moisture contamination in containers. Containers should not be resealed if contamination is suspected. CO_2 created pressure can develop. Do not attempt to use contaminated material.
- Undried air exposed to liquid components will reduce physical properties of the cured coating.

Note: The material supplied is a two component system (component "A"/component "B"), which is used to formulate this product. The quality and characteristics of the finished polymer is determined by the mixture and application of the two components by the person applying polymers.

For the most up to date technical data sheet and/or safety data sheet contact BCI.

GENERAL SAFETY, TOXICITY, & HEALTH

Safety Data Sheets are available for this coating material. Any individual who may come in contact with these products should read and understand the S.D.S. **CHEMTREC EMERGENCY NUMBER 1-800-424-9300 INT'L 1-703-527-3887.**

WARNING: Contact with skin or inhalation of vapors may cause an allergic reaction. Causes eye damage/irritation. Avoid eye contact with liquid or spray mist. Hypersensitive persons should wear protective clothes, gloves and use protective cream on face, hands and other exposed areas.

CONTAMINATION: Avoid moisture contamination in containers. Containers should not be resealed if contamination is suspected, CO_2 created pressure can develop. Do not attempt to use contaminated material.

EYE PROTECTION: Safety eye wear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/or face shield.

SKIN PROTECTION: Personal protective equipment for the body should be selected based on the task being performed, the risks involved, and should be approved by an industrial hygiene specialist before handling this product. Chemical resistant gloves complying with applicable health and safety standards shall be worn when handling this product. Cover as much of the exposed skin area as possible with appropriate clothing. Refer to safety data sheet (SDS).

RESPIRATORY PROTECTION: Harmful if inhaled and may cause allergy or asthma symptoms. Ensure adequate ventilation. If the respirator is the sole means of protection, use a full-face supplied respirator. Use respirators and components tested and approved under appropriate government standards such as OSHA 29CFR 1910.134, NIOSH (US), or CEN (EU). Consider the application and environmental concentrations when deciding if additional protective measures are necessary.

INGESTION: Do not take internally. It is believed that ingestion of polymeric isocyanates would not be fatal to humans, but may cause inflammation of mouth and stomach tissue.

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WARRANTY & DISCLAIMER

BCI has no role in the manufacture of the finished polymer other than to supply its two components. It is vital that the person applying this product understands the product, and is fully trained and certified in the use of plural-component equipment. BCI warrants only that the two components of this product shall conform to the technical specifications published in the product literature. The quality and fitness of the product are dependent upon the proper mixture and application of the components by the applicator. There are no warranties that extend beyond the description on the face of this instrument. Failure to apply the product within the parameters stated on this document shall void the warranty. BCI MAKES NO WARRANTY OF MERCHANTABILITY OF THE PRODUCT OR OF FITNESS OF THE PRODUCT FOR ANY PARTICULAR PURPOSE. BCI makes no warranty as to the quality of any product modified, supplemented, tinted, or altered in any way after it leaves the manufacturing plant. BCI does not warrant that this product is suitable for use as a liner for potable water containers. Use of this product in a potable water container could be hazardous to health if it is improperly processed or applied. The liability of BCI for any nonconformity of the product to its technical specifications shall be limited to replacement of the product. The sole exclusive remedy of buyer, which is to have BCI replace any nonconforming product at no cost to buyer, is conditioned upon buyer notifying BCI or its distributor in writing of such defect within thirty days of the discovery of such defect. BCI shall not be liable for any direct, incidental, or consequential damages resulting from any breach of warranty. The data presented herein is intended for professional applicators or those persons who purchase or utilize this product in the normal course of their business. The potential user must perform any pertinent tests in order to determine the product's performance and suitability in the intended application, since final determination of fitness of the product for any particular use is the responsibility of the buyer. The aforementioned data on this product is to be used as a guide and is subject to change without notice. The information herein is believed to be reliable, but unknown risks may be present. BCI makes no warranties, expressed or implied, including patent warranties or warranties of merchantability or fitness of use, with respect to products or information set forth herein. Nothing contained herein shall constitute permission or recommendation to practice any invention covered by a patent without a license from the owner of the patent. Accordingly, the buyer assumes all risks whatsoever as to the use of these materials and buyer's exclusive remedy as to any breach of warranty, negligence, or other claim shall be limited to the purchase price of the materials. Failure to adhere to any recommended procedures shall relieve BCI of all liability with respect to the materials and the use thereof.

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BCI
BASIC CONCEPTS INC
Justrite Safety Group

their safety is essential.
Protecting people, property, and the planet.

SC-3900—Chemical-Resistant Fast-Set Elastomers

Recommended for Immersion and/or Splash & Spillage Conditions	Occasional and Intermittent Contact	Not Recommended

Immersion tests were performed at approximately 77°F (25°C) unless otherwise noted.
Note: Test results are based on one side of the coating being exposed.

	Material Tested	24 hour Wt. Gain %	72 hour Wt. Gain %	7 day Wt. Gain %	Recommended Clean Up Window
Acids	Acetic 40%	30.00%	–	–	–
	Hydrochloric Acid 24%	0.64%	0.96%	1.02%	7 days
	Phosphoric Acid 50%	0.95%	2.15%	3.10%	7 days
	Sulfuric Acid 50%	8.60%	16.50%	23.15%	–
Hydrocarbons	Crude Oil	1.50%	2.35%	4.00%	7 days
	Diesel	1.25%	2.69%	3.44%	7 days
	Ethanol	27.20%	31.20%	36.90%	–
	Gasoline	18.50%	20.50%	22.05%	72 hours
	Jet Fuel	1.73%	3.34%	4.99%	72 hours
	Methanol	31.15%	32.10%	–	–
	Aviation Hydrolic Fluid (Skydrol)	19.90 %	32.25%	36.65%	–
Other	Mineral Oil	0.13%	0.18%	0.26%	7 days
	Sodium Hydroxide 50%	0.00%	0.09%	0.15%	7 days
	Water	1.05%	1.15%	1.20%	–

For further information call 813-659-3512, email sales@basicconcepts.com or visit us online at basicconcepts.com

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Appendix 10 – Manufacturer Chemical Compatibility Information for INEOS Composites Series 470 Epoxy Vinyl Ester Resin

RESIN SELECTION GUIDE FOR CHEMICAL RESISTANCE

DERAKANE™ RESINS FOR CORROSION-RESISTANT FRP APPLICATIONS

INEOS Composites

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DERAKANE™ CHEMICAL RESISTANCE GUIDE

FOREWORD

Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ epoxy vinyl ester resins (from this point forward referred to as Derakane™ resins) are designed and manufactured by INEOS. Derakane™ resins possess outstanding corrosion-resistant and temperature-resistant properties, which make them well-suited for a variety of demanding industrial applications. With performance that has been proven over more than 50 years, Derakane™ resins not only deliver durable solutions, they also provide a high measure of confidence.

This guide briefly describes the various Derakane™ resins, as well as detailed chemical resistance data needed to assist engineers in specifying and designing corrosion-resistant fiber reinforced polymer (FRP) applications.

FRP materials are designed with a corrosive-resistant barrier to enhance performance and longevity. Their corrosion-resistant properties make FRPs an ideal structure for tanks, pipes and ducts in environments where corrosive materials are present. These structures are typically designed with a corrosion barrier that serves to minimize penetration of a corrosive media into the structural portion of the equipment. Typically, the entire corrosion barrier is 2.5 to 6.3 mm (100 to 250 mil) thick. The first layer of the corrosion barrier is usually 0.3 to 0.8 mm (10 to 20 mil) thick and is 95% resin, reinforced by one or two surfacing veils. This layer is then backed with 2 to 6 mm (90 to 230 mils) of 75% resin, reinforced with chopped strand mat (powder binder only). Finally, the corrosion barrier is backed with a structural laminate that provides the strength and stiffness for the overall FRP structure. This guide provides guidelines for selecting the most appropriate resin for the corrosion-resistant equipment in question. Recommendations in this guide apply to a variety of corrosion-resistant structures.

Because many variables that affect the performance of a laminate are beyond INEOS' control, no warranty concerning the use of Derakane™ epoxy vinyl ester resins can be made. The temperatures shown in this guide are supported by extensive corrosion testing and/or case histories. When these guidelines are followed, properly designed, fabricated and installed equipment made with Derakane™ resins should provide excellent service life.

For the design of FRP equipment, prospective users of Derakane™ resins should refer to the appropriate industry standards and design guidelines.

For more information, contact INEOS Technical Service at derakane@ineos.com or by visiting www.derakane.com.

BRIEF PRODUCT DESCRIPTION

Derakane™ 411 series resins are the globally recognized standard for epoxy vinyl ester resins. They are based on bisphenol-A epoxy resin, providing resistance to a wide range of acids, alkalis, bleaches and solvents for use in many chemical processing applications. They offer excellent toughness and fatigue resistance.

Derakane™ 441-400 resins are low styrene monomer bisphenol-A epoxy vinyl ester resins with mechanical, thermal and chemical resistance properties between Derakane™ 411 and Derakane™ 470 resins. Their unique combination of high HDT and elongation makes them the resins of choice for applications with thermal cycling; e.g., for chemical reaction vessels.

Derakane™ 451-400 resin is a low viscosity, unpromoted novolac epoxy vinyl ester. This product allows the use of standard MEKP, exhibits excellent exotherm control and industry-leading storage stability. It offers exceptional hot water, solvent and acid resistance, excellent impact strength with high heat resistance and tensile elongation.

Derakane™ 455-400 resin is an unpromoted, highly crosslinked novolac epoxy vinyl ester. This product allows the use of standard MEKP and exhibits excellent exotherm control and storage stability. Derakane™ 455-400 resin contains less than 35% styrene and offers a higher heat distortion temperature compared to Derakane™ 451-400 resin. It also exhibits excellent solvent and acid resistance, as well as high flexural strength and heat resistance.

Derakane™ 470 series resins are epoxy novolac based vinyl ester resins designed to provide exceptional thermal and chemical resistance properties. They offer high resistance to solvents, acids and oxidizing substances such as chlorine. They also offer high retention of strength and toughness at elevated temperatures, making them the resins of choice for flue gas applications.

Derakane™ 510A/B/C series resins are brominated epoxy vinyl ester resins that offer a high degree of fire retardance.[1] The incorporation of bromine not only provides flame retardancy, but also contributes to better toughness and fatigue resistance when compared to standard epoxy vinyl ester resins. Derakane 510™ resins are also very resistant to chemical attack in chlorine and bleach environments.

Derakane™ 510N resin is a brominated epoxy novolac vinyl ester resin that offers a high degree of fire retardance.[1] It exhibits a corrosion resistance similar to Derakane™ 470 resins in most environments. It is also useful in hot, wet flue gas environments where thermal upsets can occur and where fire retardance is desired. This product is only available from North America.

Derakane™ 515-400 resin is a brominated, low viscosity, unpromoted, flame retardant[1] epoxy vinyl ester resin. This product allows the use of standard MEKP, exhibits excellent exotherm control and industry-leading storage stability. In addition to excellent flame retardancy, it offers excellent thermal shock resistance and corrosion resistance to acids and oxidizers. It is well-suited for caustic/chlorine and power industry applications.

Derakane™ 8084 resin is an elastomer-modified bisphenol-A epoxy vinyl ester resin that offers very high toughness, impact and fatigue resistance and excellent adhesion. It is the resin of choice for demanding structural applications and as a primer for chemically resistant FRP linings.

1 The degree of retardance achieved in properly formulated cured products made of these resins is most frequently quantified by the ASTM E84 tunnel test. This is a controlled test that compares flammability characteristics of one material with another, but may not be predictive of behavior in a real fire situation. Derakane™ and Derakane™ Momentum™ epoxy vinyl ester resins are organic materials and will burn under the right conditions of heat and oxygen supply.

HOW TO USE THE CHEMICAL RESISTANCE TABLE

CONTENT

This listing of chemical reagents and environments shows the highest known temperature at which equipment made with Derakane™ resins has, in general, either:

- Given good service in industry or
- Been tested in the field or in the laboratory (in accordance with ASTM C 581) with results that indicate a good life expectancy in service

It should be noted that this is not necessarily the maximum service temperature.

The temperature limits in each column are representative of the whole family of resins (e.g., the Derakane™ 411 resins column applies to Derakane™ 411, Derakane™ Momentum™ 411 and Derakane™ Signia™ 411 resins).

Each series of Derakane™ resins is based on the same epoxy (or novolac) vinyl ester resin backbone. Improvements have been made over the years for processing and stability, as seen in our recent introduction of the Derakane™ Signia™ resins. For example, Derakane™ 411-350, Derakane™ Momentum™ 411-350 and Derakane™ Signia™ 411-350 resins each are based on the same polymer backbone, and comparison studies confirm that their performance in corrosive environments is essentially equivalent. Corrosion data and case history information for each series of Derakane™ 411 resins can be applied to the entire family of Derakane™ 411 resins.

In the chemical resistance tables, a blank space indicates that no data was available at the time that temperature ratings were assigned.

NR stands for “not recommended at any temperature.”

LS stands for “limited service” (at least three days to one year at maximum 40 °C/100 °F). Generally, in these cases, the respective resins can be used for FRP that is exposed accidentally, and where cleaning and inspection are possible after no more than three days.

This guide is updated periodically as needed to take into consideration new experiences and data (e.g., new products, other temperatures or concentrations, etc.).

		Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
	concentration	411	441	451	455	470	510A/B/C	510N	515	8084
chemical environment	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Hydrochloric Acid/ Dissolved Organics <8,9,13>	0–33% HCl	NR				65/150 <15>				NR

[8] Double surfacing veil and a 5 mm/200 mil CR barrier should be used

[9] Double C-veil should be used in the CR barrier

[13] Acid resistant glass should be used in the corrosion liner and may be used in the structural wall

[15] Solution may discolor

weight–% unless otherwise stated

not recommended

no data available

highest recommended temperature (°C/°F)

FOOTNOTES

Information indicated in footnotes is essential in order to ensure a good service life of FRP equipment. It is strongly recommended that they are followed.

1 Double synthetic veil should be used in the CR barrier. Carbon veil can be used in alkaline environments above 50 °C/120 °F and in hydrofluoric acid environments for maximum corrosion resistance.

2 Post cure recommended to maximize service life.

3 Benzoyl Peroxide/Amine cure system recommended to increase service life.

4 Recommended, provided the recommended resin is also suitable for the solvent used for dissolution.

5 Satisfactory up to maximum stable temperature for product.

6 Check with the INEOS Technical Service team for specific resin recommendation.

7 Probably satisfactory at higher temperatures, but temperature shown is the highest for which information was available.

8 Double surfacing veil and a minimum 5 mm/200 mil CR barrier should be used.

9 Double C-veil should be used in the CR barrier. Nexus™ veil is recommended in sodium hypochlorite when sodium hydroxide is present. ECR veil may also be used.

10 For reactors, resins with higher elongation may be preferred.

11 Within the solubility limits in aqueous solution.

12 Above 50 °C/120 °F, acid resistant glass should be used in the CR barrier and may be used in the structural wall.

13 Acid resistant glass should be used in the corrosion liner and may be used in the structural wall.

14 If chemical composition is unknown, obtain safety data sheet from supplier.

15 Solution may discolor.

16 The use of the resin above the maximum allowable design temperature, as limited by national design standards, may require approval of the relevant authorities.

17 The thickness of the CR barrier is proportional to the service life.

18 For food contact applications, local regulations apply. Please see our Fabricating Tips Guide or contact the INEOS Technical Service team.

19 Preference for Derakane™ 510A or B at higher concentrations and temperatures, together with notes 2 and 3.

20 Carbon veil recommended at higher temperatures listed.

21 Maximum recommended temperature is 80 °C/180 °F for aqueous solutions below 0.5%.

22 For potable water applications, please contact the INEOS Technical Service team.

23 Chemical suppliers should approve materials of construction.

24 If the salt solution is saturated, the maximum use temperature from a corrosion resistance point of view could be increased up to the boiling point of the solution or the heat distortion temperature (HDT) of the resin, whichever is lower.

25 A longer life can be obtained if Derakane™ 510B resin is used for environments containing 8–15% sodium hypochlorite.

NR: Not Recommended.

LS: Limited Service. In general, three-days to one-year lifetime at room temperature (max. 40 °C/100 °F) is usually sufficient for secondary containment.

POST CURE

For a service temperature below 100 °C/210 °F:
A post cure may extend the service life if the operating temperature is within 20 °C/40 °F of the present CR guide maximum temperature for the service. This means that a post cure can be beneficial for solvent applications with a temperature limit of 25–40 °C/80–100 °F.

For a service temperature above 100 °C/210 °F:
Post cure in service may be sufficient, provided the resin-specific minimum Barcol hardness values are reached before startup.

For service in pure and neutral salt solutions:
Post cure may, in general, not be required, provided the resin-specific minimum Barcol hardness values are reached and no acetone sensitivity is detected before startup.

When using a BPO/Amine cure system:
Post cure is strongly recommended and should be performed within two weeks of construction.

The post cure conditions as detailed in European Standard EN 13121 may be used:

- For Derakane™ 411, 441, 510A/B/C and 8084 resins: Four hours at 80 °C/180 °F
- For Derakane™ 451, 455, 470 and 510N resins: Four hours at 90 °C/200 °F
- This norm recommends one hour per mm thickness of the laminate (between five and 15 hours).

VEILS

All common veils (non-apertured synthetic and glass veils) are suitable for most environments. Hydrofluoric acid (HF) containing solutions require the use of synthetic or carbon veils. Typically, one veil layer results in a final thickness of approximately 0.3 mm. The thickness of the veil layer is at least as important as the nature of the veil itself. An apertured synthetic veil (such as Nexus™ 100-10) offers an extra thickness of the veil layer and is preferred for cases where this extra thickness can increase service life (e.g., hot caustic solutions). Carbon veils have demonstrated excellent resistance to a number of aggressive chemicals such as HF, HCl and NaOH, **but not sodium hypochlorite (NaOCl).** Carbon veil is also useful in achieving conductive surfaces.

SPECIAL CASES

INSUFFICIENT INFORMATION

In cases where the environment or exposure conditions are outside the scope of this guide, and thus no specific recommendations can be made, a test laminate should be exposed to the actual or simulated conditions proposed so that a final decision on resin suitability can be reached.

COATINGS AND LININGS (REINFORCED AND NON-REINFORCED)

Coatings and linings have their own specific properties and may be limited in operating temperatures because of thermal expansion. It is recommended to consult with the INEOS Technical Service team or with a company in your region that specializes in linings and coatings technology.

Laminate linings can be more durable in liquid environments than other lining systems. For quality reasons, they should be applied by hand lay-up and not by spray-up techniques. As a general rule, and as a result of the low or missing exotherm during polymerization, linings and coatings should be post cured whenever possible (see also the “Post Cure” section of this guide).

Special precautions are required for strongly diffusing media (HCl, HF, etc.). As a general rule, the thicker and the better cured the lining, the higher the diffusion resistance and the longer the life expectancy.

HIGH (FLUE) GAS TEMPERATURES

If a synthetic veil is recommended for hot gas environments, the temperature resistance of the veil must be sufficient.

If it is not, a carbon veil can often be used.

If the environment contains water vapor and/or acids, special measures must be taken to prevent sub-dewpoint conditions in the laminate.

SHORT-TERM EXPOSURE/SPILLAGE

If exposure is intermittent or limited to fumes or spills only, it is possible to have good service life at temperatures considerably higher than those shown and even have good service life in chemical environments shown as NR (not recommended). Contact the INEOS Technical Service team for a resin recommendation at derakane@ineos.com or by visiting derakane.com.

MIXTURES OF ALTERNATING ENVIRONMENTS

The information provided in this guide represents the performance of full FRP structures under continuous use in contact with the stated chemical environment (unless otherwise indicated).

It is sometimes difficult to predict just how aggressive certain combinations of chemicals will be toward FRP. Some mixtures are more aggressive toward FRP than the individual components, so special attention should be paid to aggressively synergistic chemicals which cannot readily be predicted based solely on the corrosion properties of the individual components.

The chemical resistance may also be negatively influenced by using the same equipment for alternating storage or transport of different products, particularly where these products have widely differing properties, such as acids and bases that chemically react with each other.

When in doubt, please consult with your local distributor or your INEOS sales representative, who can put you in touch with the appropriate technical resources at INEOS.

CHEMICAL RESISTANCE INQUIRY

When requesting resin recommendations for corrosion applications, the following data are necessary for your request to be processed:

- Chemical nature of all products in a process or a batch, with their corresponding concentrations (even traces).
- Service temperatures, including maximum and upset temperatures (with corresponding duration).
- State: liquid/gas/solid (risk of phasing or condensation if any).
- Type of equipment (tank, pipe, lining, etc.).

Please feel free to use the enclosed “Chemical Resistance Inquiry” form and email your inquiries to your local distributor or the INEOS Technical Service team at derakane@ineos.com.

SAFETY PRECAUTIONS

Derakane™ epoxy vinyl ester resins and the materials (solvents, accelerators, catalysts, etc.) used with them can be hazardous unless simple but precise precautions are taken. The precautions necessary for handling Derakane™ resins are similar to those for unsaturated polyesters and will therefore be familiar to trained personnel. Safety Data Sheets (SDS) on all Derakane™ resins are available to help customers satisfy their own handling and disposal needs.

NOTICE

Recommendations as to methods and use of materials made in this publication are based on the experience of INEOS and knowledge of the characteristics of Derakane™ resins and are given in good faith. However, because as a material supplier, INEOS does not exercise any control over the use of Derakane™ resins, no legal responsibility is accepted for such recommendations. In particular, no responsibility is accepted by INEOS for any system or application in which Derakane™ resins are utilized. The legal obligations of INEOS in respect of any sale of Derakane™ resins shall be determined solely by the terms of its respective sales contract.

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DERAKANE™ EPOXY VINYL ESTER RESINS

CHEMICAL RESISTANCE INQUIRY FORM

Please e-mail this form to derakane@ineos.com or fax to +49(0)7851 99 478-30 (Europe) or your distributor.

<table>
<tr><td colspan="3">Date:</td><td colspan="3">Number of Pages:</td><td>*Project Reference ID:</td></tr>
<tr><td colspan="3">To:
Technical Service Derakane™ Resins
INEOS Composites

E-Mail: derakane@ineos.com</td><td colspan="3">From:
Name:
Company:
E-Mail:
Fax:
Tel:</td><td>Engineering:</td></tr>
<tr><td colspan="6">Industry Sector/Process:
(Chemical, Paper, Mining, Flue Gas …)</td><td>End User:</td></tr>
<tr><td colspan="2" rowspan="2">*Equipment Type:
(Tank, Scrubber, Pipe/Duct, Lining ...)</td><td colspan="2">Tank or Pipe?</td><td>Other:</td><td>Fabricator:</td></tr>
<tr><td colspan="3">Full FRP Applications or
lining on steel, concrete?</td><td rowspan="11">Comments/notes:
(e.g., unusual process conditions, temperature cycling, high/low concentrations, addition and dilution, novel design or construction, abrasion)</td></tr>
<tr><td colspan="6">*Dimensions/Capacity:
(Height, Diameter, Flow Rate …)</td></tr>
<tr><td colspan="3">*OPERATING CONDITIONS</td><td colspan="3">Concentration/Units (g/L, oz/gal, %)</td></tr>
<tr><td colspan="3">Chemical Environment or CAS Numbers
(indicated on the Safety Data Sheet)</td><td>Minimum</td><td>Normal</td><td>Maximum</td></tr>
<tr><td colspan="3">1)</td><td></td><td></td><td></td></tr>
<tr><td colspan="3">2)</td><td></td><td></td><td></td></tr>
<tr><td colspan="3">3)</td><td></td><td></td><td></td></tr>
<tr><td colspan="3">4)</td><td></td><td></td><td></td></tr>
<tr><td colspan="6">NOTE: Please show all major/minor components, concentrations, including traces. (If insufficient space, please add extra sheet or include the respective Safety Data Sheet).</td></tr>
<tr><td>Temperatures
(°C) or (°F)?</td><td>Minimum:</td><td colspan="2">Normal operating
temperature:</td><td colspan="2">Maximum:

Design:</td></tr>
<tr><td>Upsets:</td><td colspan="5">Maximum Temperature, Duration (h), Frequency per year:</td></tr>
<tr><td colspan="3">Pressure (Bar, psi)/Vacuum:</td><td colspan="3">pH – Typical: Min., Normal, Max.:</td></tr>
</table>

* required fields

CHEMICAL NAME/CAS NUMBERS

CAS Number	Chemical Name
7-31-3	Methyl Formate
10-54-3	Hexane
50-0-0	Formaldehyde
50-21-5	Lactic Acid
50-70-4	Sorbitol
50-78-2	Acetylsalicylic Acid
56-23-5	Carbon Tetrachloride
56-81-5	Glycerin or Glycerol
56-93-9	Benzyltrimethylammonium Chloride
57-10-3	Palmitic Acid
57-11-4	Stearic Acid
57-13-6	Urea
57-50-1	Cane Sugar, Sugar
57-55-6	Propylene Glycol
60-24-2	Mercaptoethanol
60-29-7	Diethyl Ether
60-29-7	Ethyl Ether
60-34-4	Monomethylhydrazine
62-53-3	Aniline
62-56-6	Thiourea
62-76-0	Sodium Oxalate
64-2-8	Ethylenediaminetetraacetic acid, tetrasodium salt (EDTA)
64-17-5	Alcohol, Ethyl; e.g., ethanol
64-17-5	Ethanol (Ethyl Alcohol)
64-18-6	Formic Acid
64-19-7	Acetic Acid
64-67-5	Diethyl Sulfate
65-85-0	Benzoic Acid
67-43-6	Diethylenetriaminepentaacetic acid
67-48-1	Choline Chloride
67-56-1	Methanol (Methyl Alcohol)
67-63-0	Isopropyl Alcohol
67-64-1	Acetone
67-68-5	Dimethyl Sulfoxide (DMSO)
67-72-1	Hexachloroethane
68-11-1	Thioglycolic Acid (Mercaptoacetic Acid)
68-12-2	Dimethyl Formamide
69-72-7	Salicylic Acid
71-23-8	Propanol (n-)
71-36-3	Alcohol, Butyl: e.g., n-butanol
71-36-3	Butanol (-n)
71-36-3	Butyl Alcohol
71-41-0	Alcohol, Amyl: e.g., 1-pentanol
71-43-2	Benzene
71-55-6	Trichloroethane (1,1,1-)
74-82-8	Methane
74-83-9	Methyl Bromide
74-87-3	Methyl Chloride
74-89-5	Methylamine
74-90-8	Hydrocyanic Acid
74-93-1	Methyl Mercaptan (Gas)
74-96-4	Ethyl Bromide
74-98-6	Propane
75-0-3	Ethyl Chloride
75-1-4	Vinyl Chloride
75-4-7	Ethyl Amine
75-5-8	Acetonitrile
75-7-0	Acetaldehyde
75-9-2	Dichloromethane
75-9-2	Methylene Chloride
75-12-7	Formamide
75-15-0	Carbon Disulfide
75-18-3	Dimethyl Sulfide
75-21-8	Ethylene Oxide
75-31-0	Isopropyl Amine
75-36-5	Acetyl Chloride
75-45-6	Chlorodifluoromethane
75-52-5	Nitromethane
75-56-9	Propylene Oxide
75-59-2	Tetramethyl Ammonium Hydroxide
75-69-4	Chlorofluorocarbon (CFC): R-11 (Trichlorofluoromethane)
75-71-8	Chlorofluorocarbon (CFC): R-12 (Dichlorodifluoromethane)
75-75-2	Methanesulfonic Acid
75-87-6	Chloral
75-99-0	Dichloropropionic Acid (2,2-)
76-1-7	Pentachloroethane
76-3-9	Trichloroacetic Acid
76-5-1	Trifluoroacetic Acid (see Chloroacetic Acid)
76-6-2	Chloropicrin (Nitrochloroform)
76-13-1	Chlorofluorocarbon (CFC): CFC-113 (Trichlorotrifluoroethane)
77-47-4	Hexachlorocyclopentadiene
77-73-6	Dicyclopentadiene
77-78-1	Dimethyl Sulfate
77-92-9	Citric Acid
78-10-4	Ethyl Silicate
78-10-4	Tetraethyl Orthosilicate
78-42-2	Trioctylphosphate
78-50-2	Trioctyl Phosphine Oxide
78-83-1	Isobutyl Alcohol
78-87-5	Dichloropropane (Propylene Dichloride)
78-93-3	Methyl Ethyl Ketone
78-96-6	Isopropanol Amine
79-0-5	Trichloroethane (1,1,2-)
79-1-6	Trichloroethylene
79-3-8	Propionyl Chloride
79-6-1	Acrylamide
79-9-4	Propionic Acid
79-10-7	Acrylic Acid
79-11-8	Chloroacetic Acid
79-14-1	Glycolic acid
79-14-1	Hydroxyacetic Acid
79-20-9	Methyl Acetate
79-21-0	Peracetic Acid
79-41-4	Methacrylic Acid
79-43-6	see Chloroacetic Acid
80-62-6	Methyl Methacrylate
81-16-3	Tobias Acid
84-69-5	Diisobutyl Phthalate
84-74-2	Dibutyl Phthalate
85-44-9	Phthalic Anhydride
85-52-9	o-Benzoyl Benzoic Acid
85-68-7	Butyl Benzyl Phthalate
87-86-5	Pentachlorophenol
88-89-1	Picric Acid (Alcoholic)
88-99-3	Phthalic Acid
89-8-7	Sulfophthalic Acid (4-)
91-20-3	Naphthalene
91-22-5	Quinoline
93-97-0	Benzoic Anhydride
94-75-7	2,4-Dichlorophenoxyacetic Acid
95-49-8	Chlorotoluene (o-)
95-50-1	Dichlorobenzene (o-)
95-53-4	Toluidine (o-)
95-63-6	Trimethyl Benzene
96-13-9	Dibromopropanol (2, 3-)
96-22-0	Diethyl Ketone
96-23-1	Glycerol Dichlorohydrin
96-24-2	Glycerol Monochlorohydrin
97-65-4	Itaconic Acid
97-99-4	Tetrahydrofuryl Alcohol
98-0-0	Furfuryl Alcohol
98-1-1	Furfural
98-7-7	Benzotrichloride
98-9-9	Benzenesulfonyl Chloride
98-11-3	Benzenesulfonic Acid
98-82-8	Cumene
98-83-9	Alpha-Methylstyrene
98-83-9	Methylstyrene (Alpha-)
98-86-2	Acetophenone
98-87-3	Dichlorotoluene (Benzal Chloride)
98-88-4	Benzoyl Chloride
98-95-3	Nitrobenzene
100-37-8	Diethylaminoethanol
100-41-4	Ethylbenzene
100-42-5	Styrene
100-44-7	Benzyl Chloride
100-51-6	Benzyl Alcohol
100-52-7	Benzaldehyde
100-97-0	Hexamethylenetetramine
101-2-0	Triphenyl Phosphite
101-68-8	Diphenylmethane-4,4-Diisocyanate (MDI)
101-84-8	Diphenyl Oxide
102-71-6	Triethanolamine
104-15-4	Toluenesulfonic Acid
104-74-5	Lauryl Pyridinium Chloride
104-76-7	Isooctyl Alcohol
105-58-8	Diethyl Carbonate
105-60-2	Caprolactam
106-43-4	Chlorotoluene (p-)
106-46-7	Dichlorobenzene (p-)
106-49-0	Toluidine (p-)
106-88-7	Butylene Oxide (1,2-)
106-89-8	Epichlorohydrin
106-93-4	Ethylene Dibromide
106-94-5	Propyl Bromide
106-97-8	Butane
106-99-0	Butadiene
107-2-8	Acrolein (Acrylaldehyde)
107-5-1	Allyl Chloride
107-6-2	Dichloroethane (Ethylene Chloride)
107-7-3	Ethylene Chlorohydrin
107-13-1	Acrylonitrile
107-15-3	Ethylenediamine
107-18-6	Allyl Alcohol
107-21-1	Ethylene Glycol
107-22-2	Glyoxal
107-39-1	Diisobutylene
107-92-6	Butyric Acid
107-96-0	Mercaptopropionic (3-) Acid
107-98-2	1-Methoxy-2-Propanol
108-1-0	Dimethylethanolamine
108-5-4	Vinyl Acetate
108-10-1	Methyl Isobutyl Ketone
108-24-7	Acetic Anhydride
108-31-6	Maleic Anhydride
108-44-1	Toluidine (m-)
108-46-3	Resorcinol
108-65-6	Propylene Glycol Methyl Ether Acetate
108-77-0	Cyanuric Chloride
108-80-5	Cyanuric Acid
108-83-8	Diisobutyl Ketone
108-88-3	Toluene
108-90-7	Chlorobenzene
108-90-7	Monochlorobenzene
108-91-8	Cyclohexylamine
108-94-1	Cyclohexanone
108-95-2	Phenol
109-43-3	Dibutyl Sebacate
109-60-4	Propyl Acetate
109-64-8	Dibromopropane
109-69-3	Butyl Chloride
109-70-6	Trimethylene Chlorobromide
109-73-9	Butyl Amine
109-89-7	Diethylamine
109-99-9	Tetrahydrofuran THF
110-16-7	Maleic Acid
110-27-0	Isopropyl Myristate
110-61-2	Succinonitrile
110-82-7	Cyclohexane
110-86-1	Pyridine
110-91-8	Morpholine
110-94-1	Glutaric Acid
111-30-8	Glutaraldehyde
111-40-0	Diethylenetriamine
111-42-2	Diethanolamine
111-46-6	Diethylene Glycol
111-76-2	Ethylene Glycol n-Butylether: Ethanol, 2-butoxy
111-77-3	Diethylene Glycol Methyl Ether
111-90-0	Diethylene Glycol Monoethyl Ether
111-96-6	Diethylene Glycol Dimethyl Ether
112-16-3	Lauroyl Chloride
112-18-5	Dodecyldimethylamine
112-27-6	Triethylene Glycol
112-30-1	Decanol
112-34-5	Diethylene Glycol n-Butyl Ether also called Ethanol, 2-(2-butoxy-ethoxy)-
112-40-3	Dodecane
112-41-4	Dodecene
112-52-7	Lauryl Chloride
112-53-8	Dodecanol (Lauryl Alcohol)
112-53-8	Lauryl Alcohol
112-55-0	Dodecylmercaptan
112-55-0	Lauryl Mercaptan
112-73-2	Dibutyl Carbitol (diethylene glycol dibutyl ether)
112-80-1	Oleic Acid
117-81-7	Dioctyl Phthalate
120-51-4	Benzyl Benzoate
121-3-9	Nitrotoluene (4-) Sulfonic Acid (2-)
121-43-7	Trimethyl Borate in Methyl Alcohol
121-44-8	Triethylamine
121-47-1	Sulfanilic Acid (meta)
121-57-3	Sulfanilic Acid (para)
121-69-7	Dimethylaniline (N,N)
123-42-2	Diacetone Alcohol
123-51-3	Isoamyl Alcohol
123-72-8	Butyraldehyde
123-76-2	Levulinic Acid (also 4-Oxopentanoic Acid)
123-86-4	Butyl Acetate
123-91-1	Dioxane
123-95-5	Butyl Stearate
123-99-9	Azelaic Acid
124-4-9	Adipic Acid
124-7-2	Caprylic Acid (Octanoic Acid)
124-7-2	Octanoic Acid
124-38-9	Carbon Dioxide
124-40-3	Dimethyl Amine
124-64-1	Tetrakis (Hydroxymethyl) Phosphonium Chloride
126-11-4	Nitromethane (tris, hydroxymethyl)
126-30-7	Neopentyl Glycol
126-72-7	Dibromopropyl Phosphate
126-73-8	Tributyl Phosphate
127-9-3	Sodium Acetate
127-18-4	Perchloroethylene
127-18-4	Tetrachloroethylene (Perchloroethylene)
127-19-5	Dimethylacetamide
127-20-8	Dalapon, Sodium Salt (2,2-Dichloropropionic Acid and Sodium Salt)
128-4-1	Sodium Dimethyldithiocarbamate
131-11-3	Dimethyl Phthalate
131-17-9	Diallyl Phthalate
132-27-4	Sodium salt o-phenylphenate (Antimicrobial)
136-60-7	Butyl Benzoate
137-42-8	Sodium Methyldithiocarbamate
140-1-2	Diethylenetriaminepentaacetic acid, sodium salt (-penta sodium)
140-31-8	Aminoethyl Piperazine
140-88-5	Ethyl Acrylate
141-32-2	Butyl Acrylate
141-43-5	Ethanolamine
141-78-6	Ethyl Acetate
141-91-3	Dimethyl Morpholine (2,6-)
141-97-9	Ethyl Acetoacetate
142-4-1	Aniline Hydrochloride
142-62-1	Caproic Acid (Hexanoic Acid)
142-62-1	Hexanoic Acid
142-82-5	Heptane, n-
142-91-6	Isopropyl Palmitate
142-96-1	Dibutyl Ether (-n)
143-7-7	Lauric Acid
143-33-9	Sodium Cyanide
144-55-8	Sodium Bicarbonate
144-62-7	Oxalic Acid
149-91-7	Gallic Acid
151-21-3	Sodium Lauryl Sulfate
151-50-8	Potassium Cyanide
287-92-3	Cyclopentane
298-7-7	Di (2-Ethylhexyl) Phosphoric Acid (DEHPA)
298-12-4	Glyoxylic Acid
298-14-6	Potassium Bicarbonate
301-4-2	Lead (II) Acetate
302-1-2	Hydrazine
334-48-5	Capric Acid (Decanoic Acid)
334-48-5	Decanoic Acid
497-19-8	Sodium Carbonate
502-44-3	Caprolactone
506-59-2	Dimethylammonium Hydrochloride (Dimethylamine HCl, DMA-HCl)
506-64-9	Silver Cyanide
507-40-4	Butyl Hypochlorite (tert-)
513-77-9	Barium Carbonate
526-83-0	Tartaric Acid
526-95-4	Gluconic Acid
527-7-1	Sodium Gluconate
532-32-1	Sodium Benzoate
540-54-5	Propyl Chloride
540-59-0	Dichloroethylene
540-72-7	Sodium Thiocyanate
540-82-9	Ethyl Sulfate
541-41-3	Ethyl Chloroformate
542-16-5	Aniline Sulfate
542-62-1	Barium Cyanide
542-75-6	Dichloropropene
543-59-9	Amyl Chloride
543-59-9	Chloropentane
543-80-6	Barium Acetate
544-63-8	Myristic Acid
544-92-3	Copper Cyanide
545-6-2	Trichloroacetonitrile
546-93-0	Magnesium Carbonate
554-7-4	Potassium Gold Cyanide
554-13-2	Lithium Carbonate
557-21-1	Zinc Cyanide
583-52-8	Potassium Oxalate
584-8-7	Potassium Carbonate
593-81-7	Trimethylamine Hydrochloride (Trimethylammonium Chloride)
598-54-9	Copper Acetate
608-33-3	Dibromophenol (-2,6)
611-6-3	Dichloronitrobenzene (2,4-)
615-58-7	Dibromophenol (-2,4)
616-38-6	Dimethylcarbonate
617-84-5	Diethyl Formamide
622-97-9	Methylstyrene (p-)
626-61-9	Chloropyridine
627-3-2	Ethoxy Acetic Acid
628-63-7	Amyl Acetate
630-8-0	Carbon Monoxide Gas
630-20-6	Tetrachloroethane
631-61-8	Ammonium Acetate
704-76-7	2-Ethylhexyl Alcohol
753-73-1	Dimethyltin Dichloride
759-94-4	Ethyl-N,N-di-n-Propylthiolcarbamate (herbicide)
763-69-9	Ethyl-3-Ethoxy Propionate
853-68-9	Anthraquinone Disulfonic Acid
866-81-9	Cobalt Citrate
868-18-8	Sodium Tartrate
872-50-4	N-methyl-2-pyrrolidone
929-6-6	Diglycolamine
993-16-8	Methyl Tin Trichloride
1066-33-7	Ammonium Bicarbonate
1071-83-6	Glyphosate

CHEMICAL NAME/CAS NUMBERS (continued)

CAS Number	Chemical Name
1113-38-8	Ammonium Oxalate
1191-50-0	Sodium Myristyl Sulfate
1300-21-6	Dichloroethane
1300-72-7	Sodium Xylene Sulfonate
1302-42-7	Sodium Aluminate
1303-96-4	Borax
1305-62-0	Calcium Hydroxide
1309-42-8	Magnesium Hydroxide
1310-58-3	Potassium Hydroxide
1310-65-2	Lithium Hydroxide
1310-73-2	Sodium Hydroxide
1312-76-1	Potassium Metasilicate
1313-82-2	Sodium Sulfide
1314-56-3	Phosphorous Pentoxide
1314-85-8	Phosphorus Sesquisulfide
1317-65-3	Calcium Carbonate
1319-77-3	Cresylic Acid
1327-41-9	Aluminum Chlorohydrate
1327-52-2	Arsenic Acid
1327-53-3	Arsenious Acid
1330-20-7	Xylene
1330-43-4	Sodium Tetraborate
1330-78-5	Tricresyl Phosphate
1330-86-5	Isooctyl Adipate
1330-96-4	Sodium Borate
1333-39-7	Phenol Sulfonic Acid
1333-83-1	Sodium Bifluoride
1335-54-2	Diisopropanolamine
1336-21-6	Ammonium Hydroxide
1341-49-7	Ammonium Bifluoride
1344-9-8	Sodium Silicate
1344-67-8	Copper Chloride
1461-25-2	Tetrabutyltin
1565-80-6	Amyl Alcohol
1634-4-4	Methyl t-Butyl Ether
1634-4-4	t-Butyl Methyl Ether (MTBE)
1762-95-4	Ammonium Thiocyanate
1863-63-4	Ammonium Benzoate
2008-39-1	2,4-D, Dimethylamine Salt
2052-49-5	Tetra-n-Butylammonium Hydroxide
2082-81-7	Trimethylamine
2090-64-4	Carbonic Acid
2235-54-3	Ammonium Lauryl Sulfate
2402-79-1	Tetrachloropyridine
2836-32-0	Sodium Glycolate
2971-90-6	Clopidol
3012-65-5	Ammonium Citrate
3039-83-6	Ethylenesulfonic Acid, Sodium Salt
3251-23-8	Copper Nitrate
3710-84-7	Diethyl Hydroxylamine
4316-73-8	Sodium Sarcosinate
5329-14-6	Sulfamic Acid
5421-46-5	Ammonium Thioglycolate
5536-61-8	Sodium Methacrylate
5996-10-1	Glucose
6164-98-3	Chlordimeform Insecticide
6303-21-5	Hypophosphorous Acid
6484-52-2	Ammonium Nitrate
6871-90-2	Potassium Silicofluoride
6899-5-4	Glutamic Acid
6915-15-7	Malic Acid
7320-34-5	Potassium Pyrophosphate
7378-99-6	Alkyl (C8-C10) Dimethyl Amine; e.g., octyldimethyl amine
7439-97-6	Mercury
7446-9-5	Sulfur Dioxide
7446-11-9	Sulfur Trioxide
7446-70-0	Aluminum Chloride
7447-39-4	Curpric Chloride, see Copper Chloride
7447-40-7	Potassium Chloride
7447-41-8	Lithium Chloride
7487-88-9	Magnesium Sulfate
7487-94-7	Mercuric Chloride
7488-52-0	Zinc Sulfite
7550-35-8	Lithium Bromide
7550-45-0	Titanium Tetrachloride (Titanium Chloride)
7553-56-2	Iodine
7558-79-4	Sodium Phosphate (di)
7558-80-7	Sodium Phosphate (mono)
7601-54-9	Sodium Phosphate (tri)
7601-89-0	Sodium Perchlorate
7601-90-3	Perchloric Acid
7631-90-5	Sodium Bisulfite
7631-99-4	Sodium Nitrate
7632-0-0	Sodium Nitrite
7646-78-8	Stannic Chloride
7646-79-9	Cobalt Chloride
7646-85-7	Zinc Chloride
7647-1-0	Hydrochloric Acid
7647-1-0	Hydrogen Chloride
7647-14-5	Sodium Chloride
7647-15-6	Sodium Bromide
7647-18-9	Antimony Pentachloride
7664-38-2	Phosphoric Acid
7664-39-3	Hydrofluoric Acid or Hydrogen Fluoride
7664-41-7	Ammonia
7664-93-9	Sulfuric Acid
7681-11-0	Potassium Iodide
7681-38-1	Sodium Bisulfate
7681-49-4	Sodium Fluoride
7681-52-9	Sodium Hypochlorite
7681-53-0	Sodium Monophosphate
7681-57-4	Sodium Metabisulfite
7697-37-2	Nitric Acid
7704-34-9	Sulfur
7705-8-0	Ferric Chloride
7718-54-9	Nickel Chloride
7719-9-7	Thionyl Chloride
7719-12-2	Phosphorus Trichloride
7720-78-7	Ferrous Sulfate
7722-64-7	Potassium Permanganate
7722-76-1	Ammonium Phosphate, monobasic
7722-84-1	Hydrogen Peroxide
7722-88-5	Tetrasodium Pyrophospate
7726-95-6	Bromine
7727-15-3	Aluminum Bromide
7727-21-1	Potassium Persulfate
7727-43-7	Barium Sulfate
7727-54-0	Ammonium Persulfate
7732-18-5	Water or Steam
7733-2-0	Zinc Sulfate
7738-94-5	Chromic Acid
7757-79-1	Potassium Nitrate
7757-82-6	Sodium Sulfate
7757-83-7	Sodium Sulfite
7757-87-1	Magnesium Phosphate
7758-1-2	Potassium Bromate
7758-2-3	Potassium Bromide
7758-11-4	Dipotassium Phosphate
7758-19-2	Sodium Chlorite
7758-29-4	Sodium Tripolyphosphate
7758-98-7	Copper Sulfate
7761-88-8	Silver Nitrate
7772-98-7	Sodium Thiosulfate
7772-99-8	Stannous Chloride
7773-1-5	Manganese Chloride (Manganous Chloride)
7775-9-9	Sodium Chlorate
7775-11-3	Sodium Chromate
7775-14-6	Sodium Hydrosulfite
7775-27-1	Sodium Persulfate
7778-50-9	Potassium Dichromate
7778-54-3	Calcium Hypochlorite
7778-66-7	Potassium Hypochlorite
7778-80-5	Potassium Sulfate
7779-86-4	Zinc Hydrosulfite
7779-88-6	Zinc Nitrate
7779-90-0	Zinc Phosphate
7782-41-4	Fluorine Gas
7782-50-5	Chlorine Gas
7782-77-6	Nitrous Acid
7782-99-2	Sulfurous Acid
7783-0-8	Selenious Acid
7783-6-4	Hydrogen Sulfide
7783-13-3	Sodium Ammonium Phosphate
7783-18-8	Ammonium Thiosulfate
7783-20-2	Ammonium Sulfate
7783-28-0	Ammonium Phosphate, dibasic
7783-28-0	Diammonium Phosphate
7784-18-1	Aluminum Fluoride
7784-24-9	Potassium Aluminum Sulfate
7784-46-5	Sodium Arsenite
7785-87-7	Manganese Sulfate (Manganous Sulfate)
7786-30-3	Magnesium Chloride
7786-81-4	Nickel Sulfate
7789-23-3	Potassium Fluoride
7789-32-4	Ammonium Bromide
7789-38-0	Sodium Bromate
7789-41-5	Calcium Bromide
7790-92-3	Hypochlorous Acid
7790-93-4	Chloric Acid
7790-94-5	Chlorosulfonic Acid
7790-98-9	Ammonium Perchlorate
7791-8-4	Antimony Oxychloride
8000-26-8	Pine Oil
8000-48-4	Eucalyptus Oil
8001-22-7	Soybean Oil
8001-25-0	Olive Oil
8001-26-1	Linseed Oil
8001-29-4	Cottonseed Oil
8001-30-7	Corn Oil
8001-54-5	Benzalkonium Chloride
8001-69-2	Cod Liver Oil
8001-79-4	Castor Oil
8002-3-7	Peanut Oil
8002-26-4	Tall Oil
8002-74-2	Paraffin Wax
8002-92-4	Ammonium Carbonate
8006-64-2	Turpentine
8007-56-5	Aqua Regia
8007-69-0	Almond Oil
8008-20-6	Kerosene
8008-79-5	Spearmint Oil <18>
8012-14-4	Sodium Hexametaphosphate
8013-7-8	Soybean Oil, epoxidized
8013-54-5	Chloroform
8014-95-7	Oleum (Fuming Sulfuric)
8016-79-3	Beet Sugar Liquor
8017-16-1	Polyphosphoric Acid
8017-16-1	Superphosphoric Acid
8027-16-5	Cresols, Mixture
8028-89-5	Caramel
8029-43-4	Corn Syrup
8032-32-4	Naphtha
8052-42-4	Asphalt
8061-53-8	Ammonium Ligno Sulfonate
8062-15-5	Lignin Sulfonate
8064-96-2	Cashew Nut Oil
8140-1-2	Cocamidopropyl Dimethylamine
9002-85-1	Polyvinylidiene Chloride (PVDC)
9002-86-2	Polyvinyl Chloride (PVC)
9002-89-5	Polyvinyl Alcohol
9002-98-6	Polyethyleneimine
9003-1-4	Polyacrylic Acid
9003-4-7	Sodium Polyacrylate
9003-5-8	Polyacrylamide
9003-20-7	Polyvinyl Acetate Emulsion
9003-35-4	Phenol Formaldehyde Resin
9003-35-4	Phenolic Resin
9004-32-4	Carboxymethylcellulose
9004-74-4	Polyethylene glycol methyl ether
9005-25-8	Starch
9016-45-9	Ethoxylated Nonyl Phenol
10025-67-9	Sulfur Chloride
10025-73-7	Chromic Chloride
10025-87-3	Phosphorus Oxychloride
10025-91-9	Antimony Trichloride
10026-4-7	Silicone Tetrachloride
10028-15-6	Ozone in solution
10034-85-2	Hydriodic Acid
10034-93-2	Hydrazine Sulfate
10035-10-6	Hydrobromic Acid or Hydrogen Bromide
10039-54-0	Hydroxylamine Acid Sulfate
10043-1-3	Aluminum Sulfate
10043-35-3	Boric Acid
10043-52-4	Calcium Chloride
10043-67-1	Aluminum Potassium Sulfate
10049-4-4	Chlorine Dioxide
10099-74-8	Lead (II) Nitrate
10101-53-8	Chromic Sulfate
10108-64-2	Cadmium Chloride
10108-73-3	Cerous Nitrate
10112-91-1	Mercurous Chloride
10124-37-5	Calcium Nitrate
10137-74-3	Calcium Chlorate
10141-0-1	Chromium Potassium Sulfate
10141-5-6	Cobalt Nitrate (II)
10196-4-0	Ammonium Sulfite
10222-1-2	Dibromonitrilo-Propionamide
10257-55-3	Calcium Sulfite
10294-34-5	Boron Trichloride
10361-37-2	Barium Chloride
10377-48-7	Lithium Sulfate
10377-60-3	Magnesium Nitrate
10377-66-9	Manganese Nitrate (Manganous)
10421-48-4	Ferric Nitrate
10450-55-2	Ferric Acetate
10545-99-0	Sulfur Dichloride
10553-31-8	Barium Bromide
10588-1-9	Sodium Dichromate
11120-25-5	Ammonium Tungstate
12007-89-5	Ammonium Pentaborate
12021-95-3	Fluozirconic Acid
12028-48-7	Ammonium Metatungstate
12042-91-0	Aluminum Chlorohydroxide
12124-99-1	Ammonium Sulfide
12125-1-8	Ammonium Fluoride
12125-2-9	Ammonium Chloride
12259-92-6	Ammonium Polysulfide
12379-40-7	Imidazoline Acetate
12501-45-0	Ammonium Molybdate
13235-36-4	Tetrasodium Ethylenediaminetetraacetic Acid (Tetrasodium Salt of EDTA)
13463-67-7	Titanium Dioxide
13473-90-0	Aluminum Nitrate
13478-10-10	Ferrous Chloride
13520-68-9	Ferrous Nitrate
13598-36-2	Phosphorous Acid, ortho-
13601-19-9	Sodium Ferrocyanide
13674-87-8	Dichloro-(2)-Propyl Phosphate
13746-66-2	Potassium Ferricyanide
13755-29-8	Sodium Fluoroborate
13770-89-3	Nickel Sulfamate
13774-25-9	Magnesium Bisulfite
13814-97-6	Tin Fluoborate
13826-88-5	Zinc Fluoborate
13840-33-0	Lithium Hypochlorite
13843-59-9	Ammonium Bromate
13846-18-9	Calcium Bisulfite
13943-58-3	Potassium Ferrocyanide
13967-50-5	Potassium Gold Cyanide
14216-75-2	Nickel Nitrate
14217-21-1	Sodium Ferricyanide
14518-69-5	Tetra-n-Butylphosphonium Hydroxide
15972-60-8	Alachlore, Herbicide
16529-56-9	2-Methyl-3-Butenenitrile
16672-87-0	Ethephon
16721-80-5	Sodium Bisulfide (Hydrosulfide)
16721-80-5	Sodium Hydrosulfide
16872-11-0	Fluoboric Acid
16893-85-9	Sodium Fluorosilicate
16940-66-2	Sodium Borohydride SWS (Stabilized Water Solution)
16949-65-8	Magnesium Fluosilicate
16961-83-4	Fluosilicic Acid (Hydrofluosilicic Acid)
17194-0-2	Barium Hydroxide
17439-11-1	Fluotitanic Acid
17496-8-1	Ammonium Propionate
18130-44-4	Titanium Sulfate
18483-17-5	Tannic Acid
19351-18-9	2,2-Dimethyl Thiazolidine
21645-51-2	Aluminum Hydroxide
23210-56-2	N-Chloro-o-Tolyl (insecticide emulsion)
24347-58-8	Butylene Glycol
24800-44-0	Tripropylene Glycol, see Ethylene Glycol
25013-15-4	Vinyl Toluene
25154-55-6	Nitrophenol
25155-30-0	Sodium Dodecylbenzenesulfonate
25265-71-8	Dipropylene Glycol
25322-68-3	Polyethylene Glycol
25339-17-7	Isodecanol
25340-17-4	Diethylbenzene
25567-55-9	Sodium Tetrachlorophenate
25639-42-3	Methylcyclohexanol
26248-24-8	Sodium Tridecylbenzene Sulfonate
26968-58-1	Ethyl Benzyl Chloride
27138-31-4	Dipropylene Glycol Dibenzoate
27176-87-0	Dodecylbenzenesulphonic Acid
27458-94-2	Isononyl Alcohol
28348-53-0	Sodium Cumenesulfonate
28553-12-0	Diisonoyl Phthalate
29965-97-7	Cyclooctadiene
31142-56-0	Aluminum Citrate
34590-94-8	Dipropylene Glycol Monomethyl Ether, Propanol, (2-Methoxy-ethylethoxy)-
35139-28-8	Ferric Sulfate
36653-82-4	Cetyl alcohol
36653-82-4	Hexadecanol (n-)
50864-67-0	Barium Sulfide
51218-45-2	Metolachlor
61789-32-0	Fatty Acids
61789-40-0	Cocamidopropyl Betaine
61789-77-3	Dicoco Dimethyl Ammonium Chloride
61804-50-0	Divinyl Benzene
63449-41-2	Benzyltrimethylammonium Chloride
65996-63-6	Corn Starch
68002-20-0	Melamine Formaldehyde Resin
68131-30-6	Green Liquor (Pulp Mill)
68412-54-4	Nonyl(phenoxypoly(ethyleneoxy)ethanol, branched
68439-50-9	Ethoxylated Alcohol, C12-C14
68439-57-6	Sodium alpha-Olefin Sulfonate
68476-34-6	Diesel Fuel
68476-78-8	Molasses
68514-06-7	Ammonium Bisulfite Liquor (black liquor)
68526-83-0	Isooctyl Alcohol
68526-85-2	Alcohol, Isodecyl: e.g., isodecanol
68603-42-9	Coconut Fatty Acid
72674-5-6	Alpha Olefin Sulfonate
74552-83-3	Trichloroethane (1,1,1-)
84961-48-8	Coconut Oil
91722-14-4	Epoxidized Soybean Oil
95077-5-7	Kaolin Slurry
97328-76-2	Carbonic Acid
99400-1-8	Calcium Sulfate
99551-14-1	Oils, Mineral (aliphatic)
105839-17-6	Epoxidized Castor Oil

CHEMICAL RESISTANCE TABLE

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

		Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
	concentration	411	441	451	455	470	510A/B/C	510N	515	8084
chemical environment	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Acetaldehyde	20	40/100	40/100			40/100	40/100	40/100		40/100
Acetaldehyde	100	NR	NR	NR	NR	LS	NR			NR
Acetic Acid <21>	0.5–10	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	65/150
Acetic Acid	11–25	100/210	100/210	80/180	100/210	100/210	100/210	100/210	100/210	65/150
Acetic Acid	26–50	80/180	80/180	65/150	100/210	80/180	80/180	80/180	100/210	
Acetic Acid	51–75	65/150	65/150	45/110	65/150	65/150	65/150	65/150	65/150	
Acetic Acid	76–85	45/110	45/110	45/110	45/110	45/110	45/110	45/110	45/110	
Acetic Acid, glacial <2>	86–100	NR	NR			40/100	NR	NR		NR
Acetic Acid/Nitric Acid/Chromic Oxide	3:5:3	65/150	80/180			80/180	65/150	80/180		65/150
Acetic Acid/Sulfuric Acid	20:10	100/210	100/210			100/210	100/210	100/210		65/150
Acetic Anhydride	100	NR	NR			40/100	NR	NR	NR	NR
Acetone	10		80/180			80/180	80/180	80/180		
Acetone	20		30/85			40/100				
Acetone <15>	100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Acetone (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Acetone/Toluene <15>	50:50	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acetonitrile	20	40/100	40/100			40/100	40/100	40/100		
Acetonitrile	100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Acetonitrile (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Acetophenone	100	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acetyl Acetone	20	40/100	40/100			50/120	40/100	50/120		40/100
Acetyl Acetone	100	NR	NR			LS	NR	NR		NR
Acid Cleaner (31% Hydrochloric Acid) <2,8,9,13>	31	65/150	70/160			80/180 <15>	65/150	80/180 <15>		65/150
Acrolein (Acrylaldehyde)	20	40/100	40/100			40/100	40/100	40/100		
Acrolein (Acrylaldehyde)	100	NR	NR			LS	NR	NR		NR
Acrylamide	50	40/100	40/100	25/80	40/100	40/100	40/100	40/100	40/100	40/100

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Acrylic Acid <7>	10	40/100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	
Acrylic Acid <7>	25	40/100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	40/100
Acrylic Acid	100	NR	NR			LS	NR	NR		NR
Acrylic Latex	All	80/180	80/180			80/180	80/180	80/180		
Acrylonitrile	7 (max. solubility at 20 °C (68 °F))	40/100	40/100			40/100	40/100	40/100		
Acrylonitrile	100	NR	NR			LS	NR	NR		NR
Acrylonitrile, latex dispersion <7>	2	25/80	25/80	NR		25/80	25/80	25/80		25/80
Activated Carbon Beds, water treatment		80/180	100/210			100/210	80/180	100/210	100/210	65/150
Adipic Acid (1.5 g sol. in water at 25 °C (77 °F), sol. hot water)	23	80/180	80/180			80/180	80/180	80/180		
Air (max. surface temperature of the FRP) <16>		180/360	180/360	95/200		200/392	160/320	160/320		
Alachlore, Herbicide <4>	All					40/100				
Alcohol, see Ethanol										
Alcohol, Amyl	100	50/120	60/140			65/150	50/120	60/140		50/120
Alcohol, Butyl	100	50/120	50/120			65/150	50/120	50/120		NR
Alcohol, Ethyl	95	25/80	25/80			40/100	25/80	25/80		NR
Alcohol, Isodecyl	100	50/120	65/150			80/180	50/120	65/150		50/120
Alcohol, Propyl	100	40/100	40/100			50/120	40/100	40/100		NR
Alkaline Cleaner, see Sodium Hydroxide and Potassium Hydroxide										
Alkaline Solutions, see Sodium, Potassium, and Ammonium Hydroxides and Carbonates										
Alkane Sulfonate, see Sodium Dodecylbenzene Sulfonate										
Alkyl (C8-C10) Dimethyl Amine	100	80/180	95/200			100/210	80/180	95/200		
Alkyl (C8-C18) Chloride <21>	All	80/180	95/200			100/210	95/200	100/210		
Alkyl Aryl Sulfonic Acid, see Alkyl Benzene Sulfonic Acid										
Alkyl Benzene Sulfonic Acid <6,21>	All	80/180	80/180	80/180		100/210 <24>	95/200	100/210	80/180	

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Alkyldiphenyloxide Disulfonate (anionic surfactant type)	All	50/120	50/120			50/120	50/120	50/120		
Alkyltolyl Trimethyl Ammonium Chloride		40/100	50/120			50/120	40/100	50/120		
Allyl Alcohol	100	NR	NR			25/80	NR	NR		NR
Allyl Chloride	100	25/80	25/80	25/80		25/80	25/80	25/80	25/80	NR
Alpha-Oleum Sulfates	100	50/120	50/120			50/120	50/120	50/120		
Alpha-Methylstyrene	100	25/80	40/100			50/120	25/80	40/100		NR
Alum <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Alumina Hydrate	All	80/180	80/180			80/180	80/180	80/180		80/180
Aluminum Bromide <21>	All			70/160			70/160			
Aluminum Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Aluminum Chlorohydrate <21>	All	100/210	100/210	100/210		100/210 <24>	100/210	100/210	100/210	80/180
Aluminum Chlorohydrate/Hydrochloric Acid <2,8,9,12,13>	> 0.5:15	80/180	100/210			100/210	80/180	100/210		65/150
Aluminum Chlorohydroxide	50	100/210	100/210	100/210		100/210	100/210	100/210	100/210	80/180
Aluminum Citrate <21>	All			95/200	95/200		95/200		95/200	
Aluminum Fluoride <1>	All	25/80	25/80	30/90	30/90	25/80	25/80	25/80	30/90	25/80
Aluminum Hydroxide	100	80/180	80/180			95/200	80/180	80/180		80/180
Aluminum Nitrate	All	100/210	100/210	80/180	80/180	100/210 <24>	100/210	100/210	80/180	80/180
Aluminum Potassium Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Aluminum Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Aluminum Sulfate Reactor <10>	> 0.5	100/210	100/210				100/210			
Amine Salts	All	50/120	65/150	50/120	65/150	65/150	50/120	65/150	65/150	
Amino Acids	All	40/100	40/100			40/100	40/100	40/100		
Aminoethyl Piperazine	100						NR			
Ammonia	Liquified gas	NR	NR			NR	NR	NR		NR

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Ammonia gas	100	40/100	40/100	80/180	40/100	40/100	40/100	40/100	40/100	40/100
Ammonia, fumes, wet	40 vol-%	80/180	80/180	65/150	NR	80/180	80/180	80/180	NR	
Ammonia, aqueous, see Ammonium Hydroxide										
Ammonium Acetate	All	25/80	25/80	45/110		40/100	25/80	25/80		NR
Ammonium Benzoate	All	80/180		80/180			80/180			
Ammonium Bicarbonate	All	70/160	70/160	65/150	65/150	70/160	70/160	70/160	65/150	70/160
Ammonium Bifluoride <1>	All	65/150	65/150			65/150				65/150
Ammonium Bisulfite black liquor		80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	
Ammonium Bisulfite cooking liquor		65/150	65/150			65/150	65/150	65/150		
Ammonium Bromate	All	70/160	70/160			70/160	70/160	70/160		70/160
Ammonium Bromide	All	70/160	70/160			70/160	70/160	70/160		70/160
Ammonium Carbonate	All	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150
Ammonium Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ammonium Citrate	All	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150
Ammonium Fluoride <1>	All	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150
Ammonium Hydroxide <21>	0.5–1 (as NH_3)	80/180	80/180	95/200		65/150	95/200	65/150		80/180
Ammonium Hydroxide	2–5 (as NH_3)	80/180	80/180	80/180		65/150	80/180	65/150		80/180
Ammonium Hydroxide	6–10 (as NH_3)	65/150	65/150	70/160		40/100	70/160	40/100		65/150
Ammonium Hydroxide	11–20 (as NH_3)	65/150	65/150	50/120		40/100	65/150	40/100		65/150
Ammonium Hydroxide	21–28 (as NH_3)	50/120	40/100	50/120		40/100	50/120	40/100		40/100
Ammonium Hydroxide	29–30 (as NH_3)	40/100	40/100			40/100	40/100	40/100		40/100
Ammonium Hydroxide/Ammonium Chloride/Ammonium Carbonate <1>	30 (as NH_3):35:5	40/100	40/100				40/100	40/100		40/100
Ammonium Lauryl Sulfate	All	50/120	50/120	55/130		50/120	50/120	50/120		50/120
Ammonium Ligno Sulfonate	All	80/180	80/180			80/180	80/180	80/180		65/150
Ammonium Metatungstate (AMT) (pH 3.3)	50						LS80/180			

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Ammonium Molybdate	All	65/150								65/150
Ammonium Nitrate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ammonium Nitrate/Urea/Water (fertilizer)	up to 40/up to 50/ balance						50/120			
Ammonium Oxalate	All	65/150	65/150							
Ammonium Pentaborate	All	50/120	50/120							50/120
Ammonium Perchlorate	All	75/170								
Ammonium Persulfate <21>	All	100/210	100/210	80/180	80/180	100/210 <24>	100/210	100/210	80/180	80/180
Ammonium Phosphate, dibasic <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ammonium Phosphate, monobasic <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ammonium Polysulfide	All	50/120	50/120			65/150				50/120
Ammonium Propionate	All	25/80	25/80			40/100	25/80	25/80		NR
Ammonium Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ammonium Sulfate/Ethyl Alcohol/Ethoxylate	60:15:3	40/100	50/120			65/150	40/100	50/120		40/100
Ammonium Sulfate/Manganous Sulfate/Sulfuric Acid (concentrations in g/l)	up to 150:up to 15:up to 40			50/120	50/120		50/120			
Ammonium Sulfide (Bisulfide)	All	50/120	50/120	50/120	50/120	50/120	50/120		50/120	50/120
Ammonium Sulfite	All	65/150	65/150	40/100	40/100	65/150	65/150		40/100	65/150
Ammonium Thiocyanate	All	50/120	50/120	50/120	50/120	50/120	50/120	50/120	50/120	
Ammonium Thioglycolate	All	40/100	40/100			40/100	40/100	40/100		
Ammonium Thiosulfate	All	40/100	40/100			40/100	60/140	60/140	40/100	
Amyl Acetate	> 0.5	20/70	40/100	40/100	50/120	50/120	NR		50/120	
Amyl Acetate/Xylene	30:70			50/120						
Amyl Alcohol	100	50/120	60/140	95/200	95/200	65/150	50/120	60/140	95/200	50/120
Amyl Alcohol, Vapor	100	50/120	100/210			100/210	50/120	100/210		
Amyl Chloride	100	50/120	50/120	50/120	50/120	50/120	50/120	50/120	50/120	

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Anaerobic Sewage	All	30/85		30/85	30/85	30/85	30/85		30/85	
Aniline	20	40/100	40/100			40/100	40/100	40/100		
Aniline	100	NR	NR	NR	NR	20/70	NR	NR	NR	NR
Aniline Hydrochloride	> 0.5	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	
Aniline Sulfate <21>	> 0.5	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	
Animal Fat <21>	100	80/180	100/210							
Anionic Surfactant	All	40/100	50/120			50/120	40/100	50/120		
Anionic/Cationic Polymer Emulsions in Kerosene or Petroleum Distillates/Water	0–50	40/100	50/120			50/120				
Anodize (15% Sulfuric Acid)		100/210	100/210			100/210	100/210	100/210		
Anthraquinone Disulfonic Acid	1	65/150		65/150			65/150			
Antimony Pentachloride, for aqueous solutions, see Hydrochloric Acid	> 99	40/100	40/100	30/90		40/100	40/100	40/100		40/100
Antimony Trichloride	100	95/200		105/220	105/220		95/200		105/220	
Aqua Regia (concentrated Hydrochloric Acid/Nitric Acid, 3:1) <2,6,9>				NR	NR		NR		NR	
Aromatic Naphtha/Naphthalene/Isopropanol	60:5:10		50/120			50/120		50/120		
Arsenic Acid	> 0.5	80/180	80/180			80/180	80/180	80/180		
Arsenic Acid/Copper Sulfate/Sodium Dichromate	17:37:20	80/180	80/180			80/180	80/180	80/180		
Arsenic Pentoxide/Copper Oxide/Chromic Acid	17:9:24	40/100	40/100			40/100	40/100	40/100		40/100
Arsenious Acid	19°Be	80/180	80/180			80/180	80/180	80/180		65/150
Barium Acetate	All	80/180	80/180	90/195	80/180	80/180	90/195	80/180	80/180	
Barium Bromide <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Barium Carbonate (slurry)	All	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Barium Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Barium Cyanide	All	65/150	65/150			65/150	65/150	65/150		65/150
Barium Hydroxide <21>	> 0.5	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150
Barium Sulfate	All	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Barium Sulfide <21>	All	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	80/180
Barley Solution <18>	> 0.5	75/170	75/170							
Beer <18>	> 0.5	50/120	50/120							
Beet Sugar Liquor <18>	> 0.5	80/180	80/180	80/180	80/180				80/180	
Benzal Chloride (Benzyl Dichloride)	100	NR								
o-Benzoyl Benzoic Acid	All	100/210	100/210			100/210	100/210	100/210		65/150
Benzaldehyde	100	NR	NR			20/70	NR	NR	NR	NR
Benzalkonium Chloride	Dilute	40/100	40/100							40/100
Benzene	100	NR	NR	40/100	40/100	40/100; LS 50/120	NR	LS 50/100	40/100; LS 50/100	NR
Benzene, vapor		25/80	25/80			50/120	NR	25/80		NR
Benzene/Methyl Tertiary Butyl Ether	80:20	NR	NR			40/100	NR	LS		NR
Benzene/Ethyl Benzene/Toluene/Trimethyl Benzene/Xylene	All	NR	NR			40/100	NR	LS		NR
Benzene/Ethylbenzene	33:67	NR	25/80			40/100	NR	25/80		NR
Benzenesulfonic Acid <6>	All	65/150	65/150	80/180	80/180	65/150	65/150	65/150	80/180	65/150
Benzenesulfonic Acid/Sulfuric Acid/balance Water	88:7	60/140		60/140			60/140			
Benzenesulfonyl Chloride	100	NR	NR			LS	NR	NR		NR
Benzoic Acid	Sat'd	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	80/180
Benzotrichloride	100	NR					NR			
Benzoyl Chloride	100	NR					NR			
Benzoylbenzoic Acid (o-)	100	100/210	100/210	100/210	100/210	100/210	100/210		100/210	
Benzyl Alcohol	20	40/100	50/120			50/120	40/100	50/120		40/100
Benzyl Alcohol	100	NR	25/80	40/100	40/100	40/100	NR	25/80	25/80	NR
Benzyl Chloride <2>	All	NR	NR	25/80	25/80	40/100	NR	NR	25/80	NR
Benzyltrimethylammonium Chloride	60	40/100	40/100			40/100	40/100	40/100		
Biocide Chlorphenate (organic sulfur type, blend)	100	50/120		50/120			50/120			
Biodiesel/FAME (max. 0.2% Methanol)		80/180	80/180		80/180	80/180	80/180	80/180	80/180	
Black Liquor (pulp & kraft mill) <1,2>	Thin	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	
Black Liquor, thick, heavy (pulp & kraft mill) <1,2>	Thick	95/200	105/220			105/220	105/220	105/220		

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Black Liquor recovery, furnace gases <6,16>		165/325	175/350	115/240	115/240	205/400	165/325	175/350	115/240	
Bleach (please check the composition of the product and refer to the type of bleaching agent used like Hydrogen Peroxide, Sodium Hypochlorite, etc.) <14>										
Blow Down (non-condensable gases from pulp digester; i.e., Dimethyl Sulfide and Mercaptanes) <8>		120/250	120/250			120/250	120/250	120/250		
Borax (Sodium Borate, Sodium Tetraborate) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Boric Acid	> 0.5	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	80/180
Boron Trichloride, scrubbing	> 0.5	65/150	65/150			65/150	65/150	65/150		
Brake Fluid	100	50/120	50/120	50/120	50/120	50/120 <7>	50/120	50/120	50/120	50/120
Brass Plating Solution (3% Copper, 1% Zinc, 5.6% Sodium Cyanides, 3.0% Sodium Carbonate) <1>		80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Brine, chlorinated, pH < 2.5 <8,21>	All	80/180	80/180	80/180	80/180	95/200	80/180	95/200	80/180	
Brine, chlorinated, pH 2.5–9 <6>	All	40/100	40/100			40/100	40/100	40/100		40/100
Brine, chlorinated, pH > 9 <2,3,9>	All	80/180	80/180	65/150		65/150	80/180	65/150		
Brine Mixture (0.4% $MgSO_4$, 9.5% NaCl, 5.0% Na_2SO_4, 2.0% K_2SO_4, 7% $CaSO_4{:}2H_2O$, 3% $Na_2SO_3{:}9H_2O$, pH 7)		100/210	100/210			100/210	100/210	100/210		80/180
Brine, salt <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Brominated Phosphate Ester	> 0.5					50/120				
Bromine Water, laboratory reagent	3.2 g in 100 g water			95/200			80/180			
Bromine, dry gas	100	40/100	40/100	40/100	40/100	40/100 <7>	40/100	40/100	40/100	40/100
Bromine in Water (no pure Bromine phase)	< Sat'd	75				80/180				
Bromine, liquid	100	NR	NR			NR	NR	NR		NR
Bromine, wet gas	100	40/100	40/100	30/90	30/90	40/100	40/100	40/100	30/90	40/100
Bronze Plating Solution (4% Copper, 5% Sodium Cyanides, 3% Sodium Carbonate, 4.5% Rochelle Salts)		80/180		80/180	80/180				80/180	
Brown Stock		95/200	95/200	80/180		80/180	95/200	80/180		

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Bunker C Fuel Oil (heavy fraction)	100	100/210	105/220			105/220	100/210	105/220		65/150
Butadiene, gas <2>	100	45/110	45/110			45/110	45/110	45/110		45/110
Butane	100	60/140	60/140			60/140	65/140	60/140		60/140
Butanol	100	50/120	50/120			65/150	50/120	50/120		NR
Butyl Acetate	100	NR	25/80	30/90	30/90	30/90	NR	25/80	30/90	NR
Butyl Acrylate	100	NR	NR			25/80	NR	NR		NR
Butyl Alcohol	100	50/120	50/120	50/120	50/120	65/150	50/120	50/120	50/120	NR
Butyl Ether, see Dibutyl Ether (-n)										
Butyl Alcohol/Benzene	93:4	NR	40/100			50/120	NR	40/100		NR
Butyl Amine	100	NR	NR			LS	NR	NR		NR
Butyl Benzoate	70					40/100				
Butyl Benzyl Phthalate	100	80/180	100/210			100/210	80/180	100/210		
Butyl Chloride	0.1–100	NR	LS			25/80	NR	LS		NR
Butyl Hypochlorite	98	NR	NR			NR	NR	NR		NR
Butyl Stearate (5% in Mineral Spirits)		40/100	40/100							
Butylene Glycol	100	70/160	80/180	80/180	80/180	80/180	70/160	80/180	80/180	
Butylene Oxide	100	NR	NR			LS	NR	NR		NR
Butyraldehyde	100	NR	NR			40/100	NR	NR		NR
Butyric Acid <21>	0.5–50	100/210	100/210	80/180	100/210	100/210	100/210	100/210	100/210	
Butyric Acid	51–70	50/120		50/120	50/120		50/120		50/120	
Butyric Acid	71–100	25/80	50/120	40/100	50/120	50/120	25/80	50/120	50/120	
Cadmium Chloride <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Cadmium Cyanide Plating Solution (3% Cadmium Oxide, 10% Sodium Cyanide, 1.2% Sodium Hydroxide) <1>		80/180	80/180	105/220		80/180	80/180	80/180		80/180
Calcium Bisulfite <21>	All	100/210	100/210	80/180	80/180	100/210 <24>	100/210	100/210	80/180	80/180
Calcium Bromide <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Calcium Carbonate (slurry) <21>	All	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Calcium Chlorate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Calcium Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Calcium Hydroxide <1>	100	100/210	100/210	40/100	40/100	100/210	100/210	100/210	40/100	80/180
Calcium Hydroxide (slurry) <1>	0.5–25	80/180	65/150			40/100	80/180	65/150		65/150
Calcium Hypochlorite <2,3,5,9,17>	All	80/180	80/180	70/160	70/160	40/100	80/180	80/180	70/160	80/180
Calcium Nitrate	> 0.5	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	80/180
Calcium Sulfate (slurry) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Calcium Sulfite <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Cane Sugar Liquor & Sweetwater <18>	All	80/180	80/180							
Capric Acid (Decanoic Acid) <4>	> 0.5	80/180	80/180			80/180	80/180	80/180		80/180
Capric Acid/Lauric Acid/Fatty Acids (C10-C18)	70:15:15	80/180	80/180			95/200	80/180	80/180		80/180
Caproic Acid (Hexanoic Acid)	100	25/80	50/120			50/120	25/80	50/120		25/80
Caprolactam	0–50	40/100	40/100			40/100	40/100	40/100		40/100
Caprolactam	100	NR	NR			LS	NR	NR		NR
Caprolactone	100	NR	NR			LS	NR	NR		NR
Caprylic Acid (Octanoic Acid)	100	80/180	100/210			100/210	80/180	100/210		
Caramel <18>	All	50/120	50/120							
Carbon Dioxide Gas <16>	All	165/325	175/350	120/250	120/250	205/400	165/325	175/350	120/250	80/180
Carbon Disulfide	100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Carbon Disulfide (no condensation or coalescence)	Fumes	40/100	65/150	40/100	65/150	65/150	40/100	65/150	65/150	NR
Carbon Monoxide Gas <16>	All	165/325	175/350	120/250		205/400	165/325	175/350	175/350	80/180
Carbon Tetrachloride	100	50/120	50/120	50/120	50/120	65/150			50/120	
Carbon Tetrachloride (no condensation or coalescence)	Fumes	80/180	95/200	65/150	95/200	95/200	80/180	95/200	95/200	
Carbonic Acid	All			70/160			70/160			

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration %	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin 411 °C/°F	441 °C/°F	451 °C/°F	455 °C/°F	470 °C/°F	510A/B/C °C/°F	510N °C/°F	515 °C/°F	8084 °C/°F
Carbonic Acid/Magnesium Salt	All	80/180	80/180	80/180	80/180		80/180		80/180	
Carboxyethyl Cellulose	10	65/150	65/150			65/150	65/150	65/150		65/150
Carboxymethyl Cellulose	10	65/150		80/180	65/150		65/150		65/150	
Cashew Nut Oil	100	65/150	65/150							
Castor Oil (Ricinus Oil)	100	70/160	70/160	50/120	50/120	70/160	70/160	70/160	50/120	70/160
Cationic/Anionic Polymer Emulsions in Kerosene or Petroleum Distillates/Water	0–50	40/100	50/120			50/120				
Caustic, see Sodium Hydroxide										
Cerous Nitrate	All	30/90		30/90	30/90		30/90		30/90	
Cetyl Alcohol (Hexadecanol)	100	65/150	80/180			80/180	65/150	80/180		50/120
Chlordimeform Insecticide	100	25/80	50/120			50/120	25/80	50/120		
Chloric Acid	All	25/80	25/80			25/80	25/80	25/80		25/80
Chlorinated Brine; see Brine, chlorinated										
Chlorinated Paraffin Wax	100	80/180		95/200	80/180		80/180		80/180	
Chlorinated Pulp <6>	All	80/180	90/195		95/200	95/200	90/195	95/200	95/200	
Chlorinated Solvent Recovery, see specific solvents										
Chlorinated Wax	All	80/180	80/180			80/180	80/180	80/180		
Chlorination Washer (hoods & vent systems)	Fumes	80/180	95/200			95/200	80/180	95/200		65/150
Chlorine Dioxide Generator Effluent, R2 system <6>		65/150	80/180	80/180		80/180	65/150	80/180		65/150
Chlorine Dioxide (<1 g/l) <6>				80/180	80/180		60/140		80/180	
Chlorine Dioxide (chilled liquid) <6>				7/45			7/45			
Chlorine Dioxide Scrubber <1,2,3>		75/170	75/170				75/170			
Chlorine Dioxide, Chlorine (bleaching solution, with or without pulp) <6>	All	80/180	90/195			95/200	90/195	95/200		
Chlorine Dioxide, no Chlorine (bleaching solution, with or without pulp) <6>	All	80/180	90/195			95/200	90/195	95/200		
Chlorine Dioxide, solution storage <9>	Sat'd	20/70	20/70			20/70	20/70	20/70		
Chlorine Water, see Brine, chlorinated										
Chlorine, dry gas <2,8,17>	100	80/180	90/195	100/210	100/210	100/210	80/180	100/210	100/210	65/150

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration %	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
		°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Chlorine, wet gas, acidic pH <2,8,17>	100	80/180	90/195	80/180	80/180	100/210	80/180	100/210	80/180	65/150
Chlorine/Chlorine Dioxide/Sulfur Dioxide	0.8:2:0.7	95/200	95/200			95/200	95/200	95/200		80/180
Chlorine-Hydrogen Chloride, with aqueous condensate <8,9,12,16>	8–10% HCl	80/180	100/210			100/210; LS 175/350	80/180	100/210		80/180
Chloroacetic Acid (Monochloroacetic Acid)	1	50/120	50/120	50/120	50/120	50/120	50/120	50/120	50/120	
Chloroacetic Acid	2–25	50/120	50/120	40/100	40/100	50/120	50/120	50/120	40/100	
Chloroacetic Acid	26–50	40/100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	
Chloroacetic Acid	51–79	25/80	25/80			30/90	25/80	30/90		
Chloroacetic Acid	80–85	25/80	25/80			25/80	25/80	25/80		
Chloroacetic Acid	86–100	NR	NR			LS	NR	NR		NR
Chlorobenzene	1			25/80	25/80				25/80	
Chlorobenzene	100	NR	25/80	25/80	25/80	40/100	NR	25/80	25/80	NR
Chlorodifluoromethane <1>	100	25/75		25/75			25/80			
Chlorofluorocarbon (CFC): R-11 (Trichlorofluoromethane), R-12 (Dichlorodifluoromethane) <1>	100	25/80	40/100			40/100	25/80	40/100		NR
Chlorofluorocarbon (CFC): CFC-113 (Trichlorotrifluoroethane) <1>		40/100	40/100			40/100	40/100	40/100		
Chloroform	100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Chloroform (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Chloroform/Dichloroethane/Methylene Chloride	All	NR	NR			LS	NR	NR		NR
Chloropentane (1 to 5 Cl)	100	40/100	50/120			55/130	40/100	50/120		NR
Chloropicrin (Nitrochloroform)	100	NR	NR			LS	NR	NR		NR
Chloropyridine (tetra)	100	25/80	50/120			50/120	25/80	50/120		NR
Chlorosulfonic Acid	10	NR	NR			NR	NR	NR		NR
Chlorosulfonic Acid	100	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chlorotoluene	100	25/80	40/100			40/100	25/80	40/100		NR
N-Chloro-o-Tolyl (insecticide emulsion)	10	50/120	50/120			50/120	50/120	50/120		
Choline Chloride	All	50/120	65/150			65/150	50/120	65/150		50/120
Chrome Plating Solution (19% Chromic Acid with Sodium Fluorosilicate and Sulfate) <1>		50/120	50/120	40/100		65/150	50/120	50/120	50/120	50/120

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Chrome Reduction Process <6>	25	90/195					90/195			
Chromic Acid <2>	0.5–10	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150
Chromic Acid <2>	11–20	50/120	65/150	50/120	50/120	65/150	65/150	65/150	50/120	50/120
Chromic Acid <2>	25					55/100				
Chromic Acid <2>	30	LS	LS	NR	NR	LS	LS	LS	NR	
Chromic Acid <2>	40	NR	NR	NR	NR	LS	NR	NR	NR	
Chromic Acid/Nitric Acid mixture <2>	5:10	40/100	50/120			65/150	40/100	40/100		40/100
Chromic Acid: Sodium Metabisulfite <2>	15:45	50/120	65/150			65/150	65/150	65/150		50/120
Chromic Acid/Sulfuric Acid mixture (Maximum total concentration 10%) <2>	10	50/120	65/150			65/150	50/120	65/150		50/120
Chromic Acid/Sulfuric Acid <2>	3:16	NR					NR			
Chromic Acid/Sulfuric Acid <2>	20:20	NR					NR			
Chromium Plate, electroplating with a salt solution (with Sulfuric Acid: not recommended)		55/130	55/130			55/130	55/130	55/130		55/130
Chromium Sulfate, water-soluble forms (Chromous Sulfate) <21>	All	100/210	100/210	65/150	65/150	100/210 <24>	100/210	100/210	65/150	80/180
Citric Acid	> 0.5	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	65/150
Cleaner (heavy-duty phenolic-based disinfectant cleaner) <14>	100			40/100			40/100			
Cleaner, liquid (biodegradable, all purpose) <14>		40/100		40/100			40/100			
Clopidol <4>	All					40/100		40/100		
Cobalt Chloride <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Cobalt Chloride reactor (Hydrochloric Acid/Sulfuric Acid) <10>	40		95/200							
Cobalt Citrate	12	80/180	80/180			80/180				50/120
Cobalt Nitrate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Cocamidopropyl Betaine	100	50/120		50/120			50/120			
Cocamidopropyl Dimethylamine	100	50/120		50/120			50/120			
Coconut Oil <18>	100	80/180	95/200	80/180	80/180	95/200	80/180	95/200	80/180	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Cod Liver Oil <18>	100	40/100	40/100						40/100	
Copper Acetate	All	70/160		80/180			70/160			
Copper Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Copper Chloride/Ammonium Chloride/Ammonium Hydroxide, see Ammonium Hydroxide	26:5:2									
Copper Cyanide <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Copper Cyanide Plating Solution (10.5% Copper, 14% Sodium Cyanides, 6% Rochelle Salts)		70/160	70/160	80/180	80/180	70/160	70/160	70/160	80/180	70/160
Copper Cyanide/Potassium Cyanide/Potassium Hydroxide <1>	7:2.5:2	65/150	40/100			25/80	65/150	25/80		
Copper Matte Dipping Bath (30% Iron Chloride, 19% Hydrochloric Acid) <8,9,13>		80/180	95/200	95/200	95/200	95/200	95/200	95/200		80/180
Copper Nitrate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Copper Plating Solution (45% Cu(BF4)2, 19% Copper Sulfate, 8% Sulfuric Acid) <1>		80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Copper Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Copper Sulfate, ammoniated <21>	All			90/195	90/195		90/195		90/195	
Corn Oil <18>	100	80/180	100/210	95/200	100/210	100/210	80/180	100/210	100/210	65/150
Corn Starch <18>	Slurry	100/210	100/210	105/220	100/210		100/210		100/210	
Corn Sugar/Syrup (Glucose) <18>	All	80/180	80/180							
Cottonseed Oil <18>	100	100/210	100/210	95/200	100/210	100/210	100/210	100/210	100/210	65/150
Crude Oil, sweet and sour	100	100/210	120/250			120/250	100/210	120/250	-	65/150
Cumene	100	25/80	50/120			50/120	25/80	50/120		25/80
Cumene/Toluene/Xylene	All	25/80	40/100			50/120	25/80	50/120		NR
Cupric Chloride, see Copper Chloride										
Cyanide Disposal (reacts with Hypo to form Sodium Thiosulfite)			40/100			40/100				
Cyanuric Acid	All	25/80	40/100			50/120	25/80	40/100		
Cyanuric Chloride <4>	All	50/120	50/120			50/120	50/120	50/120		50/120

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Cyclohexane	100	50/120	65/150	65/150	65/150	65/150	50/120	65/150	65/150	
Cyclohexane (no condensation, no coalescence)	Fumes	80/180		80/180			80/180			
Cyclohexylamine	100		LS			40/100		LS		
Cyclopentane	100	40/100	45/110			50/120	40/100	45/110		
Dalapon/Sodium Salt (2,2-Dichloropropionic Acid and Sodium Salt)	100	NR	25/80			40/100	NR	25/80		NR
Decanoic Acid <4>	> 0.5	80/180	80/180			80/180	80/180	80/180		80/180
Decanol	100	50/120	65/150			80/180	50/120	65/150		
Deionized Water <2>	100	80/180	80/180			80/180	80/180	80/180		80/180
Demineralized Water <2>	100	80/180	80/180			80/180	80/180	80/180		80/180
Detergent, dishwashing liquid (biodegradable) <14>	100	40/100		40/100			40/100			
Detergents, sulfated <21>	1–50	100/210		105/220	80/180		100/210		80/180	
Detergents, sulfonated	100	100/210		105/220			100/210			
De-waxed Paraffin Distillate	100	80/180	80/180			80/180	80/180	80/180		65/150
Di (2-Ethylhexyl) Phosphoric Acid (DEHPA) in Kerosene	20	50/120		65/150			50/120		80/180	
Diacetone Alcohol	10		40/100			50/120	40/100	50/120		
Diacetone Alcohol	100	NR	NR			LS	NR	NR		NR
Diallyl Phthalate	All	80/180	100/210	100/210	100/210	100/210	80/180	100/210	100/210	65/150
Diammonium Phosphate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Dibasic Acid (51-61% Glutaric Acid/18-28% Succinic Acid/ 15-25% Adipic Acid/2% Nitric Acid)	> 0.5–50	80/180	95/200			95/200	80/180	95/200		80/180
Dibromonitrilo-Propionamide	100	NR	25/80			40/100	NR	25/80		NR
Dibromophenol	100	NR	40/100			40/100	NR	40/100		NR
Dibromopropane	100	NR	25/80			40/100	NR	25/80		NR
Dibromopropanol	100			NR		40/100	NR			
Dibutyl Carbitol (Diethylene Glycol Dibutyl Ether)	100	25/80	40/100			40/100	25/80	40/100		
Dibutyl Ether	100	25/80	50/120	50/120	50/120	80/180	25/80	65/150	50/120	
Dibutyl Phthalate	100	80/180	80/180	95/200	95/200	100/210	65/150	80/180	95/200	

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Dibutyl Sebacate	100	50/120	65/150	100/210		65/150	100/210	65/150	65/150	
Dichloroacetic Acid, see Chloroacetic Acid										
Dichlorobenzene (ortho and para)	100	NR	40/100	40/100		50/120	NR	40/100		NR
Dichloroethane	100	NR	NR	NR	NR	25/80	NR	NR	NR	NR
Dichloroethylene	100	NR	NR			LS	NR	NR		NR
Dichloromethane (Methylene Chloride)	100	NR	NR			LS	NR	NR		NR
Dichlorophenol (DCP)	100	NR					NR			
2,4-Dichlorophenoxyacetic Acid (acid, salt, ester formulations) <4>		50/120	50/120			50/120	50/120	50/120		
Dichloropropane	100	NR	25/80			40/100	NR	25/80		NR
Dichloropropane/Dichloropropene mixture		NR		NR	NR		NR			
Dichloropropene	100	NR	NR	NR	NR	25/80	NR	NR	NR	NR
Dichloropropene/Dichloropropane mixture		NR		NR	NR		NR			
Dichloropropionic Acid	100	NR	25/80	NR	NR	40/100	NR	25/80	NR	NR
Dichlorotoluene	100	25/80	50/120			50/120	25/80	50/120		NR
Dicoco Dimethyl Ammonium Chloride <21>	All	50/120		50/120			50/120			
Diesel Fuel	100	80/180	100/210	95/200	95/200	100/210	80/180	100/210	95/200	65/150
Diethanolamine	100	50/120	50/120	50/120	50/120	65/150	50/120	50/120	50/120	
Diethanolamine/Ethanolamine	80:20	50/120	50/120			50/120	50/120	50/120		
Diethyl Carbonate	100	NR	25/80	NR		40/100	NR	25/80	25/80	NR
Diethyl Ether	100	NR	NR			NR	NR	NR		NR
Diethyl Formamide	20	40/100	40/100			40/100	40/100	40/100		NR
Diethyl Formamide	100	NR	LS			40/100	NR	LS		NR
Diethyl Hydroxylamine	100	NR	NR			LS	NR	NR		
Diethyl Ketone	20	40/100	45/110			50/120	40/100	40/100		40/100
Diethyl Ketone	100	NR	NR	NR	25/80	25/80	NR	NR	25/80	NR
Diethyl Sulfate	100	40/100	50/120	40/100	40/100	50/120	40/100	50/120	40/100	
Diethylamine	20	40/100	40/100			40/100	40/100	40/100		NR

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Diethylamine	100	NR	NR	NR		LS	NR	NR		NR
Diethylaminoethanol	100	50/120	50/120			50/120	50/120	50/120		40/100
Diethylbenzene	100	40/100	65/150	50/120	65/150	65/150	40/100	65/150	65/150	NR
Diethylene Glycol	100	80/180	100/210	100/210	100/210	100/210	80/180	100/210	100/210	80/180
Diethylene Glycol Dimethyl Ether	20	40/100	40/100			40/100	40/100	40/100		NR
Diethylene Glycol Dimethyl Ether	100	NR	NR			25/80	NR	NR		NR
Diethylene Glycol Butyl Ether (2-(2-Butoxyethoxy)ethanol)	100	40/100	40/100	30/90	40/100	40/100	40/100	40/100	40/100	NR
Diethylene Glycol Monomethyl Ether	100	NR	NR			LS	NR	NR		NR
Diethylene Triamine Pentaacetic Acid	All	40/100	50/120			50/120	50/120	50/120		
Diethylene Triamine Pentaacetic Acid/Sodium Salt	40	40/100	50/120			50/120	50/120	50/120		
Di-2-Ethylhexyl Phosphoric Acid (DEHPA) in Kerosene	20	80/180	80/180			80/180	80/180	80/180		
Diglycolamine (Aminoethoxyethanol)	20	40/100	50/120			50/120	40/100	50/120		40/100
Diglycolamine (Aminoethoxyethanol)	50	40/100	40/100			40/100	40/100	40/100		40/100
Diglycolamine (Aminoethoxyethanol)	100	NR	NR			LS	NR	NR		NR
Diisobutyl Ketone	100	NR	50/120			50/120	NR	50/120		NR
Diisobutyl Phthalate	100	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150	
Diisobutylene	100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	25/80
Diisonoyl Phthalate	100	65/150	100/210			100/210	65/150	100/210		65/150
Diisopropanolamine	100	50/120	50/120	50/120	50/120	65/150	50/120	50/120	50/120	40/100
Dimethyl Acetamide	20	40/100	40/100			40/100	40/100	40/100		NR
Dimethyl Acetamide	100	NR	NR			LS	NR	NR		NR
Dimethyl Acetamide (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Dimethylamine	20	40/100	40/100			40/100	40/100	40/100		40/100
Dimethylamine	40	LS	LS			LS	LS	LS		NR
2,4-D Dimethylamine Salt	67	50/120	50/120			50/120	50/120	50/120		
Dimethylammonium Hydrochloride (Dimethylamine HCl)	70	40/100	40/100			50/120 <7>	40/100	40/100		40/100

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Dimethylaniline	100	NR	LS			40/100	NR	25/80		LS
Dimethylcarbonate	100	NR	NR			NR	NR	NR		NR
Dimethylethanolamine	20	50/120	50/120			60/140				
Dimethylethanolamine	100	25/80	30/85			40/100	25/80	30/85		NR
Dimethylformamide	20	40/100	40/100			40/100	40/100	40/100		
Dimethylformamide	30	NR					NR			
Dimethylformamide	100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Dimethylformamide (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Dimethylformamide/Acetonitrile/Methanol	26:9:7	NR	NR			LS	NR	NR		NR
Dimethylmorpholine	100	NR	25/80	40/100		50/120	NR	25/80	25/80	NR
Dimethyl Phthalate	100	65/150	80/180	65/150		80/180	65/150	80/180	80/180	
Dimethyl Sulfate	20	40/100	50/120			50/120	40/100	50/120		40/100
Dimethyl Sulfate	100	NR	LS			LS	NR	NR		NR
Dimethyl Sulfide	100	NR	LS			25/80	NR	25/80		NR
Dimethyl Sulfoxide (DMSO)	20	40/100	40/100			40/100	40/100	40/100		40/100
Dimethyl Sulfoxide (DMSO)	100	NR	LS			LS	NR	NR		NR
2,2-Dimethyl Thiazolidine	1	65/150	80/180			80/180	65/150	80/180		
Dimethyltin Dichloride/Methyltin Trichloride (90/10) in aqueous solution <7>	50					45/110				
Dioctyl Phthalate	100	65/150	100/210	65/150	65/150	100/210	65/150	100/210	65/150	65/150
Dioxane	100	NR		NR			NR			
Diphenylmethane-4,4-Diisocyanate (MDI)	100	NR	NR			NR	NR	NR		NR
Diphenyl Oxide (Diphenyl Ether, Phenyl Ether)	100	25/80	40/100	50/120	50/120	50/120	25/80	50/120	50/120	NR
Dipotassium Phosphate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Dipropylene Glycol	100	80/180	100/210	100/210	100/210	100/210	80/180	100/210	100/210	65/150
Dipropylene Glycol Dibenzoate	100	50/120		50/120			50/120			
Dipropylene Glycol Methyl Ether (2-(2-Methoxypropoxy)-1-Propanol)	20	40/100	50/120			65/150	50/120	65/150		40/100

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Dipropylene Glycol Methyl Ether (2-(2-Methoxypropoxy)-1-Propanol)	100	NR	LS			20/70	NR	NR		NR
Dishwashing Detergent in solution <14>	All	80/180	80/180			65/150	80/180	65/150		80/180
Distilled Water <2>	100	80/180	80/180			80/180	80/180	80/180		80/180
Divinylbenzene	100	40/100	50/120	50/120		50/120	40/100	50/120	50/120	NR
Dodecane	100	25/80		50/120	50/120		25/80		50/120	
Dodecanol (Lauryl Alcohol)	100	65/150	80/180	80/180	80/180	80/180	65/150	80/180	80/180	50/120
Dodecene	100	65/150	80/180		80/180	80/180	65/150	80/180	80/180	50/120
Dodecylbenzene Sulfonic Acid <6>	100	80/180	95/200	105/220		100/210	100/210	100/210	95/200	
Dodecylbenzene Sulfonic Acid/Sulfuric Acid/Water/Oil	85:10:4:1	65/150	65/150			65/150	65/150	65/150		65/150
Dodecyldimethylamine	100	80/180	95/200			100/210	80/180	95/200		
Dodecylmercaptan	100	80/180	95/200			100/210	80/180	95/200		
DOWTHERM* heat transfer agent	100	50/120	65/150			65/150	50/120	65/150		
Epichlorohydrin	100	LS	LS	NR	NR	25/80	NR	NR		NR
Epoxidized Castor Oil	100	40/100	40/100							40/100
Epoxidized Soybean Oil	100	65/150	65/150			65/150	65/150	65/150		65/150
Esters/Fatty Acid	100	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	65/150
Ethanol (Ethyl Alcohol)	10	50/120	50/120	65/150	65/150	65/150	50/120	50/120	65/150	50/120
Ethanol (Ethyl Alcohol)	50	40/100	40/100	65/150	65/150	65/150	40/100	40/100	65/150	NR
Ethanol (Ethyl Alcohol)	90–95	25/80	25/80	40/100	40/100	40/100	25/80	25/80	40/100	NR
Ethanol (Ethyl Alcohol)	100	NR	LS	40/100	40/100	40/100	NR	25/80	40/100	NR
Ethanol (Ethyl Alcohol, no condensation, no coalescence)	Fumes	65/150	65/150			80/180	80/180	80/180		65/150
Ethanol/Ethylacetate/Methanol/DMF	35:29:10:10	NR	NR			LS	NR	NR		NR
Ethanolamine	20	40/100	45/110			50/120	40/100	50/120		
Ethanolamine	100	25/80	30/90	30/90	25/80	40/100	25/80	30/90	25/80	NR
Ethanolamine/Ethylene Glycol Monobutyl Ether (alkaline film stripper)	30:57	NR					NR			
Ethephon	100		40/100			40/100				

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Ethoxy Acetic Acid	10		40/100			40/100		40/100		
Ethoxy Acetic Acid	100	NR	NR			LS	NR	NR		NR
Ethoxylated Alcohol, C12-C14	100	25/80	40/100			50/120	25/80	40/100		
Ethoxylated Alkyl Amines, C12 and higher	100	25/80	40/100			50/120	25/80	40/100		
Ethoxylated Nonyl Phenol	100	NR	LS			40/100	NR	LS		NR
Ethyl Acetate	1			NR	NR		NR		NR	
Ethyl Acetate	100	NR	LS	NR	NR	25/80	NR	LS	NR	NR
Ethyl Acetate (no condensation, no coalescence)	fumes					80/180	80/180	80/180		
Ethyl Acetate/Sodium Hydroxide <1,2>	4:0–50	50/120	50/120			40/100	50/120	40/100		
Ethyl Acrylate	100	NR	LS	NR	NR	25/80	NR	20/70	NR	NR
Ethyl Alcohol, see Ethanol										
Ethyl Amine	20	40/100	40/100			40/100	40/100	40/100		40/100
Ethyl Amine	70	NR	NR			LS	NR	NR		NR
Ethyl Benzene/Benzene	2:3/1:3 vol								25/80	
Ethyl Benzyl Chloride <2>	100	NR	NR			40	NR	NR		NR
Ethyl Bromide	100	NR	LS	NR	NR	LS	NR	LS	NR	NR
Ethyl Chloride	100	NR	LS	NR	25/80	25/80	NR	25/80	25/80	NR
Ethyl Ether	100	NR	NR			NR	NR	NR	NR	NR
Ethyl Silicate	100					40/100				
Ethyl Sulfate	100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	40/100
2-Ethylhexyl Alcohol	100	65/150	70/160			80/180	70/160	80/180		50/120
Ethyl-3-Ethoxy Propionate	100	NR	LS			25/80	NR	LS		NR
Ethylbenzene	100	25/80	40/100	40/100	50/120	50/120	25/80	40/100	40/100	
Ethylbenzene/Benzene	67:33	NR	25/80			40/100	NR	25/80		NR
Ethylene Chloride, see Dichloroethane										
Ethylene Chlorohydrin	20	40/100	50/120			65/150	50/120	65/150		40/100

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration %	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin 411 °C/°F	441 °C/°F	451 °C/°F	455 °C/°F	470 °C/°F	510A/B/C °C/°F	510N °C/°F	515 °C/°F	8084 °C/°F
Ethylene Chlorohydrin	100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	NR
Ethylene Diamine	20	40/100	40/100			40/100	40/100	40/100		40/100
Ethylene Diamine	100	NR	NR			LS	NR	NR		NR
Ethylene Dibromide	100	NR	NR			NR	NR	NR	NR	NR
Ethylene Dichloride, see Dichloroethane										
Ethylene Dichloride/Ethylene Dibromide/Tetra Ethyl Lead (above water solublity)	5:5:5	NR	NR			LS	NR	NR		NR
Ethylene Glycol	100	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	65/150
Ethylene Glycol based coolants	> 0.5	100/210	100/210			100/210	100/210	100/210		
Ethylene Glycol/Sulfuric Acid	0–40:0–10	65/150	80/180			80/180	80/180	80/180		
Ethylene Glycol Monobutyl Ether (2-Butoxyethanol)	20	40/100	50/120			65/150	50/120	65/150		40/100
Ethylene Glycol Monobutyl Ether (2-Butoxyethanol)	100	40/100	40/100	40/100	40/100	65/150	40/100	40/100	40/100	NR
Ethylene Glycol Monobutyl Ether/Ethanolamine (alkaline film stripper)	57:30						NR			
Ethylene Oxide	100	NR	NR			NR	NR	NR	NR	NR
Ethylenediaminetetraacetic Acid (EDTA)	All	80/180	80/180	30/90	40/100	80/180	80/180	80/180	40/100	80/180
Ethylenesulfonic Acid/Sodium Salt <6>	All	70/160	70/160			70/160	70/160	70/160		
Eucalyptus Oil <18>	100	60/140	60/140			60/140	60/140	60/140		
Fatty Acid/Sterol/Triglyceride	All	100/210	120/250			120/250	100/210	120/250		65/150
Fatty Acid/Sulfuric Acid <10>	5:2	100/210	100/210			100/210	100/210	100/210		
Fatty Acids	All	100/210	120/250	105/220	120/250	120/250	100/210	120/250	120/250	65/150
Ferric Acetate	All	80/180	80/180	80/180		80/180	80/180	80/180	80/180	
Ferric Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ferric Chloride/Ferrous Chloride	5:20	100/210	100/210			100/210	100/210	100/210		80/180
Ferric Chloride/Ferrous Chloride/Hydrochloric Acid	48:0.2:0.2	100/210	105/220			105/220	100/210	105/220		80/180
Ferric Chloride/ Hydrochloric Acid <2,8,9,12,13>	0–29:1–20	80/180	105/220			105/220	80/180	105/220		80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Ferric Nitrate <21>	All			100/210	100/210		100/210		100/210	
Ferric or Ferrous Sulfate/Sulfuric Acid	0–40:0–25	100/210	100/210			100/210	100/210	100/210		80/180
Ferric Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ferrous Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ferrous Chloride/Hydrochloric Acid <2,8,9,12,13>	0–29:1–20	80/180	100/210			100/210	80/180	100/210		80/180
Ferrous Chloride, Manganese Chloride, Ferric Chloride/ Hydrochloric Acid <2,8,9,12,13>	1–60:0–20	80/180	100/210			100/210	100/210	100/210		80/180
Ferrous Nitrate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ferrous Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Fertilizer 32-0-0 (32% wt of total Nitrogen), Urea-Ammonium Nitrate solution		65/150	65/150			65/150	65/150	65/150		65/150
Fertilizer 8-8-8 (% wt of total Nitrogen, Phosphorus and Potassium)		65/150	65/150	65/150		65/150	65/150	65/150	65/150	65/150
Fertilizer Solution, Grades N-P-K:10-34-0	100			65/150			65/150			
Flue Gas, dry <16>	All	165/325	175/350	175/350	175/350	205/400	160/320	160/320		
Flue Gas, wet	All	80/180	100/210	100/210	100/210	100/210	80/180	100/210		80/180
Fluoboric Acid <1,2>	1–10	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	65/150
Fluoboric Acid <1,2>	11–100	100/210	100/210	95/200	95/200	100/210	100/210	100/210	95/200	65/150
Fluoride Salts/Hydrochloric Acid <1,2>	30:10	50/120	50/120			50/120	50/120	50/120		50/120
Fluorine in flue gas, wet <1,2>	2	80/180	100/210			100/210	80/180	100/210		80/180
Fluosilicic Acid (Fluorosilicic Acid, Hexafluorosilicic Acid) <1,2>	1	80/180		70/160	80/180	80/180	80/180		80/180	
Fluosilicic Acid (Fluorosilicic Acid, Hexafluorosilicic Acid) <1,2>	2–10	80/180	80/180	70/160	80/180	80/180	80/180	80/180	80/180	65/150
Fluosilicic Acid (Fluorosilicic Acid, Hexafluorosilicic Acid) <1,2>	11–20	60/140	60/140			60/140	60/140	60/140		60/140
Fluosilicic Acid (Fluorosilicic Acid, Hexafluorosilicic Acid) <1,2>	21–35	40/100	40/100	40/100	50/120	40/100	40/100	40/100	50/120	40/100
Fluosilicic Acid (Fluorosilicic Acid, Hexafluorosilicic Acid) <1,2>	Sat'd	40/100		40/100	40/100		40/100		40/100	
Fluosilicic Acid fumes <1,2>	All	80/180	80/180			80/180	80/180			65/150

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Fluosilicic Acid/Hydrofluoric Acid/Phosphoric Acid <1,2>	22:5:5	40/100	40/100			40/100	40/100	40/100		40/100
Fluozirconic Acid/Fluotitanic Acid/Ammonium Hydroxide <1,2>	5:4:3	40/100	40/100			40/100	40/100	40/100		40/100
Fly Ash Slurry		80/180	80/180		65/150	80/180	80/180	80/180	65/150	80/180
Formaldehyde	38	50/120	65/150	65/150	65/150	65/150	50/120	65/150	65/150	
Formaldehyde/Methanol	0–37:0–15	50/120	65/150			65/150	50/120	65/150		
Formamide	20	40/100	50/120			65/150	50/120	65/150		40/100
Formamide	100	20/70	20/70	LS40/LS100	40/100	20/70	20/70	20/70	40/100	
Formic Acid	10	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	65/150
Formic Acid	25	50/120	65/150	50/120	50/120	65/150	50/120	65/150	50/120	50/120
Formic Acid	50	50/120	50/120	50/120	50/120	50/120	50/120	50/120	50/120	
Formic Acid <2>	85	25/80	25/80	50/120	50/120	40/100	25/80	25/80	50/120	
Formic Acid <2>	100				40/100	40/100			40/100	
Fuel C (50:50 Isooctane/Toluene)	100					50/120				
Fuel C/Methyl t-Butyl Ether (MTBE) (Fuel C is 50:50 Toluene/ Isooctane)	85:15					50/120				
Fuel Oil	100	80/180	100/210	80/180	80/180	100/210	80/180	100/210		65/150
Furfural <11>	0–10	40/100	50/120	65/150	65/150	50/120	40/100	50/120	65/150	
Furfural <11>	11–100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Furfural in organic solvent <4,6>	0–20	NR	25/80			40/100	NR	40/100		
Furfural/Acetic Acid/Methanol	30:10:5	NR	NR			LS	NR	NR		NR
Furfuryl Alcohol <2>	20	40/100	50/120			65/150	40/100	50/120		40/100
Furfuryl Alcohol <2>	100	NR	NR			25/80	NR	NR	NR	NR
Gallic Acid	All	80/180	80/180			80/180	80/180	80/180		
Gasohol, 1-100% alcohol	100					40/100				
Gasoline, no alcohol	100					50/120				
Gluconic Acid	50			50/120			40/100			
Glucose <18>	All	80/180	80/180							

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Glutamic Acid <18>	50	50/120	50/120			50/120	50/120	50/120		
Glutaraldehyde	50	50/120	50/120			50/120	50/120	50/120		50/120
Glutaric Acid	50	50/120	50/120			50/120	50/120	50/120		
Glycerine	100	100/210	100/210	105/220	100/210	100/210	100/210	100/210	100/210	65/150
Glycine and derivatives	All	40/100	40/100			40/100	40/100	40/100		
Glycol	100	100/210	100/210			100/210	100/210	100/210		65/150
Glycolic Acid (Hydroxyacetic Acid)	0–70	50/120	50/120	50/120	50/120	65/150	50/120	65/150	50/120	50/120
Glyconic Acid	50	80/180	80/180			80/180	80/180	80/180		65/150
Glyoxal	40	40/100	40/100	25/80		40/100	40/100	40/100	40/100	
Glyoxylic Acid (Oxoacetic Acid)	25	NR		NR	NR		NR		NR	
Glyphosate	All		40/100			40/100		40/100		
Gold Plating Solution (23% Potassium Ferrocyanide, Potassium Gold Cyanide, Sodium Cyanide)		100/210	100/210	95/200	95/200	100/210	100/210	100/210	95/200	80/180
Green Liquor <1,2>	All	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Gypsum Slurry, see also Calcium Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Hard Chrome Plating Baths (with Sulfuric Acid–not recommended)		60/140	60/140							
Heptane	100	100/210	100/210	95/200	95/200	100/210	100/210	100/210	95/200	80/180
Heptane (no condensation, no coalescence)	Fumes	100/210	100/210			100/210	100/210	100/210		80/180
Hexachlorocyclopentadiene	100			80/180			80/180			
Hexachloroethane	100	LS	40/100			50/120	LS	40/100		NR
Hexadecanol	100	65/150	80/180			80/180	65/150	80/180		50/120
Hexafluorosilicic Acid, see Fluosilicic Acid										
Hexamethylenetetramine	40	40/100	50/120			50/120	40/100	50/120		
Hexane	100	70/160	70/160	70/160	70/160	70/160	70/160	70/160	70/160	
Hexanoic Acid	100	25/80	50/120			50/120	25/80	50/120		25/80
Hot Stack Gas, see Flue Gas										
Humid Air, trace sulfur fumes				95/200	95/200		95/200			

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Hydraulic Fluid (glycols) <14>	100	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	
Hydrazine	20		LS			LS	LS	LS		
Hydrazine	70	NR		NR	NR		NR		NR	
Hydrazine	100	NR	NR			LS	NR	NR		NR
Hydrazine/Sodium Phosphate	5:10		LS			LS	LS	LS		
Hydriodic Acid (57% Hydrogen Iodide)	40	65/150	65/150			65/150	65/150	65/150		65/150
Hydriodic Acid (57% Hydrogen Iodide)	100		40/100			40/100	40/100	40/100		
Hydrobromic Acid	1–25	80/180	80/180	105/220	105/220	80/180	80/180	80/180	105/220	80/180
Hydrobromic Acid	48	65/150	65/150	70/160	70/160	65/150	65/150	65/150	70/160	65/150
Hydrobromic Acid	62	40/100	40/100			40/100	40/100	40/100		40/100
Hydrobromic Acid/Bromine	40:2		40/100			40/100	40/100	40/100		
Hydrochloric Acid <9,13>	1–15	80/180	105/220	105/220	105/220	110/230	100/210	105/220	105/220	80/180
Hydrochloric Acid <2,8,9,13>	16–20	80/180	105/220	95/200	95/200	110/230	100/210	105/220	95/200	80/180
Hydrochloric Acid <2,8,9,13>	21–25	65/150	80/180	80/180	80/180	100/210	80/180	80/180	80/180	80/180
Hydrochloric Acid <2,8,9,13>	26–30	65/150	80/180			95/200	80/180	80/180		80/180
Hydrochloric Acid <2,8,9,13>	31–32	65/150	70/160	65/150	65/150	80/180 <15>	65/150	80/180 <15>	65/150	65/150
Hydrochloric Acid <2,8,9,13>	33–34	50/120	50/120			70/160 <15>	50/120	70/160 <15>		50/120
Hydrochloric Acid <2,8,9,13>	35–36	50/120	50/120	50/120	50/120	60/140 <15>	50/120	60/140 <15>	50/120	50/120
Hydrochloric Acid <2,8,9,13>	37	40/100	45/110	40/100	40/100	50/120 <15>	40/100	50/120 <15>	40/100	
Hydrochloric Acid, fumes <2,8,9,13,16>		100/210	175/350			175/350	100/210	175/350		80/180
Hydrochloric Acid, fumes/free Chlorine, dry above 210 °F/100 °C <2,8,9,12,13,16>			175/350			175/350		175/350		
Hydrochloric Acid/Aluminum (reactor)/Aluminum Chloride <2,8,9,12,13>	< 15% HCl	80/180	100/210				80/180			

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Hydrochloric Acid/Aluminum Chloride <2,8,9,12>	30:0–40	65/150	70/160			80/180 <15>	65/150	80/180 <15>		65/150
Hydrochloric Acid/Aluminum Chlorohydrate <2,8,9,12,13>	< 15:> 0.5	80/180	100/210			100/210	80/180	100/210		65/150
Hydrochloric Acid/Bromine/Chlorine <2,8,9,12,13>	22:0.1:0.1	65/150	80/180			100/210	80/180	80/180		80/180
Hydrochloric Acid/Calcium Chloride <2,8,9,12,13>	27:15	65/150	80/180			95/200	80/180	80/180		80/180
Hydrochloric Acid/Chlorine <2,8,9,12,13>	0.5–20% HCl	80/180	90/195			100/210	80/180	100/210		80/180
Hydrochloric Acid/Diethylene Triamine (as Hydrochloride)/ Ammonium Chloride <2,8,9,12,13>	33:10:10					65/150				
Hydrochloric Acid/Dissolved Organics <2,8,9,12,13>	0–33% HCl	NR				65/150 <15>				NR
Hydrochloric Acid/Ferric Chloride <2,8,9,12,13>	1–20:0–29	80/180	105/220			105/220	80/180	105/220		80/180
Hydrochloric Acid/Ferric Chloride/Organics <2,8,9,12,13>	28:35:1	NR	NR			65/150	NR	NR		NR
Hydrochloric Acid/Ferrous Chloride <2,8,9,12>	1–20:0–29	80/180	100/210			100/210	80/180	100/210		80/180
Hydrochloric Acid/Formaldehyde <2,8,9,12,13>	25:3	NR	NR			65/150	NR	NR		NR
Hydrochloric Acid/Hydrofluoric Acid <1,2,8,12,13>	36:1		40/100			40/100 <15>		40/100 <15>		
Hydrochloric Acid/Hydrofluoric Acid <1,2,8,12,13>	Max total % = 20	40/100	40/100			40/100	40/100	40/100		40/100
Hydrochloric Acid/Hydrofluoric Acid <1,2,8,12,13>	15:0.1–1	80/180	100/210			100/210	100/210	100/210		80/180
Hydrochloric Acid/Hydrofluoric Acid <1,2,8,12,13>	25:6	40/100	45/110			50/120	40/100	50/120		
Hydrochloric Acid/Hydrofluoric Acid <1,2,8,12,13>	0.5–20:0–1	65/150	80/180			80/180	65/150	80/180		
Hydrochloric Acid/Hydrofluoric Acid <1,2,8,12,13>	30:15					40/100				
Hydrochloric Acid/Hydrofluoric Acid/Phosphoric Acid/ Nitrobenzene <1,2,8,12,13>	15:1:1:0.5	NR	LS			40/100	NR	LS		NR
Hydrochloric Acid/Hydrofluoric Acid/Xylene <1,2,8,12,13>	15:15:70					NR				
Hydrochloric Acid/Phosphorus Acid <2,8,9,12,13>	2:70			80/180	80/180		80/180		80/180	
Hydrochloric Acid/Sodium Chloride <2,8,9,12,13>	5:Sat'd NaCl			100/210	100/210		100/210		100/210	
Hydrochloric Acid/Sulfuric Acid (iron and steel cleaning bath) <2,8,9,12,13>	9:23			95/200	100/210		95/200		100/210	
Hydrocyanic Acid	All	100/210	100/210	65/150	65/150	100/210	100/210	100/210	65/150	80/180
Hydrofluoric Acid <1,2,13>	1	65/150		65/150	65/150		65/150		65/150	

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration %	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin 411 °C/°F	441 °C/°F	451 °C/°F	455 °C/°F	470 °C/°F	510A/B/C °C/°F	510N °C/°F	515 °C/°F	8084 °C/°F
Hydrofluoric Acid <1,2,13>	5	65/150		50/120	50/120		50/120		50/120	
Hydrofluoric Acid <1,2,13>	10	65/150		40/100	40/100	65/150	65/150	65/150	40/100	65/150
Hydrofluoric Acid <1,2,13>	15			30/90	30/90	40/100	40/100	40/100	30/90	
Hydrofluoric Acid <1,2,13>	20	40/100	40/100	LS30/LS90	LS30/LS90	40/100	40/100	40/100	LS30/LS90	40/100
Hydrofluoric Acid/Nitric Acid <1,2,13>	15:15					40/100		40/100		
Hydrofluoric Acid/Nitric Acid <1,2,13>	6:20	50/120	50/120			60/140	55/130	60/140		40/100
Hydrofluoric Acid/Nitric Acid <1,2,13>	3–5:30–35	NR	NR			LS	NR	LS		NR
Hydrofluoric Acid/Nitric Acid/Sulfuric Acid <1,2,13>	8:20:2					60/140		60/140		
Hydrofluosilicic Acid, see Fluosilicic Acid										
Hydrofluosilicic Acid/Polyaluminum Chloride (Poly(aluminum hydroxy)chloride) <1,2>	1–22:1–35	40/100	40/100			40/100	40/100	40/100		40/100
Hydrofluosilicic Acid/Zinc Chloride <1,2>	20:All	40/100	40/100			40/100	40/100	40/100		40/100
Hydrogen Bromide, dry gas	100	80/180	80/180	80/180	80/180	100/210	80/180	100/210	80/180	80/180
Hydrogen Bromide, wet gas	100	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Hydrogen Chloride, dry gas <6,16>	100	100/210	175/350	105/220	120/250	175/350	100/210	175/350	120/250	80/180
Hydrogen Chloride, wet gas	100	100/210	110/230	105/220	105/220	110/230	100/210	110/230	105/220	80/180
Hydrogen Fluoride, dry gas/vapor (if wet, max. 40 °C/100 °F) <1,2,6>		80/180	80/180			80/180	80/180	80/180		80/180
Hydrogen Peroxide <2,3,6>	5	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150
Hydrogen Peroxide <2,3,6>	30	40/100	40/100	40/100	65/150	65/165	40/100	65/150	65/150	40/100
Hydrogen Peroxide <2,3,6>	35	25/80	30/90			40/100	30/90	40/100		NR
Hydrogen Peroxide <2,3,6>	50	NR	NR			LS	NR	NR		NR
Hydrogen Sulfide <6,16>	5	100/210	175/350			175/350	100/210	175/350		80/180
Hydrogen Sulfide, aqueous	All	100/210	100/210			100/210	100/210	100/210		80/180
Hydrogen Sulfide, dry gas	100	100/210	110/230	100/210	100/210	110/230	100/210	110/230	100/210	80/180
Hydrogen Sulfide, sewer gas		30/90		30/90			30/90			
Hydrogenated Tallow Alkyl Amine (C8-C18)	100	40/100	40/100							
Hydrosulfite Bleach, aqueous solution containing 5% Zinc Hydrosulfite and 2.5% Tripolyphosphate <5>		80/180	80/180			80/180	80/180	80/180		80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Hydroxyacetic Acid (Glycolic Acid)	0–70	50/120	50/120	50/120	50/120	65/150	50/120	65/150	50/120	50/120
Hydroxylamine Acid Sulfate (Hydroxylammonium Acid Sulfate (HAS)), reaction of Hydroxylamine Acid Disulfate with steam to form HAS, Sulfuric Acid, Ammonium Sulfate <21>	All		100/210			100/210				
Hypophosphorous Acid	0–50	50/120	50/120	30/90	30/90	50/120	50/120	50/120	30/90	50/120
Imidazoline Acetate/Solvent <2,4>	20	40/100	45/110			50/120	40/100	45/110		NR
Imidazoline Acetate/Solvent <2,4>	60	NR	LS			40/100	NR	NR		NR
Incinerator Gases, see Flue Gas										
Iodine, crystals	100	65/150	65/150			65/150	65/150	65/150		65/150
Iodine, vapor	100	65/150	65/150			80/180	65/150	65/150	65/150	65/150
Ion Exchange Resin, fine mesh resins		80/180	80/180			80/180	80/180	80/180		80/180
Iron and Steel Cleaning Bath (9% Hydrochloric Acid/ 23% Sulfuric Acid)		80/180	100/210			100/210	80/180	100/210		80/180
Iron Plating Solution (45% $FeCl_2$, 15% $CaCl_2$, 20% $FeSO_4$, 11% $(NH_4)_2SO_4$)		80/180	100/210	80/180	80/180	100/210	80/180	100/210	80/180	80/180
Iron Perchloride, see Ferric Chloride										
Isoamyl Alcohol	20	65/150	65/150			80/180	65/150	65/150		65/150
Isoamyl Alcohol	100	50/120	60/140	50/120	50/120	65/150	50/120	60/140	50/120	50/120
Isobutyl Alcohol	20	65/150	65/150			80/180	65/150	65/150		40/100
Isobutyl Alcohol	100	50/120	50/120			65/150	50/120	50/120		NR
Isodecanol	100	50/120	65/150	80/180	80/180	80/180	50/120	65/150	50/120	50/120
Isononyl Alcohol	100	65/150	65/150			65/150	65/150	65/150		40/100
Isooctyl Adipate	100	50/120	50/120			65/150	50/120			40/100
Isooctyl Alcohol	100	65/150	65/150			65/150	65/150	65/150		50/120
Isopropanol Amine	100	50/120	50/120			50/120	50/120	50/120		NR
Isopropyl Alcohol (Isopropanol)	100	50/120	50/120	40/100	50/120	50/120	50/120	50/120	50/120	NR
Isopropyl Amine	0.5–50	40/100	40/100			40/100	40/100	40/100		
Isopropyl Amine	100	NR	NR			LS	NR	NR		NR
Isopropyl Myristate	100	100/210	110/230			110/230		110/230		65/150

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Isopropyl Palmitate	100	100/210	110/230	105/220		110/230	100/210	110/230	110/230	65/150
Itaconic Acid	0.5–40	60/140	60/140	100/210	100/210	60/140	60/140	60/140	100/210	60/140
Jet Fuel, general <6>	100	60/140	60/140			60/140	60/140	60/140		60/140
Kerosene	100	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	65/150
Kraft Recovery Boiler Breeching, see Flue Gas										
Lactic Acid	All	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	65/150
Latex (emulsion in water), for specific latices see under chemical/polymer name	All	50/120	50/120			50/120	50/120	50/120		50/120
Latex Paint, acrylic binders	100			40/100	50/120		40/100		50/120	
Latex Paint, dispersion in water	100			40/100	50/120		40/100		50/120	
Latex Paint, vinyl binders	100			40/100	50/120		40/100		50/120	
Lauric Acid	All			100/210			100/210			
Lauroyl Chloride	100	40/100	50/120			50/120		50/120		
Lauryl Alcohol	100	65/150	80/180			80/180	65/150	80/180		50/120
Lauryl Chloride	100	100/210	100/210			100/210	100/210	100/210	100/210	65/150
Lauryl Mercaptan	100	80/180	95/200			100/210	80/180	95/200	65/150	
Lead Acetate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	
Lead (II) Nitrate <21>	All	100/210		100/210	100/210	100/210 <24>	100/210		100/210	
Lead Plating Solution (acidic process, 8% Lead with Fluoboric Acid and Boric Acid) <1>				95/200			95/200			
Lead Plating Solution (alkaline process, 8% Lead Acetate, 20% Sodium Hydroxide)				80/180			80/180			
Levulinic Acid <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	
Lignin Sulfonate	All	80/180	80/180			80/180	80/180	80/180		65/150
Lime Slurry, see Calcium Hydroxide										
Limestone Slurry, see Calcium Carbonate										
Linseed Oil	100	100/210	110/230	105/220	105/220	110/230	100/210	110/230	105/220	65/150

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Liquid Petroleum Gas (LPG)	100	60/140	60/140			60/140	60/140	60/140		60/140
Lithium Bromide <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210		100/210	80/180
Lithium Carbonate <1>	All	80/180	80/180			80/180	80/180	80/180		80/180
Lithium Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Lithium Hydroxide <1>	All	80/180	80/180	65/150		40/100	80/180	80/180	80/180	80/180
Lithium Hypochlorite <2,3,5,9>	All	80/180	80/180			40/100	80/180	80/180		80/180
Lithium Sulfate <21>	All			100/210	100/210	100/210 <24>	100/210		100/210	
Magnesium Bisulfite <21>	All	100/210	100/210	80/180	80/180	100/210 <24>	100/210	100/210	80/180	80/180
Magnesium Carbonate	All	80/180	80/180			80/180	80/180	80/180		80/180
Magnesium Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Magnesium Fluosilicate <1>	All	80/180	80/180			80/180		80/180		80/180
Magnesium Hydroxide <21>	All	100/210	100/210			80/180	100/210	100/210		80/180
Magnesium Nitrate	All	100/210	100/210	70/160	100/210	100/210	100/210	100/210	100/210	80/180
Magnesium Phosphate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Magnesium Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Magnesium Sulfate/Phosphoric Acid	1–40:0–36	100/210	100/210			100/210	100/210	100/210		100/210
MAGNIFLOC Flocculant MW>40.000, Cationic Polyamine <6>	All	60/140	60/140			60/140	60/140	60/140		60/140
Maleic Acid <21>	All	80/180	100/210	80/180	100/210	100/210 <24>	80/180	100/210	100/210	80/180
Maleic Anhydride	100			65/150			65/150			
Malic Acid	All				100/210 <24>				100/210 <24>	
Manganese Chloride (Manganous Chloride) <21>	All	100/210	100/210			100/210 <24>	100/210	100/210	100/210	80/180
Manganese Nitrate (Manganous Nitrate) <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Manganese Sulfate (Manganous Sulfate) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Manganous Sulfate/Ammonium Sulfate/Sulfuric Acid (concentrations in g/l)	up to 15:up to 150:up to 40			50/120	50/120		50/120			
MDI, see Diphenylmethane-4,4-Diisocyanate										
Melamine Formaldehyde Resin	All	40/100	50/120			50/120	40/100	50/120		40/100
Mercaptoacetic Acid	All	NR	25/80	40/100		40/100	NR	25/80		NR
Mercaptoethanol	10		80/180			80/180		80/180		
Mercaptopropionic (3-) Acid	100						NR			
Mercury	100	100/210	120/250	105/220		120/250	100/210	120/250	120/250	65/150
Mercury(I) Chloride (Mercurous Chloride) <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Mercury(II) Chloride (Mercuric Chloride) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Metal Pickling Solutions (Sulfuric Acid/Hydrochloric Acid/ and/or Phosphoric Acid) <9>	0.5–15 total	100/210	100/210			100/210	100/210	100/210		
Methacrylic Acid <7>	25	40/100	40/100			50/120	40/100	40/100		40/100
Methacrylic Acid	100	NR	NR			LS	NR	NR		NR
Methanamide, see Formamide										
Methane/Nitrogen	70:30	60/140	80/180			95/200	80/180	95/200		60/140
Methane Sulfonic Acid <6>	0–70	NR	LS			40/100	NR	NR		NR
Methanol (Methyl Alcohol)	5	50/120	50/120			50/120	50/120	50/120		50/120
Methanol (Methyl Alcohol)	20	NR	30/90			40/100	NR	40/100		NR
Methanol (Methyl Alcohol)	40–100	NR	LS	40/100	40/100	40/100	NR	NR	40/100	NR
Methanol (no condensation, no coalescence)	Fumes		65/150			80/180	80/180	80/180		
Methanol/Ethanolamine	0–60:0–20	NR	LS			40/100	NR	NR		NR
Methanol/Formaldehyde/Sulfuric Acid	60:20:2	NR	LS			40/100	NR	NR		NR
Methanol/Formaldehyde	0–15:0–37	50/120	65/150			65/150	50/120	65/150		
Methanol/Formaldehyde	35:4	NR	NR			40/100	NR	NR		
1-Methoxy-2-Propanol	100	NR	LS			20/70	NR	NR		NR

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Methyl Acetate	20	40/100	40/100			40/100	40/100	40/100		40/100
Methyl Acetate	100	NR	NR			LS	NR	LS		NR
Methyl Alcohol, see Methanol										
Methylamine	20	40/100	40/100			40/100	40/100	40/100		40/100
Methylamine	40	LS	LS			LS	LS	LS		NR
Methylamine	100	NR	NR			LS	NR	NR		NR
Methyl Bromide	10	25/80	25/80			25/80	25/80	25/80		NR
Methyl Bromide	100	NR	NR			LS	NR	NR		NR
2-Methyl-3-Butenenitrile	All	25/80	40/100			40/100	25/80	40/100		
Methyl Butyl Ketone (MBK), includes Methyl t-Butyl Ketone (MTBK) and other isomers	100	25/80	40/100			50/120	25/80	40/100		NR
Methyl Chloride (no condensation, no coalescence)	Fumes	40/100	65/150	80/180	80/180	80/180	80/180	80/180		
Methyl Chloroform (also 1,1,1-Trichloroethane inhibited)	100	40/100	50/120			50/120	40/100	50/120		NR
Methyl Chloroform/Perchloroethylene	75:25	40/100	50/120			50/120	40/100	50/120		
Methyl Distearyl Ammonium Chloride/Isopropanol	75:25	50/120	50/120			50/120	50/120	50/120		
Methyl Ethyl Ketone	20	40/100	40/100			40/100	40/100	40/100		40/100
Methyl Ethyl Ketone	100	LS	LS	NR	NR	20/70	LS	LS	NR	NR
Methyl Ethyl Ketone/2-Butanol/Triethylamine/2-Butoxy Ethanol	< 25 total	LS	25/80			40/100	LS	25/80		NR
Methyl Formate	5	40/100	45/110			50/120	45/110	50/120		
Methyl Isobutyl Ketone (MIBK)	100	25/80	40/100	NR	NR	50/120	25/80	40/100	NR	NR
Methyl Mercaptan, gas	All	40/100	65/150			65/150	40/100	65/150		NR
Methyl Methacrylate	All	NR	LS			25/80	NR	20/70		NR
N-Methyl-2-Pyrrolidone	10					LS				
N-Methyl-2-Pyrrolidone	100	NR	NR			LS	NR	NR		NR
Methyl Sulfate, see Dimethyl Sulfate										
Methyldiethanolamine	20	50/120	65/150			80/180	50/120	65/150		40/100
Methyldiethanolamine	100	50/120	50/120			65/150	50/120	50/120		
Methylene Chloride (Dichloromethane)	100	NR	NR		NR	LS	NR	NR	NR	NR

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Methylene Chloride (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Methylene Chloride/Methanol/Water	1:4:95	40/100	40/100			50/120	40/100	40/100		40/100
Methylstyrene (alpha)	100	25/80	40/100	NR	NR	50/120	25/80	40/100	NR	NR
Methyl t-Butyl Ether (MTBE)	100	NR	25/80	25/80		25/80	NR	25/80		NR
Methyl t-Butyl Ether (MTBE)/Fuel C (Fuel C is 50% Toluene and 50% Isooctane)	15:85	40/100	50/120			50/120	40/100	50/120		NR
Methyl t-Butyl Ether (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Methyl Tin Trichloride/Dimethyl Tin Dichloride (10/90) in aqueous solution <7>	50					45/110				
Metolachlor	100			40/100						
Mineral Oils, aliphatic	100	100/210	120/250	100/210	120/250	120/250	100/210	120/250	120/250	65/150
Mineral Spirits	100	105/220		105/220	120/250		105/220		120/250	
Molasses	100	80/180	80/180							
Monochloroacetic Acid, see Chloroacetic Acid										
Monochlorobenzene, see Chlorobenzene										
Monoethanolamine, see Ethanolamine										
Monohydroxysuccinic Acid, see Malic Acid										
Monomethylhydrazine	100	NR	NR			LS	NR	NR		NR
Morpholine <2>	20	40/100	45/110			50/120	45/110	50/120		40/100
Morpholine <2>	100	NR	NR			25/80	NR	NR		NR
Morpholine/Cyclohexylamine	All	NR	NR			25/80	NR	NR		NR
Motor Oil	100	100/210	120/250	105/220	105/220	120/250	100/210	120/250	105/220	65/150
Muriatic Acid, see Hydrochloric Acid										
Myristic Acid	100	100/210	120/250	105/220	120/250	120/250	100/210	120/250	120/250	65/150
Naphtha	100	80/180	100/210	95/200	100/210	100/210	80/180	100/210	100/210	80/180
Naphtha, heavy aromatic	100		50/120			50/120		50/120		
Naphthalene	100	100/210	100/210	95/200	100/210	100/210	100/210	100/210	100/210	80/180
Neutralizer & Desmut	All	65/150	65/150			65/150	65/150	65/150		65/150

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Nickel Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Nickel Nitrate	> 0.5	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	80/180
Nickel Plating Solution #1 (11% Nickel Sulfate, 2% Nickel Chloride, 1% Boric Acid)		80/180	80/180			80/180	80/180	80/180		80/180
Nickel Plating Solution #2 (44% Nickel Sulfate, 4% Ammonium Chloride, 4% Boric Acid)		80/180	80/180	95/200	95/200	80/180	80/180	80/180	95/200	80/180
Nickel Plating Solution #3 (15% Nickel Sulfate, 5% Nickel Chloride, 3% Boric Acid)		100/210	100/210			100/210	100/210	100/210		80/180
Nickel Sulfamate	All	80/180	80/180			80/180	80/180	80/180		80/180
Nickel Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Nitric Acid	1	100/210		100/210	80/180		100/210		80/180	
Nitric Acid	2–5	65/150	80/180	70/160	80/180	80/180	65/150	80/180	80/180	65/150
Nitric Acid	6–10	65/150	65/150	60/140	65/150	65/150	65/150	65/150	65/150	50/120
Nitric Acid	11–20	50/120	50/120	65/150	65/150	65/150	50/120	65/150	65/150	50/120
Nitric Acid <2,13>	21–29	40/100	40/100	55/130	65/150	50/120	40/100	50/120		40/100
Nitric Acid <2,13>	30–35	25/80	30/90	50/120		40/100	30/90	40/100		NR
Nitric Acid <2,13>	36–40	NR	NR	NR	NR	40/100	NR	25/80	NR	NR
Nitric Acid <2,13>	50			NR	NR		NR		NR	
Nitric Acid <2,13>	70	NR	NR			LS	NR	NR		NR
Nitric Acid, fumes (no condensation, no coalescence) <2>	< 60 (soln.)	80/180	80/180			80/180	80/180	80/180		80/180
Nitric Acid, fumes (no condensation, no coalescence) <2>	> 60 (soln.)	80/180	80/180			80/180	80/180	80/180		80/180
Nitric Acid/Hexavalent Chrome (Chromic Acid) <2,13>	10:5	40/100	50/120			65/150	40/100	40/100		40/100
Nitric Acid/Hydrogen Peroxide/Hydrofluoric Acid <1,2,3,13>	30:5:0.5	25/80	30/90			40/100	30/90	40/100		NR
Nitric Acid/Hydrofluoric Acid <1,2,13>	25:3	40/100	40/100			50/120	40/100	50/120		40/100
Nitric Acid/Hydrofluoric Acid <1,2,13>	15:15					40/100		40/100		

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Nitric Acid/Hydrofluoric Acid <1,2,13>	20:6	50/120	50/120			60/140	55/130	60/140		40/100
Nitric Acid/Hydrofluoric Acid <1,2,13>	30–35:3-5	NR	NR			LS	NR	LS		NR
Nitric Acid/Hydrofluoric Acid/Sulfuric Acid <1,2,13>	20:8:2					60/140		60/140		
Nitric Acid/Phosphoric Acid <2,13>	5:5	65/150	80/180			80/180	80/180	80/180		65/150
Nitric Acid/ Phosphoric Acid <2,13>	24:23	40/100	40/100			50/120	40/100	50/120		40/100
Nitric Acid/Sulfuric Acid <2,13>	20:20	40/100	40/100			50/120	40/100	50/120		40/100
Nitric Acid/Sulfuric Acid/Phosphoric Acid <2,13>	20:5:2	40/100	40/100			50/120	40/100	50/120		40/100
Nitrobenzene	100	NR	25/80	NR	NR	40/100	NR	25/80	NR	NR
Nitromethane (tris, Hydroxymethyl), traces of Formaldehyde, pH 3	51	50/120		50/120			50/120			
Nitrophenol <11>	100	NR	25/80			40/100	NR	25/80		NR
N-Methyl-2-Pyrrolidone	10					LS				
N-Methyl-2-Pyrrolidone	100	NR	NR			LS	NR	NR		NR
Non-condensable Blow-Down Gases, see Flue Gas or Blow Down										
Nonyl Phenol (Monononyl Phenol)	100	45/110		45/110	45/110		45/110			
Octanoic Acid		80/180	100/210	95/200	95/200	100/210	80/180	100/210	100/210	
Oil, sweet and sour, crude		100/210	120/250	100/210	100/210	120/250	100/210	120/250	100/210	65/150
Oil, lubricating, see Motor Oil										
Oleic Acid		100/210	100/210	100/210	100/210	95/200	95/200		100/210	
Oleum (fuming Sulfuric Acid)		NR	NR			LS	NR	NR		NR
Olive Oil <18>	100	100/210	120/250			120/250				
Organic Oil (animal, plants), see also the specific oil name; for example, Peanut Oil	100			95/200	95/200		95/200		95/200	
Ortho-Dichlorobenzene, see Dichlorobenzene										
Oxalic Acid <18>	All	50/120	50/120	80/180	80/180	50/120	50/120	50/120	80/180	
Ozone in solution <6>	2 mg/l	40/100	40/100			40/100	40/100	40/100		40/100
Palladium suspensions in Ammonium Hydroxide, see Ammonium Hydroxide										
Palladium suspensions in Hydrochloric Acid, see Hydrochloric Acid										

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Palmitic Acid (n-Hexadecanoic Acid) <18>	100	100/210	120/250	105/220	120/250	120/250	100/210		120/250	
Paper Mill Effluent, see Sulfite/Sulfate liquors (pulp mill)										
Para-dichlorobenzene, see Dichlorobenzene										
Peanut Oil <18>	100	80/180	80/180	80/180	80/180		80/180		80/180	
Pentabromo Diphenyl Oxide	100	25/80	45/110			50/120	25/80	50/120		NR
Pentachlorophenol <4>	All	50/120	50/120			50/120	50/120	50/120		50/120
Pentanedioic Acid, see Glutaric Acid										
Peracetic Acid <1,2,3,6,13>	20	40/100	40/100			40/100	40/100	40/100		
Peracetic Acid <1,2,3,6,13>	35	NR	NR			LS	NR	NR		NR
Perchloric Acid	5	80/180		80/180	80/180		80/180		80/180	
Perchloric Acid	10	65/150	65/150	65/150		65/150	65/150	65/150	65/150	65/150
Perchloric Acid	30	40/100	40/100	25/80		40/100	40/100	40/100	40/100	40/100
Perchloroethylene	100	25/80	50/120	40/100	40/100	50/120	25/80	50/120	40/100	NR
Perchloroethylene/Methyl Chloroform	75:25	40/100	50/120			50/120	40/100	50/120		
Petroleum, see Oil, crude										
Petroleum Ether, see specific alkane hydrocarbon; for example, Hexane										
Phenol (Carbolic Acid) <2,13>	0–2	25/80	40/100	40/100	40/100	50/120	25/80	40/100	40/100	NR
Phenol (Carbolic Acid) <2,3,13>	5	NR	25/80	25/80	25/80	50/120	NR	25/80	25/80	NR
Phenol (Carbolic Acid) <2,3,13>	10	NR	LS			50/120	NR	LS		NR
Phenol (Carbolic Acid) <2,3,13>	15	NR	LS	NR	NR	30/90	NR	LS	NR	NR
Phenol (Carbolic Acid) <2,3,13>	85	NR					NR			
Phenol (Carbolic Acid) <2,3,13>	88	NR	NR			20/70	NR	NR		NR
Phenol (Carbolic Acid) <2,3,13>	100			NR	NR		NR		NR	
Phenol Formaldehyde Resin	All	40/100	50/120			50/120	40/100	50/120		40/100
Phenol Sulfonic Acid <6>	All	25/80	25/80	NR	NR	25/80	25/80	25/80		

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Phenol/Methanol/Anionic Detergent	15:10:20	NR	NR			LS	NR	NR		NR
Phenolic Resin/Phenol <2>	80:20					25/80				
Phenolic Resin/Phenol <2>	90:10					50/120				
Phenyl Carbinol, see Benzyl Alcohol										
Phosphoric Acid	0.5–85	100/210	100/210	105/220	100/210	100/210	100/210	100/210	100/210	80/180
Phosphoric Acid	85–100	100/210	100/210	105/220	100/210	105/220	100/210	100/210	100/210	80/180
Phosphoric Acid (Polyphosphoric Acid)	115	100/210	100/210			105/220	100/210	100/210		80/180
Phosphoric Acid (Superphosphoric Acid, 76% P_2O_5)	105	100/210	100/210	105/220	100/210	105/220	100/210	100/210	100/210	80/180
Phosphoric Acid/Gypsum	61:39	100/210	100/210			100/210	100/210	100/210		80/180
Phosphoric Acid/Hydrochloric Acid, sat'd with Chlorine <8,9,12>	15:9	100/210	100/210		100/210	100/210	100/210	100/210	100/210	
Phosphoric Acid/Phosphorous Pentoxide/Hydrochloric Acid/ Sulfuric Dioxide (no condensation, no coalescence)	Fumes	100/210	110/230			110/230	100/210	110/230		80/180
Phosphoric Acid/Sulfuric Acid <2,12>	0–25:0–25	80/180	80/180			80/180	80/180	80/180		80/180
Phosphoric Acid/Sulfuric Acid/Hydrofluoric Acid <1,2,12>	0–75:1:0–3	65/150	65/150			65/150	65/150	65/150		65/150
Phosphoric Acid/Tributyl Phosphate (vapor phase, condensation)	85:0.5	50/120	60/140			60/140	50/120	60/140		40/100
Phosphoric Acid/Tributyl Phosphate/Hydrofluoric Acid (no condensation of TBP)	88:0.1:0.03	80/180	80/180			100/210	80/180	80/180		
Phosphoric Acid, vapor <6>	All	100/210	120/250			120/250	100/210	120/250		80/180
Phosphoric Acid/Zinc Chloride	0–100:0.5–70	100/210	100/210			100/210	100/210	100/210		80/180
Phosphorous Acid	70	100/210	100/210	105/220	100/210	100/210	100/210	100/210	100/210	80/180
Phosphorous Acid/Hydrochloric Acid <2,8,9,12,15>	0–70:1–5	100/210	100/210	80/180	80/180	100/210	100/210	100/210	80/180	80/180
Phosphorus Oxychloride <15>	100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Phosphorus Trichloride <15>	100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Phthalic Acid <4>	All	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	
Phthalic Anhydride	Sat'd	100/210		105/220			100/210			
Picric Acid, alcoholic <4>	10	NR	LS			40/100	NR	NR		NR
Pine Oil	100	90/195	90/195			90/195	90/195	90/195		

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Polyacrylamide	All	80/180	80/180			80/180	80/180	80/180		80/180
Polyacrylic Acid	All	80/180	80/180			80/180	80/180	80/180		80/180
Polyelectrolytes, anionic	100	55/130		55/130	55/130		55/130		55/130	
Polyethylene Glycol	100	100/210	100/210			100/210	100/210	100/210		65/150
Polyethylene Glycols and Methoxypolyethylene Glycols	100	40/100		50/120			40/100			
Polyethyleneimine	All	80/180	80/180			80/180	80/180	80/180		
Polyphosphoric Acid 115% H_3PO_4, see Phosphoric Acid										
Polyvinyl Acetate adhesives	All	50/120	50/120			50/120	50/120	50/120		
Polyvinyl Acetate emulsion		100/210		100/210			100/210			
Polyvinyl Alcohol	10	80/180		80/180	80/180		80/180		80/180	
Polyvinyl Alcohol	100	80/180	80/180	50/120	50/120	80/180	80/180	80/180	50/120	
Polyvinyl Chloride latex with 35 parts Dioctyl Phthalate <6>	All	50/120	50/120	50/120	50/120	50/120	50/120	50/120	50/120	
Potassium Aluminum Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Potassium Bicarbonate	All	80/180	80/180	70/160	65/150	80/180	70/160	80/180	65/150	80/180
Potassium Bromide <21>	All	100/210	100/210	70/160	70/160	100/210 <24>	100/210	100/210	70/160	80/180
Potassium Carbonate <1>	0–50	80/180	65/150	65/150	40/100	40/100	80/180	40/100		
Potassium Carbonate/Boric Acid/Potassium Metavanadate <1>	20:4:1	80/180	80/180			65/150	80/180	65/150		80/180
Potassium Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Potassium Dichromate <21>	All	100/210	100/210	100/210		100/210 <24>	100/210	100/210	100/210	80/180
Potassium Ferricyanide <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Potassium Ferrocyanide <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Potassium Fluoride <1>	All	80/180	80/180	65/150		80/180	80/180	80/180		80/180
Potassium Gold Cyanide	12	100/210	100/210			100/210	100/210	100/210		80/180
Potassium Hydroxide <1,2>	0–45	65/150	40/100	65/150	NR	25/80	65/150	25/80	NR	
Potassium Hydroxide <1,2>	50	65/150		65/150	NR		65/150		NR	
Potassium Hydroxide/Potassium Cyanide/Copper Cyanide <1,2>	2:3:8 oz/gal; 2:2.5:7%	65/150	40/100			25/80	65/150	25/80		
Potassium Hypochlorite/Potassium Hydroxide/Potassium Metasilicate <2,3,9>	50:40:10	50/120								
Potassium Iodide	All	100/210	100/210			100/210	100/210	100/210		100/210
Potassium Nitrate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Potassium Oxalate	All	65/150	65/150			65/150	65/150	65/150		65/150
Potassium Permanganate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Potassium Persulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Potassium Pyrophosphate (Tetrapotassium Diphosphate)	0–60	55/130	65/150	40/100	65/150	65/150	55/130	65/150	65/150	55/130
Potassium Silicofluoride <1>	All	40/100	40/100			40/100	40/100	40/100		40/100
Potassium Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Propane	100	60/140	60/140			60/140	60/140	60/140		60/140
Propanol (n-)	100	40/100	40/100			50/120	40/100	40/100		NR
Propanol (n-) (no condensation, no coalescence)	Fumes	80/180	80/180			80/180	80/180	80/180		80/180
Propenoic Acid, see Acrylic Acid										
Propionic Acid	0–20	100/210	100/210	80/180	100/210	100/210	100/210	100/210	100/210	65/150
Propionic Acid	21–50	80/180	80/180	65/150	100/210	80/180	80/180	80/180	100/210	
Propionic Acid	100	NR	25/80			40/100	NR	25/80	25/80	NR
Propionyl Chloride	100	NR	NR			LS	NR	NR		NR
Propyl Acetate	100	NR	LS			25/80	NR	NR		NR
Propyl Bromide	100	NR	LS			25/80	NR	LS		NR

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Propyl Chloride	100	NR	LS			25/80	NR	LS		NR
Propylene Dichloride	100	NR		NR	NR		NR		NR	
Propylene Glycol	100	100/210	100/210	105/220	100/210	100/210	100/210	100/210	100/210	
Propylene Glycol Monomethyl Ether (1-Methoxy-2-Propanol)	100	NR	LS			20/70	NR	NR		NR
Propylene Glycol Methyl Ether Acetate <2>	20	40/100	50/120			50/120	40/100	50/120		40/100
Propylene Glycol Monomethyl Ether Acetate <2>	100	NR	LS			20/70	NR	NR		NR
Propylene Glycol/Ethoxylated Fatty Alcohol/Diethylene Glycol n-Butyl Ether	60:20:20	40/100	45/110			50/120	40/100	50/120		NR
Propylene Glycol/Monoethanolamine	0–99:1	25/80	30/90			40/100	25/80	30/90		NR
Propylene Oxide	100	NR	NR			NR	NR	NR		NR
Propylene Oxide (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Pulp Paper Mill Blow Down (non-condensable gases), see Blow Down										
Pyridine	20	40/100	40/100			40/100	40/100	40/100		NR
Pyridine	100	NR	NR			LS	NR	NR		NR
Quaternary Amine Salts	All	80/180	80/180			80/180	80/180	80/180		
Quaternary Ammonium Salts	All	80/180		80/180	80/180		80/180		80/180	
Quinoline	20	40/100	40/100			40/100	40/100	40/100		
Quinoline	100					LS				
Rayon Spin Bath						60/140				
Rayon Spinning (no condensation, no coalescence)	Fumes	60/140	60/140			60/140	60/140	60/140		
Recovery Boiler Gases, see Flue Gas										
Red Liquor	All	80/180	80/180	75/165	80/180	80/180	80/180	80/180	80/180	65/150
Salicylic Acid	All	70/160	70/160	70/160			70/160		60/140	
Salt Brine, see Brine, salt										
Scrubbing Low MW Amines with 10% Sulfuric Acid, see Amine Salts										
Sea Water		100/210	100/210	100/210	95/200	100/210	100/210	100/210	95/200	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Selenious Acid <21>	All	100/210	100/210	100/210	50/120	100/210	100/210	100/210	50/120	80/180
Sewage Gas, Hydrogen Sulfide, see Hydrogen Sulfide										
Silicon Tetrafluoride/Hydrofluoric Acid/Sulfuric Acid <1,2>	< 10 total	50/120	50/120			50/120	50/120	50/120		50/120
Silver Cyanide	100	100/210		100/210			100/210			
Silver Nitrate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Silver Plating Solution (4% Silver, 7% Potassium Cyanide, 5% Sodium Cyanide, 2% Potassium Carbonate) <1>		80/180	80/180	95/200	80/180	65/150	80/180	65/150	80/180	
Sodium Acetate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	
Sodium Acid Sulfite, see Sodium Bisulfite										
Sodium Alkyd Aryl Sulfonates	All	80/180	80/180			80/180	80/180	80/180		65/150
Sodium Alkyl Xanthate	All	65/150		65/150			65/150			
Sodium Aluminate <1>	All	70/160	70/160	70/160		50/120	70/160	50/120		50/120
Sodium Benzoate <21>	All	80/180	80/180	100/210		80/180	80/180	80/180		80/180
Sodium Bicarbonate	All	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Sodium Bicarbonate/Sodium Carbonate <1>	15:20	80/180	80/180			65/150	80/180	65/150		80/180
Sodium Bichromate, see Sodium Dichromate										
Sodium Bifluoride <1>	All	50/120	50/120			50/120	50/120	50/120		50/120
Sodium Bisulfate (Sodium Hydrogen Sulfate) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Bisulfide (Sodium Hydrosulfide)	All	80/180	80/180			80/180	80/180	80/180		80/180
Sodium Bisulfite (Sodium Hydrogen Sulfite) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Borate (Borax, Sodium Tetraborate) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Bromate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Sodium Bromide <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Sodium Carbonate <1>	All	80/180	80/180	80/180	80/180	65/150	80/180	65/150	80/180	80/180
Sodium Carbonate/Sodium Bicarbonate <1>	20:15	80/180	80/180			65/150	80/180	65/150		80/180
Sodium Chlorate, stable <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Chlorate/Sodium Chloride <21>	34:20	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Chloride (Brine, salt) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Chloride saturated solution, see Brine, salt										
Sodium Chloride with Chlorine, see Brine, chlorinated										
Sodium Chloride/Ethyl Vanillin	0.1–25:1	50/120	50/120							
Sodium Chloride/Hydrochloric Acid <2,8,9,12>	Sat'd. NaCl:5	100/210		100/210	100/210		100/210		100/210	
Sodium Chloride/Magnesium Oxide/Lime	0.5–26:0.1–20: 0.1–10	100/210	100/210			100/210	100/210	100/210		80/180
Sodium Chloride/Sodium Hydroxide <1,2>	0.5–10:0.1–2	80/180	65/150			40/100	80/180	65/150		50/120
Sodium Chloride/Sodium Chlorate	20:34	100/210	100/210			100/210	100/210	100/210		
Sodium Chlorite, pH < 6, see Chlorine Dioxide										
Sodium Chlorite, stable, pH > 6, <5,21>	All	100/210	100/210	100/210	100/210	100/210	100/210	100/210		80/180
Sodium Chlorite/Sodium Hypochlorite, pH > 11, <2,3,9>	0.1–25:0.1–15	40/100	40/100			40/100	40/100	40/100		40/100
Sodium Chromate	> 0.5	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	80/180
Sodium Cyanide <21>	All	100/210	100/210			100/210 <24>	100/210	100/210	100/210	
Sodium Dichromate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Dichromate/Sulfuric Acid	up to 3:up to 30	NR					NR			
Sodium Dimethyldithiocarbamate/Disodium Ethylene Bisdithiocarbamate	0.1–15:0.1–15	40/100	40/100			50/120	40/100	50/120		40/100
Sodium Diphosphate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Sodium Dodecylbenzenesulfonate	All	70/160	70/160			70/160	70/160	70/160		
Sodium Ferricyanide <21>	All	100/210	100/210	100/210		100/210 <24>	100/210	100/210		

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Sodium Ferrocyanide <21>	All	100/210	100/210	100/210		100/210 <24>	100/210	100/210		80/180
Sodium Fluoride <1>	All	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Sodium Fluoroborate <1,21>	All	95/200	95/200			95/200				
Sodium Fluorosilicate <1>	All	50/120	50/120	65/150		50/120	50/120	50/120		50/120
Sodium Gluconate <21>	All	80/180	95/200			100/210 <24>	95/200	100/210		65/150
Sodium Glycolate <21>	All	80/180	95/200			100/210 <24>	80/180	95/200		65/150
Sodium Hexametaphosphate	All	80/180	80/180	65/150	65/150	80/180	80/180	80/180	65/150	80/180
Sodium Hydrosulfide (Sodium Bisulfide)	All	80/180	80/180	60/140	60/140	80/180	80/180	80/180	60/140	80/180
Sodium Hydrosulfide/Sodium Hydroxide	15:15	60/140		60/140			60/140			
Sodium Hydrosulfite	All	40/100	40/100			40/100	40/100	40/100		40/100
Sodium Hydroxide <1,2,7>	0.5	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	65/150
Sodium Hydroxide <1,2,7>	1	80/180	80/180	80/180	70/160	80/180	80/180	80/180	70/160	65/150
Sodium Hydroxide <1,2>	5	80/180	60/140	70/160		40/100	70/160	40/100		
Sodium Hydroxide <1,2>	10	65/150	50/120	60/140			65/150			
Sodium Hydroxide <1,2>	25	65/150	50/120	50/120			65/150			
Sodium Hydroxide <1,2>	50	80/180	65/150	65/150			80/180			
Sodium Hydroxide/Sodium Bisulfite <1,2>	All	80/180	65/150			40/100	80/180	65/150		65/150
Sodium Hydroxide/Sodium Chloride/Sodium Sulfate/Sodium Hypochlorite (active Chlorine) <2,3,5,9>	"1–20:1–15:1–8 : 0–15"	50/120			NR		510A/B: 65/150 510C: 50/120		NR	
Sodium Hydroxide/Organics (within solubility limits; i.e., no phase separation or coalescence) <1,2>	8:Traces	80/180	65/150							
Sodium Hydroxide/Sodium Hydrosulfide <1,2>	15:15	60/140		60/140			60/140			
Sodium Hydroxide/Sodium Hypochlorite (active Chlorine) <1,2>	0–20:0–0.1	80/180								
Sodium Hypochlorite (stable, alkaline pH > 11) <2,3,5,9>	2	65/150 <19>	50/120	65/150	50/120	40/100	65/150	40/100	50/120	65/150

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Sodium Hypochlorite (stable, alkaline pH > 11), <2,3,5,9>	5.25	65/150 <19>	50/120	65/150	50/120	40/100	65/150	40/100	50/120	65/150
Sodium Hypochlorite (stable, alkaline pH > 11) <2,3,5,9,19>	10	50/120	<6>				510A/B: 65/150 510C: 50/120			
Sodium Hypochlorite (stable, alkaline pH > 11) <2,3,5,9,19>	11–17	50/120	<6>		NR		510A/B: 65/150 510C: 50/120		NR	
Sodium Hypochlorite (stable, alkaline pH > 11) <2,3,5,9>	18–25						510A: 40/100			
Sodium Lauryl Sulfate	All	70/160	70/160	80/180	70/160	70/160	70/160	70/160	70/160	
Sodium Metabisulfite <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Sodium Methyldithiocarbamate	All	80/180	80/180			80/180	80/180	80/180		
Sodium Monophosphate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Myristyl Sulfate	All	70/160	70/160			70/160	70/160	70/160		
Sodium Nitrate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Nitrite <21>	All	100/210	100/210	100/210		100/210 <24>	100/210	100/210		80/180
Sodium Oxalate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Sodium Perchlorate	60	40/100	40/100			40/100	40/100	40/100		40/100
Sodium Persulfate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Sodium Phosphate, mono-, di-, tribasic <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Sodium Polyacrylate	All	80/180	80/180	65/150	80/180	80/180	80/180	80/180	80/180	
Sodium Salt o-Phenylphenate, antimicrobial	All	50/120	50/120			50/120	50/120	50/120		
Sodium Sarcosinate	40	50/120	50/120			50/120	50/120	50/120		
Sodium Silicate <1>	All	80/180	80/180	80/180	80/180	65/150	80/180	65/150	80/180	80/180
Sodium Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Sodium Sulfate/Sodium Sulfite <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Sodium Sulfhydrate, see Sodium Hydrosulfide										
Sodium Sulfide <21>	All	100/210	100/210	100/210		100/210 <24>	100/210	100/210		80/180
Sodium Sulfite <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Sulfite/Sodium Hydroxide/Toluene	22:10:5	25/80	40/100			40/100	25/80	40/100		NR
Sodium Tartrate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Sodium Tetraborate (Borax, Sodium Borate) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Thiocyanate <21>	All	80/180	80/180	95/200	95/200	80/180	80/180	80/180	95/200	80/180
Sodium Thiosulfate	All	80/180	80/180	50/120	80/180	80/180	80/180	80/180	80/180	80/180
Sodium Tridecylbenzene Sulfonate	All	50/120		50/120			50/120			
Sodium Tripolyphosphate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Xylene Sulfonate	All	70/160	70/160	100/210		70/160	70/160	70/160		
Soil		30/90		30/90			30/90			
Solvent Extraction Solutions (3% Isodecanol, 6% Amines tri-C8-C10-alkyl, 91% Kerosene)		80/180	80/180			80/180	80/180	80/180		65/150
Solvent Extraction Solutions (4% Trioctylphosphine Oxide (TOPO), 4% Di 2-Ethylhexyl Phosphoric Acid (DEHPA), 92% Kerosene)		80/180	80/180			80/180	80/180	80/180		
Sorbitol Solutions	All	70/160	70/160	65/150	65/150	80/180	70/160	70/160	65/150	
Sour Crude Oil, see Crude Oil										
Soy (Soya) Sauce <18>		70/160	70/160				100/210			
Soya Oil <18>	100	100/210	100/210			100/210	100/210	100/210		65/150
Soybean Oil	100	80/180		80/180	100/210		80/180		100/210	
Soybean Oil, epoxidized (ESO)	100	50/120		65/150	100/210		50/120		65/150	
Spearmint Oil <18>	100	40/100	40/100							

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Stannic Chloride	All	100/210	100/210	80/180	80/180	100/210	100/210	100/210	80/180	80/180
Stannous Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Steam, dry (no condensation)		100/210	105/220	105/220	105/220	105/220	100/210	105/220	105/220	80/180
Steam, wet (condensation)		80/180	80/180			80/180	80/180	80/180		80/180
Stearic Acid	All	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	65/150
Styrene	100	NR	40/100	25/80	25/80	50/120	NR	40/100	25/80	NR
Styrene Acrylic Emulsion	All	50/120	50/120			50/120	50/120	50/120		
Styrene-Butadiene Latex	All	60/140	60/140			60/140	60/140	60/140		60/140
Succinonitrile, aqueous	All	25/80	40/100	40/100	40/100	40/100	25/80	40/100	40/100	NR
Sugar/Sucrose <18>	All	100/210	100/210							
Sugar Beet, liquor <18>	All	80/180	80/180	80/180	80/180	80/180	80/180		80/180	
Sugar Cane, liquor and sweetwater <18>	All	80/180	80/180	80/180	80/180	80/180	80/180		80/180	
Sulfamic Acid	0.5–10	100/210	100/210			100/210	100/210	100/210		80/180
Sulfamic Acid	11–15	80/180	80/180	100/210	100/210	80/180	80/180	80/180	100/210	65/150
Sulfamic Acid	16–25	65/150	65/150			65/150	65/150	65/150		65/150
Sulfamic Acid/Boric Acid/Glycolic Acid	0.5–25:0.5–30: 0.5–10	65/150	65/150			65/150	65/150	65/150		
Sulfanilic Acid (meta, para) <4,6,21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sulfate process non-condensable gases, see Flue Gas										
Sulfated Detergents, see Sulfonated Detergents										
Sulfated Tall Oil Fatty Acid, see Tall Oil										
Sulfides scrubbing with caustic, see Sodium Hydroxide										
Sulfite/Sulfate Liquors, pulp mill		95/200	95/200	105/220	105/220	95/200	95/200	95/200	105/220	80/180
Sulfonated Detergents	100	70/160	80/180			80/180	70/160	80/180		70/160
Sulfur, molten, dry <16>	100		120/250			150/300		120/250		
Sulfur, molten (traces of Hydrogen Sulfide, Sulfur Dioxide, Sulfur Trioxide, Water)	100	NR					NR			
Sulfur, wettable, fungicide <4>	All	80/180	80/180			80/180	80/180	80/180		80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Sulfur Chloride	100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Sulfur Chloride (no condensation, no coalescence)	Fumes	95/200	95/200			95/200	95/200	95/200		80/180
Sulfur Dichloride (no condensation, no coalescence)	Fumes			NR	NR		NR		NR	
Sulfur Dioxide, see Flue Gas										
Sulfur Trioxide, dry (no condensation, no coalescence) <6>	Fumes	100/210		105/220			100/210			
Sulfur Trioxide, wet, see Sulfuric Acid <6>										
Sulfuric Acid <2,13>	0.5–25	100/210	105/220	105/220	105/220	105/220	100/210	105/220	105/220	80/180
Sulfuric Acid <2,13>	26–50	100/210	100/210	95/200	95/200	100/210	100/210	100/210	95/200	80/180
Sulfuric Acid <2,13,15>	51–70	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Sulfuric Acid <2,13,15>	71–75	40/100	50/120	50/120	50/120	80/180	40/100	50/120	50/120	40/100
Sulfuric Acid <2,13,15>	76–80	40/100	40/100	NR	NR	50/120	40/100	40/100	NR	
Sulfuric Acid <2,13,15>	> 80	NR	NR			LS	NR	LS		NR
Sulfuric Acid/Ammonium Bifluoride <1>	0–75:0.1–3	40/100	50/120			65/150	40/100	50/120		
Sulfuric Acid/Ammonium Sulfate/Manganous Sulfate (concentrations in g/l)	Up to 40:up to 150:up to 15			50/120	50/120		50/120			
Sulfuric Acid/Benzenesulfonic Acid/Water <2,12>	7:88:5	60/140		60/140			60/140			
Sulfuric Acid/Chromic Acid <2,12>	20:20	NR					NR			
Sulfuric Acid/Chromic Acid mixture (Maximum total concentration 10%) <2,12>		50/120	65/150			65/150	50/120	65/150		50/120
Sulfuric Acid/Copper Salts, see Sulfuric Acid										
Sulfuric Acid/Copper Sulfate <2,12>	0–25:1–35	100/210	100/210			100/210	100/210	100/210		
Sulfuric Acid/Copper Sulfate/Sodium Persulfate/EDTA <2,12>	13:12:1:1	55/130	55/130			55/130	55/130	55/130		55/130
Sulfuric Acid/Hydriodic Acid <2,12>	60:20	40/100	40/100			50/120	40/100	40/100		
Sulfuric Acid/Hydrochloric Acid, iron and steel cleaning bath <2,8,9,12>	23:9	95/200		95/200	100/210		95/200		100/210	
Sulfuric Acid/Hydrochloric Acid <2,8,9,12>	1–25:1–10	80/180	100/210			100/210	100/210	100/210		80/180
Sulfuric Acid/Hydrochloric Acid <2,8,9,12>	50:15	40/100	45/110			50/120	40/100	50/120		
Sulfuric Acid/Hydrochloric Acid/Hydrofluoric Acid/Phosphoric Acid/Chlorinated Solvents <1,2,8,12>	40:20:5:35:1	NR	NR			LS	NR	LS		NR
Sulfuric Acid/ Hydrofluoric Acid <1,2,12>	1–20:3–6	55/130	55/130			60/140	55/130	60/140		40/100

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Sulfuric Acid/Hydrofluoric Acid <1,2,12>	10:10	40/100	50/120			65/150	40/100	40/100		
Sulfuric Acid/Hydrofluoric Acid <1,2,12>	25:10	40/100	45/110			50/120	40/100	40/100		
Sulfuric Acid/Hydrofluoric Acid <1,2,12>	30–35:3–5	LS	LS			LS	LS	LS		LS
Sulfuric Acid/Hydrofluosilicic Acid/ MIBK <1,2,12>	25:1:2	LS	40/100			50/120	LS	40/100		
Sulfuric Acid/Hydrogen Peroxide <2,3,12>	1–20:1–10	65/150	65/150			65/150	65/150	65/150		
Sulfuric Acid/Hydrogen Peroxide/Ammonium Sulfate/ Copper Sulfate <2,3,12>	10:5:5:5	40/100	40/100			40/100	40/100	40/100		
Sulfuric Acid/Hydrogen Sulfide <2,12>	1–50:0–10	100/210	100/210			100/210	100/210	100/210		80/180
Sulfuric Acid/Inorganic Salts <2,12>	0.5–20:0.5–50	100/210	100/210			100/210	100/210	100/210		80/180
Sulfuric Acid/Inorganic Salts <2,12>	21–50:0.5–20	80/180	80/180			80/180	80/180	80/180		80/180
Sulfuric Acid/Lactic Acid/Sodium Sulfate <2,12>	50:20:0–10	40/100	50/120			65/150	40/100	50/120		40/100
Sulfuric Acid/Methanol <2,12>	30:5		40/100			50/120				
Sulfuric Acid/Nitric Acid <2,12>	20:5	65/150	80/180			80/180	65/150	80/180		65/150
Sulfuric Acid/Nitric Acid/Phosphoric Acid	0–13:0–11:0–30	65/150	65/150			65/150	65/150	65/150		
Sulfuric Acid/Phosphoric Acid <2,12>	0–25:0–25	80/180	80/180			80/180	80/180	80/180		80/180
Sulfuric Acid vapor, see Sulfuric Acid										
Sulfuric Acid/Sodium Dichromate, see Sulfuric Acid/Chromic Acid mixture										
Sulfuric Acid/Sulfate Salts, max. total concentration 80%, see Sulfuric Acid										
Sulfurous Acid	10	50/120	50/120	40/100	40/100	50/120	50/120	50/120	40/100	50/120
Superphosphoric Acid (76% P_2O_5), see Phosphoric Acid										
Surfactant, see specific chemical name <6,14>										
Surfactant, anionic	All	40/100	50/120			50/120	40/100	40/100		
Tall Oil, storage <6>	100	95/200	105/220	65/150	65/150	105/220	95/200	105/220	65/150	
Tall Oil, reactor <6>		100/210	105/220			105/220	100/210	105/220		
Tallow/Sulfuric Acid	99:1	80/180	80/180							

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Tannic Acid <21>	All	100/210	100/210	100/210		100/210 <24>	100/210	100/210		65/150
Tap Water, hard <2>	All	100/210	100/210			100/210	100/210	100/210		80/180
Tap Water, soft <2>	All	80/180	80/180			80/180	80/180	80/180		80/180
Tar Camphor, see Naphthalene										
Tartaric Acid	> 0.5	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	65/150
t-Butyl Methyl Ether (MTBE)	20	40/100	50/120			50/120	40/100	50/120		30/90
t-Butyl Methyl Ether (MTBE)	100	NR	25/80			25/80	NR	25/80		NR
Tetrabutyltin	100	50/120	50/120			50/120	50/120	50/120		
Tetrachloroethane	100	40/100	50/120			55/130	40/100	50/120		NR
Tetrachloroethylene (Perchloroethylene)	100	25/80	50/120	40/100	40/100	50/120	25/80	50/120	40/100	NR
Tetrachloropyridine	100	25/80	50/120	50/120		50/120	25/80	50/120		NR
Tetraethyl Orthosilicate	100					40/100				
Tetrahydrofuran	0–5	40/100	40/100			50/120	40/100	50/120		
Tetrahydrofuran	10–100	NR	NR			LS	NR	NR		NR
Tetrahydrofuran (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Tetramethyl Ammonium Hydroxide <1>	0–10	50/120	40/100				50/120	40/100		
Tetra-n-Butylammonium Hydroxide <1,2>	40	40/100	40/100				40/100	40/100		
Tetra-n-Butylphosphonium Hydroxide <1,2>	40	40/100	40/100				40/100	40/100		
Tetrapotassium Diphosphate (Potassium Pyrophosphate)	0–60	55/130	65/150	40/100	65/150	65/150	55/130	65/150	65/150	55/130
Tetrasodium Ethylenediaminetetraacetic Acid (Tetrasodium salt of EDTA)	All	80/180	80/180			65/150	80/180	65/150		80/180
Tetrasodium Pyrophosphate (Sodium Pyrophosphate) <21>	All	40/100		40/100			40/100			
Thermal Oxidizer (HCl absorption), see Flue Gas, wet										
Thioglycolic Acid, see Mercaptoacetic Acid										
Thionyl Chloride	100	NR	NR			LS	NR	NR		NR
Thiourea	0–50	65/150	65/150			65/150	65/150	65/150		65/150
Tin Fluoborate Plating Solution (18% Stannous Fluoborate, 7% Tin, 9% Fluoboric Acid, 2% Boric Acid) <1>		100/210	100/210	95/200	100/210	100/210	100/210	100/210	100/210	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Titanium Dioxide	All	80/180	80/180			80/180	80/180	80/180		80/180
Titanium Dioxide/Sulfuric Acid	0–30:30	100/210	100/210			100/210	100/210	100/210		80/180
Titanium Tetrachloride	All	65/150	80/180			80/180	65/150	80/180		
Tobias Acid (2-Naphthylamine-1-Sulfonic Acid) <6>	100	100/210	100/210	100/210	100/210	100/210	100/210	100/210		
Toluene	100	25/80	40/100	50/120	40/100	50/120	25/80	40/100	50/120	NR
Toluene/Acetone <2>	50:50	NR		NR	NR		NR			
Toluene (no condensation, no coalescence)	Fumes		65/150			80/180	80/180	80/180		
Toluene Diisocyanate (TDI) <2>	100	NR	NR	25/80		30/85 <6>	NR	NR		NR
Toluenesulfonic Acid <6,21>	All	80/180	95/200	100/210	100/210	100/210 <24>	95/200	100/210	100/210	
Toluidine (o-, p-, m-)	100	NR	NR			20/70	NR	NR		NR
Tomato Sauce <18>	All	90/195	90/195							
Transformer Oils, ester types	100	50/120	65/150			65/150		65/150		
Transformer Oils, Silicone and Mineral Oils <16>	100	100/210	120/250	100/210	100/210	150/300	110/230	120/250	100/210	
Tributyl Phosphate	100	50/120	60/140	65/150	65/150	60/140	50/120	60/140	65/150	40/100
Trichloroacetic Acid	50	100/210		100/210	100/210		100/210		100/210	
Trichloroacetic Acid	85	25/80	40/100			50/120	25/80	40/100		25/80
Trichlorobenzene	100	NR					NR			
Trichloroethane	100	40/100	50/120	25/80	25/80	50/120	40/100	50/120		NR
Trichloroethane (1,1,2-) (Vinyl Trichloride)	100			25/80	25/80					
Trichloroethylene <15>	100	NR	NR	NR	NR	LS	NR	NR		NR
Tricresyl Phosphate	100	70/160	70/160	50/120	50/120	70/160	70/160	70/160	50/120	
Triethanolamine	100	50/120	50/120	65/150	65/150	65/150	50/120	50/120	65/150	NR
Triethylamine	All	50/120	50/120	65/150	50/120	50/120	50/120	50/120	50/120	NR
Triethylamine/Triethylamine Hydrochloride/Hydrochloric Acid <2,8,12>	50:20:5	50/120	50/120			50/120	50/120	50/120		NR

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Triethylene Glycol, see Ethylene Glycol										
Trifluoroacetic Acid, see Chloroacetic Acid										
Trihydroxybenzoic Acid, see Gallic Acid										
Trimethyl Carbinol, see Butyl Alcohol										
Trimethylamine	20	40/100	50/120			50/120	40/100	50/120		NR
Trimethylamine	100	25/80	25/80			40/100	25/80	25/80		
Trimethylamine (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Trimethylamine Hydrochloride (pH 3-4)	100			55/130			55/130			
Trimethylammonium Chloride (Trimethylamine HCl, TMA-HCl)	70	40/100	40/100			50/120 <7>	40/100	40/100		40/100
Trimethylbenzene	100	25/80	40/100			50/120	25/80	50/120		NR
Trimethylene Chlorobromide		NR	25/80			40/100	NR	25/80		NR
Trioctyl Phosphate	100	70/160	70/160			80/180	70/160	70/160		40/100
Trioctyl Phosphine Oxide/Di-2-Ethylhexyl Phosphoric Acid (DEHPA)/Kerosene	4:4:92	80/180	80/180			80/180	80/180	80/180		
Triphenyl Phosphite	100	40/100		40/100	40/100		40/100		40/100	
Tripropylene Glycol, see Ethylene Glycol										
Trisodium Phosphate <21>	All	100/210	100/210	80/180	80/180	100/210 <24>	100/210	100/210	80/180	80/180
Turpentine	100	65/150	100/210			100/210	65/150	100/210		40/100
Turpentine, crude sulfate	100	40/100		40/100			40/100			
Turpentine, pure gum	100	30/90		40/100	80/180		30/90			
Uranium <6>										
Uranium Extraction, see Kerosene										
Urea	All	70/160	70/160	80/180	80/180	70/160	70/160	70/160	80/180	65/150
Urea/Ammonium Nitrate/Water	35:44:20	65/150	65/150			65/150	65/150	65/150		65/150
Urea Formaldehyde Resin	All	40/100	50/120			50/120	40/100	50/120		40/100
Urine, see Urea										
Urotropine, see Hexamethylenetetramine										

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Vanillin Black Liquor <18>		50/120	50/120							
Vinegar <18>	100	100/210	100/210			100/210	100/210	100/210		65/150
Vinyl Acetate	20	40/100	40/100			40/100	40/100	40/100		NR
Vinyl Acetate	100	NR	NR			LS	NR	NR		NR
Vinyl Chloride	100	NR	NR			LS	NR	NR		NR
Vinyl Chloride (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Vinyl Toluene	100	25/80	50/120	25/80	25/80	50/120	25/80	50/120	25/80	NR
Water, deionized <2,6,22>	100	80/180	80/180	95/200	80/180	80/180	80/180	80/180	80/180	80/180
Water, distilled <2,6,22>	100	80/180	80/180	95/200	80/180	80/180	80/180	80/180	80/180	80/180
Water/Phenol, see Phenol										
Water, sea, desalination	All	80/180	80/180			80/180	80/180	80/180		80/180
Water, steam condensate <2>	100	80/180	80/180			80/180	80/180	80/180		80/180
Water, tap, hard <2,22>	100	100/210	100/210	105/220	105/220	100/210	100/210	100/210	105/220	80/180
Water, tap, soft <2,22>	100	80/180	80/180	95/200	80/180	80/180	80/180	80/180	80/180	80/180
Water/Urea/Ammonium Nitrate (fertilizer)	Up to 40:up to 30:balance	50/120					50/120		-	
Water Vapor (no condensation, no coalescence), see Flue Gas, dry										
Water Vapor, wet <2>	All	80/180	80/180			80/180	80/180	80/180		80/180
Whey	All	65/150	65/150							
White Liquor (pulp mill) <1,2>	All	80/180	80/180	65/150	80/180	40/100	80/180	80/180	80/180	80/180
White Spirit, see Mineral Spirit										
Xylene	100	25/80	40/100	50/120	40/100	50/120	25/80	50/120		NR
Xylene/Amyl Acetate	70:30			50/120						
Xylene (no condensation, no coalescence)	Fumes		65/150			80/180	80/180	80/180		
Xylene/Methyl Ethyl Ketone/Butyl Acetate/Methyl Acetate	50:20:20:10	NR	NR			LS	NR	NR		NR
Zinc Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>		100/210	100/210	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Zinc Cyanide Plating Solution (9% Zinc Cyanide, 4% Sodium Cyanide, 9% Sodium Hydroxide) <1,2>		80/180	80/180			40/100	80/180	80/180		80/180
Zinc Electrolyte (Zinc Sulfate, 35g/l Sulfuric Acid), see Sulfuric Acid										
Zinc Fluoborate Plating Bath, 49% Zinc Fluoborate; 5% Ammonium Chloride, 6% Ammonium Fluoborate <1>		95/200	95/200	70/160		95/200	95/200	95/200		80/180
Zinc Fluoborate <1>	50	100/210		100/210	100/210		100/210		100/210	
Zinc Nitrate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Zinc Phosphate, slurry	All	80/180	80/180			80/180	80/180	80/180		80/180
Zinc Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210		80/180
Zinc Sulfite	All	80/180		80/180	80/180		80/180		80/180	

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Appendix 11 – Manufacturer Information for Xypex Chemical Corporation, Xypex Admix C-Series

XYPEX®

Admix C-Series

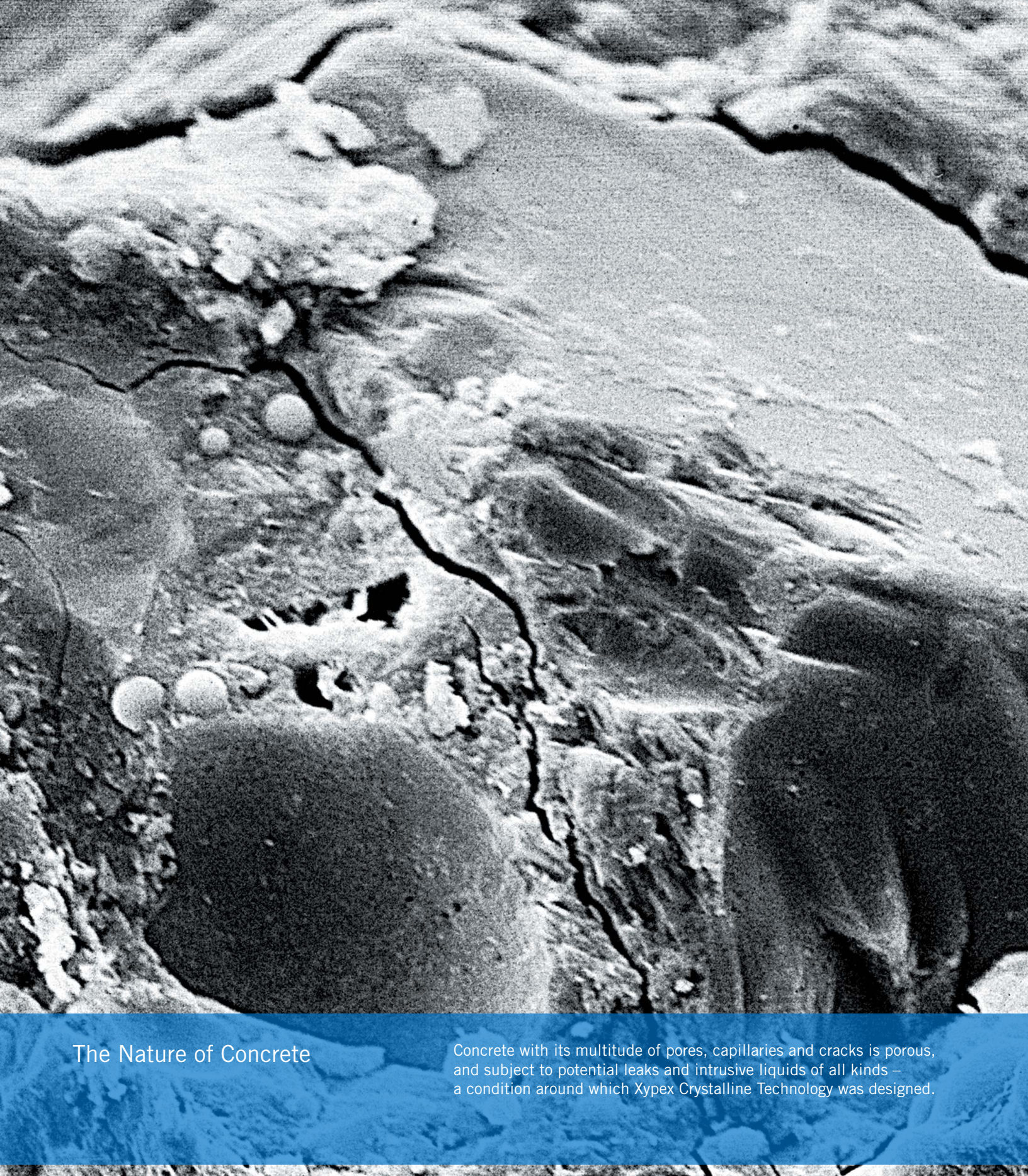
Concrete Waterproofing by Crystallization™

Improving concrete performance... right from the start

XYPEX ADMIX

Making Waterproofing Part of the Mix

Xypex Admix is blended into the concrete mix at the time of batching to waterproof and protect concrete. Xypex Admix meets the persistent challenges of water, chemicals, and harsh environments before they become problems. Utilizing Xypex's world-renowned crystalline technology, Xypex Admix becomes an integral part of the concrete matrix, sealing the primary paths by which water and aggressive chemicals penetrate, attack, and ultimately threaten the long-term integrity of the concrete structure. Xypex Admix is part of the Xypex Crystalline Concrete Waterproofing and Protection System which also includes Xypex Coatings, Dry Shake and Repair products. Together, these Xypex products provide the flexibility needed to advance a cost-effective ***Value-Engineered*** concrete waterproofing strategy.



The Nature of Concrete

Concrete with its multitude of pores, capillaries and cracks is porous, and subject to potential leaks and intrusive liquids of all kinds – a condition around which Xypex Crystalline Technology was designed.

Xypex Crystalline Technology has become the world standard in ***Concrete Waterproofing by Crystallization™***, a position fully recognized by architects, engineers, contractors and concrete producers who place a premium on proven quality and reliability.

Xypex Crystalline Technology – Lifelong Waterproofing and Protection for Concrete Structures

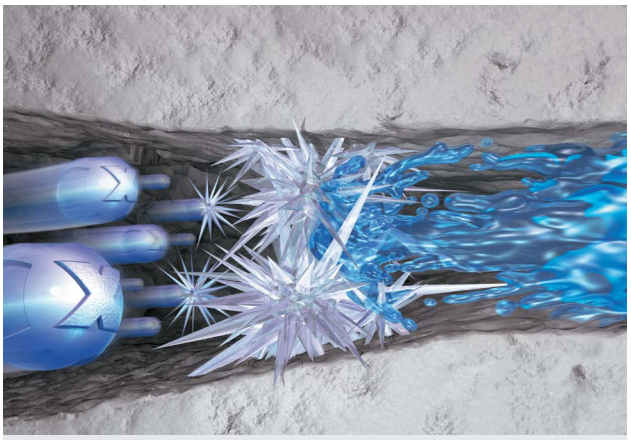
Xypex Crystalline Technology is at the forefront of concrete waterproofing, employing a transformative approach that harnesses concrete's innate chemistry. This proprietary technology initiates an integral reaction within the concrete, delivering permanent waterproofing and protection. The Xypex crystalline system reacts with cement hydration by-products, forming non-soluble crystalline within interconnected pores and voids. The crystalline structure becomes a permanent part of the concrete, stopping water ingress even under extreme hydrostatic pressure and protecting it against harsh environmental conditions.

Half a century ago, Xypex Chemical Corporation coined the concept of "Concrete Waterproofing by Crystallization"marking a departure from conventional surface-reliant barrier products. Pioneering a unique technology that capitalizes on concrete's natural characteristics, Xypex has remained at the forefront of innovation.

Control over permeability is crucial, and Xypex Admix and surface-applied products are crucial in enhancing concrete durability. They ensure long-term structural integrity, protection, and aesthetics by preventing the penetration of aggressive chemicals and safeguarding against reinforcing steel corrosion, sulphate and acid attacks, carbonation, and microbial-induced corrosion. Additionally, they mitigate deterioration from freeze-thaw cycles, wetting and drying, and temperature fluctuations.

Sustainability has been integral to Xypex's ethos since its inception in 1969. Today, this commitment translates into construction practices meeting present needs without compromising the ability of future generations to meet their own needs. Our crystalline technology exemplifies this commitment, providing durable and permanent concrete waterproofing while facilitating circular construction practices. Central to our mission is assisting you in reducing your project's carbon footprint and achieving sustainability goals. Xypex technology has a 60% lower carbon footprint than traditional waterproofing membranes and coatings, contains no VOCs, and minimizes environmental impacts. This results in a significantly lower lifecycle impact and decreased maintenance costs. Validated by Environmental Product Declarations (EPD) and Health Product Declarations (HPD), Xypex aligns with industry standards for efficiency and environmental responsibility, supporting LEED credits.

We are dedicated to a future where construction endures the test of time, promoting environmental health and resource efficiency. With Xypex, embrace a legacy of enduring structures and sustainable practices.



Typical Xypex Admix Applications

- Sewage and Water Treatment Plants
- Foundations
- Precast Components
- Reservoirs
- Secondary Containment Structures
- Tunnels and Subway Systems
- Underground Vaults
- Parking Structures
- Swimming Pools

Xypex Admix Advantages

Xypex Admix simply has more performance muscle than other products in its field, beginning with the fact that it is present and active throughout the entire concrete matrix from the moment it's poured.

1

INTEGRAL CRYSTALLINE TECHNOLOGY

- Xypex crystallization process
- Becomes part of the concrete matrix
- Seals static-cracks up to 0.5 mm
- Permanent

2

WIDE PERFORMANCE CAPABILITIES

- Resists extreme hydrostatic pressure
- Resists chemical attack
- Prevents microbial induced corrosion
- Enhances durability

3

QUALITY CONTROL

- Through independant testing to world standards
- Extensive research and in-house analysis
- Technical support, field analysis and site supervision
- Quality Assurance Management System - ISO 9001

4

VALUE ENGINEERING

- Adds flexibility to construction scheduling
- Shortens construction process, saving time and money
- Not subject to climatic restraints
- No adverse effect on mix design
- Easy and less costly to install

All variations of the Admix C-Series contain the equivalent amount of reactive chemicals at their prescribed dosage rates and provide the same waterproofing and durability performance characteristics. Xypex Admix C-Series is available in regular or no-fines grade and is packaged conveniently, including soluble bags for accurate, easy and safe handling during dosing.

Admix C-500 / C-500 NF / C-5000 are formulated to have minimal or no effect on setting time.

Admix C-1000 / C-1000 NF are formulated for mix designs requiring a normal or slightly delayed set.

Admix C-2000 / 2000 NF are designed for warmer climates and projects requiring a slower hydration rate.

Better Control

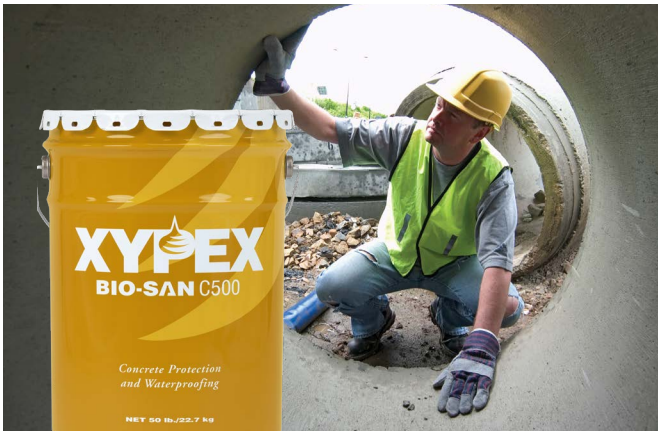
Better Project Control. Using Xypex Admix means that the waterproofing chemical are installed at the time of batching concrete. This means that engineers and contractors can exert much better control over the waterproofing production schedule. ***Better Cost Control.*** Construction schedules can be accelerated and cost savings realized, by eliminating most of the time and labour costs associated with traditional waterproofing methods. ***Climate Control***. Hot, cold, wet, or dry, the prevailing climate does not inhibit the installation of Xypex Admix. It's already in the mix. ***Xypex Support.*** With representatives in over 100 countries, Xypex has first-hand knowledge of local construction procedure, environmental variables, and is readily available to respond to the questions and concerns of our customers.

Design Friendly & Permanent

Xypex Admix will not adversely affect the strength, slump, air entrainment or workability of the concrete as formulated in the mix design. With Xypex Admix inside, concrete is still handled, placed, finished and cured as usual. ***Permanent.*** Xypex Admix can be trusted to perform to original specifications throughout the life of the concrete. Even when changing conditions affect the concrete, or hairline cracks develop over time, Xypex Admix will reactivate to protect the structure and prevent water leakage.

Innovation: Bio-San

Xypex closely monitors the feedback from clients and representatives to stay closely attuned to the ever-changing needs of the marketplace. Our recent admix product innovation – Xypex Bio-San - is a case in point. Responding to the issue of microbial induced corrosion (MIC) of concrete in ***severe*** sewage conditions, Xypex's new antimicrobial crystalline technology is a unique way of protecting concrete with high levels of hydrogen sulphide - the cause of microbial induced corrosion. No other admixture combines potent antimicrobial properties with Xypex's Crystalline Waterproofing Technology to offer complete protection of concrete sewer and wastewater structures. Xypex Bio-San is recommended for sewer lines with long retention times, sealed or unvented manholes, and areas of high turbulence such as lift stations.



Installing Xypex Admix

Blended into the mix at time of batching means Xypex Admix is pre-installed in the concrete and conveniently ready to satisfy diverse project requirements and ambient temperature variations. A wide range of application methods are available: ***Poured-in-Place*** – slabs, footings, walls, in-fill grout; ***Shotcrete*** – for structural and non-structural building components, including tunnel linings and stabilizing excavations; ***Precast*** – for manholes, pipes, sump pits, septic tanks. Xypex Admix Red is also available for precast applications requiring admix identification.

Managing Expectations

Xypex Admix's high performance standards are matched by equally high customer expectations. Proof from both the lab and the field support our unwavering commitment to quality and are our way of managing these expectations.

Xypex Admix has been thoroughly tested in independent labs throughout the world and according to international standards. Permeability, chemical resistance, compressive strength, freeze-thaw durability, potable water and other tests, all concluded positive results.

PERMEABILITY

U.S. Army Corps of Engineers CRD C48, "Permeability of Concrete", Aviles Engineering Corp., Houston, USA
Two concrete samples containing Xypex Admix and an untreated control sample were tested for water permeability. Both the treated and untreated samples were subjected to a pressure of 150 psi / 1.04 MPa (350 ft. / 106.7 m water head). Results showed moisture and permeated water throughout the untreated sample after 24 hours. However, the Xypex Admix samples showed no leakage, and water penetration of only 1.5 mm / 0.06 inches after 120 hours (5 days).

U.S. Army Corps of Engineers CRD C48, "Permeability of Concrete", Setsco Services, Pte Ltd., Singapore
Six Xypex Admix-treated and six untreated concrete samples were tested for water permeability. Pressure was gradually increased over five days and then maintained at 7 bars (224 ft. / 68.3 m water head) for 10 days. While the six reference samples showed water leakage beginning on the fifth day and increasing throughout the test period, the Xypex Admix samples showed no water leakage at any time during the test.

ACCI Water Permeability Test, "Water Permeability of Concrete", Australia Centre of Construction and Innovation, University of New South Wales, Sydney, Australia
Concrete samples containing Xypex Admix NF at a dosage rate of 0.8% and 1.2% were tested for water permeability against control samples. All the samples were subjected to a pressure of 10 bars (100 meters / 328 ft. water head) for 2 weeks. Water permeability coefficients were calculated and the Xypex Admix treated concrete showed significant reduction in water permeability by up to 93% at a dosage rate of 1.2%.

COMPRESSIVE STRENGTH

ASTM C 39, "Compressive Strength of Cylindrical Concrete Specimens", Kleinfelder Laboratories, San Francisco, USA
At 28 days, the compressive strength test of the concrete containing Xypex Admix measured 7160 psi / 49.5 MPa as compared to the reference sample at 6460 psi / 44.5 MPa (a 10% increase).

FREEZE / THAW DURABILITY

ASTM C 666, "Freeze/Thaw Durability", Independent Laboratory, Cleveland, USA
After 300 freeze/thaw cycles, the Xypex Admix-treated samples indicated 94% relative durability.

POTABLE WATER EXPOSURE

NSF 61, "Drinking Water System Component-Health Effects", NSF International, Ann Arbor, USA
Exposure testing of potable water in contact with Xypex-treated samples indicated no harmful effects.

CHEMICAL RESISTANCE

CSN 73 1326, "Measuring Loss of Surface Due to Sulphate Attack of Concrete Treated with Admix C-1000/Admix C-1000 NF", Betonconsult, Building Materials Testing Laboratory, Prague, Czech Republic
Concrete specimens treated with Admix C-1000 at 1% and 2%, and Admix C-1000 NF at 0.5% and 1% were cast along with non-treated concrete specimens. The specimens were exposed to a highly concentrated sulphate solution (i.e. 36,000 mg/ℓ) for 4 months and samples were periodically weighed to determine mass loss. The Admix treated samples recorded a mass loss between 5 and 50 g/m^2 and showed no surface deterioration, while the non-treated specimens measured an average mass loss of 4,860 g/m^2 with significant surface deterioration.

"Sulfuric Acid Resistance Test", Aviles Engineering Corporation, Houston, USA
Concrete containing Xypex Admix at different dosage rates including 3% specimens were tested against untreated control samples for sulfuric acid resistance. After immersion in the sulfuric acid, each sample was tested for weight loss on a daily basis until a weight loss of 50% or a definite response trend was obtained. The percentage weight loss of the samples containing Xypex Admix tested significantly lower than the control samples.

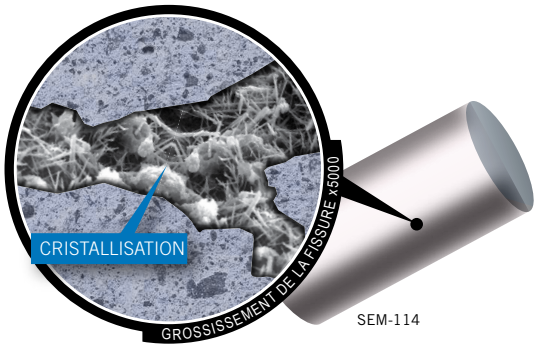
"Acid Resistance of Mortar Containing Xypex Admix C-1000 NF", Construction and Maintenance Technology Research Center (CONTEC), Sirindhorn International Institute of Technology (SIIT) - Thammasat University, Bangkok, Thailand
An acid testing regime was part of an extensive program to determine the benefit of the Xypex Admix C-1000 NF dosed at 1% to improve the durability of concrete. Several comparative mixes were utilized in this evaluation, including: a plain Portland cement and a 30% fly ash mix. Cured samples were exposed to 5% H2SO4; the pH value of this acid solution was 0.25 and never greater than 0.54 pH. In this extremely acidic, corrosive environment, at 12 weeks the Admix samples reduced the weight loss by 48% compared to controls of the cement-only mortar, and 53% in the fly ash specimens.

SCANNING ELECTRON MICROSCOPY

SEM "Microscopic Examination of Crystalline Products in Three Xypex Admix Modified Concrete Mortars", Australian Centre for Construction Innovation, University of New South Wales, Sydney, Australia
Slag and fly ash blended cement samples were treated with Xypex Admix and examined for evidence of crystalline growth at ages ranging from 8 months to 2 years. Samples were sliced and/or split and examined at magnifications between 500x and 5000x. Characteristic Xypex crystalline growth was observable on all Xypex treated samples, providing evidence of Xypex crystalline reactions with fly ash and slag blended cements.

CRACK SEALING

ASTM C1585 and ASTM C1202, "Evaluation of Self-healing Capability of Self-compacting Concrete Made with Blast-furnace Slag Cements Activated by the Xypex Crystalline Catalyst", Instituto Tecnologico de Aeronautica, Sao Jose dos Campos, Brazil
Portland, blast furnace slag and slag-modified Portland concrete samples, treated with 2.5% Admix C-500, were evaluated for self-healing capabilities. Microcracks were induced by loading to 90% of ultimate compressive strength. Cracked samples were then immersed in water to trigger self-healing after 28, 56 and 84 days. Strength and ultrasonic pulse velocity tests were used to determine mechanical recovery; sorptivity and rapid chloride permeability were used to evaluate watertightness recovery. Results substantiated the ability of Xypex Admix to provide self-healing of cracked concrete.



SEM-114

Worldwide Admix Projects

Xypex Admix was used to waterproof and protect multiple areas of THE SHARD, the tallest building in the UK at 309.6 metres (1,016 ft). Construction required the largest continuous concrete pour in UK history.

AIR FORCE ACADEMY, USA

SOUTH DISTRICT WWTP, USA

ESPLANADE THEATRE ON THE BAY, SINGAPORE

PAVLOV ARCHEOLOGICAL PARK, CZECH REPUBLIC

AMOS REX ART MUSEUM, FINLAND

DELHI METRO, INDIA

Beingthere™ Projects in Over 100 Countries

When Xypex first introduced its unique crystalline concrete waterproofing technology more than 50 years ago, the company knew its potential. This was technology for a wide array of project types – basements, bridges, locks and dams, water treatment plants, power plants and, in general, the infrastructure of cities. It was a product system for varying climatic conditions - hot, cold, wet and dry. Xypex Admix was part of an early product extension strategy, designed to focus primarily on new construction. Its market impact has been extensive, and its use on many of the major projects around the world has proven its value and reliability.

Beingthere. Xypex's global presence and commitment to excellence is bolstered by a strong network of licensees, distributors, technical representatives and installers who respond quickly to the needs and expectations of customers and their project concerns.

Being Green. Energy efficiency, material selection, minimizing site impact, VOC reduction and extending the service life of the structure are the 'green' benefits that non-toxic Xypex products provide the construction world and the pursuit of environmental sustainability.

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Attachment 2

RCRA Part B Permit Application

WASTE CHARACTERISTICS AND WASTE ANALYSIS PLAN

US Ecology Tulsa, Inc.

EPA ID: OKD000402396

Tulsa, Oklahoma

Permit Modification Application ~~June~~September 2025

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ATTACHMENT 2 – Waste Characteristics and Waste Analysis Plan

This section describes the methods used to determine the chemical and physical nature of the solid and hazardous wastes to be handled at the US Ecology Tulsa, Inc. (USE Tulsa) facility.

1. OBTAINING CHEMICAL AND PHYSICAL ANALYSES OF WASTE STREAMS: 40 CFR 270.14(b)(2) AND 40 CFR 264.13

USE Tulsa is a commercial treatment and storage facility that accepts non-hazardous waste, listed hazardous waste, and characteristic hazardous waste for on-site management. Hazardous waste management units on-site include tanks and container storage/treatment management units. Before any hazardous waste is treated at USE Tulsa, the facility collects all the chemical and physical information required to treat, store, or dispose of solid and hazardous waste in accordance with Code of Federal Regulations (CFR), Title 40, Part 264 (40 CFR 264), and (where applicable) Part 268 (Land Disposal Restrictions) and Part 273 (Universal Waste Management), as well as the requirements of Chapters 205 (Hazardous Waste Management) and 515 (Solid Waste Management) of Title 252, Oklahoma Administrative Code (OAC), administered by the Oklahoma Department of Environmental Quality (ODEQ). Detailed information for these analyses is provided in the facility Waste Analysis Plan (WAP), provided in Section 2 of this attachment. Information may include data provided by the generator under 40 CFR Part 261, existing published or documented data on the waste, and existing published or documented data on waste generated from similar processes. Verification of information collected from the analysis may be repeated when the facility is notified or has reason to believe that the process or operation generating the hazardous wastes has changed.

Specific hazardous wastes managed on-site are identified in the facility Part A Permit Application. Analytical methods have been selected and analytical protocols developed to provide sufficient information to facilitate successful management of solid and hazardous wastes accepted for management on-site (see Figure 1 – Waste Analysis Parameters and Rationale and Figure 2 – Waste Analysis Parameters).

1a. CONTAINERIZED WASTE: 40 CFR 264.172, 264.175, AND 264.177

Compatibility of waste with containers, containment systems for container storage areas, and container sampling and analysis information is discussed in the following paragraphs.

Additional details regarding container management on-site are presented in Attachment 10 - Process Description.

Incompatible wastes, or incompatible wastes and materials will not be placed or commingled in the same container unless the precautions outlined in Section 2f are taken. Hazardous waste will not be placed in an unwashed container that previously held an incompatible waste or material. Care will be taken to store only waste that is compatible with the container material.

Liquid Resource Conservation and Recovery Act (RCRA) hazardous wastes will be stored in container storage areas equipped with secondary containment. Prior to storage of solid hazardous waste outside of containment areas, a visual inspection will be performed to confirm that the waste is not liquid therefore would not require secondary containment. All available information, including the US Department of Transportation (DOT) proper shipping name and/or the waste profile form, will be used to determine if the waste stream may contain free liquid. If there is question as to whether the waste is solid or liquid, a sample of the waste will be subjected to the Paint Filter Liquids Test (PFLT) Method 9095 in SW 846, in accordance with facility sampling protocol (for waste acceptance) and the WAP (Section 2c). Hazardous waste confirmed to be solid by visual inspection or passing the PFLT (no free liquids) may be assigned a location in a designated container storage area not equipped with secondary containment (e.g., Container Management Area 4 [CMA-4]). Temporary secondary containment setups may be used for liquid RCRA hazardous waste storage in areas without built-in secondary containment in emergency situations. For containerized liquid waste within combination packaging, the outer container is considered the secondary containment and can be stored in areas not equipped with secondary containment. The locations of container storage areas are shown in Figure 1: A-2 - General Facility Layout (Existing Conditions) and Figure 1b: A-2b – General Facility Layout (Proposed Site Plan) presented in Attachment 1 – Maps and Figures.

Standard facility sampling protocol for solid and hazardous waste acceptance requires that a minimum of ten percent (10%) of the containers in a manifested line-item shipment will be sampled. Samples from multiple containers that have been sampled from within the specific manifest line item may be combined into a single composite sample to represent that waste stream.

Standard facility sampling protocol is waived for lab pack wastes, transshipped wastes (containerized wastes that enter the facility and are shipped from the facility without any repackaging or treatment activities), discarded commercial products, and site-generated wastes [see Section 2e(iii)]. Container sampling methods are designed to provide a representative sample of the waste. Analytical methods, outlined in Sections 2a and 2b, have been chosen or developed to provide the information required for appropriate waste management. Specific sampling methods are discussed in Section 2c.

1b. WASTE IN TANK SYSTEMS: 40 CFR 270.16 AND 40 CFR 264.192(a)(2), 264.198 AND 264.199

Compatibility of wastes with tank systems, sampling, and analysis information is discussed in the following paragraphs. Additional details regarding tank management are presented in Attachment 10 - Process Description.

Reactive waste will be stored or treated in such a way that it is protected from any material or conditions that may cause the waste to become reactive. In addition, incompatible wastes, or incompatible wastes and materials will not be placed in the same tank system unless the precautions outlined in Section 2f are taken.

Hazardous waste will not be placed in a tank system that previously held an incompatible waste or material and that has not been decontaminated or can be visually inspected and confirmed to be free of contamination unless the precautions outlined in Section 2f are taken.

Bulk sampling methods are designed to provide a representative sample of the waste. Analytical methods, outlined in Sections 2a and 2b, have been chosen or developed to provide the information required for appropriate waste management. Specific sampling methods are discussed in Section 2c.

1c. WASTE IN PILES: 40 CFR 264.250(c)(1) AND (4)

USE Tulsa does not operate a hazardous waste pile unit; therefore, this section is not applicable.

1d. LANDFILLED WASTES: 40 CFR 264.300

USE Tulsa does not operate a hazardous waste landfill; therefore, this section is not applicable.

1e. WASTE INCINERATED AND WASTE USED IN PERFORMANCE TESTS: 40 CFR 264.340

USE Tulsa does not operate a hazardous waste incinerator; therefore, this section is not applicable.

1f. WASTE TO BE LAND TREATED: 40 CFR 264.270

USE Tulsa does not operate a hazardous waste land treatment facility; therefore, this section is not applicable.

2. WASTE ANALYSIS PLAN: 40 CFR 270.14(b)(3); 264.13(b) AND 264.13(c)

The wastes accepted at the USE Tulsa may include a wide variety of RCRA hazardous and non-hazardous (solid) wastes. Specific hazardous wastes managed on-site are identified in the facility Part A Permit Application.

USE Tulsa may accept any liquid or solid RCRA hazardous waste, as defined in 40 CFR 261 (and identified in the facility Part A Permit Application), for storage and/or treatment. Additionally, non-hazardous industrial wastes (not subject to regulation under 40 CFR Part 264) are managed on-site in accordance with the requirements of OAC 252:515. Additional information regarding waste analysis parameters and rationale, test methods, sampling methods, and frequency of analysis as well as additional requirements for wastes generated off-site and for ignitable, reactive, or incompatible wastes are addressed in the sections below.

2a. PARAMETERS AND RATIONALE FOR WASTE ANALYSIS: 40 CFR 264.13(b)(1)

USE Tulsa has selected physical and chemical waste analysis parameters to facilitate safe solid and hazardous waste handling practices as well as sound tank and container management practices at the facility. The waste analysis parameters selected and their rationale for selection are shown in Figure 1 - Waste Analysis Parameters and Rationale. The parameters identified in Figure 1 are those currently utilized or expected to be utilized by USE Tulsa. Additional or equivalent methods may be used at the discretion of USE Tulsa.

In addition to the parameters identified in Figure 1, the Paint Filter Liquids Test (PFLT) Method 9095 in accordance with SW-846 will be used to identify containers requiring secondary containment during storage (see Section la), as well as any additional information

available concerning the waste stream (e.g., visual inspection, US DOT proper shipping name and/or waste profile). In accordance with facility sampling protocol and this WAP, information for the hazardous wastes designated for storage in container storage areas not equipped with secondary containment will be reviewed (e.g., DOT proper shipping name and waste acceptance profile) and will be subjected to the PFLT and managed accordingly. In addition, wastes identified by EPA waste codes F020, F021, F022, F023, F026 or F027 will not be assigned a container storage location without secondary containment.

2b. TEST METHODS: 40 CFR 264.13(b)(2)

Analytical methods used by USE Tulsa are standard laboratory methods or are methods developed by USE Tulsa for waste management on-site and incorporated into this WAP. The physical and chemical waste analysis parameters for solid and hazardous waste management in tank systems, container management areas, and (where applicable) process equipment are shown in Figure 1 - Waste Analysis Parameters and Rationale. The specific analytical testing method to be used for each parameter is shown in Figure 2 - Waste Analysis Parameters.

Prior to approving a waste stream for management on-site, USE Tulsa requires that the generator provide information. A representative waste sample may be requested for examination prior to approval. Specific information regarding pre-acceptance procedures is presented in Section 2e(i). USE Tulsa personnel will evaluate the data (initial profile) provided by the generator to determine if the waste is suitable for management at the USE Tulsa facility. An independent laboratory, in-house laboratory, or combination of these may be used by the generator or USE Tulsa for sample analysis.

2c. SAMPLING METHODS: 40 CFR 264.13(b)(3); 40 CFR Part 261, Appendix I

Off-site generators are responsible for collecting representative samples of their waste streams. Original waste samples from generators may be requested prior to waste profile approvals or during waste acceptance by USE Tulsa personnel in order to gain necessary information regarding the treatment and disposition of the waste. Should the generator need instructions on representative sampling procedures, USE Tulsa may provide the recommendations as specified in 40 CFR 261, Appendix I, or an equivalent sampling method. Standard on site facility sampling protocol is described in Section 2e(iii).

2d. FREQUENCY OF ANALYSIS: 40 CFR 264.13(b)(4)

The initial waste profile analysis will be evaluated and recertified every year or if the Generator has notified USE Tulsa or USE Tulsa has reason to believe that the process that produces the waste stream has changed. If the waste has not been managed on-site during the preceding 18 months, the applicable waste approval data will be reviewed by the approvals department and forwarded to additional departments as necessary. This review will be used to determine if the information is still accurate and whether the re-approval process may be applied or if the complete waste approval process needs to be followed. If the generator cannot make this certification, a new profile must be provided for the waste analysis parameters. Examples of the initial waste profile form and the waste profile recertification form are shown, respectively, in Figure 3 – Republic Waste/Material Profile Form Example and Figure 4 – Waste Recertification Document Example.

A waste stream re-characterization will be performed when a generator notifies USE Tulsa that a process or operation generating the waste has changed. In the event USE Tulsa has reason to believe that the process or operation generating the waste has changed without notice from the generator, a re-characterization request will be made. The results will be submitted to USE Tulsa before additional waste from the re-characterized waste stream can be accepted from the generator.

If the fingerprint analysis of a waste (as outlined in Section 2e) indicates that the waste received at the facility does not agree with the waste acceptance profile described by the manifest and the waste profile, the generator may re-characterize the waste by either amending the existing profile or providing a new completed profile and appropriate analysis, as necessary.

For certain emergency response situations and generator spills, some of the initial waste analysis parameters for on-site management (Figure 1 - Waste Analysis Parameters and Rationale) may be waived. This will only occur if the generator can adequately make the hazardous waste determination of 40 CFR 262.11. All available analytical data, generator knowledge, and supporting Safety Data Sheets (SDSs) will be evaluated prior to receipt of the waste at the USE Tulsa facility. Upon arrival of the waste on-site, additional testing may be performed at the discretion of USE Tulsa.

Conditionally exempt small quantity generators may not be required to perform some of the initial waste analysis parameters identified in Figure 1 - Waste Analysis Parameters and Rationale. The waste analysis data requirements for these generators will be determined on a case-by-case basis by the General Manager or designee prior to approval.

2d(i). WASTE TREATMENT VERIFICATION

Each treated batch of mixed, one-time receipt, or inconsistent wastes must be sampled and undergo specific verification to show the treated waste meets the Land Disposal Restrictions (LDR) standards defined in 40 CFR 268.40 and/or 268.48. An example of the LDR Form is shown in Figure 5 – Land Disposal Restriction Form Example. The sample will be collected through the following process:

1. Once the treatment recipe is completed, the excavator operator will scoop a bucket of the treated waste and then sit the bucket down within the secondary containment.
2. The surface layer of the treated waste will be scraped aside using a dedicated disposable cup.
3. A scoop of treated waste will then be placed in a new, clean, high density polypropylene cup with lid.
4. The outside of the container will be cleaned then labeled with the batch number, date, time, and sampler's initials.
5. Once labeled, the sample will be delivered to the laboratory for analysis.

Consistent waste stream (waste streams that show acceptable [in reference to USE Tulsa waste rejection parameters] little to no variation in the fingerprint analysis, results, or constituents between shipments) approvals will not require individual batch analysis after treatment if the recipe has been proven to be effective. The consistent approvals recipe will be "proven" after the same recipe is applied to five (5) consecutive batches with 100% effective treatment demonstrated by laboratory analysis. The treatment efficacy will then be verified on at least 10% of the batches thereafter. The established recipe should only be applied to a subsequent identical batch (e.g., same waste stream(s) and reagent

prescription). Sample collection will follow the same process as described in the previous paragraph.

For consistent waste streams which have waste codes or Underlying Hazardous Constituents (UHC's) identified by the generator, and if those constituents of concern are not detected during laboratory analysis after five (5) separate shipments of that waste, further testing for that constituent of concern will not be required and USE Tulsa will discuss these results with the generator to discuss possible removal of the identified waste code or UHC. If the generator does not agree and wants the waste code or UHC to remain on the profile, then testing will continue.

2e. ADDITIONAL REQUIREMENTS FOR WASTES GENERATED OFF-SITE: 40 CFR 264.13(c)

2e(i). PRE-ACCEPTANCE PROTOCOL

Prior to accepting a waste at the facility, a standard form summarizing waste characteristics (profile), as shown in Figure 3 – Republic Waste/Material Profile Form Example, is required to be completed by the generator for each solid and hazardous waste stream. This form will be revised as needed to ensure all information is provided to properly review the waste profile. In addition to the profile, the generator may attach any previously performed analytical data and all applicable SDSs. The generator may use knowledge of process or laboratory analysis to complete this form. The completed profile will allow USE Tulsa to make a preliminary evaluation regarding the acceptability of the waste and will provide preliminary basic information enabling USE Tulsa to successfully manage hazardous waste in accordance with the requirements of 40 CFR Part 264. The profile also identifies wastes subject to the LDR as specified in 40 CFR Part 268.

The generator is responsible for defining waste in accordance with 40 CFR 262.11 and through knowledge of process to aid USE Tulsa in its evaluation of the applicability of 40 CFR 264 Subpart CC requirements and ensure that organic concentration is less than 500 ppm for wastes, as needed.

The generator's waste characterization may include an analysis of a representative sample of the waste, however generator knowledge of the waste may be used in some cases. The

generator, an independent laboratory, the USE Tulsa laboratory, or another US Ecology laboratory may perform the testing. Testing and analyses are performed using standard laboratory tests (US Environmental Protection Agency [EPA], ASTM, AWWA, or other approved tests) or alternate methods approved in this WAP.

USE Tulsa has developed a series of criteria to determine the acceptability of specific waste. These criteria are referred to as pre-acceptance reviews and dictate what information is needed to determine the acceptability of the waste for on-site management. At a minimum, USE Tulsa will obtain all the information required by 40 CFR §264.13(a)(1) and as outlined in 40 CFR §264.13(a)(2). If the generator has not supplied the detailed analysis, USE Tulsa may elect to gather the specified information. If the information is not provided by the generator nor has USE Tulsa gathered the information, the waste stream is not approved to be received at USE Tulsa. The applicability of Subpart CC will be evaluated during the approval process. Subpart CC constituents will be identified based on information provided by the generator and will be used in the determination of the total Subpart CC value for that waste stream. As part of the waste profile, all waste treated in TA-2a, TA-2b, or TA-2c will be certified that the volatile organic content subject to Subpart CC is less than 500 ppm. The waste stream will be flagged using an internal system to document the Subpart CC applicability and the required management. The waste stream is given a treatment code that corresponds to the facilities management methods for handling.

The pre-acceptance review is the mechanism for deciding the acceptability of a particular waste, based on the conditions or limitations of existing permits, compatibility with other wastes being managed on site, and the waste's suitability for management utilizing the process options, and off-site disposal options available. The pre-acceptance review may be carried out on-site, prior to the receipt of the initial load, or upon receipt of the initial load. USE Tulsa may obtain analytical information, as needed either during the pre-acceptance review or incoming load review to confirm the concentration of constituents of concern reasonably expected to be present in the waste. At USE Tulsa, the Approvals Coordinator or designated trained employee(s) reviews the information on the completed profile to ensure compliance with the facility's RCRA permit. The General Manager or their

designee reviews the completed profile for the ability to properly and safely treat the waste with the facility's treatment options. The General Manager or their designee may request that other qualified USE Tulsa employees review the profile as well if there are any questions or special conditions.

After the profile has been approved, all hazardous wastes except those that fall under the exemption descriptions listed in Section 2e(iii) received at USE Tulsa that are destined for on-site treatment will undergo a set of fingerprint tests at the time of receipt to confirm that the waste is consistent with the information on the profile. The tests that will be used as part of the fingerprint testing are shown in Figure 6 – Fingerprint Tests. USE Tulsa may also conduct additional analyses to aid in processing decisions.

The pre-acceptance evaluation is concluded with documentation of the decision regarding acceptability of the waste and the proposed method of management. Included within the documentation is the required notification to the generator that the waste is approved for management in accordance with the facilities permit and 40 CFR §264.12(b).

USE Tulsa technical disposal decisions are based on:

- Available waste management methods;
- Conditions or limitations of existing permits and regulations;
- Capability to manage the waste in a safe and environmentally compliant manner;
- Profile description of the process generating the waste;
- Profile description of the chemical and physical properties of the waste;
- Any applicable LDR notification per 40 CFR 268.7(a);
- Results of the onsite fingerprint analysis or third party lab analysis;
- Management's technical experience and judgment.

The personnel involved in reviewing and approving the pre-acceptance waste profiles participate in a team approach to these approvals. The General Manager or their designee works with other qualified USE Tulsa employees as needed to perform the following tasks for review and approval:

- Reviews the profile to ensure that the waste can be safely stored and treated at the site, and as such, has been trained by experience and training;
- Assesses the regulatory compliance of the waste to ensure that the waste fits within the permit limits of the facility;
- Ensures that the receipt and handling of the waste is within the constraints of the facility; and
- Reviews all facets of the waste profile.

Requirements:

For each new proposed waste stream, except as noted herein, the following information will be obtained as appropriate:

- Pertinent chemical and physical data to determine waste characteristics and when appropriate, representative sampling information and certifications.
- A representative sample, if required and available (may not be required if facility management determines the pre-acceptance documentation gives sufficient information to maintain compliance with permit and operational constraints and submittal of a sample for analysis would not aid in the disposal or treatment process).

Other exceptions to sample requirements are listed in Section 2e(iii).

Profile Updates:

Profile evaluations will be performed annually from the date of the original generator certification. In addition, a waste profile evaluation will be conducted in accordance with 40 CFR 264.13(a)(3) if any of the following occurs:

- Generator notification indicates a change in the process generating the waste.
- Visual waste inspection, fingerprint, or other analysis as described in Section 2b indicates the waste received at the facility does not match the identity of the waste profile. These updates may be in the form of a profile addendum letter to the profile

from the generator requesting the change, or it may be in the form of a new profile reflecting the changes.

2e(ii). ACCEPTANCE PROTOCOL

Each shipment of waste is inspected, sampled, and analyzed as defined in this document before acceptance, except as noted in Section 2e(iii). However, wastes that will be remanifested to another treatment storage and disposal facility (TSDF) and not processed at USE Tulsa may be opened or tested, while relying on the final TSDF to identify significant discrepancies. This procedure serves first to compare the received waste identity with that determined during the pre-acceptance process and the manifested waste. Second, it serves to ensure proper disposition of the waste for treatment, storage, or disposal of the waste. Although analysis is generally only performed by properly trained and qualified USE Tulsa laboratory employees, other contractors may be utilized if needed. Non-bulk and small bulk hazardous waste shipments (e.g., drums and tote tanks) arriving on site will be unloaded into a storage location as soon as possible, at which time the sampling and waste acceptance protocol begins. Rejected waste may remain on site until the safe shipment of the waste can be arranged, providing the waste may be safely segregated and stored. If the rejected waste will be on-site more than ten (10) days since its arrival at the facility, ODEQ will be notified and provided information on the identification of the generator, all available waste information, the reason for the delay, and the expected date of shipment either to the generator or an appropriate receiving facility. ODEQ will then instruct USE Tulsa of any further actions or information needed to ensure the waste is properly handled.

USE Tulsa acceptance procedures are designed to ensure that solid and hazardous waste received at the facility matches the identity of the waste on the accompanying manifest. Upon arrival of a solid or hazardous waste at the facility, a sample of the waste is collected and fingerprint analyzed on-site as described in Section 2e(iii). Subsequently, the waste may be assigned to a specific temporary storage tank or container storage area depending on the chemical properties of the waste.

Multiple reviews are conducted of the received waste prior to acceptance to the facility. When the load arrives, the paperwork, including the hazardous waste manifest and LDR notice, are reviewed by receiving personnel or receiving laboratory personnel for full completion and meeting the permit requirements. These associates have been trained to ensure that the received manifest has been correctly and fully completed, and that if a problem is detected, will bring it to the attention of the General Manager or their designee, as needed, to resolve the issue or reject the load. Once reviewed and approved, the waste is sampled (as required) and the fingerprint tests are conducted by the laboratory personnel. USE Tulsa reserves the right to use either the site laboratory or other US Ecology site laboratories for the required analyses, or other state-certified independent commercial laboratories for any analytical methods (required or optional) during waste management activities if necessary. All laboratories will use the test methods identified and approved in the site's WAP. All results will be maintained as part of the site's Operating Record. If all test results are within the tolerances of the WAP's requirements, the laboratory personnel or appropriately trained technical personnel approves receipt of the waste and transmits that information to the operations employee who unloads the waste into the appropriate receiving area. The Laboratory Manager/Supervisor, Chemist, and/or Laboratory Technician have been trained in the analytical protocols and regulatory and permit limits of the site to ensure that all received wastes meet the requirements. Issues associated with the waste should be brought to the attention of the General Manager or their designee, as needed, for determination if the waste may be accepted.

The incoming waste loads may remain in tank trucks or on trailers until the fingerprint analyses are completed in order to determine whether to reject or accept the waste. If unloaded for sampling, containers will be managed as appropriate for the material manifested. During acceptance or staging, USE Tulsa may manage containers in areas outside of permitted container storage areas. This period is limited to the time required to approve the receipt, but in no case will last longer than the same day in which it arrived. If the waste must be held overnight prior to approval, the delivering truck will be held in a secondarily contained unloading area. Containerized wastes will be moved to appropriate

storage areas after the acceptance requirements have been met. Alternatively, the driver will be instructed to return at a later scheduled date/time.

Upon arrival of an incoming waste load to the USE Tulsa facility, the truck driver delivers the manifest and accompanying shipping papers to receiving personnel. The specific generator waste analysis profile is then obtained and reviewed.

The manifest is then inspected for completeness and correctness, with a minimum of the following information checked for hazardous wastes:

- The manifest document number;
- The generator's name, address, and EPA ID number;
- Each transporter's name and EPA ID number;
- An alternative TSDF, address, and EPA ID number (if applicable);
- DOT shipping name, hazard class, United Nations/North America (UN/NA) number, and packing group;
- The volume/weight of waste in a bulk shipment or the number and type of containers in a piece shipment;
- A signed and dated certification of the shipment contents by the generator;
- A signed and dated transporter 1 block and 2 block (if necessary); and
- For hazardous wastes, a complete LDR notification/certification form (if not already on file).

The shipment of hazardous waste is then inspected visually for the following information:

- The number and type of containers or bulk volume anticipated from manifest information;
- Shipment labels/placards in accordance with information on the manifest; and
- Other irregularities with the shipment (e.g., leaks, poor container condition, etc.).

USE Tulsa receives hazardous waste in accordance with the requirements of Subpart E of 40 CFR Part 264. When hazardous waste is received on-site, USE Tulsa will:

- Sign and date each copy of the manifest to certify that the hazardous waste described by the manifest was received;

- Note any significant discrepancies in the manifest [as defined in 40 CFR 264.72(a)] on each copy of the manifest:
  - Manifest discrepancies are differences between the quantity or type of hazardous waste designated on the manifest or shipping paper, and the quantity or type of hazardous waste a facility actually receives. Significant discrepancies in quantity are: 1) For bulk waste, variations greater than 10 percent in weight; and 2) for batch waste, any variation in piece count, such as a discrepancy of one drum in a truckload. For bulk waste, the noted weight on the manifest may be converted to volume using the waste's specific gravity, if needed. This calculated volume is then compared to the actual bulk waste volume. Any volume discrepancy greater than 10% is managed as a significant discrepancy. Significant discrepancies in type are obvious differences which can be discovered by inspection or waste analysis, such as waste solvent substituted for waste acid, or toxic constituents not reported on the manifest or shipping paper.
  - Upon discovering a significant discrepancy, USE Tulsa will attempt to reconcile the discrepancy with the waste generator or transporter (e.g., with telephone conversations or in person). If the discrepancy is not resolved within fifteen (15) days after receiving a hazardous waste, USE Tulsa will immediately submit a letter describing the discrepancy, attempts to reconcile the discrepancy, and a copy of the manifest or shipping paper at issue to the ODEQ.
- Provide the appropriate transporter copy of the signed manifest:
  - The manifest may be signed and provided to the transporter prior to completion of confirmation analysis as specified in this WAP. When subsequent analysis identifies a manifest discrepancy, USE Tulsa will contact the generator to resolve the discrepancy.
- Send a copy of the manifest to the generator within the timeframe presented in 40 CFR 262.42.

2e(iii). SAMPLING AND ANALYSIS OF WASTE MOVEMENTS

The sampling and analysis of the incoming waste will utilize appropriate methods as specified in Section 2b of this document. The sampling procedures will depend upon the type of shipment and the type of waste. Sampling methods are discussed in Section 2c.

100% of containerized loads to be processed at USE Tulsa will have an inspection (which can include looking at the waste inside the container, moving/rotating the containers to verify the physical state by detecting free liquids via displacement, etc.), while a minimum of 10% per waste stream per shipment and manifest will be sampled. Wastes that will not be processed at Tulsa but will be remanifested to another TSDF, may not be internally inspected except as part of the 10% sampling, but rather the receiving TSDF will do the confirming inspection, and if it is not as the profile notes, the significant discrepancy will be discussed with the generator. Multiple manifests from the same generator containing the same waste stream will be treated as separate loads and will each have a 10% sampling requirement. A visual inspection form or equivalent will be completed during the visual inspection. If the appearance of the waste varies in any significant way from that listed on the profile, the waste in question may be rejected or sampled and analyzed before further handling. Sampling and fingerprint analysis for bulk loads routinely received in volumes of >5 loads per month may be reduced to 20%. Standard facility waste acceptance protocol is waived for lab pack wastes, transshipped wastes, discarded commercial products, and site-generated wastes. Acceptance protocols for these wastes are discussed below.

- Lab pack wastes - The packing list arriving with lab packs will be compared to the pre-acceptance packing list. Discrepancies will be resolved prior to acceptance.
- Transshipped wastes - Waste acceptance for transshipped wastes will consist of verification of manifest information, container count, and container labels. In some cases, USE Tulsa may sample transshipped wastes (e.g., prior to shipment to an affiliated facility or if USE Tulsa has concerns regarding the identity of the waste).
- Discarded commercial products - Generator "knowledge of process" including applicable SDSs provide adequate characterization of waste commercial products.

- Site generated wastes - Site generated wastes include used personal protective equipment, process residuals, and incidental wastes. Waste acceptance for site-generated wastes is not required. "Knowledge of process" or profile information corresponding to processed waste streams will adequately characterize these wastes for proper management. Analysis of the waste may be conducted at the discretion of USE Tulsa.

In addition, USE Tulsa may waive on-site sampling requirements where pre-acceptance evaluations coupled with visual inspections or if any of the following conditions exist:

- A sample cannot be reasonably obtained, such as filter cartridges, tank cleanout sludge (prior to cleanout), large, contaminated pieces, or debris
- Waste contained in a lab pack or combination packaging. “Combination packaging” is defined in 49 CFR 171.8 as “…one or more inner packagings secured in a non-bulk outer packaging and is subject to DOT requirements of 49 CFR part 173.
- Commercial products or chemicals, off-specification, outdated, unused, contaminated, or banned. These products are typically supported by an SDS.
- Empty containers of waste material, commercial products or chemicals, including empty containers which may contain residues. A container shall be determined empty according to the criteria specified in 40 CFR 261.7.
- Residue and debris from the cleanup of spills or releases of chemical substances, previously approved wastes, commercial products, or a waste which would otherwise qualify as an exception.
- Wastes that are easily identifiable through an inspection process. Examples may include cathode tubes, batteries, fluorescent light tubes, filters and filter cartridges, wire or tubing, paper products, metals sheeting and parts, crushed glass, computer parts, and other debris.
- Demolition wastes. This includes wastes from the dismantling or demolition of plants, facilities, or industrial equipment contaminated with chemicals from the process.
- USE Tulsa site-generated wastes.

- Household hazardous waste (HHW), pesticides, waste from small quantity generators and or small volume waste streams (<100 tons per year). For these exceptions, the generator will supply USE Tulsa with sufficient chemical and physical characteristics information for the proper management of the waste.
- Controlled substances regulated by government agencies including drugs and/or materials from clandestine labs.
- Wastes from remediation projects in which the waste characterization is known through a sampling plan approved by a federal or state agency.
- Debris as defined in 40 CFR §268.2. These materials will be visually inspected prior to acceptance in order to ensure the waste meets the definition of debris.
- Contaminated personal protective equipment (PPE).
- Aerosol cans.
- Materials not amenable to sampling such as structural steel, tanks, pipe, cement, glass, empty drums, machinery. Equipment, manufactured items, monolithic materials, and others may be managed by USE Tulsa which do not allow for normal sampling procedures. These materials will be managed on a case-by-case basis.

In these cases, the shipment will be inspected for conformance with manifest and pre-acceptance documentation as previously described.

Liquid in containers will be sampled with a column liquid waste sampler, also called a coliwasa (or other suitable method). Solids and sludges in containers will be grab-sampled with a trier (or other suitable method). If standard facility sampling techniques do not provide a representative sample for analysis, an alternate method will be used. The USE Tulsa laboratory has the equipment, procedures, and training to complete all of the required fingerprint testing, but off-site laboratories may be used at the discretion of USE Tulsa.

For incoming bulk liquid waste in tank trucks, the representative sampling device used by USE Tulsa will be a coliwasa (or other suitable method). A grab sample will be collected through the dome hatch on top of the truck trailer. An alternate sampling procedure may be selected (if deemed necessary) to obtain a representative sample, i.e., for safety reasons

or when the waste is not of homogeneous composition. Off-site laboratories may be used at the discretion of USE Tulsa.

The analyses conducted on-site are for selected analytical (fingerprint) parameters. Fingerprint parameters are selected to support the identification of wastes received at the facility. These parameters are normally a subset of the initial waste analysis information (profile) that generators have provided to USE Tulsa during pre-acceptance procedures. The analyses performed on a waste will be selected to provide adequate information to provide confirmation of waste identity, facilitate sound waste management practices on-site, and determine applicability of LDR requirements for appropriate hazardous waste disposal. A standard set of fingerprint analyses are generally conducted on the wastes, depending on the type of waste that it is. The General Manager or their designee selects the tests that are required for each waste stream and may elect to require additional tests based on the information included in the waste profile or determined from review of the initial receipt information.

The results of the on-site fingerprint analysis are maintained in the operating record and the results are compared to the initial waste analysis data. If the fingerprint analysis results are within acceptance tolerances, the waste received at the facility will be identified as the solid or hazardous waste specified on the accompanying manifest, and therefore, acceptable for management.

Based on the results of the fingerprint tests, each waste stream is directed to an appropriate storage area. Bulk liquid wastes can be stored in tank farm 1 (TF-1), offloaded into treatment tanks, or pumped into containers. It is noted that TF-1 is proposed for closure and will be replaced by tank farm TF-4 after it is modified to receive hazardous waste. Non-bulk (e.g., drums) and small-bulk (e.g., tote tank) containerized wastes are currently generally unloaded into container management area 3 (CMA-3) which has the ability to segregate incompatible wastes into separate cells. Separate cells are available for ignitable waste, oxidizers, acids, and bases. CMA-1 is proposed for expansion with additional storage bays for containerized waste. After this occurs, containerized waste will be unloaded into both CMA-3 and CMA-1.

Containerized waste will be segregated according to the DOT shipping hazard class information on each container's label and in compliance with 40 CFR Part 264, Appendix V. Wastes that are received and proven to be non-hazardous wastes and waste in combination packaging may be received into and stored in the other waste management areas of the facility designated for such operations.

Waste variability may be attributed to waste loading procedures or other factors. Loading onto tank trucks may mix the waste and may incorporate some solids from generator storage devices. Examples of anticipated waste variability could be the result of any of the following:

- differences due to temperature;
- precipitation or absorption of constituents after sampling for waste analysis data due to varying length of storage time before management;
- sedimentation of solids during prolonged storage times or during transportation to the USE Tulsa facility.

Analytical results of the sample taken at the USE Tulsa facility for fingerprinting may differ somewhat from the waste analysis data provided by the generator (i.e., some range is anticipated for the results of analytical procedures).

Accepted tolerances for acceptance criteria are as follows:

- Physical state of sample — Anticipated physical state must be within tolerance limits from value stated on waste profile.
- Flash Point – The fingerprint analysis determines if the flash point is equal to or greater than 140 degrees F, or less than 140 degrees F. Unexpected flash point determination resulting in a change in characterization status is considered out of the tolerance limit.
- pH – If the fingerprint analysis indicates that a characteristic or segregation determination must be changed from what is listed on the waste profile based on pH, the waste is out of tolerance limits.

If any fingerprint parameter falls outside the accepted tolerances, it may be necessary for a second sample to be taken and the analysis repeated. Should the second sample of the

fingerprint parameters fall outside the accepted tolerances, the generator will be contacted and advised that the waste may either be re-characterized or that it will be rejected (see Section 2e(ii) for procedures applicable to significant manifest discrepancies). Fingerprint discrepancies could require USE Tulsa personnel to verify the container has been properly labeled by the generator during preparation of the waste for transport. If fingerprint analysis indicates results within specified acceptance tolerance for an alternate approved waste stream, the waste will be accepted and appropriate waste names and numbers will be changed on the manifest (with approval from the generator).

2e(iv). SITE MANAGEMENT

Site generated wastes include wastes generated during site processing or other management practices, contaminated PPE, and clean up residuals from incidental spills.

Upon storing waste in tanks, solid and hazardous waste may be generated by the settling of suspended solids in the bottoms of tanks. Solid and hazardous waste may be generated as solids are filtered from liquids or during other types of on-site processes. Generated solids are accumulated in containers on-site. Knowledge of process (including waste stream history) or testing may be used to determine appropriate management practices for these wastes. If a site-generated waste is determined to be hazardous, the waste will be managed in accordance with state and federal regulations.

USE Tulsa may receive and treat characteristic hazardous waste from off-site generators to meet treatment standards in accordance with Subpart D of 40 CFR Part 268. USE Tulsa may also treat characteristic site-generated hazardous wastes to meet treatment standards in accordance with Subpart D of 40 CFR Part 268. For each shipment of such waste to a subtitle D facility, USE Tulsa will prepare documentation in accordance with 40 CFR 268.9(d). This WAP describes the procedures developed by USE Tulsa to comply with the requirements of 40 CFR 268.7(a)(1) through (a)(10). The General Manager or designee approves each treatment batch to ensure that the wastes meet the applicable disposal requirements, including standards for the bulking of liquid wastes or fuels blending off site, or shipment to an off-site disposal facility for further waste management not available at USE Tulsa.

2e(iv)1. Waste Prohibited from Treatment

Current technologies and regulations prevent treatment of certain types of waste at USE Tulsa. However, these waste codes may be stored but not treated. These prohibited waste types include:

- D001 ~~ignitable~~ flammable wastes [i.e., ignitable wastes as defined in 40 CFR 261.21(a)(1) and (2)];
- The following D003 reactives:
  - Pyrophoric wastes (such as most organometallic compounds or alkali metals) and any other reactive wastes having the properties described in 40 CFR 261.23(a)(1)~~;~~
  - Self-heating wastes and any other reactive wastes having the properties described in 40 CFR 261.23(a)(6)
  - Explosives, ~~or~~ any self-detonating wastes, wastes that form potentially explosive reactions with water, and any other reactive wastes having the properties described in 40 CFR 261.23(a)(3), 40 CFR 261.23(a)(7), or 40 CFR 261.23(a)(8);
  - ~~Self-heating wastes~~
  - ~~Pyrophoric wastes (such as most organometallic compounds or alkali metals);~~
- Waste that carries F, K, P, or U codes; and
- Waste prohibited from land disposal as listed in 40 CFR 268 Subpart C.

The facility treats a subset of D003 wastes having the properties described in 40 CFR 261.23(a)(2), 40 CFR 261.23(a)(4), or 40 CFR 261.23(a)(5) and approved by ~~O~~DEQ~~P~~.

The facility's ~~standard operating procedure~~protocol for accepting D003 wastes for treatment is provided in Appendix 1.

2f. ADDITIONAL REQUIREMENTS FOR IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTES: 40 CFR 264.13(b)(6); 40 CFR 264.17

USE Tulsa may handle ignitable wastes, as defined under 40 CFR 261.21(a)(1). After testing, waste streams designated as ignitable may not exhibit the characteristic of ignitability in some shipments and if so, will be managed appropriately. USE Tulsa will manage ignitable and reactive waste in accordance with the following procedures. Incompatible wastes, or incompatible wastes and materials will not be placed in the same container unless precautions are taken to prevent reactions that could:

- Generate extreme heat or pressure, fire or explosions, or violent reactions
- Produce uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health or the environment
- Produce uncontrolled ignitable fumes or gases in sufficient quantities to pose a risk of fire or explosions
- Damage the structural integrity of the device or facility
- T~~hrough other like means t~~hreaten human health or the environment through other like means.

Ignitable wastes are stored in closed containers in order to prevent accidental ignition. Reactive wastes are stored in closed containers or tanks in order to prevent accidental reaction. Incompatible wastes are separated and ignitable/reactive wastes are protected from sources of ignition or reaction. Activities that would produce open flames, hot surfaces, frictional heat, sparks, spontaneous ignition or radiant heat will not occur in the vicinity of ignitable wastes.

As a safeguard for handling ignitable and reactive wastes, smoking is not allowed within the inner fence-line of the facility (except in designated areas). Signs are posted at the main entrance to the facility stating, "No Smoking Beyond This Point". Prior to co-mingling wastes in storage tanks or tankers, USE Tulsa operations personnel will use existing waste analysis information provided by the generator, and/or published literature to determine if

there is a potential danger in mixing incompatible wastes. The primary sources of published literature used for reference include 40 CFR 264 Appendix V, The Merck Index 3rd Edition, and The Rapid Guide to Hazardous Chemicals in the Workplace (Sax and Lewis, 1st Edition).

Potentially incompatible wastes may be bench tested in the on-site laboratory. Since a portion of each waste sample is retained during the initial sampling from incoming trucks, proportional amounts of different wastes to be co-mingled may be mixed and observed for incompatibility.

3. WASTE ANALYSIS PLAN AMENDMENT FOR WASTES SUBJECT TO THE LAND DISPOSAL RESTRICTIONS: 40 CFR 268 SUBPART B

All solid and hazardous wastes accepted for management on-site will be subject to applicable requirements of this WAP. The USE Tulsa facility does not operate any hazardous or solid waste land disposal unit.

3a. WASTE CHARACTERISTICS

Analytical or "knowledge of process" data will be required from the generator for each waste managed at the USE Tulsa facility to identify restricted waste in accordance with 40 CFR 268. LDR information (if applicable) for all applicable hazardous waste managed at the USE Tulsa facility that is not otherwise exempted will be maintained in the operating record.

4. RECORDKEEPING REQUIREMENTS

The following records will be maintained in the facility operating record for three (3) years unless noted:

- Information gathered in accordance with this WAP (ex: fingerprint analysis results)
- Laboratory results performed for waste analysis
- Manifests

----------END OF ATTACHMENT----------

Figure 1

WASTE ANALYSIS PARAMETERS

AND RATIONALE

PARAMETER	RATIONALE FOR SELECTION
Color	Waste verification
Physical state, appearance	Waste verification
Paint Filter	Waste verification
Temperature	Identify waste streams that need to cool before unloading
pH	Waste verification, storage selection, and verification of USE Tulsa treatment efficacy
Oxidizers	Waste verification, storage selection, and verification of USE Tulsa treatment efficacy
Normality	Waste verification of acid/alkaline content
Specific gravity	Waste verification
Flash Point	Waste verification, storage selection, and verification of USE Tulsa treatment efficacy
TOC	Verification of LDR treatability subcategory for D001 waste
Sulfide screen	Verification of potentially reactive sulfide waste and to aid in storage area selection
Cyanide screen	Verification of potentially reactive cyanide waste and aid in storage area selection
Reactive cyanides	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Reactive sulfides	Verification of LDR treatment standards and USE Tulsa treatment efficacy
TCLP	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Arsenic	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Barium	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Beryllium	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Cadmium	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Chromium	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Lead	Verification of LDR treatment standards and USE Tulsa treatment efficacy

Figure 1

WASTE ANALYSIS PARAMETERS

AND RATIONALE

PARAMETER	RATIONALE FOR SELECTION
Mercury	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Selenium	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Silver	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Antimony	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Thallium	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Nickel	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Percent solids	Waste verification and element of stabilization formulation
Heat of combustion	Waste verification and confirmation of acceptability for off-site fuel
Halogen	Waste verification and/or verification of LDR treatment standards, confirmation of acceptability for off-site fuel
Percent water	Confirmation of acceptability for off-site fuel
Total VOCs	Waste Verification
Total Semi-VOCs	Waste Verification

*Selection of applicable analysis is dependent of waste characteristics and method of waste management on-site. See Figure 2, Waste Analysis Parameters used to identify methods performed on all waste streams.

Figure 2

WASTE ANALYSIS PARAMETERS

PARAMETERS	ANALYTICAL METHODS	PROTOCOL
Color	SM 2120	All waste streams
Physical state, appearance	ASTM D4979-08	All waste streams
Paint Filter	SW-846 9095B	Treated residuals
Temperature	SM 2550	Optional analysis
pH	SM 4500-H+B or SW-846 9040C, 9045D or 9041A	Aqueous waste streams
Normality	USE Tulsa protocol	Optional analysis
Oxidizers	ASTM D4981-19	All corrosive waste streams
Specific Gravity	ASTM D5057-17	All liquid, bulk waste streams
Flash point	ASTM D3278-96 or SW-846 1010B	Optional analysis
TOC	SW-846 9060A, EPA or SM 5310	Optional analysis
Sulfide screen	Lead Acetate Test Strips	Optional analysis
Cyanide screen	Cyanide Millipore Sigma QuantoFix	Optional analysis
Reactive cyanide	SW-846 9010C	Optional analysis
Reactive sulfide	SW-846 9030B, 9034	Optional analysis
TCLP	SW-846 1311	Optional analysis
Arsenic	SW-846 6010D,	Optional analysis
Barium	SW-846 6010D,	Optional analysis
Beryllium	SW-846 6010D,	Optional analysis
Cadmium	SW-846 6010D,	Optional analysis
Chromium	SW-846 6010D,	Optional analysis
Lead	SW-846 6010D,	Optional analysis
Mercury	SW-846 7470A, 7471B	Optional analysis
Selenium	SW-846 6010D, , 7741A	Optional analysis
Silver	SW-846 6010D, 7760, 7761	Optional analysis
Antimony	SW-846 6010D, 7041, 7040	Optional analysis
Nickel	SW-846 6010D, 7520, 7521	Optional analysis
Thallium	SW-846 6010D, 7840, 7871	Optional analysis
Percent solids	40 CFR 261 Appendix II Section 7	Optional analysis
Heat of combustion	ASTM D240-17	Optional analysis
Halogen	SW-846 9077	Optional analysis
Percent water	ASTM D4017-02	Optional analysis
Total VOCs	SW-846 8100, 8060, 8270	Optional analysis
Total Semi-VOCs	SW-846 8021, 8015	Optional analysis

NOTES:	**Methods**	Analytical methods may be substituted with approved equivalent methods (e.g., accepted methods superseding listed methods). Optional analyses may be performed at the discretion of facility personnel.
	SM	AWWA Standard Methods for the Examination of Water and Wastewater
	ASTM	American Society for Testing and Materials
	SW-846	Test Methods for Evaluating Solid Wastes
	Hach	Water Analysis Handbook for Spectrophotometers, 9th Edition
	QuantoFix	Method included with test kit
	USE Tulsa Protocol	USE Tulsa Internal Analytical Protocols

Figure 3 - Republic Waste/Material Profile Form Example

REPUBLIC SERVICES

Profile #:

WASTE/MATERIAL PROFILE FORM

A. GENERATOR/CUSTOMER INFORMATION *(If foreign generator, complete Waste Import Supplement)*

1. Generator: ☐ Invoicing information is the same as generator mailing address
2. Site Address: ☐ P.O. required for payment? *If yes, include:*
   City: Phone: 8. Invoicing Company:
   State: Zip: Country:
3. Mailing Address: 9. Invoicing Address:
   City: City:
   State: Zip: Country: State: Zip: Country:
4. Technical Contact: 10. Customer Contact:
5. Phone: Email: 11. Phone: Email:
6. Generator Status: ◯ SQG ◯ LQG ◯ VSQG/CESQG *(If yes, complete Certification Supplement)* ◯ Not Applicable
7. EPA ID #: NAICS CODE: State ID #: *(If applicable)*

B. WASTE/MATERIAL STREAM

1. Common Name:

(Please provide a site history for Remediation & IDW sites. Use additional form if necessary.)

2. Generating Process:
3. Source Code: Form Code:

C. SHIPPING/PACKAGING INFORMATION

1. DOT Hazardous Materials? ◯ Yes ◯ No Proper Shipping Name:
2. Additional Description: *(49 CFR 172.203, e.g. "Lead" or "D008")*
3. RQ: ◯ Yes ◯ No RQ Reason: RQ Threshold: UN/NA #:
   Packing Group: ERG #: Hazard Class: Select #1 Select #2 Select #3
4. DOT Special Permit? ◯ Yes ◯ No Permit #:
5. 24-Hour Emergency Phone: 6. DOT Inhalation Hazard? ◯ Yes ◯ No
7. Container Type: ☐ Bulk ☐ Totes ☐ Pallet ☐ Boxes ☐ Drums ☐ Cylinder Container Size:
   ☐ Lab Pack *(If 40 CFR 264.316/49CFR 173.12(b) Lab Pack Inventory lists required)*
   ☐ Combination Containers (e.g., inner containers), Describe:
   ☐ Other, Describe:
8. Volume/Frequency: Volume: Units:
   Frequency: ◯ Year ◯ Quarterly ◯ Monthly ◯ 1 Time ◯ Other, Describe:

D. PHYSICAL PROPERTIES *(Use additional form if necessary)*

1. Physical Description *(e.g. soil, water, PPE, debris, sorbent, etc. Include 100% of container content. If debris, provide dimensions & weight.)*

Description	Typical (%)	Min (%)	Max (%)

2. Odor: ◯ None ◯ Slight ◯ Strong Odor Type: ☐ Ammonia ☐ Amines ☐ Mercaptans ☐ Sulfur ☐ Organic Acid ☐ Other, Describe:
3. Physical State: *(at 70°F)* ☐ Solid ☐ Dust/Powder ☐ Debris ☐ Sludge/Slurry ☐ Liquid ☐ Gas/Aerosol ☐ Varies
4. Color: Primary Color Secondary Color 5. Liquid phases: ◯ Single ◯ Double Layer ◯ Multi-layer ◯ N/A
6. Is it solid using the paint filter test? *(40 CFR Part 264.314(b))* ◯ Yes *(Solid)* ◯ No *(Not Solid)*
   Is there a possibility of incidental liquids from transportation? ◯ Yes ◯ No
7. pH: *(If solid, provide estimated pH if mixed 50:50 with water)* ☐ ≤ 2 ☐ 2.1 - 4.9 ☐ 5 - 10 ☐ 10.1 - 12.4 ☐ ≥ 12.5
8. Flash Point: °F and/or ☐ < 90°F ☐ 90 - 139°F ☐ 140 - 199°F ☐ ≥ 200°F ☐ Does Not Flash ☐ Flammable Solid
   BTU /lb. Value: and/or ◯ <5000 BTU ◯ ≥5000 BTU
9. Are there any known handling/treatment issues involving this material? ***(i.e. Describe whether the waste stream has ever been the direct or suspected cause of a fire or other reaction, and whether there are any specific controls you use to prevent any adverse reactions?)***
   ◯ Yes ◯ No *If yes*, Describe:

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E. CHARACTERIZATION & CHEMICAL COMPOSITION *(Use additional form if necessary)*

1. **Robstown Facility Customers - Waste/Material Type:** ○ Industrial ○ Non-Industrial ○ N/A **TX State Code:**
Pennsylvania Residual Waste: ○ Yes ○ No **PA State Code(s):**

2. **State Waste Codes:** ☐ None

3. **RCRA Waste Codes:** ☐ None

If None, is it exempt from the definition of "Solid Waste" or "Hazardous Waste"? ○ Yes ○ No
If yes, list reference from 40 CFR Part 261.2, 3, or 4:

4. **If F006-F009, F012, or F019, are Cyanides used in the process?** ○ Yes ○ No *(If yes, Total and Amenable CN (9010/9012) analysis required)*

5. **Knowledge is from:** ☐ Lab analysis *(requires attachment)* ☐ SDS/MSDS *(requires attachment)* ☐ Process/generator knowledge

6. **Chemical Composition** *(include all applicable UHC's, TRI Section 313 chemicals, OSHA Hazardous Materials, PFAS Constituents, etc.)*

Constituent	Units	TCLP	Totals	Typical	Min	Max	UHC	Exceeds LDR
	Select	○	○				☐	☐
	Select	○	○				☐	☐
	Select	○	○				☐	☐
	Select	○	○				☐	☐
	Select	○	○				☐	☐
	Select	○	○				☐	☐
	Select	○	○				☐	☐
	Select	○	○				☐	☐

F. ADDITIONAL PROPERTIES ☐ **None Apply** *(Through Question F23)*

1. **Explosive:** ○ Yes ○ No	2. **Reactive Sulfides:** ____ ppm ○ Yes ○ No
3. **Shock Sensitive:** ○ Yes ○ No	4. **Reactive Cyanides:** ____ ppm ○ Yes ○ No
5. **Radioactive:** ○ Yes ○ No *(If yes, complete Radioactive Waste Acceptance Supplement)*	6. **Reactive Other:** ○ Yes ○ No **Describe:**
7. **Medical/Infectious/Biohazard Waste:** ○ Yes ○ No	8. **Polychlorinated Biphenyls (PCB):** ○ Yes ○ No *(If yes, complete PCB Supplement)*
9. **Dioxins and/or Furans:** ○ Yes ○ No	10. **Metal Fines/Powder/Paste:** ○ Yes ○ No *(Including Aluminum)*
11. **Pyrophoric:** ○ Yes ○ No	12. **Temperature Controlled:** ○ Yes ○ No *(For Transportation Only)*
13. **Thermally Unstable:** ○ Yes ○ No	14. **Biodegradable Sorbents:** ○ Yes ○ No
15. **Compressed Gas:** ○ Yes ○ No *(If yes, complete Compressed Gas Cylinder Supplement)*	16. **Used Oil:** (per 40 CFR Part 279) ○ Yes ○ No *(If yes, complete Used Oil Supplement)*
17. **Oxidizer:** *(List in Section E6)* ○ Yes ○ No	18. **Tires:** *(If yes, must be quartered for landfill)* ○ Yes ○ No
19. **Organic Peroxide:** ○ Yes ○ No	20. **Beryllium:** ○ Yes ○ No
21. **Ammonia/Ammonia Compounds:** ○ Yes ○ No	22. **Per-and Polyfluoroalkyl Substances (PFAS):** ○ Yes ○ No

23. **Asbestos:** ○ Yes ○ No **If Yes:** ○ Friable ○ Non-Friable *(If friable, material must be packaged per 40 CFR Part 61.150)*

24. **Hazardous Secondary Material:** *(Per 40 CFR Part 260.10)* ○ Yes ○ No
If yes, ☐ I certify that this waste/material meets all requirements of legitimate recycling of Hazardous Secondary Materials under 40 CFR Part 260.43 and/or I am complying with the conditions for generators using one verified recycler exclusion.

25. **Are pharmaceutical wastes profiled under this approval subject to a prescription?** ○ Yes ○ No ○ N/A
(If yes, complete Pharmaceutical Certification Supplement)

G. REGULATORY INFORMATION

1. **Volatile Organic Concentration:** *(Per 40 CFR Part 264.1083 & 265.1084)* ○ <500 ppmw ○ ≥500 ppmw

2. **Has the material been treated after the initial point of generation?** ○ Yes ○ No *If yes,* **Describe:**

3. **If RCRA Hazardous:** ○ None Apply
   - ○ Wastewater *WW=<1% TSS & TOC; 40 CFR Part 268.2*
   - ○ Non-wastewater *TSS/TOC>WW*
   - ○ Alternative Treatment Standards for soil *> 50% soil; 40 CFR Part 268.49*
   - ○ Alternative Treatment Standards for debris *40 CFR Part 268.2(g) & (h); >50% of waste is >2.5 inch size*
     - ☐ I confirm debris cannot reasonably be separated from non-debris by simple physical or mechanical means.
     - ☐ I confirm debris has not been mixed/diluted with non-debris as prohibited in *40 CFR Part 268.3.*
   - ○ Waste meets LDR Treatment Standards

4. **Treatment subcategory:** *(if applicable)*

5. **Is the site or waste/material, subject to NESHAP/MACT standard(s)?** ○ Yes ○ No
   If yes, **Please choose the applicable Part:** ○ 61 ○ 62 ○ 63 **Subpart** ____ **of NESHAP/MACT standards** ○ **N/A**

6. **Is the waste/material RCRA Hazardous containing Benzene and originating at a petroleum refinery (SIC 2911), chemical manufacturing plant (SIC 2800 thru 2899) or Coke by-product recovery plant (SIC 3312)?**
   ○ Yes ○ No (*If yes, complete the Benzene Waste Operations Supplement and if applicable the Thermal Supplement.*)

H. GENERATOR'S CERTIFICATION

1. **Is a specific facility or treatment technology requested?** ○ Yes ○ No

2. **Requested Technology:**

3. **Thermal processing:** ○ Yes ○ No *(If yes, complete Thermal Supplement)*

4. **Other specific restrictions requested:**

5. **Requested Facility:**
   (If Chicago Facility, complete Illinois Disposal Supplement)

I certify that all information (including attachments) is complete, factual and is an accurate representation of the known and suspected hazards pertaining to waste/material described herein. I authorize Republic Services' personnel to add supplemental information to the Waste/Material Profile Form, provided I am contacted and grant permission to do so. Republic Services may require re-submittal of the Waste/Material Profile Form if substantial changes are determined necessary. I authorize Republic Services' personnel to obtain a sample from any waste/material shipment for purposes of verification and confirmation and understand that waste/material that does not conform to specifications described in this Waste/Material Profile Form may be rejected by Republic Services. I certify that I am familiar with the waste/material described herein through analysis and/or process knowledge and that all information is true, accurate, representative and complete and that this Waste/Material Profile Form was completed in accordance with the instructions provided.

If I am an agent acting on behalf of the generator, I also certify that I have permission to sign any and all waste/material characterization paperwork on the generator's behalf and that I can produce such certification in writing upon request.

Print Name: **Signature:**

Title: **Company:**

Date:

Figure 4 - Waste Recertification Document Example

US ecology

RE-APPROVAL NOTICE

Customer Account: _____

Name: _____

Company: _____

Address: _____

City, State Zip: _____

Thank you for selecting US Ecology as your environmental management partner. In the event that a waste stream has changed, the generator may use this form to re-approve the waste profile.

Generator Name: _____ **EPA ID No.:** _____

For Benzene NESHAP Regulated Generators: Please provide your updated TAB here _____ Mg/Year, if this field is left blank, it will be assumed that there are no changes to the TAB quantity for your facility.

Waste Common Name: _____

Waste Code(s): _____

Approval No.: Expiration Date:

Please select one of the following options:

❑ Re-approval with No Process Change
❑ Re-approval with Process Change
❑ Process Change

Please provide a detailed description below of the changes to the waste stream:

_____

_____

This Re-approval Notice acknowledges the acceptability of waste material(s) into the EQ facility(s) and ensures that each facility has the appropriate permit(s) issued by federal and state regulatory agencies to properly transport, treat, and/or dispose of the waste material(s). Upon signature and submittal of this form, the waste stream will be reviewed to extend the expiration for one year.

I certify that all information (including attachments) is complete and factual and is an accurate representation of the known and suspected hazards, pertaining to the waste described herein. I authorize EQ to add supplemental information to the waste approval file, provided I am contacted and give verbal permission. I authorize EQ to obtain a sample from any waste shipment for purposes of verification and confirmation. I agree that, if EQ approves the waste described herein, all such wastes that are transported, delivered, or tendered to EQ by Generator or on Generator's behalf shall be subject to, and Generator shall be bound by, the Standard Terms and Conditions associated with the original Waste Profile. (The Standard Terms and Conditions are incorporated into the Waste Profile as Page 4.)

Generator Signature: _____ Printed Name: _____

Company: _____ Date: _____

Questions? Please call (800)592-5489. Please return completed document to Customer Service via fax (800)592-5329 or e-mail at customer.service@usecology.com

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Figure 5 – Land Disposal Restriction Form Example

LAND DISPOSAL RESTRICTION FORM **Profile #:**
(From Question G3)

Generator Information			
1. Generator:			**2. EPA ID Number:**
3. Manifest Number:	**4. Line Number:**	**5. Waste is a:** ◯ Wastewater (<1% TSS & TOC) ◯ Non-wastewater ◯ Debris	
6. Notification Frequency: ◯ One Time ◯ Required with Each Shipment			
7. Shipment EPA Waste Codes:			
8. UHC's: *(Underlying Hazardous Constituents 40 CFR 268.48)?* ◯ Yes ◯ No *(If yes, list constituents):*			
9. Does a subcategory apply per 40 CFR 268.40? ◯ Yes ◯ No *(If yes, select subcategory):*			
10. Constituents requiring treatment in F001-5, F039, debris, and alternate soils? ◯ Yes ◯ No *(If yes, list):*			

Requires Treatment

☐ **Waste Subject To Treatment (40 CFR 268.7(a) (2))**
The restricted waste identified above must be treated to the applicable treatment standards in 40 CFR 268.40, or treated to comply with applicable Prohibitions set forth in Part 268.32 or RCRA Section 3004(d) and 268.49 (c).

If applicable, under 268.49, this contaminated soil ◯ does or ◯ does not contain listed hazardous waste and ◯ does or ◯ does not exhibit a characteristic of hazardous waste and is subject to the soil treatment standards as provided by 268.49 (c) or the universal treatment standards.

☐ **Hazardous Debris Subject To Treatment (40 CFR 268.45)**
This hazardous debris identified above must be treated to the alternative treatment standards in 40 CFR 268.45.

☐ **Waste De-characterized But Requires Treatment For UHC (40 CFR 268.7 (b) (4) (iv))**
I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 or 268.49 to remove the hazardous characteristic. This de-characterized waste contains Underlying Hazardous Constituents that require further treatment to meet treatment standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

Waste Meets Treatment Standards

☐ **Waste Meets Treatment Standards (40 CFR 268.7(a) (3))**
The restricted waste identified above meets the treatment standards in 40 CFR 268.40 or Alternative LDR treatment standards for contaminated soil 40 CFR268.49 and can be landfill disposed without further treatment.

If applicable, under 268.49, this contaminated soil ◯ does or ◯ does not contain listed hazardous waste and ◯ does or ◯ does not exhibit a characteristic of hazardous waste and complies with the soil treatment standards as provided by 268.49 (c) or the universal treatment standards.

☐ **I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D. I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.**

☐ **Waste Treated To Treatment Standards (40 CFR 268.7(b) (l) & 268.7 (b) (2))**
The treatment residue, or extract of such residue, or the restricted waste identified above has been tested to assure that the treatment residues or Extract meet all applicable treatment standards in 40 CFR 268.40 and/or performance standards in 40 CFR 268.45

☐ **I certify under penalty of law that I personally have examined and am familiar with the treatment technology and operation of the treatment process used to support this certification. Based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the treatment process has been operated and maintained properly so as to comply with the treatment standards specified in 40 CFR 268.40 without impermissible dilution of the prohibited waste. I am aware there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.**

Waste Soil treated to alternative standards (40 CFR 268.7 (b) (4))

☐ **I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and believe that it has been maintained and operated properly so as to comply with treatment standards specified in 40 CFR 268.49 without impermissible dilution of the prohibited wastes. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.**

I certify and warrant that the information that appears on this form, and appended documents, is true and correct. I have correctly indicated how my waste is to be Managed in accordance with 40 CFR 268. My certification is based on personal examination of the information submitted, or is based on my inquiries of those individuals responsible for obtaining the information.

Print Name:	**Signature:**	**Title:**	**Date:**

Figure 6 – Fingerprint Tests

Test	Solid Hazardous Waste	Non-Bulk Liquid Hazardous Waste	Bulk Liquid Hazardous waste
Color	X	X	X
Odor	X	X	X
Consistency	X	X	X
pH		X	X
Flashpoint		X	X
Oxidizer (if profile indicates potential)		X	
Specific Gravity			X

Appendix 1 – D003 Waste Treatment Protocol

The facility will treat a subset of D003 wastes having the properties described in 40 CFR 261.23(a)(2), 40 CFR 261.23(a)(4), or 40 CFR 261.23(a)(5) as detailed below and approved by DEQ.

RCRA Reactive Property	**DOT Category**	**General Waste Streams**
40 CFR 261.21(a)(2)	DOT Class 5.1~~,~~ DOT Class 5.2	Organic peroxides, or any organic compound containing bivalent oxygens that are derivatives of hydrogen peroxide, such as peroxyacetic acid or benzoyl peroxide; oxidizers such as nitrated, chlorated, or hypochlorite compounds; other waste streams that can be managed by deactivation. Sometimes these can be characterized as D003 (in addition to D001, D002) by the generator.
40 CFR 261.23~~1~~(a)(4) 40 CFR 261.23(a)(2)	~~DOT 5.1,~~ DOT Class 6.1~~,~~ DOT C~~c~~lass 8	Water reactive waste streams that can generate toxic gas. Phosphorus (tri, penta or oxychloride, or pentoxide) in smaller, limited volumes managed by neutralization.
40 CFR 261.23~~1~~(a)(5)	DOT Class 6.1 DOT C~~c~~lass 8 DOT Class 9	Thiols, sulfides, and other sulfur-bearing waste streams can be used as a reducing reagent source to treat other waste (such as sodium sulfide, hydrosulfide, thioglycolates, thiosulfates) such as metals-contaminated waste streams as well as cyanide-containing waste streams rendering it to a less toxic form managed by deactivation, stabilization, or neutralization, depending on the waste type and purpose.

Attachment 10

RCRA Part B Permit Application

Process Description

US Ecology Tulsa, Inc.

Tulsa, Oklahoma

Permit Modification Application ~~June~~ September **2025**

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Attachment 10 - Process Description

This section provides specific process information regarding the management of hazardous waste at the US Ecology Tulsa, Inc. (USE Tulsa) facility located near Tulsa, Oklahoma. Waste management practices at USE Tulsa have been designed in accordance with the requirements of 40 Code of Federal Regulations (CFR) 264 Subpart I and Subpart J which are incorporated by reference into Oklahoma Administrative Code (OAC) 252:205-3-2(f). USE Tulsa accepts hazardous waste as identified in the facility Part A Permit (Section A of this document) for treatment, container/tank storage, and other management on-site. In addition, USE Tulsa may generate hazardous wastes as a result of waste management operations on-site. USE Tulsa also handles other industrial wastes (i.e., wastes not designated as "hazardous" in accordance with 40 CFR Part 261 and OAC 252:515 [see Attachment 12 – Solid Waste Activities for details regarding solid waste activities on-site]). Although solid waste management may parallel hazardous waste activities where appropriate, this section is not applicable to non-hazardous waste management. However, non-hazardous wastes may be managed in tanks or container areas permitted for hazardous waste service so long as compatibility issues are addressed. Hazardous waste in containers may be stored and/or treated in Container Management Areas (CMAs) at four locations on the facility: CMA-1, CMA-2, CMA-3, and CMA-4. Of these units, CMA-1 is proposed for expansion. The locations of the existing CMAs and proposed expanded CMA-1 are shown on Figures 1 and 1-b presented in Attachment 1 - Maps and Figures.

Containers may be located within other areas on-site. Site generated wastes, such as but not limited to, discarded Personal Protective Equipment (PPE), tank bottoms, process residues, and laboratory waste may be managed in accordance with generator standards for satellite accumulation as specified in 40 CFR 262.15. All other generated waste may be accumulated for ninety (90) days or less in containers complying with the requirements of 40 CFR Part 264 Subpart I and located only within permitted areas onsite.

USE Tulsa currently stores and treats liquid hazardous waste in four (4) tanks located in one tank farm (TF-1) and treats hazardous waste in two (2) TA-series treatment tanks. Tanks designated for non-hazardous waste service previously present on-site at the 200 and 400 series Tank Farms (i.e.,

TF-2 and TF-4, respectively) will be removed. After the existing non-hazardous waste tanks have been removed from TF-4, the TF-4 containment area will be improved, four (4) new hazardous waste tanks will be installed in TF-4 to take over the hazardous waste storage operations being conducted in TF-1, and the tanks in TF-1 will be closed and removed. Operations in the TF-4 tanks will not begin until closure of the TF-1 tanks is completed. In addition, existing treatment tank TA-2b will be replaced with a larger tank, also called TA-2b, and new treatment tank TA-2c, with the same design as TA-2b, will be added. The locations of the existing and proposed tank farms and tanks are shown on Figures 1 and 1-b presented in Attachment 1 - Maps and Figures.

USE Tulsa does not manage hazardous waste in waste piles, surface impoundments, incinerators, landfills, land treatment units, or miscellaneous units.

1. CONTAINER DESIGN

Containers managed in USE Tulsa CMAs may include units of any size composed of a variety of materials of construction; non-bulk as well as bulk containers may be used. 40 CFR 260.10 includes a definition of the term container as any portable device in which a material is stored, transported, treated, disposed of, or otherwise handled. Non-bulk and bulk containers are distinguished based on capacity and net mass (49 CFR §171.8). Non-bulk containers have a capacity of 450 liters (119 gallons) or less for a liquid or a solid and a net mass of 400 kilograms (882 pounds) or less for a solid. Bulk containers have a capacity greater than 450 liters (119 gallons) for a liquid or a solid and a net mass greater than 400 kilograms (882 pounds) for a solid material.

Most containers managed on-site are "55 gallon drums"; however, containers accepted at USE Tulsa may include containers of any capacity (e.g., pint sized cans, 5 gallon pails, 30 gallon drums, tote tanks, glass bottles, "Marino Bags," overpack containers, etc.). In addition, bulk containers such as gondolas, sludge boxes, roll-on/roll-off boxes, and intermodal containers may be managed on-site. Containers may be constructed of carbon steel, aluminum, other metals, plastic lined metal containers, various plastics, fiberglass, glass, wood, cardboard, or other appropriate materials. Containers used to store hazardous waste on-site will comply with the requirements of Subpart I, 40 CFR Part 264. Where applicable, US Department of Transportation (US DOT) Performance Oriented Packaging Standards will be used for wastes offered for shipment off-site. The facility

may receive and ship hazardous wastes in any appropriate US DOT approved or performance specified container (used or new); other types of containers may be used for storage and processing of site generated hazardous wastes or for specific on-site processes.

CMAs are permitted for capacity based in volume (i.e., gallons or cubic feet) to facilitate management of different container sizes. The facility Part A Permit Application provides capacity information for the permitted container storage areas.

a. CONTAINERS WITH FREE LIQUIDS AND/OR F020, F021, F022, F023, F026, AND F027 WASTES

Containerized hazardous waste with free liquids and/or F020, F021, F022, F023, F026, and F027 wastes will be stored in permitted areas equipped with secondary containment systems only. Containment systems for these container storage areas will be designed and operated as follows:

- Containment systems will be equipped with a base for containers which is free of cracks or gaps and is sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed.
- The base of containment systems will be sloped or the containment system will be otherwise designed and operated to drain and remove liquids resulting from leaks, spills, or precipitation (e.g., concrete floor will be sloped, or the containers will be elevated, or containers will be otherwise protected from contact with accumulated liquids).
- Containment systems will have sufficient capacity to contain 10% of the total volume of containers or the volume of the largest container, whichever is greater (containers that do not contain free liquids need not be considered in this determination).
- Run-on into the containment system will be prevented unless the collection system has sufficient excess capacity (in addition to 10% of the volume of containers or the volume of the largest container, whichever is greater) to contain any run-on which might enter the system.

- Spilled or leaked waste and accumulated precipitation will be removed from the sump or collection area in as timely a manner as is necessary to prevent overflow of the collection system:
    - Precipitation and liquid accumulated in secondary containment areas is inspected to determine if it has been contaminated by hazardous waste by visually inspecting the surface for a sheen on the liquid surface or observing if there is contamination associated with waste managed in that area. If a sheen or released waste is observed, the liquid is presumed to have been contaminated and will be managed as a hazardous waste. If a sheen or other anomalous indications are not observed, and there has not been a release that might have contaminated the water, the water will be released to the surface outside the containment area similar to rainfall falling outside of containment.
    - If the collected material is a hazardous waste as defined in 40 CFR Part 261, it will be managed as a hazardous waste in accordance with all applicable requirements of 40 CFR Parts 262 through 266, 268, and 279.

i. BASIC DESIGN PARAMETERS, DIMENSIONS, AND MATERIALS OF CONSTRUCTION

Storage of hazardous waste in containers is conducted in four (4) CMAs (CMA-1, CMA-2, CMA-3, and CMA-4). Locations of the existing units and proposed expanded CMA-1 are shown on Figures 1 and 1-b (A-2, Facility Layout (Existing Conditions) and A-2b, Facility Layout (Proposed Site Plan), respectively) - presented in Attachment 1 - Maps and Figures. Design parameters, dimensions, and materials of construction of the secondary containment systems for the CMAs are presented in Section C of this application. Per 40 CFR 264.175(c), the Container Management Area 4 (CMA-4) need not be provided with secondary containment since only containers with no free liquids are stored in this area. In addition, the CMAs are sloped so that the containers do not sit in rainwater, or they are elevated to protect the container from accumulated liquid. Appendix 4, Permitted Hazardous Waste Container Management Area Information Table in Section C -

Information Requirements for Containers provides additional details regarding containment and capacity of these units.

ii. DESCRIPTION OF HOW DESIGN PROMOTES DRAINAGE OR HOW CONTAINERS ARE KEPT FROM CONTACT WITH STANDING LIQUIDS IN CONTAINMENT SYSTEMS

Containment systems for CMAs at USE Tulsa are designed with slopes for drainage of liquids or are otherwise designed and operated to drain and remove liquids resulting from leaks, spills, or precipitation, except where the containers are elevated or are otherwise protected from contact with accumulated liquids. Hazardous waste in containers may be managed on pallets or directly on the container management area floor. Standard operating procedures include daily inspections in accordance with container inspection requirements outlined in Attachment 4 - Inspection Schedules and Forms and Attachment 6 - Procedures to Prevent Hazards. The inspections facilitate the detection and appropriate management of liquids accumulated in CMAs.

iii. CAPACITY OF THE CONTAINMENT SYSTEM RELATIVE TO THE NUMBER AND VOLUME OF CONTAINERS TO BE STORED

In accordance with 40 CFR 264.175, containment systems for container storage areas that may contain free liquids must have sufficient capacity to contain 10% of the total volume of containers or the volume of the largest container, whichever is greater. Containers that do not contain free liquids need not be considered in this determination. Section C and Section T of this application for details regarding capacity of containment systems for container storage areas. CMAs which share containment structures with tank storage areas (CMA-1 and Tank Farm 4 [TF-4]) will be equipped with adequate containment for 10% of the total volume of hazardous waste storage capacity (containers and tanks), the volume of the largest container, or the volume of the largest tank, whichever is greatest. In accordance with the containment requirements for tank systems, any tank and container co-management area will be provided with a containment volume adequate to contain the additional volume of the precipitation of the 24-hour, 25-year rainfall event, if the co-management area is not protected from precipitation.

iv. PROVISIONS FOR PREVENTION OR MANAGING RUN-ON

CMA-1, CMA-2, and CMA-3 are equipped with secondary containment structures which are designed to contain accumulated liquid within containment systems. Containment structures will minimize the potential for run-on of precipitation into containment systems. Where installed, the roof or canopy (or equivalent cover) will minimize the accumulation of precipitation in containment systems.

v. HOW ACCUMULATED LIQUIDS CAN BE ANALYZED AND REMOVED TO PREVENT OVERFLOW

USE Tulsa operating procedures include inspections designed to identify accumulated liquids in a timely manner (inspection schedule and criteria are outlined in Attachment 4 - Inspection Schedules and Forms and Section 6 - Procedures to Prevent Hazards). After discovery, spilled or leaked waste and accumulated precipitation will be removed from the sump or collection area in as timely a manner as is necessary to prevent overflow of the collection system. Accumulated liquids will be identified by visual observation, review of facility records, and (if deemed necessary) by chemical analysis. If required, analyses will be conducted in accordance with the facility Waste Analysis Plan presented in Attachment 2 - Waste Characteristics and Waste Analysis Plan.

b. CONTAINERS WITHOUT FREE LIQUIDS OR F020, F021, F022, F023, F026, AND F027 WASTES

Except for hazardous wastes identified as F020, F021, F022, F023, F026, and F027, containers holding wastes that do not contain free liquids may be stored in areas not equipped with secondary containment. In accordance with the requirements of 40 CFR 264.175, test procedures and results or other documentation that the wastes do not contain free liquids will be obtained prior to storage of these wastes in these areas not equipped with secondary containment systems. This documentation may include use of the Paint Filter Liquids Test, Method 9095 in SW-846 or other equivalent method.

Hazardous wastes designated as F020, F021, F022, F023, F026, and F027 will not be stored in areas not equipped with a secondary containment system.

c. CONTAINER MANAGEMENT

Permitted hazardous wastes managed in containers on-site are identified in the facility Part A Permit Application.

Types of containers managed on-site are described previously; compatibility of waste with containers is discussed in Section ii below.

Container management at the USE Tulsa facility consists of storage of waste in a variety of container types. Container management activities include bulking, consolidating, and decanting to combine compatible waste streams into a single container for ease of storage. Secondary containment is not required for containers that do not contain or involve free liquids and meet the requirements of 40 CFR 264.175(c).

i. CONDITION OF CONTAINERS: 40 CFR 264.171

USE Tulsa may reject any container of hazardous waste if the container is in poor condition, the container is incompatible with the waste, or if the container is not in compliance with US DOT requirements. If an accepted hazardous waste is in a container that is not in good condition (e.g., severe rusting, apparent structural defects) or if the container begins to leak, USE Tulsa personnel will transfer the hazardous waste from this container to a container that is in good condition, will provide an "over-pack" for the affected container, or manage the waste in on-site processes. Other deficiencies in containers of incoming wastes will be addressed on a "case-by-case" basis.

ii. COMPATIBILITY OF WASTE WITH CONTAINERS: 40 CFR 264.172

When placing waste in a container, USE Tulsa will use a container made of or lined with materials which will not react with, and is otherwise compatible with, the hazardous waste to be stored, so that the ability of the container to contain the waste is not impaired.

iii. MANAGEMENT OF CONTAINERS: 40 CFR 264.173

Management of containers at USE Tulsa is conducted as follows:

- Containers holding hazardous waste will always be closed during storage, except when it is necessary to add, remove, or inspect waste.

- Sampling of containers may occur during pre-acceptance, staging, or storage; sampling methods are presented in Attachment 2 - Waste Characteristics and Waste Analysis Plan.
- Any container holding hazardous waste will not be opened, handled, or stored in a manner which may rupture the container or cause it to leak.

1. HANDLING PROCEDURES

Containerized hazardous wastes may remain on the transport vehicle during completion of acceptance protocol and will be inspected daily; acceptance protocol is outlined in Attachment 2 - Waste Characteristics and Waste Analysis Plan. Acceptance protocol will be completed within ten (10) days. After the acceptance protocol is completed, wastes will be transferred into designated permitted CMAs within 24 hours of acceptance. Containerized wastes will be moved to an appropriate CMA if analysis identifies any compatibility problems. Containment (permanent or portable) will be provided for hazardous waste pending acceptance. Examples of portable containment include overpack drums, self-contained pallets and portable spill berms. Portable containment is intended to be used for non-bulk or small bulk containers that have been unloaded from the vehicle for sampling and are waiting for receipt approval.

2. CONTAINER TYPES, QUANTITY, AND STACKING ARRANGEMENTS

As discussed in Section l, USE Tulsa may accept containers of any size for management on-site. To accommodate operational requirements and depending on compatibility requirements, any container management area may be used for any container type or volume provided the permitted volume is not exceeded. If applicable, containment systems will be decontaminated prior to storage of an incompatible waste type in the unit.

Permitted storage of hazardous waste in containers occurs in four (4) CMAs on-site. Section C of this application includes details regarding permitted volumes and design parameters for these areas.

Single containers may be unloaded and/or moved manually or with mechanical drum handling equipment such as hand carts, drum dollies, forklifts, backhoe or equivalent equipment. Forklifts or industrial trucks may be used for palletized containers. Equipment is available for over-packing, repackaging, or bulking operations. Ramps (permanent or portable) as well as portable containment units may be used during unloading, staging, or storage of containers.

USE Tulsa conducts regular inspections to facilitate the detection of accumulated liquids in containment areas and to assess container status (i.e., that containers are sealed, stacked properly, and are in good condition). Specifics regarding facility inspections are presented in Attachment 4 - Inspection Schedules and Forms and Attachment 6 - Procedures to Prevent Hazards. Accumulated liquids will be removed from containment systems in CMAs within 24 hours of detection. Response to container leaks and spills (including identification of accumulated liquids in CMAs) is addressed in Attachment 5 - Contingency Plan.

Minimum aisle space of three (3) feet will be maintained in CMAs to facilitate inspections and (if necessary) the movement of emergency equipment. Where applicable, stacking of compatible wastes in containers is conducted in accordance with the National Fire Protection Association (NFPA) code. Containers may only be stacked if they have sufficient strength and stiffness to resist bending or buckling and remain vertical without perceptible leaning. Fifty-five (55) gallon size or larger containers may be double stacked during storage; pallets, skids, plywood or equivalent devices may be used to facilitate container management. Smaller containers may be stored in stacks of multiple containers. Total stack height will be limited to eight (8) feet or less unless all drums are secured on pallets and pallet racks are used. Configuration of pallets will be in rows approximately four to five (4-5) feet wide. Shipments of palletized containers may be "banded," "shrink-wrapped," or otherwise consolidated for shipping purposes and, after acceptance approval, may be placed in storage "as is." Containers holding multiple smaller containers (such as lab packs) may be double-stacked or multi-

stacked, as applicable, for the size of the consolidating container. Total volume of containerized hazardous wastes will not exceed the permitted capacity.

3. LOCATION OF IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTE

Management practices for ignitable, reactive, and incompatible wastes at USE Tulsa have been designed to minimize the potential for fires, explosions, gaseous emission, leaching, or other discharge of hazardous waste or hazardous waste constituents which could result from the mixing of incompatible wastes or materials if containers break or leak. A specific procedure for the management of these wastes is outlined in Section B.9, Prevention of Accidental Ignition, Reaction of Ignitable, Reactive, or Incompatible Waste. USE Tulsa will not place incompatible wastes, or incompatible wastes and materials in the same container, unless the requirements of 40 CFR 264.17(b) are complied with. In addition, hazardous waste will not be placed in an unwashed container that previously held an incompatible waste or material.

Containers holding ignitable or reactive wastes will be located at least 50 feet from the USE Tulsa facility property line. Any container holding a hazardous waste that is incompatible with any waste or other materials will be separated from the other materials by means of a dike, berm, wall, or other equivalent device; portable containment units may be used for this purpose.

4. MARKINGS AND LABELS FOR CONTAINERS

USE Tulsa will store wastes subject to the Land Disposal Restrictions (LDR) in accordance with the applicable requirements of 40 CFR 268.50(a). Specifically, incoming LDR wastes will be dated during acceptance procedures (i.e., the container will be clearly marked to identify its contents and the date each period of accumulation begins). Lab pack wastes will be marked on the outside of the lab pack. Palletized shipments of small containers will be marked on each side of the consolidated stack.

5. CLOSURE

USE Tulsa has developed a closure plan for final and partial closure which is presented in Attachment 8 – Closure and Post-Closure Plan with Estimates and Insurance

Information. During final closure, all hazardous waste and hazardous waste residues will be removed from CMAs. Containment structures will be decontaminated or removed.

iv. CONTAINER INSPECTIONS: 40 CFR 264.174

As required under 40 CFR 264.174, USE Tulsa will inspect areas where containers are stored, looking for leaking containers and for deterioration of containers and the containment system caused by corrosion or other factors. See Attachment 4 Inspection Schedules and Forms for details regarding inspection of CMAs.

2. TANK SYSTEMS

USE Tulsa currently uses the above ground tank system in TF-1 for storage and treatment of liquid hazardous waste and two treatment tanks (TA-2a and TA-2b) for hazardous waste treatment. Locations of the existing tanks are shown on Figure 1: A-2, Facility Layout (Existing Conditions) presented in Attachment 1- Maps and Figures. As previously described, the tanks in TF-1 will be removed and new hazardous waste tanks will be installed in TF-4. In addition, the existing treatment tank TA-2b will be replaced with a larger tank and new treatment tank TA-2c will be added. Locations of the proposed tanks are shown on Figure 1: A-2b, Facility Layout (Proposed Site Plan) presented in Attachment 1 – Maps and Figures.

Treatment activities in tanks conducted at USE Tulsa include chemical oxidation, deactivation via chemical reduction of oxidizers and reactive waste streams, alkaline chlorination of cyanide waste streams, decanting, bulking, consolidation, encapsulation, fuel bulking, neutralization, permissible dilution, precipitation, solidification, stabilization, size reduction, or equivalent procedures. Treatment activities will take place only in permitted waste management units TA-2a, TA-2b, and TA-2c. The following are descriptions of the treatment techniques:

- Deactivation via Chemical Reduction (oxidizing or reactive property waste) – The deactivation treatment technology removes the hazardous characteristics of a waste via chemical reduction reagents (such as ferrous sulfate) due to its ignitability, corrosivity, and/or reactivity. Common safety practices include examples such as removal of combustible organic material from the treatment tanks, rinsing the treatment tank prior to commencing treatment, hydration of waste by a constant flow of water via hose or spray

bars that emit a mist to control emissions, metered addition into the treatment tanks (such as slowing the speed, gaging any expected reactions), utilization of pH adjusting reagents such as lime, and utilization of reducing reagents such as ferrous sulfate or sodium sulfide, among other similar products or waste. Waste streams are reviewed in the Approvals stage as well as by qualified chemists for compatibility such as fingerprinting and other analytical procedures as deemed necessary. During treatment, contents of each container will be visually inspected prior to the addition into the treatment tanks. After a treatment is completed and the treated residual has been dug out of the treatment tank utilizing an excavator bucket, the treatment tanks will be inspected for signs of contamination to ensure no contamination potential is carried into the next batch. This is done by rinsing the tank floors and walls and then removing any residual as deemed necessary

- Neutralization (Acidic or basic waste) – Adjusting corrosive hazardous waste to a pH level desired for the purpose of rendering waste to a less hazardous, and no longer regulated, state. This includes either raising acidic waste pH or lowering alkaline waste pH. Common safety practices for acidic waste streams include examples such as creating an alkaline "slurry" utilizing pH adjusting reagents such as lime and water, hydration of waste by a constant flow of water via hose or spray bars that emit a mist to control emissions (as needed), among other similar products or waste, and metering the addition of waste and reagent into the treatment tanks (such as slowing the speed, gaging any expected reactions.) Therefore, for treating corrosive materials, the treatment/neutralization chemicals will be added to the treatment tank prior to the addition of the corrosive waste/materials. This will ensure that any reactive, corrosive, or oxidizing substances are hydrated, and in a more controlled state.

- Stabilization (metal contaminated waste) – Stabilization is the use of reagents to chemically bind waste streams generally with heavy metals to prevent them from leaching into groundwater once disposed of in a landfill. This can be accomplished using reagents such as lime kiln dust, ferrous sulfate, sodium sulfide, among other similar products or waste in order to chemically bind thus stabilize the waste from leaching.

- Alkaline Chlorination (reactive property waste) – The chemical oxidation of cyanide uses bleach to convert cyanide to a cyanate, and the high pH environment hydrolyzes the cyanate into nitrogen and carbon dioxide. Common practices include but are not limited to hydration of waste and subjecting them to reagents such as hypochlorites, permanganates, and/or peroxides, among other similar products or waste, then deactivating. Safety practices include always keeping the pH of the waste environment alkaline (>11 s.u.). Waste streams are reviewed in the Approvals stage as well as by qualified chemists for compatibility such as fingerprinting and other analytical procedures as deemed necessary. During treatment, contents of each container will be visually inspected prior to the addition into the treatment tanks. After a treatment is completed and the treated residual has been dug out of the treatment tank utilizing an excavator bucket, the treatment tanks will be inspected for signs of contamination to ensure no contamination potential is carried into the next batch. This is done by rinsing the tank floors and walls and then removing any residual as deemed necessary.

- Solidification is the addition of an absorbent reagent to eliminate free liquids and pass a Paint Filter Liquids Test (Method 9095 in SW-846 or other equivalent method).

- Chemical Oxidation (reductive or organic waste) is binding a carbon atom usually with oxygen. This method is a way to break down hazardous waste into a less dangerous state, which is no longer regulated under RCRA. Common practices include, but are not limited to, hydration of waste and subjecting the waste to reagents such as hypochlorites, permanganates, and/or peroxides, among other similar products or waste, then deactivating (as described above.)

- Macro-encapsulation of waste will be treated to comply with 40 CFR 268.45, with surface coating materials such as polymeric organics (e.g., resins and plastics) or with a jacket of inert inorganic materials to substantially reduce surface exposure (and without leaving any empty spaces) to potential leaching media. Section T of this application provides information regarding the number of tanks, tank volumes, and material of construction as well as containment system design.

Management practices for reactive and incompatible wastes at USE Tulsa have been designed to minimize the potential for fires, explosions, gaseous emission, leaching, or other discharge of hazardous waste or hazardous waste constituents which could result from the mixing of incompatible wastes or materials if tank systems ruptured or failed. Specific procedures for the management of these wastes are outlined in Attachment 6 - Procedures to Prevent Hazards. USE Tulsa will not place incompatible wastes, or incompatible wastes and materials in the same tank unless the requirements of 40 CFR 264.17 are complied with. In addition, hazardous waste will not be placed in a tank that has not been decontaminated and previously held an incompatible waste or material unless the requirements of 40 CFR 264.17(b) are met.

Where reactive waste will be stored or treated in a tank system, USE Tulsa will comply with the requirements for the maintenance of protective distances between the waste management area and any public ways, streets, alleys, or an adjoining property line that can be built upon as required in the National Fire Protection Association (NFPA) code, "Flammable and Combustible Liquids Code," Tables 2-1 through 2-6, 1990. NFPA Tables 2-1 through 2-6, 1977 or 1981, are incorporated by reference into 40 CFR 260.11).

In the waste profile reviewing stage, if an SDS accompanies the waste stream it will be reviewed to ensure current treatment technologies to be executed can account for normal processing and treatment capabilities, and current safety protocols in place. The current treatment technology for removing the reactivity characteristic is neutralization and/or deactivation, depending on the waste stream. Some common examples include organic peroxides and some other oxidizers, phosphorus-bearing waste streams, cyanides, sulfides, reductants, etc. Safety precautions for treating cyanides can be referenced above in the alkaline chlorination section of this attachment. Sulfide-bearing waste streams will be treated in alkaline or basic conditions only. Certain oxidizers that are characterized by reactive D003 waste code will be subject to the deactivation (and thereby neutralization) procedure as referenced above in this attachment. Safety precautions in place for water reactive waste and air reactive waste with a flash point at or greater than 140 degrees Fahrenheit are subject to hydration by submerging the containerized waste under water in the treatment tank, continuous water flow or spray bars into the treatment tank, and limiting the batch sizes (quantity) to control anticipated reactions in the treatment tank. Waste streams are reviewed

in the Approvals stage as well as by qualified chemists for compatibility such as fingerprinting and other analytical procedures as deemed necessary. During treatment, contents of each container will be visually inspected prior to the addition into the treatment tanks. After a treatment is completed and the treated residual has been dug out of the treatment tank utilizing an excavator bucket, the treatment tanks will be inspected for signs of contamination to ensure no contamination potential is carried into the next batch. This is done by rinsing the tank floors and walls and then removing any residual as deemed necessary.

In addition, reactive waste will not be placed in the tank systems, unless the waste is treated by deactivation/neutralization during or immediately after placement in the tank system so that:

- The resulting waste, mixture, or dissolved material no longer meets the definition of reactive waste under 261.23 and the requirements of 40 CFR 264.17(b) are complied with.
- The waste is stored or treated in such a way that it is protected from any material or conditions that may cause the waste to react.

The facility Part A Permit Application identifies specific US Environmental Protection Agency (EPA) waste codes managed onsite; waste information including associated waste characteristics are addressed in Attachment 2-Waste Characteristics and Waste Analysis Plan. Waste types managed in tank systems are addressed in the tank certification documents presented in Section T of this application.

a. EXISTING TANK SYSTEMS

i. ASSESSMENT OF EXISTING TANK SYSTEM'S INTEGRITY: 40 CFR 264.191; 40 CFR 270.16(a)

Per 40 CFR 260.10, "Existing tank system" is defined as the tank system that is used for the storage or treatment of hazardous waste and that is in operation, or for which installation has commenced on or prior to July 14, 1986. Tanks T-101, T-102, T-103 and T-107 in TF-1 and treatment tanks TA-2~~b~~a and TA-2~~e~~b were installed after 1986. Hence, this section does not apply to USE Tulsa.

ii. EXTERNAL CORROSION PROTECTION

This subsection for the existing aboveground tank systems of TF-1, TA-2a, and TA-2b does not apply to USE Tulsa. However, the fiberglass tanks (T-101, T-102 T-103 and T-

107) are finished with a "gel-coat" which provides weather protection, and the steel treatment tanks (TA-2a and TA-2b) are isolated from direct contact with soil or water- by their steel containment.

b. NEW TANK SYSTEMS

i. ASSESSMENT OF NEW TANK SYSTEM'S INTEGRITY: 40 CFR 264.192; 40 CFR 270.16(a)

TF-4 will be developed as the new hazardous waste tank farm to replace TF-1. In addition, a larger TA-2b treatment tank will be constructed to replace existing TA-2b, and new TA-2c will be constructed. A written design assessment, reviewed and certified by an independent, qualified, registered professional engineer, on the structural integrity and suitability of each new tank system for handling hazardous waste is presented in Section T, Appendix 8 of this application. The assessment shows that the foundation, structural support, seams, connections and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength and compatibility with the waste to be managed to ensure that it will not collapse, rupture, or fail. Information provided in the assessment ~~and associated documents will~~ includes the following:

- Design standards (where applicable) according to which tank and ancillary equipment is (or will be) constructed;
- Hazardous characteristics of the wastes that are and will be handled;
- Corrosion assessment (where applicable);
- Design of operational measures to protect underground tank system components from potential damage by vehicles;~~Vehicular protection;~~ and ~~Documented or estimated age of tank system (not applicable as the new tank systems have not yet been constructed);~~
- Design considerations to ensure that tank foundations will maintain the load of a full tank, will be anchored to prevent flotation or dislodgement; and will withstand the effects of frost heave.

- Additional evaluations, as required by 40 CFR 264,192(b), will be conducted after the new tank systems have been constructed. ~~Results of a leak test, internal inspection, or other tank integrity examination~~

ii. EXTERNAL CORROSION PROTECTION

The proposed aboveground TF-4 tanks are fiberglass reinforced plastic (FRP) tanks lined with epoxy vinyl ester resin. These tanks will not be in contact with soil or water. Therefore, this subsection for the proposed TF-4 tank system does not apply to USE Tulsa.

Proposed treatment tanks TA-2b and TA-2c are below-ground tanks consisting of carbon steel within a concrete containment vault. There are no external metal components of the treatment tank systems that are in direct contact with the soil or with water. Therefore, this subsection does not apply to USE Tulsa.

iii. TANK INSTALLATION AND TESTING

Prior to placement of a tank system in hazardous waste service, an independent, qualified installation inspector or an independent, qualified registered professional engineer will inspect the tank system for the following items: 1) weld breaks; 2) punctures; 3) scrapes of protective coatings; 4) cracks; 5) corrosion; 6) other structural damage or inadequate construction/installation. In addition, the inspection will specify how all discrepancies were (or will be) repaired, how tank systems (including ancillary equipment) was (or will be) tightness tested, and how ancillary equipment is supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.

c. DIMENSIONS AND CAPACITY OF EACH TANK SYSTEM

Details regarding dimensions and capacity of each tank system are provided in Section T of this application. Tank farms for hazardous waste tanks will have secondary containment systems. Design parameters, dimensions, and materials of construction of the secondary containment systems for the tanks are presented in Section T of this application.

d. DESCRIPTION OF FEED SYSTEMS, SAFETY CUTOFF, BYPASS SYSTEMS, AND PRESSURE CONTROLS

USE Tulsa uses closed top tanks for storing liquid hazardous waste which are equipped with loading and unloading ports and vents; tank details for existing tanks T-101, T-102, T-103 and

T-107 and proposed tanks T-407, T-408 T-409 and T-410 are provided in Section T of this application. These tanks on-site are typically loaded using top fill lines and unloaded through bottom discharge lines or loaded/unloaded from bottom fill/discharge lines. Where present, manholes are used for inspection and cleaning operations. Spill prevention controls for truck unloading, such as check valves and quick connect couplings, will be used for the TF-4 tanks. Manual controls for overfill prevention will be implemented. Additionally, high level (80% capacity) and high-high level (90% capacity) audible alarms will be installed on each tank. Lastly, the proposed TF-4 tanks will be equipped with emergency pressure release vents in the event that a tank becomes over-pressurized.

USE Tulsa uses open-top atmospheric tanks for treating hazardous wastes. Tank details for existing treatment tanks TA-2a and TA-2b and proposed treatment tanks TA-2b and TA-2c are provided in Section T of this application. Bulk and containerized waste is transferred into the tanks manually by facility personnel during operations. Overfill is prevented via manual control. Based on the above operations, automated feed systems, safety cutoffs, and bypass systems are not needed. Spill prevention controls used for transferred bulk loads from trucks to treatment tanks include using quick connect coupling on fill lines and visual observation. Waste loads from roll-offs are dumped into TA-2a, TA-2b, and TA-2c. Fugitive particulate air emissions while handling dusty materials at the treatment tanks are controlled by applying a fine mist of water over a tank using a spray bar with nozzles. Other operational techniques used to control emissions for specific waste treatment techniques are ~~–~~described at the beginning of Section 2. As the tanks are open top and atmospheric, pressure control are not needed.

e. TREATMENT IN T-101, T-102, T-103, AND T-107

Existing tanks T-101, T-102, T-103, and T-107 will store and treat characteristically hazardous waste. Waste types include containerized waste and bulk loads in liquid or sludge physical state. Waste streams will be combined based on compatibility determination of the fingerprint data, treatability study laboratory results, and/or generator and/or chemistry knowledge. Typical reagents include (but are not limited to) lime kiln dust, quick lime, ferrous sulfate,

sodium sulfide, and sodium hydroxide. Process controls include specific instructions on anticipated safety concerns, such as order of waste, water, and reagents to be added to the treatment tank, and expected chemical reactions (if any). Volumes and/or ratios of reagents to waste to be treated will be distributed by an individual knowledgeable in chemistry to avoid impermissible dilution. The minimum mixing time shall be specified in specific Standard Operating Procedures (SOPs) and treatment instructions, based on the waste treatment type. All treatments must be mixed into a final homogenous treated batch. The treated waste is analyzed by the laboratory for verification of treatment. If batches fail the verification treatment, the tank will undergo a retreatment. Batches that pass treatment standards will be accompanied by the appropriate laboratory analysis, manifest, and LDR paperwork as required and kept on record. Disposal of treated waste will be scheduled to an appropriate landfill and paperwork retained on file.

f. TREATMENT IN TA-2a, TA-2b, AND TA-2c

Wastes that are characteristically hazardous may be treated in Treatment Tank TA-2a, TA-2b, and TA-2c (after it is constructed). Treatment chemicals can include, but are not limited to, cement kiln dust (CKD), bed ash, fly ash, lime kiln dust (LKD), quick lime, bleach, waster, ferrous sulfate, sodium hydroxide, sawdust, or Z-pellets. Other chemicals may be used after determination of a treatment protocol through laboratory studies, Safety Data Sheet (SDS) review, chemistry knowledge, etc.

The laboratory's treatment protocol for compatibility can include treatability studies as well as generator and chemical knowledge. During treatment, contents of each container will be visually inspected prior to addition into the treatment tanks. Any material that shows signs of discrepancies or reaction other than those expected during treatment (e.g., heat generation, off gassing, bubbling) shall be communicated to the Lab Manager and the Operations Manager immediately, those containers will be reviewed, and the containers will be marked with labels that indicate the containers are on hold, as applicable. If applicable, communications will be initiated with the CSR and Corporate Sales personnel of the issue with the container.

The waste will be reviewed during the approvals process to ensure that the Subpart CC volatile organic concentrations are less than 500 parts per million (ppm) before approving for onsite

treatment. Materials above 500 ppm volatile organics are not permissible for treatment in TA-2a, TA-2b, and TA-2c.

An excavator will be used to mix the waste and chemicals. The bucket of the excavator is maintained over the containment tank at all times. The bucket is cleaned before leaving the containment area.

Daily Inspection of the TA-2a, TA-2b, and TA-2c areas will be performed and documented to ensure safe and compliant operations. All spills are cleaned up immediately and management notified promptly.

Waste materials are mixed to a uniform and homogenous consistency before a representative sample is obtained. The mixture sample is tested for Toxicity Characteristic Leaching Procedure (TCLP) and Underlying Hazardous Constituent (UHC) requirements before characteristic waste can be de-classified.

Fugitive particulate air emissions while handling dusty materials are controlled using several methods. Water may be added to the mixing container prior to materials being introduced, water can be added to the containers prior to introduction to the treatment tank, or a fine spray of water can be misted over the treatment tank using a spray bar. Materials will be introduced and mixed in a manner that helps reduce the amount of dust emissions. During inclement weather processing will be adjusted to the safest manner possible.

For TA-2a, the liquid processing volume for the 42.7 yd^3 (8,625 gallons) treatment tank will be limited to 4,000-gallon batches maximum. This is required to allow for the secondary containment to hold 100% of the mixing volume (waste and reagents) and the volume in the containment occupied by ~~allow for the displacement of~~ the treatment tank. For TA-2b and TA-2c, the liquid processing volume for each ~~229~~219.~~2~~ 19 yd^3 (~~42,500~~44,267 gallons) tank will be limited to ~~21,250~~20,500-gallons. This will allow for the ~~outer~~ concrete secondary containment ~~volume~~ to hold 100% of the ~~treatment tank~~ mixing volume and the volume in the containment occupied by the steel tank and associated framing members~~while allowing for the volume displacement for the box~~. USE Tulsa will perform periodic metal thickness testing using an ultrasonic probe to ensure that the wall thickness is adequate, as established in paragraph of

Section T. In addition, a visual inspection shall be performed on days when the treatment tank is in use.

For waste that will undergo deactivation, chemical oxidization, or alkaline chlorination treatment technologies in the treatment tank, tank walls and floor will be inspected and cleaned of all potentially organic matter prior to beginning the oxidizing treatment. If water is used for cleaning, it can remain in the treatment tank and will be used for process water for the new mix. This will ensure that any potential oxidizing substances are hydrated and safe.

For treating corrosive materials, the treatment/neutralization chemicals will be added to the treatment tank prior to the addition of the corrosive materials. The use of water may be needed to control the heat of reaction.

For treating monolithic oxidizing waste streams or pool chemicals in the form of pucks, pre-treatment via size reduction will be performed prior to proceeding into the deactivation treatment technology. An example of accomplishing this would be utilizing the bucket of the excavator or a grinder. USE Tulsa will utilize a portable grinder, capable of reducing hockey puck sized pool cleaning wastes to a milled product. The reduction in size significantly improves the facility's ability to efficiently manage the waste streams and ensures complete deactivation prior to disposal. The portable grinder will include a single drum rotor grinder equipped with an infeed hopper, support stand, and discharge hopper. The components are manufactured with a combination of 304 stainless steel (hopper) and 316 stainless steel (grinding mechanism and support stand) for chemical compatibility. The design capacity of the grinder is 55-gallons.

The portable grinder will be operated, maintained, and closed in a manner that prevents releases that have adverse effects on human health or the environment due to migration of waste. Grinding activities will take place only within permitted facility CMAs and treatment tanks. These permitted units and their features prevent releases that may have adverse effects on human health or the environment due to migration of waste. No new containment features are proposed for the operation of portable grinder, as it will be operated within the footprint of existing units. Waste processed in the portable grinder will be done in batches. Waste will be processed expeditiously, and the unit will be cleared of all infeed material during the process

of a batch. No unprocessed material will be allowed to remain in the infeed hopper at the conclusion of the batch operation. Following grinding, the milled product will either be placed in containers for future treatment or treated directly in Facility Stabilization Tanks.

The Facility has developed a program to ensure that necessary precautions are taken to prevent accidental commingling or reaction of incompatible and/or reactive wastes, or ignition of ignitable materials. The program encompasses the following elements:

- Identification of the hazardous characteristics of the waste streams during the approval process.
- Segregation of reactive or incompatible materials according to the segregation and classification system.
- Verification testing of incoming shipments includes compatibility checks on waste streams intended for bulking or combined treatment.
- Identification of sources of ignition and necessary precautions.
- Fire prevention/suppression controls include fire extinguishers, water hoses, and designated smoking areas away from waste storage and treatment areas.

Key safety measures include wearing appropriate personal protective equipment (PPE), such as eye protection, hearing protection, respiratory protection, and gloves. Employees will also receive documented training on the portable grinder, and operators should be familiar with its controls and proper operation. The portable grinder must be inspected before use. The portable grinder will be dismantled and disposed, or decontaminated and recycled, following its use and thus closure and post-closure care is not applicable.

USE Tulsa will be utilizing an Aircycle Bulb Eater 3L crushing device or equivalent. This device is considered controlled crushing and is regulated under both federal and state hazardous and universal waste regulations. By placing this device under the drum canopy, the device will be protected from the elements while in use and storage.

The Aircycle Bulb Eater 3L is a lamp crushing system that requires specific safety precautions to ensure the well-being of operators and the environment. Key safety measures include

wearing appropriate PPE, such as eye protection, hearing protection, and gloves, and operating the machine in a well-ventilated area. The machine must also be inspected for damage before use, and operators should be familiar with its controls and proper operation. Operators will be required to take the Bulb Eater® 3L Certified Training – an online, 5-step program covering Bulb Eater® 3L assembly, operations, safety, and maintenance. This program includes a training video, quiz, and certificate of completion.

The Bulb Eater 3L system crushes spent- lamps of any length, u-tubes, and compact fluorescent lightbulbs (CFLs) into treatable material, and captures over 99.99% of the vapors released. The system, which is mounted to a 55-gallon drum, can hold up to 1350 4-foot lamps. A five-stage filtering process removes hazardous particulates and vapors. Once the drum is full, USE Tulsa will treat and dispose to a subtitle D disposal facility.

----------**END OF ATTACHMENT**----------

Appendix 1 – Proposed Storage and Treatment Increases

Permitted Values					
Existing			**Proposed**		
Storage			Storage		
CMA-1	10,560	gal	T-407	19,960	gal
CMA-2	4,840	gal	T-408	19,960	gal
CMA-3	30,560	gal	T-409	19,960	gal
CMA-4	181,776	gal	T-410	19,960	gal
T-101	16,800	gal	CMA-1	33,000	gal
T-102	19,960	gal	CMA-2	4,840	gal
T-103	19,960	gal	CMA-3	30,560	gal
T-107	13,077	gal	CMA-4	181,776	gal
Treatment			Treatment		
TA-2a	25,851	gal/day	TA-2a	12,000	gal/day
TA-2b	21,991	gal/day	TA-2b	82,000	gal/day
T-101	16,800	gal/day	TA-2c	82,000	gal/day
T-102	19,960	gal/day			
T-103	19,960	gal/day			
T-107	13,077	gal/day			

Existing Storage	297,533	gal	Proposed Storage	330,016	gal
Existing Treatment	117,639	gal/day	Proposed Treatment	176,000	gal/day

% Storage Increase	10.9%
% Treatment Increase	49.6%

ATTACHMENT B
REPLACEMENT SECTIONS AND ATTACHMENTS FOR PERMIT MODIFICATION APPLICATION

Section A – Part A Application
Section T – Information Requirements for Tank Systems
Attachment 2 – Waste Characteristics and Waste Analysis Plan
Attachment 10 – Process Description

United States Environmental Protection Agency
RCRA SUBTITLE C SITE IDENTIFICATION FORM

1. Reason for Submittal (Select only one.)

☐	Obtaining or updating an EPA ID number for on-going regulated activities (Items 10-17) that will continue for a period of time.
☐	Submitting as a component of the Hazardous Waste Report for _____(Reporting Year)
	☐ Site was a TSD facility and/or generator of ≥ 1,000 kg of non-acute hazardous waste, >1 kg of acute hazardous waste, or > 100 kg of acute hazardous waste spill cleanup in **o**ne or more months of the reporting year (or State equivalent LQG regulations)
☐	Notifying that regulated activity is no longer occurring at this Site
☐	Obtaining or updating an EPA ID number for conducting Electronic Manifest Broker activities
☒	Submitting a new or revised Part A Form

9/17/25

LICENSED PROFESSIONAL ENGINEER
JEREMY L. YEGLIN
28976
OKLAHOMA

2. Site EPA ID Number

O	K	D	0	0	0	4	0	2	3	9	6

3. Site Name

US Ecology Tulsa, Inc.

4. Site Location Address

Street Address: 2700 S. 25th W. Ave.		
City, Town, or Village: Tulsa		Tulsa
State: Oklahoma	Country: USA	Zip Code: 74104
Latitude: 36.121574	Longitude: -96.020577	☐ Use Lat/Long as Primary Address

5. Site Mailing Address ☒ **Same as Location Address**

Street Address		
City, Town, or Village		
State	Country	Zip Code

6. Site Land Type

☒Private ☐County ☐District ☐Federal ☐Tribal ☐Municipal ☐Other

7. North American Industry Classification System (NAICS) Code(s) for the Site (at least 5-digit codes)

A. (Primary) 562211	C.
B.	D.

8. Site Contact Information ☒ **Same as Location Address**

First Name: Dan	MI:	Last Name: Cavanaugh
Title: Environmental Compliance Manager		
Street Address:		
City, Town, or Village:		
State:	Country:	Zip Code:
Email: dcavanaugh@republicservices.com		
Phone: 918-808-1100	Ext	Fax: 918-560-5252

9. Legal Owner and Operator of the Site

A. Name of Site's Legal Owner ☒ **Same as Location Address**

Full Name: US Ecology Tulsa Inc.		Date Became Owner (mm/dd/yyyy) 6/18/2014
Owner Type ☒Private ☐County ☐District ☐Federal ☐Tribal ☐Municipal ☐State ☐Other		
Street Address:		
City, Town, or Village		
State	Country	Zip Code
Email		
Phone: (918) 582-9595	Ext	Fax
Comments		

B. Name of Site's Legal Operator ☒ **Same as Location Address**

Full Name: US Ecology Tulsa Inc.		Date Became Owner (mm/dd/yyyy):
Owner Type ☒Private ☐County ☐District ☐Federal ☐Tribal ☐Municipal ☐State ☐Other		
Street Address		
City, Town, or Village		
State	Country	Zip Code
Email		
Phone: (918) 582-9595	Ext	Fax
Comments		

10. Type of Regulated Waste Activity (at your site)

Mark "Yes" or "No" for all current activities (as of the date submitting the form); complete any additional boxes as instructed.

A. Hazardous Waste Activities

☒Y ☐N	1. Generator of Hazardous Waste—If "Yes", mark only one of the following—a, b, c	
☒	a. LQG	- Generates, in any calendar month, 1,000 kg/mo (2,200 lb/mo) or more of non-acute hazardous waste (includes quantities imported by importer site); or - Generates, in any calendar month, or accumulates at any time, more than 1 kg/mo (2.2 lb/mo) of acute hazardous waste; or - Generates, in any calendar month or accumulates at any time, more than 100 kg/mo (220 lb/mo) of acute hazardous spill cleanup material.
☐	b. SQG	100 to 1,000 kg/mo (220-2,200 lb/mo) of non-acute hazardous waste and no more than 1 kg (2.2 lb) of acute hazardous waste and no more than 100 kg (220 lb) of any acute hazardous spill cleanup material.
☐	c. VSQG	Less than or equal to 100 kg/mo (220 lb/mo) of non-acute hazardous waste.
☐Y ☒N	2. Short-Term Generator (generates from a short-term or one-time event and not from on-going processes). If "Yes", provide an explanation in the Comments section. *Note: If "Yes", you MUST indicate that you are a Generator of Hazardous Waste in Item 10.A.1 above.*	
☒Y ☐N	3. Treater, Storer or Disposer of Hazardous Waste—Note: Part B of a hazardous waste permit is required for these activities.	
☒Y ☐N	4. Receives Hazardous Waste from Off-site	
☒Y ☐N	5. Recycler of Hazardous Waste	
☒	a. Recycler who stores prior to recycling	
☐	b. Recycler who does not store prior to recycling	
☐Y ☒N	6. Exempt Boiler and/or Industrial Furnace—If "Yes", mark all that apply.	
☐	a. Small Quantity On-site Burner Exemption	
☐	b. Smelting, Melting, and Refining Furnace Exemption	

B. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g. D001, D003, F007, U112). Use an additional page if more spaces are needed.

D001	D002	D003	D004	D005	D006	D007
D008	D009	D010	D011	D012	D013	D014
D015	D016	D017	D018	D019	D020	D021
D022	D023	D024	D025	D026	D027	D028
D029	D030	D031	D032	D033	D034	D035

C. Waste Codes for State Regulated (non-Federal) Hazardous Wastes. Please list the waste codes of the State hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed.

10B. **Waste Codes for Federally Regulated Hazardous Wastes.** (continued)

D036	D037	D038	D039	D040	D041	D042
D043						
F001	F002	F003	F004	F005	F006	F007
F008	F009	F010	F011	F012	F019	F020
F021	F022	F023	F024	F025	F026	F027
F028	F032	F034	F035	F037	F038	F039
K001	K002	K003	K004	K005	K006	K007
K008	K009	K010	K011	K013	K014	K015
K016	K017	K018	K019	K020	K021	K022
K023	K024	K025	K026	K027	K028	K029
K030	K031	K032	K033	K034	K035	K036
K037	K038	K039	K040	K041	K042	K043
K044	K045	K046	K047	K048	K049	K050
K051	K052	K060	K061	K062	K069	K071
K073	K083	K084	K085	K086	K087	K088
K093	K094	K095	K096	K097	K098	K099
K100	K101	K102	K103	K104	K105	K106
K107	K108	K109	K110	K111	K112	K113
K114	K115	K116	K117	K118	K123	K124
K125	K126	K131	K132	K136	K141	K142
K143	K144	K145	K147	K148	K149	K150
K151		K156	K157	K158	K159	K161
K169	K170	K171	K172	K174	K175	K176
K177	K178	K181				
P001	P002	P003	P004	P005	P006	P007
P008	P009	P010	P011	P012	P013	P014
P015	P016	P017	P018	P020	P021	P022
P023	P024		P026	P027	P028	P029
P030	P031	P033	P034	P036	P037	P038
P039	P040	P041	P042	P043	P044	P045
P046	P047	P048	P049	P050	P051	P054
P056	P057	P058	P059	P060	P062	P063
P064	P065	P066	P067	P068	P069	P070
P071	P072	P073	P074	P075	P076	P077
P078	P081	P082	P084	P085	P087	P088
P089	P092	P093	P094	P095	P096	P097
P098	P099	P101	P102	P103	P104	P105
P106	P108	P109	P110	P111	P112	P113
P114	P115	P116		P118	P119	P120
P121	P122	P123	P127	P128	P185	P188
P189	P190	P191	P192	P194	P196	P197
P198	P199	P201	P202	P203	P204	P205
U001	U002	U003	U004	U005	U006	U007

U008	U009	U010	U011	U012	U014	U015
U016	U017	U018	U019	U020	U021	U022
U023	U024	U025	U026	U027	U028	U029
U030	U031	U032	U033	U034	U035	U036
U037	U038	U039	U041	U042	U043	U044
U045	U046	U047	U048	U049	U050	U051
U052	U053	U055	U056	U057	U058	U059
U060	U061	U062	U063	U064	U066	U067
U068	U069	U070	U071	U072	U073	U074
U075	U076	U077	U078	U079	U080	U081
U082	U083	U084	U085	U086	U087	U088
U089	U090	U091	U092	U093	U094	U095
U096	U097	U098	U099	U101	U102	U103
U105	U106	U107	U108	U109	U110	U111
U112	U113	U114	U115	U116	U117	U118
U119	U120	U121	U122	U123	U124	U125
U126	U127	U128	U129	U130	U131	U132
U133	U134	U135	U136	U137	U138	U140
U141	U142	U143	U144	U145	U146	U147
U148	U149	U150	U151	U152	U153	U154
U155	U156	U157	U158	U159	U160	U161
U162	U163	U164	U165	U166	U167	U168
U169	U170	U171	U172	U173	U174	U176
U177	U178	U179	U180	U181	U182	U183
U184	U185	U186	U187	U188	U189	U190
U191	U192	U193	U194	U196	U197	U200
U201		U203	U204	U205	U206	U207
U208	U209	U210	U211	U213	U214	U215
U216	U217	U218	U219	U220	U221	U222
U223	U225	U226	U227	U228	U234	U235
U236	U237	U238	U239	U240	U243	U244
U246	U247	U248	U249	U271	U278	U279
U280	U328	U353	U359	U364	U367	U372
U373	U387	U389	U394	U395	U404	U409
U410	U411					

11. Additional Regulated Waste Activities (NOTE: Refer to your State regulations to determine if a separate permit is required.)

A. Other Waste Activities

☒Y ☐N	1. Transporter of Hazardous Waste—If "Yes", mark all that apply.
☒	a. Transporter
☒	b. Transfer facility (at your site)
☐Y ☒N	2. Underground Injection Control
☒Y ☐N	3. United States Importer of Hazardous Waste
☐Y ☒N	4. Recognized Trader – If "Yes", mark all that apply.
☐	a. Importer
☐	b. Exporter
☒Y ☐N	5. Importer/Exporter of Spent Lead-Acid Batteries (SLABs) under 40 CFR 266 Subpart G—If "Yes", mark all that apply.
☒	a. Importer
☒	b. Exporter

B. Universal Waste Activities

☒Y ☐N	1. Large Quantity Handler of Universal Waste (you accumulate 5,000 kg or more) - If "Yes" mark all that apply. Note: Refer to your State regulations to determine what is regulated.
☒	a. Batteries
☒	b. Pesticides
☒	c. Mercury Containing Equipment
☒	d. Lamps
☒	e. Aerosol Cans
☐	f. Other (specify) _____
☐	g. Other (specify) _____
☒Y ☐N	2. Destination Facility for Universal Waste. Note: A hazardous waste permit may be required for this activity.

C. Used Oil Activities

☒Y ☐N	1. Used Oil Transporter—If "Yes", mark all that apply.
☒	a. Transporter
☒	b. Transfer facility (at your site)
☐Y ☒N	2. Used Oil Processor and/or Re-refiner – If "Yes", mark all that apply
☐	a. Processor
☐	b. Re-refiner
☐Y ☒N	3. Off-Specification Used Oil Burner
☐Y ☒N	4. Used Oil Fuel Marketer – If "Yes", mark all that apply
☐	a. Marketer Who Directs Shipments of Off-Specification Used Oil to Off-Specification Used Oil Burner
☐	b. Marketer Who First Claims the Used Oil Meets the Specifications

D. Pharmaceutical Activities

☒Y ☐N	1. Operating under 40 CFR Part 266, Subpart P for the management of hazardous waste pharmaceuticals – If "Yes", mark only one. Note: See the Item-by-Item Instructions for definitions of healthcare facility and reverse distributor..
☐	a. Healthcare Facility
☒	b. Reverse Distributor
☐Y ☒N	2. Withdrawing from operating under 40 CFR 266, Subpart P for the management of hazardous waste pharmaceuticals. Note: You may only withdraw if you are a healthcare facility that is a VSQG for all of your hazardous waste, including hazardous waste pharmaceuticals.

12. Eligible Academic Entities with Laboratories – Notification for opting into or withdrawing from managing laboratory hazardous waste pursuant to 40 CFR Part 262, Subpart K.

☐Y ☒N	A. Opting into or currently operating under 40 CFR 262 Subpart K for the management of hazardous wastes in laboratories—If "Yes", mark all that apply. Note: See the item-by-item instructions for definitions of types of eligible academic entities.
☐	1. College or University
☐	2. Teaching Hospital that is owned by or has a formal written affiliation with a college or university
☐	3. Non-profit Institute that is owned by or has a formal written affiliation with a college or university
☐Y ☒N	B. Withdrawing from 40 CFR 262 Subpart K for the management of hazardous wastes in laboratories.

13. Episodic Generation

☐Y ☒N	Are you an SQG or VSQG generating hazardous waste from a planned or unplanned episodic event, lasting no more than 60 days, that moves you to a higher generator category. If "Yes", you must fill out the Addendum for Episodic Generator.

14. LQG Consolidation of VSQG Hazardous Waste

☐Y ☒N	A. Are you an LQG notifying of consolidating VSQG Hazardous Waste Under the Control of the Same Person pursuant to 40 CFR 262.17(f)? If "Yes", you must fill out the Addendum for LQG Consolidation of VSQG hazardous waste.

15. Notification of LQG Site Closure for a Central Accumulation Area (CAA) (optional) OR Entire Facility (required)

☐Y ☒N LQG Site Closure of a Central Accumulation Area (CAA) or Entire Facility..
☐ A. Central Accumulation Area (CAA) or ☐ Entire Facility
B. Expected closure date:_____mm/dd/yyyy
C. Requesting new closure date:_____mm/dd/yyyy
D. Date closed : _____mm/dd/yyyy ☐ 1. In compliance with the closure performance standards 40 CFR 262.17(a)(8) ☐ 2. Not in compliance with the closure performance standards 40 CFR 262.17(a)(8)

16. Notification of Hazardous Secondary Material (HSM) Activity

☐Y ☒N	Are you notifying under 40 CFR 260.42 that you will begin managing, are managing, or will stop managing hazardous secondary material under 40 CFR 260.30, 40 CFR 261.4(a)(23), (24), (25) or (27)? If "Yes", you must fill out the Addendum to the Site Identification Form for Managing Hazardous Secondary Material.

17. Electronic Manifest Broker

☐Y ☒N	Are you notifying as a person, as defined in 40 CFR 260.10, electing to use the EPA electronic manifest system to obtain, complete, and transmit an electronic manifest under a contractual relationship with a hazardous waste generator?

18. Comments (Include the item number for each comment)

Additional page attached for section 10b. – Waste Codes for Federally Regulated Hazardous Waste (pages 4 and 5 of 8).

19. Certification I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. **Note: For the RCRA Hazardous Waste Part A Permit Application, all owners and operators must sign (see 40 CFR 270.10(b) and 270.11)**.

Signature of legal owner, operator or authorized representative	Date (mm/dd/yyyy) 9/15/2025
Printed Name (First, Middle Initial Last) Vincent Scheerer	Title Area President
Email vscheerer@republicservices.com	

EPA ID Number	O	K	D	0	0	0	4	0	2	3	9	6

OMB# 2050-0024; Expires 04/30/2024

United States Environmental Protection Agency
HAZARDOUS WASTE PERMIT PART A FORM

1. Facility Permit Contact

First Name Dan	MI:	Last Name Cavanaugh
Title Environmental Compliance Manager		
Email dcavanaugh@republicservices.com		
Phone 918-560-5260	Ext	Fax 918-560-5252

2. Facility Permit Contact Mailing Address

Street Address 2700 S. 25th W. Ave.		
City, Town, or Village Tulsa		
State Oklahoma	Country USA	Zip Code 74107

3. Facility Existence Date (mm/dd/yyyy)

1972

4. Other Environmental Permits

A. Permit Type	B. Permit Number	C. Description
E	201-082-O	Synthetic Minor Source Air Permit

5. Nature of Business

US Ecology Tulsa, Inc. is a Treatment, Storage, and Disposal Facility (TSDF) for hazardous and solid waste.

6. Process Codes and Design Capacities (See Appendix 1 in Attachment 10 for reference)

Line Number		A. Process Code			B. Process Design Capacity		C. Process Total Number of Units	D. Unit Name
					(1) Amount	(2) Unit of Measure		
0	1	S	0	1	33,000	G	1	CMA-1
0	2	S	0	1	4,840	G	1	CMA-2
0	3	S	0	1	30,560	G	1	CMA-3
0	4	S	0	2	19,960	G	1	T-407
0	5	S	0	2	19,960	G	1	T-408
0	6	S	0	2	19,960	G	1	T-409
0	7	S	0	2	19,960	G	1	T-410
0	8	T	0	1	12,000	U	1	TA-2a
0	9	T	0	1	82,000	U	1	TA-2b
1	0	T	0	1	82,000	U	1	TA-2c
1	1	S	0	1	900 (181,776)	Y (G)	1	CMA-4

7. Description of Hazardous Wastes (Enter codes for Items 7.A, 7.C and 7.D(1))

Line No.			A. EPA Hazardous Waste No.				B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes									
									(1) Process Codes									(2) Process Description (if code is not entered in 7.D1))
0	0	1	D	0	0	1	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	2	D	0	0	2	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	3	D	0	0	3	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	4	D	0	0	4	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	5	D	0	0	5	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	6	D	0	0	6	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	7	D	0	0	7	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	8	D	0	0	8	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	9	D	0	0	9	15,000	T	S	0	1	S	0	2	T	0	1	
0	1	0	D	0	1	0	15,000	T	S	0	1	S	0	2	T	0	1	
0	1	1	D	0	1	1	15,000	T	S	0	1	S	0	2	T	0	1	
0	1	2	D	0	1	2	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	3	D	0	1	3	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	4	D	0	1	4	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	5	D	0	1	5	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	6	D	0	1	6	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	7	D	0	1	7	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	8	D	0	1	8	50,000	T	S	0	1	S	0	2	T	0	1	
0	1	9	D	0	1	9	25,000	T	S	0	1	S	0	2	T	0	1	
0	2	0	D	0	2	0	25,000	T	S	0	1	S	0	2	T	0	1	
0	2	1	D	0	2	1	25,000	T	S	0	1	S	0	2	T	0	1	
0	2	2	D	0	2	2	25,000	T	S	0	1	S	0	2	T	0	1	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
023	D023	25,000	T	S01 S02 T01	
024	D024	25,000	T	S01 S02 T01	
025	D025	25,000	T	S01 S02 T01	
026	D026	25,000	T	S01 S02 T01	
027	D027	25,000	T	S01 S02 T01	
028	D028	25,000	T	S01 S02 T01	
029	D029	25,000	T	S01 S02 T01	
030	D030	25,000	T	S01 S02 T01	
031	D031	25,000	T	S01 S02 T01	
032	D032	25,000	T	S01 S02 T01	
033	D033	25,000	T	S01 S02 T01	
034	D034	25,000	T	S01 S02 T01	
035	D035	25,000	T	S01 S02 T01	
036	D036	25,000	T	S01 S02 T01	
037	D037	25,000	T	S01 S02 T01	
038	D038	25,000	T	S01 S02 T01	
039	D039	25,000	T	S01 S02 T01	
040	D040	25,000	T	S01 S02 T01	
041	D041	25,000	T	S01 S02 T01	
042	D042	25,000	T	S01 S02 T01	
043	D043	25,000	T	S01 S02 T01	
044	F001	25,000	T	S01 S02	
045	F002	25,000	T	S01 S02	
046	F003	25,000	T	S01 S02	
047	F004	25,000	T	S01 S02	
048	F005	25,000	T	S01 S02	
049	F006	50,000	T	S01 S02	
050	F007	2,000	T	S01 S02	
051	F008	2,000	T	S01 S02	
052	F009	2,000	T	S01 S02	
053	F010	2,000	T	S01 S02	
054	F011	2,000	T	S01 S02	
055	F019	10,000	T	S01 S02	
057	F020	2,000	T	S01 S02	
058	F021	2,000	T	S01 S02	
059	F022	2,000	T	S01 S02	
060	F023	2,000	T	S01 S02	
061	F024	2,000	T	S01 S02	
062	F025	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
063	F026	2,000	T	S01 S02	
064	F027	2,000	T	S01 S02	
065	F028	2,000	T	S01 S02	
066	F032	2,000	T	S01 S02	
067	F034	2,000	T	S01 S02	
068	F035	2,000	T	S01 S02	
069	F037	2,000	T	S01 S02	
070	F038	2,000	T	S01 S02	
071	F039	2,000	T	S01 S02	
072	K001	2,000	T	S01 S02	
073	K002	2,000	T	S01 S02	
074	K003	2,000	T	S01 S02	
075	K004	2,000	T	S01 S02	
076	K005	2,000	T	S01 S02	
077	K006	2,000	T	S01 S02	
078	K007	2,000	T	S01 S02	
079	K008	2,000	T	S01 S02	
080	K009	2,000	T	S01 S02	
081	K010	2,000	T	S01 S02	
082	K011	2,000	T	S01 S02	
083	K013	2,000	T	S01 S02	
084	K014	2,000	T	S01 S02	
085	K015	2,000	T	S01 S02	
086	K016	2,000	T	S01 S02	
087	K017	2,000	T	S01 S02	
088	K018	2,000	T	S01 S02	
089	K019	2,000	T	S01 S02	
090	K020	2,000	T	S01 S02	
091	K021	2,000	T	S01 S02	
092	K022	2,000	T	S01 S02	
093	K023	2,000	T	S01 S02	
094	K024	2,000	T	S01 S02	
095	K025	2,000	T	S01 S02	
096	K026	2,000	T	S01 S02	
097	K027	2,000	T	S01 S02	
098	K028	2,000	T	S01 S02	
099	K029	2,000	T	S01 S02	
100	K030	2,000	T	S01 S02	
101	K031	2,000	T	S01 S02	
102	K032	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
103	K033	2,000	T	S01 S02	
104	K034	2,000	T	S01 S02	
105	K035	2,000	T	S01 S02	
106	K036	2,000	T	S01 S02	
107	K037	2,000	T	S01 S02	
108	K038	2,000	T	S01 S02	
109	K039	2,000	T	S01 S02	
110	K040	2,000	T	S01 S02	
111	K041	2,000	T	S01 S02	
112	K042	2,000	T	S01 S02	
113	K043	2,000	T	S01 S02	
114	K044	2,000	T	S01 S02	
115	K045	2,000	T	S01 S02	
116	K046	2,000	T	S01 S02	
117	K047	2,000	T	S01 S02	
118	K048	50,000	T	S01 S02	
119	K049	50,000	T	S01 S02	
120	K050	50,000	T	S01 S02	
121	K051	50,000	T	S01 S02	
122	K052	50,000	T	S01 S02	
123	K060	10,000	T	S01 S02	
124	K061	2,000	T	S01 S02	
125	K062	50,000	T	S01 S02	
126	K069	2,000	T	S01 S02	
127	K071	2,000	T	S01 S02	
12S	K073	2,000	T	S01 S02	
129	K083	2,000	T	S01 S02	
130	K084	2,000	T	S01 S02	
131	K085	2,000	T	S01 S02	
132	K086	2,000	T	S01 S02	
133	K087	10,000	T	S01 S02	
134	K088	2,000	T	S01 S02	
13S	K093	2,000	T	S01 S02	
136	K094	2,000	T	S01 S02	
137	K095	2,000	T	S01 S02	
13S	K096	2,000	T	S01 S02	
139	K097	2,000	T	S01 S02	
140	K098	2,000	T	S01 S02	
141	K099	2,000	T	S01 S02	
142	K100	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
143	K101	2,000	T	S01 S02	
144	K102	2,000	T	S01 S02	
145	K103	2,000	T	S01 S02	
146	K104	2,000	T	S01 S02	
147	K105	2,000	T	S01 S02	
148	K106	2,000	T	S01 S02	
149	K107	2,000	T	S01 S02	
150	K108	2,000	T	S01 S02	
151	K109	2,000	T	S01 S02	
152	K110	2,000	T	S01 S02	
153	K111	2,000	T	S01 S02	
154	K112	2,000	T	S01 S02	
155	K113	2,000	T	S01 S02	
156	K114	2,000	T	S01 S02	
157	K115	2,000	T	S01 S02	
158	K116	2,000	T	S01 S02	
159	K117	2,000	T	S01 S02	
160	K118	2,000	T	S01 S02	
161	K123	2,000	T	S01 S02	
162	K124	2,000	T	S01 S02	
163	K125	2,000	T	S01 S02	
164	K126	2,000	T	S01 S02	
165	K131	2,000	T	S01 S02	
166	K132	2,000	T	S01 S02	
167	K136	2,000	T	S01 S02	
168	K141	10,000	T	S01 S02	
169	K142	10,000	T	S01 S02	
170	K143	10,000	T	S01 S02	
171	K144	10,000	T	S01 S02	
172	K145	10,000	T	S01 S02	
173	K147	10,000	T	S01 S02	
174	K148	10,000	T	S01 S02	
175	K149	10,000	T	S01 S02	
176	K150	10,000	T	S01 S02	
177	K151	10,000	T	S01 S02	
178	K156	10,000	T	S01 S02	
179	K157	10,000	T	S01 S02	
180	K158	10,000	T	S01 S02	
181	K159	10,000	T	S01 S02	
182	K161	10,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
183	K169	10,000	T	S01 S02	
184	K170	10,000	T	S01 S02	
185	K171	10,000	T	S01 S02	
186	K172	10,000	T	S01 S02	
187	K174	10,000	T	S01 S02	
188	K175	10,000	T	S01 S02	
189	K176	10,000	T	S01 S02	
190	K177	10,000	T	S01 S02	
191	K178	10,000	T	S01 S02	
192	K181	10,000	T	S01 S02	
193	P001	2,000	T	S01 S02	
194	P002	2,000	T	S01 S02	
195	P003	2,000	T	S01 S02	
196	P004	2,000	T	S01 S02	
197	P005	2,000	T	S01 S02	
198	P006	2,000	T	S01 S02	
199	P007	2,000	T	S01 S02	
200	P008	2,000	T	S01 S02	
201	P009	2,000	T	S01 S02	
202	P010	2,000	T	S01 S02	
203	P011	2,000	T	S01 S02	
204	P012	2,000	T	S01 S02	
205	P013	2,000	T	S01 S02	
206	P014	2,000	T	S01 S02	
207	P015	2,000	T	S01 S02	
208	P016	2,000	T	S01 S02	
209	P017	2,000	T	S01 S02	
210	P018	2,000	T	S01 S02	
211	P020	2,000	T	S01 S02	
212	P021	2,000	T	S01 S02	
213	P022	2,000	T	S01 S02	
214	P023	2,000	T	S01 S02	
215	P024	2,000	T	S01 S02	
216	P026	2,000	T	S01 S02	
217	P027	2,000	T	S01 S02	
218	P028	2,000	T	S01 S02	
219	P029	2,000	T	S01 S02	
220	P030	2,000	T	S01 S02	
221	P031	2,000	T	S01 S02	
222	P033	2,000	T	S01 S02	
223	P034	2,000	T	S01 S02	
224	P036	2,000	T	S01 S02	
225	P037	2,000	T	S01 S02	
226	P038	2,000	T	S01 S02	
227	P039	2,000	T	S01 S02	
228	P040	2,000	T	S01 S02	
229	P041	2,000	T	S01 S02	
230	P042	2,000	T	S01 S02	
231	P043	2,000	T	S01 S02	
232	P044	2,000	T	S01 S02	
233	P045	2,000	T	S01 S02	
234	P046	2,000	T	S01 S02	
235	P047	2,000	T	S01 S02	
236	P048	2,000	T	S01 S02	
237	P049	2,000	T	S01 S02	
238	P050	2,000	T	S01 S02	
239	P051	2,000	T	S01 S02	
240	P054	2,000	T	S01 S02	
241	P056	2,000	T	S01 S02	
242	P057	2,000	T	S01 S02	
243	P058	2,000	T	S01 S02	
244	P059	2,000	T	S01 S02	
245	P060	2,000	T	S01 S02	
246	P062	2,000	T	S01 S02	
247	P063	2,000	T	S01 S02	
248	P064	2,000	T	S01 S02	
249	P065	2,000	T	S01 S02	
250	P066	2,000	T	S01 S02	
251	P067	2,000	T	S01 S02	
252	P068	2,000	T	S01 S02	
253	P069	2,000	T	S01 S02	
254	P070	2,000	T	S01 S02	
255	P071	2,000	T	S01 S02	
256	P072	2,000	T	S01 S02	
257	P073	2,000	T	S01 S02	
258	P074	2,000	T	S01 S02	
259	P075	2,000	T	S01 S02	
260	P076	2,000	T	S01 S02	
261	P077	2,000	T	S01 S02	
262	P078	2,000	T	S01 S02	
263	P081	2,000	T	S01 S02	
264	P082	2,000	T	S01 S02	
265	P084	2,000	T	S01 S02	
266	P085	2,000	T	S01 S02	
267	P087	2,000	T	S01 S02	
268	P088	2,000	T	S01 S02	
269	P089	2,000	T	S01 S02	
270	P092	2,000	T	S01 S02	
271	P093	2,000	T	S01 S02	
272	P094	2,000	T	S01 S02	
273	P095	2,000	T	S01 S02	
274	P096	2,000	T	S01 S02	
275	P097	2,000	T	S01 S02	
276	P098	2,000	T	S01 S02	
277	P099	2,000	T	S01 S02	
278	P101	2,000	T	S01 S02	
279	P102	2,000	T	S01 S02	
280	P103	2,000	T	S01 S02	
281	P104	2,000	T	S01 S02	
282	P105	2,000	T	S01 S02	
283	P106	2,000	T	S01 S02	
284	P107	2,000	T	S01 S02	
285	P108	2,000	T	S01 S02	
286	P109	2,000	T	S01 S02	
287	P110	2,000	T	S01 S02	
288	P111	2,000	T	S01 S02	
289	P112	2,000	T	S01 S02	
290	P113	2,000	T	S01 S02	
291	P114	2,000	T	S01 S02	
292	P115	2,000	T	S01 S02	
293	P116	2,000	T	S01 S02	
294	P117	2,000	T	S01 S02	
295	P118	2,000	T	S01 S02	
296	P119	2,000	T	S01 S02	
297	P120	2,000	T	S01 S02	
298	P121	2,000	T	S01 S02	
299	P122	2,000	T	S01 S02	
300	P123	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
223	P034	2,000	T	S01 S02	
224	P036	2,000	T	S01 S02	
225	P037	2,000	T	S01 S02	
226	P038	2,000	T	S01 S02	
227	P039	2,000	T	S01 S02	
228	P040	2,000	T	S01 S02	
229	P041	2,000	T	S01 S02	
230	P042	2,000	T	S01 S02	
231	P043	2,000	T	S01 S02	
232	P044	2,000	T	S01 S02	
233	P045	2,000	T	S01 S02	
234	P046	2,000	T	S01 S02	
235	P047	2,000	T	S01 S02	
236	P048	2,000	T	S01 S02	
237	P049	2,000	T	S01 S02	
238	P050	2,000	T	S01 S02	
239	P051	2,000	T	S01 S02	
240	P054	2,000	T	S01 S02	
241	P056	2,000	T	S01 S02	
242	P057	2,000	T	S01 S02	
243	P058	2,000	T	S01 S02	
244	P059	2,000	T	S01 S02	
245	P060	2,000	T	S01 S02	
246	P062	2,000	T	S01 S02	
247	P063	2,000	T	S01 S02	
248	P064	2,000	T	S01 S02	
249	P065	2,000	T	S01 S02	
250	P066	2,000	T	S01 S02	
251	P067	2,000	T	S01 S02	
252	P068	2,000	T	S01 S02	
253	P069	2,000	T	S01 S02	
254	P070	2,000	T	S01 S02	
255	P071	2,000	T	S01 S02	
256	P072	2,000	T	S01 S02	
257	P073	2,000	T	S01 S02	
258	P074	2,000	T	S01 S02	
259	P075	2,000	T	S01 S02	
260	P076	2,000	T	S01 S02	
261	P077	2,000	T	S01 S02	
262	P078	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
263	P081	2,000	T	S01 S02	
264	P082	2,000	T	S01 S02	
265	P084	2,000	T	S01 S02	
266	P085	2,000	T	S01 S02	
267	P087	2,000	T	S01 S02	
268	P088	2,000	T	S01 S02	
269	P089	2,000	T	S01 S02	
270	P092	2,000	T	S01 S02	
271	P093	2,000	T	S01 S02	
272	P094	2,000	T	S01 S02	
273	P095	2,000	T	S01 S02	
274	P096	2,000	T	S01 S02	
275	P097	2,000	T	S01 S02	
276	P098	2,000	T	S01 S02	
277	P099	2,000	T	S01 S02	
278	P101	2,000	T	S01 S02	
279	P102	2,000	T	S01 S02	
280	P103	2,000	T	S01 S02	
281	P104	2,000	T	S01 S02	
282	P105	2,000	T	S01 S02	
283	P106	2,000	T	S01 S02	
284	P108	2,000	T	S01 S02	
285	P109	2,000	T	S01 S02	
286	P110	2,000	T	S01 S02	
287	P111	2,000	T	S01 S02	
288	P112	2,000	T	S01 S02	
289	P113	2,000	T	S01 S02	
290	P114	2,000	T	S01 S02	
291	P115	2,000	T	S01 S02	
292	P116	2,000	T	S01 S02	
293					
294	P118	2,000	T	S01 S02	
295	P119	2,000	T	S01 S02	
296	P120	2,000	T	S01 S02	
297	P121	2,000	T	S01 S02	
298	P122	2,000	T	S01 S02	
299	P123	2,000	T	S01 S02	
300	P127	2,000	T	S01 S02	
301	P128	2,000	T	S01 S02	
302	P185	2,000	T	S01 S02	
303	P188	2,000	T	S01 S02	
304	P189	2,000	T	S01 S02	
305	P190	2,000	T	S01 S02	
306	P191	2,000	T	S01 S02	
307	P192	2,000	T	S01 S02	
308	P194	2,000	T	S01 S02	
309	P196	2,000	T	S01 S02	
310	P197	2,000	T	S01 S02	
311	P198	2,000	T	S01 S02	
312	P199	2,000	T	S01 S02	
313	P201	2,000	T	S01 S02	
314	P202	2,000	T	S01 S02	
315	P203	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
304	P189	2,000	T	S01 S02	
305	P190	2,000	T	S01 S02	
306	P191	2,000	T	S01 S02	
307	P192	2,000	T	S01 S02	
308	P194	2,000	T	S01 S02	
309	P196	2,000	T	S01 S02	
310	P197	2,000	T	S01 S02	
311	P198	2,000	T	S01 S02	
312	P199	2,000	T	S01 S02	
313	P201	2,000	T	S01 S02	
314	P202	2,000	T	S01 S02	
315	P203	2,000	T	S01 S02	
316	P204	2,000	T	S01 S02	
317	P205	2,000	T	S01 S02	
318	U001	2,000	T	S01 S02	
319	U002	2,000	T	S01 S02	
320	U003	2,000	T	S01 S02	
321	U004	2,000	T	S01 S02	
322	U005	2,000	T	S01 S02	
323	U006	2,000	T	S01 S02	
324	U007	2,000	T	S01 S02	
325	U008	2,000	T	S01 S02	
326	U009	2,000	T	S01 S02	
327	U010	2,000	T	S01 S02	
328	U011	2,000	T	S01 S02	
329	U012	2,000	T	S01 S02	
330	U014	2,000	T	S01 S02	
331	U015	2,000	T	S01 S02	
332	U016	2,000	T	S01 S02	
333	U017	2,000	T	S01 S02	
334	U018	2,000	T	S01 S02	
335	U019	2,000	T	S01 S02	
336	U020	2,000	T	S01 S02	
337	U021	2,000	T	S01 S02	
338	U022	2,000	T	S01 S02	
339	U023	2,000	T	S01 S02	
340	U024	2,000	T	S01 S02	
341	U025	2,000	T	S01 S02	
342	U026	2,000	T	S01 S02	
343	U027	2,000	T	S01 S02	
344	U028	2,000	T	S01 S02	
345	U029	2,000	T	S01 S02	
346	U030	2,000	T	S01 S02	
347	U031	2,000	T	S01 S02	
348	U032	2,000	T	S01 S02	
349	U033	2,000	T	S01 S02	
350	U034	2,000	T	S01 S02	
351	U035	2,000	T	S01 S02	
352	U036	2,000	T	S01 S02	
353	U037	2,000	T	S01 S02	
354	U038	2,000	T	S01 S02	
355	U039	2,000	T	S01 S02	
356	U041	2,000	T	S01 S02	
357	U042	2,000	T	S01 S02	
358	U043	2,000	T	S01 S02	
359	U044	2,000	T	S01 S02	
360	U045	2,000	T	S01 S02	
361	U046	2,000	T	S01 S02	
362	U047	2,000	T	S01 S02	
363	U048	2,000	T	S01 S02	
364	U049	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
345	U029	2,000	T	S01 S02	
346	U030	2,000	T	S01 S02	
347	U031	2,000	T	S01 S02	
348	U032	2,000	T	S01 S02	
349	U033	2,000	T	S01 S02	
350	U034	2,000	T	S01 S02	
351	U035	2,000	T	S01 S02	
352	U036	2,000	T	S01 S02	
353	U037	2,000	T	S01 S02	
354	U038	2,000	T	S01 S02	
355	U039	2,000	T	S01 S02	
356	U041	2,000	T	S01 S02	
357	U042	2,000	T	S01 S02	
358	U043	2,000	T	S01 S02	
359	U044	2,000	T	S01 S02	
360	U045	2,000	T	S01 S02	
361	U046	2,000	T	S01 S02	
362	U047	2,000	T	S01 S02	
363	U048	2,000	T	S01 S02	
364	U049	2,000	T	S01 S02	
365	U050	2,000	T	S01 S02	
366	U051	2,000	T	S01 S02	
367	U052	2,000	T	S01 S02	
368	U053	2,000	T	S01 S02	
369	U055	2,000	T	S01 S02	
370	U056	2,000	T	S01 S02	
371	U057	2,000	T	S01 S02	
372	U058	2,000	T	S01 S02	
373	U059	2,000	T	S01 S02	
374	U060	2,000	T	S01 S02	
375	U061	2,000	T	S01 S02	
376	U062	2,000	T	S01 S02	
377	U063	2,000	T	S01 S02	
378	U064	2,000	T	S01 S02	
379	U066	2,000	T	S01 S02	
380	U067	2,000	T	S01 S02	
381	U068	2,000	T	S01 S02	
382	U069	2,000	T	S01 S02	
383	U070	2,000	T	S01 S02	
384	U071	2,000	T	S01 S02	
385	U072	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
386	U073	2,000	T	S01 S02	
387	U074	2,000	T	S01 S02	
388	U075	2,000	T	S01 S02	
389	U076	2,000	T	S01 S02	
390	U077	2,000	T	S01 S02	
391	U078	2,000	T	S01 S02	
392	U079	2,000	T	S01 S02	
393	U080	2,000	T	S01 S02	
394	U081	2,000	T	S01 S02	
395	U082	2,000	T	S01 S02	
396	U083	2,000	T	S01 S02	
397	U084	2,000	T	S01 S02	
398	U085	2,000	T	S01 S02	
399	U086	2,000	T	S01 S02	
400	U087	2,000	T	S01 S02	
401	U088	2,000	T	S01 S02	
402	U089	2,000	T	S01 S02	
403	U090	2,000	T	S01 S02	
404	U091	2,000	T	S01 S02	
405	U092	2,000	T	S01 S02	
406	U093	2,000	T	S01 S02	
407	U094	2,000	T	S01 S02	
408	U095	2,000	T	S01 S02	
409	U096	2,000	T	S01 S02	
410	U097	2,000	T	S01 S02	
411	U098	2,000	T	S01 S02	
412	U099	2,000	T	S01 S02	
413	U101	2,000	T	S01 S02	
414	U102	2,000	T	S01 S02	
415	U103	2,000	T	S01 S02	
416	U105	2,000	T	S01 S02	
417	U106	2,000	T	S01 S02	
418	U107	2,000	T	S01 S02	
419	U108	2,000	T	S01 S02	
420	U109	2,000	T	S01 S02	
421	U110	2,000	T	S01 S02	
422	U111	2,000	T	S01 S02	
423	U112	2,000	T	S01 S02	
424	U113	2,000	T	S01 S02	
425	U114	2,000	T	S01 S02	
426	U115	2,000	T	S01 S02	
427	U116	2,000	T	S01 S02	
428	U117	2,000	T	S01 S02	
429	U118	2,000	T	S01 S02	
430	U119	2,000	T	S01 S02	
431	U120	2,000	T	S01 S02	
432	U121	2,000	T	S01 S02	
433	U122	2,000	T	S01 S02	
434	U123	2,000	T	S01 S02	
435	U124	2,000	T	S01 S02	
436	U125	2,000	T	S01 S02	
437	U126	2,000	T	S01 S02	
438	U127	2,000	T	S01 S02	
439	U128	2,000	T	S01 S02	
440	U129	2,000	T	S01 S02	
441	U130	2,000	T	S01 S02	
442	U131	2,000	T	S01 S02	
443	U132	2,000	T	S01 S02	
444	U133	2,000	T	S01 S02	
445	U134	2,000	T	S01 S02	
446	U135	2,000	T	S01 S02	
447	U136	2,000	T	S01 S02	
448	U137	2,000	T	S01 S02	
449	U138	2,000	T	S01 S02	
450	U139	2,000	T	S01 S02	
451	U140	2,000	T	S01 S02	
452	U141	2,000	T	S01 S02	
453	U142	2,000	T	S01 S02	
454	U143	2,000	T	S01 S02	
455	U144	2,000	T	S01 S02	
456	U145	2,000	T	S01 S02	
457	U146	2,000	T	S01 S02	
458	U147	2,000	T	S01 S02	
459	U148	2,000	T	S01 S02	
460	U149	2,000	T	S01 S02	
461	U150	2,000	T	S01 S02	
462	U151	2,000	T	S01 S02	
463	U152	2,000	T	S01 S02	
464	U153	2,000	T	S01 S02	
465	U154	2,000	T	S01 S02	
466	U155	2,000	T	S01 S02	
467	U156	2,000	T	S01 S02	
468	U157	2,000	T	S01 S02	
469	U158	2,000	T	S01 S02	
470	U159	2,000	T	S01 S02	
471	U160	2,000	T	S01 S02	
472	U161	2,000	T	S01 S02	
473	U162	2,000	T	S01 S02	
474	U163	2,000	T	S01 S02	
475	U164	2,000	T	S01 S02	
476	U165	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
427	U116	2,000	T	S01 S02	
428	U117	2,000	T	S01 S02	
429	U118	2,000	T	S01 S02	
430	U119	2,000	T	S01 S02	
431	U120	2,000	T	S01 S02	
432	U121	2,000	T	S01 S02	
433	U122	2,000	T	S01 S02	
434	U123	2,000	T	S01 S02	
435	U124	2,000	T	S01 S02	
436	U125	2,000	T	S01 S02	
437	U126	2,000	T	S01 S02	
438	U127	2,000	T	S01 S02	
439	U128	2,000	T	S01 S02	
440	U129	2,000	T	S01 S02	
441	U130	2,000	T	S01 S02	
442	U131	2,000	T	S01 S02	
443	U132	2,000	T	S01 S02	
444	U133	2,000	T	S01 S02	
445	U134	2,000	T	S01 S02	
446	U135	2,000	T	S01 S02	
447	U136	2,000	T	S01 S02	
448	U137	2,000	T	S01 S02	
449	U138	2,000	T	S01 S02	
450	U139	2,000	T	S01 S02	
451	U140	2,000	T	S01 S02	
452	U141	2,000	T	S01 S02	
453	U142	2,000	T	S01 S02	
454	U143	2,000	T	S01 S02	
455	U144	2,000	T	S01 S02	
456	U145	2,000	T	S01 S02	
457	U146	2,000	T	S01 S02	
458	U147	2,000	T	S01 S02	
459	U148	2,000	T	S01 S02	
460	U149	2,000	T	S01 S02	
461	U150	2,000	T	S01 S02	
462	U151	2,000	T	S01 S02	
463	U152	2,000	T	S01 S02	
464	U153	2,000	T	S01 S02	
465	U154	2,000	T	S01 S02	
466	U155	2,000	T	S01 S02	
467	U156	2,000	T	S01 S02	
468	U157	2,000	T	S01 S02	
469	U158	2,000	T	S01 S02	
470	U159	2,000	T	S01 S02	
471	U160	2,000	T	S01 S02	
472	U161	2,000	T	S01 S02	
473	U162	2,000	T	S01 S02	
474	U163	2,000	T	S01 S02	
475	U164	2,000	T	S01 S02	
476	U165	2,000	T	S01 S02	
477	U166	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
468	U158	2,000	T	S01 S02	
469	U159	20,000	T	S01 S02	
470	U160	2,000	T	S01 S02	
471	U161	20,000	T	S01 S02	
472	U162	2,000	T	S01 S02	
473	U163	2,000	T	S01 S02	
474	U164	2,000	T	S01 S02	
475	U165	20,000	T	S01 S02	
476	U166	2,000	T	S01 S02	
477	U167	2,000	T	S01 S02	
478	U168	2,000	T	S01 S02	
479	U169	2,000	T	S01 S02	
480	U170	2,000	T	S01 S02	
481	U171	2,000	T	S01 S02	
482	U172	2,000	T	S01 S02	
483	U173	2,000	T	S01 S02	
484	U174	2,000	T	S01 S02	
485	U176	2,000	T	S01 S02	
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490	U181	2,000	T	S01 S02	
491	U182	2,000	T	S01 S02	
492	U183	2,000	T	S01 S02	
493	U184	2,000	T	S01 S02	
494	U185	2,000	T	S01 S02	
495	U186	2,000	T	S01 S02	
496	U187	2,000	T	S01 S02	
497	U188	2,000	T	S01 S02	
498	U189	2,000	T	S01 S02	
499	U190	2,000	T	S01 S02	
500	U191	2,000	T	S01 S02	
501	U192	2,000	T	S01 S02	
502	U193	2,000	T	S01 S02	
503	U194	2,000	T	S01 S02	
504	U196	2,000	T	S01 S02	
505	U197	2,000	T	S01 S02	
506	U200	2,000	T	S01 S02	
507	U201	2,000	T	S01 S02	
508	U202	2,000	T	S01 S02	
509	U203	2,000	T	S01 S02	
510	U204	2,000	T	S01 S02	
511	U205	2,000	T	S01 S02	
512	U206	2,000	T	S01 S02	
513	U207	2,000	T	S01 S02	
514	U208	2,000	T	S01 S02	
515	U209	2,000	T	S01 S02	
516	U210	2,000	T	S01 S02	
517	U211	2,000	T	S01 S02	
518	U213	2,000	T	S01 S02	
519	U214	2,000	T	S01 S02	
520	U215	2,000	T	S01 S02	
521	U216	2,000	T	S01 S02	
522	U217	2,000	T	S01 S02	
523	U218	2,000	T	S01 S02	
524	U219	2,000	T	S01 S02	
525	U220	2,000	T	S01 S02	
526	U221	2,000	T	S01 S02	
527	U222	2,000	T	S01 S02	
528					

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
509	U203	2,000	T	S01 S02	
510	U204	2,000	T	S01 S02	
511	U205	2,000	T	S01 S02	
512	U206	2,000	T	S01 S02	
513	U207	2,000	T	S01 S02	
514	U208	2,000	T	S01 S02	
515	U209	2,000	T	S01 S02	
516	U210	20,000	T	S01 S02	
517	U211	2,000	T	S01 S02	
518	U213	2,000	T	S01 S02	
519	U214	2,000	T	S01 S02	
520	U215	2,000	T	S01 S02	
521	U216	2,000	T	S01 S02	
522	U217	2,000	T	S01 S02	
523	U218	2,000	T	S01 S02	
524	U219	2,000	T	S01 S02	
525	U220	20,000	T	S01 S02	
526	U221	2,000	T	S01 S02	
527	U222	2,000	T	S01 S02	
528	U223	2,000	T	S01 S02	
529	U225	2,000	T	S01 S02	
530	U226	2,000	T	S01 S02	
531	U227	20,000	T	S01 S02	
532	U228	20,000	T	S01 S02	
533	U234	2,000	T	S01 S02	
534	U235	2,000	T	S01 S02	
535	U236	2,000	T	S01 S02	
536	U237	2,000	T	S01 S02	
537	U238	2,000	T	S01 S02	
538	U239	20,000	T	S01 S02	
539	U240	20,000	T	S01 S02	
540	U243	2,000	T	S01 S02	
541	U244	2,000	T	S01 S02	
542	U246	2,000	T	S01 S02	
543	U247	2,000	T	S01 S02	
544	U248	2,000	T	S01 S02	
545	U249	20,000	T	S01 S02	
546	U271	2,000	T	S01 S02	
547	U278	2,000	T	S01 S02	
548	U279	2,000	T	S01 S02	
549	U280	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
550	U328	2,000	T	S01 S02	
551	U353	2,000	T	S01 S02	
552	U359	2,000	T	S01 S02	
553	U364	2,000	T	S01 S02	
554	U367	2,000	T	S01 S02	
555	U372	2,000	T	S01 S02	
556	U373	2,000	T	S01 S02	
557	U387	20,000	T	S01 S02	
558	U389	20,000	T	S01 S02	
559	U394	2,000	T	S01 S02	
560	U395	2,000	T	S01 S02	
561	U404	2,000	T	S01 S02	
562	U409	2,000	T	S01 S02	
563	U410	2,000	T	S01 S02	
564	U411	2,000	T	S01 S02	

8. Map

Attach to this application a topographical map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all spring, rivers, and other surface water bodies in this map area. See instructions for precise requirements.

See Appendix A-1 for area and site topographic maps.

9. Facility Drawing

All existing facilities must include a scale drawing of the facility. See instructions for more detail.

See Appendix A-2 for the facility drawings.

10. Photographs

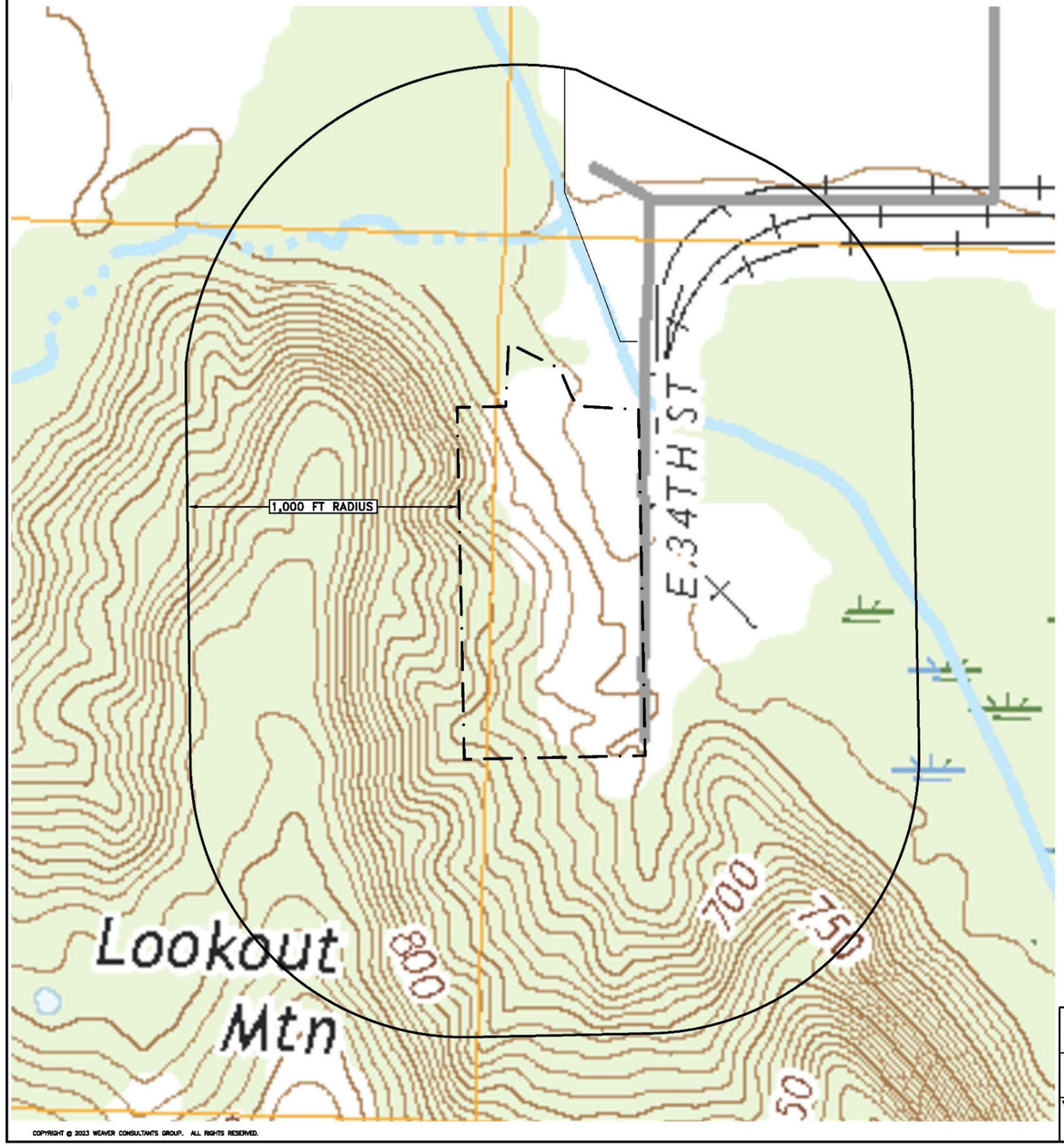
All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment, and disposal areas; and sites of future storage, treatment, or disposal areas. See instructions for more detail.

See Appendix A-3 for site photographs.

11. Comments

Appendix A-1 (Section 8)

Topographic Maps



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N

0 200 400
SCALE IN FEET

LEGEND

PROPERTY BOUNDARY

ROAD CLASSIFICATION

Expressway	Local Connector
Secondary Hwy	Local Road
Ramp	4WD

Interstate Route US Route State Route

SAND SPRINGS, OK
2022

SAPULPA NORTH, OK
2022

SOURCE: US GEOLOGICAL SOCIETY (USGS), TOPOBUILDER V.1.5.6. AUGUST 7, 2024.

Figure from November 2024 Operations Permit

- [ ] DRAFT
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION

DATE: 08/2024
FILE: 0120-045-11-00
CAD: 3A-USGS MAP.DWG

DRAWN BY: JDW
DESIGN BY: JAE
REVIEWED BY: JAE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
US ECOLOGY TULSA, INC.

REVISIONS

NO.	DATE	DESCRIPTION

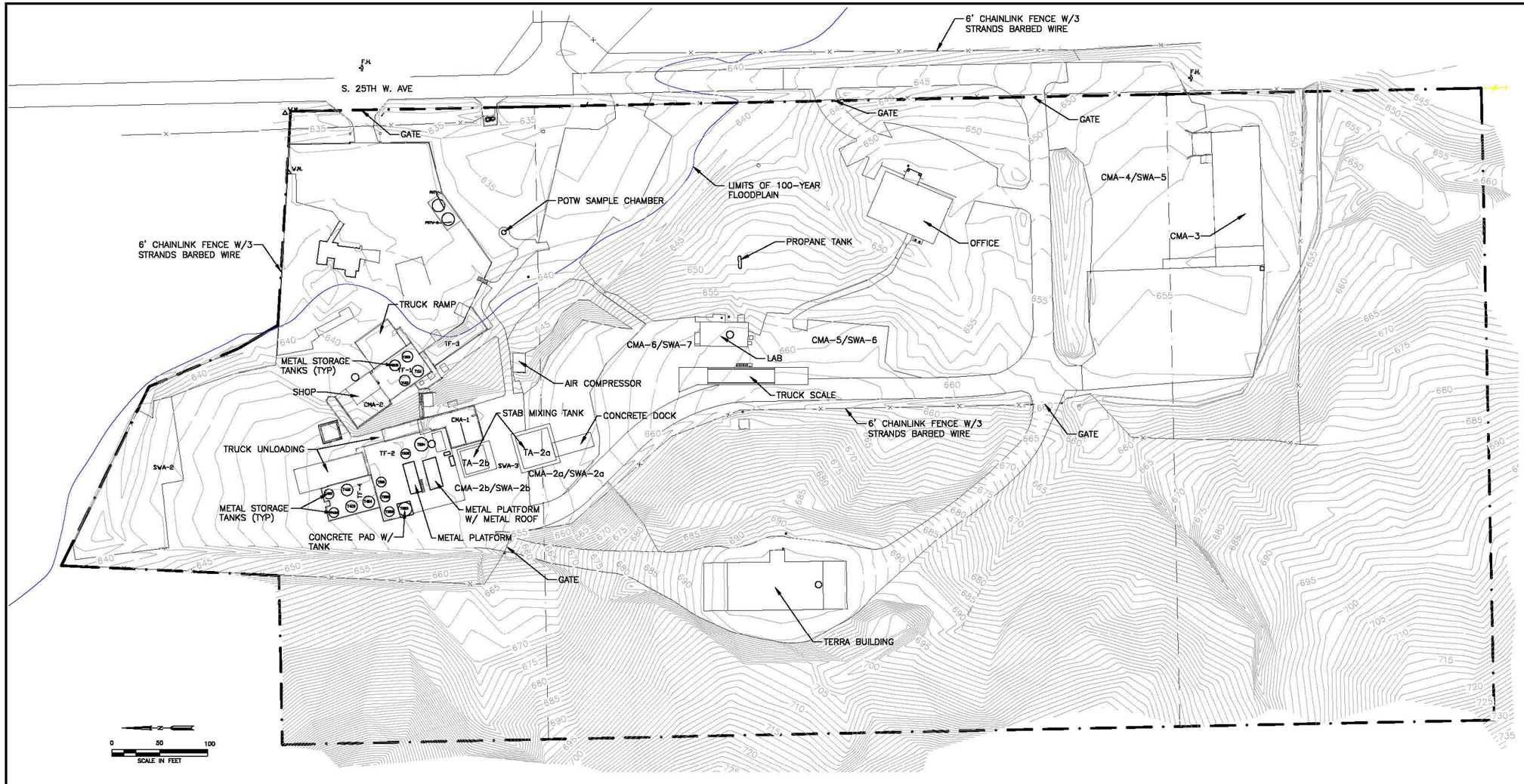
TOPOGRAPHIC MAP–1,000' RADIUS
PART B PERMIT APPLICATION
ATTACHMENT 1–MAPS AND FIGURES

US ECOLOGY TRANSFER STATION
TULSA, OKLAHOMA

WWW.WCGRP.COM

FIGURE B-2

G:\0120\45\PERMIT DRAWINGS\3A-USGS MAP.dwg, jwilson, 1:2



SWMU Number

S-1 (CMA-1T)
S-3 (WDW-1)
S-4 (Historic SI/NPA-1)
S-6 (TF-0)
S-8 (Laboratory Tank)
S-9 (TF-1)
S-10 (CMA-2)

LEGEND

PROPERTY BOUNDARY

Figure from November 2024 Operations Permit

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- [ ] ISSUED FOR CONSTRUCTION

DATE: 10/2023
FILE: 0120-045-11-00
CAD: G-3 EMERGENCY.DWG
DRAWN BY: JDW
DESIGN BY: JAE
REVIEWED BY: JAE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
US ECOLOGY TULSA, INC.

REVISIONS		
NO.	DATE	DESCRIPTION

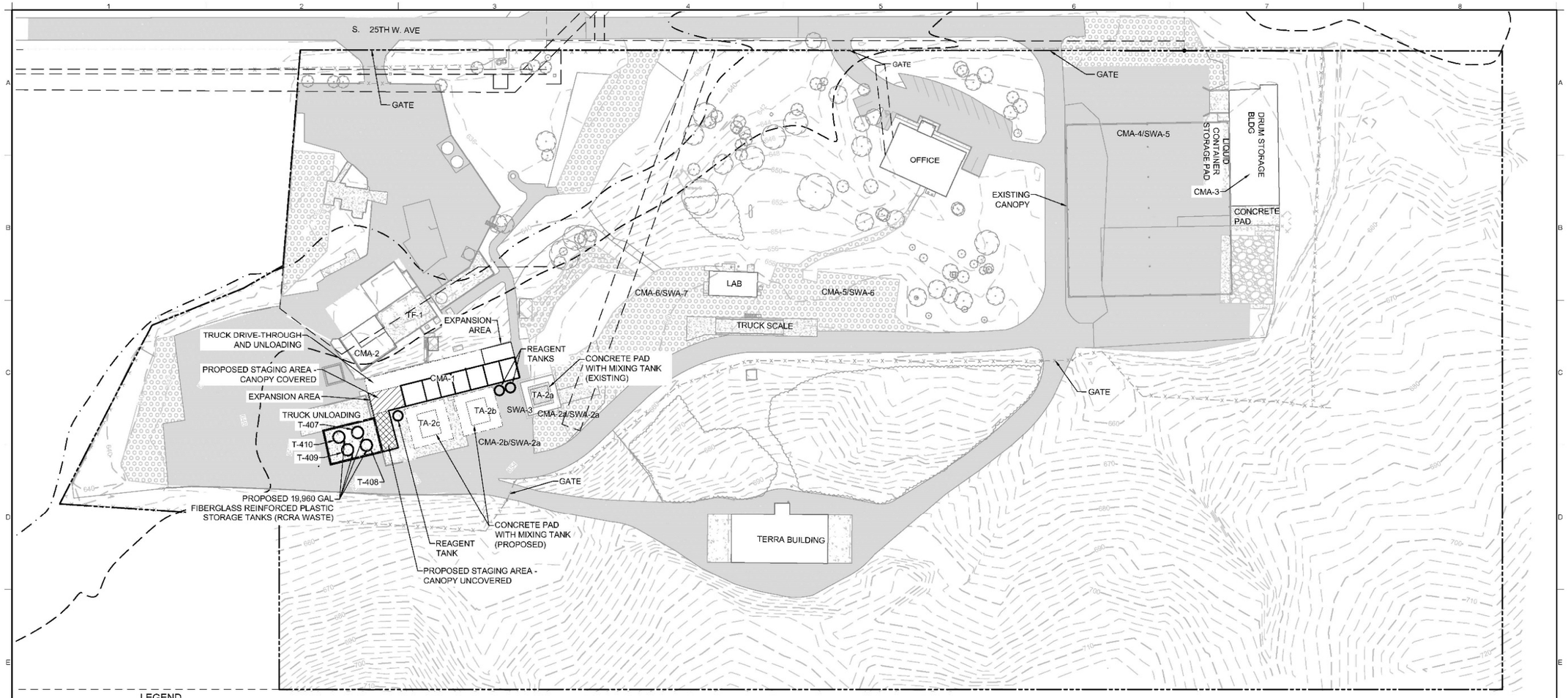
TOPOGRAPHIC SITE MAP
PART B PERMIT APPLICATION
ATTACHMENT 1-MAPS AND FIGURES

US ECOLOGY TRANSFER STATION
TULSA, OKLAHOMA

WWW.WCGRP.COM

FIGURE B-2a

O:\0120\45\PERMIT DRAWINGS\B-2_Topo Map.dwg, jwilson, 1:2



LEGEND

- EXISTING GROUND MAJOR CONTOUR (10') (NOTE 1)
- EXISTING GROUND MINOR CONTOUR (2') (NOTE 1)
- EXISTING SITE ACCESS ROAD
- EXISTING FENCE
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING BUILDING / TANK
- VEGETATION / TREE
- 100 YEAR FLOODPLAIN
- 500 YEAR FLOODPLAIN
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- PROPOSED FACILITY
- PROPOSED CANOPY COVER
- PROPOSED STAGING AREA - COVERED
- PROPOSED STAGING AREA - UNCOVERED
- PROPOSED GRADING MAJOR CONTOURS (10')
- PROPOSED GRADING MINOR CONTOURS (2')
- PROPOSED GRADING LIMIT

N

0 50 100
SCALE IN FEET

NOTES:

1. EXISTING SITE PLAN FEATURES PROVIDED BY US ECOLOGY AND COMPILED FROM PERMIT DRAWINGS PREPARED IN 2023 BY WEAVER CONSULTANTS GROUP.
2. ELEVATION DATA AND CONTOURS TAKEN FROM "TOPOGRAPHIC SITE MAP" PART B PERMIT DRAWING B-2 PREPARED IN 2023 BY WEAVER CONSULTANTS GROUP.

FOR PERMIT PURPOSES ONLY

REV	DATE	DESCRIPTION	DRN	APP

Geosyntec consultants
OKLAHOMA CERTIFICATE OF AUTHORIZATION NO. 1999 EXP. 06/30/2026
10777 WESTHEIMER RD, SUITE 900
HOUSTON, TEXAS 77042 USA
TELEPHONE: 281.920.4661

US ECOLOGY TULSA, INC.
2700 S 25TH W. AVENUE
TULSA, OKLAHOMA 74104 USA

TITLE: TOPOGRAPHIC SITE MAP (PROPOSED SITE PLAN)

PROJECT: PERMIT MODIFICATION APPLICATION

SITE: US ECOLOGY TULSA, INC. TULSA, OKLAHOMA

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

SIGNATURE

DATE

LICENSED PROFESSIONAL ENGINEER — JEREMY L. YEGLIN — 28976 — OKLAHOMA

DESIGN BY:	LMS	DATE: JANUARY 2025	
DRAWN BY:	JJV,AM	PROJECT NO.:	TXR10979
CHECKED BY:	BG	FILE:	TXR10979P2b.dwg
REVIEWED BY:	JY	FIGURE NO.:	B-2b
APPROVED BY:	JY		

C:_GEO-ACCDOCS\GEOSYNTEC\US ECOLOGY_TULSA TRANSFR STA\PROJECT FILES\CADD\1_PERMIT MOD TSP\DWGS\SHEET\SYTXR10979P2B.DWG Last Edited by Ahmed.Mahmoud on 1/7/2025

Figure from November 2024 Operations Permit

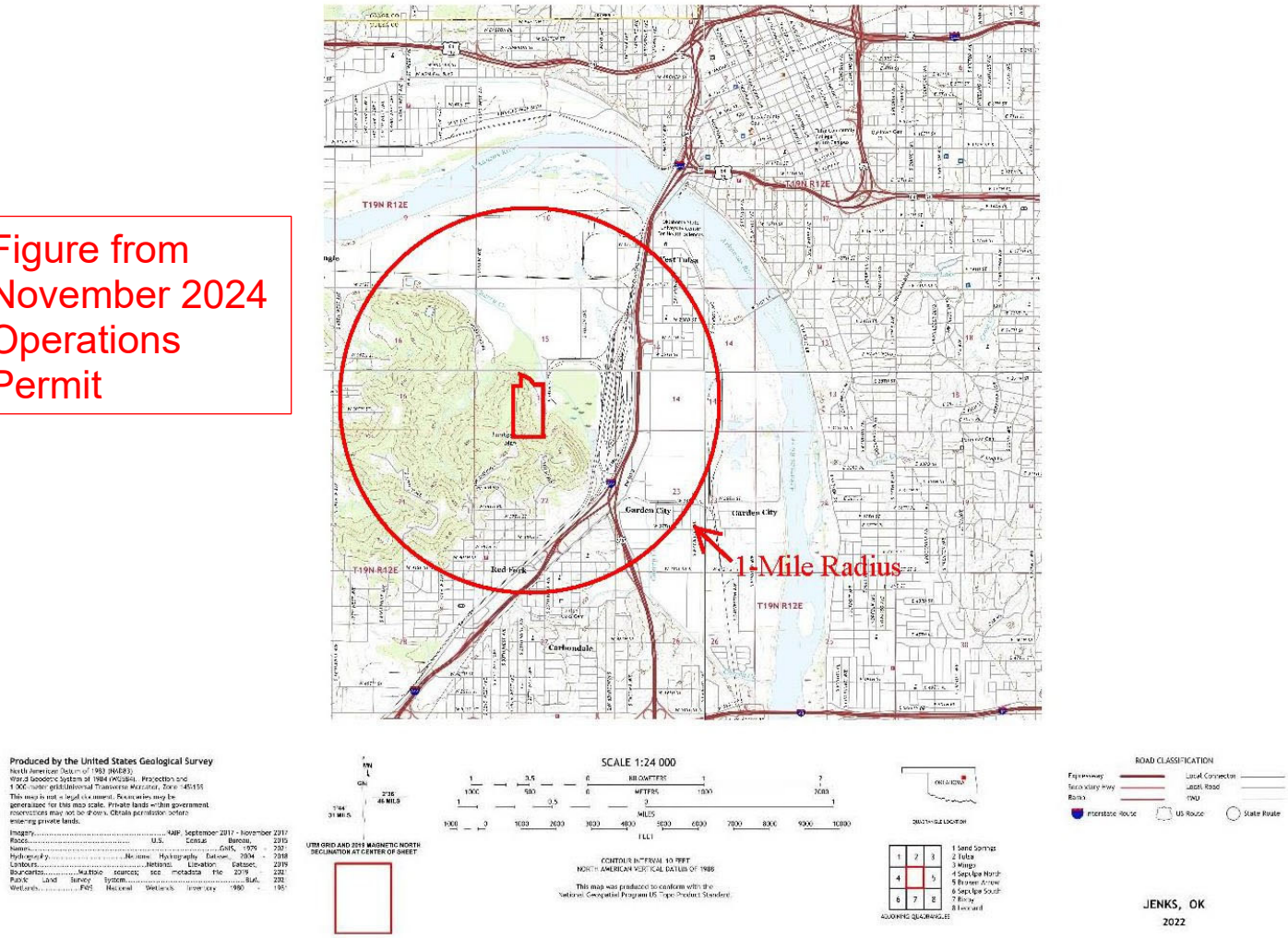
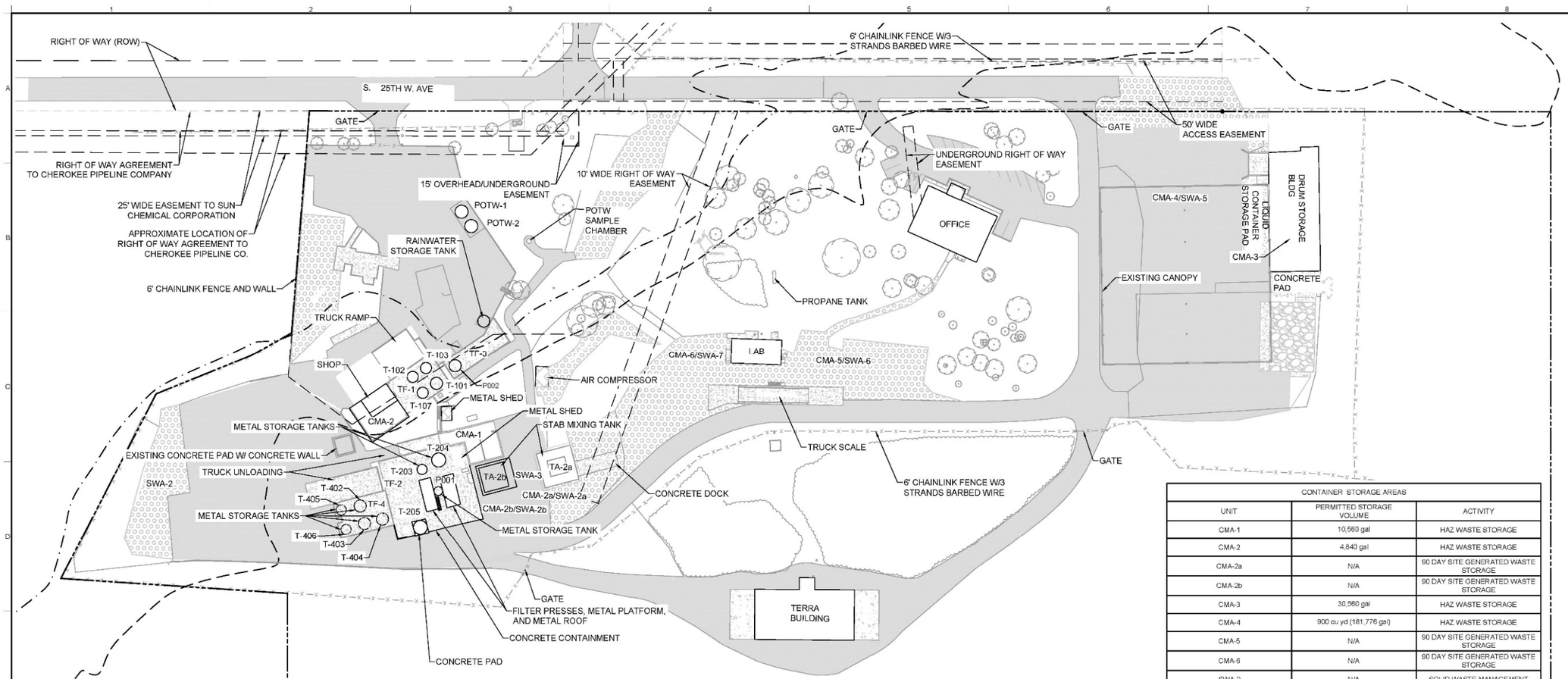


Fig. – USGS Topographic Map Showing 1-Mile Radius From Facility
(Based on portions of Sand Springs, Sapulpa, Tulsa, and Jenks Topo Maps)

Appendix A-2 (Section 9)

Facility Drawings



CONTAINER STORAGE AREAS		
UNIT	PERMITTED STORAGE VOLUME	ACTIVITY
CMA-1	10,560 gal	HAZ WASTE STORAGE
CMA-2	4,840 gal	HAZ WASTE STORAGE
CMA-2a	N/A	90 DAY SITE GENERATED WASTE STORAGE
CMA-2b	N/A	90 DAY SITE GENERATED WASTE STORAGE
CMA-3	30,560 gal	HAZ WASTE STORAGE
CMA-4	900 cu yd (181,776 gal)	HAZ WASTE STORAGE
CMA-5	N/A	90 DAY SITE GENERATED WASTE STORAGE
CMA-6	N/A	90 DAY SITE GENERATED WASTE STORAGE
SWA-2	N/A	SOLID WASTE MANAGEMENT
SWA-3	N/A	SOLID WASTE MANAGEMENT
SWA-5	N/A	SOLID WASTE MANAGEMENT
SWA-6	N/A	SOLID WASTE MANAGEMENT
SWA-7	N/A	SOLID WASTE MANAGEMENT

LEGEND

- EXISTING SITE ACCESS ROAD
- EXISTING FENCE
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING BUILDING / TANK
- VEGETATION / TREE
- 100 YEAR FLOODPLAIN
- 500 YEAR FLOODPLAIN
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL

N

0 50 100
SCALE IN FEET

NOTES:

1. EXISTING SITE PLAN FEATURES PROVIDED BY US ECOLOGY AND COMPILED FROM PERMIT DRAWINGS PREPARED IN 2023 BY WEAVER CONSULTANTS GROUP.

TANK SCHEDULE HAZARDOUS WASTE TREATMENT		
UNIT	VOLUME	CONTENTS
T-101	16,800 gal	HAZARDOUS WASTE LIQUID
T-102	19,960 gal	HAZARDOUS WASTE LIQUID
T-103	19,960 gal	HAZARDOUS WASTE LIQUID
T-107	13,077 gal	HAZARDOUS WASTE LIQUID
TA-2a	25,851 gal	HAZARDOUS WASTE LIQUID
TA-2b	21,991 gal	HAZARDOUS WASTE LIQUID

CLEAN WATER ACT TREATMENT TANKS		
UNIT I	VOLUME I	CONTENTS
POTW-1	20,000 gal	OUT OF SERVICE
POTW-2	20,000 gal	OUT OF SERVICE

PRODUCT TANK TANK SCHEDULE		
UNIT I	VOLUME I	CONTENTS
T-405	5,000 gal	DIESEL VOLUME

FOR PERMIT PURPOSES ONLY

REV	DATE	DESCRIPTION	DRN	APP

Geosyntec consultants
OKLAHOMA CERTIFICATE OF AUTHORIZATION NO. 1996 EXP. 06/30/2026
10777 WESTHEIMER RD, SUITE 900
HOUSTON, TEXAS 77042 USA
TELEPHONE: 281.920.4661

US ecology
US ECOLOGY TULSA, INC.
2700 S 25TH W. AVENUE
TULSA, OKLAHOMA 74104 USA

TITLE: GENERAL FACILITY LAYOUT (EXISTING CONDITIONS)

PROJECT: PERMIT MODIFICATION APPLICATION

SITE: US ECOLOGY TULSA, INC.
TULSA, OKLAHOMA

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

JEREMY L. YEGLIN 28976 LICENSED PROFESSIONAL ENGINEER OKLAHOMA

DESIGN BY:	LMS	DATE:	JANUARY 2025
DRAWN BY:	JJV, AM	PROJECT NO.:	TXR10979
CHECKED BY:	BG	FILE:	TXR10979P01.dwg
REVIEWED BY:	JY	FIGURE NO.:	A-2
APPROVED BY:	JY		

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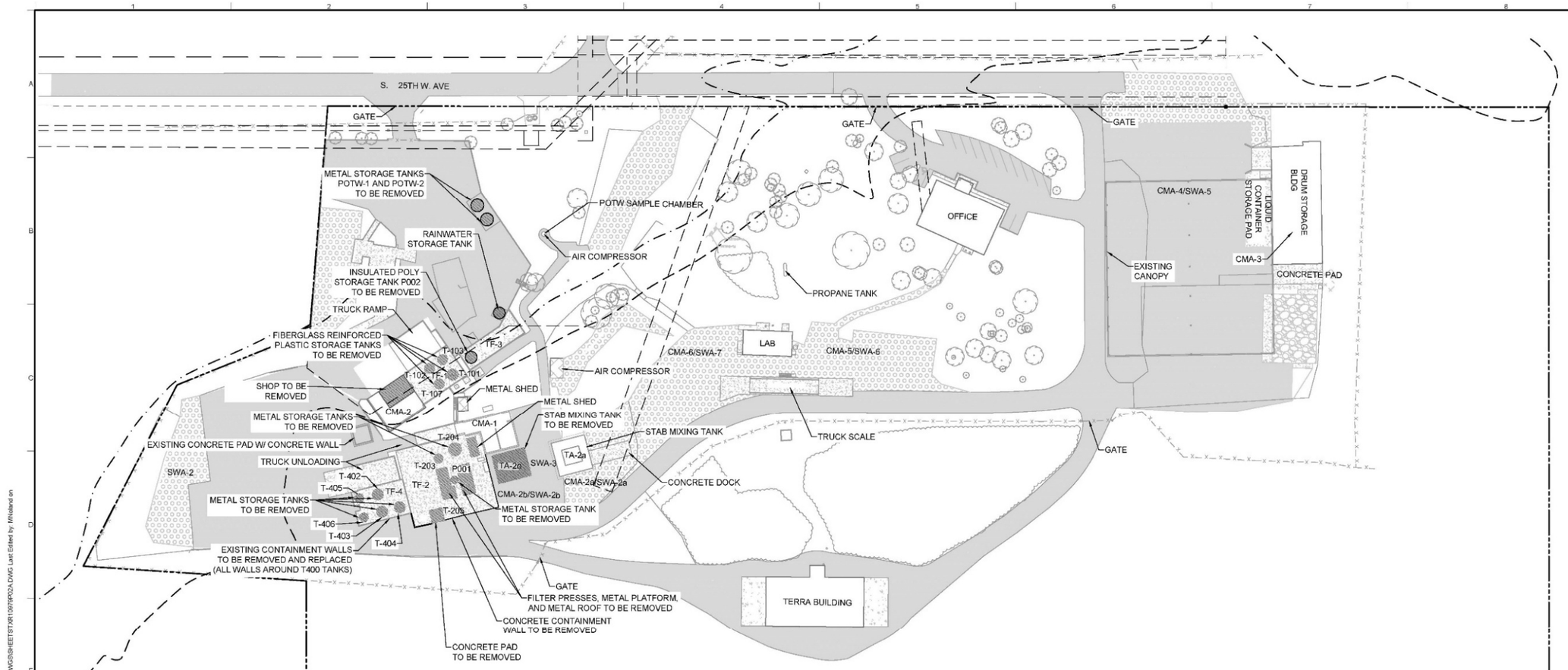

LEGEND

- EXISTING SITE ACCESS ROAD
- EXISTING FENCE
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING BUILDING / TANK
- VEGETATION / TREE
- 100 YEAR FLOODPLAIN
- 500 YEAR FLOODPLAIN
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- FACILITY TO BE REMOVED

N

0 50 100

SCALE IN FEET

NOTES:

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FOR PERMIT PURPOSES ONLY

REV	DATE	DESCRIPTION	DRN	APP

Geosyntec consultants
OKLAHOMA CERTIFICATE OF AUTHORIZATION NO. 1996 EXP. 06/30/2026
10777 WESTHEIMER RD, SUITE 900
HOUSTON, TEXAS 77042 USA
TELEPHONE: 281.920.4001

US ECOLOGY TULSA, INC.
2709 S 25TH W. AVENUE
TULSA, OKLAHOMA 74104 USA

TITLE: GENERAL FACILITY LAYOUT (DEMOLITION PLAN)

PROJECT: PERMIT MODIFICATION APPLICATION

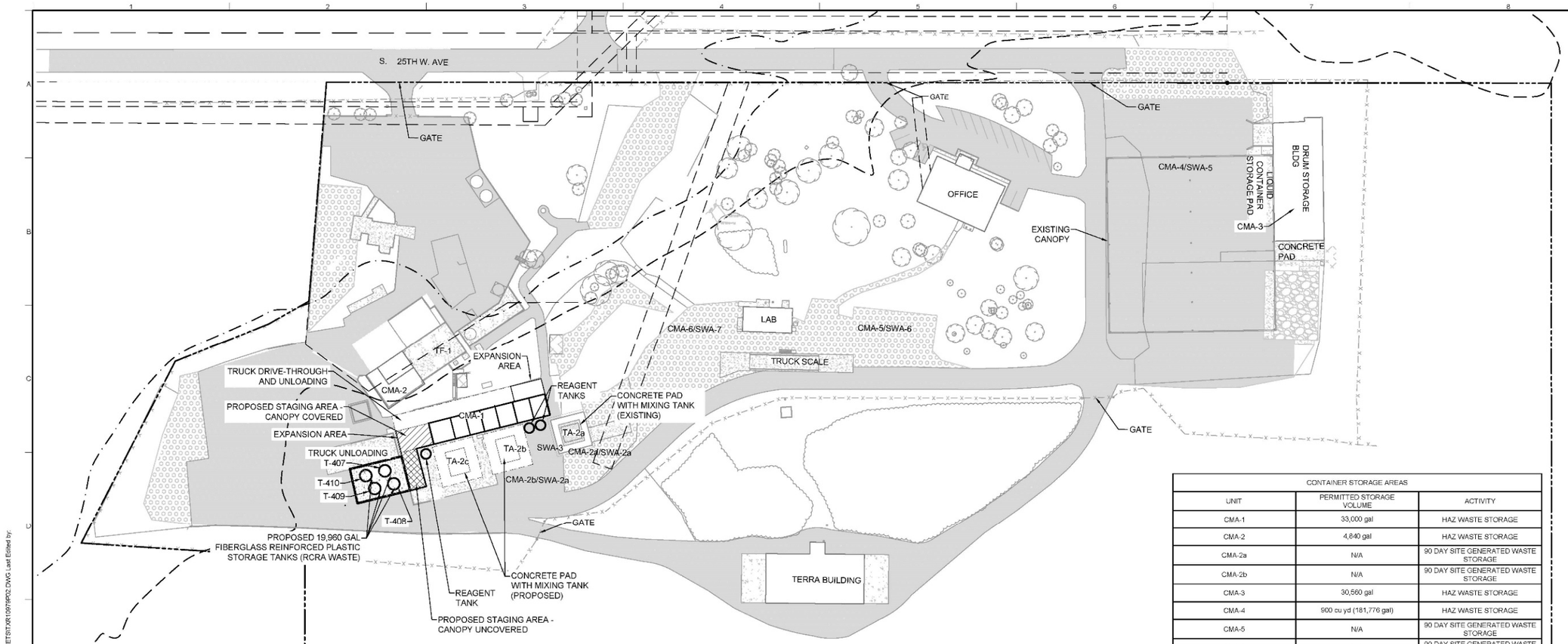
SITE: US ECOLOGY TULSA, INC.
TULSA, OKLAHOMA

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

JEREMY L. YEGLIN 28976 LICENSED PROFESSIONAL ENGINEER OKLAHOMA

DESIGN BY:	LMS	DATE: JANUARY 2025	
DRAWN BY:	JJV,AM	PROJECT NO.:	TXR10979
CHECKED BY:	BG	FILE:	TXR10979P02a.dwg
REVIEWED BY:	JY	FIGURE NO.:	A-2a
APPROVED BY:	JY		

C:_GEO_ACCACCDOCS\GEOSYNTEC\US ECOLOGY_TULSA TRANSFR STA\PROJECT FILES\CADD\01_PERMIT MOD TSD\PCW\GIS\SHEETS\TXR10979P02A.DWG Last Edited by: MWallard on 12/7/2024



CONTAINER STORAGE AREAS		
UNIT	PERMITTED STORAGE VOLUME	ACTIVITY
CMA-1	33,000 gal	HAZ WASTE STORAGE
CMA-2	4,840 gal	HAZ WASTE STORAGE
CMA-2a	N/A	90 DAY SITE GENERATED WASTE STORAGE
CMA-2b	N/A	90 DAY SITE GENERATED WASTE STORAGE
CMA-3	30,560 gal	HAZ WASTE STORAGE
CMA-4	900 cu yd (181,776 gal)	HAZ WASTE STORAGE
CMA-5	N/A	90 DAY SITE GENERATED WASTE STORAGE
CMA-6	N/A	90 DAY SITE GENERATED WASTE STORAGE
SWA-2	N/A	SOLID WASTE MANAGEMENT
SWA-3	N/A	SOLID WASTE MANAGEMENT
SWA-5	N/A	SOLID WASTE MANAGEMENT
SWA-6	N/A	SOLID WASTE MANAGEMENT
SWA-7	N/A	SOLID WASTE MANAGEMENT

LEGEND

- EXISTING SITE ACCESS ROAD
- EXISTING FENCE
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING BUILDING / TANK
- VEGETATION / TREE
- 100 YEAR FLOODPLAIN
- 500 YEAR FLOODPLAIN
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- PROPOSED FACILITY
- PROPOSED CANOPY COVER
- PROPOSED STAGING AREA - COVERED
- PROPOSED STAGING AREA - UNCOVERED
- 310 PROPOSED GRADING MAJOR CONTOURS (10')
- 312 PROPOSED GRADING MINOR CONTOURS (2')
- PROPOSED GRADING LIMIT

N

0 50 100
SCALE IN FEET

NOTES:

1. EXISTING SITE PLAN FEATURES PROVIDED BY US ECOLOGY AND COMPILED FROM PERMIT DRAWINGS PREPARED IN 2023 BY WEAVER CONSULTANTS GROUP.

TANK SCHEDULE HAZARDOUS WASTE STORAGE		
UNIT	VOLUME	CONTENTS
T-407	19,960 gal	HAZARDOUS WASTE LIQUID
T-408	19,960 gal	HAZARDOUS WASTE LIQUID
T-409	19,960 gal	HAZARDOUS WASTE LIQUID
T-410	19,960 gal	HAZARDOUS WASTE LIQUID

TANK SCHEDULE HAZARDOUS WASTE TREATMENT		
UNIT	VOLUME	CONTENTS
TA-2a	12,000 gal	HAZARDOUS WASTE LIQUID
TA-2b	82,000 gal	HAZARDOUS WASTE LIQUID
TA-2c	82,000 gal	HAZARDOUS WASTE LIQUID

FOR PERMIT PURPOSES ONLY

REV	DATE	DESCRIPTION	DRN	APP

Geosyntec consultants
OKLAHOMA CERTIFICATE OF AUTHORIZATION NO. 1996 EXP. 06/30/2026
10777 WESTHEIMER RD, SUITE 900
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US ECOLOGY TULSA, INC.
2700 S 25TH W. AVENUE
TULSA, OKLAHOMA 74104 USA

TITLE: GENERAL FACILITY LAYOUT (PROPOSED SITE PLAN)

PROJECT: PERMIT MODIFICATION APPLICATION

SITE: US ECOLOGY TULSA, INC. TULSA, OKLAHOMA

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION UNLESS SEALED.

LICENSED PROFESSIONAL ENGINEER JEREMY L. YEGLIN 28976 OKLAHOMA

DESIGN BY:	LMS	DATE: JANUARY 2025	
DRAWN BY:	JJV, AM	PROJECT NO.: TXR10979	
CHECKED BY:	BG	FILE: TXR10979P02.dwg	
REVIEWED BY:	JY	FIGURE NO.: A-2b	
APPROVED BY:	JY		

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Appendix A-3 (Section 10)

Photographs

US Ecology Tulsa, Inc.

EPA ID: OKD00D402396

US Ecology Tulsa, Inc. Photos for Part A Application Section 10

Access controlled main gate to facility

Additional photos of access controlled main gate

Main Office entrance

Unloading dock for Container Management Area 3 (CMA-3)

North lot outside CMA-3 (storage of nonhazardous and solid hazardous waste)

Indoor trailer unloading area
outside CMA-3

Container Management Area 3 (CMA-3)

Additional photo of Container Management Area 3 (CMA-3)

Storage Area in CMA-3 with concrete berm

Drum storage yard with canopy cover

Holding area for treated waste
awaiting lab results south of laboratory

Main entrance to laboratory and laboratory supply storage

Stabilization treatment tank TA-2a

Stabilization treatment tank TA-2b

South side of Container Management Area 1

Container Management Area 1 (CMA-1)

Loading dock for CMA-1 Area

SWA-2 at north end of facility with empty roll-offs and roll-offs with solid waste.

Container management Area 2 and Tank Farm 1 unloading area (empty containers storage as well)

Container Management Area 2.

Tank Farm 1 (Containment area for T-101, T-102, T-103, and T-107)

West side of Tank Farm 1

100- year flood zone area of facility (no waste activities occur in this area. Only empty container storage)

Expansion Area south of CMA-1

Expansion Area south of CMA-1. TA-2a and TA-2b (to be removed and reconstructed)

Inside of the proposed TF-4 containment area

Looking south at the proposed TF-4 containment area

Expansion Area north of CMA-1

SECTION T

RCRA Part B Permit Application

INFORMATION REQUIREMENTS FOR TANK SYSTEMS

40 CFR 270.16

US Ecology Tulsa

Tulsa, Oklahoma

9/17/25

LICENSED PROFESSIONAL ENGINEER
JEREMY L. YEGLIN
28976
OKLAHOMA

Permit Modification Application **September 2025**

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SECTION T - Information Requirements for Tank Systems

This section will provide the information required for hazardous waste storage and treatment in tank systems at US Ecology Tulsa (USE Tulsa) per 40 CFR 270.16 and 40 CFR 264 requirements. USE Tulsa utilizes tank systems in the area designated as Tank Farm 1 (TF-1), which includes tanks T-101, T-102, T-103, and T-107 for waste storage and treatment. Proposed modifications to the site include the demolition/removal of Tank Farm 1, the demolition/removal of the tanks in Tank Farm 4 (currently used for non-hazardous waste), the improvement of the Tank Farm 4 containment, and the construction of four (4) new tanks in the Tank Farm 4 location. USE Tulsa also uses stabilization tanks in the TA-2a and TA-2b area for hazardous waste treatment. The proposed changes to the site include the removal and reconstruction of TA-2b to increase the capacity of TA-2b and the addition of TA-2c. A map of the location of current Tank Farm 1, proposed Tank Farm 4, current TA-2a and 2b treatment tanks, and proposed TA-2a, TA-2b, and TA-2c treatment tanks is provided in Figures 1, 1a, and 1b presented in Attachment 1 - Maps and Figures. Additional details concerning tank system processes are provided in Attachment 10 - Process Description.

1) WRITTEN ASSESSMENT BY INDEPENDENT P.E. CERTIFYING STRUCTURAL INTEGRITY AND SUITABILITY FOR HANDLING OF HAZARDOUS WASTES OF EACH TANK SYSTEM AS REQUIRED UNDER 40 CFR 264.191 & 192: 40 CFR 207.16(a)

A copy of the Professional Engineer (P.E.) written assessment for equipment within Tank Farm 1 is provided in Appendix 1 of this attachment, and a copy of the PE assessment for existing treatment tanks TA-2a and TA-2b is provided in Appendix 5. For the proposed tanks, a P.E. written assessment for modified Tank Farm 4 (with its improved containment system and four [4] new hazardous waste tanks) and the proposed treatment tanks (TA-2b and TA-2c) is provided in Appendix 8 of this attachment.

2) DIMENSIONS AND CAPACITY OF EACH TANK: 40 CFR 270.16(b)

The information for the dimensions and capacity of each tank located in TF-1 and existing TA-2a and TA-2b stabilization treatment tanks are below:

a) Tank T-101: T-101 has a diameter of 12’ and a height of 20’. The capacity of T-101 is 16,800 gallons.

b) Tank T-102: T-102 has a diameter of 14’ and a height of 20’. The capacity of T-102 is 19,960 gallons.

c) Tank T-103: T-103 has a diameter of 14’ and a height of 20’. The capacity of T-103 is 19,960 gallons.

d) Tank T-107: T-107 has a diameter of 12’ and a height of 18.4’. The capacity of T-107 is 13,077 gallons.

e) TA-2a (existing): TA-2a is a steel treatment tank with dimensions of 16’ x 18’ x 4’. It is surrounded by a shallow steel containment box with the dimensions of 35.25’ x 35.25’ x 1’. TA-2a has a permitted treatment capacity of 25,851 gallons per day based on treating multiple processes per day.

f) TA-2b (existing): TA-2b is a steel treatment tank with dimensions of 14’x 14’ x 5’. It is surrounded by a relatively shallow steel containment box with the dimensions of 24.25’ x 24.25’ x 2.5.’ TA-2b has a treatment capacity of 21,991 gallons per day based on treating multiple processes per day.

The information for the dimensions and capacity of each proposed tank located in TF-4 and the proposed TA-2b and TA-2c stabilization treatment tanks are below (only a change in the treatment capacity for TA-2a is proposed):

g) Tank T-407: T-407 has a diameter of 12’ and a height of 32’10.5”. The capacity of T-407 is 19,960 gallons.

h) Tank T-408: T-408 has a diameter of 12’ and a height of 32’10.5”. The capacity of T-408 is 19,960 gallons.

i) Tank T-409: T-409 has a diameter of 12’ and a height of 32’10.5”. The capacity of T-409 is 19,960 gallons.

j) Tank T-410: T-410 has a diameter of 12’ and a height of 32’10.5”. The capacity of T-410 is 19,960 gallons.

k) TA-2a: TA-2a is a steel treatment tank with dimensions of 16’ x 18’ x 4’. It is surrounded by a shallow steel containment box with the dimensions of 35.25’ x 35.25’ x 1’. TA-2a has a proposed treatment capacity of up to 12,000 gallons per day based on treating multiple processes per day.

l) TA-2b: TA-2b is a treatment tank with a steel tank (liner) within a concrete structure that provides structural support and secondary containment. The bottom of the steel tank is curved in one direction (e.g., horseshoe shaped) with dimensions of 20’ x 25’ x 13’. TA-2b has a proposed treatment capacity of up to 82,000 gallons per day based on treating multiple processes per day.

m) TA-2c: TA-2c is a treatment tank with a steel tank (liner) within a concrete structure that provides structural support and secondary containment. The bottom of the steel tank is curved in one direction (e.g., horseshoe shaped) with dimensions of 20’ x 25’ x 13’. TA-2c has a proposed treatment capacity of up to 82,000 gallons per day based on treating multiple processes per day.

3) DESCRIPTION OF FEED SYSTEMS, SAFETY CUTOFFS, BYPASS SYSTEMS, AND PRESSURE CONTROL: 40 CFR 270.16(c)

USE Tulsa uses closed top tanks for storing liquid hazardous waste which are equipped with loading and unloading ports and vents. Tank details for existing tanks (to be decommissioned and removed) T-101, T-102, T-103, and T-107 are provided in Appendices 1 to 3 of this document. Tank details for proposed tanks T-407, T-408, T-409, and T-410 are provided in Appendix 4. These tanks on-site are typically loaded using top fill lines and unloaded through bottom discharge lines or loaded/unloaded from bottom fill/discharge lines. Where present, manholes are used for inspection and cleaning operations. Discharge lines from the tanks are regulated by valves (or equivalent device). Chemical resistant flexible hoses are used for unloading of tank trucks. Typically, the rigid fill lines are attached to the tanks by flange couplings. Flexible lines with quick couplings are used to connect the inlet of a tank or tank manifold system to the outlet of a tank truck. The pressure control systems on tanks are the vents and thief hatches.

USE Tulsa uses open-top atmospheric tanks for treating hazardous wastes. Tank details for existing treatment tanks TA-2a and TA-2b and proposed treatment tanks TA-2b and TA-2c are

provided in Appendices 4 and 5, respectively, of this document. Bulk and containerized waste is transferred into the tanks manually by facility personnel during operations. Overfill is prevented via manual control. Based on the above operations, automated feed systems, safety cutoffs, and bypass systems, and pressure control systems are not needed..

4) DIAGRAM OF PIPING, INSTRUMENTATION, AND PROCESS FLOW FOR EACH TANK SYSTEM: 40 CFR 270.16(d)

Details of piping, instrumentation, and process flow for the TF-1 tank systems are provided in Appendix 2 of this attachment. The process flow for TF-1 and proposed TF-4 for a bulk shipment is summarized as follows: the truck is unloaded by connecting a flexible hose with quick disconnect couplings into one of the storage tanks directly or through a tank manifold system. In addition to bulk waste, containerized waste may also be pumped into the tanks. TF-1 is proposed to be decommissioned and removed from the hazardous waste management system and replaced by proposed hazardous waste TF-4. A process flow diagram for proposed TF-4 is provided in Appendix 4-A.

The process flow for the TA-2a and TA-2b treatment tanks and proposed TA-2b and TA-2c treatment tanks for containerized shipments is summarized as follows: the containers that are approved for treatment in the stabilization area are delivered to the staging area and segregated via permitted waste codes that can be treated in the designated tank. The process flow for the TA-2a and TA-2b treatment tanks and proposed TA-2b and TA-2c treatment tanks for bulk shipment is summarized as follows: the truck is unloaded by connecting a flexible hose with quick disconnect couplings and transferring the material directly into the designated treatment tank. Roll off boxes are unloaded in TA-2a, TA-2b, and TA-2c by dumping directly into the treatment tank. The treatment tanks also receive bulk waste that has been delivered to TF-4. A process flow diagram for proposed TA-2b and TA-2c is provided in Appendix 6-A.

5) DESCRIPTION OF CORROSION PROTECTION SYSTEM AS REQUIRED UNDER 264.192(a)(3)(ii): 40 CFR 270.16(e)

Tanks T-101, T-102, T-103, and T-107 are constructed of fiberglass, which is resistant to corrosion and satisfies requirements for 264.192(a)(3)(ii). Proposed tanks T-407, T-408, T-409, and T-410 will be constructed of fiberglass as well.

Existing treatment tanks TA-2a and TA-2b (existing TA-2b to be removed), proposed mixing tanks (TA-2b and TA-2c), and their primary containment steel liners are monitored for corrosion by performing periodic thickness testing, and results are recorded and compared to previous results to determine if tanks are maintained at a thickness that will prevent leaks or containment failures. Thickness testing for TA-2a and existing TA-2b will be performed on the accessible exterior walls of the treatment tanks using an ultrasonic thickness gauge, or equivalent technology, and thickness testing of the proposed TA-2b and TA-2c tanks will be conducted on interior walls. The frequency of the testing will be according to the following chart:

Measurement (inches)	Subsequent Testing Frequency	Status
≥0.600	Annual	In Service
≥0.500	Semi-Annual	In Service
≥0.400	Quarterly	In Service
≤0.250	NA	Out of service

The treatment tanks will be constructed with one (1) inch thickness metal at a minimum and will be taken out of service when the exterior wall thickness is noted as being less than 0.250". For the proposed TA-2b and TA-2c steel liners, the curved bottom portion of the steel liner will be constructed with 1.25 inch minimum thickness and the upper vertical faces of the steel liner will be 1 inch minimum thickness. When applicable, wear plates will not be included in the thickness testing but visual inspections of those plates will be documented in the inspection of the treatment tanks as well as the secondary containments. The guidelines in 40 CFR part 264.196 will be followed regarding the repair of the treatment tanks.

6) INSTALLATION OF NEW TANK SYSTEMS IN COMPLIANCE WITH 264.192(b)(c)(d)(e): 40 CFR 270.16(f)

USE Tulsa is proposing to install a new hazardous tanks and tank system in the existing TF-4 area that meets the requirements of 40 CFR 264.192(b) to (e). The existing TF-4 tanks will be decommissioned and removed. For the new TF-4, the existing tanks containment system will be improved, and four (4) new fiberglass tanks (T-407, T-408, T-409, and T-410) will be constructed and installed in the TF-4 area. The tanks will be 12-foot in diameter, flat top, cone bottom, and supported on legs (see Appendix 4).

Additionally, USE Tulsa is proposing to install two new treatment tanks in the same general vicinity of the existing TA-2a treatment tank. The new treatment tanks (TA-2b and TA-2c) will be installed in a manner that meets the requirements of 40 CFR 264.192(c). The tanks will be backfilled with a clean, structural fill that is a noncorrosive, porous, homogeneous substance that is placed completely around the tanks and compacted to 95% of Standard Proctor (ASTM 698).

7) DETAILED PLANS AND DESCRIPTION OF THE SECONDARY CONTAINMENT SYSTEM IN COMPLIANCE WITH 264.193(a)(b)(c)(d)(e)(f): 40 CFR 270.16(g)

Details of the containment systems for Tank Farm 1 and Tank Farm 4 are provided in Appendices 3 and 4 respectively of this section. USE Tulsa operating procedures include inspections designed to identify accumulated liquids in a timely manner (inspection schedule and criteria are outlined in Section 4 - Inspection Schedules and Forms). The containment system for TF-1 is coated with an impervious, chemically resistant material. The existing containment system for TF-4 is constructed of a concrete slab and cinder blocks for walls. USE Tulsa plans to demolish the cinderblock containment wall and reconstruct as a solid concrete wall. USE Tulsa then plans to add a coating with an impervious, chemically resistant material to seal the secondary containment structure. USE Tulsa will use an industrial spray coating, SC-3900 from Basic Concepts, Inc. or an equivalent coating, to seal the secondary containment. Manufacturer information for this product is provided in Appendix 9.

The containment systems for TA-2a and existing TA-2b are constructed of steel. The proposed modifications/additions to the USE Tulsa facility consists of removing existing TA-2b and constructing a new TA-2b and TA-2c with a steel liner acting as the primary containment and 1-foot thick concrete walls as the secondary containment. The concrete will be amended with Xypex Chemical Corporation Xypex Admix or an equivalent product to create an impervious, chemically resistant material that prevents migration of waste into the concrete. USE Tulsa operating procedures include inspections designed to identify accumulated liquids in a timely manner (inspection schedule and criteria are outlined in Section 4 - Inspection Schedules and Forms). Additional information about TA-2a, TA-2b, and TA-2c are provided in Appendices 5 and 6 of this section.

The existing TA units are inspected daily for any breaches or additional issues, and the proposed TA units will also be inspected this way. When identified, spilled or leaked waste and/or accumulated precipitation will be removed from the unit via the inspection ports, if present, in as timely a manner as is necessary to prevent overflow of the unit or sump/collection system. Accumulated liquids will be identified by visual observation, review of facility records, and (if necessary) by chemical analysis. If required, analyses will be conducted and material will be processed in accordance with Attachment 4 - Waste Characteristics and Waste Analysis Plan.

----------END OF SECTION----------

Appendix 1- Tank Farm 1 Certification Documents

T101

Finite Composites Consulting
248.808.3283
Steve@FiniteCC.com
FiniteCC.com

FINITE
COMPOSITES CONSULTING

Date: 10 July 2020

To: Mark Wagner
Wagner Enterprise

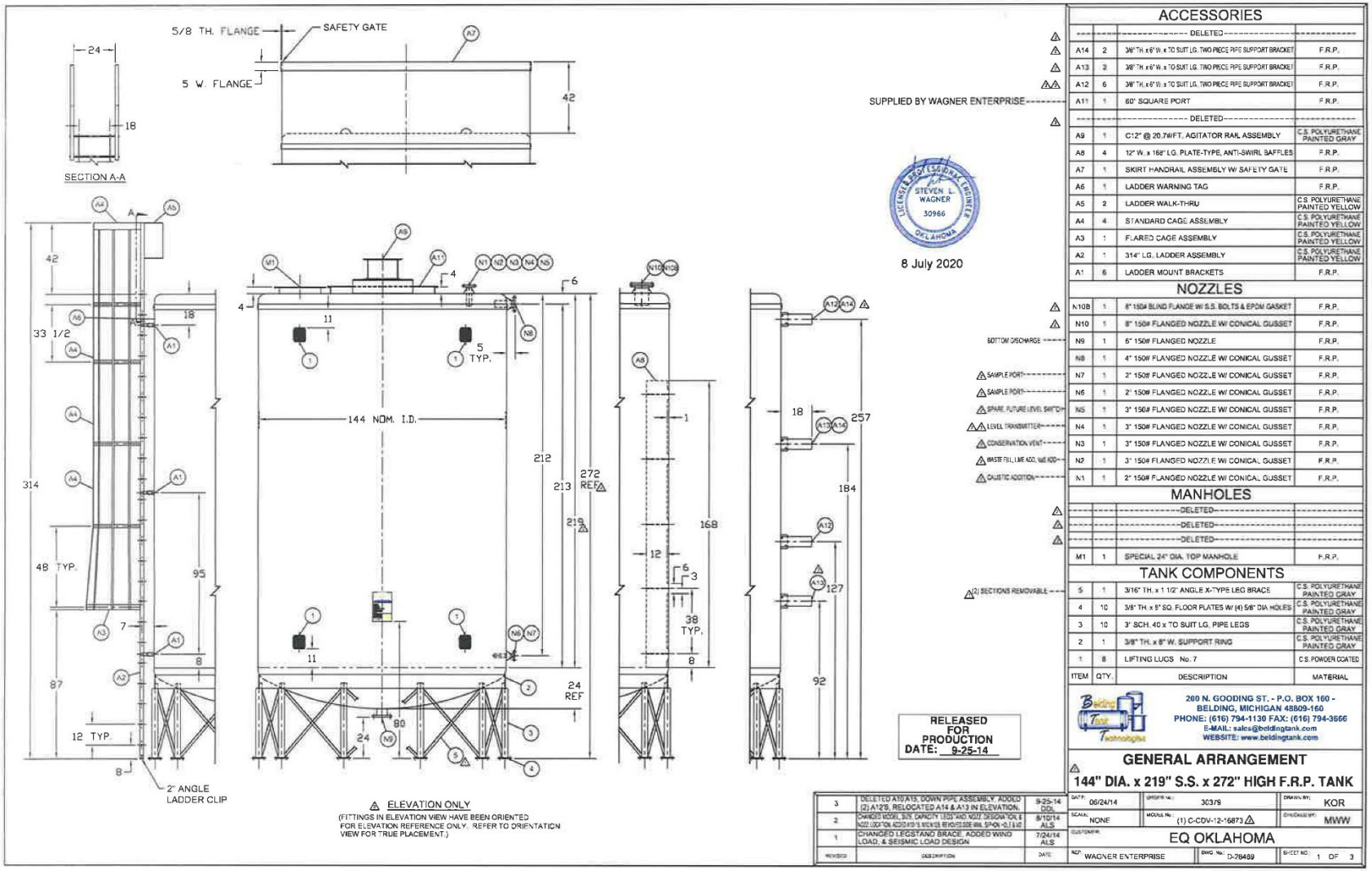
Re: Belding Tank Technologies Project Reference 30379

Mark

Included are the stamped drawings for the above referenced project. Please note, the design and drawings are approved for this vessel as originally designed and built. I cannot be liable for the current condition of the vessel because the tank has been in service for approximately 7 years.

Best Regards,

Steven Wagner, PE
Principal Engineer
Finite Composites Consulting



ACCESSORIES

		DELETED	
A14	2	3/8" TH. x 6"W. x TO SUIT LG. TWO PIECE PIPE SUPPORT BRACKET	F.R.P.
A13	2	3/8" TH. x 6"W. x TO SUIT LG. TWO PIECE PIPE SUPPORT BRACKET	F.R.P.
A12	6	3/8" TH. x 6"W. x TO SUIT LG. TWO PIECE PIPE SUPPORT BRACKET	F.R.P.
A11	1	60° SQUARE PORT (SUPPLIED BY WAGNER ENTERPRISE)	F.R.P.
		DELETED	
A9	1	C12" @ 20.7#/FT. AGITATOR RAIL ASSEMBLY	C.S. POLYURETHANE PAINTED GRAY
A8	4	12" W. x 168" LG. PLATE-TYPE, ANTI-SWIRL BAFFLES	F.R.P.
A7	1	SKIRT HANDRAIL ASSEMBLY W/ SAFETY GATE	F.R.P.
A6	1	LADDER WARNING TAG	F.R.P.
A5	2	LADDER WALK-THRU	C.S. POLYURETHANE PAINTED YELLOW
A4	4	STANDARD CAGE ASSEMBLY	C.S. POLYURETHANE PAINTED YELLOW
A3	1	FLARED CAGE ASSEMBLY	C.S. POLYURETHANE PAINTED YELLOW
A2	1	314" LG. LADDER ASSEMBLY	C.S. POLYURETHANE PAINTED YELLOW
A1	6	LADDER MOUNT BRACKETS	F.R.P.

NOZZLES

N10B	1	8" 150# BLIND FLANGE W/ S.S. BOLTS & EPDM GASKET	F.R.P.
N10	1	8" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N9	1	6" 150# FLANGED NOZZLE (BOTTOM DISCHARGE)	F.R.P.
N8	1	4" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N7	1	2" 150# FLANGED NOZZLE W/ CONICAL GUSSET (SAMPLE PORT)	F.R.P.
N6	1	2" 150# FLANGED NOZZLE W/ CONICAL GUSSET (SAMPLE PORT)	F.R.P.
N5	1	3" 150# FLANGED NOZZLE W/ CONICAL GUSSET (SPARE, FUTURE LEVEL SWITCH)	F.R.P.
N4	1	3" 150# FLANGED NOZZLE W/ CONICAL GUSSET (LEVEL TRANSMITTER)	F.R.P.
N3	1	3" 150# FLANGED NOZZLE W/ CONICAL GUSSET (CONSERVATION VENT)	F.R.P.
N2	1	3" 150# FLANGED NOZZLE W/ CONICAL GUSSET (WASTE FILL LINE ADD, N45 ADD)	F.R.P.
N1	1	2" 150# FLANGED NOZZLE W/ CONICAL GUSSET (CAUSTIC ADDITION)	F.R.P.

MANHOLES

		DELETED	
		DELETED	
		DELETED	
M1	1	SPECIAL 24" DIA. TOP MANHOLE	F.R.P.

TANK COMPONENTS

ITEM	QTY.	DESCRIPTION	MATERIAL
5	1	3/16" TH. x 1 1/2" ANGLE X-TYPE LEG BRACE (2) SECTIONS REMOVABLE	C.S. POLYURETHANE PAINTED GRAY
4	10	3/8" TH. x 8" SQ. FLOOR PLATES W/ (4) 5/8" DIA HOLES	C.S. POLYURETHANE PAINTED GRAY
3	10	3" SCH. 40 x TO SUIT LG. PIPE LEGS	C.S. POLYURETHANE PAINTED GRAY
2	1	3/8" TH. x 8" W. SUPPORT RING	C.S. POLYURETHANE PAINTED GRAY
1	8	LIFTING LUGS No. 7	C.S. POWDER COATED

Belding Tank Technologies
280 N. GOODING ST. - P.O. BOX 160 -
BELDING, MICHIGAN 48809-160
PHONE: (616) 794-1130 FAX: (616) 794-3666
E-MAIL: sales@beldingtank.com
WEBSITE: www.beldingtank.com

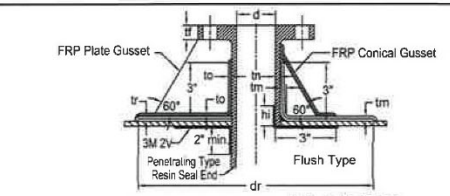
GENERAL ARRANGEMENT

144" DIA. x 219" S.S. x 272" HIGH F.R.P. TANK

REVISED	DESCRIPTION	DATE
3	DELETED A10/A15, DOWN PIPE ASSEMBLY, ADDED (2) A12'S, RELOCATED A14 & A13 IN ELEVATION.	9-25-14 GDL
2	CHANGED MODEL 3/8, CAPACITY LEGS AND NOZZ DESIGNATION, E N22 LOCATION, ADDED A13/A15, REVISED SIDE WALL SPACING, & N-10 & N	8/10/14 ALS
1	CHANGED LEGS AND BRACE, ADDED WIND LOAD, & SEISMIC LOAD DESIGN	7/24/14 ALS

DATE: 06/24/14 | ORDER No.: 3039 | DRAWN BY: KOR
SCALE: NONE | MODEL No.: (1) C-CDV-12-1687 | CHECKED BY: MWW
CUSTOMER: EQ OKLAHOMA
REF.: WAGNER ENTERPRISE | DWG. No.: D-28489 | SHEET NO.: 1 OF 3

PROJECT NOTES
1. WHITE (WJ-480) EXTERIOR GEL COAT WITH U.V. INHIBITOR REQUIRED.
2. (4) HOUR POST HEAT CURE REQUIRED FOR SERVICE.
3. BELDING TANK RECOMMENDS THE VENT BE EQUAL TO OR LAGER THAN THE LARGEST INLET OR OUTLET.
4. 60" SQUARE PORT SUPPLIED BY WAGNER ENTERPRISE INSTALLED BY B.T.T.
5. ALL CROSS BRACING MUST BE IN PLACE PRIOR TO OPERATION THE TANK.



Item	d	dr	ht	tn	Gusset	Lvl'T	tn Mat'l Pipe	to Mat'l Pipe	tf Material Pipe	tf	Rating
N1	24"	30"	1"	3/16"	None	0	5		0	3/16"	Atm
N1	2"	8"	1"	1/4"	CG	0	5		0	11/16"	125 psi
N2	3"	8"	1-1/2"	5/16"	CG	0	5		0	13/16"	125 psi
N3	3"	8"	1-1/2"	5/16"	CG	0	5		0	13/16"	125 psi
N4	3"	8"	1-1/2"	5/16"	CG	0	5		0	13/16"	125 psi
N5	3"	8"	1-1/2"	5/16"	CG	0	5		0	13/16"	125 psi
N6	2"	8"	1"	1/4"	CG	2'-2		5	1	11/16"	125 psi
N7	2"	8"	1"	1/4"	CG	2'-2		5	1	11/16"	125 psi
N8	3"	10"	2"	5/16"	None	0	5		0	15/16"	125 psi
N9	6	12"	3"	5/16"	None	2'-6		5	6	1"	100 psi
N10	8"	14"	3	5/16"	CG	0	5		0	13/16"	50 psi

Note: (1)* Liquid height is measured from item to Top of Tank Straight Side

⚠ ATTACHMENT CHART

OWNER	EQ OKLAHOMA
P.O. NO.	11048
EQUIP. NO.	
SERVICE	WASTEWATER (WITH TRACE AMOUNTS, LESS THAN 10 PPM, OF VARIOUS CHEMICALS)

DESIGN DATA

DESIGN STANDARD	ASTM D 3299-10
MAX. PRESSURE	ATMOSPHERIC
VACUUM	NONE
MAX. TEMP. (F)	AMBIENT
SPECIFIC GRAVITY	1.5 MAX
SEISMIC CODE	⚠ ASCE 7-05 (SITE CLASS = D)
SEISMIC DESIGN	⚠ OCCUPANCY CATEGORY = II SDS =0.139 SD1 =0.110
WIND LOAD	⚠ 90 MPH
APPROX. EMPTY WEIGHT (LBS)	7,600
NOM. CAPACITY (GALS)	⚠16,673
INTERIOR CATALYST	Co/MEKP
EXTERIOR CATALYST	Co/MEKP
LINER RESIN	DERAKANE 441-400
STRUCTURAL RESIN	DERAKANE 441-400
EXTERIOR LAYER RESIN	DERAKANE 441-400
COLOR	WHITE (WJ-480)
VEIL	DOUBLE NEXUS

LAMINATE CHART

LAMINATE SEQUENCE	THICKNESS
V = 1 LAYER VEIL	.010"
M = 1 1/2 OZ/FT SQ. CHOPPED STRAND	.043"
FM = FABMAT 1524	.076"
R = 24 OZ/YD SQ. WOVEN ROVING	.033"
CP = CHOPPED STRAND ROVING	
HW = HELICAL WINDING	.033"
CH = CHOP-HOOP WINDING	.033"
SW = STRAIGHT WIND	.022"
U = 15 1/2 OZ/YD. SQ. UNIDIRECTIONAL	.025"

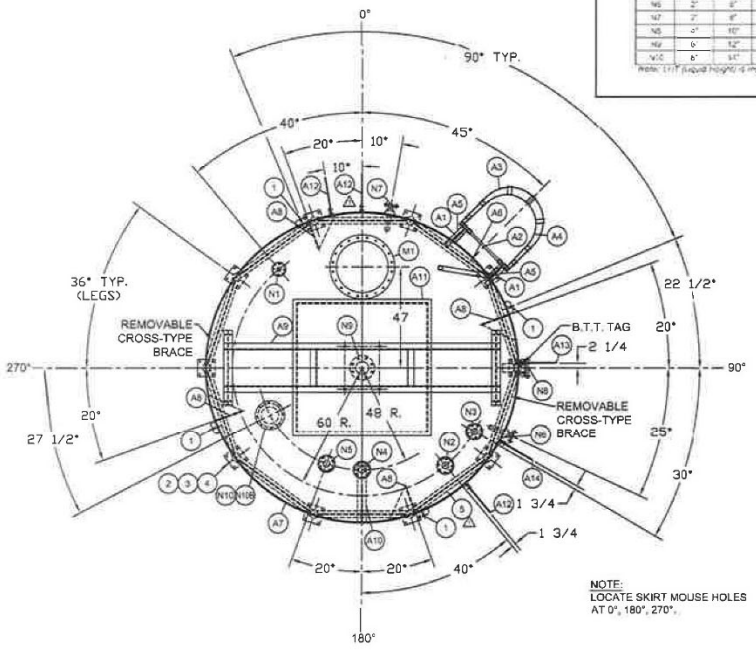
FLAT TOP: .520" NOM. TH.
2V CP(.100) 3(CP(.030) R) CP(.211)

FLAT TOP JOINT: .321" NOM. TH.
INTERIOR: 3M 2V EXTERIOR: 4M

SIDEWALL: .318" NOM. TH. TAPERED TO .274" NOM. TH.
2V CP(.100) 2SW 4HW

DISH BOTTOM: 1.121" NOM. TH.
2V CP(.100) 8(CP(.030) R) CP(.497)

LEG STAND ATTACHMENT: .390" NOM. TH.
4FM 2M



NOTE:
LOCATE SKIRT MOUSE HOLES AT 0°, 180°, 270°.

⚠ TRUE FITTING ORIENTATION

STEVEN L. WAGNER 30966 OKLAHOMA LICENSED PROFESSIONAL ENGINEER

8 July 2020

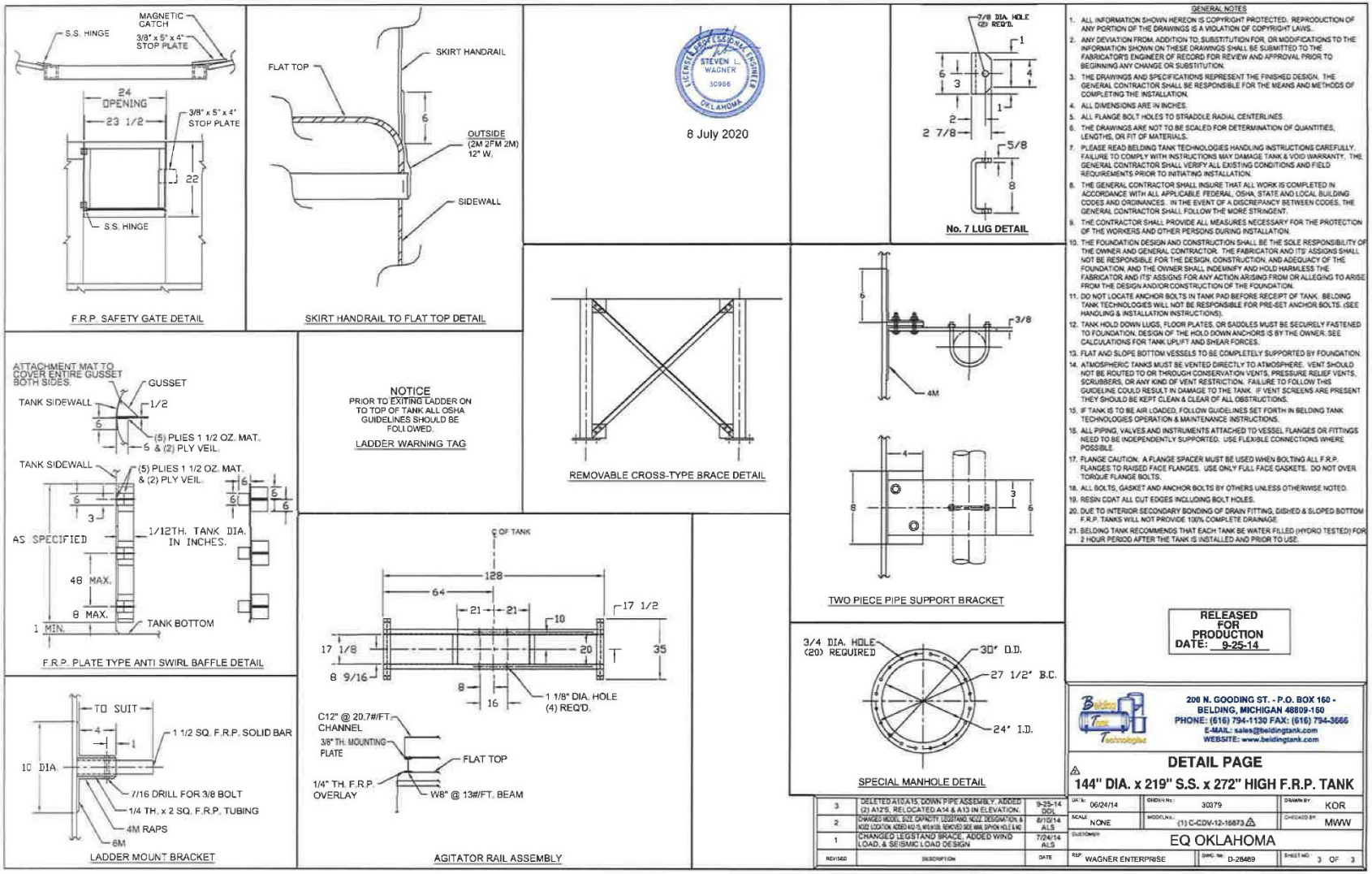
RELEASED FOR PRODUCTION
DATE: 9-25-14

Belding Tank Technologies
200 N. GOODING ST. - P.O. BOX 160 -
BELDING, MICHIGAN 48809-160
PHONE: (616) 794-1130 FAX: (616) 794-3666
E-MAIL: sales@beldingtank.com
WEBSITE: www.beldingtank.com

⚠ ORIENTATION & DETAIL PAGE
144" DIA. x 219" S.S. x 272" HIGH F.R.P. TANK

REVISED	DESCRIPTION	DATE
3	DELETED A10 A15, DOWN PIPE ASSEMBLY, ADDED (2) A12'S, RELOCATED A14 & A13 IN ELEVATION.	9-25-14 DCL
2	CHANGED MODEL SIZE, CAPACITY, LEGSTAND, NOZZ. DESIGNATION, & NOZZ. LOCATION, ADDED A12-15, W/A16, REMOVED DOG WAL, SIPHON HOLE, & NC	8/10/14 ALS
1	CHANGED LEGSTAND BRACE, ADDED WIND LOAD, & SEISMIC LOAD DESIGN	7/24/14 ALS

DATE: 06/24/14	ORDER No.: 30379	DRAWN BY: KOR
SCALE: NONE	MODEL No.: (1) C-CDV-12-16873 ⚠	CHECKED BY: MWW
CUSTOMER: EQ OKLAHOMA		
REP: WAGNER ENTERPRISE	DWG. No.: D-28489	SHEET NO.: 2 OF 3


MAGNETIC CATCH
S.S. HINGE
3/8" x 5" x 4" STOP PLATE
24 OPENING
23 1/2
22
S.S. HINGE
F.R.P. SAFETY GATE DETAIL
FLAT TOP
SKIRT HANDRAIL
6
OUTSIDE (2M 2FM 2M) 12" W.
SIDEWALL
SKIRT HANDRAIL TO FLAT TOP DETAIL
STEVEN L WAGNER 30966 OKLAHOMA
8 July 2020
7/8 DIA. HOLE (2) REQ'D.
No. 7 LUG DETAIL
GENERAL NOTES
1. ALL INFORMATION SHOWN HEREON IS COPYRIGHT PROTECTED. REPRODUCTION OF ANY PORTION OF THE DRAWINGS IS A VIOLATION OF COPYRIGHT LAWS.
2. ANY DEVIATION FROM, ADDITION TO, SUBSTITUTION FOR, OR MODIFICATIONS TO THE INFORMATION SHOWN ON THESE DRAWINGS SHALL BE SUBMITTED TO THE FABRICATOR'S ENGINEER OF RECORD FOR REVIEW AND APPROVAL PRIOR TO BEGINNING ANY CHANGE OR SUBSTITUTION.
3. THE DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED DESIGN. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE MEANS AND METHODS OF COMPLETING THE INSTALLATION.
4. ALL DIMENSIONS ARE IN INCHES.
5. ALL FLANGE BOLT HOLES TO STRADDLE RADIAL CENTERLINES.
6. THE DRAWINGS ARE NOT TO BE SCALED FOR DETERMINATION OF QUANTITIES, LENGTHS, OR FIT OF MATERIALS.
7. PLEASE READ BELDING TANK TECHNOLOGIES HANDLING INSTRUCTIONS CAREFULLY. FAILURE TO COMPLY WITH INSTRUCTIONS MAY DAMAGE TANK & VOID WARRANTY. THE GENERAL CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND FIELD REQUIREMENTS PRIOR TO INITIATING INSTALLATION.
8. THE GENERAL CONTRACTOR SHALL INSURE THAT ALL WORK IS COMPLETED IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, OSHA, STATE AND LOCAL BUILDING CODES AND ORDINANCES. IN THE EVENT OF A DISCREPANCY BETWEEN CODES, THE GENERAL CONTRACTOR SHALL FOLLOW THE MORE STRINGENT.
9. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY FOR THE PROTECTION OF THE WORKERS AND OTHER PERSONS DURING INSTALLATION.
10. THE FOUNDATION DESIGN AND CONSTRUCTION SHALL BE THE SOLE RESPONSIBILITY OF THE OWNER AND GENERAL CONTRACTOR. THE FABRICATOR AND ITS' ASSIGNS SHALL NOT BE RESPONSIBLE FOR THE DESIGN, CONSTRUCTION, AND ADEQUACY OF THE FOUNDATION, AND THE OWNER SHALL INDEMNIFY AND HOLD HARMLESS THE FABRICATOR AND ITS' ASSIGNS FOR ANY ACTION ARISING FROM OR ALLEGING TO ARISE FROM THE DESIGN AND/OR CONSTRUCTION OF THE FOUNDATION.
11. DO NOT LOCATE ANCHOR BOLTS IN TANK PAD BEFORE RECEIPT OF TANK. BELDING TANK TECHNOLOGIES WILL NOT BE RESPONSIBLE FOR PRE-SET ANCHOR BOLTS. (SEE HANDLING & INSTALLATION INSTRUCTIONS).
12. TANK HOLD DOWN LUGS, FLOOR PLATES, OR SADDLES MUST BE SECURELY FASTENED TO FOUNDATION. DESIGN OF THE HOLD DOWN ANCHORS IS BY THE OWNER. SEE CALCULATIONS FOR TANK UPLIFT AND SHEAR FORCES.
13. FLAT AND SLOPE BOTTOM VESSELS TO BE COMPLETELY SUPPORTED BY FOUNDATION.
14. ATMOSPHERIC TANKS MUST BE VENTED DIRECTLY TO ATMOSPHERE. VENT SHOULD NOT BE ROUTED TO OR THROUGH CONSERVATION VENTS, PRESSURE RELIEF VENTS, SCRUBBERS, OR ANY KIND OF VENT RESTRICTION. FAILURE TO FOLLOW THIS GUIDELINE COULD RESULT IN DAMAGE TO THE TANK. IF VENT SCREENS ARE PRESENT THEY SHOULD BE KEPT CLEAN & CLEAR OF ALL OBSTRUCTIONS.
15. IF TANK IS TO BE AIR LOADED, FOLLOW GUIDELINES SET FORTH IN BELDING TANK TECHNOLOGIES OPERATION & MAINTENANCE INSTRUCTIONS.
16. ALL PIPING, VALVES AND INSTRUMENTS ATTACHED TO VESSEL FLANGES OR FITTINGS NEED TO BE INDEPENDENTLY SUPPORTED. USE FLEXIBLE CONNECTIONS WHERE POSSIBLE.
17. FLANGE CAUTION: A FLANGE SPACER MUST BE USED WHEN BOLTING ALL F.R.P. FLANGES TO RAISED FACE FLANGES. USE ONLY FULL FACE GASKETS. DO NOT OVER TORQUE FLANGE BOLTS.
18. ALL BOLTS, GASKET AND ANCHOR BOLTS BY OTHERS UNLESS OTHERWISE NOTED.
19. RESIN COAT ALL CUT EDGES INCLUDING BOLT HOLES.
20. DUE TO INTERIOR SECONDARY BONDING OF DRAIN FITTING, DISHED & SLOPED BOTTOM F.R.P. TANKS WILL NOT PROVIDE 100% COMPLETE DRAINAGE.
21. BELDING TANK RECOMMENDS THAT EACH TANK BE WATER FILLED (HYDRO TESTED) FOR 2 HOUR PERIOD AFTER THE TANK IS INSTALLED AND PRIOR TO USE.
ATTACHMENT MAT TO COVER ENTIRE GUSSET BOTH SIDES.
GUSSET
TANK SIDEWALL
1/2
(5) PLIES 1 1/2 OZ. MAT. & (2) PLY VEIL.
AS SPECIFIED
1/12TH. TANK DIA. IN INCHES.
48 MAX.
8 MAX.
1 MIN.
TANK BOTTOM
F.R.P. PLATE TYPE ANTI SWIRL BAFFLE DETAIL
NOTICE
PRIOR TO EXITING LADDER ON TO TOP OF TANK ALL OSHA GUIDELINES SHOULD BE FOLLOWED.
LADDER WARNING TAG
REMOVABLE CROSS-TYPE BRACE DETAIL
TWO PIECE PIPE SUPPORT BRACKET
3/4 DIA. HOLE (20) REQUIRED
30" O.D.
27 1/2" B.C.
24" I.D.
SPECIAL MANHOLE DETAIL
RELEASED FOR PRODUCTION
DATE: 9-25-14
TO SUIT
1 1/2 SQ. F.R.P. SOLID BAR
10 DIA.
7/16 DRILL FOR 3/8 BOLT
1/4 TH. x 2 SQ. F.R.P. TUBING
4M RAPS
6M
LADDER MOUNT BRACKET
℄ OF TANK
128
64
21
21
10
17 1/2
17 1/8
20
35
8 9/16
8
16
1 1/8" DIA. HOLE (4) REQ'D.
C12" @ 20.7#/FT. CHANNEL
3/8" TH. MOUNTING PLATE
1/4" TH. F.R.P. OVERLAY
FLAT TOP
W8" @ 13#/FT. BEAM
AGITATOR RAIL ASSEMBLY
200 N. GOODING ST. - P.O. BOX 160 - BELDING, MICHIGAN 48809-160
PHONE: (616) 794-1130 FAX: (616) 794-3666
E-MAIL: sales@beldingtank.com
WEBSITE: www.beldingtank.com
DETAIL PAGE
144" DIA. x 219" S.S. x 272" HIGH F.R.P. TANK
3 DELETED A10/A15 "DOWN PIPE ASSEMBLY". ADDED (2) A12'S, RELOCATED A14 & A13 IN ELEVATION. 9-25-14 DDL
2 CHANGED MODEL SIZE CAPACITY LEGSTAND, NOZZ. DESIGNATION, & NOZZ LOCATION. ADDED A10-15, W'S&W'S. REMOVED SEE 4M4, EPOXY HOLE & NC 8/10/14 ALS
1 CHANGED LEGSTAND BRACE, ADDED WIND LOAD, & SEISMIC LOAD DESIGN 7/24/14 ALS
REVISED DESCRIPTION DATE
DATE: 06/24/14 ORDER No.: 30379 DRAWN BY: KOR
SCALE: NONE MODEL No.: (1) C-CDV-12-16873 CHECKED BY: MWW
CUSTOMER: EQ OKLAHOMA
REP: WAGNER ENTERPRISE DWG. No.: D-28489 SHEET NO.: 3 OF 3

Note- There have been no significant changes to T102 or T103 since the 2007 certification.

TCI Tank Consultants, Inc.

April 20, 2007

Mr. Danny Rokisky
PermaFix Environmental Services
2700 South 25th West Avenue
Tulsa, Oklahoma 74107

Re: Certification of Tanks T-101, T-102 & T-103
2700 South 25th West Avenue
Tulsa, Oklahoma 74104

Dear Mr. Rokisky

In accordance with your request, we have the reviewed the design, fabrication and installation of the above referenced tanks and associated facilities located at the above stated address. We hereby summarize our assessment of the tank system in compliance with 40 CFR Part 265 Subpart J – Tank Systems that are used to store or treat hazardous waste.

1. The Tank System and secondary containment was originally designed by Williams Brothers Engineering of Tulsa which prepared a Certification Report on the initial installation including the existing tanks in 1990. Currently there are two (2) existing tanks within the secondary containment; Tanks T-104 and T-107. Since these tanks were covered by a previous Certification Report, they are not included in this report.

2. This Certification Report covers Two (2) new Tanks T-102 & T-103; and one (1) used Tank T-101 to be installed in the existing Secondary Containment with the two (2) existing Tanks T-104 and T-107.

3. The Tanks T-102 & T-103 were constructed in 2002 by Palmer Manufacturing & Tank, Inc. of Garden City, Kansas with corrosion-resistant fiberglass reinforced plastic (FRP) and is lined with Hetron 980 and appear to be suitable for its intended service.

4. The Tank T-101 was constructed approximately 20 years ago (exact age unknown) by Atlas Tank Company with corrosion-resistant fiberglass reinforced plastic (FRP) and is lined with Dion 6694 / 6060 and appears to be suitable for its intended service.

5. FRP is compatible with the wastewater to be stored in the tanks and provides maximum corrosion resistance. The interior corrosion barrier of the tanks is compatible with the specified compositions and concentrations of wastewater.

6. None of the tank system components are located underground or in a buried installation.

7. The design of the tanks was reviewed for compliance with ASME RTP-1 Reinforced Thermoset Plastic Corrosion Resistant Equipment under applicable load conditions as

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Consulting Engineering, Environmental, and Inspection Services for Storage Tanks

TCI Tank Consultants, Inc.

specified in ASCE 7-02 Minimum Design Loads for Buildings and Other Structures. The structural steel supports for the tanks were reviewed for compliance with AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

8. The modifications to Tanks T-101, T-102 & T-103 that were performed by PermaFix, including the addition of nozzles and the pressure containing covers, will not affect the structural integrity of the tanks. The design of the tanks was evaluated for a maximum internal pressure 0.50 oz per square inch. The design of the tanks appears to be adequate to contain the specified internal pressure without failure and without any leaks.

9. The tanks are equipped with hold-down anchors to the reinforced concrete foundation that will prevent floatation or dislodgment. The tanks are installed on a reinforced concrete foundation which is part of the secondary containment.

10. The reinforced concrete foundation was reviewed in accordance with ACI-318 Building Code Requirements for Structural Concrete and appears to be of sufficient thickness and contains sufficient steel reinforcing to adequately support the weight of tanks when fully loaded with wastewater. Per the original certification, the reinforced concrete foundation is 10" thick and is placed on a 12" aggregate base course. The load bearing surface is below the frost depth and the concrete structure should not be affected by frost heave. Since the tanks are anchored to the concrete foundation, the tank system should not be affected by frost heave. The containment structure has been in place for several years and no concrete damage from frost heave is visible.

11. The secondary containment was constructed of reinforced concrete of sufficient thickness to form an impervious barrier. Construction joints in the concrete included a shear key with a PVC water stop. The secondary containment area is coated with an epoxy corrosion-resistant material to prevent migration of spilled liquids through the concrete into the subsurface.

12. The secondary containment plus overflow area provides adequate capacity to contain a total spill of the largest tank plus a 25 year, 24-hour rainfall event equal to 7-inch of water. The two (2) existing drain holes in the wall of the Storage Tank Containment shall remain open to permit overflow into the Drum Storage area. The Drum Storage area shall be restricted to a maximum of eighty-eight (88) 55 Gallon Drums or Twenty-Two (22) Pallet Equivalents, where one Pallet Equivalent equals four (4) 55 Gallon Drums. See the attached spreadsheet for Containment Volume Calculations.

13. The piping system is constructed of Driscopipe 6400 and 8000 which is compatible with the wastewater and it appears to be properly installed and adequately supported in accordance with ASME B31.3 Process Piping Code.

14. The tanks were recently inspected by TCI and appear to be free of defects and are in good condition. There were no signs of structural damage or inadequate construction or improper installation. See attached TCI Tank Inspection Report.

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TCI Tank Consultants, Inc.

15. The tanks were recently hydrotested for leaks. The tanks were filled with water to above the roof line and to a height that would adequately test the pressure holding capability of the tanks to contain 0.50 oz per square inch internal pressure. The liquid level was observed while the test was maintained for 4 hours and the tanks appeared to be structurally sound without any leaks. See attached TCI Tank Hydrotest Report.

The tank system is not leaking and is fit for service and the design for this installation meets or exceeds the requirements of 40 CFR Part 265 Subpart J – Tank Systems as related to the treatment and storage of liquids that at times may exhibit the characteristics of a hazardous waste.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Please contact me if you have any questions or concerns regarding this transmittal.

Sincerely,

Ronald Dean Davis

Ronald Dean Davis

Oklahoma P.E. 11210

Attach: Containment Calculations
Inspection Reports
Hydrotest Reports

REGISTERED PROFESSIONAL ENGINEER
RONALD DEAN
DAVIS
11210
OKLAHOMA

Ronald Dean Davis
4/20/07

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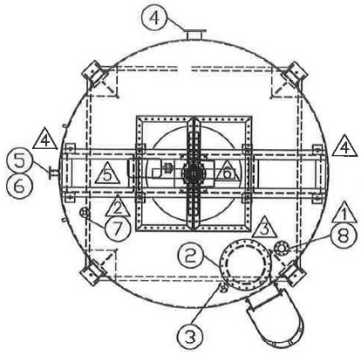
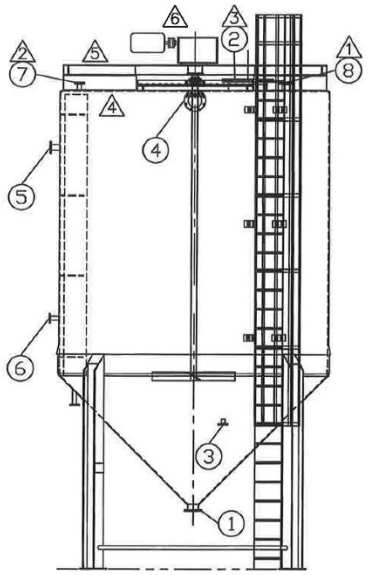


PLAN VIEW
(TRUE ORIENTATION)



ELEVATION VIEW

Bill of materials

Description	Material	Thickness
14' diameter cone bottom	Fiberglass (Hetron 980 Resin)	0.790"
14'diameter shell	Fiberglass (Hetron 980 Resin)	0.446"
14'diameter flat top	Fiberglass (Hetron 980 Resin)	0.519"

Schedule of Fittings

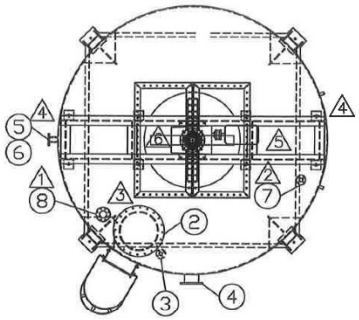
SYMBOL	Description	Material
1	6" RF Flange	Fiberglass (Hetron 980 Resin)
2	24" Flange	Fiberglass (Hetron 980 Resin)
3	2" RF Flange	Fiberglass (Hetron 980 Resin)
4	8" RF Flange	Fiberglass (Hetron 980 Resin)
5	3" RF Flange	Fiberglass (Hetron 980 Resin)
6	2" RF Flange	Fiberglass (Hetron 980 Resin)
7	3" RF Flange	Fiberglass (Hetron 980 Resin)
8	4" RF Flange	Fiberglass (Hetron 980 Resin)

SYM.	DRAWING REVISIONS	CHKD. BY	DATE	DWN. BY
6	Added Chemineer Model 5HTD-20 Mixer w/25HP motor to top of tank			
5	Added Mixer frame to top of tank			
4	Added W10x39 Mixer frame support to top of tank			
3	Added 24" Protectoseal emergency pressure relief manway 316 stainless steel pressure set @ +3" WC, mates w/ASA flange			
2	Added 3" -RF Fiberglass flange w/ Hetron resin to top of tank		02/11/03	DM
1	Added 4" -RF Fiberglass flange w/ Hetron resin to top of tank		12/07/02	DM

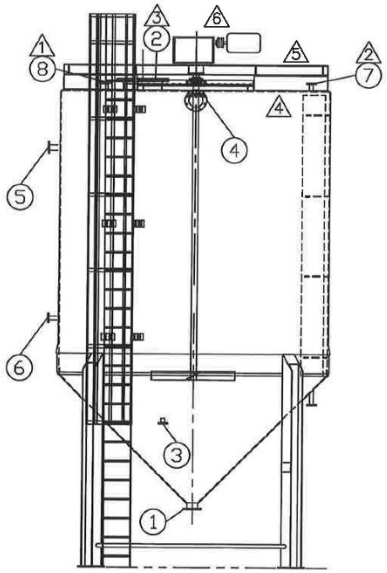
TITLE: T102, FIGURE E-9.3

PREPARED FOR:
PERMA-FIX TREATMENT SERVICES
2700 S. 25th West Ave * Tulsa, Oklahoma 74107

SCALE: No Scale	APPROVED BY: D. Roklsky	DRAWN: GDN
DATE: 5/01/06		REVISED: 2/28/07
AUTOCAD FILE: C:\MyFiles\Tulsa\Sub-Part BB		DRAWING NUMBER: T102



PLAN VIEW



ELEVATION VIEW

Bill of materials

Description	Material	Thickness
14' diameter cone bottom	Fiberglass (Hetron 980 Resin)	0.790"
14'diameter shell	Fiberglass (Hetron 980 Resin)	0.446"
14'diameter flat top	Fiberglass (Hetron 980 Resin)	0.519"

Schedule of Fittings

SYMBOL	Description	Material
1	6" RF Flange	Fiberglass (Hetron 980 Resin)
2	24" Flange	Fiberglass (Hetron 980 Resin)
3	2" RF Flange	Fiberglass (Hetron 980 Resin)
4	8" RF Flange	Fiberglass (Hetron 980 Resin)
5	3" RF Flange	Fiberglass (Hetron 980 Resin)
6	2" RF Flange	Fiberglass (Hetron 980 Resin)
7	3" RF Flange	Fiberglass (Hetron 980 Resin)
8	4" RF Flange	Fiberglass (Hetron 980 Resin)

SYM.	DRAWING REVISIONS	CHKD. BY	DATE	DWN. BY
6	Added Chemineer Model 5HTD-20 Mixer w/25HP motor to top of tank			
5	Added Mixer frame to top of tank			
4	Added W10x39 Mixer frame support to top of tank			
3	Added 24" Protectoseal emergency pressure relief manway 316 stainless steel pressure set @ +3" WC, mates w/ASA flange			
2	Added 3" -RF Fiberglass flange w/ Hetron resin to top of tank		02/11/03	DM
1	Added 4" -RF Fiberglass flange w/ Hetron resin to top of tank		12/07/02	DM

TITLE: T103, FIGURE E-9.4

PREPARED FOR: PERMA-FIX TREATMENT SERVICES
2700 S. 25th West Ave * Tulsa, Oklahoma 74107

SCALE: No Scale	APPROVED BY: D. Rokisky	DRAWN: GDN
DATE: 5/01/06		REVISED: 2/28/07
AUTOCAD FILE: C:\MyFiles\Tulsa\Sub-Part BB		DRAWING NUMBER: T102

Daryl Worley
2655 SE Evergreen Dr.
Bartlesville, OK 74006
Phone 918-333-2292
Mobile 918-440-3186
daryl_worley@sbcglobal.net

T107

Mr. Rob Boyd
A Clean Environment
2700 South 25th West Ave
Tulsa, OK 74107

RE: Tank 107 Certification

Dear Mr. Boyd:

In accordance with your request I have reviewed the design and made a visual inspection of the above referenced tank.

The tank was filled with water. The liquid level was measured and recorded. Twenty-four hours later the liquid level was again measured. This measurement revealed the tank was not leaking.

A visual examination of the tank was made. This visual examination did not reveal any signs of leaks. The structural integrity of the tank did not appear to be compromised.

Per the documents provided by you to me the tank is constructed of Fiberglass and lined with C-Veil. The material the tank is constructed and lined with is compatible with the material that will be contained in the tank.

At the time of the inspection no piping was connected to the tank.

Information provided by A Clean Environment did not indicate the tank would be operated above normal atmospheric pressures. The sustained temperature should not exceed 160° F. The tank should not be allowed to exceed 200° F for more than 1 hr.

No inspection of the secondary containment was made. The containment was also not evaluated as to the capacity. The tank appears to be structurally sound and is fit for service at normal atmospheric pressures.

I certify under penalty of law this document was prepared under my direction or supervision according to a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief true, accurate, and complete. I am aware there significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Please contact me if you have questions concerning this letter.

Sincerely,

Daryl Worley

Daryl Worley, P.E.
Oklahoma PE 19305
6-6-2009

REGISTERED PROFESSIONAL ENGINEER
DARYL LEE WORLEY
19305
OKLAHOMA

Daryl Worley 6-6-2009

DocuSign Envelope ID: 85758181-4B D-4657-8C91-723B029EB5C7

Assessment of Tank T-107 Replacement; Tank Design, Foundation, Connections, Controls, Compatibility

The Replacement, In Kind, of Tank T-107 located in Tulsa Acid Neutralization Facility has been evaluated and assessed according to 40 CFR 264.192.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

DocuSigned by: Brad Cummock

Brad Cummock, PE
Project Engineer
(OH # 82599)

DocuSigned by: Vaughn Thurgood

Vaughn Thurgood, PE
VP Engineering
(OK # 29507)

Referenced Documents:

1. Tank and Pipe Assessment – Brad Cummock (Revised 3-7-19)
2. Facility Foundation Assessment – Williams Brothers Engineering (Revised Dec 1990)
3. Tank 107 Foundation Load - Brad Cummock (Revised 3-7-19)
4. Tank Manufacturer Design Drawings – Wagner Enterprise (Revised 2-12-19)
5. Tank Design Calculations – Belding Tank Technologies (Revised 3-4-19)
6. Legacy Tank Foundation Drawings - Williams Brothers (1990)

DocuSign Envelope ID: B3158181-4B1D-4657-8C91-723B029EBBC7

7. Mixer Detail Drawing – Brawn Mixer (Revised 11-28-18)
8. Legacy Tank Display Panel – SW Controls (Revised 7-23-14)
9. Legacy Tank Layout – Perma Fix (Revised 5-1-06)
10. Legacy 1997 Tank Name Plate (image)
11. Dekrane Resin Selection Guide – Ashland (2018)
12. Hetron Resin Selection Guide – Ashland (2010)
13. Dekrane Chemical Resistance Summary – Ashland (2018)
14. Pure Flex Control Valve Order - Control Process Systems (Revised 10-16-18)
15. Pure Flex 400 Series Valve Material Specs – PureFlex Inc. (Downloaded 2019)
16. 40 CFR §264.192 citation from ODEQ (1-18-19)
17. 40 CFR §270.11 citation from EPA (7-1-12)

PROJECT NOTES
1 WHITE (WJ-480) EXTERIOR GEL COAT WITH U.V. INHIBITOR REQUIRED
2 (4) HOUR POST HEAT CURE REQUIRED FOR SERVICE.
3 NON-SKID FLAT TOP SURFACE REQUIRED
4 (1) SET OF PLASTIC FLANGE PROTECTORS REQUIRED FOR SHIPPING.
5 BELDING TANK RECOMMENDS THE VENT BE EQUAL TO OR LARGER THAN THE LARGEST INLET OR OUTLET
6 (1) SET OF NON-STAMPED BTT DESIGN CALCULATIONS REQUIRED.
7 REQUIRED TESTING ON TANK:
a VISUAL INSPECTION IN CONFORMANCE WITH ASTM C-582, TABLE 5
b BARCOL HARDNESS PER ASTM D-2583
c ACETONE SENSITIVITY PER REFERENCED TANK DESIGN

LICENSED PROFESSIONAL ENGINEER
STEVEN L. WAGNER
30966
OKLAHOMA

4 March 2019

OWNER US ECOLOGY TULSA
P.O. No 12480
EQUIP No T-107
SERVICE ACID & BASE NEUTRALIZATION

DESIGN DATA

DESIGN STANDARD	ASTM D-3299-10
MAX. PRESSURE	ATMOSPHERIC
VACUUM	NONE
MAX. TEMP. (F)	160°
SPECIFIC GRAVITY	1.5 MAX
SEISMIC CODE	ASCE 7-10 (SITE CLASS = D)
SEISMIC DESIGN	RISK CATEGORY = II SDs=0.140, SD1=0.109
WIND LOAD	115 MPH
SNOW LOAD	10 PSF
APPROX. EMPTY WEIGHT (LBS)	6,500
NOM. CAPACITY (GALS)	13,077
INTERIOR CATALYST	Co/MEKP
EXTERIOR CATALYST	Co/MEKP
LINER RESIN	DERAKANE SIGNIA 411
STRUCTURAL RESIN	DERAKANE SIGNIA 411
EXTERIOR LAYER RESIN	DERAKANE SIGNIA 411
COLOR	WHITE (WJ-480)
VEIL	DOUBLE NEXUS

LAMINATE CHART

LAMINATE SEQUENCE	THICKNESS
V = 1 LAYER VEIL	.010"
M = 1 1/2 OZ/FT SQ. CHOPPED STRAND	.043"
FM = FABMAT 1524	.076"
R = 24 OZ/YD. SQ. WOVEN ROVING	.033"
CP = CHOPPED STRAND ROVING	
HW = FILAMENT WINDING	.034"
CH = CHOP-HOOP WINDING	.028"
SW = STRAIGHT WIND	.017"
U = 15 1/2 OZ/TD. SQ. UNIDIRECTIONAL	.022"

FLAT TOP: .520" NOM. TH.
2V CP(.100) 2(CP(.050) R) CP(.050) R CP(.151)

FLAT TOP JOINT: .321" NOM. TH.
INTERIOR: 3M 2V EXTERIOR: 4M

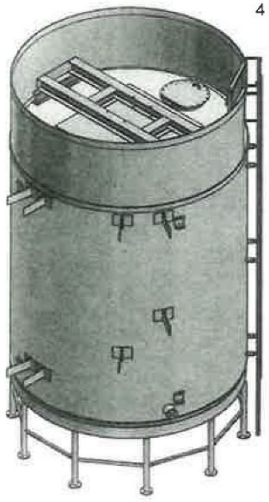
SIDEWALL: .290" NOM. TH. TAPER TO .273" NOM. TH.
2V CP(.100) 2SW 4HW

DISHED BOTTOM: 1.051" NOM. TH.
2V CP(.100) 2(CP(.050) R) CP(.050) R CP(.682)

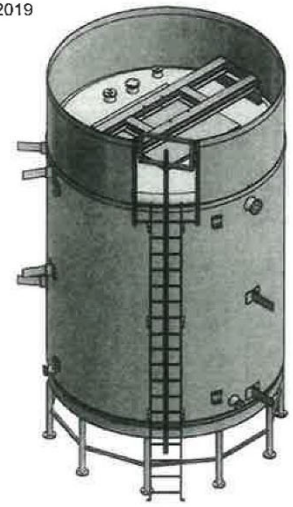
LEGS/AND ATTACHMENT: .390" NOM. TH.
4FM 2M

GENERAL NOTES

1. ALL INFORMATION SHOWN HEREON IS COPY RIGHT PROTECTED. REPRODUCTION OF ANY PORTION OF THE DRAWINGS IS A VIOLATION OF COPYRIGHT LAWS
2. ANY DEVIATION FROM, ADDITION TO, SUBSTITUTION FOR, OR MODIFICATIONS TO THE INFORMATION SHOWN ON THESE DRAWINGS SHALL BE SUBMITTED TO THE FABRICATOR'S ENGINEER OF RECORD FOR REVIEW AND APPROVAL PRIOR TO BEGINNING ANY CHANGE OR SUBSTITUTION
3. THE DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED DESIGN. RESPONSIBILITY FOR THE MEANS AND METHODS OF COMPLETING THE INSTALLATION IS BY OTHERS
4. ALL DIMENSIONS ARE IN INCHES.
5. ALL FLANGE BOLT HOLES TO STRADDLE RADIAL CENTERLINES
6. THE DRAWINGS ARE NOT TO BE SCALED FOR DETERMINATION OF QUANTITIES, LENGTHS, OR FIT OF MATERIALS
7. PLEASE READ BELDING TANK TECHNOLOGIES HANDLING INSTRUCTIONS CAREFULLY. FAILURE TO COMPLY WITH INSTRUCTIONS MAY DAMAGE TANK & VOID WARRANTY. PRIOR TO INITIATING INSTALLATION, VERIFICATION OF ALL EXISTING CONDITIONS AND FIELD REQUIREMENTS IS BY OTHERS
8. ASSURANCE THAT ALL WORK IS COMPLETED IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, OSHA, STATE AND LOCAL BUILDING CODES AND ORDINANCES IS BY OTHERS. IN THE EVENT OF A DISCREPANCY BETWEEN THE CODES, THE MORE STRINGENT SHOULD BE FOLLOWED.
9. PROVIDE ALL MEASURES NECESSARY FOR THE PROTECTION OF THE WORKERS AND OTHER PERSONS DURING INSTALLATION.
10. THE FOUNDATION DESIGN AND CONSTRUCTION SHALL BE THE RESPONSIBILITY OF OTHERS. BELDING TANK AND ITS' ASSIGNS SHALL NOT BE RESPONSIBLE FOR THE DESIGN, CONSTRUCTION, AND ADEQUACY OF THE FOUNDATION. THE OWNER SHALL INDEMNIFY AND HOLD HARMLESS BELDING TANK AND ITS' ASSIGNS FOR ANY ACTION ARISING FROM OR ALLEGING TO ARISE FROM THE DESIGN AND/OR CONSTRUCTION OF THE FOUNDATION
11. DO NOT LOCATE ANCHOR BOLTS IN THE TANK PAD BEFORE RECEIPT OF TANK. BELDING TANK TECHNOLOGIES WILL NOT BE RESPONSIBLE FOR PRE-SET ANCHOR BOLTS. (SEE HANDLING & INSTALLATION INSTRUCTIONS)
12. TANK HOLD DOWN LUGS, FLOOR PLATES, OR SADDLES MUST BE SECURELY FASTENED TO FOUNDATION. DESIGN OF THE HOLD DOWN ANCHORS IS BY THE OWNER
13. FLAT AND SLOPE BOTTOM VESSELS TO BE COMPLETELY SUPPORTED BY FOUNDATION. (PER HANDLING & INSTALLATION INSTRUCTIONS)
14. ATMOSPHERIC TANKS MUST BE VENTED DIRECTLY TO ATMOSPHERE. VENT SHOULD NOT BE ROUTED TO OR THROUGH CONSERVATION VENTS, PRESSURE RELIEF VENTS, SCRUBBERS, OR ANY KIND OF VENT RESTRICTION. FAILURE TO FOLLOW THIS GUIDELINE COULD RESULT IN DAMAGE TO THE TANK. IF VENT SCREENS ARE PRESENT THEY SHOULD BE KEPT CLEAN.
15. IF TANK IS TO BE AIR LOADED, FOLLOW GUIDELINES SET FORTH IN BELDING TANK TECHNOLOGIES OPERATION & MAINTENANCE INSTRUCTIONS
16. ALL PIPING, VALVES AND INSTRUMENTS ATTACHED TO VESSEL FLANGES OR FITTINGS NEED TO BE INDEPENDENTLY SUPPORTED. USE FLEXIBLE CONNECTIONS WHERE POSSIBLE.
17. FLANGE CAUTION: A FLANGE SPACER MUST BE USED WHEN BOLTING ALL F.R.P. FLANGES TO RAISED FACE FLANGES. USE ONLY FULL FACE GASKETS. DO NOT OVER TORQUE FLANGE BOLTS. (PER HANDLING & INSTALLATION INSTRUCTIONS)
18. ALL BOLTS, GASKET AND ANCHOR BOLTS BY OTHERS UNLESS OTHERWISE NOTED
19. RESIN COAT ALL CUT EDGES INCLUDING BOLT HOLES
20. DUE TO INTERIOR SECONDARY BONDING OF DRAIN FITTING, DISHED & SLOPE BOTTOM F.R.P. TANKS WILL NOT PROVIDE 100% COMPLETE DRAINAGE
21. BELDING TANK RECOMMENDS THAT EACH TANK BE WATER FILLED (HYDRO TESTED) FOR 2 HOUR PERIOD AFTER THE TANK IS INSTALLED AND PRIOR TO USE.

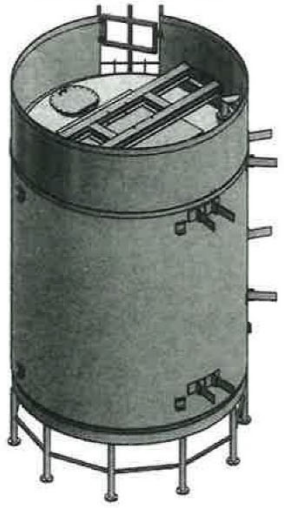


VIEW AT 45°



VIEW AT 135°

VIEW AT 225°



VIEW AT 315°

REVISED PRINT
DATE: 2-12-19

RELEASED
FOR
FABRICATION
DATE: 1-21-19

REV	DESCRIPTION	DATE
2	ADDED NON-STAMPED DESIGN CALCULATIONS	2/12/19 DDL
1	FLUSHED OFF ALL FLAT TOP FITTINGS, ADDED UP-PIPE TO N8,ADDED DESIGNATION TO N8, CHG. SERVICE & TEMP.	1/18/19 DDL

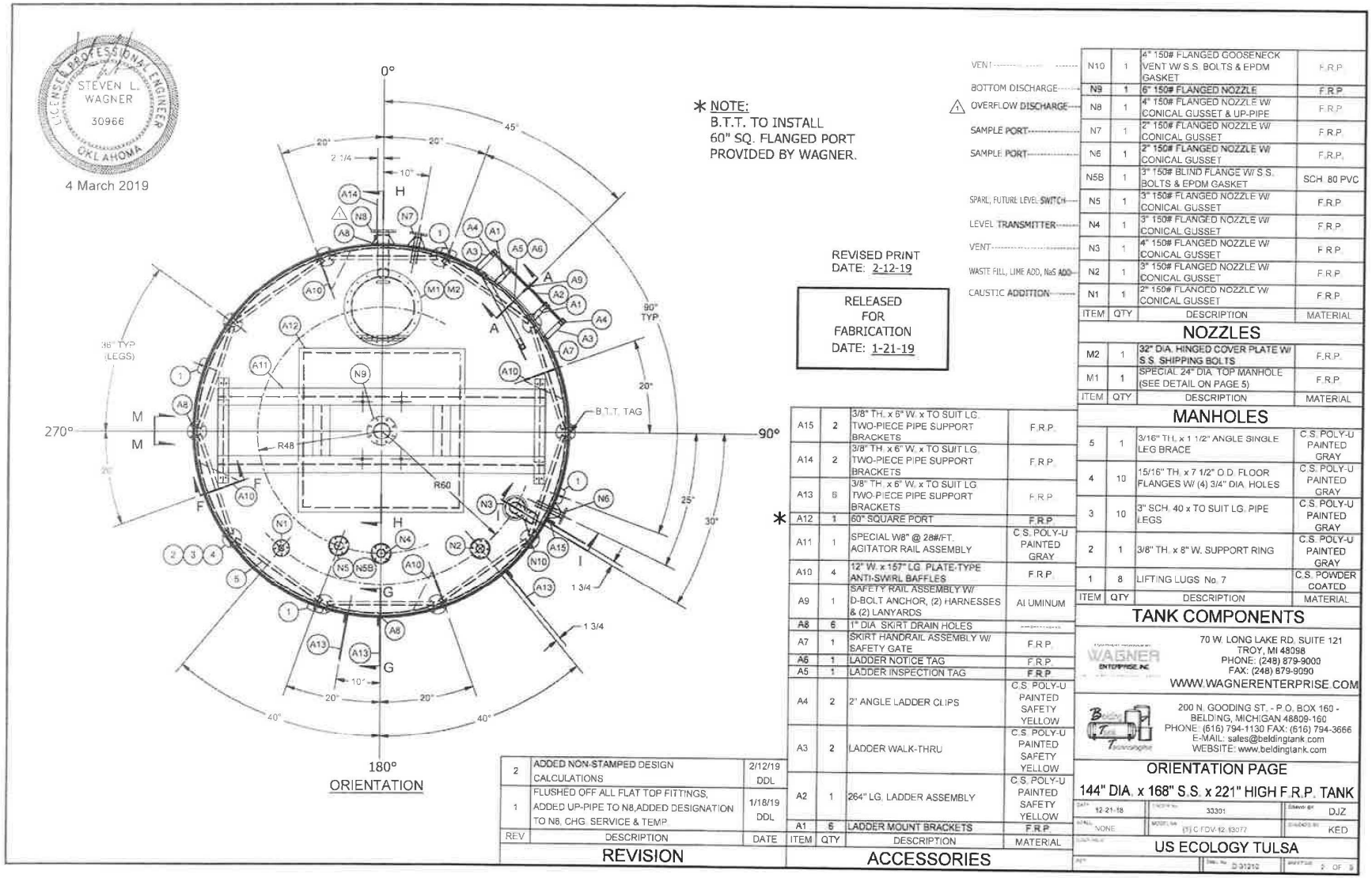
REVISION

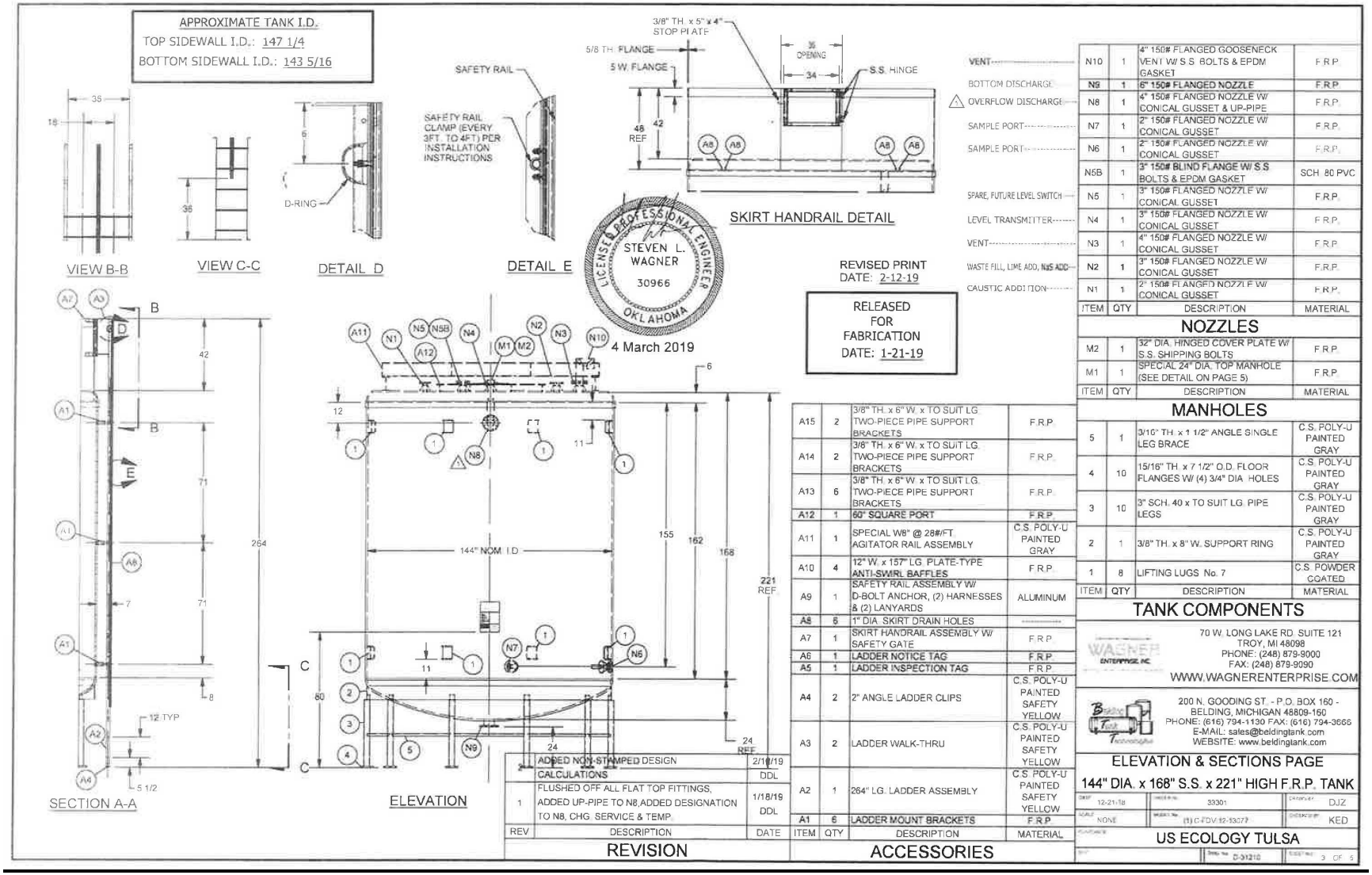
WAGNER ENTERPRISE, INC.
70 W. LONG LAKE RD. SUITE 121
TROY, MI 48098
PHONE: (248) 879-9000
FAX: (248) 879-9090
WWW.WAGNERENTERPRISE.COM

BELDING TANK TECHNOLOGIES
200 N. GOODING ST. - P.O. BOX 160 -
BELDING, MICHIGAN 48809-160
PHONE: (616) 794-1130 FAX: (616) 794-3666
E-MAIL: sales@beldingtank.com
WEBSITE: www.beldingtank.com

GENERAL ARRANGEMENT
144" DIA. x 168" S.S. x 221" HIGH F.R.P. TANK

DATE 12-21-18	ORDER No 33301	DRAWN BY DJZ	
SCALE NONE	MODEL No (1) C-FDV-12-13077	CHECKED BY KED	
CUSTOMER US ECOLOGY TULSA			
JOB	JOB No D-31210	SHEET NO 1 OF 5	


LICENSED PROFESSIONAL ENGINEER
STEVEN L. WAGNER
30966
OKLAHOMA
4 March 2019
0°
90°
180°
270°
ORIENTATION
* NOTE:
B.T.T. TO INSTALL
60" SQ. FLANGED PORT
PROVIDED BY WAGNER.
REVISED PRINT
DATE: 2-12-19
RELEASED
FOR
FABRICATION
DATE: 1-21-19
VENT
BOTTOM DISCHARGE
OVERFLOW DISCHARGE
SAMPLE PORT
SAMPLE PORT
SPARE, FUTURE LEVEL SWITCH
LEVEL TRANSMITTER
VENT
WASTE FILL, LIME ADD, NaS ADD
CAUSTIC ADDITION
B.T.T. TAG
R48
R60
90° TYP.
36° TYP. (LEGS)
1 3/4
REV | DESCRIPTION | DATE
2 | ADDED NON-STAMPED DESIGN CALCULATIONS | 2/12/19 DDL
1 | FLUSHED OFF ALL FLAT TOP FITTINGS, ADDED UP-PIPE TO N8,ADDED DESIGNATION TO N8, CHG. SERVICE & TEMP. | 1/18/19 DDL
REVISION
ITEM | QTY | DESCRIPTION | MATERIAL
A15 | 2 | 3/8" TH. x 6" W. x TO SUIT LG. TWO-PIECE PIPE SUPPORT BRACKETS | F.R.P.
A14 | 2 | 3/8" TH. x 6" W. x TO SUIT LG. TWO-PIECE PIPE SUPPORT BRACKETS | F.R.P.
A13 | 8 | 3/8" TH. x 6" W. x TO SUIT LG. TWO-PIECE PIPE SUPPORT BRACKETS | F.R.P.
A12 | 1 | 60" SQUARE PORT | F.R.P.
A11 | 1 | SPECIAL W8" @ 28#/FT. AGITATOR RAIL ASSEMBLY | C.S. POLY-U PAINTED GRAY
A10 | 4 | 12" W. x 157" LG. PLATE-TYPE ANTI-SWIRL BAFFLES | F.R.P.
A9 | 1 | SAFETY RAIL ASSEMBLY W/ D-BOLT ANCHOR, (2) HARNESSES & (2) LANYARDS | ALUMINUM
A8 | 6 | 1" DIA. SKIRT DRAIN HOLES | ---
A7 | 1 | SKIRT HANDRAIL ASSEMBLY W/ SAFETY GATE | F.R.P.
A6 | 1 | LADDER NOTICE TAG | F.R.P.
A5 | 1 | LADDER INSPECTION TAG | F.R.P.
A4 | 2 | 2' ANGLE LADDER CLIPS | C.S. POLY-U PAINTED SAFETY YELLOW
A3 | 2 | LADDER WALK-THRU | C.S. POLY-U PAINTED SAFETY YELLOW
A2 | 1 | 264" LG. LADDER ASSEMBLY | C.S. POLY-U PAINTED SAFETY YELLOW
A1 | 6 | LADDER MOUNT BRACKETS | F.R.P.
ACCESSORIES
ITEM | QTY | DESCRIPTION | MATERIAL
N10 | 1 | 4" 150# FLANGED GOOSENECK VENT W/ S.S. BOLTS & EPDM GASKET | F.R.P.
N9 | 1 | 6" 150# FLANGED NOZZLE | F.R.P.
N8 | 1 | 4" 150# FLANGED NOZZLE W/ CONICAL GUSSET & UP-PIPE | F.R.P.
N7 | 1 | 2" 150# FLANGED NOZZLE W/ CONICAL GUSSET | F.R.P.
N6 | 1 | 2" 150# FLANGED NOZZLE W/ CONICAL GUSSET | F.R.P.
N5B | 1 | 3" 150# BLIND FLANGE W/ S.S. BOLTS & EPDM GASKET | SCH. 80 PVC
N5 | 1 | 3" 150# FLANGED NOZZLE W/ CONICAL GUSSET | F.R.P.
N4 | 1 | 3" 150# FLANGED NOZZLE W/ CONICAL GUSSET | F.R.P.
N3 | 1 | 4" 150# FLANGED NOZZLE W/ CONICAL GUSSET | F.R.P.
N2 | 1 | 3" 150# FLANGED NOZZLE W/ CONICAL GUSSET | F.R.P.
N1 | 1 | 2" 150# FLANGED NOZZLE W/ CONICAL GUSSET | F.R.P.
NOZZLES
ITEM | QTY | DESCRIPTION | MATERIAL
M2 | 1 | 32" DIA. HINGED COVER PLATE W/ S.S. SHIPPING BOLTS | F.R.P.
M1 | 1 | SPECIAL 24" DIA. TOP MANHOLE (SEE DETAIL ON PAGE 5) | F.R.P.
MANHOLES
ITEM | QTY | DESCRIPTION | MATERIAL
5 | 1 | 3/16" TH. x 1 1/2" ANGLE SINGLE LEG BRACE | C.S. POLY-U PAINTED GRAY
4 | 10 | 15/16" TH. x 7 1/2" O.D. FLOOR FLANGES W/ (4) 3/4" DIA. HOLES | C.S. POLY-U PAINTED GRAY
3 | 10 | 3" SCH. 40 x TO SUIT LG. PIPE LEGS | C.S. POLY-U PAINTED GRAY
2 | 1 | 3/8" TH. x 8" W. SUPPORT RING | C.S. POLY-U PAINTED GRAY
1 | 8 | LIFTING LUGS No. 7 | C.S. POWDER COATED
ITEM | QTY | DESCRIPTION | MATERIAL
TANK COMPONENTS
WAGNER ENTERPRISE, INC
70 W. LONG LAKE RD. SUITE 121
TROY, MI 48098
PHONE: (248) 879-9000
FAX: (248) 879-9090
WWW.WAGNERENTERPRISE.COM
Belding Tank Technologies
200 N. GOODING ST. - P.O. BOX 160 - BELDING, MICHIGAN 48809-160
PHONE: (616) 794-1130 FAX: (616) 794-3666
E-MAIL: sales@beldingtank.com
WEBSITE: www.beldingtank.com
ORIENTATION PAGE
144" DIA. x 168" S.S. x 221" HIGH F.R.P. TANK
DATE 12-21-18 | 33301 | DJZ
NONE | (3) C FDV-12-93072 | KED
US ECOLOGY TULSA
D-91210 | 2 OF 5



ITEM	QTY	DESCRIPTION	MATERIAL
N10	1	4" 150# FLANGED GOOSENECK VENT W/ S.S. BOLTS & EPDM GASKET	F.R.P.
N9	1	6" 150# FLANGED NOZZLE	F.R.P.
N8	1	4" 150# FLANGED NOZZLE W/ CONICAL GUSSET & UP-PIPE	F.R.P.
N7	1	2" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N6	1	2" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N5B	1	3" 150# BLIND FLANGE W/ S.S. BOLTS & EPDM GASKET	SCH. 80 PVC
N5	1	3" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N4	1	3" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N3	1	4" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N2	1	3" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.
N1	1	2" 150# FLANGED NOZZLE W/ CONICAL GUSSET	F.R.P.

NOZZLES

ITEM	QTY	DESCRIPTION	MATERIAL
M2	1	32" DIA. HINGED COVER PLATE W/ S.S. SHIPPING BOLTS	F.R.P.
M1	1	SPECIAL 24" DIA. TOP MANHOLE (SEE DETAIL ON PAGE 5)	F.R.P.

MANHOLES

ITEM	QTY	DESCRIPTION	MATERIAL
5	1	3/16" TH. x 1 1/2" ANGLE SINGLE LEG BRACE	C.S. POLY-U PAINTED GRAY
4	10	15/16" TH. x 7 1/2" O.D. FLOOR FLANGES W/ (4) 3/4" DIA. HOLES	C.S. POLY-U PAINTED GRAY
3	10	3" SCH. 40 x TO SUIT LG. PIPE LEGS	C.S. POLY-U PAINTED GRAY
2	1	3/8" TH. x 8" W. SUPPORT RING	C.S. POLY-U PAINTED GRAY
1	8	LIFTING LUGS No. 7	C.S. POWDER COATED

TANK COMPONENTS

ITEM	QTY	DESCRIPTION	MATERIAL
A15	2	3/8" TH. x 6" W. x TO SUIT LG. TWO-PIECE PIPE SUPPORT BRACKETS	F.R.P.
A14	2	3/8" TH. x 6" W. x TO SUIT LG. TWO-PIECE PIPE SUPPORT BRACKETS	F.R.P.
A13	6	3/8" TH. x 6" W. x TO SUIT LG. TWO-PIECE PIPE SUPPORT BRACKETS	F.R.P.
A12	1	60" SQUARE PORT	F.R.P.
A11	1	SPECIAL W8" @ 28#/FT. AGITATOR RAIL ASSEMBLY	C.S. POLY-U PAINTED GRAY
A10	4	12" W. x 157" LG. PLATE-TYPE ANTI-SWIRL BAFFLES	F.R.P.
A9	1	SAFETY RAIL ASSEMBLY W/ D-BOLT ANCHOR, (2) HARNESSES & (2) LANYARDS	ALUMINUM
A8	6	1" DIA. SKIRT DRAIN HOLES	
A7	1	SKIRT HANDRAIL ASSEMBLY W/ SAFETY GATE	F.R.P.
A6	1	LADDER NOTICE TAG	F.R.P.
A5	1	LADDER INSPECTION TAG	F.R.P.
A4	2	2" ANGLE LADDER CLIPS	C.S. POLY-U PAINTED SAFETY YELLOW
A3	2	LADDER WALK-THRU	C.S. POLY-U PAINTED SAFETY YELLOW
A2	1	264" LG. LADDER ASSEMBLY	C.S. POLY-U PAINTED SAFETY YELLOW
A1	6	LADDER MOUNT BRACKETS	F.R.P.

ACCESSORIES

REV	DESCRIPTION	DATE
2	ADDED NON-STAMPED DESIGN CALCULATIONS	2/19/19 DDL
1	FLUSHED OFF ALL FLAT TOP FITTINGS, ADDED UP-PIPE TO N8, ADDED DESIGNATION TO N8, CHG. SERVICE & TEMP.	1/18/19 DDL

REVISION

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E-MAIL: sales@beldingtank.com
WEBSITE: www.beldingtank.com

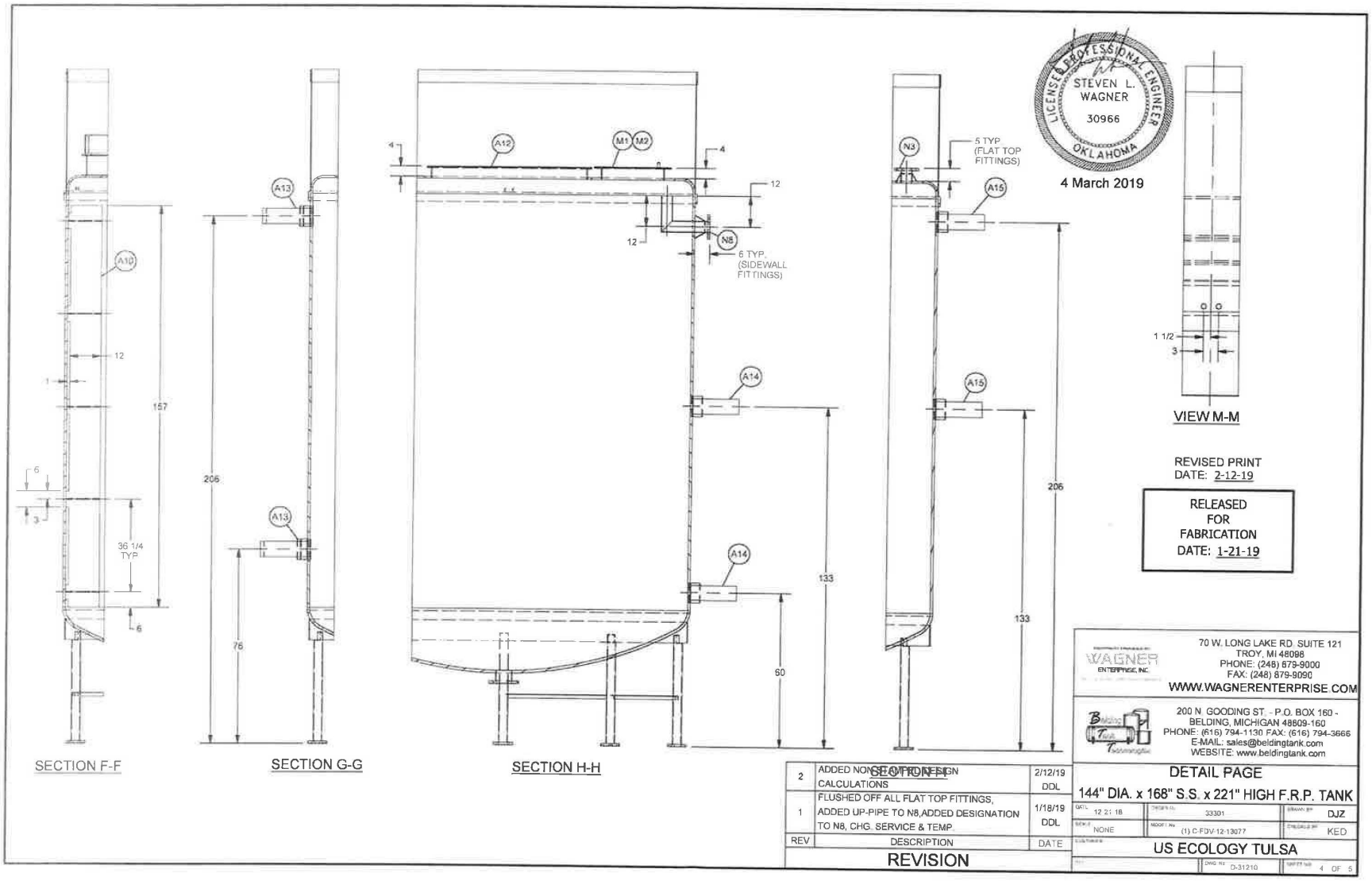
ELEVATION & SECTIONS PAGE

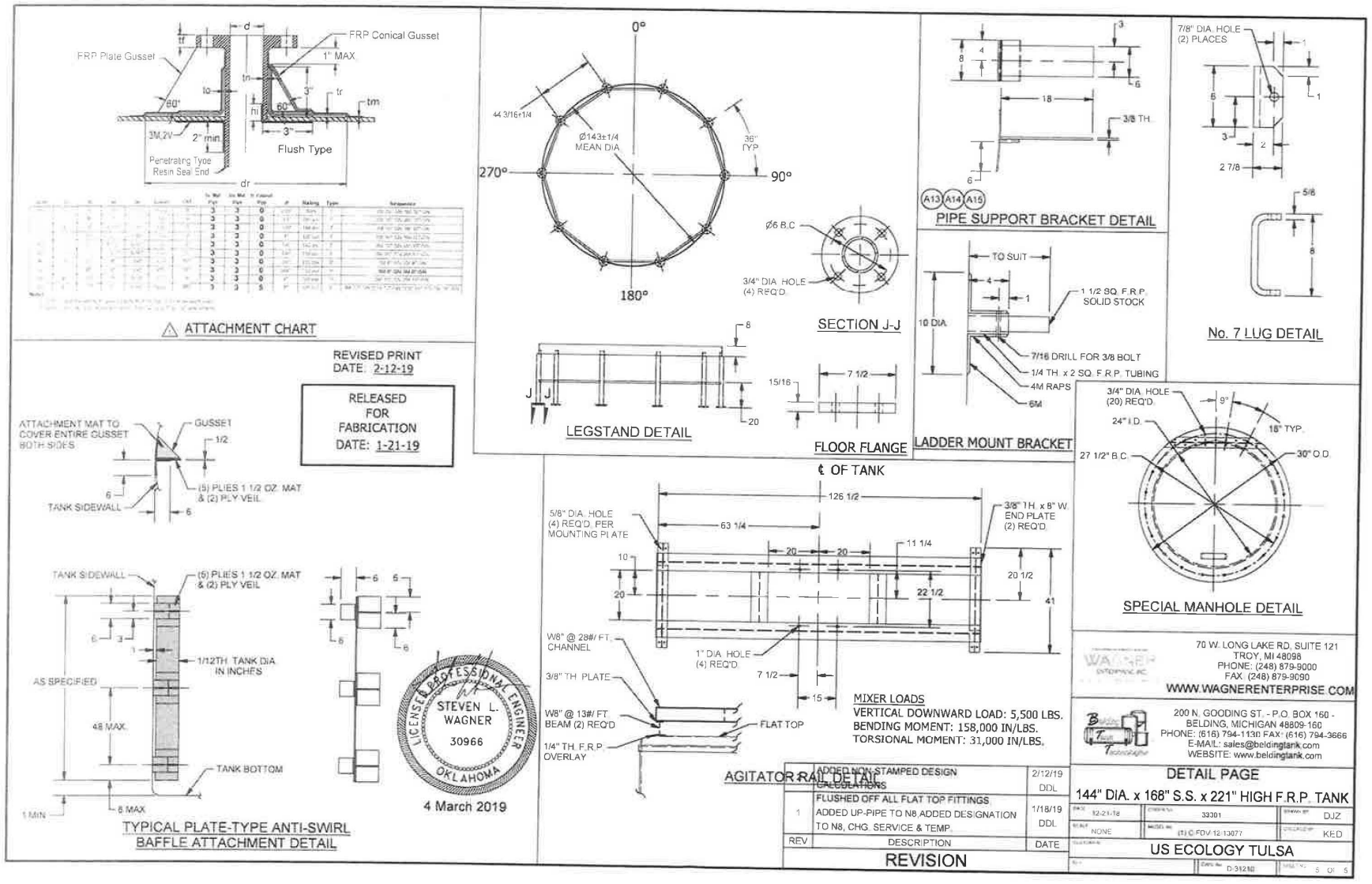
144" DIA. x 168" S.S. x 221" HIGH F.R.P. TANK

DATE	DRAWING NO.	DRAWN BY
12-21-18	33301	DJZ
SCALE: NONE	WORK No. (S) C-FDV-12-13077	CHECKED BY: KED

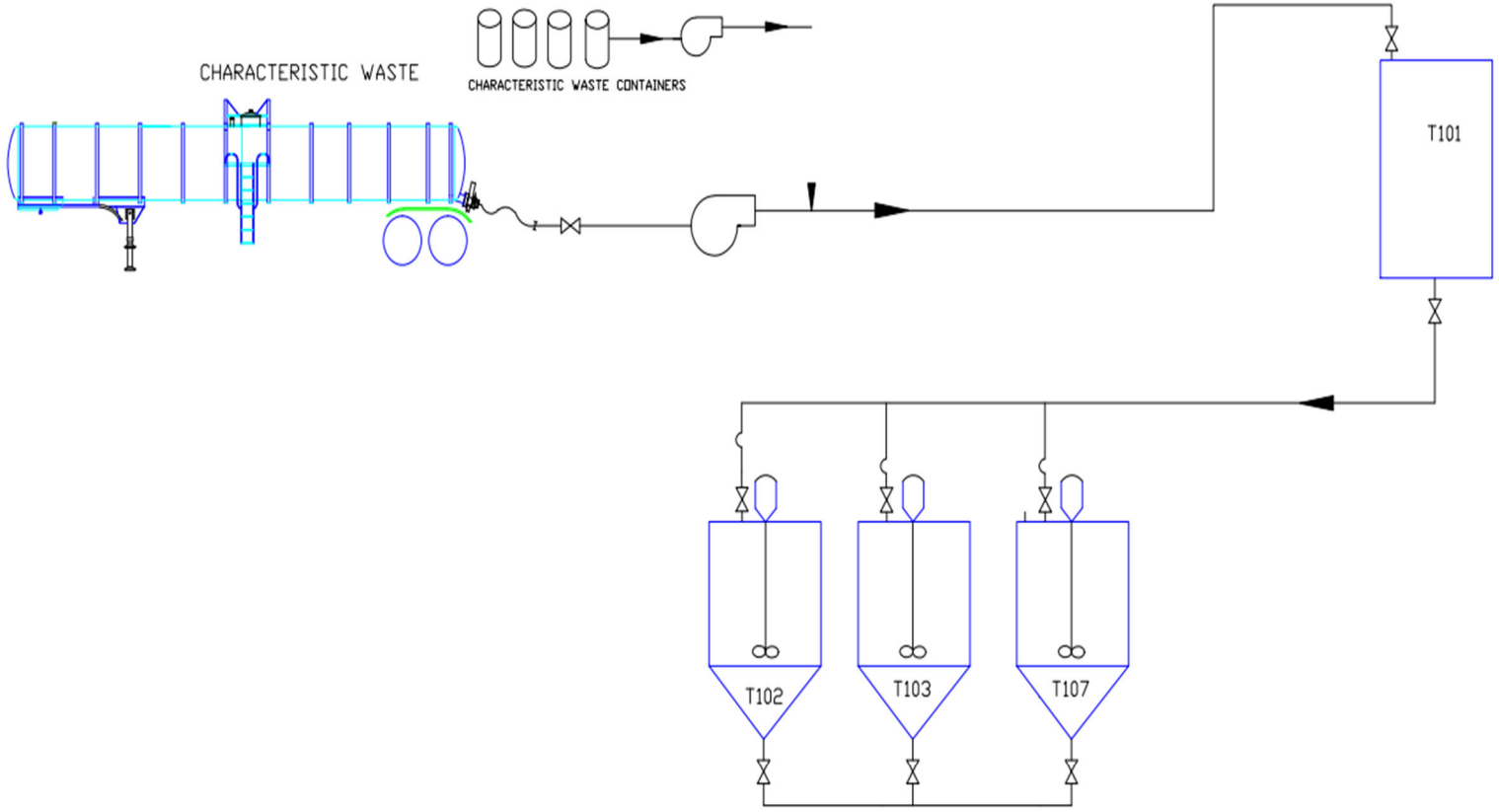
US ECOLOGY TULSA

JOB No. D-31218 SHEET 3 OF 5


SECTION F-F
SECTION G-G
SECTION H-H
VIEW M-M
LICENSED PROFESSIONAL ENGINEER
STEVEN L. WAGNER
30966
OKLAHOMA
4 March 2019
REVISED PRINT
DATE: 2-12-19
RELEASED FOR FABRICATION
DATE: 1-21-19
REV
DESCRIPTION
DATE
2 ADDED NOZZLE DESIGN CALCULATIONS 2/12/19 DDL
1 FLUSHED OFF ALL FLAT TOP FITTINGS, ADDED UP-PIPE TO N8,ADDED DESIGNATION TO N8, CHG. SERVICE & TEMP. 1/18/19 DDL
REVISION
WAGNER ENTERPRISE, INC.
70 W. LONG LAKE RD. SUITE 121
TROY, MI 48098
PHONE: (248) 879-9000
FAX: (248) 879-9090
WWW.WAGNERENTERPRISE.COM
200 N. GOODING ST. - P.O. BOX 160 -
BELDING, MICHIGAN 48809-160
PHONE: (616) 794-1130 FAX: (616) 794-3666
E-MAIL: sales@beldingtank.com
WEBSITE: www.beldingtank.com
DETAIL PAGE
144" DIA. x 168" S.S. x 221" HIGH F.R.P. TANK
DATE 12 21 18
33301
DJZ
NONE
(1) C-FDV-12-13077
KED
US ECOLOGY TULSA
D-31210
4 OF 5


FRP Conical Gusset
FRP Plate Gusset
1" MAX
Flush Type
Penetrating Type Resin Seal End
2" min
3" min
ATTACHMENT CHART
REVISED PRINT
DATE: 2-12-19
RELEASED FOR FABRICATION
DATE: 1-21-19
ATTACHMENT MAT TO COVER ENTIRE GUSSET BOTH SIDES
GUSSET
(5) PLIES 1 1/2 OZ. MAT & (2) PLY VEIL
TANK SIDEWALL
TYPICAL PLATE-TYPE ANTI-SWIRL BAFFLE ATTACHMENT DETAIL
STEVEN L. WAGNER
30966
OKLAHOMA
4 March 2019
0°
90°
180°
270°
Ø143±1/4 MEAN DIA
36" TYP
Ø6 B.C
3/4" DIA. HOLE (4) REQ'D.
SECTION J-J
LEGSTAND DETAIL
FLOOR FLANGE
PIPE SUPPORT BRACKET DETAIL
TO SUIT
1 1/2 SQ. F.R.P. SOLID STOCK
7/16 DRILL FOR 3/8 BOLT
1/4 TH. x 2 SQ. F.R.P. TUBING
4M RAPS
LADDER MOUNT BRACKET
7/8" DIA. HOLE (2) PLACES
No. 7 LUG DETAIL
℄ OF TANK
126 1/2
63 1/4
3/8" TH. x 8" W. END PLATE (2) REQ'D.
5/8" DIA. HOLE (4) REQ'D. PER MOUNTING PLATE
W8" @ 28#/ FT. CHANNEL
3/8" TH. PLATE
W8" @ 13#/ FT. BEAM (2) REQ'D
1/4" TH. F.R.P. OVERLAY
1" DIA. HOLE (4) REQ'D.
FLAT TOP
MIXER LOADS
VERTICAL DOWNWARD LOAD: 5,500 LBS.
BENDING MOMENT: 158,000 IN/LBS.
TORSIONAL MOMENT: 31,000 IN/LBS.
AGITATOR RAIL DETAIL
3/4" DIA. HOLE (20) REQ'D.
24" I.D.
27 1/2" B.C.
30" O.D.
18" TYP.
SPECIAL MANHOLE DETAIL
70 W. LONG LAKE RD, SUITE 121
TROY, MI 48098
PHONE: (248) 879-9000
FAX: (248) 879-9090
WWW.WAGNERENTERPRISE.COM
200 N. GOODING ST. - P.O. BOX 160 -
BELDING, MICHIGAN 48809-160
PHONE: (616) 794-1130 FAX: (616) 794-3666
E-MAIL: sales@beldingtank.com
WEBSITE: www.beldingtank.com
REV
DESCRIPTION
DATE
1
ADDED NON-STAMPED DESIGN CALCULATIONS
2/12/19 DDL
FLUSHED OFF ALL FLAT TOP FITTINGS. ADDED UP-PIPE TO N8.ADDED DESIGNATION TO N8, CHG. SERVICE & TEMP.
1/18/19 DDL
REVISION
DETAIL PAGE
144" DIA. x 168" S.S. x 221" HIGH F.R.P. TANK
US ECOLOGY TULSA

Appendix 2- Process Diagram for Tank Farm 1 Tank System



Waste is transferred to storage tanks from tankers or containers using compatible hoses and pump transfer systems. After this, the waste is stored and/or treated.

Appendix 3 - Tank Farm 1 (TF-1) Detailed Information

I. Unit Description

The US Ecology Tulsa, Inc. (USE Tulsa) hazardous waste Tank Farm 1 (TF-1) has a permitted storage capacity for 69,797 gallons of hazardous waste liquids. Containment requirements are based on storage of liquid hazardous wastes. Information regarding tank designation, material of construction, tank age, and nominal capacity for TF-1 is summarized in Appendix 7 - Hazardous Waste Tank System Summary which is presented at the end of this appendix.

Tank farm TF-1 has four (4) vertical above ground tanks, designated for hazardous waste service, which are located in a secondary containment system. Tank T-101 is a fiberglass, elevated cone bottom tank. Tanks T-102 and T-103 are cone bottom tanks set on legs and are fiberglass lined with C-Viel (vinylester). Tanks 102 and 103 are equipped with top beam mounted mixers. Chemical and heat resistance are provided by the structural and lining material. Tank T-107 is a fiberglass cone bottom tank on legs.

II. Basic Design Parameters, Dimensions, and Materials of Construction

Tank T-101 was manufactured by Atlas Tank Company of Yale, Oklahoma. A visual inspection was performed on all tanks during installation by a Williams Brothers Engineering Company representative. No evidence of punctures, scrapes, cracks, or other structural damage was identified by the inspection which might result in premature failure. After the tank was placed on its foundation, it was filled to capacity with water and held for a period of 24 hours. No leaks and/or evidence of leaks were detected, in T-101 as indicated by a Williams Brothers Engineering Company representative.

Tanks T-102 and T-103 were manufactured by Palmer Manufacturing and Tank, Inc. A visual inspection was performed on T-102 and T-103 after installation by the certifying engineer. No evidence of punctures, scrapes, cracks, or other structural damage was identified by the inspection which might result in premature failure. Tanks T-101, T-102, T-103 and T-107 are elevated cone-bottom tanks, and thus leak inspection is easily available.

Fiberglass material (T-101, T-102, T-103 and T-107) is compatible with alkaline, ignitable, reactive, organic, and acidic wastes.

Tanks taken out of hazardous waste service may undergo partial closure, and subsequently, be used for storage of non-hazardous wastes, product, or stormwater.

III. Containment

TF-1 is equipped with a secondary containment system meeting the requirements of 40 CFR 264.193. Containment calculations are part of this attachment. Details regarding the leak detection system for TF-1 are part of the tank assessment document.

TF-1 is equipped with a leak detection system; the secondary containment system is coated with an impervious, chemically resistant material.

IV. Control of Run-On and Run-Off

TF-1 is equipped with secondary containment structures which will control run-on and run-off.

V. Tank Management Processes

Process equipment located in and adjacent to TF-1 is ancillary to hazardous waste tank management operations. Specifically, ancillary equipment may include portable pumps, screen and canister bag filters (or other filtration equipment), mixing equipment, and other treatment equipment as deemed appropriate.

When service of tanks is changed, USE Tulsa will evaluate the need for decontamination procedures. The tank will be decontaminated when evidence of visual contamination is identified or when "knowledge of process" based on tank usage indicates decontamination is appropriate. Decontamination procedures will consist of one to two washes with water or other appropriate cleaning agent. Wash water will be disposed of in accordance with state and federal regulations.

The tanks are compatible with the waste stored. The facility inspection schedule (presented in Attachment 4 - Inspection Schedules and Forms and Attachment 6- Procedures to Prevent Hazardous) includes inspection of tank systems.

VI. Leak Detection for Ancillary Equipment

Ancillary equipment for tanks T-101, T-102, T-103 and T-107 is located above ground in the secondary containment area which is coated with an impervious coating. The equipment is inspected daily.

VII. Containment Calculations for TF – 1

Note: Containment areas for TF- 1 and CMA-2 are joined. The containment system for CMA-2 has sufficient capacity to contain the total volume of capacity required for container storage (i.e., 10% of total container capacity) plus the excess containment required for TF-1.

GIVEN:

TF-1 average wall height	=	1.77 ft
TF-1 wall length	=	52.8 ft
TF-1 wall width	=	36.0 ft
Tank radius (T-101)	=	6.0 ft
CMA-2 volume	=	1,121 ft3
CMA-2 average wall height	=	12.4 in
Drum radius	=	1.0 ft
Pallet length and width	=	4.0 ft
Pallet height (maximum)	=	8.0 in
25-year, 24-hour rainfall event	=	7 in

CONTAINMENT CAPACITY REQUIRED FOR TF-1:

Volume of largest tank or 10% of total volume of tanks (whichever is greater) + rainfall:

Largest tank	=	19,960 gal
10% of total volume of tanks = 10% x (56,720 gal)	=	5,672 gal

Rainfall:

(7 in)(1 ft/12 in)(52.8 ft)(36.0 ft)(7.48 gal/ft3)	=	8,294 gal

Total requirement:

19,960 gal + 8,294 gal	=	28,254gal

CONTAINMENT CAPACITY AVAILABLE FROM TF-1:

Volume inside containment wall:

(1.77 ft)(52.8 ft)(36.0 ft)(7.48 gal/ft3) = 25,166 gal

Volume displaced by one tank (T-101) to wall height :

[(6.0 ft)2(1.77 ft)(7.48 gal/ft3)]π = 1,497 gal

Volume displaced by other foundations:

(14 ft3)(7.48 gal/ft3) = 105 gal

Total capacity available:

25,166 gal - (1,497 gal + 105 gal) = 23,564 gal

CONTAINMENT CAPACITY REQUIRED FOR CMA-2:

Volume of largest container or 10% of total volume of containers (whichever is greater):

Largest container = 330 gal

10% of total volume of containers = 10% (4,840 gal) = 484 gal

Total requirement: = 484 gal

CONTAINMENT CAPACITY AVAILABLE FOR CMA-2:

Volume inside containment wall:

(1,121 ft3)(7.48 gal/ft3) = 8,385 gal

Volume displaced by drums and pallets to wall height (there is physically only room to fit 14 pallets on the ground, which will hold 56 drums, the remaining volume of drums will be double stacked - above the containment wall height):

[14(4 ft)(4 ft)(8 in)(1 ft/12 in) + 56π(1 ft)2(12.4 in - 8 in)(1 ft/12 in)](7.48 gal/ft3)

= 1,599 gal

Total capacity available:

8,385 gal - 1,599 gal = 6,786 gal

CONTAINMENT CAPACITY AVAILABLE FROM TF-1 AND CMA-2:

23,564 gal + 6,786 gal = 30,350 gal

CONTAINMENT CAPACITY REQUIRED FOR TF-1 AND CMA-2:

28,254 gal + 484 gal = 28,738 gal

EXCESS CONTAINMENT:

30,350 gal - 28,738 gal = 1,612 gal

Appendix 4 - Proposed Tank Farm 4 (TF-4) Detailed Information

I. Unit Description

The US Ecology Tulsa, Inc. (USE Tulsa) hazardous waste Tank Farm 4 (TF-4) has a proposed permitted capacity for 79,840 gallons of hazardous waste liquids. Containment requirements are based on storage of liquid hazardous wastes. Information regarding tank designation, material of construction, tank age, and nominal capacity for TF-4 is summarized in Appendix 7 – Permitted Hazardous Waste Tank System Information Table which is presented at the end of Section T.

Tank farm TF-4 has four (4) proposed vertical above ground tanks, designated for hazardous waste service, which are located in a secondary containment system. Tanks T-407, T-408, T-409, and T-410 are proposed to be fiber reinforced plastic (FRP) lined with vinyl ester thermoset resin. Chemical and heat resistance are provided by the structural and lining material. The tanks will have a flat top and cone bottom and will be supported on legs. Additional information on these tanks is presented below and in Appendix 8.

II. Basic Design Parameters, Dimensions, and Materials of Construction

Tanks T-407, T-408, T-409, and T-410 will be manufactured by a qualified third-party tank contractor. A visual inspection will be performed on all tanks during installation by a qualified contractor representative. Any evidence of punctures, scrapes, cracks, or other structural damage which might result in premature failure will be identified and noted by the inspector. After the tank is placed on its foundation, it will be filled to capacity with water and held for a period of 24 hours. A manufacturer representative will be on site to observe any leaks or evidence of leaks. Tanks T-407, T-408, T-409, and T-410 are elevated cone-bottom tanks, and thus, leak inspection will be easily available.

Fiberglass material (T-407, T-408, T-409, and T-410) is compatible with alkaline, ignitable, reactive, organic, and acidic wastes. As stated in Appendix 8, the proposed FRP tanks will be constructed to design standard ASTM D3299. This design standard applies to cylindrical corrosion-resistant tanks made of commercial-grade glass-fiber-reinforced polyester or vinyl ester thermoset resin fabricated by filament winding for above-ground vertical installation to contain aggressive chemicals at atmospheric pressure. Vinyl ester resin is specified for the structural component of the tanks and also the liner as it is chemically compatible with the anticipated wastes. USE Tulsa will use the Derakane Series 470 epoxy

vinyl ester resin from INEOS Composites, or an equivalent epoxy vinyl ester resin, to line the fiberglass tanks. Manufacturer information on the compatibility of this tank and lining material with an array of chemicals is provided in Appendix 10 of Section T. Because the tanks are designed to contain aggressive chemicals, the addition of an epoxy vinyl ester resin liner will further protect the tanks from degradation as stated in ASTM D3299.

Tanks taken out hazardous waste service may undergo partial closure, and subsequently, be used for storage of non-hazardous wastes, product, or stormwater.

III. Containment

TF-4 will be equipped with a secondary containment system meeting the requirements of 40 CFR 264.193. The secondary containment system is coated with an impervious, chemically resistant material. Containment calculations are part of this attachment. Details regarding the leak detection system for TF-4 are part of the tank assessment document.

TF-4 is equipped with a leak detection system. The concrete pad for TF-4 is designed with a sump for liquids collection and removal. The sump size (approx. 12 inches in diameter by 14 inches deep) and sump location have been added to drawing T-1. USE Tulsa utilizes the containment sump to remove accumulated liquids (precipitation and spilled or leaked waste) by pump and dispose of in an appropriate manner within 24 hours. Procedures for evaluating liquids removed from permitted secondary containment areas are provided in Section T.7 and Section 2 of Attachment 6. When necessary, USE Tulsa's on-site laboratory will analyze the accumulated liquids to determine if it is hazardous waste or non-hazardous waste and how it should be managed or disposed of in accordance with state and federal regulations.

IV. Control of Run-On and Run-Off

TF-4 will be equipped with secondary containment structures which will control run-on and run-off.

V. Tank Management Processes

Process equipment located in and adjacent to TF-4 is ancillary to hazardous waste tank management operations. Specifically, ancillary equipment may include portable pumps, screen and canister bag filters (or other filtration equipment), mixing equipment, and other treatment equipment as deemed appropriate.

When a different hazardous waste will be stored in a tank, USE Tulsa will evaluate the need for decontamination procedures for tanks that previously held an incompatible waste or material. The tank will be decontaminated when evidence of visual contamination is identified or when "knowledge of process" based on tank usage indicates decontamination is appropriate. Decontamination procedures will consist of one to two washes with water or other appropriate cleaning agent. Wash water will be disposed of in accordance with state and federal regulations.

The tanks are compatible with the waste stored. The facility inspection schedule (presented in Attachment 4 - Inspection Schedules and Forms and Attachment 6 - Procedures to Prevent Hazardous) includes inspection of tank systems.

VI. Leak Detection for Ancillary Equipment

Ancillary equipment for tanks T-407, T-408, T-409, and T-410 will be located above ground in the secondary containment area which is coated with an impervious coating. The equipment is to be inspected daily.

VII. Containment Calculations for TF–4

Note: Tanks T-407, T-408, T-409, and T-410 will all be constructed of the same material and all designed to the same dimensions. Therefore, the calculations below apply to all four (4) tanks.

GIVEN:

TF-4 average wall height	=	3 ft
TF-4 wall length	=	53.6 ft
TF-4 wall width	=	35.1 ft
Tank radius	=	6 ft
25-year, 24-hour rainfall event	=	7.91 in

CONTAINMENT CAPACITY REQUIRED FOR TF-4:

Volume of largest tank or 10% of total volume of tanks (whichever is greater) + rainfall:

Largest tank	=	19,960 gal
10% of total volume of tanks = 10% x (79,840 gal)	=	7,984 gal

Rainfall:

(7.91 in)(1 ft/12 in)(53.6 ft)(35.1 ft)(7.48 gal/ft3) = 9,276 gal

CONTAINMENT CAPACITY REQUIRED FOR PROPOSED TF-4:

19,960 gal + 9,276 gal = 29,236 gal

CONTAINMENT CAPACITY AVAILABLE FROM TF-4:

Volume inside containment wall:

(3 ft)(53.6 ft)(35.1 ft)(7.48 gal/ft^3) = 42,218 gal

Volume displaced by four tanks to wall height (bottom of tank is at or above the top of the containment wall):

[(6.0 $ft)^2$(0 ft)(7.48 gal/ft3)]π = 0 gal

Volume displaced by other foundations (legs of tanks):

(3 ft)(1 ft^2)(4 legs/tank)(4 tanks)(7.48 gal/ft3) = 359 gal

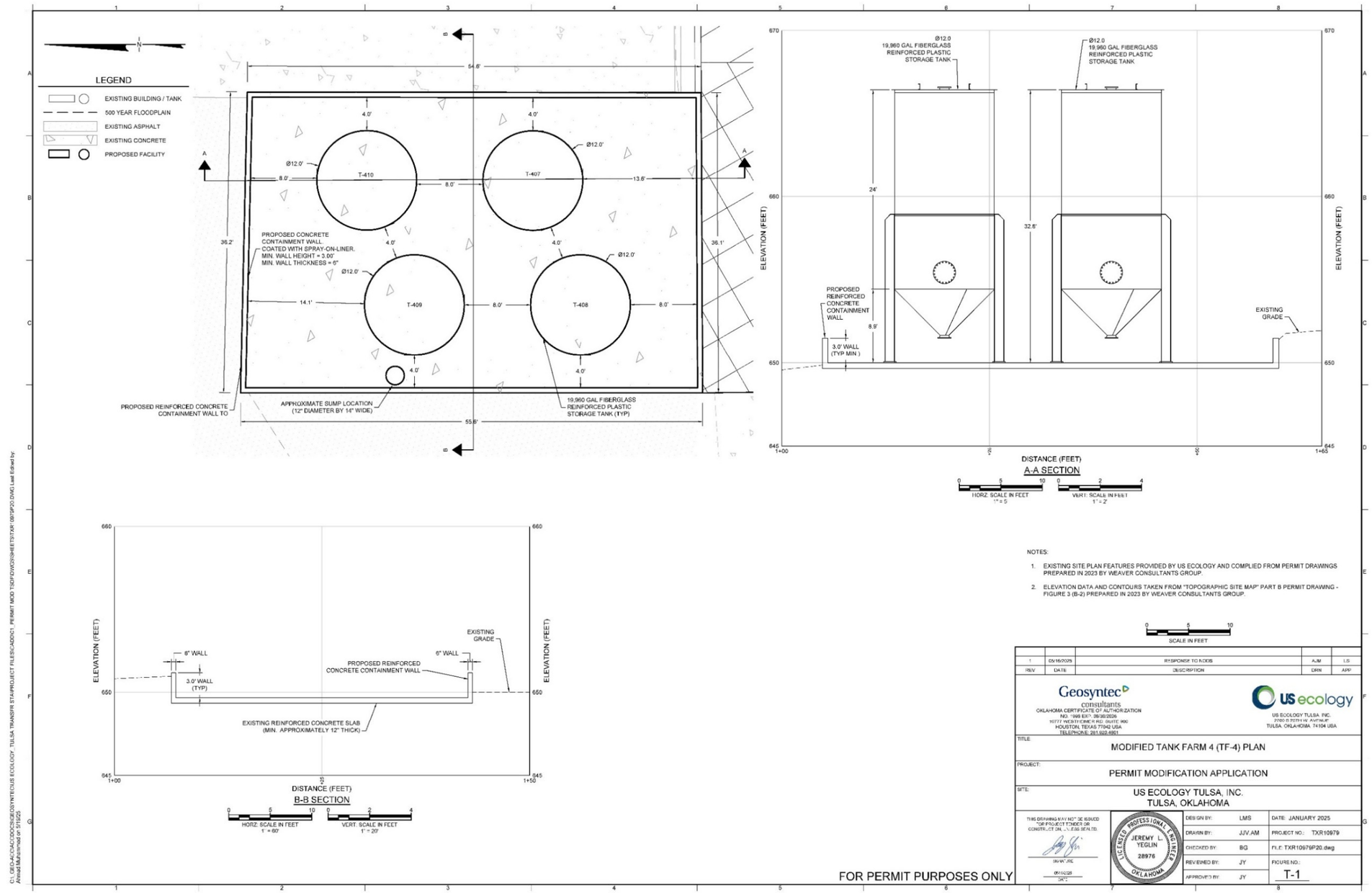
Total capacity available:

42,218 gal - (0 gal + 359 gal) = 41,859 gal

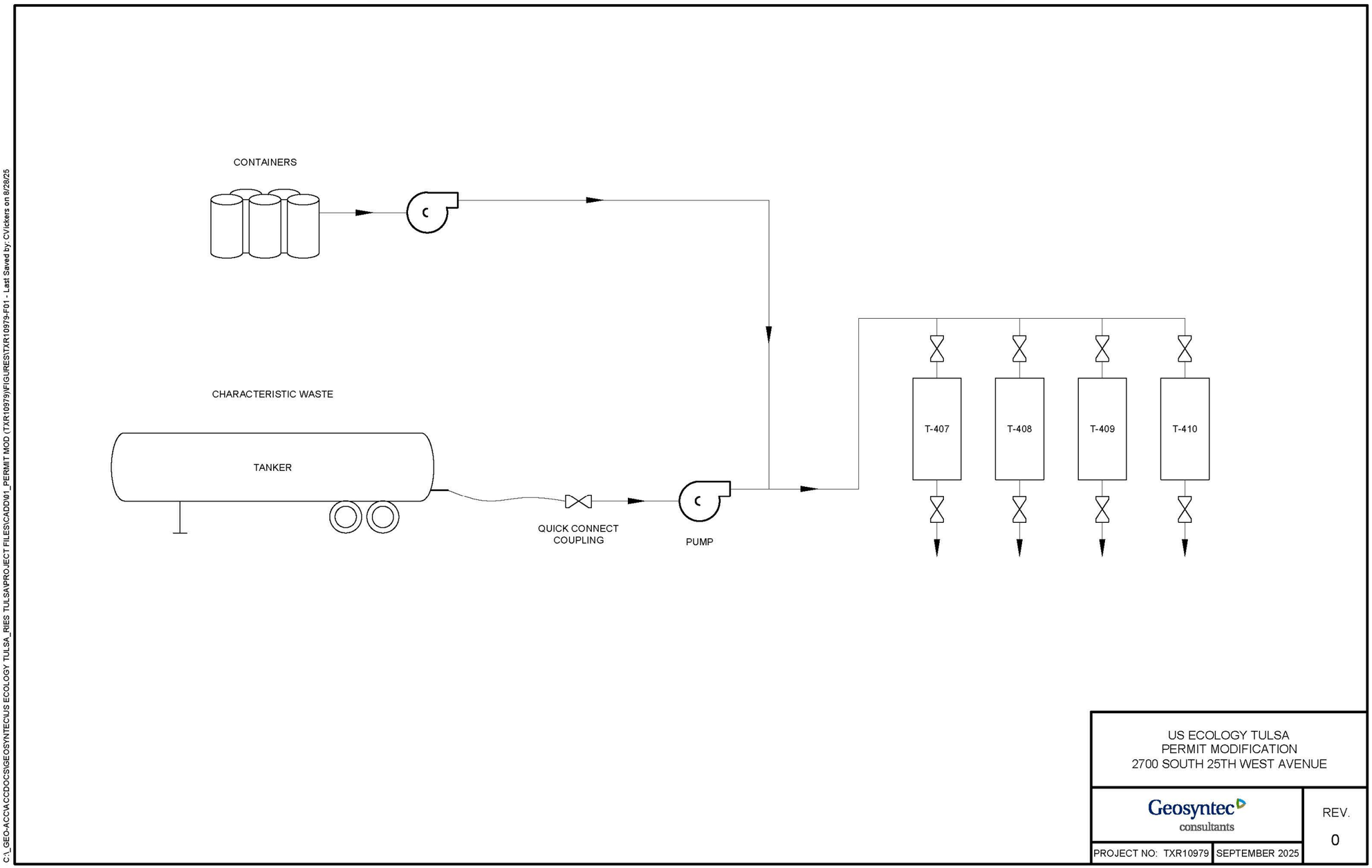
EXCESS CONTAINMENT:

41,859 gal – 29,236 gal = 12,623 gal

Figure T-1: Modified Tank Farm 4 (TF-4) Plan



Appendix 4-A - Process Diagram for Tank Farm 4 Tank System



Appendix 5 – Existing Treatment Tanks Detailed Information

Unit Description

The US Ecology Tulsa, Inc. (USE Tulsa) hazardous waste Treatment Tanks TA-2a and TA-2b have a cumulative permitted storage capacity of 79 cubic yards of hazardous waste and a cumulative daily treatment capacity of 47,842 gallons per day based on treating one tank volume per shift for 3 shifts per day. The tanks sit in similar sized secondary containment steel liners.

RCRA TANK SYSTEM CERTIFICATION
TA-2A & TA-2B

US Ecology Tulsa
2700 South 25th West Ave

Prepared By:

Kyle R. Dunn, P.E. – Managing Consultant

TRINITY CONSULTANTS
5801 E. 41st St.
Tulsa, OK 74135
(918) 622-7111

November 2023

Trinity Consultants

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1. EXECUTIVE SUMMARY

US Ecology operates Tanks TA-2A and TA-2B as hazardous waste storage tanks under the Resource Conservation and Recovery Act (RCRA) regulations. Each tank system was inspected and found to meet the requirements of 40 CFR 264.192.

PROFESSIONAL ENGINEERING CERTIFICATION

I certify that I have examined the design and installation of Tanks TA-2A and TA-2B and their ancillary equipment located at the US Ecology facility in Tulsa, OK. My duty was to provide an engineering assessment of these systems as they relate to the applicable engineering guidance for such systems. Based on the information provided and the assessment performed herein, I certify this system was designed and constructed in accordance with the stated engineering guidance documents. Therefore, based on the attached assessment, the tank systems are safe to operate in their intended use.

The information and engineering assessment presented in this report are the result of field investigations, a representative data search, and sound engineering practices and judgment. Additionally, this assessment is made solely on the information collected and reported to Trinity Consultants (Trinity) by either verbal accounts, existing reports, or existing design and construction documents.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

November 1, 2023
Date

Signature – Kyle R. Dunn, P.E.

Managing Consultant
Title

28041
Registration Number

Trinity Consultants
Company

5801 E. 41st Street, Suite 450, Tulsa, OK 74135
Address

2. INTRODUCTION

US Ecology owns and operates a hazardous waste treatment facility located in Tulsa, OK. Hazardous waste treatment is conducted in both Tanks TA-2A and TA-2B, and since these tank systems are intended to manage material classified as hazardous wastes, as defined in Appendix VIII to Part 261, a certification of the tank systems must be performed under the requirements of 40 CFR 264.192. A copy of the applicable text is included in Appendix B. Specifically, the assessment includes:

- Description and review of the design criteria used for the tank systems
- Review of the hazardous waste characteristics in reference to the tank systems' materials of construction
- Assessment of any corrosion potential for the tank systems due to contact with soil or water
- Review of vehicular traffic patterns that could damage any of the tank systems' components
- Results of a tank integrity inspections
- Assessment of other design considerations specifically included in the regulation

3. DESIGN REVIEW

3.1 Design Standards

TA-2A and TA-2B are open-top, atmospheric tanks that are constructed of 1" carbon steel, and each tank has reinforced welds on the side that receives most of the contact with the excavator bucket used for mixing and loadout. Both containers have metal secondary containment that is sufficient for holding the contents of the tanks in the event of tank failure and a significant rainfall event. There are no piping systems or ancillary equipment associated with either tank. No specific design standards were provided for the tank, but the tank drawings were reviewed and approved by a Professional Engineer. Tank design drawings are included in Appendix A.

3.2 Hazardous Waste Characteristics

TA-2A is typically used to treat acidic material, basic material, and metal bearing wastes. To minimize corrosion on the container, acidic wastes are immediately neutralized by using either reagents (e.g., lime or fly ash) or compatible wastes (e.g., caustic wastes) so the treatment mix is kept at a neutral-to-basic pH during the treatment process.

TA-2B is typically used to treat persulfate wastes which tend to be on the acidic side. However, as part of the treatment, water is used to allow the solid material to dissolve, and lime is also used to bring the material to a basic pH during treatment.

In accordance with data found in the National Association of Corrosion Engineers (NACE), *Corrosion Data Survey – Metals Section*, the carbon steel tanks are found to be compatible with the neutralized constituents found in the waste streams. Additionally, based on interviews with staff onsite, each batch is formulated in the onsite laboratory prior to transferring into the tanks. This formulation considers potential compatibility issues with carbon steel. Once the formulation of wastes and neutralizing material is approved, the operations staff visually inspects the transfer and notes if there are any unexpected reactions that occur. A water spray system is also in place to manually quench the material in the tanks, if needed.

3.3 Soil and Water Contact

The tanks systems are located aboveground and within metal containment, which is located on top of an asphalt foundation. Any water that collects in the containment drains to a sump, which is pumped into the tanks and mixed in with the waste. Therefore, extended contact with soil and water is not likely and will not result in an accelerated corrosion rate.

3.4 Vehicular Traffic Issues

There are no piping systems associated with the tank systems. Waste is transferred into the tank via forklift or manual dumping and is removed from the tank via an excavator. There are bumpers/barriers next to the tanks to prevent accidental damage from the forklifts and excavators.

3.5 Design Considerations

The following are additional design considerations that were reviewed in order to complete the RCRA tank system certification.

3.5.1 Tank Foundations

The foundation appears to be adequate. The tanks are located within metal containment, which is located on top of an asphalt foundation. There does not appear to be settling or cracking associated with the foundation.

3.5.2 Tank Flotation

The tanks are aboveground and are of sufficient size and weight such that collection of fluids in the secondary containment system will not cause flotation of the tanks.

3.5.3 Frost Heave

The tanks are not directly connected to any foundation, and they are located on an extensive asphalt foundation such that any frost heave would not affect the tanks.

4. TANK INSPECTION REVIEW

Trinity reviewed the API 653 and API 575 inspection reports and associated testing results from October 2023 (included in Appendix C). The reports indicate that all inspection points have adequate wall thickness and that the tanks are suitable for continued service. Trinity also visually inspected the tank installation and found the system to be free of weld breaks, punctures, cracks, corrosion, structural damage, and inadequate construction/installation.

5. UNDERGRGOUND TANK BACKFILLING PROVISIONS

No portions of the tank systems are located underground, so backfilling provisions are not required. No other underground components are presently associated with the tank systems being reviewed and certified by this report.

6. TANK SYSTEM TIGHTNESS

The tank systems are currently in operation and no visible leaks were identified.

7. ANCILLARY EQUIPMENT PROTECTION

There is no notable ancillary equipment associated with either tank. There are no piping systems, fittings, access points, or other openings in the tank.

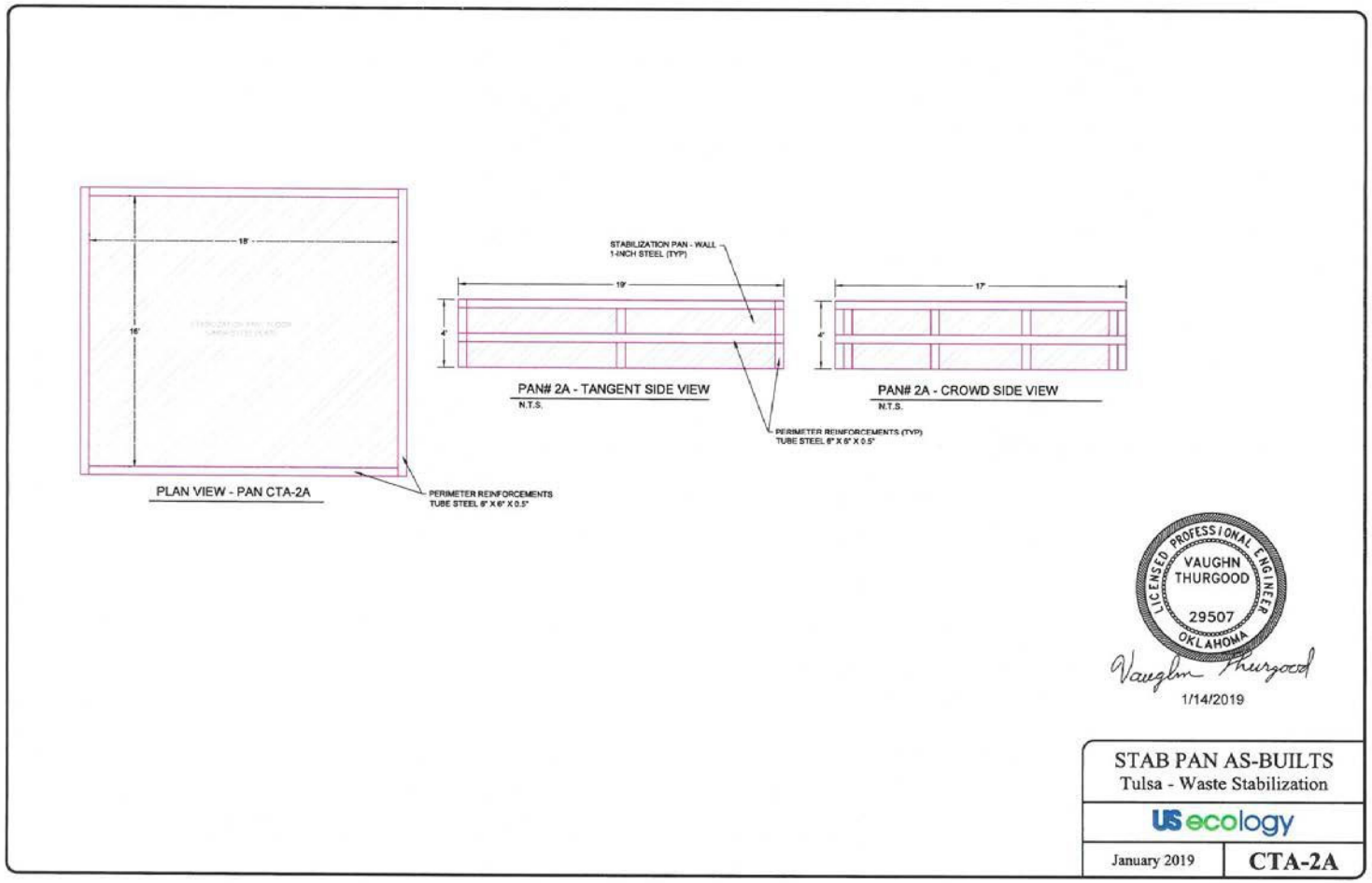
8. TANK SYSTEM CORROSION PROTECTION

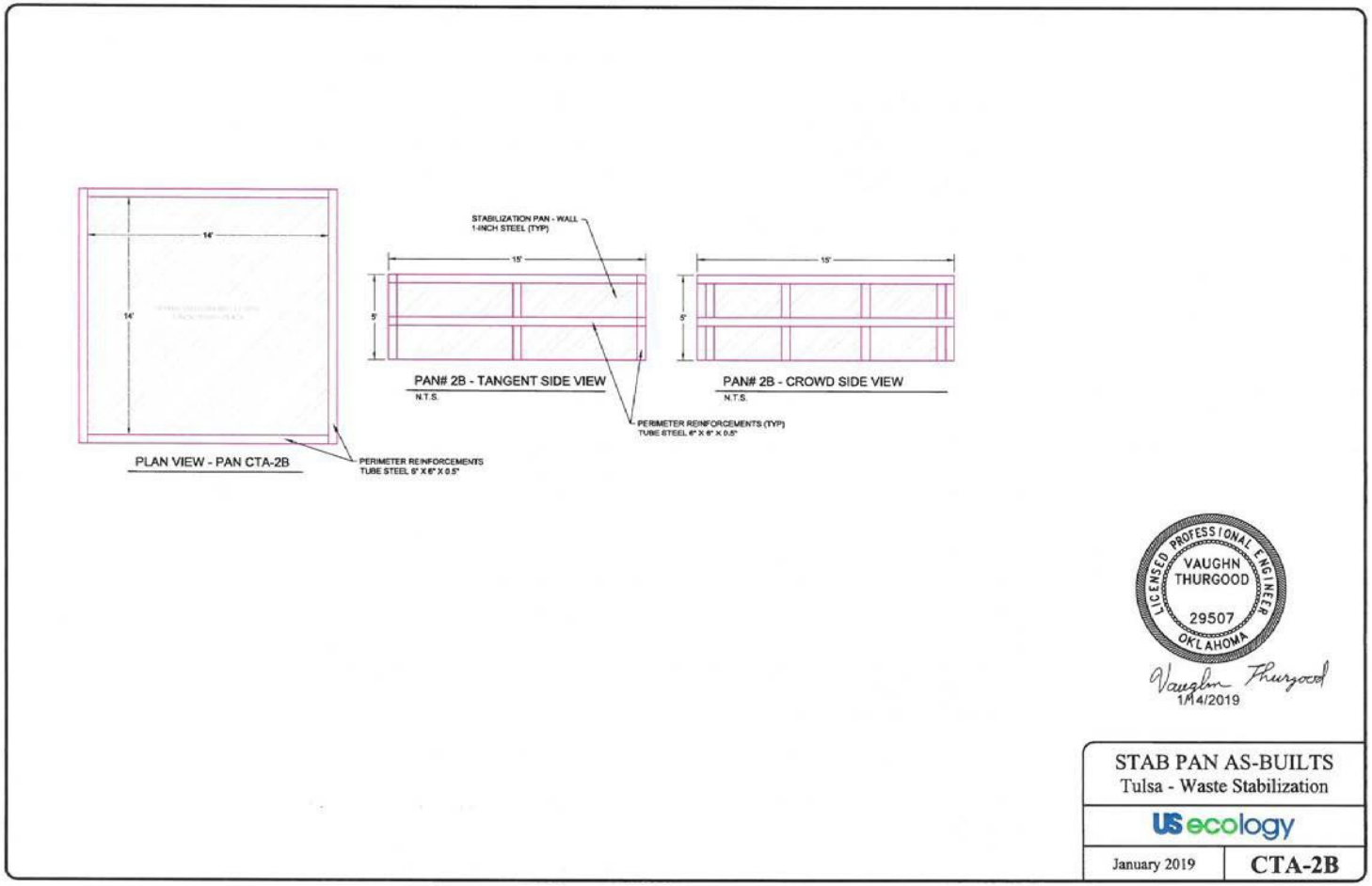
As stated in Section 3.3, the tank systems are not expected to contact soil or water in a manner that will accelerate the corrosion rate. Based on information provided by staff onsite, the metal thickness of each tank is also checked periodically.

9. TANK DESIGN AND CERTIFICATION

US Ecology will maintain this RCRA certification and all other written statements by those who have designed, constructed, or inspected the above-described tank system in the facility operating record.

APPENDIX A. TANK DRAWINGS


18'
16'
PLAN VIEW - PAN CTA-2A
PERIMETER REINFORCEMENTS
TUBE STEEL 6" X 6" X 0.5"
STABILIZATION PAN - WALL
1-INCH STEEL (TYP)
19'
4'
PAN# 2A - TANGENT SIDE VIEW
N.T.S.
PERIMETER REINFORCEMENTS (TYP)
TUBE STEEL 6" X 6" X 0.5"
17'
4'
PAN# 2A - CROWD SIDE VIEW
N.T.S.
LICENSED PROFESSIONAL ENGINEER
VAUGHN
THURGOOD
29507
OKLAHOMA
1/14/2019
STAB PAN AS-BUILTS
Tulsa - Waste Stabilization
US ecology
January 2019
CTA-2A


14'
14'
PLAN VIEW - PAN CTA-2B
PERIMETER REINFORCEMENTS
TUBE STEEL 6" X 6" X 0.5"
STABILIZATION PAN - WALL
1/4INCH STEEL (TYP)
15'
5'
PAN# 2B - TANGENT SIDE VIEW
N.T.S.
PERIMETER REINFORCEMENTS (TYP)
TUBE STEEL 6" X 6" X 0.5"
15'
5'
PAN# 2B - CROWD SIDE VIEW
N.T.S.
LICENSED PROFESSIONAL ENGINEER
VAUGHN
THURGOOD
29507
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1/14/2019
STAB PAN AS-BUILTS
Tulsa - Waste Stabilization
US ecology
January 2019
CTA-2B

APPENDIX B. REGULATORY REFERENCES

40 CFR 264.192 Design and installation of new tank systems or components

(a) Owners or operators of new tank systems or components must obtain and submit to the Regional Administrator, at time of submittal of part B information, a written assessment, reviewed and certified by a qualified Professional Engineer, in accordance with § 270.11(d) of this chapter, attesting that the tank system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste. The assessment must show that the foundation, structural support, seams, connections, and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail. This assessment, which will be used by the Regional Administrator to review and approve or disapprove the acceptability of the tank system design, must include, at a minimum, the following information:

(1) Design standard(s) according to which tank(s) and/or the ancillary equipment are constructed;

(2) Hazardous characteristics of the waste(s) to be handled;

(3) For new tank systems or components in which the external shell of a metal tank or any external metal component of the tank system will be in contact with the soil or with water, a determination by a corrosion expert of:

(i) Factors affecting the potential for corrosion, including but not limited to:

(A) Soil moisture content;
(B) Soil pH;
(C) Soil sulfides level;
(D) Soil resistivity;
(E) Structure to soil potential;
(F) Influence of nearby underground metal structures (e.g., piping);
(G) Existence of stray electric current;
(H) Existing corrosion-protection measures (e.g., coating, cathodic protection), and

(ii) The type and degree of external corrosion protection that are needed to ensure the integrity of the tank system during the use of the tank system or component, consisting of one or more of the following:

(A) Corrosion-resistant materials of construction such as special alloys, fiberglass reinforced plastic, etc.;
(B) Corrosion-resistant coating (such as epoxy, fiberglass, etc.) with cathodic protection (e.g., impressed current or sacrificial anodes); and
(C) Electrical isolation devices such as insulating joints, flanges, etc.

Note: The practices described in the National Association of Corrosion Engineers (NACE) standard, "Recommended Practice (RP-02-85) - Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems," and the American Petroleum Institute (API) Publication 1632, "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems," may be used, where applicable, as guidelines in providing corrosion protection for tank systems.

(4) For underground tank system components that are likely to be adversely affected by vehicular traffic, a determination of design or operational measures that will protect the tank system against potential damage; and

(5) Design considerations to ensure that:

(i) Tank foundations will maintain the load of a full tank;
(ii) Tank systems will be anchored to prevent flotation or dislodgment where the tank system is placed in a saturated zone, or is located within a seismic fault zone subject to the standards of § 264.18(a); and
(iii) Tank systems will withstand the effects of frost heave.

(b) The owner or operator of a new tank system must ensure that proper handling procedures are adhered to in order to prevent damage to the system during installation. Prior to covering, enclosing, or placing a new tank system or component in use, an independent, qualified, installation inspector or a qualified Professional Engineer, either of whom is trained and experienced in the proper installation of tanks systems or components, must inspect the system for the presence of any of the following items:

(1) Weld breaks;
(2) Punctures;
(3) Scrapes of protective coatings;
(4) Cracks;
(5) Corrosion;
(6) Other structural damage or inadequate construction/installation.

All discrepancies must be remedied before the tank system is covered, enclosed, or placed in use.

(c) New tank systems or components that are placed underground and that are backfilled must be provided with a backfill material that is a noncorrosive, porous, homogeneous substance and that is installed so that the backfill is placed completely around the tank and compacted to ensure that the tank and piping are fully and uniformly supported.

(d) All new tanks and ancillary equipment must be tested for tightness prior to being covered, enclosed, or placed in use. If a tank system is found not to be tight, all repairs necessary to remedy the leak(s) in the system must be performed prior to the tank system being covered, enclosed, or placed into use.

(e) Ancillary equipment must be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.
Note: The piping system installation procedures described in American Petroleum Institute (API) Publication 1615 (November 1979), "Installation of Underground Petroleum Storage Systems," or ANSI Standard B31.3, "Petroleum Refinery Piping," and ANSI Standard B31.4 "Liquid Petroleum Transportation Piping System," may be used, where applicable, as guidelines for proper installation of piping systems.

(f) The owner or operator must provide the type and degree of corrosion protection recommended by an independent corrosion expert, based on the information provided under paragraph (a)(3) of this section, or other corrosion protection if the Regional Administrator believes other corrosion protection is necessary to ensure the integrity of the tank system during use of the tank system. The installation of a corrosion protection system that is field fabricated must be supervised by an independent corrosion expert to ensure proper installation.

(g) The owner or operator must obtain and keep on file at the facility written statements by those persons required to certify the design of the tank system and supervise the installation of the tank system in accordance with the requirements of paragraphs (b) through (f) of this section, that attest that the tank system was properly designed and installed and that repairs, pursuant to paragraphs (b) and (d) of this section, were performed. These written statements must also include the certification statement as required in § 270.11(d) of this chapter.

APPENDIX C. TANK INSPECTION REPORTS

SPECIAL INSPECTIONS & DESIGN

MECHANICAL INTEGRITY INSPECTION
for
ABOVEGROUND CHEMICAL
STABILIZATION PAN TA-2A
at
US ECOLOGY
2700 S 25th STREET, TULSA, OK 74107

STABILIZATION PAN TA-2A

General Information

Manufacturer: Unknown
Mfg. City & State: Unknown
Date Manufactured: 1995 (estimated)
Governing Code or Standard: API 653
Capacity: 42.5 yd^3
Dimensions: 192" (E-W) x 215" (N-S)
Depth: 48 inches (wall height)
Design Pressure: Atmospheric
Design Temperature: NA
Design Specific Gravity: NA

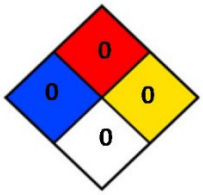
Made-Available Information

As-Built Drawing:	NO
Fabrication Reports:	NO
Baseline Data:	YES
Previous Operational Reports:	Verbal
Maintenance History:	Verbal
Previous Inspection Reports:	NO

Inspection Date: October 8, 2023
Report Number: SP-23393.2A

Inspection and Report By:
Steven C. Fults
Professional Engineer
API 653 #6122
AWS-CWI #05080851
ASNT NDT Level III Cert #21968

PRESENT: NO
NFPA LABEL



IBC/AWS/CWB/ASCE/ASME/ANSI/API/AISC Codes 314-240-0179 www.SIDengineers.com

Tank ID / Name:	STABILIZATION PAN TA-2A			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Stored:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2A

Executive Summary

The stabilization pan listed in this report was inspected in general accordance with API 653, the *Tank Inspection, Repair, Alteration, and Reconstruction Standard* and API 575 *Inspection Practices for Atmospheric and Low-Pressure Storage Tanks*. These Standards where followed as they prescribe inspection methods for the configuration and function similar to a stabilization pan. There is not a specific Code or standard that addresses stabilization pans. In summary, stabilization pan TA-2A is suitable for continued service, similar to past, based on this inspection. See attached checklist, ultrasonic thickness data report and photographs for detailed inspection results.

Deficiency List

1. No structural or mechanical deficiencies were observed that warrant repair or change of use.

Recommendations

1. Continue to monitor plate thickness annually using a calibrated digital ultrasonic thickness gauge.
2. Plate quality to be reaccessed in 10 years or earlier if backhoe damage occurs.

Per API 653, Next Inspection Due:

Routine In-service Inspection by Owner/Operator Personnel:	Monthly
External Inspection by an Authorized Inspector:	10 years
Ultrasonic Thickness Inspection by a Qualified Examiner:	10 years
Internal Inspection by an Authorized Inspector:	10 years

Limits of Liability

The professional opinions and judgments contained in this report are based on the site conditions as they existed at the time of inspection. No warranty expressed or implied is made as to the conclusions and professional advice included in this report. This report was prepared exclusively for the use and benefit of US Ecology and Trinity Consultants. Unauthorized use of content or formatting is strictly prohibited.

Please contact the undersigned if you have any questions or require additional information.

Report By:
SPECIAL INSPECTIONS & DESIGN

Steven Fults, PE
API 653 #6122
ASNT NDT Level III #21968
AWS-CWI #05080851

Tank ID / Name:	STABILIZATION PAN TA-2A			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Mixed:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2A

ABOVEGROUND STORAGE TANK EXTERNAL INSPECTION CHECKLIST

LEGEND: ✓ = ACCEPTABLE ☒ = ITEM of CONCERN NA = NOT APPLICABLE NI = NOT INSPECTED

LABELING		COMMENTS
• Nameplate	✓	No Identification posted
• Contents and capacity	✓	Not posted
• NFPA diamond	✓	Not posted
FOUNDATION & SUPPORTS		COMMENTS
• Foundation type Ring ☐ Full Pad ☑ Saddles ☐	✓	Soil and/or rock subgrade
• Levelness and uniform support	✓	Subgrade is continuous, solid, stable
• Soil settlement around pan	✓	No measurable settlement
• Drainage away from pan	✓	Adequate drainage
• Steel leg / saddle / skid supports (bent, distorted, corroded)	✓	Containment area walls are braced.
• Anchor bolts / chairs (loose, bent, corroded, missing)	✓	Gravity holds containment and pan in place
CONTAINMENT AREA Steel ☑ Concrete ☐ Trench ☐		COMMENTS
• Impervious	✓	Continuous 1/4" or 5/16" steel plate, welded joints
• Housekeeping (debris, vegetation, ponding)	✓	Minimal debris present
INSULATION / PROTECTIVE COATINGS		COMMENTS
• Lagging / sheeting (loose, missing, damaged)	NA	Not insulated
• Caulking at penetrations and supports	NA	Not insulated
• Insulation condition (CUI, wet, missing, deteriorated)	NA	Not insulated
• Coatings (blistering, peeling, chalking, holidays)	NA	No paint, thin surface corrosion present
• Seal between bottom and foundation	✓	No seal but not needed
SHELL, BOTTOM & ROOF Carbon Steel ☑ Alloy Steel ☐		COMMENTS
• Deformation / distortions (peaking, blisters, bulges, flats)	✓	Walls and Floor and relatively flat
• Shell seam welds / evidence of leaks	✓	Welds are good quality, large in size, full length & contiguous
• Shell vertical / horizontal alignment	✓	Walls are near plumb & floor plates flat
• Deformation at wall, floor, or reinforcement	✓	No significant scars or gouges from backhoe bucket mixing
• Corrosion or thinning of shell, bottom or roof	✓	No significant corrosion, surface patina only
• Roof (slope, ponding, corrosion)	✓	Pan does not have a cover, there is a sunscreen roof 20' above
• Evidence of previous repairs	✓	Repair underway to reattach lip plate, good quality welds
MANWAYS, NOZZLES & REINFORCEMENT		COMMENTS
• Maintenance of hatches, manways, covers	NA	None
• Nozzle rigidity (deformation, expansion joints)	NA	None
• Weld condition	✓	Exterior reinforcement welds are good quality, adequate size
• Bolts or studs at flanged connections	NA	No bolted connections, joints are welded
• Gasket condition / evidence of leaks	✓	No leaks or evidence found
• Condition of sump, piping manifolds, height gage, etc.	✓	PVC tubing and water spray nozzles above north wall
• Static ground wire	✓	No ground wire present, nor needed
• Venting (normal, emergency, pressure/vacuum)	✓	Open air
• Overfill protection (level gauge, alarm, automatic shutoff)	✓	Visual by operator
ACCESS STRUCTURE		COMMENTS
• Ladders (fasteners, welds, corrosion, brackets, rungs)	NA	Pan is 48 inches tall, step ladder used to enter
• Cages (fasteners, welds, brackets, corrosion)	NA	None
• Stairways (treads, fasteners, handrails, welds, stringers)	NA	None
• Platform (grating, clips, welds, corrosion, thinning)	NA	None
• Handrail (corrosion, welds, fasteners, stiffeners)	NA	None
• General condition of coatings (blistering, peeling, failure)	NA	None
OTHER		COMMENTS
• Nuts were tack welded to wall exteriors to be used as an ultrasonic thickness measurement monitoring locations.		
•		
•		

Tank ID / Name:	STABILIZATION PAN TA-2A			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Stored:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2A

Containment area wall plate is 11 to 12 inches tall

Stabilization pan TA-2A walls are 48 inches tall.

Overall containment area measures 425" (E-W) X 410" (N-S) X 11" (tall). No voids/gaps/holes were present in visually accessible areas. Containment area floor plate is believed to be continuous beneath the pan.

Containment area wall and floor plate are nominal 0.250" or 0.300" carbon steel plate.

Tank ID / Name:	STABILIZATION PAN TA-2A			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Stored:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2A

Repairs were underway to reattach & reinforce the south-side lip plate that was torn upwards by the backhoe bucket. The welder was skilled. Oscar deposted good quality weld and was effective to secure the existing plate & new plate.

UTT thickness measurements were taken at 24 locations per wall. Minor wall loss has occurred.

Floor plate thickness range measured was 0.812" to 0.925". No significant pitting or general corrosion was

Enclosed area west of the stab pan TA-2A was observed and structural members were intact. No

Weld quality was good. The 6x6 tube reinforcement is robust and very stable.

Tank ID / Name:	STABILIZATION PAN TA-2A			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Stored:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2A

ULTRASONIC THICKNESS MEASUREMENT DATA

Remaining metal thickness was measured nondestructively with straight beam ultrasonic thickness testing (UTT). A dual-element 2.25MHz transducer was used. The measurement ranges are shown below.

Pan TA-2A **floor plate** thickness was measured at 24 areas throughout the plate:
Thinnest measurement: 0.812", Thickest measurement: 0.925"

Pan TA-2A **wall plate** thickness was measured at 96 areas throughout the plates:
North wall 24 measurement locations
Thinnest measurement: 0.972", Thickest measurement: 1.018"
East wall 24 measurement locations
Thinnest measurement: 0.995", Thickest measurement: 1.012"
South wall 24 measurement locations
Thinnest measurement: 0.912", Thickest measurement: 1.011"
East wall 24 measurement locations
Thinnest measurement: 0.995", Thickest measurement: 1.012"

Pan TA-2A **containment area** wall and floor plate thickness was measured at 12 areas throughout the plates:
Thinnest measurement: 0.248", Thickest measurement: 0.344"

Measurement data and visual observation show minor product attack on the wall and floor plate. There was not a significant thickness difference in the upper and lower wall plate sections as was prevalent in Stab Pan TA-2B. The corrosion rate is approximately 0.005" IPY, based on a 20 year age. Given the facility operations guideline minimum allowable floor or wall plate thickness of 0.250", the wall and floor plate may need to be replaced or reinforced in 20 years, provided mechanical impact damage is minimal and mixing chemicals are similar to past. Plate quality to be reaccessed in 10 years or earlier if backhoe damage occurs.

US Ecology has established UTT monitoring locations by welding nuts onto the wall plate outer face. Annual measurements should be taken and documented by a competent maintained person so the plate thickness and corrosion rate are known.

SPECIAL INSPECTIONS & DESIGN

MECHANICAL INTEGRITY INSPECTION
for
ABOVEGROUND CHEMICAL
STABILIZATION PAN TA-2B
at
US ECOLOGY
2700 S 25th STREET, TULSA, OK 74107

General Information

Manufacturer: Unknown
Mfg. City & State: Unknown
Date Manufactured: 1995 (estimated)
Governing Code or Standard: API 653
Capacity: 35 yd^3
Dimensions: 165" x 165"
Depth: 60 inches (wall height)
Design Pressure: Atmospheric
Design Temperature: NA
Design Specific Gravity: NA

Made-Available Information

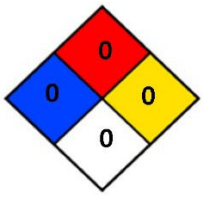
As-Built Drawing:	NO
Fabrication Reports:	NO
Baseline Data:	YES
Previous Operational Reports:	Verbal
Maintenance History:	Verbal
Previous Inspection Reports:	NO

STABILIZATION PAN TA-2B

Inspection Date: October 8, 2023
Report Number: SP-23393.2B

Inspection and Report By:
Steven C. Fults
Professional Engineer
API 653 #6122
AWS-CWI #05080851
ASNT NDT Level III Cert #21968

PRESENT: NO
NFPA LABEL



IBC/AWS/CWB/ASCE/ASME/ANSI/API/AISC Codes 314-240-0179 www.SIDengineers.com

Tank ID / Name:	STABILIZATION PAN TA-2B			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Stored:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2B

Executive Summary

The stabilization pan listed in this report was inspected in general accordance with API 653, the *Tank Inspection, Repair, Alteration, and Reconstruction Standard* and API 575 *Inspection Practices for Atmospheric and Low-Pressure Storage Tanks*. These Standards where followed as they prescribe inspection methods appropriate to the configuration and function similar to a stabilization pan. There is not a specific Code or standard that addresses stabilization pans. In summary, Stab Pan TA-2B is suitable for continued service, similar to past, based on this inspection. See attached checklist, UTT data, and photographs.

Deficiency List

1. No structural or mechanical deficiencies were observed that warrant repair or change of use.

Recommendations

1. Continue to monitor plate thickness annually using a calibrated digital ultrasonic thickness gauge.
2. Wall and plate integrity to be reassessed in 10 years or earlier if backhoe damage occurs.

Per API 653, Next Inspection Due:

Routine In-service Inspection by Owner/Operator Personnel:	Monthly
External Inspection by an Authorized Inspector:	10 years
Ultrasonic Thickness Inspection by a Qualified Examiner:	10 years
Internal Inspection by an Authorized Inspector:	10 years

Limits of Liability

The professional opinions and judgments contained in this report are based on the site conditions as they existed at the time of inspection. No warranty expressed or implied is made as to the conclusions and professional advice included in this report. This report was prepared exclusively for the use and benefit of US Ecology and Trinity Consultants. Unauthorized use of content or formatting is strictly prohibited.

Please contact the undersigned if you have any questions or require additional information.

Report By:
SPECIAL INSPECTIONS & DESIGN

Steven Fults, PE
API 653 #6122
ASNT NDT Level III #21968
AWS-CWI #05080851

Tank ID / Name:	STABILIZATION PAN TA-2B			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Mixed:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2B

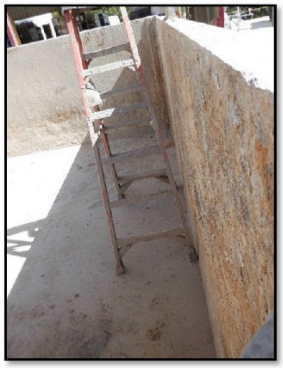
ABOVEGROUND STORAGE TANK EXTERNAL INSPECTION CHECKLIST

LEGEND: ✓ = ACCEPTABLE ☒ = ITEM of CONCERN NA = NOT APPLICABLE NI = NOT INSPECTED

LABELING		COMMENTS
• Nameplate	✓	No Identification posted
• Contents and capacity	✓	Not posted
• NFPA diamond	✓	Not posted
FOUNDATION & SUPPORTS		COMMENTS
• Foundation type Ring ☐ Full Pad ☑ Saddles ☐	✓	Soil and/or rock subgrade
• Levelness and uniform support	✓	Subgrade is continuous, solid, stable
• Soil settlement around pan	✓	No measurable settlement
• Drainage away from pan	✓	Adequate drainage
• Steel leg / saddle / skid supports (bent, distorted, corroded)	✓	Containment area walls wavy from contact with backhoe
• Anchor bolts / chairs (loose, bent, corroded, missing)	✓	Gravity holds containment and pan in place
CONTAINMENT AREA Steel ☑ Concrete ☐ Trench ☐		COMMENTS
• Impervious	✓	Continuous 1/4" steel plate containment, welded joints
• Housekeeping (debris, vegetation, ponding)	✓	No debris present
INSULATION / PROTECTIVE COATINGS		COMMENTS
• Lagging / sheeting (loose, missing, damaged)	NA	Not insulated
• Caulking at penetrations and supports	NA	Not insulated
• Insulation condition (CUI, wet, missing, deteriorated)	NA	Not insulated
• Coatings (blistering, peeling, chalking, holidays)	NA	No paint, thin surface corrosion present
• Seal between bottom and foundation	✓	No seal but not needed
SHELL, BOTTOM & ROOF Carbon Steel ☑ Alloy Steel ☐		COMMENTS
• Deformation / distortions (peaking, blisters, bulges, flats)	✓	Walls and Floor and relatively flat
• Shell seam welds / evidence of leaks	✓	Welds are good quality, large in size, full length & contiguous
• Shell vertical / horizontal alignment	✓	Walls are near plumb & floor plates flat
• Deformation at wall, floor, or reinforcement	✓	No significant scars or gouges from backhoe bucket mixing
• Corrosion or thinning of shell, bottom or roof	✓	No significant corrosion, surface patina only
• Roof (slope, ponding, corrosion)	✓	Pan does not have a cover, there is a sunscreen roof 20' above
• Evidence of previous repairs	✓	1-inch plate added to west wall over bulge
MANWAYS, NOZZLES & REINFORCEMENT		COMMENTS
• Maintenance of hatches, manways, covers	NA	None
• Nozzle rigidity (deformation, expansion joints)	NA	None
• Weld condition	✓	Exterior reinforcement welds are good quality, adequate size
• Bolts or studs at flanged connections	NA	No bolted connections, joints are welded
• Gasket condition / evidence of leaks	✓	No leaks or evidence found.
• Condition of sump, piping manifolds, height gage, etc.	✓	PVC tubing and water spray nozzles above north wall
• Static ground wire	✓	No ground wire present, nor needed
• Venting (normal, emergency, pressure/vacuum)	✓	Open air
• Overfill protection (level gauge, alarm, automatic shutoff)	✓	Visual by operator
ACCESS STRUCTURE		COMMENTS
• Ladders (fasteners, welds, corrosion, brackets, rungs)	NA	Pan is 61 inches tall, step ladder used to enter
• Cages (fasteners, welds, brackets, corrosion)	NA	None
• Stairways (treads, fasteners, handrails, welds, stringers)	NA	None
• Platform (grating, clips, welds, corrosion, thinning)	NA	None
• Handrail (corrosion, welds, fasteners, stiffeners)	NA	None
• General condition of coatings (blistering, peeling, failure)	NA	None
OTHER		COMMENTS
• Nuts were tack welded to wall exteriors to be used as an ultrasonic thickness measurement monitoring locations.		
•		
•		

Tank ID / Name:	STABILIZATION PAN TA-2B			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Stored:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2B

Continment area wall plate is 30 to 32 inches tall



Stabilization pan TA-2B walls are 60 inches tall.

Overall containment area measures 166.5" x 166.5", No voids were present in visually accessible areas.
Containment area floor plate is believed to be continuous beneath the pan.

Containment area wall plate measuring 0.290 inches thick

Tank ID / Name:	STABILIZATION PAN TA-2B			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Stored:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2B

A ten-foot long 1-inch thick plate was added to the inside of the TA-2B west wall, Continuous fillet welds secure all sides of the added plate. This plate was added to cover a bulge caused by the backhoe bucket. See orange area below.

1-inch plate was added to cover bulge in original wall plate caused by a backhoe bucket.

Floor plate thickness range measured was 0.669" to 0.868". No significant pitting or general corrosion was observed.

Reinforcement plates have been added across top of walls as needed. Walls are very stable.

Weld quality was good, welds are continuous with no gaps or voids.

Tank ID / Name:	STABILIZATION PAN TA-2B			Inspector:	Steven Fults
Company:	US Ecology	Operating Temperature:	Ambient	Inspection Date:	10/9/2023
City & State:	Tulsa, OK	Product Stored:	Acids & Bases	Job #:	23-393
Shop / Field built:	Field	In-Service:	Yes	Report #:	SP-23393.2B

ULTRASONIC THICKNESS TESTING MEASUREMENT DATA

Remaining metal thickness was measured nondestructively with straight beam ultrasonic thickness testing (UTT) using a dual-element 2.25MHz transducer. The measurement ranges are shown below.

Pan TA-2B **floor plate** thickness was measured at 24 areas throughout the plate:
Thinnest measurement: 0.669", Thickest measurement: 0.868"

Pan TA-2B **wall plate** thickness was measured at 36 areas throughout the plates (added 1" plate is excluded):
Eighteen places in the **upper** 30" of wall plate
Thinnest measurement: 0.815", Thickest measurement: 0.908"
Eighteen places in the l**ower** 30" of wall plate
Thinnest measurement: 0.635", Thickest measurement: 0.844"

Pan TA-2B **containment area** wall and floor plate thickness was measured at 18 areas throughout the plates:
Thinnest measurement: 0.268", Thickest measurement: 0.317"

Measurement data and visual observation show moderate product attack on the lower 30 inches of wall plate interior surface, resulting in a corrosion rate of approximately 0.025" IPY, based on a 20 year age. Given the facility operations guideline minimum allowable floor or wall plate thickness of 0.250", the lower plate will need to be replaced or reinforced in 15 years, provided mechanical impact damage is minimal and mixing chemicals are similar to past.

The west wall was reinforced by adding/welding the 1-inch steel plate to the original west wall inside face. The lower west wall original plate steel was apparently hit by the backhoe bucket and bulged outwards. Thickness of the bulged plate measured 0.348". This area was effectively covered/reinforced by the 1" plate so the bulged area is of no consequence now.

US Ecology has established UTT monitoring locations by welding nuts onto the wall plate outer face. Annual measurements should be taken and documented by a competent maintained person so the plate thickness and corrosion rate are known.

Appendix 6 – Proposed Treatment Tanks Detailed Information

I. Unit Description

The US Ecology Tulsa, Inc. (USE Tulsa) proposed hazardous waste Treatment Tanks TA-2b and TA-2c have a proposed cumulative permitted daily treatment capacity of 164,000 gallons per day based on treating one tank volume per shift for multiple shifts per day. Considering the existing TA-2a as well, the proposed cumulative daily treatment capacity of TA-2a, TA-2b, and TA-2c is 176,000 gallons. No structural modifications to TA-2a are proposed. Detailed information on existing Tank TA-2a is provided in Appendix 5.

This appendix presents detailed information for proposed tanks TA-2b and TA-2c. These tanks have the same design as one another. Secondary containment requirements are based on the full volume of the proposed treatment tank. Information regarding tank design, material of construction, and nominal capacity for TA-2b and TA-2c is summarized in Appendix 7 – Permitted Hazardous Waste Tank System Information.

TA-2b and TA-2c each consist of a 1-inch thick (minimum) mild carbon steel tank (liner) within a 1-foot (minimum) thick reinforced concrete secondary containment vault amended with Xypex Admix (or equivalent). The bottom of the steel tank is curved in one direction (e.g., horseshoe shaped) with dimensions of 20’ x 25’ x 13’. Chemical and heat resistance are provided by the structural and lining material of the tank system (carbon steel and reinforced concrete). Additional information on these tanks is presented below and in Appendix 8.

II. Basic Design Parameters, Dimensions, and Materials of Construction

Tanks TA-2b and TA-2c will be constructed by a qualified third-party contractor. A visual inspection will be performed on all tanks during installation by an independent, qualified installation inspector or a qualified Professional Engineer Any evidence of punctures, scrapes, cracks, or other structural damage which might result in premature failure will be identified and noted by the inspector. After each tank is constructed, it will be filled to capacity with water and held for a period of 24 hours. A qualified contractor representative will be on site to observe any leaks or evidence of leaks via observation of liquid levels in a tank and secondary containment inspection port.

The treatment tanks are compatible with the anticipated wastes. The design of the reinforced concrete is enhanced by the addition of a Xypex Admix (or equivalent) to decrease the permeability of the concrete and increase its chemical resistance. The steel liner is compatible with the wastes it is authorized to receive and treat, including alkaline, reactive, organic, and acidic wastes. To minimize any potential internal corrosion, acidic wastes are treated immediately to raise their pH. Further, the steel liner of the tanks are monitored by performing periodic thickness testing at the frequency noted in Section T.5, and the results are evaluated to confirm that the treatment tanks are at a minimum thickness that will prevent leaks or containment failures.

Tanks taken out hazardous waste service may undergo partial closure, and subsequently, be used for storage of non-hazardous wastes, product, or stormwater.

III. Containment

The proposed treatment tanks will be located under canopy cover and equipped with a secondary containment system meeting the requirements of 40 CFR 264.193. The secondary containment consists of a 1-foot (minimum) thick reinforced concrete secondary containment. The concrete will be amended with Xypex Admix (or equivalent) at the time it is batched to generate a non-soluble, chemically resistant crystalline structure throughout the pores and capillary tracts of the concrete that prevents the penetration of waste into the concrete. All interior construction joints of the concrete structure will be sealed with a chemically resistant polyethylene (or equivalent) waterstop. Details regarding the leak detection system for TA-2b and TA-2c are provided in Appendix 8.

USE Tulsa utilizes the leak detection inspection port for periodic inspections and to remove accumulated liquids (spilled or leaked waste) by pump and dispose of in an appropriate manner within 24 hours. Procedures for evaluating liquids removed from permitted secondary containment areas are provided in Section T.7 and Section 2 of Attachment 6. When necessary, USE Tulsa's on-site laboratory will analyze the accumulated liquids to determine if it is hazardous waste or non-hazardous waste and how it should be managed or disposed of in accordance with state and federal regulations.

IV. Control of Run-On and Run-Off

The tanks will be provided with curbing at the ground surface, which will control run-on. The tanks will be located under canopy cover and operated with freeboard, which will control potential run-off.

V. Tank Management Processes

Quick-connect couplings and flexible hose will be used when offloading tanker trucks into the treatment tanks. The only access point consists of a 4-inch leak detection inspection port extending from the surface of the treatment tanks to a depth slightly elevated from tank bottom. The are no piping systems, fittings, or other openings in the walls of the tanks. The inspection port is located between the steel liner and the concrete secondary containment. Tanker trucks will be offloading waste into the tanks via quick-connect couplings and flexible hose.

When a different hazardous waste is treated in a tank, USE Tulsa will evaluate the need for decontamination procedures for tanks that previously held an incompatible waste or material. The tank will be decontaminated when evidence of visual contamination is identified or when "knowledge of process" based on tank usage indicates decontamination is appropriate. Decontamination procedures will consist of one to two washes with water or other appropriate cleaning agents. Wash water will be disposed of in accordance with state and federal regulations.

The tanks are compatible with the waste treated. The facility inspection schedule (presented in Attachment 4 - Inspection Schedules and Forms and Attachment 6 - Procedures to Prevent Hazardous) includes inspection of tank systems.

VI. Leak Detection for Ancillary Equipment

The only notable ancillary equipment associated with either tank is the 4-inch leak detection inspection port extending from the surface of the treatment tanks to a depth slightly elevated from tank bottom. Tanker trucks will be offloading waste into the tanks via quick-connect couplings and flexible hose.

VII. Containment Calculations for Proposed TA-2b and TA-2c

Note: Proposed tanks TA-2b and TA-2c will be constructed of the same material and all designed to the same dimensions. Therefore, the calculations below apply to both tanks.

GIVEN:

Tank length (N/S)	=	20 ft
Tank width (E/W)	=	25 ft
Top Elevation	=	99.27 ft
Bottom Elevation	=	96.55 ft
Tank Depth	=	12.72 ft (~13 ft)
Width of left quadrant steel liner (horseshoe)	=	62.6 in
Heigh of left quadrant steel liner (horseshoe)	=	62.9 in
Width of right quadrant steel liner (horseshoe)	=	66.4 in
Height of right quadrant steel liner (horseshoe)	=	64.2 in
Arc radius of steel liner	=	60 in

SECONDARY CONTAINMENT CAPACITY AVAILABLE FROM TA-2b/TA-2c:

Volume inside secondary containment:

(20 ft)(25ft)(12.72 ft)	=	6,360 ft^3
(6,360 ft^3)(7.48 gal/ft^3)	=	47,573 gal
Total capacity available:	=	47,573 gal

CONTAINMENT CAPACITY REQUIRED FOR TA-2b/TA-2c:

Not Applicable as the primary containment is located fully within the concrete secondary containment for TA-2b/TA-2c. As long as the primary containment (steel tank) fits within the secondary containment (concrete containment) the capacity required is met.

Area of left quadrant of steel liner:

(62.6 in)(62.9 in)/(144 in^2)	=	27.34 ft^2

Area of right quadrant of steel liner:

(66.4 in)(64.2 in)/(144 in^2)	=	29.60 ft^2

Interior arc area of left quadrant steel liner:

$[\pi(60\text{ in})(60\text{ in})/4]/(144\text{ in}^2)$ = 19.63 ft^2

Interior arc area of right quadrant steel liner:

$[\pi(60\text{ in})(60\text{ in})/4]/(144\text{ in}^2)$ = 19.63 ft^2

Left quadrant area between concrete containment and steel liner:

$(27.34\text{ ft}^2) - (19.63\text{ ft}^2)$ = 7.71 ft^2

Right quadrant area between concrete containment and steel liner:

$(29.60\text{ ft}^2) - (19.63\text{ ft}^2)$ = 9.97 ft^2

Left quadrant volume between concrete containment and steel liner:

$(7.71\text{ ft}^2)(25\text{ ft})$ = 192.73 ft^3

Right quadrant volume between concrete containment and steel liner:

$(9.97\text{ ft}^2)(25\text{ ft})$ = 249.21 ft^3

Total capacity required:

$(6{,}360\text{ ft}^3) - (192.73\text{ ft}^3 + 249.21\text{ ft}^3)$ = $5{,}918.06\text{ ft}^3$

$(5{,}918.06\text{ ft}^3)(7.48\text{ gal/ft}^3)$ = 44,267 gal

Total maximum capacity required: = 44,267 gal

EXCESS CONTAINMENT:

47,573 gal – 44,267 gal = 3,306 gal

Figure T-2: Modified Tank Area 2b and 2c (TA-2b) (TA-2c)

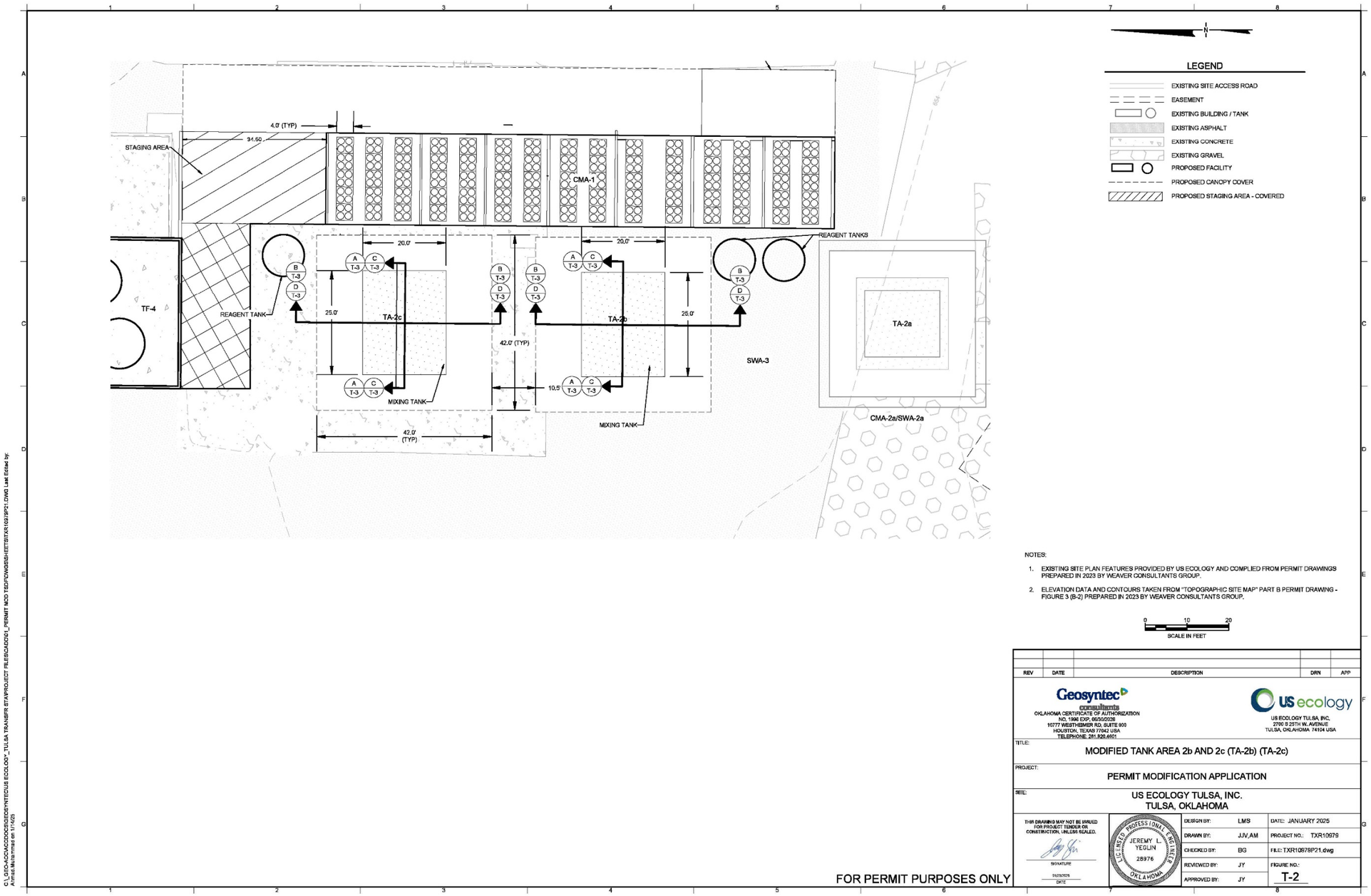


Figure T-3: TA-2 Tank Details I

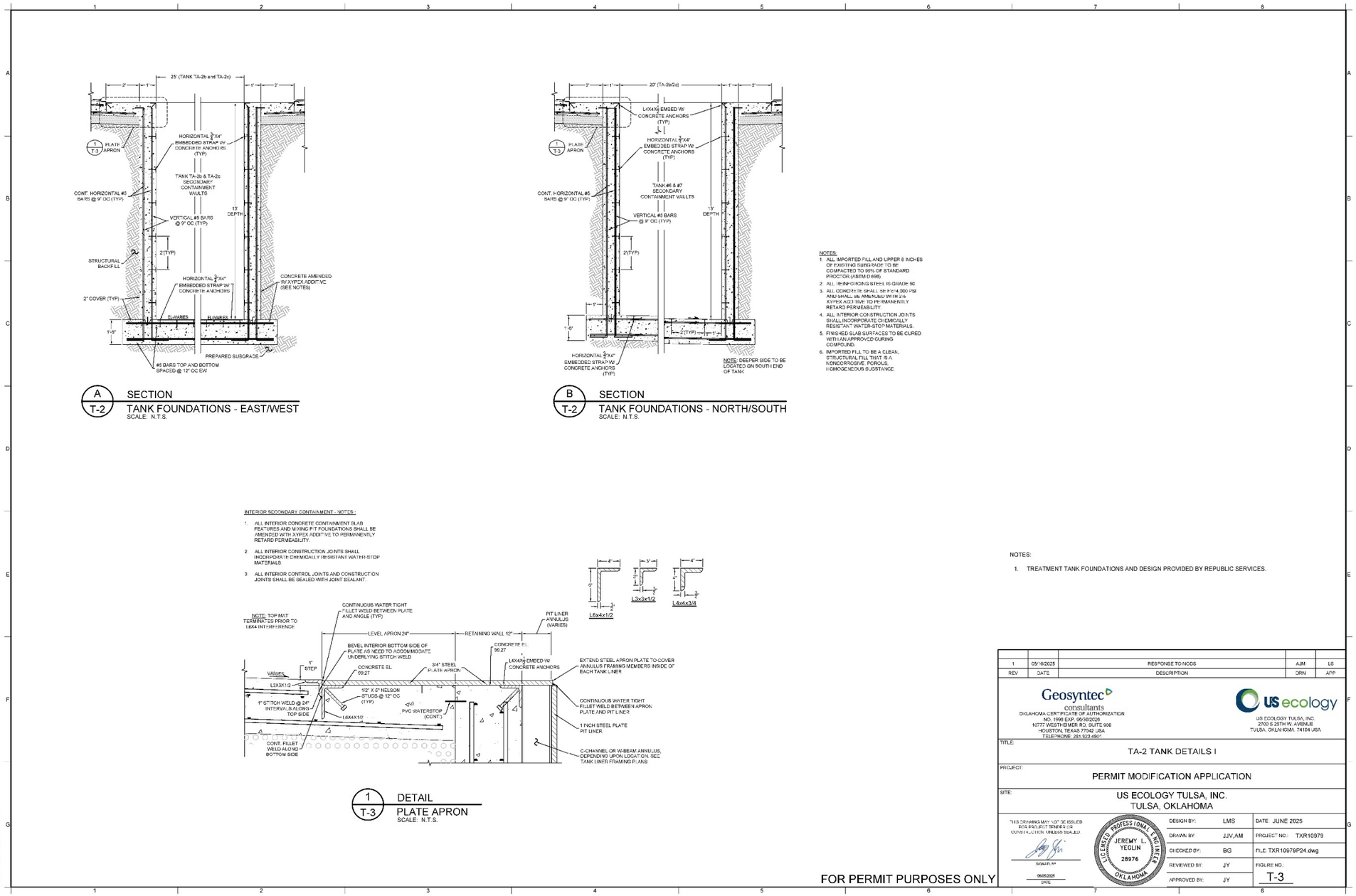
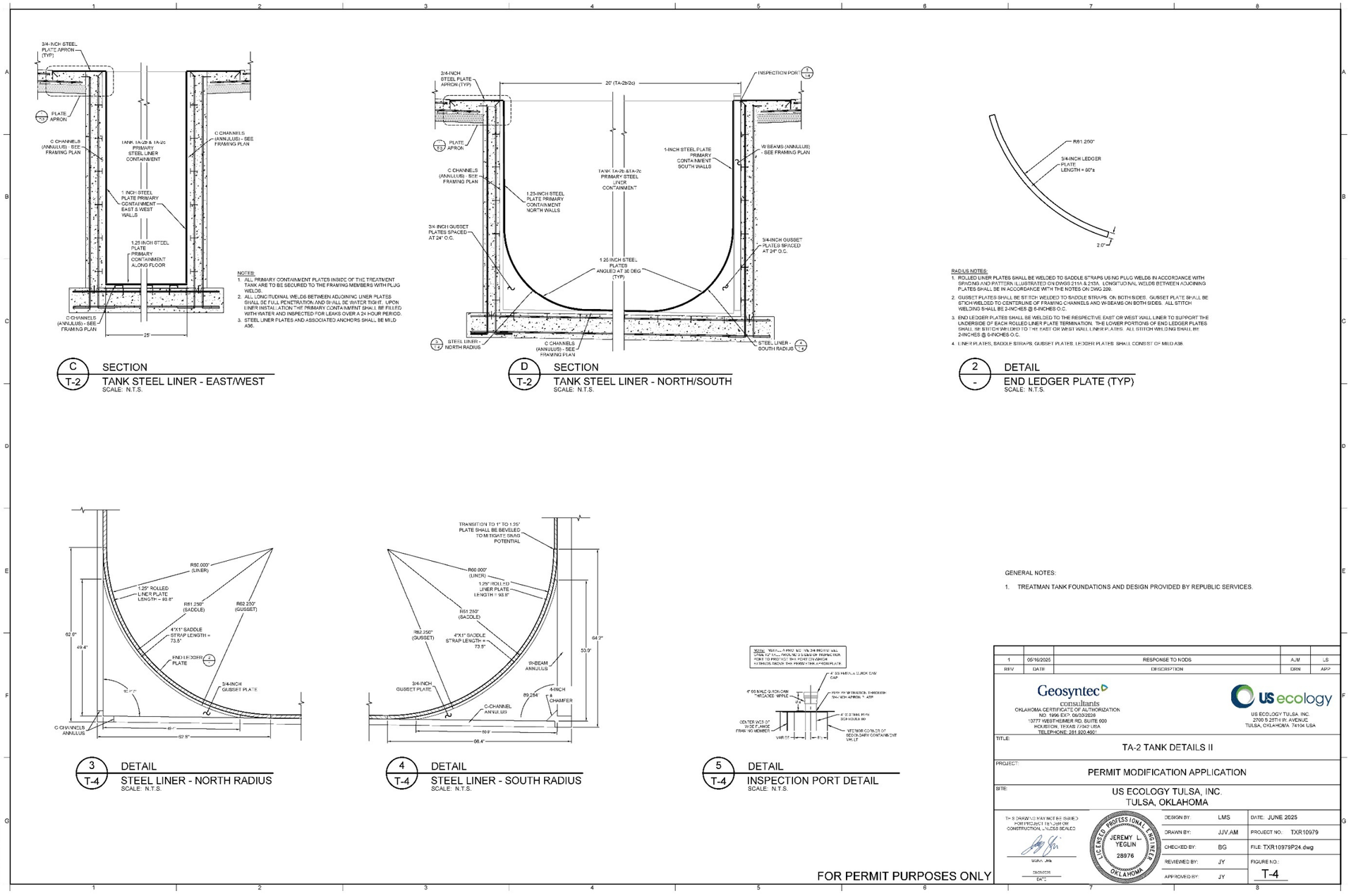


Figure T-4: TA-2 Tank Details II



GENERAL NOTES:

1. TREATMAN TANK FOUNDATIONS AND DESIGN PROVIDED BY REPUBLIC SERVICES.

REV	DATE	DESCRIPTION	DRN	APP
1	05/16/2025	RESPONSE TO NODS	AJM	LS

Geosyntec consultants
OKLAHOMA CERTIFICATE OF AUTHORIZATION NO. 1906 EXP. 06/30/2026
10777 WESTHEIMER RD, SUITE 600
HOUSTON, TEXAS 77042 USA
TELEPHONE: 281.920.4901

US ecology
US ECOLOGY TULSA, INC.
2700 S 25TH W. AVENUE
TULSA, OKLAHOMA 74104 USA

TITLE: TA-2 TANK DETAILS II

PROJECT: PERMIT MODIFICATION APPLICATION

SITE: US ECOLOGY TULSA, INC. TULSA, OKLAHOMA

THIS DRAWING MAY NOT BE ISSUED FOR PERMIT OR CONSTRUCTION, UNLESS SEALED

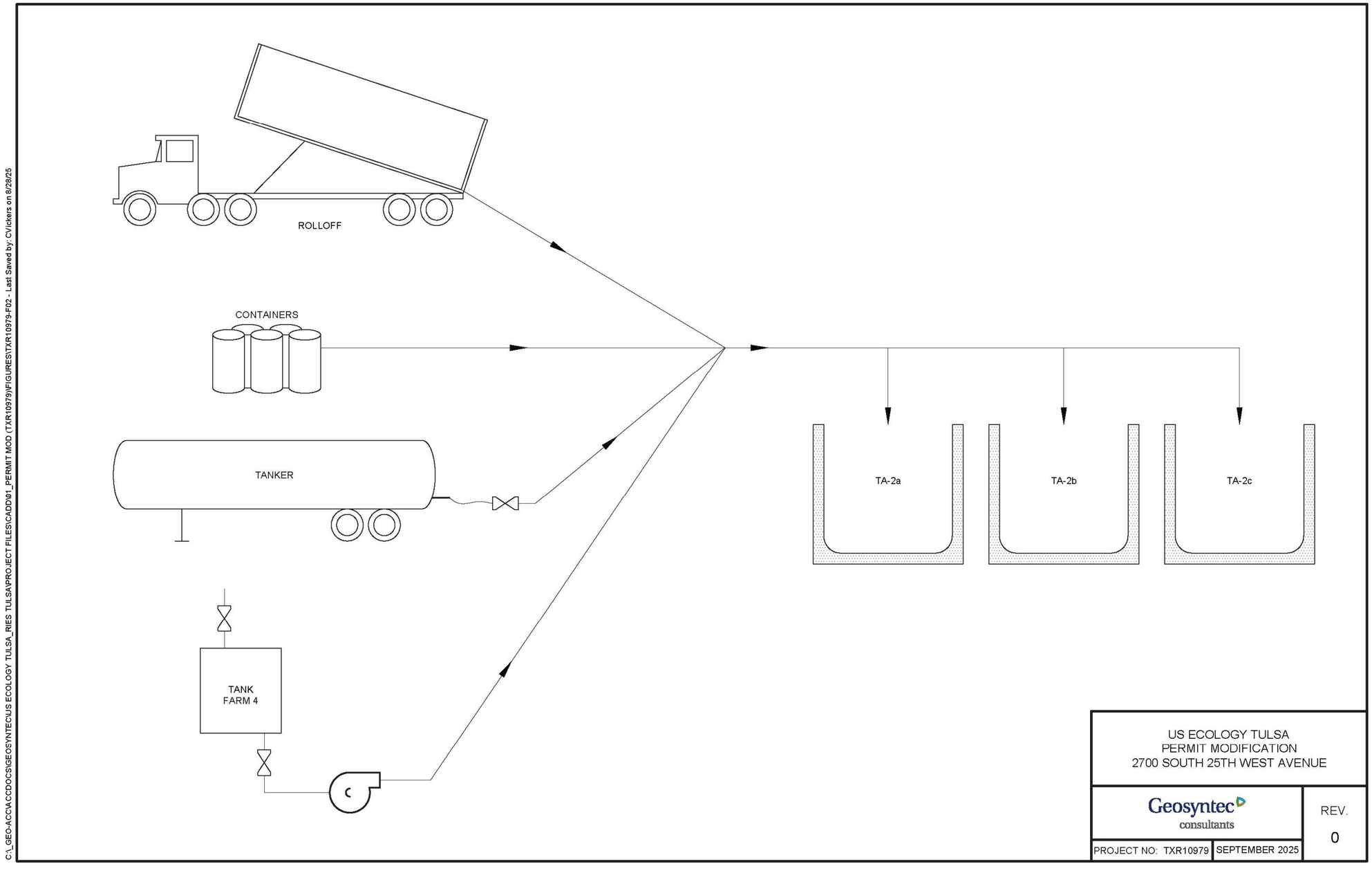
LICENSED PROFESSIONAL ENGINEER JEREMY L. YEGLIN 28976 OKLAHOMA

DESIGN BY:	LMS	DATE:	JUNE 2025
DRAWN BY:	JJV,AM	PROJECT NO.:	TXR10979
CHECKED BY:	BG	FILE:	TXR10979P24.dwg
REVIEWED BY:	JY	FIGURE NO.:	T-4
APPROVED BY:	JY		

FOR PERMIT PURPOSES ONLY

C:\GEO-ACD\ACDOCS\GEOSYNTEC\US ECOLOGY_TULSA TRANSFR ST\PROJECT FILES\CAD\09_-_PERMIT MOD TSD\DWGS\SHEETS\TXR10979P24.DWG Last Edited by: Ahmad.Muhammad on 9/9/25

Appendix 6-A - Process Diagram for Treatment Tanks TA-2b and TA-2c



Appendix 7 – Permitted Hazardous Waste Tank System Table

	Tank	Maximum Capacity (Gallons)	Material of Construction	Installation/Construction Date	Dimensions of Tank	Secondary Containment Capacity (Gallons)	Waste Types
Existing	T-101	16,800	Fiberglass	7/1990	12'Dx20'H	30,350*	Liquids
	T-102	19,960	Fiberglass	6/2005	14'Dx20'H	30,350*	Liquids
	T-103	19,960	Fiberglass	6/2005	14'Dx20'H	30,350*	Liquids
	T-107	13,077	Fiberglass	Pre-2007	12'Dx18.4'H	30,350*	Liquids
	TA-2a	4,000**	Reinforced Concrete and Steel Liner Tank	2015	16'x18'x4'H	9,296	Liquids & Solids
	TA-2b	3,500**	Reinforced Concrete and Steel Liner Tank	2015	14'x14'x5'H	10,998	Liquids & Solids
Proposed	T-407	19,960	Fiberglass	N/A	12'Dx32'10.5"H***	40,512*	Liquids
	T-408	19,960	Fiberglass	N/A	12'Dx32'10.5"H***	40,512*	Liquids
	T-409	19,960	Fiberglass	N/A	12'Dx32'10.5"H***	40,512*	Liquids
	T-410	19,960	Fiberglass	N/A	12'Dx32'10.5"H***	40,512*	Liquids
	TA-2a	No structural modifications					
	TA-2b	20,500**	Reinforced Concrete and Steel Liner	N/A	20'x25'x13'H	47,573	Liquids & Solids
	TA-2c	20,500**	Reinforced Concrete and Steel Liner	N/A	20'x25'x13'H	47,573	Liquids & Solids

Notes:

*Total secondary containment capacity for Tank Farm 1 or Tank Farm 4.
**Tanks have treatment volume limits less than total capacity to meet secondary containment and operation requirements of 40 CFR 264.193(e), 264.194(b)(2) and 264.194(b)(3).
***Total height includes the legs supporting the tanks.

Appendix 8 – Assessment of Proposed Tanks

This written assessment has been prepared in accordance with Title 40, Code of Federal Regulations (CFR) §270.16(a) to provide the information required under §264.192(a)(1) through (5) for the proposed six (6) new tanks at US Ecology Tulsa (USE Tulsa or Facility). Specifically, as shown below, this assessment demonstrates that the proposed tank systems have sufficient structural integrity and suitability for handling hazardous waste. This assessment describes how the foundations, structural supports, seams, connections, and pressure controls are adequately designed and that the tank systems have sufficient structural stability, waste compatibility, and corrosion protection to ensure they will not collapse, rupture, or fail.

The remainder of this report provides the written assessment for the proposed tanks as required by §264.192(a), which has been reviewed and certified by a qualified Professional Engineer (P.E.) in accordance with §270.11(a) attesting that the tank systems have sufficient structural integrity and are acceptable for the storing and treating of hazardous waste.

Description of Tanks

Tank Farm 4 Storage Tanks

The proposed tank system at the Tank Farm 4 location of the Facility consists of four (4) vertical aboveground, closed top, fiberglass reinforced plastic (FRP) tanks lined with epoxy vinyl ester resin (T-407, T-408, T-409, and T-410) located within an existing reinforced concrete secondary containment structure. The waste containment capacity of each of the tanks (T-407 to T-410) is approximately 19,960 gallons. The general dimensions of the proposed storage tanks are provided in Section T, Appendix 7. The proposed storage tanks have a flat top and cone bottom and are supported on legs secured to the reinforced concrete floor of the secondary containment structure. The floor and walls of the concrete containment structure are designed to be coated with an impervious, chemical resistant material.

Treatment Tanks

The treatment tank system includes the existing TA-2a and the proposed addition of new TA-2b and TA-2c. Only the new treatment tanks are discussed herein. Proposed treatment tanks TA-2b

and TA-2c each consist of an open-top, below-grade, 1-foot (minimum) thick reinforced concrete secondary containment amended with Xypex Admix C-Series (or equivalent) and lined with a 1-inch (minimum) thick mild carbon steel tank designated for hazardous waste service. The total waste containment capacity of the tanks (TA-2b and TA-2c) is approximately 44,267 gallons each, although the tanks are used for treatment purposes only and are not used for storage of hazardous waste. The total waste containment capacity of the secondary containment is approximately 47,573 gallons each. The general dimensions of the proposed treatment tanks are provided in Section T, Appendix 7.

Design Standards (40 CFR §264.192(a)(1))

Tank Farm 4 Storage Tanks

The proposed storage tanks meet the design standards of ASTM D3299 (Standard Specification for Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks). This standard is applicable to cylindrical corrosion-resistance tanks made of commercial-grade glass-fiber-reinforced polyester or vinyl ester thermoset resin fabricated by filament winding for aboveground vertical installation to contain aggressive chemicals at atmospheric pressure. Vinyl ester thermoset resin is specified for the structural component of the tanks and also the liner as it has a higher chemical resistance than polyester resin and it is chemically compatible with the anticipated wastes. The design standard includes appropriate requirements for tank materials, properties, design, construction, dimensions, tolerances, workmanship, and appearance. The ASTM D3299 standard also addresses tank seams, connections, and vents to control pressures. Further, the design criteria for the proposed tanks includes design loads based on the American Society of Civil Engineers (ASCE) 7-22 Standard (Minimum Design Loads and Associated Criteria for Buildings and Other Structures). The proposed storage tanks are adequately designed.

Treatment Tanks

There is no specific design standard applicable for the proposed treatment tanks. However, the tank drawings are reviewed and certified by a licensed P.E. to ensure they are appropriately designed for their intended use. The proposed treatment tanks are designed with reinforced concrete and carbon steel as previously described. The treatment tanks include a curved steel

liner in the north-south direction. The curved liner shape reduces the potential for contact between the liner and the excavator bucket used for mixing and loadout, as well as improves operational waste mixing efficiency. The proposed treatment tanks are adequately designed.

Hazardous Characteristics of the Wastes to be Handled (40 CFR §264.192(a)(2))

The waste streams accepted at the Facility include a wide variety of non-hazardous wastes and Resource Conservation and Recovery Act (RCRA) listed and characteristic hazardous wastes. The full list of RCRA hazardous waste codes handled at the Facility is provided in Section A of the Facility permit.

Tank Farm 4 Storage Tanks

Bulk liquid non-hazardous waste and bulk liquid hazardous waste having a RCRA waste code that is listed in Section A of the Facility permit may be stored in the Tank Farm 4 tanks. The proposed tank materials, FRP and lined with epoxy vinyl ester resin, were selected for their chemical compatibility with the anticipated hazardous and non-hazardous wastes. The tank system materials for the proposed tanks are compatible with the anticipated wastes.

Treatment Tanks

Bulk liquid non-hazardous waste and bulk liquid hazardous waste having a RCRA waste code that is listed in Section A of the Facility permit may be offloaded into the treatment tanks if the waste requires treatment and if the Facility permit allows treatment of the RCRA waste code in treatment tanks. Containerized waste meeting these criteria may also be placed in the treatment tanks. See Attachment 2 for details. Chemical and heat resistance of the treatment tanks are provided by the structural and lining materials (reinforced concrete and carbon steel). The design of the reinforced concrete is enhanced by the addition of a Xypex Admix C-Series (or equivalent) to decrease the permeability of the concrete and increase its chemical resistance. The steel liner is compatible with the wastes it is authorized to receive and treat, including alkaline, reactive, organic, and acidic wastes. To minimize any potential internal corrosion, acidic wastes are treated immediately to raise their pH. Further, the steel liner of the tanks are monitored by performing periodic thickness testing at the frequency noted in Section T, Item 5, and the results are evaluated to confirm that the treatment tanks are at a minimum thickness that will prevent

leaks or containment failures. The tank system materials for the proposed tanks are compatible with the anticipated wastes.

Corrosion Resistance for Tanks in Contact with Water or Soil (40 CFR §264.192(a)(3))

Tank Farm 4 Storage Tanks

The proposed storage tanks are constructed of corrosion resistant FRP with an internal epoxy resin lining. There are no external metal components of the tank systems that are in direct contact with the soil or with water. Therefore, this regulation does not apply.

Treatment Tanks

The proposed treatment tanks are constructed of a concrete exterior and internal steel liner. The proposed treatment tank systems are located below ground within the concrete containment vault and are provided with a covered roof structure. There are no external metal components of the treatment tank systems that are in direct contact with the soil or with water. Therefore, this regulation does not apply.

Vehicular Protection for Underground Tanks (40 CFR §264.192(a)(4))

Tank Farm 4 Storage Tank

This regulation does not apply since the storage tank systems are installed aboveground and within a concrete secondary containment structure.

Treatment Tanks

There are no piping systems or ancillary equipment associated with the treatment tanks. Waste is transferred into the tanks by mechanical equipment or manual dumping and is removed by excavator bucket. There are physical barriers present, such as curbing, bollards, and visual signs to prevent accidental damage from any hazardous waste vehicular traffic. Sufficient vehicular protection is provided for the proposed treatment tanks.

Design Considerations (40 CFR §264.192(a)(5))

Tank Farm 4 Storage Tanks

The tank foundations are designed to support the load of the full tanks. As previously described, USE Tulsa is intending to retrofit the existing reinforced concrete secondary containment

structure for use with the proposed storage tanks. Based on a visual inspection, the existing foundation appears to be in good condition and has been supporting the existing non-hazardous storage tanks present at the Facility with little to no settlement or cracking to date. Further, the secondary containment structure is designed to be coated with an impervious, chemical resistant material to seal and prevent any cracks in the existing foundation. It is anticipated that the existing foundation is safe for the proposed storage tanks, which will be confirmed prior to tank installation.

As previously noted, the legs of the tanks are designed to be anchored and secured to the concrete foundation. This will prevent flotation and control movements under potential seismic loading. It is noted, however, that the tank farm is not located over a saturated zone or within a seismic fault zone (within 200 feet of a fault which has displacement in Holocene time).

The foundation of the tank farm is designed to withstand the effects of frost heave. No visible foundation cracking was observed for the existing containment structure during inspection. Because the proposed tanks are anchored to the foundation, they are not susceptible to frost heave individually.

Treatment Tanks

The reinforced concrete containment/foundation for the treatment tanks is designed to support the load of the full tanks. The thickness of the reinforced concrete structure is 12 inches on the side walls and 18 inches on the bottom floor. Further, the tanks are of sufficient size and weight such that collection of fluids in the secondary containment system will not cause flotation.

The steel liner (primary containment) is designed to be anchored to the concrete foundation (secondary containment) to limit movement or dislodgement during seismic activity. The treatment tanks are also monitored periodically for any sign of settlement or cracking associated with the foundation. It is noted that the proposed treatment tanks are not located in or over a saturated zone or within a seismic fault zone (within 200 feet of a fault which has displacement in Holocene time).

The steel liners are located on an extensive concrete foundation that is designed to withstand the effects of frost heave. Frost heave is not anticipated to be an issue for the proposed tanks based on the performance of the existing similar treatment tank foundations at the Facility.

Professional Engineer Attestation (40 CFR §270.11(a))

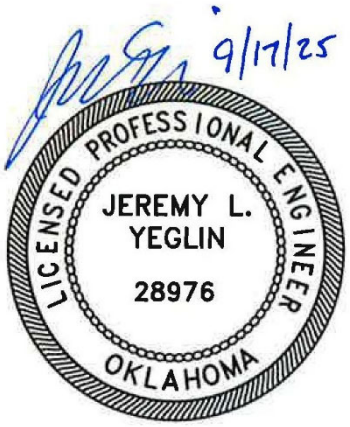
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Jeremy L. Yeglin

Name

9/17/2025

Date



Appendix 9 – Manufacturer Information for Basic Concepts, Inc. SC 3900 Industrial Spray Coating

BASIC CONCEPTS INC
Justrite Safety Group

Industrial Spray Coating System, SC-3900

Product Images

Short Description

- Fast setting to allow final coating thickness to be achieved in one application.
- 100% solid, no solvents, and zero VOCs.
- High-dry-temperature-stability-to-250°F-(121°C)-with intermittent temperatures to 300°F (148°C).
- High abrasion resistance.
- High elongation for bridging cracks.
- Excellent encapsulation characteristics.
- Load-Bearing Capacity - > 3,900 psi (27 MPa)
- Application - Coating for all types of steel infrastructure, including pipes, bridges, power line poles and structures, transportation and rail systems, as protection from corrosion; concrete tank, floor, pond, dike, tunnel, and bridge lining; existing membrane repair; asbestos and lead encapsulation; onshore

and offshore marine and high salt corrosion protection; and more.
- Compliance - Compliant with FDA/USDA for incidental food contact. Contact BCI for more information.
- Packaging - This product is sold in standard 110 gallon drum sets and 550 gallon tote sets. Available in other container sizes.
- Color - SC-3900 UB is available in standard colors (Sand, Medium Grey, and Black). Custom colors available upon request.

Description

SC-3900 is a high-strength flexible coating that can be used on a wide variety of substrates. With 3900 psi tensile strength and 300% elongation properties, SC-3900 is a good choice for concrete and steel applications that require strength and flexibility. Typical uses are concrete crack repair in secondary containment systems, internal tank coatings, loading rack containment, and rehabilitation of rail track pans.

SC-3900 UB is a fast-set, high performance, spray-applied, plural component, 100% pure urea-based elastomer. This system is based on amine-terminated polyether resins, amine chain extenders, and prepolymers. It provides a cost effective flexible, tough, resilient monolithic membrane with water and chemical resistance.

SC-3900 UB is available with cutting-edge Ultra Bond™ technology. Advanced Ultra Bond™ chemistry is coined “the duct tape molecule”. Ultra Bond™ has the unique advantage of adhering to most properly prepared organic and inorganic (new and aged) surfaces without requiring a primer. Like duct tape, SC-3900 UB with Ultra Bond™ gains adhesion over time.

As with most coatings, there is a re-coat window that presents a lack of inter-coat adhesion. The UB™ molecule mitigates this risk during installation.

Specifications

SKU	SC-3900

BASIC CONCEPTS INC
Justrite Safety Group

SC-3900 UB

HIGH STRENGTH, CHEMICAL RESISTANCE
STRUCTURAL COATINGS DIVISION

DESCRIPTION

SC-3900 UB is a fast-set, high performance, spray-applied, plural component, 100% pure urea-based elastomer. This system is based on amine-terminated polyether resins, amine chain extenders, and prepolymers. It provides a cost effective flexible, tough, resilient monolithic membrane with water and chemical resistance.

FEATURES

SC-3900 UB is available with cutting-edge Ultra Bond™ technology. Advanced Ultra Bond™ chemistry is coined "the duct tape molecule". Ultra Bond™ has the unique advantage of adhering to most properly prepared organic and inorganic (new and aged) surfaces without requiring a primer. Like duct tape, SC-3900 UB with Ultra Bond™ gains adhesion over time.

- **As with most coatings, there is a re-coat window that presents a lack of inter-coat adhesion. The UB™ molecule mitigates this risk during installation.**
- Fast setting to allow final coating thickness to be achieved in one application.
- 100% solid, no solvents, and zero VOCs.
- High dry temperature stability to 250°F (121°C) with intermittent temperatures to 300°F (148°C).
- High abrasion resistance.
- High elongation for bridging cracks.
- Excellent encapsulation characteristics.
- Compliant with FDA/USDA for incidental food contact. Contact BCI for more information.

RECOMMENDED USES

- Coating for all types of steel infrastructure, including pipes, bridges, power line poles and structures, transportation and rail systems, and other urban applications such as rebar, guardrails, signage, grates, valves, and tanks, to protect from corrosion.
- Coating over geotextile for such applications as earthen containment, primary and secondary containment, etc.
- Can be used as liner for concrete tanks, floors, ponds, reservoirs, dikes, tunnels, bridges, and other concrete infrastructure.
- Apply as a topcoat to existing membranes, or use to repair inferior or degraded membranes.
- Encapsulate asbestos, lead paint, or other dry hazardous materials.
- Re-coat over other polymer based substrates and/or coatings.
- Concrete parking decks, garages, and other structures.
- Repair polyurea, polyurethane hybrid, and other lining types.
- Rock shield for pipelines.
- Bedliners, trailers, and SUV's.
- Wastewater infrastructure, such as protecting from H^2S gas.
- Onshore and offshore marine and high salt environment corrosion and current protection.

TYPICAL PHYSICAL PROPERTIES*

@ 70 mils ± 20 (1.7 mm)	
Tensile Strength ASTM D412-06a	> 3,900 psi (27 MPa)
Elongation ASTM D412-06a	> 325%
Hardness (Shore A) ASTM D2240	96 ± 5
Hardness (Shore D) ASTM D2240	50 ± 5
100% Modulus ASTM D412	1,200 psi ± 100 (8 MPa)
300 % Modulus ASTM D412	3,010 psi ± 100 (21 MPa)
Tear Resistance ASTM D624	370 PLI ± 50 (64 KN/m)
Exposure Temperature**	-50 - +200°F (-45 - +93°C)

CURING SCHEDULE

Gel	± 5 sec.
Tack Free	± 7 sec.
Post Cure***	24 hour
Recoat	0 - 12 hours

* All cured film properties are approximate since processing parameters, ad-mixture types, and quantities change physical properties of the cured elastomer. Elevated temperatures will accelerate the curing process and shorten the re-coat window.

** Test performed in a dry, static environment.

*** Complete polymerization to achieve final strength can take up to several days or weeks, depending on a variety of conditions or product type. All samples for above tests were force cured 48 hours or aged for more than three weeks. **It is recommended that the user perform their own independent testing**.

The samples for all tests on this technical data sheet were sprayed with Graco HXP3 @ 2,800 psi (19 MPa) dynamic pressure at the gun. Proportioning machine primary heater and hose heat - 170°F (77°C) Graco MP Fusion gun with 29/29 mixing chamber with .040 ceramtip.

TEST INFORMATION

Surface Resistance of Static Dissipative ASTM D257	5.469E^{8} - 9.434E^{9} ohms/square	
Crack Bridging Property BS EN 1062-7 Method B31	Passed	
Abrasion Resistance ASTM D4060 1000 g - 1000 cycles	H-18	147 mg loss
	CS-17	6 mg loss

WET PROPERTIES

Solids by Volume	100%
Solids by Weight	100%
Volatile Organic Compounds	0 lbs./gal. (0 g/l)
Theoretical Coverage DFT	100 sq. ft. @ 16 mils/gal
Weight per gallon (approx.)	8.8 lbs. (4.0 kg)
Number of coats	1 - 2 as needed
Mix Ratio (by volume)	1 "A" : 1 "B"
Viscosity 77°F (25°C)	A: 400 ± 25 cPs B: 425 ± 25 cPs
Shelf Life Unopened Containers at 60 - 90°F (15 - 32°C)	6 Months
Minimum material/container temperature is 70°F (21°C).	

COLORS

SC-3900 UB is available in standard colors (Sand, Medium Grey, and Black). Custom colors available upon request. Note: SC-3900 UB is an aromatic polyurea. Therefore, with all aromatics, color change and superficial oxidation will occur. Aliphatic polyurea, urethane, polyaspartic, and other suitable topcoats can be used where long-term color stability and increased longevity in full sun exposure are of critical importance.

PACKAGING

This product is sold in standard 110 gallon drum sets and 550 gallon tote sets. Available in other container sizes. Contact BCI sales representative for further information. Non-standard containers may require a longer lead time.

GENERAL APPLICATION INSTRUCTIONS

Apply SC-3900 UB only to clean, dry, sound, surfaces free of loose particles or other foreign matter. SC-3900 UB can be sprayed over a broad range of ambient and substrate temperatures. It is recommended that SC-3900 UB be sprayed in multi-directional (north/south - east/west) passes to ensure uniform thickness.

Contact BCI technical service personnel for specific surface preparation for your application.

COMMON SUBSTRATES:

STEEL: 4-5 mil anchor profile is best for maximum adhesion and varies per application and conditions; adhere to proper SSPC standards.

WOOD: Apply urea onto a clean, dry, and sanded surface; free from burrs, splinters and loose debris. (It is recommended to prime wood and other porous surfaces before application of heated, fast-set polyureas to reduce pin holing).

CONCRETE: Prepare concrete in accordance with SSPC/NACE Standards and Concrete Prep Guide.

PREVIOUSLY APPLIED COATINGS: BCI recommends UB™ (ULTRA BOND™) products over existing coatings that are past the recoat window and/or application over other coatings. Contact BCI for additional information.

NOTE: It is recommended that existing surfaces be power washed with 2500—3500 psi water pressure to enhance adhesion of SC-3900 UB. If there is a possibility of surface contamination, scrub with a solution of 1/4 tsp Dawn detergent and 1 tbsp of vinegar, per 1 gallon of warm water. Follow with a thorough water rinse. If there is oxidation on the surface of the existing substrate; it must be removed prior to application of SC-3900 UB. Removal of oxidation can be done via mechanical methods to insure the SC-3900 UB has a sound substrate to adhere to. The use of SPI Prep Wipe™ solution will tack up the existing polyurea coating and help promote bonding of the SC-3900 UB.

On all above listed substrates and others, please contact Sales or Technical Support for more information specific to your application, including industry standards such as SSPC and NACE. **Adhesion tests are always recommended prior to application.**

MIXING & THINNING

Thoroughly agitate the "B" components of this product prior to application. Use a folding blade mixer or equivalent equipment approved by BCI. Install mixer through the extra air specific 2" bung hole provided on all "B" drums. Care must be taken not to cross contaminate the individual components with the mixing equipment; for best mixing results, supply the mixer with 25 cfm of air at 100 psi. Thinning is not required. Using any thinner may adversely affect product performance.

PROCESSING EQUIPMENT & SETTINGS

MACHINES:		
GRACO (Gusmer, Glass-craft)	• A-25* • A-XP1 • E-10 HP • E-20* • E-30* • E-XP1 • E-XP2 • H-20/35 Pro • H-25* • H3500 • H-40*	• H-50* • HV-20/35 • H-XP2 • H-XP3 • Reactor2 E-XP2 • Reactor2 H-XP2 • Reactor2 H-XP3 • Reactor2 E-30* • Reactor2 H-30* • Reactor2 H-40* • Reactor2 H-50*

PMC	• GH-25* • GH-40* • PA-25* • PAX-25 • PH-2* • PH-25*	• PH-40* • PHX-2 • PHX-25 • PHX-40 • PMCA-20
SPRAY FOAM EQUIP & MFG	• 5/12K* • 6/6K*	• 6/12K
*2,000 psi machines		
GUNS:		
GRACO (Gusmer, Glass-craft)	• Fusion AP • Fusion MP • GAP Pro • GX7-DI • GX-8 Pro	• GX7-400 • P2 • P2 Elite • P2 Elite "C" • D7
PMC	• AP-2	
SPRAY FOAM EQUIP & MFG	• Boss	

- Standard 1:1 ratio, heated, plural-component equipment developing a minimum of 1700 psi (11.72 MPa) dynamic pressure at the gun with heating capabilities to 170°F (77°C) will adequately spray SC-3900 UB.
- Machines capable of producing a higher dynamic psi may be required depending on the service environment the SC-3900 UB will be exposed to. Consult SPI technical service personnel for additional information.
- Proportioning machine primary heater temperature for application is 70°F (21°C).
- Hose temperature 160-170°F (71-77°C). A hose thermometer inserted under the insulation near the gun should read a minimum of 145-155°F (63-68°C).
- Physical properties will be enhanced when sprayed at higher pressure (3000 psi or more); utilizing an impingement mix gun such as MP Fusion or GX7-DI gun.
- Do not use mixing chambers with output greater than 1.5 gallons per minute. Consult SPI technical service personnel for additional information.

If you own a machine that is not listed above please contact your SPI representative for information and instructions.

PARAMETERS & LIMITATIONS

- SC-3900 UB is for professional use only. User must be proficient in the application of SC-3900 UB and the use of the high pressure heated plural component equipment used to apply it.
- SC-3900 UB must be stored at temperatures between 60—90°F (15—32°C).
- Liquid temperature in containers/drums during application 70—100°F (21—38°C).
- Apply SC-3900 UB when surface and air temperatures are above 40°F (5°C) and the surface temperature is at least 5°F (3°C) above dew point and rising.
- Avoid moisture contamination in containers. Containers should not be resealed if contamination is suspected. CO_2 created pressure can develop. Do not attempt to use contaminated material.
- Undried air exposed to liquid components will reduce physical properties of the cured coating.

Note: The material supplied is a two component system (component "A"/component "B"), which is used to formulate this product. The quality and characteristics of the finished polymer is determined by the mixture and application of the two components by the person applying polymers.

For the most up to date technical data sheet and/or safety data sheet contact BCI.

GENERAL SAFETY, TOXICITY, & HEALTH

Safety Data Sheets are available for this coating material. Any individual who may come in contact with these products should read and understand the S.D.S. **CHEMTREC EMERGENCY NUMBER 1-800-424-9300 INT'L 1-703-527-3887.**

WARNING: Contact with skin or inhalation of vapors may cause an allergic reaction. Causes eye damage/irritation. Avoid eye contact with liquid or spray mist. Hypersensitive persons should wear protective clothes, gloves and use protective cream on face, hands and other exposed areas.

CONTAMINATION: Avoid moisture contamination in containers. Containers should not be resealed if contamination is suspected, CO_2 created pressure can develop. Do not attempt to use contaminated material.

EYE PROTECTION: Safety eye wear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/or face shield.

SKIN PROTECTION: Personal protective equipment for the body should be selected based on the task being performed, the risks involved, and should be approved by an industrial hygiene specialist before handling this product. Chemical resistant gloves complying with applicable health and safety standards shall be worn when handling this product. Cover as much of the exposed skin area as possible with appropriate clothing. Refer to safety data sheet (SDS).

RESPIRATORY PROTECTION: Harmful if inhaled and may cause allergy or asthma symptoms. Ensure adequate ventilation. If the respirator is the sole means of protection, use a full-face supplied respirator. Use respirators and components tested and approved under appropriate government standards such as OSHA 29CFR 1910.134, NIOSH (US), or CEN (EU). Consider the application and environmental concentrations when deciding if additional protective measures are necessary.

INGESTION: Do not take internally. It is believed that ingestion of polymeric isocyanates would not be fatal to humans, but may cause inflammation of mouth and stomach tissue.

BASIC CONCEPTS INC

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WARRANTY & DISCLAIMER

BCI has no role in the manufacture of the finished polymer other than to supply its two components. It is vital that the person applying this product understands the product, and is fully trained and certified in the use of plural-component equipment. BCI warrants only that the two components of this product shall conform to the technical specifications published in the product literature. The quality and fitness of the product are dependent upon the proper mixture and application of the components by the applicator. There are no warranties that extend beyond the description on the face of this instrument. Failure to apply the product within the parameters stated on this document shall void the warranty. BCI MAKES NO WARRANTY OF MERCHANTABILITY OF THE PRODUCT OR OF FITNESS OF THE PRODUCT FOR ANY PARTICULAR PURPOSE. BCI makes no warranty as to the quality of any product modified, supplemented, tinted, or altered in any way after it leaves the manufacturing plant. BCI does not warrant that this product is suitable for use as a liner for potable water containers. Use of this product in a potable water container could be hazardous to health if it is improperly processed or applied. The liability of BCI for any nonconformity of the product to its technical specifications shall be limited to replacement of the product. The sole exclusive remedy of buyer, which is to have BCI replace any nonconforming product at no cost to buyer, is conditioned upon buyer notifying BCI or its distributor in writing of such defect within thirty days of the discovery of such defect. BCI shall not be liable for any direct, incidental, or consequential damages resulting from any breach of warranty. The data presented herein is intended for professional applicators or those persons who purchase or utilize this product in the normal course of their business. The potential user must perform any pertinent tests in order to determine the product's performance and suitability in the intended application, since final determination of fitness of the product for any particular use is the responsibility of the buyer. The aforementioned data on this product is to be used as a guide and is subject to change without notice. The information herein is believed to be reliable, but unknown risks may be present. BCI makes no warranties, expressed or implied, including patent warranties or warranties of merchantability or fitness of use, with respect to products or information set forth herein. Nothing contained herein shall constitute permission or recommendation to practice any invention covered by a patent without a license from the owner of the patent. Accordingly, the buyer assumes all risks whatsoever as to the use of these materials and buyer's exclusive remedy as to any breach of warranty, negligence, or other claim shall be limited to the purchase price of the materials. Failure to adhere to any recommended procedures shall relieve BCI of all liability with respect to the materials and the use thereof.

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BCI
BASIC CONCEPTS INC
Justrite Safety Group

their safety is essential.
Protecting people, property, and the planet.

SC-3900—Chemical-Resistant Fast-Set Elastomers

Recommended for Immersion and/or Splash & Spillage Conditions	Occasional and Intermittent Contact	Not Recommended

Immersion tests were performed at approximately 77°F (25°C) unless otherwise noted.
Note: Test results are based on one side of the coating being exposed.

	Material Tested	24 hour Wt. Gain %	72 hour Wt. Gain %	7 day Wt. Gain %	Recommended Clean Up Window
Acids	Acetic 40%	30.00%	–	–	–
	Hydrochloric Acid 24%	0.64%	0.96%	1.02%	7 days
	Phosphoric Acid 50%	0.95%	2.15%	3.10%	7 days
	Sulfuric Acid 50%	8.60%	16.50%	23.15%	–
Hydrocarbons	Crude Oil	1.50%	2.35%	4.00%	7 days
	Diesel	1.25%	2.69%	3.44%	7 days
	Ethanol	27.20%	31.20%	36.90%	–
	Gasoline	18.50%	20.50%	22.05%	72 hours
	Jet Fuel	1.73%	3.34%	4.99%	72 hours
	Methanol	31.15%	32.10%	–	–
	Aviation Hydrolic Fluid (Skydrol)	19.90 %	32.25%	36.65%	–
Other	Mineral Oil	0.13%	0.18%	0.26%	7 days
	Sodium Hydroxide 50%	0.00%	0.09%	0.15%	7 days
	Water	1.05%	1.15%	1.20%	–

For further information call 813-659-3512, email sales@basicconcepts.com or visit us online at basicconcepts.com

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Appendix 10 – Manufacturer Chemical Compatibility Information for INEOS Composites Series 470 Epoxy Vinyl Ester Resin

RESIN SELECTION GUIDE FOR CHEMICAL RESISTANCE

DERAKANE™ RESINS FOR CORROSION-RESISTANT FRP APPLICATIONS

INEOS Composites

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and Derakane™ Signia™ resins 14

DERAKANE™ CHEMICAL RESISTANCE GUIDE

FOREWORD

Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ epoxy vinyl ester resins (from this point forward referred to as Derakane™ resins) are designed and manufactured by INEOS. Derakane™ resins possess outstanding corrosion-resistant and temperature-resistant properties, which make them well-suited for a variety of demanding industrial applications. With performance that has been proven over more than 50 years, Derakane™ resins not only deliver durable solutions, they also provide a high measure of confidence.

This guide briefly describes the various Derakane™ resins, as well as detailed chemical resistance data needed to assist engineers in specifying and designing corrosion-resistant fiber reinforced polymer (FRP) applications.

FRP materials are designed with a corrosive-resistant barrier to enhance performance and longevity. Their corrosion-resistant properties make FRPs an ideal structure for tanks, pipes and ducts in environments where corrosive materials are present. These structures are typically designed with a corrosion barrier that serves to minimize penetration of a corrosive media into the structural portion of the equipment. Typically, the entire corrosion barrier is 2.5 to 6.3 mm (100 to 250 mil) thick. The first layer of the corrosion barrier is usually 0.3 to 0.8 mm (10 to 20 mil) thick and is 95% resin, reinforced by one or two surfacing veils. This layer is then backed with 2 to 6 mm (90 to 230 mils) of 75% resin, reinforced with chopped strand mat (powder binder only). Finally, the corrosion barrier is backed with a structural laminate that provides the strength and stiffness for the overall FRP structure. This guide provides guidelines for selecting the most appropriate resin for the corrosion-resistant equipment in question. Recommendations in this guide apply to a variety of corrosion-resistant structures.

Because many variables that affect the performance of a laminate are beyond INEOS' control, no warranty concerning the use of Derakane™ epoxy vinyl ester resins can be made. The temperatures shown in this guide are supported by extensive corrosion testing and/or case histories. When these guidelines are followed, properly designed, fabricated and installed equipment made with Derakane™ resins should provide excellent service life.

For the design of FRP equipment, prospective users of Derakane™ resins should refer to the appropriate industry standards and design guidelines.

For more information, contact INEOS Technical Service at derakane@ineos.com or by visiting www.derakane.com.

BRIEF PRODUCT DESCRIPTION

Derakane™ 411 series resins are the globally recognized standard for epoxy vinyl ester resins. They are based on bisphenol-A epoxy resin, providing resistance to a wide range of acids, alkalis, bleaches and solvents for use in many chemical processing applications. They offer excellent toughness and fatigue resistance.

Derakane™ 441-400 resins are low styrene monomer bisphenol-A epoxy vinyl ester resins with mechanical, thermal and chemical resistance properties between Derakane™ 411 and Derakane™ 470 resins. Their unique combination of high HDT and elongation makes them the resins of choice for applications with thermal cycling; e.g., for chemical reaction vessels.

Derakane™ 451-400 resin is a low viscosity, unpromoted novolac epoxy vinyl ester. This product allows the use of standard MEKP, exhibits excellent exotherm control and industry-leading storage stability. It offers exceptional hot water, solvent and acid resistance, excellent impact strength with high heat resistance and tensile elongation.

Derakane™ 455-400 resin is an unpromoted, highly crosslinked novolac epoxy vinyl ester. This product allows the use of standard MEKP and exhibits excellent exotherm control and storage stability. Derakane™ 455-400 resin contains less than 35% styrene and offers a higher heat distortion temperature compared to Derakane™ 451-400 resin. It also exhibits excellent solvent and acid resistance, as well as high flexural strength and heat resistance.

Derakane™ 470 series resins are epoxy novolac based vinyl ester resins designed to provide exceptional thermal and chemical resistance properties. They offer high resistance to solvents, acids and oxidizing substances such as chlorine. They also offer high retention of strength and toughness at elevated temperatures, making them the resins of choice for flue gas applications.

Derakane™ 510A/B/C series resins are brominated epoxy vinyl ester resins that offer a high degree of fire retardance.[1] The incorporation of bromine not only provides flame retardancy, but also contributes to better toughness and fatigue resistance when compared to standard epoxy vinyl ester resins. Derakane 510™ resins are also very resistant to chemical attack in chlorine and bleach environments.

Derakane™ 510N resin is a brominated epoxy novolac vinyl ester resin that offers a high degree of fire retardance.[1] It exhibits a corrosion resistance similar to Derakane™ 470 resins in most environments. It is also useful in hot, wet flue gas environments where thermal upsets can occur and where fire retardance is desired. This product is only available from North America.

Derakane™ 515-400 resin is a brominated, low viscosity, unpromoted, flame retardant[1] epoxy vinyl ester resin. This product allows the use of standard MEKP, exhibits excellent exotherm control and industry-leading storage stability. In addition to excellent flame retardancy, it offers excellent thermal shock resistance and corrosion resistance to acids and oxidizers. It is well-suited for caustic/chlorine and power industry applications.

Derakane™ 8084 resin is an elastomer-modified bisphenol-A epoxy vinyl ester resin that offers very high toughness, impact and fatigue resistance and excellent adhesion. It is the resin of choice for demanding structural applications and as a primer for chemically resistant FRP linings.

1 The degree of retardance achieved in properly formulated cured products made of these resins is most frequently quantified by the ASTM E84 tunnel test. This is a controlled test that compares flammability characteristics of one material with another, but may not be predictive of behavior in a real fire situation. Derakane™ and Derakane™ Momentum™ epoxy vinyl ester resins are organic materials and will burn under the right conditions of heat and oxygen supply.

HOW TO USE THE CHEMICAL RESISTANCE TABLE

CONTENT

This listing of chemical reagents and environments shows the highest known temperature at which equipment made with Derakane™ resins has, in general, either:

- Given good service in industry or
- Been tested in the field or in the laboratory (in accordance with ASTM C 581) with results that indicate a good life expectancy in service

It should be noted that this is not necessarily the maximum service temperature.

The temperature limits in each column are representative of the whole family of resins (e.g., the Derakane™ 411 resins column applies to Derakane™ 411, Derakane™ Momentum™ 411 and Derakane™ Signia™ 411 resins).

Each series of Derakane™ resins is based on the same epoxy (or novolac) vinyl ester resin backbone. Improvements have been made over the years for processing and stability, as seen in our recent introduction of the Derakane™ Signia™ resins. For example, Derakane™ 411-350, Derakane™ Momentum™ 411-350 and Derakane™ Signia™ 411-350 resins each are based on the same polymer backbone, and comparison studies confirm that their performance in corrosive environments is essentially equivalent. Corrosion data and case history information for each series of Derakane™ 411 resins can be applied to the entire family of Derakane™ 411 resins.

In the chemical resistance tables, a blank space indicates that no data was available at the time that temperature ratings were assigned.

NR stands for “not recommended at any temperature.”

LS stands for “limited service” (at least three days to one year at maximum 40 °C/100 °F). Generally, in these cases, the respective resins can be used for FRP that is exposed accidentally, and where cleaning and inspection are possible after no more than three days.

This guide is updated periodically as needed to take into consideration new experiences and data (e.g., new products, other temperatures or concentrations, etc.).

		Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
	concentration	411	441	451	455	470	510A/B/C	510N	515	8084
chemical environment	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Hydrochloric Acid/ Dissolved Organics <8,9,13>	0–33% HCl	NR				65/150 <15>				NR

[8] Double surfacing veil and a 5 mm/200 mil CR barrier should be used

[9] Double C-veil should be used in the CR barrier

[13] Acid resistant glass should be used in the corrosion liner and may be used in the structural wall

[15] Solution may discolor

weight–% unless otherwise stated

not recommended

no data available

highest recommended temperature (°C/°F)

FOOTNOTES

Information indicated in footnotes is essential in order to ensure a good service life of FRP equipment. It is strongly recommended that they are followed.

1 Double synthetic veil should be used in the CR barrier. Carbon veil can be used in alkaline environments above 50 °C/120 °F and in hydrofluoric acid environments for maximum corrosion resistance.

2 Post cure recommended to maximize service life.

3 Benzoyl Peroxide/Amine cure system recommended to increase service life.

4 Recommended, provided the recommended resin is also suitable for the solvent used for dissolution.

5 Satisfactory up to maximum stable temperature for product.

6 Check with the INEOS Technical Service team for specific resin recommendation.

7 Probably satisfactory at higher temperatures, but temperature shown is the highest for which information was available.

8 Double surfacing veil and a minimum 5 mm/200 mil CR barrier should be used.

9 Double C-veil should be used in the CR barrier. Nexus™ veil is recommended in sodium hypochlorite when sodium hydroxide is present. ECR veil may also be used.

10 For reactors, resins with higher elongation may be preferred.

11 Within the solubility limits in aqueous solution.

12 Above 50 °C/120 °F, acid resistant glass should be used in the CR barrier and may be used in the structural wall.

13 Acid resistant glass should be used in the corrosion liner and may be used in the structural wall.

14 If chemical composition is unknown, obtain safety data sheet from supplier.

15 Solution may discolor.

16 The use of the resin above the maximum allowable design temperature, as limited by national design standards, may require approval of the relevant authorities.

17 The thickness of the CR barrier is proportional to the service life.

18 For food contact applications, local regulations apply. Please see our Fabricating Tips Guide or contact the INEOS Technical Service team.

19 Preference for Derakane™ 510A or B at higher concentrations and temperatures, together with notes 2 and 3.

20 Carbon veil recommended at higher temperatures listed.

21 Maximum recommended temperature is 80 °C/180 °F for aqueous solutions below 0.5%.

22 For potable water applications, please contact the INEOS Technical Service team.

23 Chemical suppliers should approve materials of construction.

24 If the salt solution is saturated, the maximum use temperature from a corrosion resistance point of view could be increased up to the boiling point of the solution or the heat distortion temperature (HDT) of the resin, whichever is lower.

25 A longer life can be obtained if Derakane™ 510B resin is used for environments containing 8–15% sodium hypochlorite.

NR: Not Recommended.

LS: Limited Service. In general, three-days to one-year lifetime at room temperature (max. 40 °C/100 °F) is usually sufficient for secondary containment.

POST CURE

For a service temperature below 100 °C/210 °F:
A post cure may extend the service life if the operating temperature is within 20 °C/40 °F of the present CR guide maximum temperature for the service. This means that a post cure can be beneficial for solvent applications with a temperature limit of 25–40 °C/80–100 °F.

For a service temperature above 100 °C/210 °F:
Post cure in service may be sufficient, provided the resin-specific minimum Barcol hardness values are reached before startup.

For service in pure and neutral salt solutions:
Post cure may, in general, not be required, provided the resin-specific minimum Barcol hardness values are reached and no acetone sensitivity is detected before startup.

When using a BPO/Amine cure system:
Post cure is strongly recommended and should be performed within two weeks of construction.

The post cure conditions as detailed in European Standard EN 13121 may be used:

- For Derakane™ 411, 441, 510A/B/C and 8084 resins: Four hours at 80 °C/180 °F
- For Derakane™ 451, 455, 470 and 510N resins: Four hours at 90 °C/200 °F
- This norm recommends one hour per mm thickness of the laminate (between five and 15 hours).

VEILS

All common veils (non-apertured synthetic and glass veils) are suitable for most environments. Hydrofluoric acid (HF) containing solutions require the use of synthetic or carbon veils. Typically, one veil layer results in a final thickness of approximately 0.3 mm. The thickness of the veil layer is at least as important as the nature of the veil itself. An apertured synthetic veil (such as Nexus™ 100-10) offers an extra thickness of the veil layer and is preferred for cases where this extra thickness can increase service life (e.g., hot caustic solutions). Carbon veils have demonstrated excellent resistance to a number of aggressive chemicals such as HF, HCl and NaOH, **but not sodium hypochlorite (NaOCl).** Carbon veil is also useful in achieving conductive surfaces.

SPECIAL CASES

INSUFFICIENT INFORMATION

In cases where the environment or exposure conditions are outside the scope of this guide, and thus no specific recommendations can be made, a test laminate should be exposed to the actual or simulated conditions proposed so that a final decision on resin suitability can be reached.

COATINGS AND LININGS (REINFORCED AND NON-REINFORCED)

Coatings and linings have their own specific properties and may be limited in operating temperatures because of thermal expansion. It is recommended to consult with the INEOS Technical Service team or with a company in your region that specializes in linings and coatings technology.

Laminate linings can be more durable in liquid environments than other lining systems. For quality reasons, they should be applied by hand lay-up and not by spray-up techniques. As a general rule, and as a result of the low or missing exotherm during polymerization, linings and coatings should be post cured whenever possible (see also the “Post Cure” section of this guide).

Special precautions are required for strongly diffusing media (HCl, HF, etc.). As a general rule, the thicker and the better cured the lining, the higher the diffusion resistance and the longer the life expectancy.

HIGH (FLUE) GAS TEMPERATURES

If a synthetic veil is recommended for hot gas environments, the temperature resistance of the veil must be sufficient.

If it is not, a carbon veil can often be used.

If the environment contains water vapor and/or acids, special measures must be taken to prevent sub-dewpoint conditions in the laminate.

SHORT-TERM EXPOSURE/SPILLAGE

If exposure is intermittent or limited to fumes or spills only, it is possible to have good service life at temperatures considerably higher than those shown and even have good service life in chemical environments shown as NR (not recommended). Contact the INEOS Technical Service team for a resin recommendation at derakane@ineos.com or by visiting derakane.com.

MIXTURES OF ALTERNATING ENVIRONMENTS

The information provided in this guide represents the performance of full FRP structures under continuous use in contact with the stated chemical environment (unless otherwise indicated).

It is sometimes difficult to predict just how aggressive certain combinations of chemicals will be toward FRP. Some mixtures are more aggressive toward FRP than the individual components, so special attention should be paid to aggressively synergistic chemicals which cannot readily be predicted based solely on the corrosion properties of the individual components.

The chemical resistance may also be negatively influenced by using the same equipment for alternating storage or transport of different products, particularly where these products have widely differing properties, such as acids and bases that chemically react with each other.

When in doubt, please consult with your local distributor or your INEOS sales representative, who can put you in touch with the appropriate technical resources at INEOS.

CHEMICAL RESISTANCE INQUIRY

When requesting resin recommendations for corrosion applications, the following data are necessary for your request to be processed:

- Chemical nature of all products in a process or a batch, with their corresponding concentrations (even traces).
- Service temperatures, including maximum and upset temperatures (with corresponding duration).
- State: liquid/gas/solid (risk of phasing or condensation if any).
- Type of equipment (tank, pipe, lining, etc.).

Please feel free to use the enclosed “Chemical Resistance Inquiry” form and email your inquiries to your local distributor or the INEOS Technical Service team at derakane@ineos.com.

SAFETY PRECAUTIONS

Derakane™ epoxy vinyl ester resins and the materials (solvents, accelerators, catalysts, etc.) used with them can be hazardous unless simple but precise precautions are taken. The precautions necessary for handling Derakane™ resins are similar to those for unsaturated polyesters and will therefore be familiar to trained personnel. Safety Data Sheets (SDS) on all Derakane™ resins are available to help customers satisfy their own handling and disposal needs.

NOTICE

Recommendations as to methods and use of materials made in this publication are based on the experience of INEOS and knowledge of the characteristics of Derakane™ resins and are given in good faith. However, because as a material supplier, INEOS does not exercise any control over the use of Derakane™ resins, no legal responsibility is accepted for such recommendations. In particular, no responsibility is accepted by INEOS for any system or application in which Derakane™ resins are utilized. The legal obligations of INEOS in respect of any sale of Derakane™ resins shall be determined solely by the terms of its respective sales contract.

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DERAKANE™ EPOXY VINYL ESTER RESINS

CHEMICAL RESISTANCE INQUIRY FORM

Please e-mail this form to derakane@ineos.com or fax to +49(0)7851 99 478-30 (Europe) or your distributor.

<table>
<tr><td colspan="3">Date:</td><td colspan="3">Number of Pages:</td><td>*Project Reference ID:</td></tr>
<tr><td colspan="3">To:
Technical Service Derakane™ Resins
INEOS Composites

E-Mail: derakane@ineos.com</td><td colspan="3">From:
Name:
Company:
E-Mail:
Fax:
Tel:</td><td>Engineering:</td></tr>
<tr><td colspan="6">Industry Sector/Process:
(Chemical, Paper, Mining, Flue Gas …)</td><td>End User:</td></tr>
<tr><td colspan="2" rowspan="2">*Equipment Type:
(Tank, Scrubber, Pipe/Duct, Lining ...)</td><td colspan="2">Tank or Pipe?</td><td>Other:</td><td>Fabricator:</td></tr>
<tr><td colspan="3">Full FRP Applications or
lining on steel, concrete?</td><td rowspan="11">Comments/notes:
(e.g., unusual process conditions, temperature cycling, high/low concentrations, addition and dilution, novel design or construction, abrasion)</td></tr>
<tr><td colspan="6">*Dimensions/Capacity:
(Height, Diameter, Flow Rate …)</td></tr>
<tr><td colspan="3">*OPERATING CONDITIONS</td><td colspan="3">Concentration/Units (g/L, oz/gal, %)</td></tr>
<tr><td colspan="3">Chemical Environment or CAS Numbers
(indicated on the Safety Data Sheet)</td><td>Minimum</td><td>Normal</td><td>Maximum</td></tr>
<tr><td colspan="3">1)</td><td></td><td></td><td></td></tr>
<tr><td colspan="3">2)</td><td></td><td></td><td></td></tr>
<tr><td colspan="3">3)</td><td></td><td></td><td></td></tr>
<tr><td colspan="3">4)</td><td></td><td></td><td></td></tr>
<tr><td colspan="6">NOTE: Please show all major/minor components, concentrations, including traces. (If insufficient space, please add extra sheet or include the respective Safety Data Sheet).</td></tr>
<tr><td>Temperatures
(°C) or (°F)?</td><td>Minimum:</td><td colspan="2">Normal operating
temperature:</td><td colspan="2">Maximum:

Design:</td></tr>
<tr><td>Upsets:</td><td colspan="5">Maximum Temperature, Duration (h), Frequency per year:</td></tr>
<tr><td colspan="3">Pressure (Bar, psi)/Vacuum:</td><td colspan="3">pH – Typical: Min., Normal, Max.:</td></tr>
</table>

* required fields

CHEMICAL NAME/CAS NUMBERS

CAS Number	Chemical Name
7-31-3	Methyl Formate
10-54-3	Hexane
50-0-0	Formaldehyde
50-21-5	Lactic Acid
50-70-4	Sorbitol
50-78-2	Acetylsalicylic Acid
56-23-5	Carbon Tetrachloride
56-81-5	Glycerin or Glycerol
56-93-9	Benzyltrimethylammonium Chloride
57-10-3	Palmitic Acid
57-11-4	Stearic Acid
57-13-6	Urea
57-50-1	Cane Sugar, Sugar
57-55-6	Propylene Glycol
60-24-2	Mercaptoethanol
60-29-7	Diethyl Ether
60-29-7	Ethyl Ether
60-34-4	Monomethylhydrazine
62-53-3	Aniline
62-56-6	Thiourea
62-76-0	Sodium Oxalate
64-2-8	Ethylenediaminetetraacetic acid, tetrasodium salt (EDTA)
64-17-5	Alcohol, Ethyl; e.g., ethanol
64-17-5	Ethanol (Ethyl Alcohol)
64-18-6	Formic Acid
64-19-7	Acetic Acid
64-67-5	Diethyl Sulfate
65-85-0	Benzoic Acid
67-43-6	Diethylenetriaminepentaacetic acid
67-48-1	Choline Chloride
67-56-1	Methanol (Methyl Alcohol)
67-63-0	Isopropyl Alcohol
67-64-1	Acetone
67-68-5	Dimethyl Sulfoxide (DMSO)
67-72-1	Hexachloroethane
68-11-1	Thioglycolic Acid (Mercaptoacetic Acid)
68-12-2	Dimethyl Formamide
69-72-7	Salicylic Acid
71-23-8	Propanol (n-)
71-36-3	Alcohol, Butyl: e.g., n-butanol
71-36-3	Butanol (-n)
71-36-3	Butyl Alcohol
71-41-0	Alcohol, Amyl: e.g., 1-pentanol
71-43-2	Benzene
71-55-6	Trichloroethane (1,1,1-)
74-82-8	Methane
74-83-9	Methyl Bromide
74-87-3	Methyl Chloride
74-89-5	Methylamine
74-90-8	Hydrocyanic Acid
74-93-1	Methyl Mercaptan (Gas)
74-96-4	Ethyl Bromide
74-98-6	Propane
75-0-3	Ethyl Chloride
75-1-4	Vinyl Chloride
75-4-7	Ethyl Amine
75-5-8	Acetonitrile
75-7-0	Acetaldehyde
75-9-2	Dichloromethane
75-9-2	Methylene Chloride
75-12-7	Formamide
75-15-0	Carbon Disulfide
75-18-3	Dimethyl Sulfide
75-21-8	Ethylene Oxide
75-31-0	Isopropyl Amine
75-36-5	Acetyl Chloride
75-45-6	Chlorodifluoromethane
75-52-5	Nitromethane
75-56-9	Propylene Oxide
75-59-2	Tetramethyl Ammonium Hydroxide
75-69-4	Chlorofluorocarbon (CFC): R-11 (Trichlorofluoromethane)
75-71-8	Chlorofluorocarbon (CFC): R-12 (Dichlorodifluoromethane)
75-75-2	Methanesulfonic Acid
75-87-6	Chloral
75-99-0	Dichloropropionic Acid (2,2-)
76-1-7	Pentachloroethane
76-3-9	Trichloroacetic Acid
76-5-1	Trifluoroacetic Acid (see Chloroacetic Acid)
76-6-2	Chloropicrin (Nitrochloroform)
76-13-1	Chlorofluorocarbon (CFC): CFC-113 (Trichlorotrifluoroethane)
77-47-4	Hexachlorocyclopentadiene
77-73-6	Dicyclopentadiene
77-78-1	Dimethyl Sulfate
77-92-9	Citric Acid
78-10-4	Ethyl Silicate
78-10-4	Tetraethyl Orthosilicate
78-42-2	Trioctylphosphate
78-50-2	Trioctyl Phosphine Oxide
78-83-1	Isobutyl Alcohol
78-87-5	Dichloropropane (Propylene Dichloride)
78-93-3	Methyl Ethyl Ketone
78-96-6	Isopropanol Amine
79-0-5	Trichloroethane (1,1,2-)
79-1-6	Trichloroethylene
79-3-8	Propionyl Chloride
79-6-1	Acrylamide
79-9-4	Propionic Acid
79-10-7	Acrylic Acid
79-11-8	Chloroacetic Acid
79-14-1	Glycolic acid
79-14-1	Hydroxyacetic Acid
79-20-9	Methyl Acetate
79-21-0	Peracetic Acid
79-41-4	Methacrylic Acid
79-43-6	see Chloroacetic Acid
80-62-6	Methyl Methacrylate
81-16-3	Tobias Acid
84-69-5	Diisobutyl Phthalate
84-74-2	Dibutyl Phthalate
85-44-9	Phthalic Anhydride
85-52-9	o-Benzoyl Benzoic Acid
85-68-7	Butyl Benzyl Phthalate
87-86-5	Pentachlorophenol
88-89-1	Picric Acid (Alcoholic)
88-99-3	Phthalic Acid
89-8-7	Sulfophthalic Acid (4-)
91-20-3	Naphthalene
91-22-5	Quinoline
93-97-0	Benzoic Anhydride
94-75-7	2,4-Dichlorophenoxyacetic Acid
95-49-8	Chlorotoluene (o-)
95-50-1	Dichlorobenzene (o-)
95-53-4	Toluidine (o-)
95-63-6	Trimethyl Benzene
96-13-9	Dibromopropanol (2, 3-)
96-22-0	Diethyl Ketone
96-23-1	Glycerol Dichlorohydrin
96-24-2	Glycerol Monochlorohydrin
97-65-4	Itaconic Acid
97-99-4	Tetrahydrofuryl Alcohol
98-0-0	Furfuryl Alcohol
98-1-1	Furfural
98-7-7	Benzotrichloride
98-9-9	Benzenesulfonyl Chloride
98-11-3	Benzenesulfonic Acid
98-82-8	Cumene
98-83-9	Alpha-Methylstyrene
98-83-9	Methylstyrene (Alpha-)
98-86-2	Acetophenone
98-87-3	Dichlorotoluene (Benzal Chloride)
98-88-4	Benzoyl Chloride
98-95-3	Nitrobenzene
100-37-8	Diethylaminoethanol
100-41-4	Ethylbenzene
100-42-5	Styrene
100-44-7	Benzyl Chloride
100-51-6	Benzyl Alcohol
100-52-7	Benzaldehyde
100-97-0	Hexamethylenetetramine
101-2-0	Triphenyl Phosphite
101-68-8	Diphenylmethane-4,4-Diisocyanate (MDI)
101-84-8	Diphenyl Oxide
102-71-6	Triethanolamine
104-15-4	Toluenesulfonic Acid
104-74-5	Lauryl Pyridinium Chloride
104-76-7	Isooctyl Alcohol
105-58-8	Diethyl Carbonate
105-60-2	Caprolactam
106-43-4	Chlorotoluene (p-)
106-46-7	Dichlorobenzene (p-)
106-49-0	Toluidine (p-)
106-88-7	Butylene Oxide (1,2-)
106-89-8	Epichlorohydrin
106-93-4	Ethylene Dibromide
106-94-5	Propyl Bromide
106-97-8	Butane
106-99-0	Butadiene
107-2-8	Acrolein (Acrylaldehyde)
107-5-1	Allyl Chloride
107-6-2	Dichloroethane (Ethylene Chloride)
107-7-3	Ethylene Chlorohydrin
107-13-1	Acrylonitrile
107-15-3	Ethylenediamine
107-18-6	Allyl Alcohol
107-21-1	Ethylene Glycol
107-22-2	Glyoxal
107-39-1	Diisobutylene
107-92-6	Butyric Acid
107-96-0	Mercaptopropionic (3-) Acid
107-98-2	1-Methoxy-2-Propanol
108-1-0	Dimethylethanolamine
108-5-4	Vinyl Acetate
108-10-1	Methyl Isobutyl Ketone
108-24-7	Acetic Anhydride
108-31-6	Maleic Anhydride
108-44-1	Toluidine (m-)
108-46-3	Resorcinol
108-65-6	Propylene Glycol Methyl Ether Acetate
108-77-0	Cyanuric Chloride
108-80-5	Cyanuric Acid
108-83-8	Diisobutyl Ketone
108-88-3	Toluene
108-90-7	Chlorobenzene
108-90-7	Monochlorobenzene
108-91-8	Cyclohexylamine
108-94-1	Cyclohexanone
108-95-2	Phenol
109-43-3	Dibutyl Sebacate
109-60-4	Propyl Acetate
109-64-8	Dibromopropane
109-69-3	Butyl Chloride
109-70-6	Trimethylene Chlorobromide
109-73-9	Butyl Amine
109-89-7	Diethylamine
109-99-9	Tetrahydrofuran THF
110-16-7	Maleic Acid
110-27-0	Isopropyl Myristate
110-61-2	Succinonitrile
110-82-7	Cyclohexane
110-86-1	Pyridine
110-91-8	Morpholine
110-94-1	Glutaric Acid
111-30-8	Glutaraldehyde
111-40-0	Diethylenetriamine
111-42-2	Diethanolamine
111-46-6	Diethylene Glycol
111-76-2	Ethylene Glycol n-Butylether: Ethanol, 2-butoxy
111-77-3	Diethylene Glycol Methyl Ether
111-90-0	Diethylene Glycol Monoethyl Ether
111-96-6	Diethylene Glycol Dimethyl Ether
112-16-3	Lauroyl Chloride
112-18-5	Dodecyldimethylamine
112-27-6	Triethylene Glycol
112-30-1	Decanol
112-34-5	Diethylene Glycol n-Butyl Ether also called Ethanol, 2-(2-butoxy-ethoxy)-
112-40-3	Dodecane
112-41-4	Dodecene
112-52-7	Lauryl Chloride
112-53-8	Dodecanol (Lauryl Alcohol)
112-53-8	Lauryl Alcohol
112-55-0	Dodecylmercaptan
112-55-0	Lauryl Mercaptan
112-73-2	Dibutyl Carbitol (diethylene glycol dibutyl ether)
112-80-1	Oleic Acid
117-81-7	Dioctyl Phthalate
120-51-4	Benzyl Benzoate
121-3-9	Nitrotoluene (4-) Sulfonic Acid (2-)
121-43-7	Trimethyl Borate in Methyl Alcohol
121-44-8	Triethylamine
121-47-1	Sulfanilic Acid (meta)
121-57-3	Sulfanilic Acid (para)
121-69-7	Dimethylaniline (N,N)
123-42-2	Diacetone Alcohol
123-51-3	Isoamyl Alcohol
123-72-8	Butyraldehyde
123-76-2	Levulinic Acid (also 4-Oxopentanoic Acid)
123-86-4	Butyl Acetate
123-91-1	Dioxane
123-95-5	Butyl Stearate
123-99-9	Azelaic Acid
124-4-9	Adipic Acid
124-7-2	Caprylic Acid (Octanoic Acid)
124-7-2	Octanoic Acid
124-38-9	Carbon Dioxide
124-40-3	Dimethyl Amine
124-64-1	Tetrakis (Hydroxymethyl) Phosphonium Chloride
126-11-4	Nitromethane (tris, hydroxymethyl)
126-30-7	Neopentyl Glycol
126-72-7	Dibromopropyl Phosphate
126-73-8	Tributyl Phosphate
127-9-3	Sodium Acetate
127-18-4	Perchloroethylene
127-18-4	Tetrachloroethylene (Perchloroethylene)
127-19-5	Dimethylacetamide
127-20-8	Dalapon, Sodium Salt (2,2-Dichloropropionic Acid and Sodium Salt)
128-4-1	Sodium Dimethyldithiocarbamate
131-11-3	Dimethyl Phthalate
131-17-9	Diallyl Phthalate
132-27-4	Sodium salt o-phenylphenate (Antimicrobial)
136-60-7	Butyl Benzoate
137-42-8	Sodium Methyldithiocarbamate
140-1-2	Diethylenetriaminepentaacetic acid, sodium salt (-penta sodium)
140-31-8	Aminoethyl Piperazine
140-88-5	Ethyl Acrylate
141-32-2	Butyl Acrylate
141-43-5	Ethanolamine
141-78-6	Ethyl Acetate
141-91-3	Dimethyl Morpholine (2,6-)
141-97-9	Ethyl Acetoacetate
142-4-1	Aniline Hydrochloride
142-62-1	Caproic Acid (Hexanoic Acid)
142-62-1	Hexanoic Acid
142-82-5	Heptane, n-
142-91-6	Isopropyl Palmitate
142-96-1	Dibutyl Ether (-n)
143-7-7	Lauric Acid
143-33-9	Sodium Cyanide
144-55-8	Sodium Bicarbonate
144-62-7	Oxalic Acid
149-91-7	Gallic Acid
151-21-3	Sodium Lauryl Sulfate
151-50-8	Potassium Cyanide
287-92-3	Cyclopentane
298-7-7	Di (2-Ethylhexyl) Phosphoric Acid (DEHPA)
298-12-4	Glyoxylic Acid
298-14-6	Potassium Bicarbonate
301-4-2	Lead (II) Acetate
302-1-2	Hydrazine
334-48-5	Capric Acid (Decanoic Acid)
334-48-5	Decanoic Acid
497-19-8	Sodium Carbonate
502-44-3	Caprolactone
506-59-2	Dimethylammonium Hydrochloride (Dimethylamine HCl, DMA-HCl)
506-64-9	Silver Cyanide
507-40-4	Butyl Hypochlorite (tert-)
513-77-9	Barium Carbonate
526-83-0	Tartaric Acid
526-95-4	Gluconic Acid
527-7-1	Sodium Gluconate
532-32-1	Sodium Benzoate
540-54-5	Propyl Chloride
540-59-0	Dichloroethylene
540-72-7	Sodium Thiocyanate
540-82-9	Ethyl Sulfate
541-41-3	Ethyl Chloroformate
542-16-5	Aniline Sulfate
542-62-1	Barium Cyanide
542-75-6	Dichloropropene
543-59-9	Amyl Chloride
543-59-9	Chloropentane
543-80-6	Barium Acetate
544-63-8	Myristic Acid
544-92-3	Copper Cyanide
545-6-2	Trichloroacetonitrile
546-93-0	Magnesium Carbonate
554-7-4	Potassium Gold Cyanide
554-13-2	Lithium Carbonate
557-21-1	Zinc Cyanide
583-52-8	Potassium Oxalate
584-8-7	Potassium Carbonate
593-81-7	Trimethylamine Hydrochloride (Trimethylammonium Chloride)
598-54-9	Copper Acetate
608-33-3	Dibromophenol (-2,6)
611-6-3	Dichloronitrobenzene (2,4-)
615-58-7	Dibromophenol (-2,4)
616-38-6	Dimethylcarbonate
617-84-5	Diethyl Formamide
622-97-9	Methylstyrene (p-)
626-61-9	Chloropyridine
627-3-2	Ethoxy Acetic Acid
628-63-7	Amyl Acetate
630-8-0	Carbon Monoxide Gas
630-20-6	Tetrachloroethane
631-61-8	Ammonium Acetate
704-76-7	2-Ethylhexyl Alcohol
753-73-1	Dimethyltin Dichloride
759-94-4	Ethyl-N,N-di-n-Propylthiolcarbamate (herbicide)
763-69-9	Ethyl-3-Ethoxy Propionate
853-68-9	Anthraquinone Disulfonic Acid
866-81-9	Cobalt Citrate
868-18-8	Sodium Tartrate
872-50-4	N-methyl-2-pyrrolidone
929-6-6	Diglycolamine
993-16-8	Methyl Tin Trichloride
1066-33-7	Ammonium Bicarbonate
1071-83-6	Glyphosate

CHEMICAL NAME/CAS NUMBERS (continued)

CAS Number	Chemical Name
1113-38-8	Ammonium Oxalate
1191-50-0	Sodium Myristyl Sulfate
1300-21-6	Dichloroethane
1300-72-7	Sodium Xylene Sulfonate
1302-42-7	Sodium Aluminate
1303-96-4	Borax
1305-62-0	Calcium Hydroxide
1309-42-8	Magnesium Hydroxide
1310-58-3	Potassium Hydroxide
1310-65-2	Lithium Hydroxide
1310-73-2	Sodium Hydroxide
1312-76-1	Potassium Metasilicate
1313-82-2	Sodium Sulfide
1314-56-3	Phosphorous Pentoxide
1314-85-8	Phosphorus Sesquisulfide
1317-65-3	Calcium Carbonate
1319-77-3	Cresylic Acid
1327-41-9	Aluminum Chlorohydrate
1327-52-2	Arsenic Acid
1327-53-3	Arsenious Acid
1330-20-7	Xylene
1330-43-4	Sodium Tetraborate
1330-78-5	Tricresyl Phosphate
1330-86-5	Isooctyl Adipate
1330-96-4	Sodium Borate
1333-39-7	Phenol Sulfonic Acid
1333-83-1	Sodium Bifluoride
1335-54-2	Diisopropanolamine
1336-21-6	Ammonium Hydroxide
1341-49-7	Ammonium Bifluoride
1344-9-8	Sodium Silicate
1344-67-8	Copper Chloride
1461-25-2	Tetrabutyltin
1565-80-6	Amyl Alcohol
1634-4-4	Methyl t-Butyl Ether
1634-4-4	t-Butyl Methyl Ether (MTBE)
1762-95-4	Ammonium Thiocyanate
1863-63-4	Ammonium Benzoate
2008-39-1	2,4-D, Dimethylamine Salt
2052-49-5	Tetra-n-Butylammonium Hydroxide
2082-81-7	Trimethylamine
2090-64-4	Carbonic Acid
2235-54-3	Ammonium Lauryl Sulfate
2402-79-1	Tetrachloropyridine
2836-32-0	Sodium Glycolate
2971-90-6	Clopidol
3012-65-5	Ammonium Citrate
3039-83-6	Ethylenesulfonic Acid, Sodium Salt
3251-23-8	Copper Nitrate
3710-84-7	Diethyl Hydroxylamine
4316-73-8	Sodium Sarcosinate
5329-14-6	Sulfamic Acid
5421-46-5	Ammonium Thioglycolate
5536-61-8	Sodium Methacrylate
5996-10-1	Glucose
6164-98-3	Chlordimeform Insecticide
6303-21-5	Hypophosphorous Acid
6484-52-2	Ammonium Nitrate
6871-90-2	Potassium Silicofluoride
6899-5-4	Glutamic Acid
6915-15-7	Malic Acid
7320-34-5	Potassium Pyrophosphate
7378-99-6	Alkyl (C8-C10) Dimethyl Amine; e.g., octyldimethyl amine
7439-97-6	Mercury
7446-9-5	Sulfur Dioxide
7446-11-9	Sulfur Trioxide
7446-70-0	Aluminum Chloride
7447-39-4	Curpric Chloride, see Copper Chloride
7447-40-7	Potassium Chloride
7447-41-8	Lithium Chloride
7487-88-9	Magnesium Sulfate
7487-94-7	Mercuric Chloride
7488-52-0	Zinc Sulfite
7550-35-8	Lithium Bromide
7550-45-0	Titanium Tetrachloride (Titanium Chloride)
7553-56-2	Iodine
7558-79-4	Sodium Phosphate (di)
7558-80-7	Sodium Phosphate (mono)
7601-54-9	Sodium Phosphate (tri)
7601-89-0	Sodium Perchlorate
7601-90-3	Perchloric Acid
7631-90-5	Sodium Bisulfite
7631-99-4	Sodium Nitrate
7632-0-0	Sodium Nitrite
7646-78-8	Stannic Chloride
7646-79-9	Cobalt Chloride
7646-85-7	Zinc Chloride
7647-1-0	Hydrochloric Acid
7647-1-0	Hydrogen Chloride
7647-14-5	Sodium Chloride
7647-15-6	Sodium Bromide
7647-18-9	Antimony Pentachloride
7664-38-2	Phosphoric Acid
7664-39-3	Hydrofluoric Acid or Hydrogen Fluoride
7664-41-7	Ammonia
7664-93-9	Sulfuric Acid
7681-11-0	Potassium Iodide
7681-38-1	Sodium Bisulfate
7681-49-4	Sodium Fluoride
7681-52-9	Sodium Hypochlorite
7681-53-0	Sodium Monophosphate
7681-57-4	Sodium Metabisulfite
7697-37-2	Nitric Acid
7704-34-9	Sulfur
7705-8-0	Ferric Chloride
7718-54-9	Nickel Chloride
7719-9-7	Thionyl Chloride
7719-12-2	Phosphorus Trichloride
7720-78-7	Ferrous Sulfate
7722-64-7	Potassium Permanganate
7722-76-1	Ammonium Phosphate, monobasic
7722-84-1	Hydrogen Peroxide
7722-88-5	Tetrasodium Pyrophospate
7726-95-6	Bromine
7727-15-3	Aluminum Bromide
7727-21-1	Potassium Persulfate
7727-43-7	Barium Sulfate
7727-54-0	Ammonium Persulfate
7732-18-5	Water or Steam
7733-2-0	Zinc Sulfate
7738-94-5	Chromic Acid
7757-79-1	Potassium Nitrate
7757-82-6	Sodium Sulfate
7757-83-7	Sodium Sulfite
7757-87-1	Magnesium Phosphate
7758-1-2	Potassium Bromate
7758-2-3	Potassium Bromide
7758-11-4	Dipotassium Phosphate
7758-19-2	Sodium Chlorite
7758-29-4	Sodium Tripolyphosphate
7758-98-7	Copper Sulfate
7761-88-8	Silver Nitrate
7772-98-7	Sodium Thiosulfate
7772-99-8	Stannous Chloride
7773-1-5	Manganese Chloride (Manganous Chloride)
7775-9-9	Sodium Chlorate
7775-11-3	Sodium Chromate
7775-14-6	Sodium Hydrosulfite
7775-27-1	Sodium Persulfate
7778-50-9	Potassium Dichromate
7778-54-3	Calcium Hypochlorite
7778-66-7	Potassium Hypochlorite
7778-80-5	Potassium Sulfate
7779-86-4	Zinc Hydrosulfite
7779-88-6	Zinc Nitrate
7779-90-0	Zinc Phosphate
7782-41-4	Fluorine Gas
7782-50-5	Chlorine Gas
7782-77-6	Nitrous Acid
7782-99-2	Sulfurous Acid
7783-0-8	Selenious Acid
7783-6-4	Hydrogen Sulfide
7783-13-3	Sodium Ammonium Phosphate
7783-18-8	Ammonium Thiosulfate
7783-20-2	Ammonium Sulfate
7783-28-0	Ammonium Phosphate, dibasic
7783-28-0	Diammonium Phosphate
7784-18-1	Aluminum Fluoride
7784-24-9	Potassium Aluminum Sulfate
7784-46-5	Sodium Arsenite
7785-87-7	Manganese Sulfate (Manganous Sulfate)
7786-30-3	Magnesium Chloride
7786-81-4	Nickel Sulfate
7789-23-3	Potassium Fluoride
7789-32-4	Ammonium Bromide
7789-38-0	Sodium Bromate
7789-41-5	Calcium Bromide
7790-92-3	Hypochlorous Acid
7790-93-4	Chloric Acid
7790-94-5	Chlorosulfonic Acid
7790-98-9	Ammonium Perchlorate
7791-8-4	Antimony Oxychloride
8000-26-8	Pine Oil
8000-48-4	Eucalyptus Oil
8001-22-7	Soybean Oil
8001-25-0	Olive Oil
8001-26-1	Linseed Oil
8001-29-4	Cottonseed Oil
8001-30-7	Corn Oil
8001-54-5	Benzalkonium Chloride
8001-69-2	Cod Liver Oil
8001-79-4	Castor Oil
8002-3-7	Peanut Oil
8002-26-4	Tall Oil
8002-74-2	Paraffin Wax
8002-92-4	Ammonium Carbonate
8006-64-2	Turpentine
8007-56-5	Aqua Regia
8007-69-0	Almond Oil
8008-20-6	Kerosene
8008-79-5	Spearmint Oil <18>
8012-14-4	Sodium Hexametaphosphate
8013-7-8	Soybean Oil, epoxidized
8013-54-5	Chloroform
8014-95-7	Oleum (Fuming Sulfuric)
8016-79-3	Beet Sugar Liquor
8017-16-1	Polyphosphoric Acid
8017-16-1	Superphosphoric Acid
8027-16-5	Cresols, Mixture
8028-89-5	Caramel
8029-43-4	Corn Syrup
8032-32-4	Naphtha
8052-42-4	Asphalt
8061-53-8	Ammonium Ligno Sulfonate
8062-15-5	Lignin Sulfonate
8064-96-2	Cashew Nut Oil
8140-1-2	Cocamidopropyl Dimethylamine
9002-85-1	Polyvinylidiene Chloride (PVDC)
9002-86-2	Polyvinyl Chloride (PVC)
9002-89-5	Polyvinyl Alcohol
9002-98-6	Polyethyleneimine
9003-1-4	Polyacrylic Acid
9003-4-7	Sodium Polyacrylate
9003-5-8	Polyacrylamide
9003-20-7	Polyvinyl Acetate Emulsion
9003-35-4	Phenol Formaldehyde Resin
9003-35-4	Phenolic Resin
9004-32-4	Carboxymethylcellulose
9004-74-4	Polyethylene glycol methyl ether
9005-25-8	Starch
9016-45-9	Ethoxylated Nonyl Phenol
10025-67-9	Sulfur Chloride
10025-73-7	Chromic Chloride
10025-87-3	Phosphorus Oxychloride
10025-91-9	Antimony Trichloride
10026-4-7	Silicone Tetrachloride
10028-15-6	Ozone in solution
10034-85-2	Hydriodic Acid
10034-93-2	Hydrazine Sulfate
10035-10-6	Hydrobromic Acid or Hydrogen Bromide
10039-54-0	Hydroxylamine Acid Sulfate
10043-1-3	Aluminum Sulfate
10043-35-3	Boric Acid
10043-52-4	Calcium Chloride
10043-67-1	Aluminum Potassium Sulfate
10049-4-4	Chlorine Dioxide
10099-74-8	Lead (II) Nitrate
10101-53-8	Chromic Sulfate
10108-64-2	Cadmium Chloride
10108-73-3	Cerous Nitrate
10112-91-1	Mercurous Chloride
10124-37-5	Calcium Nitrate
10137-74-3	Calcium Chlorate
10141-0-1	Chromium Potassium Sulfate
10141-5-6	Cobalt Nitrate (II)
10196-4-0	Ammonium Sulfite
10222-1-2	Dibromonitrilo-Propionamide
10257-55-3	Calcium Sulfite
10294-34-5	Boron Trichloride
10361-37-2	Barium Chloride
10377-48-7	Lithium Sulfate
10377-60-3	Magnesium Nitrate
10377-66-9	Manganese Nitrate (Manganous)
10421-48-4	Ferric Nitrate
10450-55-2	Ferric Acetate
10545-99-0	Sulfur Dichloride
10553-31-8	Barium Bromide
10588-1-9	Sodium Dichromate
11120-25-5	Ammonium Tungstate
12007-89-5	Ammonium Pentaborate
12021-95-3	Fluozirconic Acid
12028-48-7	Ammonium Metatungstate
12042-91-0	Aluminum Chlorohydroxide
12124-99-1	Ammonium Sulfide
12125-1-8	Ammonium Fluoride
12125-2-9	Ammonium Chloride
12259-92-6	Ammonium Polysulfide
12379-40-7	Imidazoline Acetate
12501-45-0	Ammonium Molybdate
13235-36-4	Tetrasodium Ethylenediaminetetraacetic Acid (Tetrasodium Salt of EDTA)
13463-67-7	Titanium Dioxide
13473-90-0	Aluminum Nitrate
13478-10-10	Ferrous Chloride
13520-68-9	Ferrous Nitrate
13598-36-2	Phosphorous Acid, ortho-
13601-19-9	Sodium Ferrocyanide
13674-87-8	Dichloro-(2)-Propyl Phosphate
13746-66-2	Potassium Ferricyanide
13755-29-8	Sodium Fluoroborate
13770-89-3	Nickel Sulfamate
13774-25-9	Magnesium Bisulfite
13814-97-6	Tin Fluoborate
13826-88-5	Zinc Fluoborate
13840-33-0	Lithium Hypochlorite
13843-59-9	Ammonium Bromate
13846-18-9	Calcium Bisulfite
13943-58-3	Potassium Ferrocyanide
13967-50-5	Potassium Gold Cyanide
14216-75-2	Nickel Nitrate
14217-21-1	Sodium Ferricyanide
14518-69-5	Tetra-n-Butylphosphonium Hydroxide
15972-60-8	Alachlore, Herbicide
16529-56-9	2-Methyl-3-Butenenitrile
16672-87-0	Ethephon
16721-80-5	Sodium Bisulfide (Hydrosulfide)
16721-80-5	Sodium Hydrosulfide
16872-11-0	Fluoboric Acid
16893-85-9	Sodium Fluorosilicate
16940-66-2	Sodium Borohydride SWS (Stabilized Water Solution)
16949-65-8	Magnesium Fluosilicate
16961-83-4	Fluosilicic Acid (Hydrofluosilicic Acid)
17194-0-2	Barium Hydroxide
17439-11-1	Fluotitanic Acid
17496-8-1	Ammonium Propionate
18130-44-4	Titanium Sulfate
18483-17-5	Tannic Acid
19351-18-9	2,2-Dimethyl Thiazolidine
21645-51-2	Aluminum Hydroxide
23210-56-2	N-Chloro-o-Tolyl (insecticide emulsion)
24347-58-8	Butylene Glycol
24800-44-0	Tripropylene Glycol, see Ethylene Glycol
25013-15-4	Vinyl Toluene
25154-55-6	Nitrophenol
25155-30-0	Sodium Dodecylbenzenesulfonate
25265-71-8	Dipropylene Glycol
25322-68-3	Polyethylene Glycol
25339-17-7	Isodecanol
25340-17-4	Diethylbenzene
25567-55-9	Sodium Tetrachlorophenate
25639-42-3	Methylcyclohexanol
26248-24-8	Sodium Tridecylbenzene Sulfonate
26968-58-1	Ethyl Benzyl Chloride
27138-31-4	Dipropylene Glycol Dibenzoate
27176-87-0	Dodecylbenzenesulphonic Acid
27458-94-2	Isononyl Alcohol
28348-53-0	Sodium Cumenesulfonate
28553-12-0	Diisonoyl Phthalate
29965-97-7	Cyclooctadiene
31142-56-0	Aluminum Citrate
34590-94-8	Dipropylene Glycol Monomethyl Ether, Propanol, (2-Methoxy-ethylethoxy)-
35139-28-8	Ferric Sulfate
36653-82-4	Cetyl alcohol
36653-82-4	Hexadecanol (n-)
50864-67-0	Barium Sulfide
51218-45-2	Metolachlor
61789-32-0	Fatty Acids
61789-40-0	Cocamidopropyl Betaine
61789-77-3	Dicoco Dimethyl Ammonium Chloride
61804-50-0	Divinyl Benzene
63449-41-2	Benzyltrimethylammonium Chloride
65996-63-6	Corn Starch
68002-20-0	Melamine Formaldehyde Resin
68131-30-6	Green Liquor (Pulp Mill)
68412-54-4	Nonyl(phenoxypoly(ethyleneoxy)ethanol, branched
68439-50-9	Ethoxylated Alcohol, C12-C14
68439-57-6	Sodium alpha-Olefin Sulfonate
68476-34-6	Diesel Fuel
68476-78-8	Molasses
68514-06-7	Ammonium Bisulfite Liquor (black liquor)
68526-83-0	Isooctyl Alcohol
68526-85-2	Alcohol, Isodecyl: e.g., isodecanol
68603-42-9	Coconut Fatty Acid
72674-5-6	Alpha Olefin Sulfonate
74552-83-3	Trichloroethane (1,1,1-)
84961-48-8	Coconut Oil
91722-14-4	Epoxidized Soybean Oil
95077-5-7	Kaolin Slurry
97328-76-2	Carbonic Acid
99400-1-8	Calcium Sulfate
99551-14-1	Oils, Mineral (aliphatic)
105839-17-6	Epoxidized Castor Oil

CHEMICAL RESISTANCE TABLE

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

		Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
	concentration	411	441	451	455	470	510A/B/C	510N	515	8084
chemical environment	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Acetaldehyde	20	40/100	40/100			40/100	40/100	40/100		40/100
Acetaldehyde	100	NR	NR	NR	NR	LS	NR			NR
Acetic Acid <21>	0.5–10	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	65/150
Acetic Acid	11–25	100/210	100/210	80/180	100/210	100/210	100/210	100/210	100/210	65/150
Acetic Acid	26–50	80/180	80/180	65/150	100/210	80/180	80/180	80/180	100/210	
Acetic Acid	51–75	65/150	65/150	45/110	65/150	65/150	65/150	65/150	65/150	
Acetic Acid	76–85	45/110	45/110	45/110	45/110	45/110	45/110	45/110	45/110	
Acetic Acid, glacial <2>	86–100	NR	NR			40/100	NR	NR		NR
Acetic Acid/Nitric Acid/Chromic Oxide	3:5:3	65/150	80/180			80/180	65/150	80/180		65/150
Acetic Acid/Sulfuric Acid	20:10	100/210	100/210			100/210	100/210	100/210		65/150
Acetic Anhydride	100	NR	NR			40/100	NR	NR	NR	NR
Acetone	10		80/180			80/180	80/180	80/180		
Acetone	20		30/85			40/100				
Acetone <15>	100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Acetone (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Acetone/Toluene <15>	50:50	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acetonitrile	20	40/100	40/100			40/100	40/100	40/100		
Acetonitrile	100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Acetonitrile (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Acetophenone	100	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acetyl Acetone	20	40/100	40/100			50/120	40/100	50/120		40/100
Acetyl Acetone	100	NR	NR			LS	NR	NR		NR
Acid Cleaner (31% Hydrochloric Acid) <2,8,9,13>	31	65/150	70/160			80/180 <15>	65/150	80/180 <15>		65/150
Acrolein (Acrylaldehyde)	20	40/100	40/100			40/100	40/100	40/100		
Acrolein (Acrylaldehyde)	100	NR	NR			LS	NR	NR		NR
Acrylamide	50	40/100	40/100	25/80	40/100	40/100	40/100	40/100	40/100	40/100

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Acrylic Acid <7>	10	40/100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	
Acrylic Acid <7>	25	40/100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	40/100
Acrylic Acid	100	NR	NR			LS	NR	NR		NR
Acrylic Latex	All	80/180	80/180			80/180	80/180	80/180		
Acrylonitrile	7 (max. solubility at 20 °C (68 °F))	40/100	40/100			40/100	40/100	40/100		
Acrylonitrile	100	NR	NR			LS	NR	NR		NR
Acrylonitrile, latex dispersion <7>	2	25/80	25/80	NR		25/80	25/80	25/80		25/80
Activated Carbon Beds, water treatment		80/180	100/210			100/210	80/180	100/210	100/210	65/150
Adipic Acid (1.5 g sol. in water at 25 °C (77 °F), sol. hot water)	23	80/180	80/180			80/180	80/180	80/180		
Air (max. surface temperature of the FRP) <16>		180/360	180/360	95/200		200/392	160/320	160/320		
Alachlore, Herbicide <4>	All					40/100				
Alcohol, see Ethanol										
Alcohol, Amyl	100	50/120	60/140			65/150	50/120	60/140		50/120
Alcohol, Butyl	100	50/120	50/120			65/150	50/120	50/120		NR
Alcohol, Ethyl	95	25/80	25/80			40/100	25/80	25/80		NR
Alcohol, Isodecyl	100	50/120	65/150			80/180	50/120	65/150		50/120
Alcohol, Propyl	100	40/100	40/100			50/120	40/100	40/100		NR
Alkaline Cleaner, see Sodium Hydroxide and Potassium Hydroxide										
Alkaline Solutions, see Sodium, Potassium, and Ammonium Hydroxides and Carbonates										
Alkane Sulfonate, see Sodium Dodecylbenzene Sulfonate										
Alkyl (C8-C10) Dimethyl Amine	100	80/180	95/200			100/210	80/180	95/200		
Alkyl (C8-C18) Chloride <21>	All	80/180	95/200			100/210	95/200	100/210		
Alkyl Aryl Sulfonic Acid, see Alkyl Benzene Sulfonic Acid										
Alkyl Benzene Sulfonic Acid <6,21>	All	80/180	80/180	80/180		100/210 <24>	95/200	100/210	80/180	

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Alkyldiphenyloxide Disulfonate (anionic surfactant type)	All	50/120	50/120			50/120	50/120	50/120		
Alkyltolyl Trimethyl Ammonium Chloride		40/100	50/120			50/120	40/100	50/120		
Allyl Alcohol	100	NR	NR			25/80	NR	NR		NR
Allyl Chloride	100	25/80	25/80	25/80		25/80	25/80	25/80	25/80	NR
Alpha-Oleum Sulfates	100	50/120	50/120			50/120	50/120	50/120		
Alpha-Methylstyrene	100	25/80	40/100			50/120	25/80	40/100		NR
Alum <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Alumina Hydrate	All	80/180	80/180			80/180	80/180	80/180		80/180
Aluminum Bromide <21>	All			70/160			70/160			
Aluminum Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Aluminum Chlorohydrate <21>	All	100/210	100/210	100/210		100/210 <24>	100/210	100/210	100/210	80/180
Aluminum Chlorohydrate/Hydrochloric Acid <2,8,9,12,13>	> 0.5:15	80/180	100/210			100/210	80/180	100/210		65/150
Aluminum Chlorohydroxide	50	100/210	100/210	100/210		100/210	100/210	100/210	100/210	80/180
Aluminum Citrate <21>	All			95/200	95/200		95/200		95/200	
Aluminum Fluoride <1>	All	25/80	25/80	30/90	30/90	25/80	25/80	25/80	30/90	25/80
Aluminum Hydroxide	100	80/180	80/180			95/200	80/180	80/180		80/180
Aluminum Nitrate	All	100/210	100/210	80/180	80/180	100/210 <24>	100/210	100/210	80/180	80/180
Aluminum Potassium Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Aluminum Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Aluminum Sulfate Reactor <10>	> 0.5	100/210	100/210				100/210			
Amine Salts	All	50/120	65/150	50/120	65/150	65/150	50/120	65/150	65/150	
Amino Acids	All	40/100	40/100			40/100	40/100	40/100		
Aminoethyl Piperazine	100						NR			
Ammonia	Liquified gas	NR	NR			NR	NR	NR		NR

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Ammonia gas	100	40/100	40/100	80/180	40/100	40/100	40/100	40/100	40/100	40/100
Ammonia, fumes, wet	40 vol-%	80/180	80/180	65/150	NR	80/180	80/180	80/180	NR	
Ammonia, aqueous, see Ammonium Hydroxide										
Ammonium Acetate	All	25/80	25/80	45/110		40/100	25/80	25/80		NR
Ammonium Benzoate	All	80/180		80/180			80/180			
Ammonium Bicarbonate	All	70/160	70/160	65/150	65/150	70/160	70/160	70/160	65/150	70/160
Ammonium Bifluoride <1>	All	65/150	65/150			65/150				65/150
Ammonium Bisulfite black liquor		80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	
Ammonium Bisulfite cooking liquor		65/150	65/150			65/150	65/150	65/150		
Ammonium Bromate	All	70/160	70/160			70/160	70/160	70/160		70/160
Ammonium Bromide	All	70/160	70/160			70/160	70/160	70/160		70/160
Ammonium Carbonate	All	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150
Ammonium Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ammonium Citrate	All	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150
Ammonium Fluoride <1>	All	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150
Ammonium Hydroxide <21>	0.5–1 (as NH_3)	80/180	80/180	95/200		65/150	95/200	65/150		80/180
Ammonium Hydroxide	2–5 (as NH_3)	80/180	80/180	80/180		65/150	80/180	65/150		80/180
Ammonium Hydroxide	6–10 (as NH_3)	65/150	65/150	70/160		40/100	70/160	40/100		65/150
Ammonium Hydroxide	11–20 (as NH_3)	65/150	65/150	50/120		40/100	65/150	40/100		65/150
Ammonium Hydroxide	21–28 (as NH_3)	50/120	40/100	50/120		40/100	50/120	40/100		40/100
Ammonium Hydroxide	29–30 (as NH_3)	40/100	40/100			40/100	40/100	40/100		40/100
Ammonium Hydroxide/Ammonium Chloride/Ammonium Carbonate <1>	30 (as NH_3):35:5	40/100	40/100				40/100	40/100		40/100
Ammonium Lauryl Sulfate	All	50/120	50/120	55/130		50/120	50/120	50/120		50/120
Ammonium Ligno Sulfonate	All	80/180	80/180			80/180	80/180	80/180		65/150
Ammonium Metatungstate (AMT) (pH 3.3)	50						LS80/180			

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Ammonium Molybdate	All	65/150								65/150
Ammonium Nitrate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ammonium Nitrate/Urea/Water (fertilizer)	up to 40/up to 50/ balance						50/120			
Ammonium Oxalate	All	65/150	65/150							
Ammonium Pentaborate	All	50/120	50/120							50/120
Ammonium Perchlorate	All	75/170								
Ammonium Persulfate <21>	All	100/210	100/210	80/180	80/180	100/210 <24>	100/210	100/210	80/180	80/180
Ammonium Phosphate, dibasic <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ammonium Phosphate, monobasic <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ammonium Polysulfide	All	50/120	50/120			65/150				50/120
Ammonium Propionate	All	25/80	25/80			40/100	25/80	25/80		NR
Ammonium Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ammonium Sulfate/Ethyl Alcohol/Ethoxylate	60:15:3	40/100	50/120			65/150	40/100	50/120		40/100
Ammonium Sulfate/Manganous Sulfate/Sulfuric Acid (concentrations in g/l)	up to 150:up to 15:up to 40			50/120	50/120		50/120			
Ammonium Sulfide (Bisulfide)	All	50/120	50/120	50/120	50/120	50/120	50/120		50/120	50/120
Ammonium Sulfite	All	65/150	65/150	40/100	40/100	65/150	65/150		40/100	65/150
Ammonium Thiocyanate	All	50/120	50/120	50/120	50/120	50/120	50/120	50/120	50/120	
Ammonium Thioglycolate	All	40/100	40/100			40/100	40/100	40/100		
Ammonium Thiosulfate	All	40/100	40/100			40/100	60/140	60/140	40/100	
Amyl Acetate	> 0.5	20/70	40/100	40/100	50/120	50/120	NR		50/120	
Amyl Acetate/Xylene	30:70			50/120						
Amyl Alcohol	100	50/120	60/140	95/200	95/200	65/150	50/120	60/140	95/200	50/120
Amyl Alcohol, Vapor	100	50/120	100/210			100/210	50/120	100/210		
Amyl Chloride	100	50/120	50/120	50/120	50/120	50/120	50/120	50/120	50/120	

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Anaerobic Sewage	All	30/85		30/85	30/85	30/85	30/85		30/85	
Aniline	20	40/100	40/100			40/100	40/100	40/100		
Aniline	100	NR	NR	NR	NR	20/70	NR	NR	NR	NR
Aniline Hydrochloride	> 0.5	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	
Aniline Sulfate <21>	> 0.5	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	
Animal Fat <21>	100	80/180	100/210							
Anionic Surfactant	All	40/100	50/120			50/120	40/100	50/120		
Anionic/Cationic Polymer Emulsions in Kerosene or Petroleum Distillates/Water	0–50	40/100	50/120			50/120				
Anodize (15% Sulfuric Acid)		100/210	100/210			100/210	100/210	100/210		
Anthraquinone Disulfonic Acid	1	65/150		65/150			65/150			
Antimony Pentachloride, for aqueous solutions, see Hydrochloric Acid	> 99	40/100	40/100	30/90		40/100	40/100	40/100		40/100
Antimony Trichloride	100	95/200		105/220	105/220		95/200		105/220	
Aqua Regia (concentrated Hydrochloric Acid/Nitric Acid, 3:1) <2,6,9>				NR	NR		NR		NR	
Aromatic Naphtha/Naphthalene/Isopropanol	60:5:10		50/120			50/120		50/120		
Arsenic Acid	> 0.5	80/180	80/180			80/180	80/180	80/180		
Arsenic Acid/Copper Sulfate/Sodium Dichromate	17:37:20	80/180	80/180			80/180	80/180	80/180		
Arsenic Pentoxide/Copper Oxide/Chromic Acid	17:9:24	40/100	40/100			40/100	40/100	40/100		40/100
Arsenious Acid	19°Be	80/180	80/180			80/180	80/180	80/180		65/150
Barium Acetate	All	80/180	80/180	90/195	80/180	80/180	90/195	80/180	80/180	
Barium Bromide <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Barium Carbonate (slurry)	All	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Barium Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Barium Cyanide	All	65/150	65/150			65/150	65/150	65/150		65/150
Barium Hydroxide <21>	> 0.5	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150
Barium Sulfate	All	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Barium Sulfide <21>	All	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	80/180
Barley Solution <18>	> 0.5	75/170	75/170							
Beer <18>	> 0.5	50/120	50/120							
Beet Sugar Liquor <18>	> 0.5	80/180	80/180	80/180	80/180				80/180	
Benzal Chloride (Benzyl Dichloride)	100	NR								
o-Benzoyl Benzoic Acid	All	100/210	100/210			100/210	100/210	100/210		65/150
Benzaldehyde	100	NR	NR			20/70	NR	NR	NR	NR
Benzalkonium Chloride	Dilute	40/100	40/100							40/100
Benzene	100	NR	NR	40/100	40/100	40/100; LS 50/120	NR	LS 50/100	40/100; LS 50/100	NR
Benzene, vapor		25/80	25/80			50/120	NR	25/80		NR
Benzene/Methyl Tertiary Butyl Ether	80:20	NR	NR			40/100	NR	LS		NR
Benzene/Ethyl Benzene/Toluene/Trimethyl Benzene/Xylene	All	NR	NR			40/100	NR	LS		NR
Benzene/Ethylbenzene	33:67	NR	25/80			40/100	NR	25/80		NR
Benzenesulfonic Acid <6>	All	65/150	65/150	80/180	80/180	65/150	65/150	65/150	80/180	65/150
Benzenesulfonic Acid/Sulfuric Acid/balance Water	88:7	60/140		60/140			60/140			
Benzenesulfonyl Chloride	100	NR	NR			LS	NR	NR		NR
Benzoic Acid	Sat'd	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	80/180
Benzotrichloride	100	NR					NR			
Benzoyl Chloride	100	NR					NR			
Benzoylbenzoic Acid (o-)	100	100/210	100/210	100/210	100/210	100/210	100/210		100/210	
Benzyl Alcohol	20	40/100	50/120			50/120	40/100	50/120		40/100
Benzyl Alcohol	100	NR	25/80	40/100	40/100	40/100	NR	25/80	25/80	NR
Benzyl Chloride <2>	All	NR	NR	25/80	25/80	40/100	NR	NR	25/80	NR
Benzyltrimethylammonium Chloride	60	40/100	40/100			40/100	40/100	40/100		
Biocide Chlorphenate (organic sulfur type, blend)	100	50/120		50/120			50/120			
Biodiesel/FAME (max. 0.2% Methanol)		80/180	80/180		80/180	80/180	80/180	80/180	80/180	
Black Liquor (pulp & kraft mill) <1,2>	Thin	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	
Black Liquor, thick, heavy (pulp & kraft mill) <1,2>	Thick	95/200	105/220			105/220	105/220	105/220		

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Black Liquor recovery, furnace gases <6,16>		165/325	175/350	115/240	115/240	205/400	165/325	175/350	115/240	
Bleach (please check the composition of the product and refer to the type of bleaching agent used like Hydrogen Peroxide, Sodium Hypochlorite, etc.) <14>										
Blow Down (non-condensable gases from pulp digester; i.e., Dimethyl Sulfide and Mercaptanes) <8>		120/250	120/250			120/250	120/250	120/250		
Borax (Sodium Borate, Sodium Tetraborate) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Boric Acid	> 0.5	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	80/180
Boron Trichloride, scrubbing	> 0.5	65/150	65/150			65/150	65/150	65/150		
Brake Fluid	100	50/120	50/120	50/120	50/120	50/120 <7>	50/120	50/120	50/120	50/120
Brass Plating Solution (3% Copper, 1% Zinc, 5.6% Sodium Cyanides, 3.0% Sodium Carbonate) <1>		80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Brine, chlorinated, pH < 2.5 <8,21>	All	80/180	80/180	80/180	80/180	95/200	80/180	95/200	80/180	
Brine, chlorinated, pH 2.5–9 <6>	All	40/100	40/100			40/100	40/100	40/100		40/100
Brine, chlorinated, pH > 9 <2,3,9>	All	80/180	80/180	65/150		65/150	80/180	65/150		
Brine Mixture (0.4% $MgSO_4$, 9.5% NaCl, 5.0% Na_2SO_4, 2.0% K_2SO_4, 7% $CaSO_4{:}2H_2O$, 3% $Na_2SO_3{:}9H_2O$, pH 7)		100/210	100/210			100/210	100/210	100/210		80/180
Brine, salt <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Brominated Phosphate Ester	> 0.5					50/120				
Bromine Water, laboratory reagent	3.2 g in 100 g water			95/200			80/180			
Bromine, dry gas	100	40/100	40/100	40/100	40/100	40/100 <7>	40/100	40/100	40/100	40/100
Bromine in Water (no pure Bromine phase)	< Sat'd	75				80/180				
Bromine, liquid	100	NR	NR			NR	NR	NR		NR
Bromine, wet gas	100	40/100	40/100	30/90	30/90	40/100	40/100	40/100	30/90	40/100
Bronze Plating Solution (4% Copper, 5% Sodium Cyanides, 3% Sodium Carbonate, 4.5% Rochelle Salts)		80/180		80/180	80/180				80/180	
Brown Stock		95/200	95/200	80/180		80/180	95/200	80/180		

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Bunker C Fuel Oil (heavy fraction)	100	100/210	105/220			105/220	100/210	105/220		65/150
Butadiene, gas <2>	100	45/110	45/110			45/110	45/110	45/110		45/110
Butane	100	60/140	60/140			60/140	65/140	60/140		60/140
Butanol	100	50/120	50/120			65/150	50/120	50/120		NR
Butyl Acetate	100	NR	25/80	30/90	30/90	30/90	NR	25/80	30/90	NR
Butyl Acrylate	100	NR	NR			25/80	NR	NR		NR
Butyl Alcohol	100	50/120	50/120	50/120	50/120	65/150	50/120	50/120	50/120	NR
Butyl Ether, see Dibutyl Ether (-n)										
Butyl Alcohol/Benzene	93:4	NR	40/100			50/120	NR	40/100		NR
Butyl Amine	100	NR	NR			LS	NR	NR		NR
Butyl Benzoate	70					40/100				
Butyl Benzyl Phthalate	100	80/180	100/210			100/210	80/180	100/210		
Butyl Chloride	0.1–100	NR	LS			25/80	NR	LS		NR
Butyl Hypochlorite	98	NR	NR			NR	NR	NR		NR
Butyl Stearate (5% in Mineral Spirits)		40/100	40/100							
Butylene Glycol	100	70/160	80/180	80/180	80/180	80/180	70/160	80/180	80/180	
Butylene Oxide	100	NR	NR			LS	NR	NR		NR
Butyraldehyde	100	NR	NR			40/100	NR	NR		NR
Butyric Acid <21>	0.5–50	100/210	100/210	80/180	100/210	100/210	100/210	100/210	100/210	
Butyric Acid	51–70	50/120		50/120	50/120		50/120		50/120	
Butyric Acid	71–100	25/80	50/120	40/100	50/120	50/120	25/80	50/120	50/120	
Cadmium Chloride <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Cadmium Cyanide Plating Solution (3% Cadmium Oxide, 10% Sodium Cyanide, 1.2% Sodium Hydroxide) <1>		80/180	80/180	105/220		80/180	80/180	80/180		80/180
Calcium Bisulfite <21>	All	100/210	100/210	80/180	80/180	100/210 <24>	100/210	100/210	80/180	80/180
Calcium Bromide <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Calcium Carbonate (slurry) <21>	All	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Calcium Chlorate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Calcium Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Calcium Hydroxide <1>	100	100/210	100/210	40/100	40/100	100/210	100/210	100/210	40/100	80/180
Calcium Hydroxide (slurry) <1>	0.5–25	80/180	65/150			40/100	80/180	65/150		65/150
Calcium Hypochlorite <2,3,5,9,17>	All	80/180	80/180	70/160	70/160	40/100	80/180	80/180	70/160	80/180
Calcium Nitrate	> 0.5	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	80/180
Calcium Sulfate (slurry) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Calcium Sulfite <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Cane Sugar Liquor & Sweetwater <18>	All	80/180	80/180							
Capric Acid (Decanoic Acid) <4>	> 0.5	80/180	80/180			80/180	80/180	80/180		80/180
Capric Acid/Lauric Acid/Fatty Acids (C10-C18)	70:15:15	80/180	80/180			95/200	80/180	80/180		80/180
Caproic Acid (Hexanoic Acid)	100	25/80	50/120			50/120	25/80	50/120		25/80
Caprolactam	0–50	40/100	40/100			40/100	40/100	40/100		40/100
Caprolactam	100	NR	NR			LS	NR	NR		NR
Caprolactone	100	NR	NR			LS	NR	NR		NR
Caprylic Acid (Octanoic Acid)	100	80/180	100/210			100/210	80/180	100/210		
Caramel <18>	All	50/120	50/120							
Carbon Dioxide Gas <16>	All	165/325	175/350	120/250	120/250	205/400	165/325	175/350	120/250	80/180
Carbon Disulfide	100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Carbon Disulfide (no condensation or coalescence)	Fumes	40/100	65/150	40/100	65/150	65/150	40/100	65/150	65/150	NR
Carbon Monoxide Gas <16>	All	165/325	175/350	120/250		205/400	165/325	175/350	175/350	80/180
Carbon Tetrachloride	100	50/120	50/120	50/120	50/120	65/150			50/120	
Carbon Tetrachloride (no condensation or coalescence)	Fumes	80/180	95/200	65/150	95/200	95/200	80/180	95/200	95/200	
Carbonic Acid	All			70/160			70/160			

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration %	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin 411 °C/°F	441 °C/°F	451 °C/°F	455 °C/°F	470 °C/°F	510A/B/C °C/°F	510N °C/°F	515 °C/°F	8084 °C/°F
Carbonic Acid/Magnesium Salt	All	80/180	80/180	80/180	80/180		80/180		80/180	
Carboxyethyl Cellulose	10	65/150	65/150			65/150	65/150	65/150		65/150
Carboxymethyl Cellulose	10	65/150		80/180	65/150		65/150		65/150	
Cashew Nut Oil	100	65/150	65/150							
Castor Oil (Ricinus Oil)	100	70/160	70/160	50/120	50/120	70/160	70/160	70/160	50/120	70/160
Cationic/Anionic Polymer Emulsions in Kerosene or Petroleum Distillates/Water	0–50	40/100	50/120			50/120				
Caustic, see Sodium Hydroxide										
Cerous Nitrate	All	30/90		30/90	30/90		30/90		30/90	
Cetyl Alcohol (Hexadecanol)	100	65/150	80/180			80/180	65/150	80/180		50/120
Chlordimeform Insecticide	100	25/80	50/120			50/120	25/80	50/120		
Chloric Acid	All	25/80	25/80			25/80	25/80	25/80		25/80
Chlorinated Brine; see Brine, chlorinated										
Chlorinated Paraffin Wax	100	80/180		95/200	80/180		80/180		80/180	
Chlorinated Pulp <6>	All	80/180	90/195		95/200	95/200	90/195	95/200	95/200	
Chlorinated Solvent Recovery, see specific solvents										
Chlorinated Wax	All	80/180	80/180			80/180	80/180	80/180		
Chlorination Washer (hoods & vent systems)	Fumes	80/180	95/200			95/200	80/180	95/200		65/150
Chlorine Dioxide Generator Effluent, R2 system <6>		65/150	80/180	80/180		80/180	65/150	80/180		65/150
Chlorine Dioxide (<1 g/l) <6>				80/180	80/180		60/140		80/180	
Chlorine Dioxide (chilled liquid) <6>				7/45			7/45			
Chlorine Dioxide Scrubber <1,2,3>		75/170	75/170				75/170			
Chlorine Dioxide, Chlorine (bleaching solution, with or without pulp) <6>	All	80/180	90/195			95/200	90/195	95/200		
Chlorine Dioxide, no Chlorine (bleaching solution, with or without pulp) <6>	All	80/180	90/195			95/200	90/195	95/200		
Chlorine Dioxide, solution storage <9>	Sat'd	20/70	20/70			20/70	20/70	20/70		
Chlorine Water, see Brine, chlorinated										
Chlorine, dry gas <2,8,17>	100	80/180	90/195	100/210	100/210	100/210	80/180	100/210	100/210	65/150

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration %	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
		°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Chlorine, wet gas, acidic pH <2,8,17>	100	80/180	90/195	80/180	80/180	100/210	80/180	100/210	80/180	65/150
Chlorine/Chlorine Dioxide/Sulfur Dioxide	0.8:2:0.7	95/200	95/200			95/200	95/200	95/200		80/180
Chlorine-Hydrogen Chloride, with aqueous condensate <8,9,12,16>	8–10% HCl	80/180	100/210			100/210; LS 175/350	80/180	100/210		80/180
Chloroacetic Acid (Monochloroacetic Acid)	1	50/120	50/120	50/120	50/120	50/120	50/120	50/120	50/120	
Chloroacetic Acid	2–25	50/120	50/120	40/100	40/100	50/120	50/120	50/120	40/100	
Chloroacetic Acid	26–50	40/100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	
Chloroacetic Acid	51–79	25/80	25/80			30/90	25/80	30/90		
Chloroacetic Acid	80–85	25/80	25/80			25/80	25/80	25/80		
Chloroacetic Acid	86–100	NR	NR			LS	NR	NR		NR
Chlorobenzene	1			25/80	25/80				25/80	
Chlorobenzene	100	NR	25/80	25/80	25/80	40/100	NR	25/80	25/80	NR
Chlorodifluoromethane <1>	100	25/75		25/75			25/80			
Chlorofluorocarbon (CFC): R-11 (Trichlorofluoromethane), R-12 (Dichlorodifluoromethane) <1>	100	25/80	40/100			40/100	25/80	40/100		NR
Chlorofluorocarbon (CFC): CFC-113 (Trichlorotrifluoroethane) <1>		40/100	40/100			40/100	40/100	40/100		
Chloroform	100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Chloroform (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Chloroform/Dichloroethane/Methylene Chloride	All	NR	NR			LS	NR	NR		NR
Chloropentane (1 to 5 Cl)	100	40/100	50/120			55/130	40/100	50/120		NR
Chloropicrin (Nitrochloroform)	100	NR	NR			LS	NR	NR		NR
Chloropyridine (tetra)	100	25/80	50/120			50/120	25/80	50/120		NR
Chlorosulfonic Acid	10	NR	NR			NR	NR	NR		NR
Chlorosulfonic Acid	100	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chlorotoluene	100	25/80	40/100			40/100	25/80	40/100		NR
N-Chloro-o-Tolyl (insecticide emulsion)	10	50/120	50/120			50/120	50/120	50/120		
Choline Chloride	All	50/120	65/150			65/150	50/120	65/150		50/120
Chrome Plating Solution (19% Chromic Acid with Sodium Fluorosilicate and Sulfate) <1>		50/120	50/120	40/100		65/150	50/120	50/120	50/120	50/120

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Chrome Reduction Process <6>	25	90/195					90/195			
Chromic Acid <2>	0.5–10	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150
Chromic Acid <2>	11–20	50/120	65/150	50/120	50/120	65/150	65/150	65/150	50/120	50/120
Chromic Acid <2>	25					55/100				
Chromic Acid <2>	30	LS	LS	NR	NR	LS	LS	LS	NR	
Chromic Acid <2>	40	NR	NR	NR	NR	LS	NR	NR	NR	
Chromic Acid/Nitric Acid mixture <2>	5:10	40/100	50/120			65/150	40/100	40/100		40/100
Chromic Acid: Sodium Metabisulfite <2>	15:45	50/120	65/150			65/150	65/150	65/150		50/120
Chromic Acid/Sulfuric Acid mixture (Maximum total concentration 10%) <2>	10	50/120	65/150			65/150	50/120	65/150		50/120
Chromic Acid/Sulfuric Acid <2>	3:16	NR					NR			
Chromic Acid/Sulfuric Acid <2>	20:20	NR					NR			
Chromium Plate, electroplating with a salt solution (with Sulfuric Acid: not recommended)		55/130	55/130			55/130	55/130	55/130		55/130
Chromium Sulfate, water-soluble forms (Chromous Sulfate) <21>	All	100/210	100/210	65/150	65/150	100/210 <24>	100/210	100/210	65/150	80/180
Citric Acid	> 0.5	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	65/150
Cleaner (heavy-duty phenolic-based disinfectant cleaner) <14>	100			40/100			40/100			
Cleaner, liquid (biodegradable, all purpose) <14>		40/100		40/100			40/100			
Clopidol <4>	All					40/100		40/100		
Cobalt Chloride <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Cobalt Chloride reactor (Hydrochloric Acid/Sulfuric Acid) <10>	40		95/200							
Cobalt Citrate	12	80/180	80/180			80/180				50/120
Cobalt Nitrate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Cocamidopropyl Betaine	100	50/120		50/120			50/120			
Cocamidopropyl Dimethylamine	100	50/120		50/120			50/120			
Coconut Oil <18>	100	80/180	95/200	80/180	80/180	95/200	80/180	95/200	80/180	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Cod Liver Oil <18>	100	40/100	40/100						40/100	
Copper Acetate	All	70/160		80/180			70/160			
Copper Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Copper Chloride/Ammonium Chloride/Ammonium Hydroxide, see Ammonium Hydroxide	26:5:2									
Copper Cyanide <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Copper Cyanide Plating Solution (10.5% Copper, 14% Sodium Cyanides, 6% Rochelle Salts)		70/160	70/160	80/180	80/180	70/160	70/160	70/160	80/180	70/160
Copper Cyanide/Potassium Cyanide/Potassium Hydroxide <1>	7:2.5:2	65/150	40/100			25/80	65/150	25/80		
Copper Matte Dipping Bath (30% Iron Chloride, 19% Hydrochloric Acid) <8,9,13>		80/180	95/200	95/200	95/200	95/200	95/200	95/200		80/180
Copper Nitrate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Copper Plating Solution (45% Cu(BF4)2, 19% Copper Sulfate, 8% Sulfuric Acid) <1>		80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Copper Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Copper Sulfate, ammoniated <21>	All			90/195	90/195		90/195		90/195	
Corn Oil <18>	100	80/180	100/210	95/200	100/210	100/210	80/180	100/210	100/210	65/150
Corn Starch <18>	Slurry	100/210	100/210	105/220	100/210		100/210		100/210	
Corn Sugar/Syrup (Glucose) <18>	All	80/180	80/180							
Cottonseed Oil <18>	100	100/210	100/210	95/200	100/210	100/210	100/210	100/210	100/210	65/150
Crude Oil, sweet and sour	100	100/210	120/250			120/250	100/210	120/250	-	65/150
Cumene	100	25/80	50/120			50/120	25/80	50/120		25/80
Cumene/Toluene/Xylene	All	25/80	40/100			50/120	25/80	50/120		NR
Cupric Chloride, see Copper Chloride										
Cyanide Disposal (reacts with Hypo to form Sodium Thiosulfite)			40/100			40/100				
Cyanuric Acid	All	25/80	40/100			50/120	25/80	40/100		
Cyanuric Chloride <4>	All	50/120	50/120			50/120	50/120	50/120		50/120

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Cyclohexane	100	50/120	65/150	65/150	65/150	65/150	50/120	65/150	65/150	
Cyclohexane (no condensation, no coalescence)	Fumes	80/180		80/180			80/180			
Cyclohexylamine	100		LS			40/100		LS		
Cyclopentane	100	40/100	45/110			50/120	40/100	45/110		
Dalapon/Sodium Salt (2,2-Dichloropropionic Acid and Sodium Salt)	100	NR	25/80			40/100	NR	25/80		NR
Decanoic Acid <4>	> 0.5	80/180	80/180			80/180	80/180	80/180		80/180
Decanol	100	50/120	65/150			80/180	50/120	65/150		
Deionized Water <2>	100	80/180	80/180			80/180	80/180	80/180		80/180
Demineralized Water <2>	100	80/180	80/180			80/180	80/180	80/180		80/180
Detergent, dishwashing liquid (biodegradable) <14>	100	40/100		40/100			40/100			
Detergents, sulfated <21>	1–50	100/210		105/220	80/180		100/210		80/180	
Detergents, sulfonated	100	100/210		105/220			100/210			
De-waxed Paraffin Distillate	100	80/180	80/180			80/180	80/180	80/180		65/150
Di (2-Ethylhexyl) Phosphoric Acid (DEHPA) in Kerosene	20	50/120		65/150			50/120		80/180	
Diacetone Alcohol	10		40/100			50/120	40/100	50/120		
Diacetone Alcohol	100	NR	NR			LS	NR	NR		NR
Diallyl Phthalate	All	80/180	100/210	100/210	100/210	100/210	80/180	100/210	100/210	65/150
Diammonium Phosphate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Dibasic Acid (51-61% Glutaric Acid/18-28% Succinic Acid/ 15-25% Adipic Acid/2% Nitric Acid)	> 0.5–50	80/180	95/200			95/200	80/180	95/200		80/180
Dibromonitrilo-Propionamide	100	NR	25/80			40/100	NR	25/80		NR
Dibromophenol	100	NR	40/100			40/100	NR	40/100		NR
Dibromopropane	100	NR	25/80			40/100	NR	25/80		NR
Dibromopropanol	100			NR		40/100	NR			
Dibutyl Carbitol (Diethylene Glycol Dibutyl Ether)	100	25/80	40/100			40/100	25/80	40/100		
Dibutyl Ether	100	25/80	50/120	50/120	50/120	80/180	25/80	65/150	50/120	
Dibutyl Phthalate	100	80/180	80/180	95/200	95/200	100/210	65/150	80/180	95/200	

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Dibutyl Sebacate	100	50/120	65/150	100/210		65/150	100/210	65/150	65/150	
Dichloroacetic Acid, see Chloroacetic Acid										
Dichlorobenzene (ortho and para)	100	NR	40/100	40/100		50/120	NR	40/100		NR
Dichloroethane	100	NR	NR	NR	NR	25/80	NR	NR	NR	NR
Dichloroethylene	100	NR	NR			LS	NR	NR		NR
Dichloromethane (Methylene Chloride)	100	NR	NR			LS	NR	NR		NR
Dichlorophenol (DCP)	100	NR					NR			
2,4-Dichlorophenoxyacetic Acid (acid, salt, ester formulations) <4>		50/120	50/120			50/120	50/120	50/120		
Dichloropropane	100	NR	25/80			40/100	NR	25/80		NR
Dichloropropane/Dichloropropene mixture		NR		NR	NR		NR			
Dichloropropene	100	NR	NR	NR	NR	25/80	NR	NR	NR	NR
Dichloropropene/Dichloropropane mixture		NR		NR	NR		NR			
Dichloropropionic Acid	100	NR	25/80	NR	NR	40/100	NR	25/80	NR	NR
Dichlorotoluene	100	25/80	50/120			50/120	25/80	50/120		NR
Dicoco Dimethyl Ammonium Chloride <21>	All	50/120		50/120			50/120			
Diesel Fuel	100	80/180	100/210	95/200	95/200	100/210	80/180	100/210	95/200	65/150
Diethanolamine	100	50/120	50/120	50/120	50/120	65/150	50/120	50/120	50/120	
Diethanolamine/Ethanolamine	80:20	50/120	50/120			50/120	50/120	50/120		
Diethyl Carbonate	100	NR	25/80	NR		40/100	NR	25/80	25/80	NR
Diethyl Ether	100	NR	NR			NR	NR	NR		NR
Diethyl Formamide	20	40/100	40/100			40/100	40/100	40/100		NR
Diethyl Formamide	100	NR	LS			40/100	NR	LS		NR
Diethyl Hydroxylamine	100	NR	NR			LS	NR	NR		
Diethyl Ketone	20	40/100	45/110			50/120	40/100	40/100		40/100
Diethyl Ketone	100	NR	NR	NR	25/80	25/80	NR	NR	25/80	NR
Diethyl Sulfate	100	40/100	50/120	40/100	40/100	50/120	40/100	50/120	40/100	
Diethylamine	20	40/100	40/100			40/100	40/100	40/100		NR

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Diethylamine	100	NR	NR	NR		LS	NR	NR		NR
Diethylaminoethanol	100	50/120	50/120			50/120	50/120	50/120		40/100
Diethylbenzene	100	40/100	65/150	50/120	65/150	65/150	40/100	65/150	65/150	NR
Diethylene Glycol	100	80/180	100/210	100/210	100/210	100/210	80/180	100/210	100/210	80/180
Diethylene Glycol Dimethyl Ether	20	40/100	40/100			40/100	40/100	40/100		NR
Diethylene Glycol Dimethyl Ether	100	NR	NR			25/80	NR	NR		NR
Diethylene Glycol Butyl Ether (2-(2-Butoxyethoxy)ethanol)	100	40/100	40/100	30/90	40/100	40/100	40/100	40/100	40/100	NR
Diethylene Glycol Monomethyl Ether	100	NR	NR			LS	NR	NR		NR
Diethylene Triamine Pentaacetic Acid	All	40/100	50/120			50/120	50/120	50/120		
Diethylene Triamine Pentaacetic Acid/Sodium Salt	40	40/100	50/120			50/120	50/120	50/120		
Di-2-Ethylhexyl Phosphoric Acid (DEHPA) in Kerosene	20	80/180	80/180			80/180	80/180	80/180		
Diglycolamine (Aminoethoxyethanol)	20	40/100	50/120			50/120	40/100	50/120		40/100
Diglycolamine (Aminoethoxyethanol)	50	40/100	40/100			40/100	40/100	40/100		40/100
Diglycolamine (Aminoethoxyethanol)	100	NR	NR			LS	NR	NR		NR
Diisobutyl Ketone	100	NR	50/120			50/120	NR	50/120		NR
Diisobutyl Phthalate	100	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150	
Diisobutylene	100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	25/80
Diisonoyl Phthalate	100	65/150	100/210			100/210	65/150	100/210		65/150
Diisopropanolamine	100	50/120	50/120	50/120	50/120	65/150	50/120	50/120	50/120	40/100
Dimethyl Acetamide	20	40/100	40/100			40/100	40/100	40/100		NR
Dimethyl Acetamide	100	NR	NR			LS	NR	NR		NR
Dimethyl Acetamide (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Dimethylamine	20	40/100	40/100			40/100	40/100	40/100		40/100
Dimethylamine	40	LS	LS			LS	LS	LS		NR
2,4-D Dimethylamine Salt	67	50/120	50/120			50/120	50/120	50/120		
Dimethylammonium Hydrochloride (Dimethylamine HCl)	70	40/100	40/100			50/120 <7>	40/100	40/100		40/100

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Dimethylaniline	100	NR	LS			40/100	NR	25/80		LS
Dimethylcarbonate	100	NR	NR			NR	NR	NR		NR
Dimethylethanolamine	20	50/120	50/120			60/140				
Dimethylethanolamine	100	25/80	30/85			40/100	25/80	30/85		NR
Dimethylformamide	20	40/100	40/100			40/100	40/100	40/100		
Dimethylformamide	30	NR					NR			
Dimethylformamide	100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Dimethylformamide (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Dimethylformamide/Acetonitrile/Methanol	26:9:7	NR	NR			LS	NR	NR		NR
Dimethylmorpholine	100	NR	25/80	40/100		50/120	NR	25/80	25/80	NR
Dimethyl Phthalate	100	65/150	80/180	65/150		80/180	65/150	80/180	80/180	
Dimethyl Sulfate	20	40/100	50/120			50/120	40/100	50/120		40/100
Dimethyl Sulfate	100	NR	LS			LS	NR	NR		NR
Dimethyl Sulfide	100	NR	LS			25/80	NR	25/80		NR
Dimethyl Sulfoxide (DMSO)	20	40/100	40/100			40/100	40/100	40/100		40/100
Dimethyl Sulfoxide (DMSO)	100	NR	LS			LS	NR	NR		NR
2,2-Dimethyl Thiazolidine	1	65/150	80/180			80/180	65/150	80/180		
Dimethyltin Dichloride/Methyltin Trichloride (90/10) in aqueous solution <7>	50					45/110				
Dioctyl Phthalate	100	65/150	100/210	65/150	65/150	100/210	65/150	100/210	65/150	65/150
Dioxane	100	NR		NR			NR			
Diphenylmethane-4,4-Diisocyanate (MDI)	100	NR	NR			NR	NR	NR		NR
Diphenyl Oxide (Diphenyl Ether, Phenyl Ether)	100	25/80	40/100	50/120	50/120	50/120	25/80	50/120	50/120	NR
Dipotassium Phosphate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Dipropylene Glycol	100	80/180	100/210	100/210	100/210	100/210	80/180	100/210	100/210	65/150
Dipropylene Glycol Dibenzoate	100	50/120		50/120			50/120			
Dipropylene Glycol Methyl Ether (2-(2-Methoxypropoxy)-1-Propanol)	20	40/100	50/120			65/150	50/120	65/150		40/100

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Dipropylene Glycol Methyl Ether (2-(2-Methoxypropoxy)-1-Propanol)	100	NR	LS			20/70	NR	NR		NR
Dishwashing Detergent in solution <14>	All	80/180	80/180			65/150	80/180	65/150		80/180
Distilled Water <2>	100	80/180	80/180			80/180	80/180	80/180		80/180
Divinylbenzene	100	40/100	50/120	50/120		50/120	40/100	50/120	50/120	NR
Dodecane	100	25/80		50/120	50/120		25/80		50/120	
Dodecanol (Lauryl Alcohol)	100	65/150	80/180	80/180	80/180	80/180	65/150	80/180	80/180	50/120
Dodecene	100	65/150	80/180		80/180	80/180	65/150	80/180	80/180	50/120
Dodecylbenzene Sulfonic Acid <6>	100	80/180	95/200	105/220		100/210	100/210	100/210	95/200	
Dodecylbenzene Sulfonic Acid/Sulfuric Acid/Water/Oil	85:10:4:1	65/150	65/150			65/150	65/150	65/150		65/150
Dodecyldimethylamine	100	80/180	95/200			100/210	80/180	95/200		
Dodecylmercaptan	100	80/180	95/200			100/210	80/180	95/200		
DOWTHERM* heat transfer agent	100	50/120	65/150			65/150	50/120	65/150		
Epichlorohydrin	100	LS	LS	NR	NR	25/80	NR	NR		NR
Epoxidized Castor Oil	100	40/100	40/100							40/100
Epoxidized Soybean Oil	100	65/150	65/150			65/150	65/150	65/150		65/150
Esters/Fatty Acid	100	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	65/150
Ethanol (Ethyl Alcohol)	10	50/120	50/120	65/150	65/150	65/150	50/120	50/120	65/150	50/120
Ethanol (Ethyl Alcohol)	50	40/100	40/100	65/150	65/150	65/150	40/100	40/100	65/150	NR
Ethanol (Ethyl Alcohol)	90–95	25/80	25/80	40/100	40/100	40/100	25/80	25/80	40/100	NR
Ethanol (Ethyl Alcohol)	100	NR	LS	40/100	40/100	40/100	NR	25/80	40/100	NR
Ethanol (Ethyl Alcohol, no condensation, no coalescence)	Fumes	65/150	65/150			80/180	80/180	80/180		65/150
Ethanol/Ethylacetate/Methanol/DMF	35:29:10:10	NR	NR			LS	NR	NR		NR
Ethanolamine	20	40/100	45/110			50/120	40/100	50/120		
Ethanolamine	100	25/80	30/90	30/90	25/80	40/100	25/80	30/90	25/80	NR
Ethanolamine/Ethylene Glycol Monobutyl Ether (alkaline film stripper)	30:57	NR					NR			
Ethephon	100		40/100			40/100				

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Ethoxy Acetic Acid	10		40/100			40/100		40/100		
Ethoxy Acetic Acid	100	NR	NR			LS	NR	NR		NR
Ethoxylated Alcohol, C12-C14	100	25/80	40/100			50/120	25/80	40/100		
Ethoxylated Alkyl Amines, C12 and higher	100	25/80	40/100			50/120	25/80	40/100		
Ethoxylated Nonyl Phenol	100	NR	LS			40/100	NR	LS		NR
Ethyl Acetate	1			NR	NR		NR		NR	
Ethyl Acetate	100	NR	LS	NR	NR	25/80	NR	LS	NR	NR
Ethyl Acetate (no condensation, no coalescence)	fumes					80/180	80/180	80/180		
Ethyl Acetate/Sodium Hydroxide <1,2>	4:0–50	50/120	50/120			40/100	50/120	40/100		
Ethyl Acrylate	100	NR	LS	NR	NR	25/80	NR	20/70	NR	NR
Ethyl Alcohol, see Ethanol										
Ethyl Amine	20	40/100	40/100			40/100	40/100	40/100		40/100
Ethyl Amine	70	NR	NR			LS	NR	NR		NR
Ethyl Benzene/Benzene	2:3/1:3 vol								25/80	
Ethyl Benzyl Chloride <2>	100	NR	NR			40	NR	NR		NR
Ethyl Bromide	100	NR	LS	NR	NR	LS	NR	LS	NR	NR
Ethyl Chloride	100	NR	LS	NR	25/80	25/80	NR	25/80	25/80	NR
Ethyl Ether	100	NR	NR			NR	NR	NR	NR	NR
Ethyl Silicate	100					40/100				
Ethyl Sulfate	100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	40/100
2-Ethylhexyl Alcohol	100	65/150	70/160			80/180	70/160	80/180		50/120
Ethyl-3-Ethoxy Propionate	100	NR	LS			25/80	NR	LS		NR
Ethylbenzene	100	25/80	40/100	40/100	50/120	50/120	25/80	40/100	40/100	
Ethylbenzene/Benzene	67:33	NR	25/80			40/100	NR	25/80		NR
Ethylene Chloride, see Dichloroethane										
Ethylene Chlorohydrin	20	40/100	50/120			65/150	50/120	65/150		40/100

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration %	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin 411 °C/°F	441 °C/°F	451 °C/°F	455 °C/°F	470 °C/°F	510A/B/C °C/°F	510N °C/°F	515 °C/°F	8084 °C/°F
Ethylene Chlorohydrin	100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	40/100	NR
Ethylene Diamine	20	40/100	40/100			40/100	40/100	40/100		40/100
Ethylene Diamine	100	NR	NR			LS	NR	NR		NR
Ethylene Dibromide	100	NR	NR			NR	NR	NR	NR	NR
Ethylene Dichloride, see Dichloroethane										
Ethylene Dichloride/Ethylene Dibromide/Tetra Ethyl Lead (above water solublity)	5:5:5	NR	NR			LS	NR	NR		NR
Ethylene Glycol	100	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	65/150
Ethylene Glycol based coolants	> 0.5	100/210	100/210			100/210	100/210	100/210		
Ethylene Glycol/Sulfuric Acid	0–40:0–10	65/150	80/180			80/180	80/180	80/180		
Ethylene Glycol Monobutyl Ether (2-Butoxyethanol)	20	40/100	50/120			65/150	50/120	65/150		40/100
Ethylene Glycol Monobutyl Ether (2-Butoxyethanol)	100	40/100	40/100	40/100	40/100	65/150	40/100	40/100	40/100	NR
Ethylene Glycol Monobutyl Ether/Ethanolamine (alkaline film stripper)	57:30						NR			
Ethylene Oxide	100	NR	NR			NR	NR	NR	NR	NR
Ethylenediaminetetraacetic Acid (EDTA)	All	80/180	80/180	30/90	40/100	80/180	80/180	80/180	40/100	80/180
Ethylenesulfonic Acid/Sodium Salt <6>	All	70/160	70/160			70/160	70/160	70/160		
Eucalyptus Oil <18>	100	60/140	60/140			60/140	60/140	60/140		
Fatty Acid/Sterol/Triglyceride	All	100/210	120/250			120/250	100/210	120/250		65/150
Fatty Acid/Sulfuric Acid <10>	5:2	100/210	100/210			100/210	100/210	100/210		
Fatty Acids	All	100/210	120/250	105/220	120/250	120/250	100/210	120/250	120/250	65/150
Ferric Acetate	All	80/180	80/180	80/180		80/180	80/180	80/180	80/180	
Ferric Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ferric Chloride/Ferrous Chloride	5:20	100/210	100/210			100/210	100/210	100/210		80/180
Ferric Chloride/Ferrous Chloride/Hydrochloric Acid	48:0.2:0.2	100/210	105/220			105/220	100/210	105/220		80/180
Ferric Chloride/ Hydrochloric Acid <2,8,9,12,13>	0–29:1–20	80/180	105/220			105/220	80/180	105/220		80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Ferric Nitrate <21>	All			100/210	100/210		100/210		100/210	
Ferric or Ferrous Sulfate/Sulfuric Acid	0–40:0–25	100/210	100/210			100/210	100/210	100/210		80/180
Ferric Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ferrous Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ferrous Chloride/Hydrochloric Acid <2,8,9,12,13>	0–29:1–20	80/180	100/210			100/210	80/180	100/210		80/180
Ferrous Chloride, Manganese Chloride, Ferric Chloride/ Hydrochloric Acid <2,8,9,12,13>	1–60:0–20	80/180	100/210			100/210	100/210	100/210		80/180
Ferrous Nitrate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Ferrous Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Fertilizer 32-0-0 (32% wt of total Nitrogen), Urea-Ammonium Nitrate solution		65/150	65/150			65/150	65/150	65/150		65/150
Fertilizer 8-8-8 (% wt of total Nitrogen, Phosphorus and Potassium)		65/150	65/150	65/150		65/150	65/150	65/150	65/150	65/150
Fertilizer Solution, Grades N-P-K:10-34-0	100			65/150			65/150			
Flue Gas, dry <16>	All	165/325	175/350	175/350	175/350	205/400	160/320	160/320		
Flue Gas, wet	All	80/180	100/210	100/210	100/210	100/210	80/180	100/210		80/180
Fluoboric Acid <1,2>	1–10	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	65/150
Fluoboric Acid <1,2>	11–100	100/210	100/210	95/200	95/200	100/210	100/210	100/210	95/200	65/150
Fluoride Salts/Hydrochloric Acid <1,2>	30:10	50/120	50/120			50/120	50/120	50/120		50/120
Fluorine in flue gas, wet <1,2>	2	80/180	100/210			100/210	80/180	100/210		80/180
Fluosilicic Acid (Fluorosilicic Acid, Hexafluorosilicic Acid) <1,2>	1	80/180		70/160	80/180	80/180	80/180		80/180	
Fluosilicic Acid (Fluorosilicic Acid, Hexafluorosilicic Acid) <1,2>	2–10	80/180	80/180	70/160	80/180	80/180	80/180	80/180	80/180	65/150
Fluosilicic Acid (Fluorosilicic Acid, Hexafluorosilicic Acid) <1,2>	11–20	60/140	60/140			60/140	60/140	60/140		60/140
Fluosilicic Acid (Fluorosilicic Acid, Hexafluorosilicic Acid) <1,2>	21–35	40/100	40/100	40/100	50/120	40/100	40/100	40/100	50/120	40/100
Fluosilicic Acid (Fluorosilicic Acid, Hexafluorosilicic Acid) <1,2>	Sat'd	40/100		40/100	40/100		40/100		40/100	
Fluosilicic Acid fumes <1,2>	All	80/180	80/180			80/180	80/180			65/150

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Fluosilicic Acid/Hydrofluoric Acid/Phosphoric Acid <1,2>	22:5:5	40/100	40/100			40/100	40/100	40/100		40/100
Fluozirconic Acid/Fluotitanic Acid/Ammonium Hydroxide <1,2>	5:4:3	40/100	40/100			40/100	40/100	40/100		40/100
Fly Ash Slurry		80/180	80/180		65/150	80/180	80/180	80/180	65/150	80/180
Formaldehyde	38	50/120	65/150	65/150	65/150	65/150	50/120	65/150	65/150	
Formaldehyde/Methanol	0–37:0–15	50/120	65/150			65/150	50/120	65/150		
Formamide	20	40/100	50/120			65/150	50/120	65/150		40/100
Formamide	100	20/70	20/70	LS40/LS100	40/100	20/70	20/70	20/70	40/100	
Formic Acid	10	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	65/150
Formic Acid	25	50/120	65/150	50/120	50/120	65/150	50/120	65/150	50/120	50/120
Formic Acid	50	50/120	50/120	50/120	50/120	50/120	50/120	50/120	50/120	
Formic Acid <2>	85	25/80	25/80	50/120	50/120	40/100	25/80	25/80	50/120	
Formic Acid <2>	100				40/100	40/100			40/100	
Fuel C (50:50 Isooctane/Toluene)	100					50/120				
Fuel C/Methyl t-Butyl Ether (MTBE) (Fuel C is 50:50 Toluene/ Isooctane)	85:15					50/120				
Fuel Oil	100	80/180	100/210	80/180	80/180	100/210	80/180	100/210		65/150
Furfural <11>	0–10	40/100	50/120	65/150	65/150	50/120	40/100	50/120	65/150	
Furfural <11>	11–100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Furfural in organic solvent <4,6>	0–20	NR	25/80			40/100	NR	40/100		
Furfural/Acetic Acid/Methanol	30:10:5	NR	NR			LS	NR	NR		NR
Furfuryl Alcohol <2>	20	40/100	50/120			65/150	40/100	50/120		40/100
Furfuryl Alcohol <2>	100	NR	NR			25/80	NR	NR	NR	NR
Gallic Acid	All	80/180	80/180			80/180	80/180	80/180		
Gasohol, 1-100% alcohol	100					40/100				
Gasoline, no alcohol	100					50/120				
Gluconic Acid	50			50/120			40/100			
Glucose <18>	All	80/180	80/180							

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Glutamic Acid <18>	50	50/120	50/120			50/120	50/120	50/120		
Glutaraldehyde	50	50/120	50/120			50/120	50/120	50/120		50/120
Glutaric Acid	50	50/120	50/120			50/120	50/120	50/120		
Glycerine	100	100/210	100/210	105/220	100/210	100/210	100/210	100/210	100/210	65/150
Glycine and derivatives	All	40/100	40/100			40/100	40/100	40/100		
Glycol	100	100/210	100/210			100/210	100/210	100/210		65/150
Glycolic Acid (Hydroxyacetic Acid)	0–70	50/120	50/120	50/120	50/120	65/150	50/120	65/150	50/120	50/120
Glyconic Acid	50	80/180	80/180			80/180	80/180	80/180		65/150
Glyoxal	40	40/100	40/100	25/80		40/100	40/100	40/100	40/100	
Glyoxylic Acid (Oxoacetic Acid)	25	NR		NR	NR		NR		NR	
Glyphosate	All		40/100			40/100		40/100		
Gold Plating Solution (23% Potassium Ferrocyanide, Potassium Gold Cyanide, Sodium Cyanide)		100/210	100/210	95/200	95/200	100/210	100/210	100/210	95/200	80/180
Green Liquor <1,2>	All	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Gypsum Slurry, see also Calcium Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Hard Chrome Plating Baths (with Sulfuric Acid–not recommended)		60/140	60/140							
Heptane	100	100/210	100/210	95/200	95/200	100/210	100/210	100/210	95/200	80/180
Heptane (no condensation, no coalescence)	Fumes	100/210	100/210			100/210	100/210	100/210		80/180
Hexachlorocyclopentadiene	100			80/180			80/180			
Hexachloroethane	100	LS	40/100			50/120	LS	40/100		NR
Hexadecanol	100	65/150	80/180			80/180	65/150	80/180		50/120
Hexafluorosilicic Acid, see Fluosilicic Acid										
Hexamethylenetetramine	40	40/100	50/120			50/120	40/100	50/120		
Hexane	100	70/160	70/160	70/160	70/160	70/160	70/160	70/160	70/160	
Hexanoic Acid	100	25/80	50/120			50/120	25/80	50/120		25/80
Hot Stack Gas, see Flue Gas										
Humid Air, trace sulfur fumes				95/200	95/200		95/200			

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Hydraulic Fluid (glycols) <14>	100	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	
Hydrazine	20		LS			LS	LS	LS		
Hydrazine	70	NR		NR	NR		NR		NR	
Hydrazine	100	NR	NR			LS	NR	NR		NR
Hydrazine/Sodium Phosphate	5:10		LS			LS	LS	LS		
Hydriodic Acid (57% Hydrogen Iodide)	40	65/150	65/150			65/150	65/150	65/150		65/150
Hydriodic Acid (57% Hydrogen Iodide)	100		40/100			40/100	40/100	40/100		
Hydrobromic Acid	1–25	80/180	80/180	105/220	105/220	80/180	80/180	80/180	105/220	80/180
Hydrobromic Acid	48	65/150	65/150	70/160	70/160	65/150	65/150	65/150	70/160	65/150
Hydrobromic Acid	62	40/100	40/100			40/100	40/100	40/100		40/100
Hydrobromic Acid/Bromine	40:2		40/100			40/100	40/100	40/100		
Hydrochloric Acid <9,13>	1–15	80/180	105/220	105/220	105/220	110/230	100/210	105/220	105/220	80/180
Hydrochloric Acid <2,8,9,13>	16–20	80/180	105/220	95/200	95/200	110/230	100/210	105/220	95/200	80/180
Hydrochloric Acid <2,8,9,13>	21–25	65/150	80/180	80/180	80/180	100/210	80/180	80/180	80/180	80/180
Hydrochloric Acid <2,8,9,13>	26–30	65/150	80/180			95/200	80/180	80/180		80/180
Hydrochloric Acid <2,8,9,13>	31–32	65/150	70/160	65/150	65/150	80/180 <15>	65/150	80/180 <15>	65/150	65/150
Hydrochloric Acid <2,8,9,13>	33–34	50/120	50/120			70/160 <15>	50/120	70/160 <15>		50/120
Hydrochloric Acid <2,8,9,13>	35–36	50/120	50/120	50/120	50/120	60/140 <15>	50/120	60/140 <15>	50/120	50/120
Hydrochloric Acid <2,8,9,13>	37	40/100	45/110	40/100	40/100	50/120 <15>	40/100	50/120 <15>	40/100	
Hydrochloric Acid, fumes <2,8,9,13,16>		100/210	175/350			175/350	100/210	175/350		80/180
Hydrochloric Acid, fumes/free Chlorine, dry above 210 °F/100 °C <2,8,9,12,13,16>			175/350			175/350		175/350		
Hydrochloric Acid/Aluminum (reactor)/Aluminum Chloride <2,8,9,12,13>	< 15% HCl	80/180	100/210				80/180			

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Hydrochloric Acid/Aluminum Chloride <2,8,9,12>	30:0–40	65/150	70/160			80/180 <15>	65/150	80/180 <15>		65/150
Hydrochloric Acid/Aluminum Chlorohydrate <2,8,9,12,13>	< 15:> 0.5	80/180	100/210			100/210	80/180	100/210		65/150
Hydrochloric Acid/Bromine/Chlorine <2,8,9,12,13>	22:0.1:0.1	65/150	80/180			100/210	80/180	80/180		80/180
Hydrochloric Acid/Calcium Chloride <2,8,9,12,13>	27:15	65/150	80/180			95/200	80/180	80/180		80/180
Hydrochloric Acid/Chlorine <2,8,9,12,13>	0.5–20% HCl	80/180	90/195			100/210	80/180	100/210		80/180
Hydrochloric Acid/Diethylene Triamine (as Hydrochloride)/ Ammonium Chloride <2,8,9,12,13>	33:10:10					65/150				
Hydrochloric Acid/Dissolved Organics <2,8,9,12,13>	0–33% HCl	NR				65/150 <15>				NR
Hydrochloric Acid/Ferric Chloride <2,8,9,12,13>	1–20:0–29	80/180	105/220			105/220	80/180	105/220		80/180
Hydrochloric Acid/Ferric Chloride/Organics <2,8,9,12,13>	28:35:1	NR	NR			65/150	NR	NR		NR
Hydrochloric Acid/Ferrous Chloride <2,8,9,12>	1–20:0–29	80/180	100/210			100/210	80/180	100/210		80/180
Hydrochloric Acid/Formaldehyde <2,8,9,12,13>	25:3	NR	NR			65/150	NR	NR		NR
Hydrochloric Acid/Hydrofluoric Acid <1,2,8,12,13>	36:1		40/100			40/100 <15>		40/100 <15>		
Hydrochloric Acid/Hydrofluoric Acid <1,2,8,12,13>	Max total % = 20	40/100	40/100			40/100	40/100	40/100		40/100
Hydrochloric Acid/Hydrofluoric Acid <1,2,8,12,13>	15:0.1–1	80/180	100/210			100/210	100/210	100/210		80/180
Hydrochloric Acid/Hydrofluoric Acid <1,2,8,12,13>	25:6	40/100	45/110			50/120	40/100	50/120		
Hydrochloric Acid/Hydrofluoric Acid <1,2,8,12,13>	0.5–20:0–1	65/150	80/180			80/180	65/150	80/180		
Hydrochloric Acid/Hydrofluoric Acid <1,2,8,12,13>	30:15					40/100				
Hydrochloric Acid/Hydrofluoric Acid/Phosphoric Acid/ Nitrobenzene <1,2,8,12,13>	15:1:1:0.5	NR	LS			40/100	NR	LS		NR
Hydrochloric Acid/Hydrofluoric Acid/Xylene <1,2,8,12,13>	15:15:70					NR				
Hydrochloric Acid/Phosphorus Acid <2,8,9,12,13>	2:70			80/180	80/180		80/180		80/180	
Hydrochloric Acid/Sodium Chloride <2,8,9,12,13>	5:Sat'd NaCl			100/210	100/210		100/210		100/210	
Hydrochloric Acid/Sulfuric Acid (iron and steel cleaning bath) <2,8,9,12,13>	9:23			95/200	100/210		95/200		100/210	
Hydrocyanic Acid	All	100/210	100/210	65/150	65/150	100/210	100/210	100/210	65/150	80/180
Hydrofluoric Acid <1,2,13>	1	65/150		65/150	65/150		65/150		65/150	

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration %	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin 411 °C/°F	441 °C/°F	451 °C/°F	455 °C/°F	470 °C/°F	510A/B/C °C/°F	510N °C/°F	515 °C/°F	8084 °C/°F
Hydrofluoric Acid <1,2,13>	5	65/150		50/120	50/120		50/120		50/120	
Hydrofluoric Acid <1,2,13>	10	65/150		40/100	40/100	65/150	65/150	65/150	40/100	65/150
Hydrofluoric Acid <1,2,13>	15			30/90	30/90	40/100	40/100	40/100	30/90	
Hydrofluoric Acid <1,2,13>	20	40/100	40/100	LS30/LS90	LS30/LS90	40/100	40/100	40/100	LS30/LS90	40/100
Hydrofluoric Acid/Nitric Acid <1,2,13>	15:15					40/100		40/100		
Hydrofluoric Acid/Nitric Acid <1,2,13>	6:20	50/120	50/120			60/140	55/130	60/140		40/100
Hydrofluoric Acid/Nitric Acid <1,2,13>	3–5:30–35	NR	NR			LS	NR	LS		NR
Hydrofluoric Acid/Nitric Acid/Sulfuric Acid <1,2,13>	8:20:2					60/140		60/140		
Hydrofluosilicic Acid, see Fluosilicic Acid										
Hydrofluosilicic Acid/Polyaluminum Chloride (Poly(aluminum hydroxy)chloride) <1,2>	1–22:1–35	40/100	40/100			40/100	40/100	40/100		40/100
Hydrofluosilicic Acid/Zinc Chloride <1,2>	20:All	40/100	40/100			40/100	40/100	40/100		40/100
Hydrogen Bromide, dry gas	100	80/180	80/180	80/180	80/180	100/210	80/180	100/210	80/180	80/180
Hydrogen Bromide, wet gas	100	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Hydrogen Chloride, dry gas <6,16>	100	100/210	175/350	105/220	120/250	175/350	100/210	175/350	120/250	80/180
Hydrogen Chloride, wet gas	100	100/210	110/230	105/220	105/220	110/230	100/210	110/230	105/220	80/180
Hydrogen Fluoride, dry gas/vapor (if wet, max. 40 °C/100 °F) <1,2,6>		80/180	80/180			80/180	80/180	80/180		80/180
Hydrogen Peroxide <2,3,6>	5	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150	65/150
Hydrogen Peroxide <2,3,6>	30	40/100	40/100	40/100	65/150	65/165	40/100	65/150	65/150	40/100
Hydrogen Peroxide <2,3,6>	35	25/80	30/90			40/100	30/90	40/100		NR
Hydrogen Peroxide <2,3,6>	50	NR	NR			LS	NR	NR		NR
Hydrogen Sulfide <6,16>	5	100/210	175/350			175/350	100/210	175/350		80/180
Hydrogen Sulfide, aqueous	All	100/210	100/210			100/210	100/210	100/210		80/180
Hydrogen Sulfide, dry gas	100	100/210	110/230	100/210	100/210	110/230	100/210	110/230	100/210	80/180
Hydrogen Sulfide, sewer gas		30/90		30/90			30/90			
Hydrogenated Tallow Alkyl Amine (C8-C18)	100	40/100	40/100							
Hydrosulfite Bleach, aqueous solution containing 5% Zinc Hydrosulfite and 2.5% Tripolyphosphate <5>		80/180	80/180			80/180	80/180	80/180		80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Hydroxyacetic Acid (Glycolic Acid)	0–70	50/120	50/120	50/120	50/120	65/150	50/120	65/150	50/120	50/120
Hydroxylamine Acid Sulfate (Hydroxylammonium Acid Sulfate (HAS)), reaction of Hydroxylamine Acid Disulfate with steam to form HAS, Sulfuric Acid, Ammonium Sulfate <21>	All		100/210			100/210				
Hypophosphorous Acid	0–50	50/120	50/120	30/90	30/90	50/120	50/120	50/120	30/90	50/120
Imidazoline Acetate/Solvent <2,4>	20	40/100	45/110			50/120	40/100	45/110		NR
Imidazoline Acetate/Solvent <2,4>	60	NR	LS			40/100	NR	NR		NR
Incinerator Gases, see Flue Gas										
Iodine, crystals	100	65/150	65/150			65/150	65/150	65/150		65/150
Iodine, vapor	100	65/150	65/150			80/180	65/150	65/150	65/150	65/150
Ion Exchange Resin, fine mesh resins		80/180	80/180			80/180	80/180	80/180		80/180
Iron and Steel Cleaning Bath (9% Hydrochloric Acid/ 23% Sulfuric Acid)		80/180	100/210			100/210	80/180	100/210		80/180
Iron Plating Solution (45% $FeCl_2$, 15% $CaCl_2$, 20% $FeSO_4$, 11% $(NH_4)_2SO_4$)		80/180	100/210	80/180	80/180	100/210	80/180	100/210	80/180	80/180
Iron Perchloride, see Ferric Chloride										
Isoamyl Alcohol	20	65/150	65/150			80/180	65/150	65/150		65/150
Isoamyl Alcohol	100	50/120	60/140	50/120	50/120	65/150	50/120	60/140	50/120	50/120
Isobutyl Alcohol	20	65/150	65/150			80/180	65/150	65/150		40/100
Isobutyl Alcohol	100	50/120	50/120			65/150	50/120	50/120		NR
Isodecanol	100	50/120	65/150	80/180	80/180	80/180	50/120	65/150	50/120	50/120
Isononyl Alcohol	100	65/150	65/150			65/150	65/150	65/150		40/100
Isooctyl Adipate	100	50/120	50/120			65/150	50/120			40/100
Isooctyl Alcohol	100	65/150	65/150			65/150	65/150	65/150		50/120
Isopropanol Amine	100	50/120	50/120			50/120	50/120	50/120		NR
Isopropyl Alcohol (Isopropanol)	100	50/120	50/120	40/100	50/120	50/120	50/120	50/120	50/120	NR
Isopropyl Amine	0.5–50	40/100	40/100			40/100	40/100	40/100		
Isopropyl Amine	100	NR	NR			LS	NR	NR		NR
Isopropyl Myristate	100	100/210	110/230			110/230		110/230		65/150

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Isopropyl Palmitate	100	100/210	110/230	105/220		110/230	100/210	110/230	110/230	65/150
Itaconic Acid	0.5–40	60/140	60/140	100/210	100/210	60/140	60/140	60/140	100/210	60/140
Jet Fuel, general <6>	100	60/140	60/140			60/140	60/140	60/140		60/140
Kerosene	100	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	65/150
Kraft Recovery Boiler Breeching, see Flue Gas										
Lactic Acid	All	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	65/150
Latex (emulsion in water), for specific latices see under chemical/polymer name	All	50/120	50/120			50/120	50/120	50/120		50/120
Latex Paint, acrylic binders	100			40/100	50/120		40/100		50/120	
Latex Paint, dispersion in water	100			40/100	50/120		40/100		50/120	
Latex Paint, vinyl binders	100			40/100	50/120		40/100		50/120	
Lauric Acid	All			100/210			100/210			
Lauroyl Chloride	100	40/100	50/120			50/120		50/120		
Lauryl Alcohol	100	65/150	80/180			80/180	65/150	80/180		50/120
Lauryl Chloride	100	100/210	100/210			100/210	100/210	100/210	100/210	65/150
Lauryl Mercaptan	100	80/180	95/200			100/210	80/180	95/200	65/150	
Lead Acetate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	
Lead (II) Nitrate <21>	All	100/210		100/210	100/210	100/210 <24>	100/210		100/210	
Lead Plating Solution (acidic process, 8% Lead with Fluoboric Acid and Boric Acid) <1>				95/200			95/200			
Lead Plating Solution (alkaline process, 8% Lead Acetate, 20% Sodium Hydroxide)				80/180			80/180			
Levulinic Acid <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	
Lignin Sulfonate	All	80/180	80/180			80/180	80/180	80/180		65/150
Lime Slurry, see Calcium Hydroxide										
Limestone Slurry, see Calcium Carbonate										
Linseed Oil	100	100/210	110/230	105/220	105/220	110/230	100/210	110/230	105/220	65/150

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Liquid Petroleum Gas (LPG)	100	60/140	60/140			60/140	60/140	60/140		60/140
Lithium Bromide <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210		100/210	80/180
Lithium Carbonate <1>	All	80/180	80/180			80/180	80/180	80/180		80/180
Lithium Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Lithium Hydroxide <1>	All	80/180	80/180	65/150		40/100	80/180	80/180	80/180	80/180
Lithium Hypochlorite <2,3,5,9>	All	80/180	80/180			40/100	80/180	80/180		80/180
Lithium Sulfate <21>	All			100/210	100/210	100/210 <24>	100/210		100/210	
Magnesium Bisulfite <21>	All	100/210	100/210	80/180	80/180	100/210 <24>	100/210	100/210	80/180	80/180
Magnesium Carbonate	All	80/180	80/180			80/180	80/180	80/180		80/180
Magnesium Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Magnesium Fluosilicate <1>	All	80/180	80/180			80/180		80/180		80/180
Magnesium Hydroxide <21>	All	100/210	100/210			80/180	100/210	100/210		80/180
Magnesium Nitrate	All	100/210	100/210	70/160	100/210	100/210	100/210	100/210	100/210	80/180
Magnesium Phosphate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Magnesium Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Magnesium Sulfate/Phosphoric Acid	1–40:0–36	100/210	100/210			100/210	100/210	100/210		100/210
MAGNIFLOC Flocculant MW>40.000, Cationic Polyamine <6>	All	60/140	60/140			60/140	60/140	60/140		60/140
Maleic Acid <21>	All	80/180	100/210	80/180	100/210	100/210 <24>	80/180	100/210	100/210	80/180
Maleic Anhydride	100			65/150			65/150			
Malic Acid	All				100/210 <24>				100/210 <24>	
Manganese Chloride (Manganous Chloride) <21>	All	100/210	100/210			100/210 <24>	100/210	100/210	100/210	80/180
Manganese Nitrate (Manganous Nitrate) <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Manganese Sulfate (Manganous Sulfate) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Manganous Sulfate/Ammonium Sulfate/Sulfuric Acid (concentrations in g/l)	up to 15:up to 150:up to 40			50/120	50/120		50/120			
MDI, see Diphenylmethane-4,4-Diisocyanate										
Melamine Formaldehyde Resin	All	40/100	50/120			50/120	40/100	50/120		40/100
Mercaptoacetic Acid	All	NR	25/80	40/100		40/100	NR	25/80		NR
Mercaptoethanol	10		80/180			80/180		80/180		
Mercaptopropionic (3-) Acid	100						NR			
Mercury	100	100/210	120/250	105/220		120/250	100/210	120/250	120/250	65/150
Mercury(I) Chloride (Mercurous Chloride) <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Mercury(II) Chloride (Mercuric Chloride) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Metal Pickling Solutions (Sulfuric Acid/Hydrochloric Acid/ and/or Phosphoric Acid) <9>	0.5–15 total	100/210	100/210			100/210	100/210	100/210		
Methacrylic Acid <7>	25	40/100	40/100			50/120	40/100	40/100		40/100
Methacrylic Acid	100	NR	NR			LS	NR	NR		NR
Methanamide, see Formamide										
Methane/Nitrogen	70:30	60/140	80/180			95/200	80/180	95/200		60/140
Methane Sulfonic Acid <6>	0–70	NR	LS			40/100	NR	NR		NR
Methanol (Methyl Alcohol)	5	50/120	50/120			50/120	50/120	50/120		50/120
Methanol (Methyl Alcohol)	20	NR	30/90			40/100	NR	40/100		NR
Methanol (Methyl Alcohol)	40–100	NR	LS	40/100	40/100	40/100	NR	NR	40/100	NR
Methanol (no condensation, no coalescence)	Fumes		65/150			80/180	80/180	80/180		
Methanol/Ethanolamine	0–60:0–20	NR	LS			40/100	NR	NR		NR
Methanol/Formaldehyde/Sulfuric Acid	60:20:2	NR	LS			40/100	NR	NR		NR
Methanol/Formaldehyde	0–15:0–37	50/120	65/150			65/150	50/120	65/150		
Methanol/Formaldehyde	35:4	NR	NR			40/100	NR	NR		
1-Methoxy-2-Propanol	100	NR	LS			20/70	NR	NR		NR

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Methyl Acetate	20	40/100	40/100			40/100	40/100	40/100		40/100
Methyl Acetate	100	NR	NR			LS	NR	LS		NR
Methyl Alcohol, see Methanol										
Methylamine	20	40/100	40/100			40/100	40/100	40/100		40/100
Methylamine	40	LS	LS			LS	LS	LS		NR
Methylamine	100	NR	NR			LS	NR	NR		NR
Methyl Bromide	10	25/80	25/80			25/80	25/80	25/80		NR
Methyl Bromide	100	NR	NR			LS	NR	NR		NR
2-Methyl-3-Butenenitrile	All	25/80	40/100			40/100	25/80	40/100		
Methyl Butyl Ketone (MBK), includes Methyl t-Butyl Ketone (MTBK) and other isomers	100	25/80	40/100			50/120	25/80	40/100		NR
Methyl Chloride (no condensation, no coalescence)	Fumes	40/100	65/150	80/180	80/180	80/180	80/180	80/180		
Methyl Chloroform (also 1,1,1-Trichloroethane inhibited)	100	40/100	50/120			50/120	40/100	50/120		NR
Methyl Chloroform/Perchloroethylene	75:25	40/100	50/120			50/120	40/100	50/120		
Methyl Distearyl Ammonium Chloride/Isopropanol	75:25	50/120	50/120			50/120	50/120	50/120		
Methyl Ethyl Ketone	20	40/100	40/100			40/100	40/100	40/100		40/100
Methyl Ethyl Ketone	100	LS	LS	NR	NR	20/70	LS	LS	NR	NR
Methyl Ethyl Ketone/2-Butanol/Triethylamine/2-Butoxy Ethanol	< 25 total	LS	25/80			40/100	LS	25/80		NR
Methyl Formate	5	40/100	45/110			50/120	45/110	50/120		
Methyl Isobutyl Ketone (MIBK)	100	25/80	40/100	NR	NR	50/120	25/80	40/100	NR	NR
Methyl Mercaptan, gas	All	40/100	65/150			65/150	40/100	65/150		NR
Methyl Methacrylate	All	NR	LS			25/80	NR	20/70		NR
N-Methyl-2-Pyrrolidone	10					LS				
N-Methyl-2-Pyrrolidone	100	NR	NR			LS	NR	NR		NR
Methyl Sulfate, see Dimethyl Sulfate										
Methyldiethanolamine	20	50/120	65/150			80/180	50/120	65/150		40/100
Methyldiethanolamine	100	50/120	50/120			65/150	50/120	50/120		
Methylene Chloride (Dichloromethane)	100	NR	NR		NR	LS	NR	NR	NR	NR

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Methylene Chloride (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Methylene Chloride/Methanol/Water	1:4:95	40/100	40/100			50/120	40/100	40/100		40/100
Methylstyrene (alpha)	100	25/80	40/100	NR	NR	50/120	25/80	40/100	NR	NR
Methyl t-Butyl Ether (MTBE)	100	NR	25/80	25/80		25/80	NR	25/80		NR
Methyl t-Butyl Ether (MTBE)/Fuel C (Fuel C is 50% Toluene and 50% Isooctane)	15:85	40/100	50/120			50/120	40/100	50/120		NR
Methyl t-Butyl Ether (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Methyl Tin Trichloride/Dimethyl Tin Dichloride (10/90) in aqueous solution <7>	50					45/110				
Metolachlor	100			40/100						
Mineral Oils, aliphatic	100	100/210	120/250	100/210	120/250	120/250	100/210	120/250	120/250	65/150
Mineral Spirits	100	105/220		105/220	120/250		105/220		120/250	
Molasses	100	80/180	80/180							
Monochloroacetic Acid, see Chloroacetic Acid										
Monochlorobenzene, see Chlorobenzene										
Monoethanolamine, see Ethanolamine										
Monohydroxysuccinic Acid, see Malic Acid										
Monomethylhydrazine	100	NR	NR			LS	NR	NR		NR
Morpholine <2>	20	40/100	45/110			50/120	45/110	50/120		40/100
Morpholine <2>	100	NR	NR			25/80	NR	NR		NR
Morpholine/Cyclohexylamine	All	NR	NR			25/80	NR	NR		NR
Motor Oil	100	100/210	120/250	105/220	105/220	120/250	100/210	120/250	105/220	65/150
Muriatic Acid, see Hydrochloric Acid										
Myristic Acid	100	100/210	120/250	105/220	120/250	120/250	100/210	120/250	120/250	65/150
Naphtha	100	80/180	100/210	95/200	100/210	100/210	80/180	100/210	100/210	80/180
Naphtha, heavy aromatic	100		50/120			50/120		50/120		
Naphthalene	100	100/210	100/210	95/200	100/210	100/210	100/210	100/210	100/210	80/180
Neutralizer & Desmut	All	65/150	65/150			65/150	65/150	65/150		65/150

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Nickel Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Nickel Nitrate	> 0.5	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	80/180
Nickel Plating Solution #1 (11% Nickel Sulfate, 2% Nickel Chloride, 1% Boric Acid)		80/180	80/180			80/180	80/180	80/180		80/180
Nickel Plating Solution #2 (44% Nickel Sulfate, 4% Ammonium Chloride, 4% Boric Acid)		80/180	80/180	95/200	95/200	80/180	80/180	80/180	95/200	80/180
Nickel Plating Solution #3 (15% Nickel Sulfate, 5% Nickel Chloride, 3% Boric Acid)		100/210	100/210			100/210	100/210	100/210		80/180
Nickel Sulfamate	All	80/180	80/180			80/180	80/180	80/180		80/180
Nickel Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Nitric Acid	1	100/210		100/210	80/180		100/210		80/180	
Nitric Acid	2–5	65/150	80/180	70/160	80/180	80/180	65/150	80/180	80/180	65/150
Nitric Acid	6–10	65/150	65/150	60/140	65/150	65/150	65/150	65/150	65/150	50/120
Nitric Acid	11–20	50/120	50/120	65/150	65/150	65/150	50/120	65/150	65/150	50/120
Nitric Acid <2,13>	21–29	40/100	40/100	55/130	65/150	50/120	40/100	50/120		40/100
Nitric Acid <2,13>	30–35	25/80	30/90	50/120		40/100	30/90	40/100		NR
Nitric Acid <2,13>	36–40	NR	NR	NR	NR	40/100	NR	25/80	NR	NR
Nitric Acid <2,13>	50			NR	NR		NR		NR	
Nitric Acid <2,13>	70	NR	NR			LS	NR	NR		NR
Nitric Acid, fumes (no condensation, no coalescence) <2>	< 60 (soln.)	80/180	80/180			80/180	80/180	80/180		80/180
Nitric Acid, fumes (no condensation, no coalescence) <2>	> 60 (soln.)	80/180	80/180			80/180	80/180	80/180		80/180
Nitric Acid/Hexavalent Chrome (Chromic Acid) <2,13>	10:5	40/100	50/120			65/150	40/100	40/100		40/100
Nitric Acid/Hydrogen Peroxide/Hydrofluoric Acid <1,2,3,13>	30:5:0.5	25/80	30/90			40/100	30/90	40/100		NR
Nitric Acid/Hydrofluoric Acid <1,2,13>	25:3	40/100	40/100			50/120	40/100	50/120		40/100
Nitric Acid/Hydrofluoric Acid <1,2,13>	15:15					40/100		40/100		

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Nitric Acid/Hydrofluoric Acid <1,2,13>	20:6	50/120	50/120			60/140	55/130	60/140		40/100
Nitric Acid/Hydrofluoric Acid <1,2,13>	30–35:3-5	NR	NR			LS	NR	LS		NR
Nitric Acid/Hydrofluoric Acid/Sulfuric Acid <1,2,13>	20:8:2					60/140		60/140		
Nitric Acid/Phosphoric Acid <2,13>	5:5	65/150	80/180			80/180	80/180	80/180		65/150
Nitric Acid/ Phosphoric Acid <2,13>	24:23	40/100	40/100			50/120	40/100	50/120		40/100
Nitric Acid/Sulfuric Acid <2,13>	20:20	40/100	40/100			50/120	40/100	50/120		40/100
Nitric Acid/Sulfuric Acid/Phosphoric Acid <2,13>	20:5:2	40/100	40/100			50/120	40/100	50/120		40/100
Nitrobenzene	100	NR	25/80	NR	NR	40/100	NR	25/80	NR	NR
Nitromethane (tris, Hydroxymethyl), traces of Formaldehyde, pH 3	51	50/120		50/120			50/120			
Nitrophenol <11>	100	NR	25/80			40/100	NR	25/80		NR
N-Methyl-2-Pyrrolidone	10					LS				
N-Methyl-2-Pyrrolidone	100	NR	NR			LS	NR	NR		NR
Non-condensable Blow-Down Gases, see Flue Gas or Blow Down										
Nonyl Phenol (Monononyl Phenol)	100	45/110		45/110	45/110		45/110			
Octanoic Acid		80/180	100/210	95/200	95/200	100/210	80/180	100/210	100/210	
Oil, sweet and sour, crude		100/210	120/250	100/210	100/210	120/250	100/210	120/250	100/210	65/150
Oil, lubricating, see Motor Oil										
Oleic Acid		100/210	100/210	100/210	100/210	95/200	95/200		100/210	
Oleum (fuming Sulfuric Acid)		NR	NR			LS	NR	NR		NR
Olive Oil <18>	100	100/210	120/250			120/250				
Organic Oil (animal, plants), see also the specific oil name; for example, Peanut Oil	100			95/200	95/200		95/200		95/200	
Ortho-Dichlorobenzene, see Dichlorobenzene										
Oxalic Acid <18>	All	50/120	50/120	80/180	80/180	50/120	50/120	50/120	80/180	
Ozone in solution <6>	2 mg/l	40/100	40/100			40/100	40/100	40/100		40/100
Palladium suspensions in Ammonium Hydroxide, see Ammonium Hydroxide										
Palladium suspensions in Hydrochloric Acid, see Hydrochloric Acid										

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Palmitic Acid (n-Hexadecanoic Acid) <18>	100	100/210	120/250	105/220	120/250	120/250	100/210		120/250	
Paper Mill Effluent, see Sulfite/Sulfate liquors (pulp mill)										
Para-dichlorobenzene, see Dichlorobenzene										
Peanut Oil <18>	100	80/180	80/180	80/180	80/180		80/180		80/180	
Pentabromo Diphenyl Oxide	100	25/80	45/110			50/120	25/80	50/120		NR
Pentachlorophenol <4>	All	50/120	50/120			50/120	50/120	50/120		50/120
Pentanedioic Acid, see Glutaric Acid										
Peracetic Acid <1,2,3,6,13>	20	40/100	40/100			40/100	40/100	40/100		
Peracetic Acid <1,2,3,6,13>	35	NR	NR			LS	NR	NR		NR
Perchloric Acid	5	80/180		80/180	80/180		80/180		80/180	
Perchloric Acid	10	65/150	65/150	65/150		65/150	65/150	65/150	65/150	65/150
Perchloric Acid	30	40/100	40/100	25/80		40/100	40/100	40/100	40/100	40/100
Perchloroethylene	100	25/80	50/120	40/100	40/100	50/120	25/80	50/120	40/100	NR
Perchloroethylene/Methyl Chloroform	75:25	40/100	50/120			50/120	40/100	50/120		
Petroleum, see Oil, crude										
Petroleum Ether, see specific alkane hydrocarbon; for example, Hexane										
Phenol (Carbolic Acid) <2,13>	0–2	25/80	40/100	40/100	40/100	50/120	25/80	40/100	40/100	NR
Phenol (Carbolic Acid) <2,3,13>	5	NR	25/80	25/80	25/80	50/120	NR	25/80	25/80	NR
Phenol (Carbolic Acid) <2,3,13>	10	NR	LS			50/120	NR	LS		NR
Phenol (Carbolic Acid) <2,3,13>	15	NR	LS	NR	NR	30/90	NR	LS	NR	NR
Phenol (Carbolic Acid) <2,3,13>	85	NR					NR			
Phenol (Carbolic Acid) <2,3,13>	88	NR	NR			20/70	NR	NR		NR
Phenol (Carbolic Acid) <2,3,13>	100			NR	NR		NR		NR	
Phenol Formaldehyde Resin	All	40/100	50/120			50/120	40/100	50/120		40/100
Phenol Sulfonic Acid <6>	All	25/80	25/80	NR	NR	25/80	25/80	25/80		

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Phenol/Methanol/Anionic Detergent	15:10:20	NR	NR			LS	NR	NR		NR
Phenolic Resin/Phenol <2>	80:20					25/80				
Phenolic Resin/Phenol <2>	90:10					50/120				
Phenyl Carbinol, see Benzyl Alcohol										
Phosphoric Acid	0.5–85	100/210	100/210	105/220	100/210	100/210	100/210	100/210	100/210	80/180
Phosphoric Acid	85–100	100/210	100/210	105/220	100/210	105/220	100/210	100/210	100/210	80/180
Phosphoric Acid (Polyphosphoric Acid)	115	100/210	100/210			105/220	100/210	100/210		80/180
Phosphoric Acid (Superphosphoric Acid, 76% P_2O_5)	105	100/210	100/210	105/220	100/210	105/220	100/210	100/210	100/210	80/180
Phosphoric Acid/Gypsum	61:39	100/210	100/210			100/210	100/210	100/210		80/180
Phosphoric Acid/Hydrochloric Acid, sat'd with Chlorine <8,9,12>	15:9	100/210	100/210		100/210	100/210	100/210	100/210	100/210	
Phosphoric Acid/Phosphorous Pentoxide/Hydrochloric Acid/ Sulfuric Dioxide (no condensation, no coalescence)	Fumes	100/210	110/230			110/230	100/210	110/230		80/180
Phosphoric Acid/Sulfuric Acid <2,12>	0–25:0–25	80/180	80/180			80/180	80/180	80/180		80/180
Phosphoric Acid/Sulfuric Acid/Hydrofluoric Acid <1,2,12>	0–75:1:0–3	65/150	65/150			65/150	65/150	65/150		65/150
Phosphoric Acid/Tributyl Phosphate (vapor phase, condensation)	85:0.5	50/120	60/140			60/140	50/120	60/140		40/100
Phosphoric Acid/Tributyl Phosphate/Hydrofluoric Acid (no condensation of TBP)	88:0.1:0.03	80/180	80/180			100/210	80/180	80/180		
Phosphoric Acid, vapor <6>	All	100/210	120/250			120/250	100/210	120/250		80/180
Phosphoric Acid/Zinc Chloride	0–100:0.5–70	100/210	100/210			100/210	100/210	100/210		80/180
Phosphorous Acid	70	100/210	100/210	105/220	100/210	100/210	100/210	100/210	100/210	80/180
Phosphorous Acid/Hydrochloric Acid <2,8,9,12,15>	0–70:1–5	100/210	100/210	80/180	80/180	100/210	100/210	100/210	80/180	80/180
Phosphorus Oxychloride <15>	100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Phosphorus Trichloride <15>	100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Phthalic Acid <4>	All	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	
Phthalic Anhydride	Sat'd	100/210		105/220			100/210			
Picric Acid, alcoholic <4>	10	NR	LS			40/100	NR	NR		NR
Pine Oil	100	90/195	90/195			90/195	90/195	90/195		

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Polyacrylamide	All	80/180	80/180			80/180	80/180	80/180		80/180
Polyacrylic Acid	All	80/180	80/180			80/180	80/180	80/180		80/180
Polyelectrolytes, anionic	100	55/130		55/130	55/130		55/130		55/130	
Polyethylene Glycol	100	100/210	100/210			100/210	100/210	100/210		65/150
Polyethylene Glycols and Methoxypolyethylene Glycols	100	40/100		50/120			40/100			
Polyethyleneimine	All	80/180	80/180			80/180	80/180	80/180		
Polyphosphoric Acid 115% H_3PO_4, see Phosphoric Acid										
Polyvinyl Acetate adhesives	All	50/120	50/120			50/120	50/120	50/120		
Polyvinyl Acetate emulsion		100/210		100/210			100/210			
Polyvinyl Alcohol	10	80/180		80/180	80/180		80/180		80/180	
Polyvinyl Alcohol	100	80/180	80/180	50/120	50/120	80/180	80/180	80/180	50/120	
Polyvinyl Chloride latex with 35 parts Dioctyl Phthalate <6>	All	50/120	50/120	50/120	50/120	50/120	50/120	50/120	50/120	
Potassium Aluminum Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Potassium Bicarbonate	All	80/180	80/180	70/160	65/150	80/180	70/160	80/180	65/150	80/180
Potassium Bromide <21>	All	100/210	100/210	70/160	70/160	100/210 <24>	100/210	100/210	70/160	80/180
Potassium Carbonate <1>	0–50	80/180	65/150	65/150	40/100	40/100	80/180	40/100		
Potassium Carbonate/Boric Acid/Potassium Metavanadate <1>	20:4:1	80/180	80/180			65/150	80/180	65/150		80/180
Potassium Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Potassium Dichromate <21>	All	100/210	100/210	100/210		100/210 <24>	100/210	100/210	100/210	80/180
Potassium Ferricyanide <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Potassium Ferrocyanide <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Potassium Fluoride <1>	All	80/180	80/180	65/150		80/180	80/180	80/180		80/180
Potassium Gold Cyanide	12	100/210	100/210			100/210	100/210	100/210		80/180
Potassium Hydroxide <1,2>	0–45	65/150	40/100	65/150	NR	25/80	65/150	25/80	NR	
Potassium Hydroxide <1,2>	50	65/150		65/150	NR		65/150		NR	
Potassium Hydroxide/Potassium Cyanide/Copper Cyanide <1,2>	2:3:8 oz/gal; 2:2.5:7%	65/150	40/100			25/80	65/150	25/80		
Potassium Hypochlorite/Potassium Hydroxide/Potassium Metasilicate <2,3,9>	50:40:10	50/120								
Potassium Iodide	All	100/210	100/210			100/210	100/210	100/210		100/210
Potassium Nitrate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Potassium Oxalate	All	65/150	65/150			65/150	65/150	65/150		65/150
Potassium Permanganate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Potassium Persulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Potassium Pyrophosphate (Tetrapotassium Diphosphate)	0–60	55/130	65/150	40/100	65/150	65/150	55/130	65/150	65/150	55/130
Potassium Silicofluoride <1>	All	40/100	40/100			40/100	40/100	40/100		40/100
Potassium Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Propane	100	60/140	60/140			60/140	60/140	60/140		60/140
Propanol (n-)	100	40/100	40/100			50/120	40/100	40/100		NR
Propanol (n-) (no condensation, no coalescence)	Fumes	80/180	80/180			80/180	80/180	80/180		80/180
Propenoic Acid, see Acrylic Acid										
Propionic Acid	0–20	100/210	100/210	80/180	100/210	100/210	100/210	100/210	100/210	65/150
Propionic Acid	21–50	80/180	80/180	65/150	100/210	80/180	80/180	80/180	100/210	
Propionic Acid	100	NR	25/80			40/100	NR	25/80	25/80	NR
Propionyl Chloride	100	NR	NR			LS	NR	NR		NR
Propyl Acetate	100	NR	LS			25/80	NR	NR		NR
Propyl Bromide	100	NR	LS			25/80	NR	LS		NR

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Propyl Chloride	100	NR	LS			25/80	NR	LS		NR
Propylene Dichloride	100	NR		NR	NR		NR		NR	
Propylene Glycol	100	100/210	100/210	105/220	100/210	100/210	100/210	100/210	100/210	
Propylene Glycol Monomethyl Ether (1-Methoxy-2-Propanol)	100	NR	LS			20/70	NR	NR		NR
Propylene Glycol Methyl Ether Acetate <2>	20	40/100	50/120			50/120	40/100	50/120		40/100
Propylene Glycol Monomethyl Ether Acetate <2>	100	NR	LS			20/70	NR	NR		NR
Propylene Glycol/Ethoxylated Fatty Alcohol/Diethylene Glycol n-Butyl Ether	60:20:20	40/100	45/110			50/120	40/100	50/120		NR
Propylene Glycol/Monoethanolamine	0–99:1	25/80	30/90			40/100	25/80	30/90		NR
Propylene Oxide	100	NR	NR			NR	NR	NR		NR
Propylene Oxide (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Pulp Paper Mill Blow Down (non-condensable gases), see Blow Down										
Pyridine	20	40/100	40/100			40/100	40/100	40/100		NR
Pyridine	100	NR	NR			LS	NR	NR		NR
Quaternary Amine Salts	All	80/180	80/180			80/180	80/180	80/180		
Quaternary Ammonium Salts	All	80/180		80/180	80/180		80/180		80/180	
Quinoline	20	40/100	40/100			40/100	40/100	40/100		
Quinoline	100					LS				
Rayon Spin Bath						60/140				
Rayon Spinning (no condensation, no coalescence)	Fumes	60/140	60/140			60/140	60/140	60/140		
Recovery Boiler Gases, see Flue Gas										
Red Liquor	All	80/180	80/180	75/165	80/180	80/180	80/180	80/180	80/180	65/150
Salicylic Acid	All	70/160	70/160	70/160			70/160		60/140	
Salt Brine, see Brine, salt										
Scrubbing Low MW Amines with 10% Sulfuric Acid, see Amine Salts										
Sea Water		100/210	100/210	100/210	95/200	100/210	100/210	100/210	95/200	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Selenious Acid <21>	All	100/210	100/210	100/210	50/120	100/210	100/210	100/210	50/120	80/180
Sewage Gas, Hydrogen Sulfide, see Hydrogen Sulfide										
Silicon Tetrafluoride/Hydrofluoric Acid/Sulfuric Acid <1,2>	< 10 total	50/120	50/120			50/120	50/120	50/120		50/120
Silver Cyanide	100	100/210		100/210			100/210			
Silver Nitrate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Silver Plating Solution (4% Silver, 7% Potassium Cyanide, 5% Sodium Cyanide, 2% Potassium Carbonate) <1>		80/180	80/180	95/200	80/180	65/150	80/180	65/150	80/180	
Sodium Acetate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	
Sodium Acid Sulfite, see Sodium Bisulfite										
Sodium Alkyd Aryl Sulfonates	All	80/180	80/180			80/180	80/180	80/180		65/150
Sodium Alkyl Xanthate	All	65/150		65/150			65/150			
Sodium Aluminate <1>	All	70/160	70/160	70/160		50/120	70/160	50/120		50/120
Sodium Benzoate <21>	All	80/180	80/180	100/210		80/180	80/180	80/180		80/180
Sodium Bicarbonate	All	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Sodium Bicarbonate/Sodium Carbonate <1>	15:20	80/180	80/180			65/150	80/180	65/150		80/180
Sodium Bichromate, see Sodium Dichromate										
Sodium Bifluoride <1>	All	50/120	50/120			50/120	50/120	50/120		50/120
Sodium Bisulfate (Sodium Hydrogen Sulfate) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Bisulfide (Sodium Hydrosulfide)	All	80/180	80/180			80/180	80/180	80/180		80/180
Sodium Bisulfite (Sodium Hydrogen Sulfite) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Borate (Borax, Sodium Tetraborate) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Bromate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Sodium Bromide <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Sodium Carbonate <1>	All	80/180	80/180	80/180	80/180	65/150	80/180	65/150	80/180	80/180
Sodium Carbonate/Sodium Bicarbonate <1>	20:15	80/180	80/180			65/150	80/180	65/150		80/180
Sodium Chlorate, stable <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Chlorate/Sodium Chloride <21>	34:20	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Chloride (Brine, salt) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Chloride saturated solution, see Brine, salt										
Sodium Chloride with Chlorine, see Brine, chlorinated										
Sodium Chloride/Ethyl Vanillin	0.1–25:1	50/120	50/120							
Sodium Chloride/Hydrochloric Acid <2,8,9,12>	Sat'd. NaCl:5	100/210		100/210	100/210		100/210		100/210	
Sodium Chloride/Magnesium Oxide/Lime	0.5–26:0.1–20: 0.1–10	100/210	100/210			100/210	100/210	100/210		80/180
Sodium Chloride/Sodium Hydroxide <1,2>	0.5–10:0.1–2	80/180	65/150			40/100	80/180	65/150		50/120
Sodium Chloride/Sodium Chlorate	20:34	100/210	100/210			100/210	100/210	100/210		
Sodium Chlorite, pH < 6, see Chlorine Dioxide										
Sodium Chlorite, stable, pH > 6, <5,21>	All	100/210	100/210	100/210	100/210	100/210	100/210	100/210		80/180
Sodium Chlorite/Sodium Hypochlorite, pH > 11, <2,3,9>	0.1–25:0.1–15	40/100	40/100			40/100	40/100	40/100		40/100
Sodium Chromate	> 0.5	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	80/180
Sodium Cyanide <21>	All	100/210	100/210			100/210 <24>	100/210	100/210	100/210	
Sodium Dichromate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Dichromate/Sulfuric Acid	up to 3:up to 30	NR					NR			
Sodium Dimethyldithiocarbamate/Disodium Ethylene Bisdithiocarbamate	0.1–15:0.1–15	40/100	40/100			50/120	40/100	50/120		40/100
Sodium Diphosphate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Sodium Dodecylbenzenesulfonate	All	70/160	70/160			70/160	70/160	70/160		
Sodium Ferricyanide <21>	All	100/210	100/210	100/210		100/210 <24>	100/210	100/210		

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Sodium Ferrocyanide <21>	All	100/210	100/210	100/210		100/210 <24>	100/210	100/210		80/180
Sodium Fluoride <1>	All	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Sodium Fluoroborate <1,21>	All	95/200	95/200			95/200				
Sodium Fluorosilicate <1>	All	50/120	50/120	65/150		50/120	50/120	50/120		50/120
Sodium Gluconate <21>	All	80/180	95/200			100/210 <24>	95/200	100/210		65/150
Sodium Glycolate <21>	All	80/180	95/200			100/210 <24>	80/180	95/200		65/150
Sodium Hexametaphosphate	All	80/180	80/180	65/150	65/150	80/180	80/180	80/180	65/150	80/180
Sodium Hydrosulfide (Sodium Bisulfide)	All	80/180	80/180	60/140	60/140	80/180	80/180	80/180	60/140	80/180
Sodium Hydrosulfide/Sodium Hydroxide	15:15	60/140		60/140			60/140			
Sodium Hydrosulfite	All	40/100	40/100			40/100	40/100	40/100		40/100
Sodium Hydroxide <1,2,7>	0.5	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	65/150
Sodium Hydroxide <1,2,7>	1	80/180	80/180	80/180	70/160	80/180	80/180	80/180	70/160	65/150
Sodium Hydroxide <1,2>	5	80/180	60/140	70/160		40/100	70/160	40/100		
Sodium Hydroxide <1,2>	10	65/150	50/120	60/140			65/150			
Sodium Hydroxide <1,2>	25	65/150	50/120	50/120			65/150			
Sodium Hydroxide <1,2>	50	80/180	65/150	65/150			80/180			
Sodium Hydroxide/Sodium Bisulfite <1,2>	All	80/180	65/150			40/100	80/180	65/150		65/150
Sodium Hydroxide/Sodium Chloride/Sodium Sulfate/Sodium Hypochlorite (active Chlorine) <2,3,5,9>	"1–20:1–15:1–8 : 0–15"	50/120			NR		510A/B: 65/150 510C: 50/120		NR	
Sodium Hydroxide/Organics (within solubility limits; i.e., no phase separation or coalescence) <1,2>	8:Traces	80/180	65/150							
Sodium Hydroxide/Sodium Hydrosulfide <1,2>	15:15	60/140		60/140			60/140			
Sodium Hydroxide/Sodium Hypochlorite (active Chlorine) <1,2>	0–20:0–0.1	80/180								
Sodium Hypochlorite (stable, alkaline pH > 11) <2,3,5,9>	2	65/150 <19>	50/120	65/150	50/120	40/100	65/150	40/100	50/120	65/150

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Sodium Hypochlorite (stable, alkaline pH > 11), <2,3,5,9>	5.25	65/150 <19>	50/120	65/150	50/120	40/100	65/150	40/100	50/120	65/150
Sodium Hypochlorite (stable, alkaline pH > 11) <2,3,5,9,19>	10	50/120	<6>				510A/B: 65/150 510C: 50/120			
Sodium Hypochlorite (stable, alkaline pH > 11) <2,3,5,9,19>	11–17	50/120	<6>		NR		510A/B: 65/150 510C: 50/120		NR	
Sodium Hypochlorite (stable, alkaline pH > 11) <2,3,5,9>	18–25						510A: 40/100			
Sodium Lauryl Sulfate	All	70/160	70/160	80/180	70/160	70/160	70/160	70/160	70/160	
Sodium Metabisulfite <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Sodium Methyldithiocarbamate	All	80/180	80/180			80/180	80/180	80/180		
Sodium Monophosphate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Myristyl Sulfate	All	70/160	70/160			70/160	70/160	70/160		
Sodium Nitrate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Nitrite <21>	All	100/210	100/210	100/210		100/210 <24>	100/210	100/210		80/180
Sodium Oxalate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Sodium Perchlorate	60	40/100	40/100			40/100	40/100	40/100		40/100
Sodium Persulfate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Sodium Phosphate, mono-, di-, tribasic <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Sodium Polyacrylate	All	80/180	80/180	65/150	80/180	80/180	80/180	80/180	80/180	
Sodium Salt o-Phenylphenate, antimicrobial	All	50/120	50/120			50/120	50/120	50/120		
Sodium Sarcosinate	40	50/120	50/120			50/120	50/120	50/120		
Sodium Silicate <1>	All	80/180	80/180	80/180	80/180	65/150	80/180	65/150	80/180	80/180
Sodium Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Sodium Sulfate/Sodium Sulfite <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Sodium Sulfhydrate, see Sodium Hydrosulfide										
Sodium Sulfide <21>	All	100/210	100/210	100/210		100/210 <24>	100/210	100/210		80/180
Sodium Sulfite <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Sulfite/Sodium Hydroxide/Toluene	22:10:5	25/80	40/100			40/100	25/80	40/100		NR
Sodium Tartrate <21>	All	100/210	100/210			100/210 <24>	100/210	100/210		80/180
Sodium Tetraborate (Borax, Sodium Borate) <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Thiocyanate <21>	All	80/180	80/180	95/200	95/200	80/180	80/180	80/180	95/200	80/180
Sodium Thiosulfate	All	80/180	80/180	50/120	80/180	80/180	80/180	80/180	80/180	80/180
Sodium Tridecylbenzene Sulfonate	All	50/120		50/120			50/120			
Sodium Tripolyphosphate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sodium Xylene Sulfonate	All	70/160	70/160	100/210		70/160	70/160	70/160		
Soil		30/90		30/90			30/90			
Solvent Extraction Solutions (3% Isodecanol, 6% Amines tri-C8-C10-alkyl, 91% Kerosene)		80/180	80/180			80/180	80/180	80/180		65/150
Solvent Extraction Solutions (4% Trioctylphosphine Oxide (TOPO), 4% Di 2-Ethylhexyl Phosphoric Acid (DEHPA), 92% Kerosene)		80/180	80/180			80/180	80/180	80/180		
Sorbitol Solutions	All	70/160	70/160	65/150	65/150	80/180	70/160	70/160	65/150	
Sour Crude Oil, see Crude Oil										
Soy (Soya) Sauce <18>		70/160	70/160				100/210			
Soya Oil <18>	100	100/210	100/210			100/210	100/210	100/210		65/150
Soybean Oil	100	80/180		80/180	100/210		80/180		100/210	
Soybean Oil, epoxidized (ESO)	100	50/120		65/150	100/210		50/120		65/150	
Spearmint Oil <18>	100	40/100	40/100							

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Stannic Chloride	All	100/210	100/210	80/180	80/180	100/210	100/210	100/210	80/180	80/180
Stannous Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Steam, dry (no condensation)		100/210	105/220	105/220	105/220	105/220	100/210	105/220	105/220	80/180
Steam, wet (condensation)		80/180	80/180			80/180	80/180	80/180		80/180
Stearic Acid	All	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	65/150
Styrene	100	NR	40/100	25/80	25/80	50/120	NR	40/100	25/80	NR
Styrene Acrylic Emulsion	All	50/120	50/120			50/120	50/120	50/120		
Styrene-Butadiene Latex	All	60/140	60/140			60/140	60/140	60/140		60/140
Succinonitrile, aqueous	All	25/80	40/100	40/100	40/100	40/100	25/80	40/100	40/100	NR
Sugar/Sucrose <18>	All	100/210	100/210							
Sugar Beet, liquor <18>	All	80/180	80/180	80/180	80/180	80/180	80/180		80/180	
Sugar Cane, liquor and sweetwater <18>	All	80/180	80/180	80/180	80/180	80/180	80/180		80/180	
Sulfamic Acid	0.5–10	100/210	100/210			100/210	100/210	100/210		80/180
Sulfamic Acid	11–15	80/180	80/180	100/210	100/210	80/180	80/180	80/180	100/210	65/150
Sulfamic Acid	16–25	65/150	65/150			65/150	65/150	65/150		65/150
Sulfamic Acid/Boric Acid/Glycolic Acid	0.5–25:0.5–30: 0.5–10	65/150	65/150			65/150	65/150	65/150		
Sulfanilic Acid (meta, para) <4,6,21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Sulfate process non-condensable gases, see Flue Gas										
Sulfated Detergents, see Sulfonated Detergents										
Sulfated Tall Oil Fatty Acid, see Tall Oil										
Sulfides scrubbing with caustic, see Sodium Hydroxide										
Sulfite/Sulfate Liquors, pulp mill		95/200	95/200	105/220	105/220	95/200	95/200	95/200	105/220	80/180
Sulfonated Detergents	100	70/160	80/180			80/180	70/160	80/180		70/160
Sulfur, molten, dry <16>	100		120/250			150/300		120/250		
Sulfur, molten (traces of Hydrogen Sulfide, Sulfur Dioxide, Sulfur Trioxide, Water)	100	NR					NR			
Sulfur, wettable, fungicide <4>	All	80/180	80/180			80/180	80/180	80/180		80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Sulfur Chloride	100	NR	NR	NR	NR	LS	NR	NR	NR	NR
Sulfur Chloride (no condensation, no coalescence)	Fumes	95/200	95/200			95/200	95/200	95/200		80/180
Sulfur Dichloride (no condensation, no coalescence)	Fumes			NR	NR		NR		NR	
Sulfur Dioxide, see Flue Gas										
Sulfur Trioxide, dry (no condensation, no coalescence) <6>	Fumes	100/210		105/220			100/210			
Sulfur Trioxide, wet, see Sulfuric Acid <6>										
Sulfuric Acid <2,13>	0.5–25	100/210	105/220	105/220	105/220	105/220	100/210	105/220	105/220	80/180
Sulfuric Acid <2,13>	26–50	100/210	100/210	95/200	95/200	100/210	100/210	100/210	95/200	80/180
Sulfuric Acid <2,13,15>	51–70	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180	80/180
Sulfuric Acid <2,13,15>	71–75	40/100	50/120	50/120	50/120	80/180	40/100	50/120	50/120	40/100
Sulfuric Acid <2,13,15>	76–80	40/100	40/100	NR	NR	50/120	40/100	40/100	NR	
Sulfuric Acid <2,13,15>	> 80	NR	NR			LS	NR	LS		NR
Sulfuric Acid/Ammonium Bifluoride <1>	0–75:0.1–3	40/100	50/120			65/150	40/100	50/120		
Sulfuric Acid/Ammonium Sulfate/Manganous Sulfate (concentrations in g/l)	Up to 40:up to 150:up to 15			50/120	50/120		50/120			
Sulfuric Acid/Benzenesulfonic Acid/Water <2,12>	7:88:5	60/140		60/140			60/140			
Sulfuric Acid/Chromic Acid <2,12>	20:20	NR					NR			
Sulfuric Acid/Chromic Acid mixture (Maximum total concentration 10%) <2,12>		50/120	65/150			65/150	50/120	65/150		50/120
Sulfuric Acid/Copper Salts, see Sulfuric Acid										
Sulfuric Acid/Copper Sulfate <2,12>	0–25:1–35	100/210	100/210			100/210	100/210	100/210		
Sulfuric Acid/Copper Sulfate/Sodium Persulfate/EDTA <2,12>	13:12:1:1	55/130	55/130			55/130	55/130	55/130		55/130
Sulfuric Acid/Hydriodic Acid <2,12>	60:20	40/100	40/100			50/120	40/100	40/100		
Sulfuric Acid/Hydrochloric Acid, iron and steel cleaning bath <2,8,9,12>	23:9	95/200		95/200	100/210		95/200		100/210	
Sulfuric Acid/Hydrochloric Acid <2,8,9,12>	1–25:1–10	80/180	100/210			100/210	100/210	100/210		80/180
Sulfuric Acid/Hydrochloric Acid <2,8,9,12>	50:15	40/100	45/110			50/120	40/100	50/120		
Sulfuric Acid/Hydrochloric Acid/Hydrofluoric Acid/Phosphoric Acid/Chlorinated Solvents <1,2,8,12>	40:20:5:35:1	NR	NR			LS	NR	LS		NR
Sulfuric Acid/ Hydrofluoric Acid <1,2,12>	1–20:3–6	55/130	55/130			60/140	55/130	60/140		40/100

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Sulfuric Acid/Hydrofluoric Acid <1,2,12>	10:10	40/100	50/120			65/150	40/100	40/100		
Sulfuric Acid/Hydrofluoric Acid <1,2,12>	25:10	40/100	45/110			50/120	40/100	40/100		
Sulfuric Acid/Hydrofluoric Acid <1,2,12>	30–35:3–5	LS	LS			LS	LS	LS		LS
Sulfuric Acid/Hydrofluosilicic Acid/ MIBK <1,2,12>	25:1:2	LS	40/100			50/120	LS	40/100		
Sulfuric Acid/Hydrogen Peroxide <2,3,12>	1–20:1–10	65/150	65/150			65/150	65/150	65/150		
Sulfuric Acid/Hydrogen Peroxide/Ammonium Sulfate/ Copper Sulfate <2,3,12>	10:5:5:5	40/100	40/100			40/100	40/100	40/100		
Sulfuric Acid/Hydrogen Sulfide <2,12>	1–50:0–10	100/210	100/210			100/210	100/210	100/210		80/180
Sulfuric Acid/Inorganic Salts <2,12>	0.5–20:0.5–50	100/210	100/210			100/210	100/210	100/210		80/180
Sulfuric Acid/Inorganic Salts <2,12>	21–50:0.5–20	80/180	80/180			80/180	80/180	80/180		80/180
Sulfuric Acid/Lactic Acid/Sodium Sulfate <2,12>	50:20:0–10	40/100	50/120			65/150	40/100	50/120		40/100
Sulfuric Acid/Methanol <2,12>	30:5		40/100			50/120				
Sulfuric Acid/Nitric Acid <2,12>	20:5	65/150	80/180			80/180	65/150	80/180		65/150
Sulfuric Acid/Nitric Acid/Phosphoric Acid	0–13:0–11:0–30	65/150	65/150			65/150	65/150	65/150		
Sulfuric Acid/Phosphoric Acid <2,12>	0–25:0–25	80/180	80/180			80/180	80/180	80/180		80/180
Sulfuric Acid vapor, see Sulfuric Acid										
Sulfuric Acid/Sodium Dichromate, see Sulfuric Acid/Chromic Acid mixture										
Sulfuric Acid/Sulfate Salts, max. total concentration 80%, see Sulfuric Acid										
Sulfurous Acid	10	50/120	50/120	40/100	40/100	50/120	50/120	50/120	40/100	50/120
Superphosphoric Acid (76% P_2O_5), see Phosphoric Acid										
Surfactant, see specific chemical name <6,14>										
Surfactant, anionic	All	40/100	50/120			50/120	40/100	40/100		
Tall Oil, storage <6>	100	95/200	105/220	65/150	65/150	105/220	95/200	105/220	65/150	
Tall Oil, reactor <6>		100/210	105/220			105/220	100/210	105/220		
Tallow/Sulfuric Acid	99:1	80/180	80/180							

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Tannic Acid <21>	All	100/210	100/210	100/210		100/210 <24>	100/210	100/210		65/150
Tap Water, hard <2>	All	100/210	100/210			100/210	100/210	100/210		80/180
Tap Water, soft <2>	All	80/180	80/180			80/180	80/180	80/180		80/180
Tar Camphor, see Naphthalene										
Tartaric Acid	> 0.5	100/210	100/210	100/210	100/210	100/210	100/210	100/210	100/210	65/150
t-Butyl Methyl Ether (MTBE)	20	40/100	50/120			50/120	40/100	50/120		30/90
t-Butyl Methyl Ether (MTBE)	100	NR	25/80			25/80	NR	25/80		NR
Tetrabutyltin	100	50/120	50/120			50/120	50/120	50/120		
Tetrachloroethane	100	40/100	50/120			55/130	40/100	50/120		NR
Tetrachloroethylene (Perchloroethylene)	100	25/80	50/120	40/100	40/100	50/120	25/80	50/120	40/100	NR
Tetrachloropyridine	100	25/80	50/120	50/120		50/120	25/80	50/120		NR
Tetraethyl Orthosilicate	100					40/100				
Tetrahydrofuran	0–5	40/100	40/100			50/120	40/100	50/120		
Tetrahydrofuran	10–100	NR	NR			LS	NR	NR		NR
Tetrahydrofuran (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Tetramethyl Ammonium Hydroxide <1>	0–10	50/120	40/100				50/120	40/100		
Tetra-n-Butylammonium Hydroxide <1,2>	40	40/100	40/100				40/100	40/100		
Tetra-n-Butylphosphonium Hydroxide <1,2>	40	40/100	40/100				40/100	40/100		
Tetrapotassium Diphosphate (Potassium Pyrophosphate)	0–60	55/130	65/150	40/100	65/150	65/150	55/130	65/150	65/150	55/130
Tetrasodium Ethylenediaminetetraacetic Acid (Tetrasodium salt of EDTA)	All	80/180	80/180			65/150	80/180	65/150		80/180
Tetrasodium Pyrophosphate (Sodium Pyrophosphate) <21>	All	40/100		40/100			40/100			
Thermal Oxidizer (HCl absorption), see Flue Gas, wet										
Thioglycolic Acid, see Mercaptoacetic Acid										
Thionyl Chloride	100	NR	NR			LS	NR	NR		NR
Thiourea	0–50	65/150	65/150			65/150	65/150	65/150		65/150
Tin Fluoborate Plating Solution (18% Stannous Fluoborate, 7% Tin, 9% Fluoboric Acid, 2% Boric Acid) <1>		100/210	100/210	95/200	100/210	100/210	100/210	100/210	100/210	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Titanium Dioxide	All	80/180	80/180			80/180	80/180	80/180		80/180
Titanium Dioxide/Sulfuric Acid	0–30:30	100/210	100/210			100/210	100/210	100/210		80/180
Titanium Tetrachloride	All	65/150	80/180			80/180	65/150	80/180		
Tobias Acid (2-Naphthylamine-1-Sulfonic Acid) <6>	100	100/210	100/210	100/210	100/210	100/210	100/210	100/210		
Toluene	100	25/80	40/100	50/120	40/100	50/120	25/80	40/100	50/120	NR
Toluene/Acetone <2>	50:50	NR		NR	NR		NR			
Toluene (no condensation, no coalescence)	Fumes		65/150			80/180	80/180	80/180		
Toluene Diisocyanate (TDI) <2>	100	NR	NR	25/80		30/85 <6>	NR	NR		NR
Toluenesulfonic Acid <6,21>	All	80/180	95/200	100/210	100/210	100/210 <24>	95/200	100/210	100/210	
Toluidine (o-, p-, m-)	100	NR	NR			20/70	NR	NR		NR
Tomato Sauce <18>	All	90/195	90/195							
Transformer Oils, ester types	100	50/120	65/150			65/150		65/150		
Transformer Oils, Silicone and Mineral Oils <16>	100	100/210	120/250	100/210	100/210	150/300	110/230	120/250	100/210	
Tributyl Phosphate	100	50/120	60/140	65/150	65/150	60/140	50/120	60/140	65/150	40/100
Trichloroacetic Acid	50	100/210		100/210	100/210		100/210		100/210	
Trichloroacetic Acid	85	25/80	40/100			50/120	25/80	40/100		25/80
Trichlorobenzene	100	NR					NR			
Trichloroethane	100	40/100	50/120	25/80	25/80	50/120	40/100	50/120		NR
Trichloroethane (1,1,2-) (Vinyl Trichloride)	100			25/80	25/80					
Trichloroethylene <15>	100	NR	NR	NR	NR	LS	NR	NR		NR
Tricresyl Phosphate	100	70/160	70/160	50/120	50/120	70/160	70/160	70/160	50/120	
Triethanolamine	100	50/120	50/120	65/150	65/150	65/150	50/120	50/120	65/150	NR
Triethylamine	All	50/120	50/120	65/150	50/120	50/120	50/120	50/120	50/120	NR
Triethylamine/Triethylamine Hydrochloride/Hydrochloric Acid <2,8,12>	50:20:5	50/120	50/120			50/120	50/120	50/120		NR

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Triethylene Glycol, see Ethylene Glycol										
Trifluoroacetic Acid, see Chloroacetic Acid										
Trihydroxybenzoic Acid, see Gallic Acid										
Trimethyl Carbinol, see Butyl Alcohol										
Trimethylamine	20	40/100	50/120			50/120	40/100	50/120		NR
Trimethylamine	100	25/80	25/80			40/100	25/80	25/80		
Trimethylamine (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Trimethylamine Hydrochloride (pH 3-4)	100			55/130			55/130			
Trimethylammonium Chloride (Trimethylamine HCl, TMA-HCl)	70	40/100	40/100			50/120 <7>	40/100	40/100		40/100
Trimethylbenzene	100	25/80	40/100			50/120	25/80	50/120		NR
Trimethylene Chlorobromide		NR	25/80			40/100	NR	25/80		NR
Trioctyl Phosphate	100	70/160	70/160			80/180	70/160	70/160		40/100
Trioctyl Phosphine Oxide/Di-2-Ethylhexyl Phosphoric Acid (DEHPA)/Kerosene	4:4:92	80/180	80/180			80/180	80/180	80/180		
Triphenyl Phosphite	100	40/100		40/100	40/100		40/100		40/100	
Tripropylene Glycol, see Ethylene Glycol										
Trisodium Phosphate <21>	All	100/210	100/210	80/180	80/180	100/210 <24>	100/210	100/210	80/180	80/180
Turpentine	100	65/150	100/210			100/210	65/150	100/210		40/100
Turpentine, crude sulfate	100	40/100		40/100			40/100			
Turpentine, pure gum	100	30/90		40/100	80/180		30/90			
Uranium <6>										
Uranium Extraction, see Kerosene										
Urea	All	70/160	70/160	80/180	80/180	70/160	70/160	70/160	80/180	65/150
Urea/Ammonium Nitrate/Water	35:44:20	65/150	65/150			65/150	65/150	65/150		65/150
Urea Formaldehyde Resin	All	40/100	50/120			50/120	40/100	50/120		40/100
Urine, see Urea										
Urotropine, see Hexamethylenetetramine										

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Vanillin Black Liquor <18>		50/120	50/120							
Vinegar <18>	100	100/210	100/210			100/210	100/210	100/210		65/150
Vinyl Acetate	20	40/100	40/100			40/100	40/100	40/100		NR
Vinyl Acetate	100	NR	NR			LS	NR	NR		NR
Vinyl Chloride	100	NR	NR			LS	NR	NR		NR
Vinyl Chloride (no condensation, no coalescence)	Fumes					80/180	80/180	80/180		
Vinyl Toluene	100	25/80	50/120	25/80	25/80	50/120	25/80	50/120	25/80	NR
Water, deionized <2,6,22>	100	80/180	80/180	95/200	80/180	80/180	80/180	80/180	80/180	80/180
Water, distilled <2,6,22>	100	80/180	80/180	95/200	80/180	80/180	80/180	80/180	80/180	80/180
Water/Phenol, see Phenol										
Water, sea, desalination	All	80/180	80/180			80/180	80/180	80/180		80/180
Water, steam condensate <2>	100	80/180	80/180			80/180	80/180	80/180		80/180
Water, tap, hard <2,22>	100	100/210	100/210	105/220	105/220	100/210	100/210	100/210	105/220	80/180
Water, tap, soft <2,22>	100	80/180	80/180	95/200	80/180	80/180	80/180	80/180	80/180	80/180
Water/Urea/Ammonium Nitrate (fertilizer)	Up to 40:up to 30:balance	50/120					50/120		-	
Water Vapor (no condensation, no coalescence), see Flue Gas, dry										
Water Vapor, wet <2>	All	80/180	80/180			80/180	80/180	80/180		80/180
Whey	All	65/150	65/150							
White Liquor (pulp mill) <1,2>	All	80/180	80/180	65/150	80/180	40/100	80/180	80/180	80/180	80/180
White Spirit, see Mineral Spirit										
Xylene	100	25/80	40/100	50/120	40/100	50/120	25/80	50/120		NR
Xylene/Amyl Acetate	70:30			50/120						
Xylene (no condensation, no coalescence)	Fumes		65/150			80/180	80/180	80/180		
Xylene/Methyl Ethyl Ketone/Butyl Acetate/Methyl Acetate	50:20:20:10	NR	NR			LS	NR	NR		NR
Zinc Chloride <21>	All	100/210	100/210	100/210	100/210	100/210 <24>		100/210	100/210	80/180

CHEMICAL RESISTANCE TABLE (continued)

Maximum service temperatures for Derakane™, Derakane™ Momentum™ and Derakane™ Signia™ resins

chemical environment	concentration	Derakane™, Derakane™ Momentum™ or Derakane™ Signia™ resin								
		411	441	451	455	470	510A/B/C	510N	515	8084
	%	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Zinc Cyanide Plating Solution (9% Zinc Cyanide, 4% Sodium Cyanide, 9% Sodium Hydroxide) <1,2>		80/180	80/180			40/100	80/180	80/180		80/180
Zinc Electrolyte (Zinc Sulfate, 35g/l Sulfuric Acid), see Sulfuric Acid										
Zinc Fluoborate Plating Bath, 49% Zinc Fluoborate; 5% Ammonium Chloride, 6% Ammonium Fluoborate <1>		95/200	95/200	70/160		95/200	95/200	95/200		80/180
Zinc Fluoborate <1>	50	100/210		100/210	100/210		100/210		100/210	
Zinc Nitrate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210	100/210	80/180
Zinc Phosphate, slurry	All	80/180	80/180			80/180	80/180	80/180		80/180
Zinc Sulfate <21>	All	100/210	100/210	100/210	100/210	100/210 <24>	100/210	100/210		80/180
Zinc Sulfite	All	80/180		80/180	80/180		80/180		80/180	

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Appendix 11 – Manufacturer Information for Xypex Chemical Corporation, Xypex Admix C-Series

XYPEX®

Admix C-Series

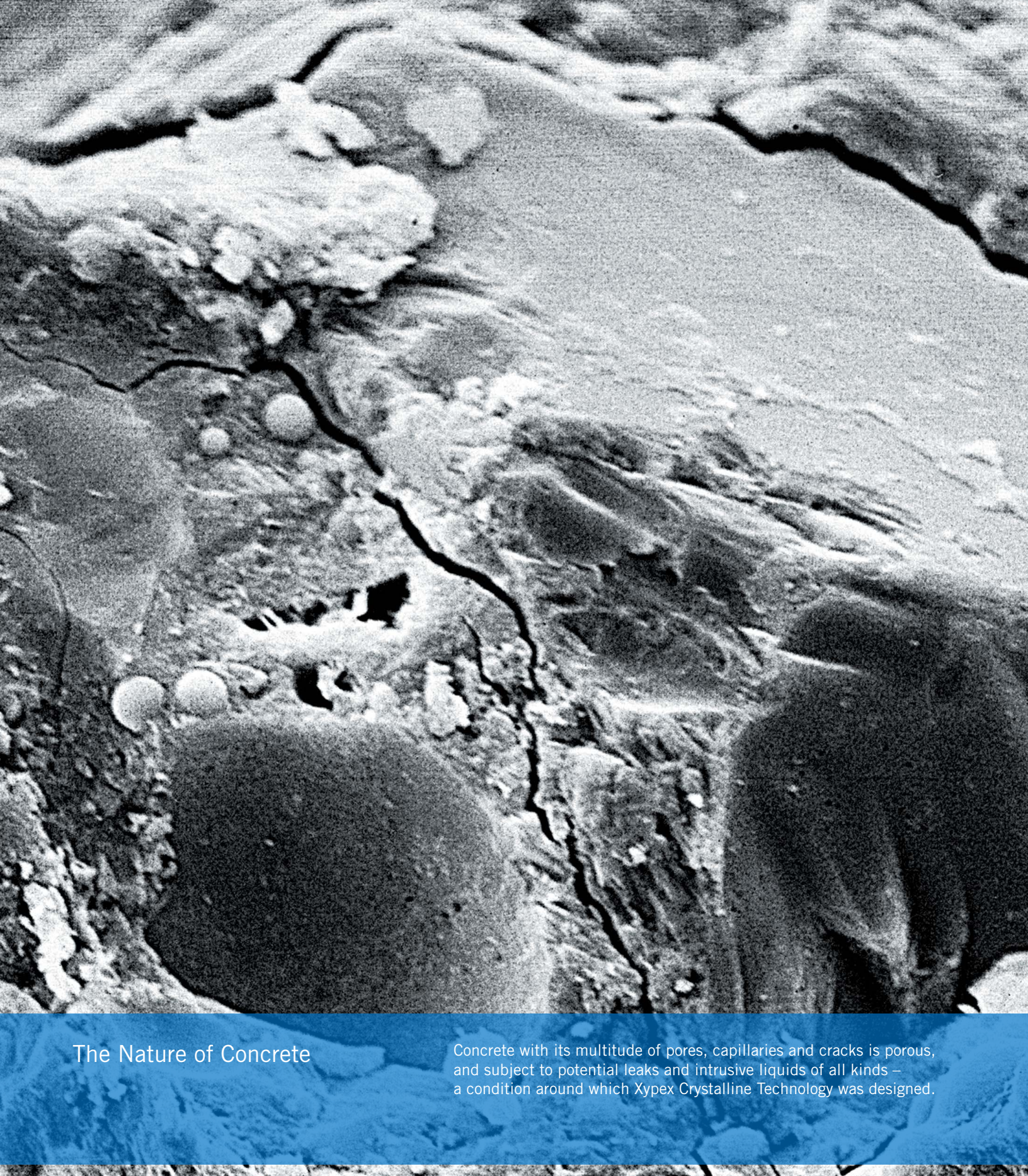
Concrete Waterproofing by Crystallization™

Improving concrete performance... right from the start

XYPEX ADMIX

Making Waterproofing Part of the Mix

Xypex Admix is blended into the concrete mix at the time of batching to waterproof and protect concrete. Xypex Admix meets the persistent challenges of water, chemicals, and harsh environments before they become problems. Utilizing Xypex's world-renowned crystalline technology, Xypex Admix becomes an integral part of the concrete matrix, sealing the primary paths by which water and aggressive chemicals penetrate, attack, and ultimately threaten the long-term integrity of the concrete structure. Xypex Admix is part of the Xypex Crystalline Concrete Waterproofing and Protection System which also includes Xypex Coatings, Dry Shake and Repair products. Together, these Xypex products provide the flexibility needed to advance a cost-effective ***Value-Engineered*** concrete waterproofing strategy.



The Nature of Concrete

Concrete with its multitude of pores, capillaries and cracks is porous, and subject to potential leaks and intrusive liquids of all kinds – a condition around which Xypex Crystalline Technology was designed.

Xypex Crystalline Technology has become the world standard in ***Concrete Waterproofing by Crystallization™***, a position fully recognized by architects, engineers, contractors and concrete producers who place a premium on proven quality and reliability.

Xypex Crystalline Technology – Lifelong Waterproofing and Protection for Concrete Structures

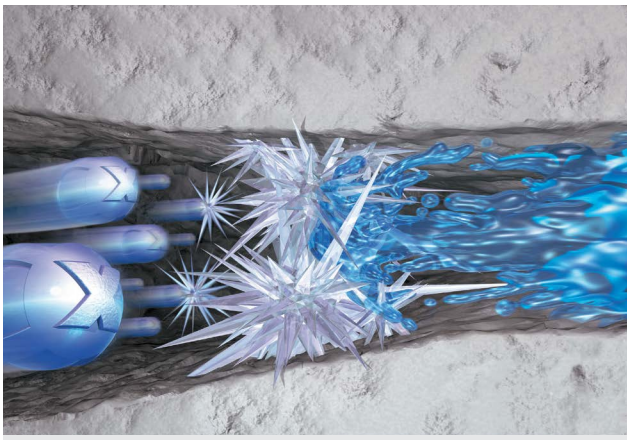
Xypex Crystalline Technology is at the forefront of concrete waterproofing, employing a transformative approach that harnesses concrete's innate chemistry. This proprietary technology initiates an integral reaction within the concrete, delivering permanent waterproofing and protection. The Xypex crystalline system reacts with cement hydration by-products, forming non-soluble crystalline within interconnected pores and voids. The crystalline structure becomes a permanent part of the concrete, stopping water ingress even under extreme hydrostatic pressure and protecting it against harsh environmental conditions.

Half a century ago, Xypex Chemical Corporation coined the concept of "Concrete Waterproofing by Crystallization"marking a departure from conventional surface-reliant barrier products. Pioneering a unique technology that capitalizes on concrete's natural characteristics, Xypex has remained at the forefront of innovation.

Control over permeability is crucial, and Xypex Admix and surface-applied products are crucial in enhancing concrete durability. They ensure long-term structural integrity, protection, and aesthetics by preventing the penetration of aggressive chemicals and safeguarding against reinforcing steel corrosion, sulphate and acid attacks, carbonation, and microbial-induced corrosion. Additionally, they mitigate deterioration from freeze-thaw cycles, wetting and drying, and temperature fluctuations.

Sustainability has been integral to Xypex's ethos since its inception in 1969. Today, this commitment translates into construction practices meeting present needs without compromising the ability of future generations to meet their own needs. Our crystalline technology exemplifies this commitment, providing durable and permanent concrete waterproofing while facilitating circular construction practices. Central to our mission is assisting you in reducing your project's carbon footprint and achieving sustainability goals. Xypex technology has a 60% lower carbon footprint than traditional waterproofing membranes and coatings, contains no VOCs, and minimizes environmental impacts. This results in a significantly lower lifecycle impact and decreased maintenance costs. Validated by Environmental Product Declarations (EPD) and Health Product Declarations (HPD), Xypex aligns with industry standards for efficiency and environmental responsibility, supporting LEED credits.

We are dedicated to a future where construction endures the test of time, promoting environmental health and resource efficiency. With Xypex, embrace a legacy of enduring structures and sustainable practices.



Typical Xypex Admix Applications

- Sewage and Water Treatment Plants
- Foundations
- Precast Components
- Reservoirs
- Secondary Containment Structures
- Tunnels and Subway Systems
- Underground Vaults
- Parking Structures
- Swimming Pools

Xypex Admix Advantages

Xypex Admix simply has more performance muscle than other products in its field, beginning with the fact that it is present and active throughout the entire concrete matrix from the moment it's poured.

1

INTEGRAL CRYSTALLINE TECHNOLOGY

- Xypex crystallization process
- Becomes part of the concrete matrix
- Seals static-cracks up to 0.5 mm
- Permanent

2

WIDE PERFORMANCE CAPABILITIES

- Resists extreme hydrostatic pressure
- Resists chemical attack
- Prevents microbial induced corrosion
- Enhances durability

3

QUALITY CONTROL

- Through independant testing to world standards
- Extensive research and in-house analysis
- Technical support, field analysis and site supervision
- Quality Assurance Management System - ISO 9001

4

VALUE ENGINEERING

- Adds flexibility to construction scheduling
- Shortens construction process, saving time and money
- Not subject to climatic restraints
- No adverse effect on mix design
- Easy and less costly to install

All variations of the Admix C-Series contain the equivalent amount of reactive chemicals at their prescribed dosage rates and provide the same waterproofing and durability performance characteristics. Xypex Admix C-Series is available in regular or no-fines grade and is packaged conveniently, including soluble bags for accurate, easy and safe handling during dosing.

Admix C-500 / C-500 NF / C-5000 are formulated to have minimal or no effect on setting time.

Admix C-1000 / C-1000 NF are formulated for mix designs requiring a normal or slightly delayed set.

Admix C-2000 / 2000 NF are designed for warmer climates and projects requiring a slower hydration rate.

Better Control

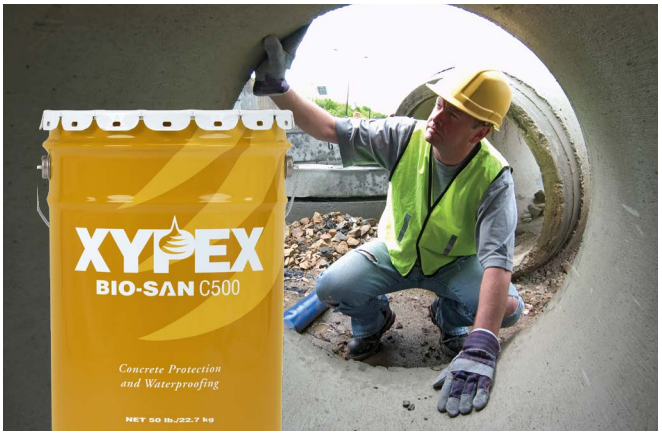
Better Project Control. Using Xypex Admix means that the waterproofing chemical are installed at the time of batching concrete. This means that engineers and contractors can exert much better control over the waterproofing production schedule. ***Better Cost Control.*** Construction schedules can be accelerated and cost savings realized, by eliminating most of the time and labour costs associated with traditional waterproofing methods. ***Climate Control***. Hot, cold, wet, or dry, the prevailing climate does not inhibit the installation of Xypex Admix. It's already in the mix. ***Xypex Support.*** With representatives in over 100 countries, Xypex has first-hand knowledge of local construction procedure, environmental variables, and is readily available to respond to the questions and concerns of our customers.

Design Friendly & Permanent

Xypex Admix will not adversely affect the strength, slump, air entrainment or workability of the concrete as formulated in the mix design. With Xypex Admix inside, concrete is still handled, placed, finished and cured as usual. ***Permanent.*** Xypex Admix can be trusted to perform to original specifications throughout the life of the concrete. Even when changing conditions affect the concrete, or hairline cracks develop over time, Xypex Admix will reactivate to protect the structure and prevent water leakage.

Innovation: Bio-San

Xypex closely monitors the feedback from clients and representatives to stay closely attuned to the ever-changing needs of the marketplace. Our recent admix product innovation – Xypex Bio-San - is a case in point. Responding to the issue of microbial induced corrosion (MIC) of concrete in ***severe*** sewage conditions, Xypex's new antimicrobial crystalline technology is a unique way of protecting concrete with high levels of hydrogen sulphide - the cause of microbial induced corrosion. No other admixture combines potent antimicrobial properties with Xypex's Crystalline Waterproofing Technology to offer complete protection of concrete sewer and wastewater structures. Xypex Bio-San is recommended for sewer lines with long retention times, sealed or unvented manholes, and areas of high turbulence such as lift stations.



Installing Xypex Admix

Blended into the mix at time of batching means Xypex Admix is pre-installed in the concrete and conveniently ready to satisfy diverse project requirements and ambient temperature variations. A wide range of application methods are available: ***Poured-in-Place*** – slabs, footings, walls, in-fill grout; ***Shotcrete*** – for structural and non-structural building components, including tunnel linings and stabilizing excavations; ***Precast*** – for manholes, pipes, sump pits, septic tanks. Xypex Admix Red is also available for precast applications requiring admix identification.

Managing Expectations

Xypex Admix's high performance standards are matched by equally high customer expectations. Proof from both the lab and the field support our unwavering commitment to quality and are our way of managing these expectations.

Xypex Admix has been thoroughly tested in independent labs throughout the world and according to international standards. Permeability, chemical resistance, compressive strength, freeze-thaw durability, potable water and other tests, all concluded positive results.

PERMEABILITY

U.S. Army Corps of Engineers CRD C48, "Permeability of Concrete", Aviles Engineering Corp., Houston, USA
Two concrete samples containing Xypex Admix and an untreated control sample were tested for water permeability. Both the treated and untreated samples were subjected to a pressure of 150 psi / 1.04 MPa (350 ft. / 106.7 m water head). Results showed moisture and permeated water throughout the untreated sample after 24 hours. However, the Xypex Admix samples showed no leakage, and water penetration of only 1.5 mm / 0.06 inches after 120 hours (5 days).

U.S. Army Corps of Engineers CRD C48, "Permeability of Concrete", Setsco Services, Pte Ltd., Singapore
Six Xypex Admix-treated and six untreated concrete samples were tested for water permeability. Pressure was gradually increased over five days and then maintained at 7 bars (224 ft. / 68.3 m water head) for 10 days. While the six reference samples showed water leakage beginning on the fifth day and increasing throughout the test period, the Xypex Admix samples showed no water leakage at any time during the test.

ACCI Water Permeability Test, "Water Permeability of Concrete", Australia Centre of Construction and Innovation, University of New South Wales, Sydney, Australia
Concrete samples containing Xypex Admix NF at a dosage rate of 0.8% and 1.2% were tested for water permeability against control samples. All the samples were subjected to a pressure of 10 bars (100 meters / 328 ft. water head) for 2 weeks. Water permeability coefficients were calculated and the Xypex Admix treated concrete showed significant reduction in water permeability by up to 93% at a dosage rate of 1.2%.

COMPRESSIVE STRENGTH

ASTM C 39, "Compressive Strength of Cylindrical Concrete Specimens", Kleinfelder Laboratories, San Francisco, USA
At 28 days, the compressive strength test of the concrete containing Xypex Admix measured 7160 psi / 49.5 MPa as compared to the reference sample at 6460 psi / 44.5 MPa (a 10% increase).

FREEZE / THAW DURABILITY

ASTM C 666, "Freeze/Thaw Durability", Independent Laboratory, Cleveland, USA
After 300 freeze/thaw cycles, the Xypex Admix-treated samples indicated 94% relative durability.

POTABLE WATER EXPOSURE

NSF 61, "Drinking Water System Component-Health Effects", NSF International, Ann Arbor, USA
Exposure testing of potable water in contact with Xypex-treated samples indicated no harmful effects.

CHEMICAL RESISTANCE

CSN 73 1326, "Measuring Loss of Surface Due to Sulphate Attack of Concrete Treated with Admix C-1000/Admix C-1000 NF", Betonconsult, Building Materials Testing Laboratory, Prague, Czech Republic
Concrete specimens treated with Admix C-1000 at 1% and 2%, and Admix C-1000 NF at 0.5% and 1% were cast along with non-treated concrete specimens. The specimens were exposed to a highly concentrated sulphate solution (i.e. 36,000 mg/ℓ) for 4 months and samples were periodically weighed to determine mass loss. The Admix treated samples recorded a mass loss between 5 and 50 g/m^2 and showed no surface deterioration, while the non-treated specimens measured an average mass loss of 4,860 g/m^2 with significant surface deterioration.

"Sulfuric Acid Resistance Test", Aviles Engineering Corporation, Houston, USA
Concrete containing Xypex Admix at different dosage rates including 3% specimens were tested against untreated control samples for sulfuric acid resistance. After immersion in the sulfuric acid, each sample was tested for weight loss on a daily basis until a weight loss of 50% or a definite response trend was obtained. The percentage weight loss of the samples containing Xypex Admix tested significantly lower than the control samples.

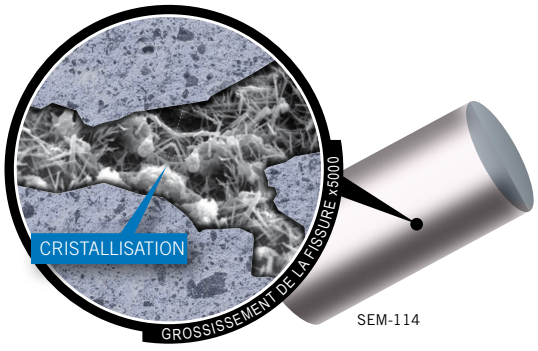
"Acid Resistance of Mortar Containing Xypex Admix C-1000 NF", Construction and Maintenance Technology Research Center (CONTEC), Sirindhorn International Institute of Technology (SIIT) - Thammasat University, Bangkok, Thailand
An acid testing regime was part of an extensive program to determine the benefit of the Xypex Admix C-1000 NF dosed at 1% to improve the durability of concrete. Several comparative mixes were utilized in this evaluation, including: a plain Portland cement and a 30% fly ash mix. Cured samples were exposed to 5% H2SO4; the pH value of this acid solution was 0.25 and never greater than 0.54 pH. In this extremely acidic, corrosive environment, at 12 weeks the Admix samples reduced the weight loss by 48% compared to controls of the cement-only mortar, and 53% in the fly ash specimens.

SCANNING ELECTRON MICROSCOPY

SEM "Microscopic Examination of Crystalline Products in Three Xypex Admix Modified Concrete Mortars", Australian Centre for Construction Innovation, University of New South Wales, Sydney, Australia
Slag and fly ash blended cement samples were treated with Xypex Admix and examined for evidence of crystalline growth at ages ranging from 8 months to 2 years. Samples were sliced and/or split and examined at magnifications between 500x and 5000x. Characteristic Xypex crystalline growth was observable on all Xypex treated samples, providing evidence of Xypex crystalline reactions with fly ash and slag blended cements.

CRACK SEALING

ASTM C1585 and ASTM C1202, "Evaluation of Self-healing Capability of Self-compacting Concrete Made with Blast-furnace Slag Cements Activated by the Xypex Crystalline Catalyst", Instituto Tecnologico de Aeronautica, Sao Jose dos Campos, Brazil
Portland, blast furnace slag and slag-modified Portland concrete samples, treated with 2.5% Admix C-500, were evaluated for self-healing capabilities. Microcracks were induced by loading to 90% of ultimate compressive strength. Cracked samples were then immersed in water to trigger self-healing after 28, 56 and 84 days. Strength and ultrasonic pulse velocity tests were used to determine mechanical recovery; sorptivity and rapid chloride permeability were used to evaluate watertightness recovery. Results substantiated the ability of Xypex Admix to provide self-healing of cracked concrete.



SEM-114

Worldwide Admix Projects

Xypex Admix was used to waterproof and protect multiple areas of THE SHARD, the tallest building in the UK at 309.6 metres (1,016 ft). Construction required the largest continuous concrete pour in UK history.

AIR FORCE ACADEMY, USA

SOUTH DISTRICT WWTP, USA

ESPLANADE THEATRE ON THE BAY, SINGAPORE

PAVLOV ARCHEOLOGICAL PARK, CZECH REPUBLIC

AMOS REX ART MUSEUM, FINLAND

DELHI METRO, INDIA

Beingthere™ Projects in Over 100 Countries

When Xypex first introduced its unique crystalline concrete waterproofing technology more than 50 years ago, the company knew its potential. This was technology for a wide array of project types – basements, bridges, locks and dams, water treatment plants, power plants and, in general, the infrastructure of cities. It was a product system for varying climatic conditions - hot, cold, wet and dry. Xypex Admix was part of an early product extension strategy, designed to focus primarily on new construction. Its market impact has been extensive, and its use on many of the major projects around the world has proven its value and reliability.

Beingthere. Xypex's global presence and commitment to excellence is bolstered by a strong network of licensees, distributors, technical representatives and installers who respond quickly to the needs and expectations of customers and their project concerns.

Being Green. Energy efficiency, material selection, minimizing site impact, VOC reduction and extending the service life of the structure are the 'green' benefits that non-toxic Xypex products provide the construction world and the pursuit of environmental sustainability.

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Attachment 2

RCRA Part B Permit Application

WASTE CHARACTERISTICS AND WASTE ANALYSIS PLAN

US Ecology Tulsa, Inc.

EPA ID: OKD000402396

Tulsa, Oklahoma

9/17/25

LICENSED PROFESSIONAL ENGINEER
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OKLAHOMA

Permit Modification Application

September 2025

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ATTACHMENT 2 – Waste Characteristics and Waste Analysis Plan

This section describes the methods used to determine the chemical and physical nature of the solid and hazardous wastes to be handled at the US Ecology Tulsa, Inc. (USE Tulsa) facility.

1. OBTAINING CHEMICAL AND PHYSICAL ANALYSES OF WASTE STREAMS: 40 CFR 270.14(b)(2) AND 40 CFR 264.13

USE Tulsa is a commercial treatment and storage facility that accepts non-hazardous waste, listed hazardous waste, and characteristic hazardous waste for on-site management. Hazardous waste management units on-site include tanks and container storage/treatment management units. Before any hazardous waste is treated at USE Tulsa, the facility collects all the chemical and physical information required to treat, store, or dispose of solid and hazardous waste in accordance with Code of Federal Regulations (CFR), Title 40, Part 264 (40 CFR 264), and (where applicable) Part 268 (Land Disposal Restrictions) and Part 273 (Universal Waste Management), as well as the requirements of Chapters 205 (Hazardous Waste Management) and 515 (Solid Waste Management) of Title 252, Oklahoma Administrative Code (OAC), administered by the Oklahoma Department of Environmental Quality (ODEQ). Detailed information for these analyses is provided in the facility Waste Analysis Plan (WAP), provided in Section 2 of this attachment. Information may include data provided by the generator under 40 CFR Part 261, existing published or documented data on the waste, and existing published or documented data on waste generated from similar processes. Verification of information collected from the analysis may be repeated when the facility is notified or has reason to believe that the process or operation generating the hazardous wastes has changed.

Specific hazardous wastes managed on-site are identified in the facility Part A Permit Application. Analytical methods have been selected and analytical protocols developed to provide sufficient information to facilitate successful management of solid and hazardous wastes accepted for management on-site (see Figure 1 – Waste Analysis Parameters and Rationale and Figure 2 – Waste Analysis Parameters).

1a. CONTAINERIZED WASTE: 40 CFR 264.172, 264.175, AND 264.177

Compatibility of waste with containers, containment systems for container storage areas, and container sampling and analysis information is discussed in the following paragraphs.

Additional details regarding container management on-site are presented in Attachment 10 - Process Description.

Incompatible wastes, or incompatible wastes and materials will not be placed or commingled in the same container unless the precautions outlined in Section 2f are taken. Hazardous waste will not be placed in an unwashed container that previously held an incompatible waste or material. Care will be taken to store only waste that is compatible with the container material.

Liquid Resource Conservation and Recovery Act (RCRA) hazardous wastes will be stored in container storage areas equipped with secondary containment. Prior to storage of solid hazardous waste outside of containment areas, a visual inspection will be performed to confirm that the waste is not liquid therefore would not require secondary containment. All available information, including the US Department of Transportation (DOT) proper shipping name and/or the waste profile form, will be used to determine if the waste stream may contain free liquid. If there is question as to whether the waste is solid or liquid, a sample of the waste will be subjected to the Paint Filter Liquids Test (PFLT) Method 9095 in SW 846, in accordance with facility sampling protocol (for waste acceptance) and the WAP (Section 2c). Hazardous waste confirmed to be solid by visual inspection or passing the PFLT (no free liquids) may be assigned a location in a designated container storage area not equipped with secondary containment (e.g., Container Management Area 4 [CMA-4]). Temporary secondary containment setups may be used for liquid RCRA hazardous waste storage in areas without built-in secondary containment in emergency situations. For containerized liquid waste within combination packaging, the outer container is considered the secondary containment and can be stored in areas not equipped with secondary containment. The locations of container storage areas are shown in Figure 1: A-2 - General Facility Layout (Existing Conditions) and Figure 1b: A-2b – General Facility Layout (Proposed Site Plan) presented in Attachment 1 – Maps and Figures.

Standard facility sampling protocol for solid and hazardous waste acceptance requires that a minimum of ten percent (10%) of the containers in a manifested line-item shipment will be sampled. Samples from multiple containers that have been sampled from within the specific manifest line item may be combined into a single composite sample to represent that waste stream.

Standard facility sampling protocol is waived for lab pack wastes, transshipped wastes (containerized wastes that enter the facility and are shipped from the facility without any repackaging or treatment activities), discarded commercial products, and site-generated wastes [see Section 2e(iii)]. Container sampling methods are designed to provide a representative sample of the waste. Analytical methods, outlined in Sections 2a and 2b, have been chosen or developed to provide the information required for appropriate waste management. Specific sampling methods are discussed in Section 2c.

1b. WASTE IN TANK SYSTEMS: 40 CFR 270.16 AND 40 CFR 264.192(a)(2), 264.198 AND 264.199

Compatibility of wastes with tank systems, sampling, and analysis information is discussed in the following paragraphs. Additional details regarding tank management are presented in Attachment 10 - Process Description.

Reactive waste will be stored or treated in such a way that it is protected from any material or conditions that may cause the waste to become reactive. In addition, incompatible wastes, or incompatible wastes and materials will not be placed in the same tank system unless the precautions outlined in Section 2f are taken.

Hazardous waste will not be placed in a tank system that previously held an incompatible waste or material and that has not been decontaminated or can be visually inspected and confirmed to be free of contamination unless the precautions outlined in Section 2f are taken.

Bulk sampling methods are designed to provide a representative sample of the waste. Analytical methods, outlined in Sections 2a and 2b, have been chosen or developed to provide the information required for appropriate waste management. Specific sampling methods are discussed in Section 2c.

1c. WASTE IN PILES: 40 CFR 264.250(c)(1) AND (4)

USE Tulsa does not operate a hazardous waste pile unit; therefore, this section is not applicable.

1d. LANDFILLED WASTES: 40 CFR 264.300

USE Tulsa does not operate a hazardous waste landfill; therefore, this section is not applicable.

1e. WASTE INCINERATED AND WASTE USED IN PERFORMANCE TESTS: 40 CFR 264.340

USE Tulsa does not operate a hazardous waste incinerator; therefore, this section is not applicable.

1f. WASTE TO BE LAND TREATED: 40 CFR 264.270

USE Tulsa does not operate a hazardous waste land treatment facility; therefore, this section is not applicable.

2. WASTE ANALYSIS PLAN: 40 CFR 270.14(b)(3); 264.13(b) AND 264.13(c)

The wastes accepted at the USE Tulsa may include a wide variety of RCRA hazardous and non-hazardous (solid) wastes. Specific hazardous wastes managed on-site are identified in the facility Part A Permit Application.

USE Tulsa may accept any liquid or solid RCRA hazardous waste, as defined in 40 CFR 261 (and identified in the facility Part A Permit Application), for storage and/or treatment. Additionally, non-hazardous industrial wastes (not subject to regulation under 40 CFR Part 264) are managed on-site in accordance with the requirements of OAC 252:515. Additional information regarding waste analysis parameters and rationale, test methods, sampling methods, and frequency of analysis as well as additional requirements for wastes generated off-site and for ignitable, reactive, or incompatible wastes are addressed in the sections below.

2a. PARAMETERS AND RATIONALE FOR WASTE ANALYSIS: 40 CFR 264.13(b)(1)

USE Tulsa has selected physical and chemical waste analysis parameters to facilitate safe solid and hazardous waste handling practices as well as sound tank and container management practices at the facility. The waste analysis parameters selected and their rationale for selection are shown in Figure 1 - Waste Analysis Parameters and Rationale. The parameters identified in Figure 1 are those currently utilized or expected to be utilized by USE Tulsa. Additional or equivalent methods may be used at the discretion of USE Tulsa.

In addition to the parameters identified in Figure 1, the Paint Filter Liquids Test (PFLT) Method 9095 in accordance with SW-846 will be used to identify containers requiring secondary containment during storage (see Section la), as well as any additional information

available concerning the waste stream (e.g., visual inspection, US DOT proper shipping name and/or waste profile). In accordance with facility sampling protocol and this WAP, information for the hazardous wastes designated for storage in container storage areas not equipped with secondary containment will be reviewed (e.g., DOT proper shipping name and waste acceptance profile) and will be subjected to the PFLT and managed accordingly. In addition, wastes identified by EPA waste codes F020, F021, F022, F023, F026 or F027 will not be assigned a container storage location without secondary containment.

2b. TEST METHODS: 40 CFR 264.13(b)(2)

Analytical methods used by USE Tulsa are standard laboratory methods or are methods developed by USE Tulsa for waste management on-site and incorporated into this WAP. The physical and chemical waste analysis parameters for solid and hazardous waste management in tank systems, container management areas, and (where applicable) process equipment are shown in Figure 1 - Waste Analysis Parameters and Rationale. The specific analytical testing method to be used for each parameter is shown in Figure 2 - Waste Analysis Parameters.

Prior to approving a waste stream for management on-site, USE Tulsa requires that the generator provide information. A representative waste sample may be requested for examination prior to approval. Specific information regarding pre-acceptance procedures is presented in Section 2e(i). USE Tulsa personnel will evaluate the data (initial profile) provided by the generator to determine if the waste is suitable for management at the USE Tulsa facility. An independent laboratory, in-house laboratory, or combination of these may be used by the generator or USE Tulsa for sample analysis.

2c. SAMPLING METHODS: 40 CFR 264.13(b)(3); 40 CFR Part 261, Appendix I

Off-site generators are responsible for collecting representative samples of their waste streams. Original waste samples from generators may be requested prior to waste profile approvals or during waste acceptance by USE Tulsa personnel in order to gain necessary information regarding the treatment and disposition of the waste. Should the generator need instructions on representative sampling procedures, USE Tulsa may provide the recommendations as specified in 40 CFR 261, Appendix I, or an equivalent sampling method. Standard on site facility sampling protocol is described in Section 2e(iii).

2d. FREQUENCY OF ANALYSIS: 40 CFR 264.13(b)(4)

The initial waste profile analysis will be evaluated and recertified every year or if the Generator has notified USE Tulsa or USE Tulsa has reason to believe that the process that produces the waste stream has changed. If the waste has not been managed on-site during the preceding 18 months, the applicable waste approval data will be reviewed by the approvals department and forwarded to additional departments as necessary. This review will be used to determine if the information is still accurate and whether the re-approval process may be applied or if the complete waste approval process needs to be followed. If the generator cannot make this certification, a new profile must be provided for the waste analysis parameters. Examples of the initial waste profile form and the waste profile recertification form are shown, respectively, in Figure 3 – Republic Waste/Material Profile Form Example and Figure 4 – Waste Recertification Document Example.

A waste stream re-characterization will be performed when a generator notifies USE Tulsa that a process or operation generating the waste has changed. In the event USE Tulsa has reason to believe that the process or operation generating the waste has changed without notice from the generator, a re-characterization request will be made. The results will be submitted to USE Tulsa before additional waste from the re-characterized waste stream can be accepted from the generator.

If the fingerprint analysis of a waste (as outlined in Section 2e) indicates that the waste received at the facility does not agree with the waste acceptance profile described by the manifest and the waste profile, the generator may re-characterize the waste by either amending the existing profile or providing a new completed profile and appropriate analysis, as necessary.

For certain emergency response situations and generator spills, some of the initial waste analysis parameters for on-site management (Figure 1 - Waste Analysis Parameters and Rationale) may be waived. This will only occur if the generator can adequately make the hazardous waste determination of 40 CFR 262.11. All available analytical data, generator knowledge, and supporting Safety Data Sheets (SDSs) will be evaluated prior to receipt of the waste at the USE Tulsa facility. Upon arrival of the waste on-site, additional testing may be performed at the discretion of USE Tulsa.

Conditionally exempt small quantity generators may not be required to perform some of the initial waste analysis parameters identified in Figure 1 - Waste Analysis Parameters and Rationale. The waste analysis data requirements for these generators will be determined on a case-by-case basis by the General Manager or designee prior to approval.

2d(i). WASTE TREATMENT VERIFICATION

Each treated batch of mixed, one-time receipt, or inconsistent wastes must be sampled and undergo specific verification to show the treated waste meets the Land Disposal Restrictions (LDR) standards defined in 40 CFR 268.40 and/or 268.48. An example of the LDR Form is shown in Figure 5 – Land Disposal Restriction Form Example. The sample will be collected through the following process:

1. Once the treatment recipe is completed, the excavator operator will scoop a bucket of the treated waste and then sit the bucket down within the secondary containment.
2. The surface layer of the treated waste will be scraped aside using a dedicated disposable cup.
3. A scoop of treated waste will then be placed in a new, clean, high density polypropylene cup with lid.
4. The outside of the container will be cleaned then labeled with the batch number, date, time, and sampler's initials.
5. Once labeled, the sample will be delivered to the laboratory for analysis.

Consistent waste stream (waste streams that show acceptable [in reference to USE Tulsa waste rejection parameters] little to no variation in the fingerprint analysis, results, or constituents between shipments) approvals will not require individual batch analysis after treatment if the recipe has been proven to be effective. The consistent approvals recipe will be "proven" after the same recipe is applied to five (5) consecutive batches with 100% effective treatment demonstrated by laboratory analysis. The treatment efficacy will then be verified on at least 10% of the batches thereafter. The established recipe should only be applied to a subsequent identical batch (e.g., same waste stream(s) and reagent

prescription). Sample collection will follow the same process as described in the previous paragraph.

For consistent waste streams which have waste codes or Underlying Hazardous Constituents (UHC's) identified by the generator, and if those constituents of concern are not detected during laboratory analysis after five (5) separate shipments of that waste, further testing for that constituent of concern will not be required and USE Tulsa will discuss these results with the generator to discuss possible removal of the identified waste code or UHC. If the generator does not agree and wants the waste code or UHC to remain on the profile, then testing will continue.

2e. ADDITIONAL REQUIREMENTS FOR WASTES GENERATED OFF-SITE: 40 CFR 264.13(c)

2e(i). PRE-ACCEPTANCE PROTOCOL

Prior to accepting a waste at the facility, a standard form summarizing waste characteristics (profile), as shown in Figure 3 – Republic Waste/Material Profile Form Example, is required to be completed by the generator for each solid and hazardous waste stream. This form will be revised as needed to ensure all information is provided to properly review the waste profile. In addition to the profile, the generator may attach any previously performed analytical data and all applicable SDSs. The generator may use knowledge of process or laboratory analysis to complete this form. The completed profile will allow USE Tulsa to make a preliminary evaluation regarding the acceptability of the waste and will provide preliminary basic information enabling USE Tulsa to successfully manage hazardous waste in accordance with the requirements of 40 CFR Part 264. The profile also identifies wastes subject to the LDR as specified in 40 CFR Part 268.

The generator is responsible for defining waste in accordance with 40 CFR 262.11 and through knowledge of process to aid USE Tulsa in its evaluation of the applicability of 40 CFR 264 Subpart CC requirements and ensure that organic concentration is less than 500 ppm for wastes, as needed.

The generator's waste characterization may include an analysis of a representative sample of the waste, however generator knowledge of the waste may be used in some cases. The

generator, an independent laboratory, the USE Tulsa laboratory, or another US Ecology laboratory may perform the testing. Testing and analyses are performed using standard laboratory tests (US Environmental Protection Agency [EPA], ASTM, AWWA, or other approved tests) or alternate methods approved in this WAP.

USE Tulsa has developed a series of criteria to determine the acceptability of specific waste. These criteria are referred to as pre-acceptance reviews and dictate what information is needed to determine the acceptability of the waste for on-site management. At a minimum, USE Tulsa will obtain all the information required by 40 CFR §264.13(a)(1) and as outlined in 40 CFR §264.13(a)(2). If the generator has not supplied the detailed analysis, USE Tulsa may elect to gather the specified information. If the information is not provided by the generator nor has USE Tulsa gathered the information, the waste stream is not approved to be received at USE Tulsa. The applicability of Subpart CC will be evaluated during the approval process. Subpart CC constituents will be identified based on information provided by the generator and will be used in the determination of the total Subpart CC value for that waste stream. As part of the waste profile, all waste treated in TA-2a, TA-2b, or TA-2c will be certified that the volatile organic content subject to Subpart CC is less than 500 ppm. The waste stream will be flagged using an internal system to document the Subpart CC applicability and the required management. The waste stream is given a treatment code that corresponds to the facilities management methods for handling.

The pre-acceptance review is the mechanism for deciding the acceptability of a particular waste, based on the conditions or limitations of existing permits, compatibility with other wastes being managed on site, and the waste's suitability for management utilizing the process options, and off-site disposal options available. The pre-acceptance review may be carried out on-site, prior to the receipt of the initial load, or upon receipt of the initial load. USE Tulsa may obtain analytical information, as needed either during the pre-acceptance review or incoming load review to confirm the concentration of constituents of concern reasonably expected to be present in the waste. At USE Tulsa, the Approvals Coordinator or designated trained employee(s) reviews the information on the completed profile to ensure compliance with the facility's RCRA permit. The General Manager or their

designee reviews the completed profile for the ability to properly and safely treat the waste with the facility's treatment options. The General Manager or their designee may request that other qualified USE Tulsa employees review the profile as well if there are any questions or special conditions.

After the profile has been approved, all hazardous wastes except those that fall under the exemption descriptions listed in Section 2e(iii) received at USE Tulsa that are destined for on-site treatment will undergo a set of fingerprint tests at the time of receipt to confirm that the waste is consistent with the information on the profile. The tests that will be used as part of the fingerprint testing are shown in Figure 6 – Fingerprint Tests. USE Tulsa may also conduct additional analyses to aid in processing decisions.

The pre-acceptance evaluation is concluded with documentation of the decision regarding acceptability of the waste and the proposed method of management. Included within the documentation is the required notification to the generator that the waste is approved for management in accordance with the facilities permit and 40 CFR §264.12(b).

USE Tulsa technical disposal decisions are based on:

- Available waste management methods;
- Conditions or limitations of existing permits and regulations;
- Capability to manage the waste in a safe and environmentally compliant manner;
- Profile description of the process generating the waste;
- Profile description of the chemical and physical properties of the waste;
- Any applicable LDR notification per 40 CFR 268.7(a);
- Results of the onsite fingerprint analysis or third party lab analysis;
- Management's technical experience and judgment.

The personnel involved in reviewing and approving the pre-acceptance waste profiles participate in a team approach to these approvals. The General Manager or their designee works with other qualified USE Tulsa employees as needed to perform the following tasks for review and approval:

- Reviews the profile to ensure that the waste can be safely stored and treated at the site, and as such, has been trained by experience and training;
- Assesses the regulatory compliance of the waste to ensure that the waste fits within the permit limits of the facility;
- Ensures that the receipt and handling of the waste is within the constraints of the facility; and
- Reviews all facets of the waste profile.

Requirements:

For each new proposed waste stream, except as noted herein, the following information will be obtained as appropriate:

- Pertinent chemical and physical data to determine waste characteristics and when appropriate, representative sampling information and certifications.
- A representative sample, if required and available (may not be required if facility management determines the pre-acceptance documentation gives sufficient information to maintain compliance with permit and operational constraints and submittal of a sample for analysis would not aid in the disposal or treatment process).

Other exceptions to sample requirements are listed in Section 2e(iii).

Profile Updates:

Profile evaluations will be performed annually from the date of the original generator certification. In addition, a waste profile evaluation will be conducted in accordance with 40 CFR 264.13(a)(3) if any of the following occurs:

- Generator notification indicates a change in the process generating the waste.
- Visual waste inspection, fingerprint, or other analysis as described in Section 2b indicates the waste received at the facility does not match the identity of the waste profile. These updates may be in the form of a profile addendum letter to the profile

from the generator requesting the change, or it may be in the form of a new profile reflecting the changes.

2e(ii). ACCEPTANCE PROTOCOL

Each shipment of waste is inspected, sampled, and analyzed as defined in this document before acceptance, except as noted in Section 2e(iii). However, wastes that will be remanifested to another treatment storage and disposal facility (TSDF) and not processed at USE Tulsa may be opened or tested, while relying on the final TSDF to identify significant discrepancies. This procedure serves first to compare the received waste identity with that determined during the pre-acceptance process and the manifested waste. Second, it serves to ensure proper disposition of the waste for treatment, storage, or disposal of the waste. Although analysis is generally only performed by properly trained and qualified USE Tulsa laboratory employees, other contractors may be utilized if needed. Non-bulk and small bulk hazardous waste shipments (e.g., drums and tote tanks) arriving on site will be unloaded into a storage location as soon as possible, at which time the sampling and waste acceptance protocol begins. Rejected waste may remain on site until the safe shipment of the waste can be arranged, providing the waste may be safely segregated and stored. If the rejected waste will be on-site more than ten (10) days since its arrival at the facility, ODEQ will be notified and provided information on the identification of the generator, all available waste information, the reason for the delay, and the expected date of shipment either to the generator or an appropriate receiving facility. ODEQ will then instruct USE Tulsa of any further actions or information needed to ensure the waste is properly handled.

USE Tulsa acceptance procedures are designed to ensure that solid and hazardous waste received at the facility matches the identity of the waste on the accompanying manifest. Upon arrival of a solid or hazardous waste at the facility, a sample of the waste is collected and fingerprint analyzed on-site as described in Section 2e(iii). Subsequently, the waste may be assigned to a specific temporary storage tank or container storage area depending on the chemical properties of the waste.

Multiple reviews are conducted of the received waste prior to acceptance to the facility. When the load arrives, the paperwork, including the hazardous waste manifest and LDR notice, are reviewed by receiving personnel or receiving laboratory personnel for full completion and meeting the permit requirements. These associates have been trained to ensure that the received manifest has been correctly and fully completed, and that if a problem is detected, will bring it to the attention of the General Manager or their designee, as needed, to resolve the issue or reject the load. Once reviewed and approved, the waste is sampled (as required) and the fingerprint tests are conducted by the laboratory personnel. USE Tulsa reserves the right to use either the site laboratory or other US Ecology site laboratories for the required analyses, or other state-certified independent commercial laboratories for any analytical methods (required or optional) during waste management activities if necessary. All laboratories will use the test methods identified and approved in the site's WAP. All results will be maintained as part of the site's Operating Record. If all test results are within the tolerances of the WAP's requirements, the laboratory personnel or appropriately trained technical personnel approves receipt of the waste and transmits that information to the operations employee who unloads the waste into the appropriate receiving area. The Laboratory Manager/Supervisor, Chemist, and/or Laboratory Technician have been trained in the analytical protocols and regulatory and permit limits of the site to ensure that all received wastes meet the requirements. Issues associated with the waste should be brought to the attention of the General Manager or their designee, as needed, for determination if the waste may be accepted.

The incoming waste loads may remain in tank trucks or on trailers until the fingerprint analyses are completed in order to determine whether to reject or accept the waste. If unloaded for sampling, containers will be managed as appropriate for the material manifested. During acceptance or staging, USE Tulsa may manage containers in areas outside of permitted container storage areas. This period is limited to the time required to approve the receipt, but in no case will last longer than the same day in which it arrived. If the waste must be held overnight prior to approval, the delivering truck will be held in a secondarily contained unloading area. Containerized wastes will be moved to appropriate

storage areas after the acceptance requirements have been met. Alternatively, the driver will be instructed to return at a later scheduled date/time.

Upon arrival of an incoming waste load to the USE Tulsa facility, the truck driver delivers the manifest and accompanying shipping papers to receiving personnel. The specific generator waste analysis profile is then obtained and reviewed.

The manifest is then inspected for completeness and correctness, with a minimum of the following information checked for hazardous wastes:

- The manifest document number;
- The generator's name, address, and EPA ID number;
- Each transporter's name and EPA ID number;
- An alternative TSDF, address, and EPA ID number (if applicable);
- DOT shipping name, hazard class, United Nations/North America (UN/NA) number, and packing group;
- The volume/weight of waste in a bulk shipment or the number and type of containers in a piece shipment;
- A signed and dated certification of the shipment contents by the generator;
- A signed and dated transporter 1 block and 2 block (if necessary); and
- For hazardous wastes, a complete LDR notification/certification form (if not already on file).

The shipment of hazardous waste is then inspected visually for the following information:

- The number and type of containers or bulk volume anticipated from manifest information;
- Shipment labels/placards in accordance with information on the manifest; and
- Other irregularities with the shipment (e.g., leaks, poor container condition, etc.).

USE Tulsa receives hazardous waste in accordance with the requirements of Subpart E of 40 CFR Part 264. When hazardous waste is received on-site, USE Tulsa will:

- Sign and date each copy of the manifest to certify that the hazardous waste described by the manifest was received;

- Note any significant discrepancies in the manifest [as defined in 40 CFR 264.72(a)] on each copy of the manifest:
  - Manifest discrepancies are differences between the quantity or type of hazardous waste designated on the manifest or shipping paper, and the quantity or type of hazardous waste a facility actually receives. Significant discrepancies in quantity are: 1) For bulk waste, variations greater than 10 percent in weight; and 2) for batch waste, any variation in piece count, such as a discrepancy of one drum in a truckload. For bulk waste, the noted weight on the manifest may be converted to volume using the waste's specific gravity, if needed. This calculated volume is then compared to the actual bulk waste volume. Any volume discrepancy greater than 10% is managed as a significant discrepancy. Significant discrepancies in type are obvious differences which can be discovered by inspection or waste analysis, such as waste solvent substituted for waste acid, or toxic constituents not reported on the manifest or shipping paper.
  - Upon discovering a significant discrepancy, USE Tulsa will attempt to reconcile the discrepancy with the waste generator or transporter (e.g., with telephone conversations or in person). If the discrepancy is not resolved within fifteen (15) days after receiving a hazardous waste, USE Tulsa will immediately submit a letter describing the discrepancy, attempts to reconcile the discrepancy, and a copy of the manifest or shipping paper at issue to the ODEQ.
- Provide the appropriate transporter copy of the signed manifest:
  - The manifest may be signed and provided to the transporter prior to completion of confirmation analysis as specified in this WAP. When subsequent analysis identifies a manifest discrepancy, USE Tulsa will contact the generator to resolve the discrepancy.
- Send a copy of the manifest to the generator within the timeframe presented in 40 CFR 262.42.

2e(iii). SAMPLING AND ANALYSIS OF WASTE MOVEMENTS

The sampling and analysis of the incoming waste will utilize appropriate methods as specified in Section 2b of this document. The sampling procedures will depend upon the type of shipment and the type of waste. Sampling methods are discussed in Section 2c.

100% of containerized loads to be processed at USE Tulsa will have an inspection (which can include looking at the waste inside the container, moving/rotating the containers to verify the physical state by detecting free liquids via displacement, etc.), while a minimum of 10% per waste stream per shipment and manifest will be sampled. Wastes that will not be processed at Tulsa but will be remanifested to another TSDF, may not be internally inspected except as part of the 10% sampling, but rather the receiving TSDF will do the confirming inspection, and if it is not as the profile notes, the significant discrepancy will be discussed with the generator. Multiple manifests from the same generator containing the same waste stream will be treated as separate loads and will each have a 10% sampling requirement. A visual inspection form or equivalent will be completed during the visual inspection. If the appearance of the waste varies in any significant way from that listed on the profile, the waste in question may be rejected or sampled and analyzed before further handling. Sampling and fingerprint analysis for bulk loads routinely received in volumes of >5 loads per month may be reduced to 20%. Standard facility waste acceptance protocol is waived for lab pack wastes, transshipped wastes, discarded commercial products, and site-generated wastes. Acceptance protocols for these wastes are discussed below.

- Lab pack wastes - The packing list arriving with lab packs will be compared to the pre-acceptance packing list. Discrepancies will be resolved prior to acceptance.
- Transshipped wastes - Waste acceptance for transshipped wastes will consist of verification of manifest information, container count, and container labels. In some cases, USE Tulsa may sample transshipped wastes (e.g., prior to shipment to an affiliated facility or if USE Tulsa has concerns regarding the identity of the waste).
- Discarded commercial products - Generator "knowledge of process" including applicable SDSs provide adequate characterization of waste commercial products.

- Site generated wastes - Site generated wastes include used personal protective equipment, process residuals, and incidental wastes. Waste acceptance for site-generated wastes is not required. "Knowledge of process" or profile information corresponding to processed waste streams will adequately characterize these wastes for proper management. Analysis of the waste may be conducted at the discretion of USE Tulsa.

In addition, USE Tulsa may waive on-site sampling requirements where pre-acceptance evaluations coupled with visual inspections or if any of the following conditions exist:

- A sample cannot be reasonably obtained, such as filter cartridges, tank cleanout sludge (prior to cleanout), large, contaminated pieces, or debris
- Waste contained in a lab pack or combination packaging. “Combination packaging” is defined in 49 CFR 171.8 as “…one or more inner packagings secured in a non-bulk outer packaging and is subject to DOT requirements of 49 CFR part 173.
- Commercial products or chemicals, off-specification, outdated, unused, contaminated, or banned. These products are typically supported by an SDS.
- Empty containers of waste material, commercial products or chemicals, including empty containers which may contain residues. A container shall be determined empty according to the criteria specified in 40 CFR 261.7.
- Residue and debris from the cleanup of spills or releases of chemical substances, previously approved wastes, commercial products, or a waste which would otherwise qualify as an exception.
- Wastes that are easily identifiable through an inspection process. Examples may include cathode tubes, batteries, fluorescent light tubes, filters and filter cartridges, wire or tubing, paper products, metals sheeting and parts, crushed glass, computer parts, and other debris.
- Demolition wastes. This includes wastes from the dismantling or demolition of plants, facilities, or industrial equipment contaminated with chemicals from the process.
- USE Tulsa site-generated wastes.

- Household hazardous waste (HHW), pesticides, waste from small quantity generators and or small volume waste streams (<100 tons per year). For these exceptions, the generator will supply USE Tulsa with sufficient chemical and physical characteristics information for the proper management of the waste.
- Controlled substances regulated by government agencies including drugs and/or materials from clandestine labs.
- Wastes from remediation projects in which the waste characterization is known through a sampling plan approved by a federal or state agency.
- Debris as defined in 40 CFR §268.2. These materials will be visually inspected prior to acceptance in order to ensure the waste meets the definition of debris.
- Contaminated personal protective equipment (PPE).
- Aerosol cans.
- Materials not amenable to sampling such as structural steel, tanks, pipe, cement, glass, empty drums, machinery. Equipment, manufactured items, monolithic materials, and others may be managed by USE Tulsa which do not allow for normal sampling procedures. These materials will be managed on a case-by-case basis.

In these cases, the shipment will be inspected for conformance with manifest and pre-acceptance documentation as previously described.

Liquid in containers will be sampled with a column liquid waste sampler, also called a coliwasa (or other suitable method). Solids and sludges in containers will be grab-sampled with a trier (or other suitable method). If standard facility sampling techniques do not provide a representative sample for analysis, an alternate method will be used. The USE Tulsa laboratory has the equipment, procedures, and training to complete all of the required fingerprint testing, but off-site laboratories may be used at the discretion of USE Tulsa.

For incoming bulk liquid waste in tank trucks, the representative sampling device used by USE Tulsa will be a coliwasa (or other suitable method). A grab sample will be collected through the dome hatch on top of the truck trailer. An alternate sampling procedure may be selected (if deemed necessary) to obtain a representative sample, i.e., for safety reasons

or when the waste is not of homogeneous composition. Off-site laboratories may be used at the discretion of USE Tulsa.

The analyses conducted on-site are for selected analytical (fingerprint) parameters. Fingerprint parameters are selected to support the identification of wastes received at the facility. These parameters are normally a subset of the initial waste analysis information (profile) that generators have provided to USE Tulsa during pre-acceptance procedures. The analyses performed on a waste will be selected to provide adequate information to provide confirmation of waste identity, facilitate sound waste management practices on-site, and determine applicability of LDR requirements for appropriate hazardous waste disposal. A standard set of fingerprint analyses are generally conducted on the wastes, depending on the type of waste that it is. The General Manager or their designee selects the tests that are required for each waste stream and may elect to require additional tests based on the information included in the waste profile or determined from review of the initial receipt information.

The results of the on-site fingerprint analysis are maintained in the operating record and the results are compared to the initial waste analysis data. If the fingerprint analysis results are within acceptance tolerances, the waste received at the facility will be identified as the solid or hazardous waste specified on the accompanying manifest, and therefore, acceptable for management.

Based on the results of the fingerprint tests, each waste stream is directed to an appropriate storage area. Bulk liquid wastes can be stored in tank farm 1 (TF-1), offloaded into treatment tanks, or pumped into containers. It is noted that TF-1 is proposed for closure and will be replaced by tank farm TF-4 after it is modified to receive hazardous waste. Non-bulk (e.g., drums) and small-bulk (e.g., tote tank) containerized wastes are currently generally unloaded into container management area 3 (CMA-3) which has the ability to segregate incompatible wastes into separate cells. Separate cells are available for ignitable waste, oxidizers, acids, and bases. CMA-1 is proposed for expansion with additional storage bays for containerized waste. After this occurs, containerized waste will be unloaded into both CMA-3 and CMA-1.

Containerized waste will be segregated according to the DOT shipping hazard class information on each container's label and in compliance with 40 CFR Part 264, Appendix V. Wastes that are received and proven to be non-hazardous wastes and waste in combination packaging may be received into and stored in the other waste management areas of the facility designated for such operations.

Waste variability may be attributed to waste loading procedures or other factors. Loading onto tank trucks may mix the waste and may incorporate some solids from generator storage devices. Examples of anticipated waste variability could be the result of any of the following:

- differences due to temperature;
- precipitation or absorption of constituents after sampling for waste analysis data due to varying length of storage time before management;
- sedimentation of solids during prolonged storage times or during transportation to the USE Tulsa facility.

Analytical results of the sample taken at the USE Tulsa facility for fingerprinting may differ somewhat from the waste analysis data provided by the generator (i.e., some range is anticipated for the results of analytical procedures).

Accepted tolerances for acceptance criteria are as follows:

- Physical state of sample — Anticipated physical state must be within tolerance limits from value stated on waste profile.
- Flash Point – The fingerprint analysis determines if the flash point is equal to or greater than 140 degrees F, or less than 140 degrees F. Unexpected flash point determination resulting in a change in characterization status is considered out of the tolerance limit.
- pH – If the fingerprint analysis indicates that a characteristic or segregation determination must be changed from what is listed on the waste profile based on pH, the waste is out of tolerance limits.

If any fingerprint parameter falls outside the accepted tolerances, it may be necessary for a second sample to be taken and the analysis repeated. Should the second sample of the

fingerprint parameters fall outside the accepted tolerances, the generator will be contacted and advised that the waste may either be re-characterized or that it will be rejected (see Section 2e(ii) for procedures applicable to significant manifest discrepancies). Fingerprint discrepancies could require USE Tulsa personnel to verify the container has been properly labeled by the generator during preparation of the waste for transport. If fingerprint analysis indicates results within specified acceptance tolerance for an alternate approved waste stream, the waste will be accepted and appropriate waste names and numbers will be changed on the manifest (with approval from the generator).

2e(iv). SITE MANAGEMENT

Site generated wastes include wastes generated during site processing or other management practices, contaminated PPE, and clean up residuals from incidental spills.

Upon storing waste in tanks, solid and hazardous waste may be generated by the settling of suspended solids in the bottoms of tanks. Solid and hazardous waste may be generated as solids are filtered from liquids or during other types of on-site processes. Generated solids are accumulated in containers on-site. Knowledge of process (including waste stream history) or testing may be used to determine appropriate management practices for these wastes. If a site-generated waste is determined to be hazardous, the waste will be managed in accordance with state and federal regulations.

USE Tulsa may receive and treat characteristic hazardous waste from off-site generators to meet treatment standards in accordance with Subpart D of 40 CFR Part 268. USE Tulsa may also treat characteristic site-generated hazardous wastes to meet treatment standards in accordance with Subpart D of 40 CFR Part 268. For each shipment of such waste to a subtitle D facility, USE Tulsa will prepare documentation in accordance with 40 CFR 268.9(d). This WAP describes the procedures developed by USE Tulsa to comply with the requirements of 40 CFR 268.7(a)(1) through (a)(10). The General Manager or designee approves each treatment batch to ensure that the wastes meet the applicable disposal requirements, including standards for the bulking of liquid wastes or fuels blending off site, or shipment to an off-site disposal facility for further waste management not available at USE Tulsa.

2e(iv)1. Waste Prohibited from Treatment

Current technologies and regulations prevent treatment of certain types of waste at USE Tulsa. However, these waste codes may be stored but not treated. These prohibited waste types include:

- D001 flammable wastes [i.e., ignitable wastes as defined in 40 CFR 261.21(a)(1) and (2)];
- The following D003 reactives:
  - Pyrophoric wastes (such as most organometallic compounds or alkali metals) and any other reactive wastes having the properties described in 40 CFR 261.23(a)(1)
  - Self-heating wastes and any other reactive wastes having the properties described in 40 CFR 261.23(a)(6)
  - Explosives, any self-detonating wastes, wastes that form potentially explosive reactions with water, and any other reactive wastes having the properties described in 40 CFR 261.23(a)(3), 40 CFR 261.23(a)(7), or 40 CFR 261.23(a)(8);
- Waste that carries F, K, P, or U codes; and
- Waste prohibited from land disposal as listed in 40 CFR 268 Subpart C.

The facility treats a subset of D003 wastes having the properties described in 40 CFR 261.23(a)(2), 40 CFR 261.23(a)(4), or 40 CFR 261.23(a)(5) and approved by DEQ. The facility's protocol for accepting D003 wastes for treatment is provided in Appendix 1.

2f. ADDITIONAL REQUIREMENTS FOR IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTES: 40 CFR 264.13(b)(6); 40 CFR 264.17

USE Tulsa may handle ignitable wastes, as defined under 40 CFR 261.21(a)(1). After testing, waste streams designated as ignitable may not exhibit the characteristic of ignitability in some shipments and if so, will be managed appropriately. USE Tulsa will manage ignitable and reactive waste in accordance with the following procedures. Incompatible wastes, or incompatible wastes and materials will not be placed in the same container unless precautions are taken to prevent reactions that could:

- Generate extreme heat or pressure, fire or explosions, or violent reactions
- Produce uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health or the environment
- Produce uncontrolled ignitable fumes or gases in sufficient quantities to pose a risk of fire or explosions
- Damage the structural integrity of the device or facility
- Threaten human health or the environment through other like means.

Ignitable wastes are stored in closed containers in order to prevent accidental ignition. Reactive wastes are stored in closed containers or tanks in order to prevent accidental reaction. Incompatible wastes are separated and ignitable/reactive wastes are protected from sources of ignition or reaction. Activities that would produce open flames, hot surfaces, frictional heat, sparks, spontaneous ignition or radiant heat will not occur in the vicinity of ignitable wastes.

As a safeguard for handling ignitable and reactive wastes, smoking is not allowed within the inner fence-line of the facility (except in designated areas). Signs are posted at the main entrance to the facility stating, "No Smoking Beyond This Point". Prior to co-mingling wastes in storage tanks or tankers, USE Tulsa operations personnel will use existing waste analysis information provided by the generator, and/or published literature to determine if there is a potential danger in mixing incompatible wastes. The primary sources of published literature used for reference include 40 CFR 264 Appendix V, The Merck Index 3rd Edition, and The Rapid Guide to Hazardous Chemicals in the Workplace (Sax and Lewis, 1st Edition).

Potentially incompatible wastes may be bench tested in the on-site laboratory. Since a portion of each waste sample is retained during the initial sampling from incoming trucks, proportional amounts of different wastes to be co-mingled may be mixed and observed for incompatibility.

3. WASTE ANALYSIS PLAN AMENDMENT FOR WASTES SUBJECT TO THE LAND DISPOSAL RESTRICTIONS: 40 CFR 268 SUBPART B

All solid and hazardous wastes accepted for management on-site will be subject to applicable requirements of this WAP. The USE Tulsa facility does not operate any hazardous or solid waste land disposal unit.

3a. WASTE CHARACTERISTICS

Analytical or "knowledge of process" data will be required from the generator for each waste managed at the USE Tulsa facility to identify restricted waste in accordance with 40 CFR 268. LDR information (if applicable) for all applicable hazardous waste managed at the USE Tulsa facility that is not otherwise exempted will be maintained in the operating record.

4. RECORDKEEPING REQUIREMENTS

The following records will be maintained in the facility operating record for three (3) years unless noted:

- Information gathered in accordance with this WAP (ex: fingerprint analysis results)
- Laboratory results performed for waste analysis
- Manifests

----------END OF ATTACHMENT----------

Figure 1

WASTE ANALYSIS PARAMETERS

AND RATIONALE

PARAMETER	RATIONALE FOR SELECTION
Color	Waste verification
Physical state, appearance	Waste verification
Paint Filter	Waste verification
Temperature	Identify waste streams that need to cool before unloading
pH	Waste verification, storage selection, and verification of USE Tulsa treatment efficacy
Oxidizers	Waste verification, storage selection, and verification of USE Tulsa treatment efficacy
Normality	Waste verification of acid/alkaline content
Specific gravity	Waste verification
Flash Point	Waste verification, storage selection, and verification of USE Tulsa treatment efficacy
TOC	Verification of LDR treatability subcategory for D001 waste
Sulfide screen	Verification of potentially reactive sulfide waste and to aid in storage area selection
Cyanide screen	Verification of potentially reactive cyanide waste and aid in storage area selection
Reactive cyanides	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Reactive sulfides	Verification of LDR treatment standards and USE Tulsa treatment efficacy
TCLP	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Arsenic	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Barium	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Beryllium	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Cadmium	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Chromium	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Lead	Verification of LDR treatment standards and USE Tulsa treatment efficacy

Figure 1

WASTE ANALYSIS PARAMETERS

AND RATIONALE

PARAMETER	RATIONALE FOR SELECTION
Mercury	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Selenium	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Silver	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Antimony	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Thallium	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Nickel	Verification of LDR treatment standards and USE Tulsa treatment efficacy
Percent solids	Waste verification and element of stabilization formulation
Heat of combustion	Waste verification and confirmation of acceptability for off-site fuel
Halogen	Waste verification and/or verification of LDR treatment standards, confirmation of acceptability for off-site fuel
Percent water	Confirmation of acceptability for off-site fuel
Total VOCs	Waste Verification
Total Semi-VOCs	Waste Verification

*Selection of applicable analysis is dependent of waste characteristics and method of waste management on-site. See Figure 2, Waste Analysis Parameters used to identify methods performed on all waste streams.

Figure 2

WASTE ANALYSIS PARAMETERS

PARAMETERS	ANALYTICAL METHODS	PROTOCOL
Color	SM 2120	All waste streams
Physical state, appearance	ASTM D4979-08	All waste streams
Paint Filter	SW-846 9095B	Treated residuals
Temperature	SM 2550	Optional analysis
pH	SM 4500-H+B or SW-846 9040C, 9045D or 9041A	Aqueous waste streams
Normality	USE Tulsa protocol	Optional analysis
Oxidizers	ASTM D4981-19	All corrosive waste streams
Specific Gravity	ASTM D5057-17	All liquid, bulk waste streams
Flash point	ASTM D3278-96 or SW-846 1010B	Optional analysis
TOC	SW-846 9060A, EPA or SM 5310	Optional analysis
Sulfide screen	Lead Acetate Test Strips	Optional analysis
Cyanide screen	Cyanide Millipore Sigma QuantoFix	Optional analysis
Reactive cyanide	SW-846 9010C	Optional analysis
Reactive sulfide	SW-846 9030B, 9034	Optional analysis
TCLP	SW-846 1311	Optional analysis
Arsenic	SW-846 6010D,	Optional analysis
Barium	SW-846 6010D,	Optional analysis
Beryllium	SW-846 6010D,	Optional analysis
Cadmium	SW-846 6010D,	Optional analysis
Chromium	SW-846 6010D,	Optional analysis
Lead	SW-846 6010D,	Optional analysis
Mercury	SW-846 7470A, 7471B	Optional analysis
Selenium	SW-846 6010D, , 7741A	Optional analysis
Silver	SW-846 6010D, 7760, 7761	Optional analysis
Antimony	SW-846 6010D, 7041, 7040	Optional analysis
Nickel	SW-846 6010D, 7520, 7521	Optional analysis
Thallium	SW-846 6010D, 7840, 7871	Optional analysis
Percent solids	40 CFR 261 Appendix II Section 7	Optional analysis
Heat of combustion	ASTM D240-17	Optional analysis
Halogen	SW-846 9077	Optional analysis
Percent water	ASTM D4017-02	Optional analysis
Total VOCs	SW-846 8100, 8060, 8270	Optional analysis
Total Semi-VOCs	SW-846 8021, 8015	Optional analysis

NOTES:	**Methods**	Analytical methods may be substituted with approved equivalent methods (e.g., accepted methods superseding listed methods). Optional analyses may be performed at the discretion of facility personnel.
	SM	AWWA Standard Methods for the Examination of Water and Wastewater
	ASTM	American Society for Testing and Materials
	SW-846	Test Methods for Evaluating Solid Wastes
	Hach	Water Analysis Handbook for Spectrophotometers, 9th Edition
	QuantoFix	Method included with test kit
	USE Tulsa Protocol	USE Tulsa Internal Analytical Protocols

Figure 3 - Republic Waste/Material Profile Form Example

REPUBLIC SERVICES

Profile #:

WASTE/MATERIAL PROFILE FORM

A. GENERATOR/CUSTOMER INFORMATION *(If foreign generator, complete Waste Import Supplement)*

1. Generator: ☐ Invoicing information is the same as generator mailing address
2. Site Address: ☐ P.O. required for payment? *If yes, include:*
   City: Phone: 8. Invoicing Company:
   State: Zip: Country:
3. Mailing Address: 9. Invoicing Address:
   City: City:
   State: Zip: Country: State: Zip: Country:
4. Technical Contact: 10. Customer Contact:
5. Phone: Email: 11. Phone: Email:
6. Generator Status: ◯ SQG ◯ LQG ◯ VSQG/CESQG *(If yes, complete Certification Supplement)* ◯ Not Applicable
7. EPA ID #: NAICS CODE: State ID #: *(If applicable)*

B. WASTE/MATERIAL STREAM

1. Common Name:

(Please provide a site history for Remediation & IDW sites. Use additional form if necessary.)

2. Generating Process:
3. Source Code: Form Code:

C. SHIPPING/PACKAGING INFORMATION

1. DOT Hazardous Materials? ◯ Yes ◯ No Proper Shipping Name:
2. Additional Description: *(49 CFR 172.203, e.g. "Lead" or "D008")*
3. RQ: ◯ Yes ◯ No RQ Reason: RQ Threshold: UN/NA #:
   Packing Group: ERG #: Hazard Class: Select #1 Select #2 Select #3
4. DOT Special Permit? ◯ Yes ◯ No Permit #:
5. 24-Hour Emergency Phone: 6. DOT Inhalation Hazard? ◯ Yes ◯ No
7. Container Type: ☐ Bulk ☐ Totes ☐ Pallet ☐ Boxes ☐ Drums ☐ Cylinder Container Size:
   ☐ Lab Pack *(If 40 CFR 264.316/49CFR 173.12(b) Lab Pack Inventory lists required)*
   ☐ Combination Containers (e.g., inner containers), Describe:
   ☐ Other, Describe:
8. Volume/Frequency: Volume: Units:
   Frequency: ◯ Year ◯ Quarterly ◯ Monthly ◯ 1 Time ◯ Other, Describe:

D. PHYSICAL PROPERTIES *(Use additional form if necessary)*

1. Physical Description *(e.g. soil, water, PPE, debris, sorbent, etc. Include 100% of container content. If debris, provide dimensions & weight.)*

Description	Typical (%)	Min (%)	Max (%)

2. Odor: ◯ None ◯ Slight ◯ Strong Odor Type: ☐ Ammonia ☐ Amines ☐ Mercaptans ☐ Sulfur ☐ Organic Acid ☐ Other, Describe:
3. Physical State: *(at 70°F)* ☐ Solid ☐ Dust/Powder ☐ Debris ☐ Sludge/Slurry ☐ Liquid ☐ Gas/Aerosol ☐ Varies
4. Color: Primary Color Secondary Color 5. Liquid phases: ◯ Single ◯ Double Layer ◯ Multi-layer ◯ N/A
6. Is it solid using the paint filter test? *(40 CFR Part 264.314(b))* ◯ Yes *(Solid)* ◯ No *(Not Solid)*
   Is there a possibility of incidental liquids from transportation? ◯ Yes ◯ No
7. pH: *(If solid, provide estimated pH if mixed 50:50 with water)* ☐ ≤ 2 ☐ 2.1 - 4.9 ☐ 5 - 10 ☐ 10.1 - 12.4 ☐ ≥ 12.5
8. Flash Point: °F and/or ☐ < 90°F ☐ 90 - 139°F ☐ 140 - 199°F ☐ ≥ 200°F ☐ Does Not Flash ☐ Flammable Solid
   BTU /lb. Value: and/or ◯ <5000 BTU ◯ ≥5000 BTU
9. Are there any known handling/treatment issues involving this material? ***(i.e. Describe whether the waste stream has ever been the direct or suspected cause of a fire or other reaction, and whether there are any specific controls you use to prevent any adverse reactions?)***
   ◯ Yes ◯ No *If yes*, Describe:

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E. CHARACTERIZATION & CHEMICAL COMPOSITION *(Use additional form if necessary)*

1. **Robstown Facility Customers - Waste/Material Type:** ○ Industrial ○ Non-Industrial ○ N/A **TX State Code:**
Pennsylvania Residual Waste: ○ Yes ○ No **PA State Code(s):**

2. **State Waste Codes:** ☐ None

3. **RCRA Waste Codes:** ☐ None

If None, is it exempt from the definition of "Solid Waste" or "Hazardous Waste"? ○ Yes ○ No
If yes, list reference from 40 CFR Part 261.2, 3, or 4:

4. **If F006-F009, F012, or F019, are Cyanides used in the process?** ○ Yes ○ No *(If yes, Total and Amenable CN (9010/9012) analysis required)*

5. **Knowledge is from:** ☐ Lab analysis *(requires attachment)* ☐ SDS/MSDS *(requires attachment)* ☐ Process/generator knowledge

6. **Chemical Composition** *(include all applicable UHC's, TRI Section 313 chemicals, OSHA Hazardous Materials, PFAS Constituents, etc.)*

Constituent	Units	TCLP	Totals	Typical	Min	Max	UHC	Exceeds LDR
	Select	○	○				☐	☐
	Select	○	○				☐	☐
	Select	○	○				☐	☐
	Select	○	○				☐	☐
	Select	○	○				☐	☐
	Select	○	○				☐	☐
	Select	○	○				☐	☐
	Select	○	○				☐	☐

F. ADDITIONAL PROPERTIES ☐ **None Apply** *(Through Question F23)*

1. **Explosive:** ○ Yes ○ No	2. **Reactive Sulfides:** ____ ppm ○ Yes ○ No
3. **Shock Sensitive:** ○ Yes ○ No	4. **Reactive Cyanides:** ____ ppm ○ Yes ○ No
5. **Radioactive:** ○ Yes ○ No *(If yes, complete Radioactive Waste Acceptance Supplement)*	6. **Reactive Other:** ○ Yes ○ No **Describe:**
7. **Medical/Infectious/Biohazard Waste:** ○ Yes ○ No	8. **Polychlorinated Biphenyls (PCB):** ○ Yes ○ No *(If yes, complete PCB Supplement)*
9. **Dioxins and/or Furans:** ○ Yes ○ No	10. **Metal Fines/Powder/Paste:** ○ Yes ○ No *(Including Aluminum)*
11. **Pyrophoric:** ○ Yes ○ No	12. **Temperature Controlled:** ○ Yes ○ No *(For Transportation Only)*
13. **Thermally Unstable:** ○ Yes ○ No	14. **Biodegradable Sorbents:** ○ Yes ○ No
15. **Compressed Gas:** ○ Yes ○ No *(If yes, complete Compressed Gas Cylinder Supplement)*	16. **Used Oil:** (per 40 CFR Part 279) ○ Yes ○ No *(If yes, complete Used Oil Supplement)*
17. **Oxidizer:** *(List in Section E6)* ○ Yes ○ No	18. **Tires:** *(If yes, must be quartered for landfill)* ○ Yes ○ No
19. **Organic Peroxide:** ○ Yes ○ No	20. **Beryllium:** ○ Yes ○ No
21. **Ammonia/Ammonia Compounds:** ○ Yes ○ No	22. **Per-and Polyfluoroalkyl Substances (PFAS):** ○ Yes ○ No

23. **Asbestos:** ○ Yes ○ No **If Yes:** ○ Friable ○ Non-Friable *(If friable, material must be packaged per 40 CFR Part 61.150)*

24. **Hazardous Secondary Material:** *(Per 40 CFR Part 260.10)* ○ Yes ○ No
If yes, ☐ I certify that this waste/material meets all requirements of legitimate recycling of Hazardous Secondary Materials under 40 CFR Part 260.43 and/or I am complying with the conditions for generators using one verified recycler exclusion.

25. **Are pharmaceutical wastes profiled under this approval subject to a prescription?** ○ Yes ○ No ○ N/A
(If yes, complete Pharmaceutical Certification Supplement)

G. REGULATORY INFORMATION

1. **Volatile Organic Concentration:** *(Per 40 CFR Part 264.1083 & 265.1084)* ○ <500 ppmw ○ ≥500 ppmw

2. **Has the material been treated after the initial point of generation?** ○ Yes ○ No *If yes,* **Describe:**

3. **If RCRA Hazardous:** ○ None Apply
   - ○ Wastewater *WW=<1% TSS & TOC; 40 CFR Part 268.2*
   - ○ Non-wastewater *TSS/TOC>WW*
   - ○ Alternative Treatment Standards for soil *> 50% soil; 40 CFR Part 268.49*
   - ○ Alternative Treatment Standards for debris *40 CFR Part 268.2(g) & (h); >50% of waste is >2.5 inch size*
     - ☐ I confirm debris cannot reasonably be separated from non-debris by simple physical or mechanical means.
     - ☐ I confirm debris has not been mixed/diluted with non-debris as prohibited in *40 CFR Part 268.3.*
   - ○ Waste meets LDR Treatment Standards

4. **Treatment subcategory:** *(if applicable)*

5. **Is the site or waste/material, subject to NESHAP/MACT standard(s)?** ○ Yes ○ No
   If yes, **Please choose the applicable Part:** ○ 61 ○ 62 ○ 63 **Subpart** ____ **of NESHAP/MACT standards** ○ **N/A**

6. **Is the waste/material RCRA Hazardous containing Benzene and originating at a petroleum refinery (SIC 2911), chemical manufacturing plant (SIC 2800 thru 2899) or Coke by-product recovery plant (SIC 3312)?**
   ○ Yes ○ No (*If yes, complete the Benzene Waste Operations Supplement and if applicable the Thermal Supplement.*)

H. GENERATOR'S CERTIFICATION

1. **Is a specific facility or treatment technology requested?** ○ Yes ○ No

2. **Requested Technology:**

3. **Thermal processing:** ○ Yes ○ No *(If yes, complete Thermal Supplement)*

4. **Other specific restrictions requested:**

5. **Requested Facility:**
   (If Chicago Facility, complete Illinois Disposal Supplement)

I certify that all information (including attachments) is complete, factual and is an accurate representation of the known and suspected hazards pertaining to waste/material described herein. I authorize Republic Services' personnel to add supplemental information to the Waste/Material Profile Form, provided I am contacted and grant permission to do so. Republic Services may require re-submittal of the Waste/Material Profile Form if substantial changes are determined necessary. I authorize Republic Services' personnel to obtain a sample from any waste/material shipment for purposes of verification and confirmation and understand that waste/material that does not conform to specifications described in this Waste/Material Profile Form may be rejected by Republic Services. I certify that I am familiar with the waste/material described herein through analysis and/or process knowledge and that all information is true, accurate, representative and complete and that this Waste/Material Profile Form was completed in accordance with the instructions provided.

If I am an agent acting on behalf of the generator, I also certify that I have permission to sign any and all waste/material characterization paperwork on the generator's behalf and that I can produce such certification in writing upon request.

Print Name: **Signature:**

Title: **Company:**

Date:

Figure 4 - Waste Recertification Document Example

US ecology

RE-APPROVAL NOTICE

Customer Account: _____

Name: _____

Company: _____

Address: _____

City, State Zip: _____

Thank you for selecting US Ecology as your environmental management partner. In the event that a waste stream has changed, the generator may use this form to re-approve the waste profile.

Generator Name: _____ **EPA ID No.:** _____

For Benzene NESHAP Regulated Generators: Please provide your updated TAB here _____ Mg/Year, if this field is left blank, it will be assumed that there are no changes to the TAB quantity for your facility.

Waste Common Name: _____

Waste Code(s): _____

Approval No.: Expiration Date:

Please select one of the following options:

❑ Re-approval with No Process Change
❑ Re-approval with Process Change
❑ Process Change

Please provide a detailed description below of the changes to the waste stream:

_____

_____

This Re-approval Notice acknowledges the acceptability of waste material(s) into the EQ facility(s) and ensures that each facility has the appropriate permit(s) issued by federal and state regulatory agencies to properly transport, treat, and/or dispose of the waste material(s). Upon signature and submittal of this form, the waste stream will be reviewed to extend the expiration for one year.

I certify that all information (including attachments) is complete and factual and is an accurate representation of the known and suspected hazards, pertaining to the waste described herein. I authorize EQ to add supplemental information to the waste approval file, provided I am contacted and give verbal permission. I authorize EQ to obtain a sample from any waste shipment for purposes of verification and confirmation. I agree that, if EQ approves the waste described herein, all such wastes that are transported, delivered, or tendered to EQ by Generator or on Generator's behalf shall be subject to, and Generator shall be bound by, the Standard Terms and Conditions associated with the original Waste Profile. (The Standard Terms and Conditions are incorporated into the Waste Profile as Page 4.)

Generator Signature: _____ Printed Name: _____

Company: _____ Date: _____

Questions? Please call (800)592-5489. Please return completed document to Customer Service via fax (800)592-5329 or e-mail at customer.service@usecology.com

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Figure 5 – Land Disposal Restriction Form Example

REPUBLIC SERVICES

LAND DISPOSAL RESTRICTION FORM **Profile #:**
(From Question G3)

Generator Information			
1. Generator:			**2. EPA ID Number:**
3. Manifest Number:	**4. Line Number:**	**5. Waste is a:** ◯ Wastewater (<1% TSS & TOC) ◯ Non-wastewater ◯ Debris	
6. Notification Frequency: ◯ One Time ◯ Required with Each Shipment			
7. Shipment EPA Waste Codes:			
8. UHC's: *(Underlying Hazardous Constituents 40 CFR 268.48)?* ◯ Yes ◯ No *(If yes, list constituents):*			
9. Does a subcategory apply per 40 CFR 268.40? ◯ Yes ◯ No *(If yes, select subcategory):*			
10. Constituents requiring treatment in F001-5, F039, debris, and alternate soils? ◯ Yes ◯ No *(If yes, list):*			

Requires Treatment

☐ **Waste Subject To Treatment (40 CFR 268.7(a) (2))**
The restricted waste identified above must be treated to the applicable treatment standards in 40 CFR 268.40, or treated to comply with applicable Prohibitions set forth in Part 268.32 or RCRA Section 3004(d) and 268.49 (c).

If applicable, under 268.49, this contaminated soil ◯ does or ◯ does not contain listed hazardous waste and ◯ does or ◯ does not exhibit a characteristic of hazardous waste and is subject to the soil treatment standards as provided by 268.49 (c) or the universal treatment standards.

☐ **Hazardous Debris Subject To Treatment (40 CFR 268.45)**
This hazardous debris identified above must be treated to the alternative treatment standards in 40 CFR 268.45.

☐ **Waste De-characterized But Requires Treatment For UHC (40 CFR 268.7 (b) (4) (iv))**
I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 or 268.49 to remove the hazardous characteristic. This de-characterized waste contains Underlying Hazardous Constituents that require further treatment to meet treatment standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

Waste Meets Treatment Standards

☐ **Waste Meets Treatment Standards (40 CFR 268.7(a) (3))**
The restricted waste identified above meets the treatment standards in 40 CFR 268.40 or Alternative LDR treatment standards for contaminated soil 40 CFR268.49 and can be landfill disposed without further treatment.

If applicable, under 268.49, this contaminated soil ◯ does or ◯ does not contain listed hazardous waste and ◯ does or ◯ does not exhibit a characteristic of hazardous waste and complies with the soil treatment standards as provided by 268.49 (c) or the universal treatment standards.

☐ **I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D. I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.**

☐ **Waste Treated To Treatment Standards (40 CFR 268.7(b) (l) & 268.7 (b) (2))**
The treatment residue, or extract of such residue, or the restricted waste identified above has been tested to assure that the treatment residues or Extract meet all applicable treatment standards in 40 CFR 268.40 and/or performance standards in 40 CFR 268.45

☐ **I certify under penalty of law that I personally have examined and am familiar with the treatment technology and operation of the treatment process used to support this certification. Based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the treatment process has been operated and maintained properly so as to comply with the treatment standards specified in 40 CFR 268.40 without impermissible dilution of the prohibited waste. I am aware there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.**

Waste Soil treated to alternative standards (40 CFR 268.7 (b) (4))

☐ **I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and believe that it has been maintained and operated properly so as to comply with treatment standards specified in 40 CFR 268.49 without impermissible dilution of the prohibited wastes. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.**

I certify and warrant that the information that appears on this form, and appended documents, is true and correct. I have correctly indicated how my waste is to be Managed in accordance with 40 CFR 268. My certification is based on personal examination of the information submitted, or is based on my inquiries of those individuals responsible for obtaining the information.

Print Name:	**Signature:**	**Title:**	**Date:**

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Figure 6 – Fingerprint Tests

Test	Solid Hazardous Waste	Non-Bulk Liquid Hazardous Waste	Bulk Liquid Hazardous waste
Color	X	X	X
Odor	X	X	X
Consistency	X	X	X
pH		X	X
Flashpoint		X	X
Oxidizer (if profile indicates potential)		X	
Specific Gravity			X

Appendix 1 – D003 Waste Treatment Protocol

The facility will treat a subset of D003 wastes having the properties described in 40 CFR 261.23(a)(2), 40 CFR 261.23(a)(4), or 40 CFR 261.23(a)(5) as detailed below and approved by DEQ.

RCRA Reactive Property	DOT Category	General Waste Streams
40 CFR 261.21(a)(2)	DOT Class 5.1 DOT Class 5.2	Organic peroxides, or any organic compound containing bivalent oxygens that are derivatives of hydrogen peroxide, such as peroxyacetic acid or benzoyl peroxide; oxidizers such as nitrated, chlorated, or hypochlorite compounds; other waste streams that can be managed by deactivation. Sometimes these can be characterized as D003 (in addition to D001, D002) by the generator.
40 CFR 261.23(a)(4) 40 CFR 261.23(a)(2)	DOT Class 6.1 DOT Class 8	Water reactive waste streams that can generate toxic gas. Phosphorus (tri, penta or oxychloride, or pentoxide) in smaller, limited volumes managed by neutralization.
40 CFR 261.23(a)(5)	DOT Class 6.1 DOT Class 8 DOT Class 9	Thiols, sulfides, and other sulfur-bearing waste streams can be used as a reducing reagent source to treat other waste (such as sodium sulfide, hydrosulfide, thioglycolates, thiosulfates) such as metals-contaminated waste streams as well as cyanide-containing waste streams rendering it to a less toxic form managed by deactivation, stabilization, or neutralization, depending on the waste type and purpose.

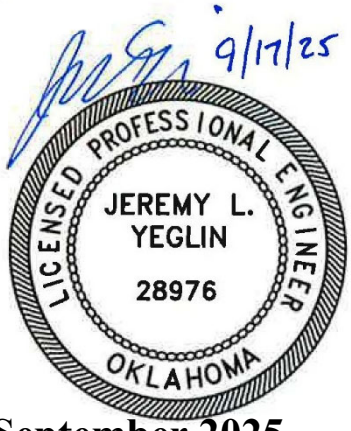
Attachment 10

RCRA Part B Permit Application

Process Description

US Ecology Tulsa, Inc.

Tulsa, Oklahoma



Permit Modification Application **September 2025**

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Attachment 10 - Process Description

This section provides specific process information regarding the management of hazardous waste at the US Ecology Tulsa, Inc. (USE Tulsa) facility located near Tulsa, Oklahoma. Waste management practices at USE Tulsa have been designed in accordance with the requirements of 40 Code of Federal Regulations (CFR) 264 Subpart I and Subpart J which are incorporated by reference into Oklahoma Administrative Code (OAC) 252:205-3-2(f). USE Tulsa accepts hazardous waste as identified in the facility Part A Permit (Section A of this document) for treatment, container/tank storage, and other management on-site. In addition, USE Tulsa may generate hazardous wastes as a result of waste management operations on-site. USE Tulsa also handles other industrial wastes (i.e., wastes not designated as "hazardous" in accordance with 40 CFR Part 261 and OAC 252:515 [see Attachment 12 – Solid Waste Activities for details regarding solid waste activities on-site]). Although solid waste management may parallel hazardous waste activities where appropriate, this section is not applicable to non-hazardous waste management. However, non-hazardous wastes may be managed in tanks or container areas permitted for hazardous waste service so long as compatibility issues are addressed. Hazardous waste in containers may be stored and/or treated in Container Management Areas (CMAs) at four locations on the facility: CMA-1, CMA-2, CMA-3, and CMA-4. Of these units, CMA-1 is proposed for expansion. The locations of the existing CMAs and proposed expanded CMA-1 are shown on Figures 1 and 1-b presented in Attachment 1 - Maps and Figures.

Containers may be located within other areas on-site. Site generated wastes, such as but not limited to, discarded Personal Protective Equipment (PPE), tank bottoms, process residues, and laboratory waste may be managed in accordance with generator standards for satellite accumulation as specified in 40 CFR 262.15. All other generated waste may be accumulated for ninety (90) days or less in containers complying with the requirements of 40 CFR Part 264 Subpart I and located only within permitted areas onsite.

USE Tulsa currently stores and treats liquid hazardous waste in four (4) tanks located in one tank farm (TF-1) and treats hazardous waste in two (2) TA-series treatment tanks. Tanks designated for non-hazardous waste service previously present on-site at the 200 and 400 series Tank Farms (i.e.,

TF-2 and TF-4, respectively) will be removed. After the existing non-hazardous waste tanks have been removed from TF-4, the TF-4 containment area will be improved, four (4) new hazardous waste tanks will be installed in TF-4 to take over the hazardous waste storage operations being conducted in TF-1, and the tanks in TF-1 will be closed and removed. Operations in the TF-4 tanks will not begin until closure of the TF-1 tanks is completed. In addition, existing treatment tank TA-2b will be replaced with a larger tank, also called TA-2b, and new treatment tank TA-2c, with the same design as TA-2b, will be added. The locations of the existing and proposed tank farms and tanks are shown on Figures 1 and 1-b presented in Attachment 1 - Maps and Figures.

USE Tulsa does not manage hazardous waste in waste piles, surface impoundments, incinerators, landfills, land treatment units, or miscellaneous units.

1. CONTAINER DESIGN

Containers managed in USE Tulsa CMAs may include units of any size composed of a variety of materials of construction; non-bulk as well as bulk containers may be used. 40 CFR 260.10 includes a definition of the term container as any portable device in which a material is stored, transported, treated, disposed of, or otherwise handled. Non-bulk and bulk containers are distinguished based on capacity and net mass (49 CFR §171.8). Non-bulk containers have a capacity of 450 liters (119 gallons) or less for a liquid or a solid and a net mass of 400 kilograms (882 pounds) or less for a solid. Bulk containers have a capacity greater than 450 liters (119 gallons) for a liquid or a solid and a net mass greater than 400 kilograms (882 pounds) for a solid material.

Most containers managed on-site are "55 gallon drums"; however, containers accepted at USE Tulsa may include containers of any capacity (e.g., pint sized cans, 5 gallon pails, 30 gallon drums, tote tanks, glass bottles, "Marino Bags," overpack containers, etc.). In addition, bulk containers such as gondolas, sludge boxes, roll-on/roll-off boxes, and intermodal containers may be managed on-site. Containers may be constructed of carbon steel, aluminum, other metals, plastic lined metal containers, various plastics, fiberglass, glass, wood, cardboard, or other appropriate materials. Containers used to store hazardous waste on-site will comply with the requirements of Subpart I, 40 CFR Part 264. Where applicable, US Department of Transportation (US DOT) Performance Oriented Packaging Standards will be used for wastes offered for shipment off-site. The facility

may receive and ship hazardous wastes in any appropriate US DOT approved or performance specified container (used or new); other types of containers may be used for storage and processing of site generated hazardous wastes or for specific on-site processes.

CMAs are permitted for capacity based in volume (i.e., gallons or cubic feet) to facilitate management of different container sizes. The facility Part A Permit Application provides capacity information for the permitted container storage areas.

a. CONTAINERS WITH FREE LIQUIDS AND/OR F020, F021, F022, F023, F026, AND F027 WASTES

Containerized hazardous waste with free liquids and/or F020, F021, F022, F023, F026, and F027 wastes will be stored in permitted areas equipped with secondary containment systems only. Containment systems for these container storage areas will be designed and operated as follows:

- Containment systems will be equipped with a base for containers which is free of cracks or gaps and is sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed.
- The base of containment systems will be sloped or the containment system will be otherwise designed and operated to drain and remove liquids resulting from leaks, spills, or precipitation (e.g., concrete floor will be sloped, or the containers will be elevated, or containers will be otherwise protected from contact with accumulated liquids).
- Containment systems will have sufficient capacity to contain 10% of the total volume of containers or the volume of the largest container, whichever is greater (containers that do not contain free liquids need not be considered in this determination).
- Run-on into the containment system will be prevented unless the collection system has sufficient excess capacity (in addition to 10% of the volume of containers or the volume of the largest container, whichever is greater) to contain any run-on which might enter the system.

- Spilled or leaked waste and accumulated precipitation will be removed from the sump or collection area in as timely a manner as is necessary to prevent overflow of the collection system:
    - Precipitation and liquid accumulated in secondary containment areas is inspected to determine if it has been contaminated by hazardous waste by visually inspecting the surface for a sheen on the liquid surface or observing if there is contamination associated with waste managed in that area. If a sheen or released waste is observed, the liquid is presumed to have been contaminated and will be managed as a hazardous waste. If a sheen or other anomalous indications are not observed, and there has not been a release that might have contaminated the water, the water will be released to the surface outside the containment area similar to rainfall falling outside of containment.
    - If the collected material is a hazardous waste as defined in 40 CFR Part 261, it will be managed as a hazardous waste in accordance with all applicable requirements of 40 CFR Parts 262 through 266, 268, and 279.

i. BASIC DESIGN PARAMETERS, DIMENSIONS, AND MATERIALS OF CONSTRUCTION

Storage of hazardous waste in containers is conducted in four (4) CMAs (CMA-1, CMA-2, CMA-3, and CMA-4). Locations of the existing units and proposed expanded CMA-1 are shown on Figures 1 and 1-b (A-2, Facility Layout (Existing Conditions) and A-2b, Facility Layout (Proposed Site Plan), respectively) - presented in Attachment 1 - Maps and Figures. Design parameters, dimensions, and materials of construction of the secondary containment systems for the CMAs are presented in Section C of this application. Per 40 CFR 264.175(c), the Container Management Area 4 (CMA-4) need not be provided with secondary containment since only containers with no free liquids are stored in this area. In addition, the CMAs are sloped so that the containers do not sit in rainwater, or they are elevated to protect the container from accumulated liquid. Appendix 4, Permitted Hazardous Waste Container Management Area Information Table in Section C -

Information Requirements for Containers provides additional details regarding containment and capacity of these units.

ii. DESCRIPTION OF HOW DESIGN PROMOTES DRAINAGE OR HOW CONTAINERS ARE KEPT FROM CONTACT WITH STANDING LIQUIDS IN CONTAINMENT SYSTEMS

Containment systems for CMAs at USE Tulsa are designed with slopes for drainage of liquids or are otherwise designed and operated to drain and remove liquids resulting from leaks, spills, or precipitation, except where the containers are elevated or are otherwise protected from contact with accumulated liquids. Hazardous waste in containers may be managed on pallets or directly on the container management area floor. Standard operating procedures include daily inspections in accordance with container inspection requirements outlined in Attachment 4 - Inspection Schedules and Forms and Attachment 6 - Procedures to Prevent Hazards. The inspections facilitate the detection and appropriate management of liquids accumulated in CMAs.

iii. CAPACITY OF THE CONTAINMENT SYSTEM RELATIVE TO THE NUMBER AND VOLUME OF CONTAINERS TO BE STORED

In accordance with 40 CFR 264.175, containment systems for container storage areas that may contain free liquids must have sufficient capacity to contain 10% of the total volume of containers or the volume of the largest container, whichever is greater. Containers that do not contain free liquids need not be considered in this determination. Section C and Section T of this application for details regarding capacity of containment systems for container storage areas. CMAs which share containment structures with tank storage areas (CMA-1 and Tank Farm 4 [TF-4]) will be equipped with adequate containment for 10% of the total volume of hazardous waste storage capacity (containers and tanks), the volume of the largest container, or the volume of the largest tank, whichever is greatest. In accordance with the containment requirements for tank systems, any tank and container co-management area will be provided with a containment volume adequate to contain the additional volume of the precipitation of the 24-hour, 25-year rainfall event, if the co-management area is not protected from precipitation.

iv. PROVISIONS FOR PREVENTION OR MANAGING RUN-ON

CMA-1, CMA-2, and CMA-3 are equipped with secondary containment structures which are designed to contain accumulated liquid within containment systems. Containment structures will minimize the potential for run-on of precipitation into containment systems. Where installed, the roof or canopy (or equivalent cover) will minimize the accumulation of precipitation in containment systems.

v. HOW ACCUMULATED LIQUIDS CAN BE ANALYZED AND REMOVED TO PREVENT OVERFLOW

USE Tulsa operating procedures include inspections designed to identify accumulated liquids in a timely manner (inspection schedule and criteria are outlined in Attachment 4 - Inspection Schedules and Forms and Section 6 - Procedures to Prevent Hazards). After discovery, spilled or leaked waste and accumulated precipitation will be removed from the sump or collection area in as timely a manner as is necessary to prevent overflow of the collection system. Accumulated liquids will be identified by visual observation, review of facility records, and (if deemed necessary) by chemical analysis. If required, analyses will be conducted in accordance with the facility Waste Analysis Plan presented in Attachment 2 - Waste Characteristics and Waste Analysis Plan.

b. CONTAINERS WITHOUT FREE LIQUIDS OR F020, F021, F022, F023, F026, AND F027 WASTES

Except for hazardous wastes identified as F020, F021, F022, F023, F026, and F027, containers holding wastes that do not contain free liquids may be stored in areas not equipped with secondary containment. In accordance with the requirements of 40 CFR 264.175, test procedures and results or other documentation that the wastes do not contain free liquids will be obtained prior to storage of these wastes in these areas not equipped with secondary containment systems. This documentation may include use of the Paint Filter Liquids Test, Method 9095 in SW-846 or other equivalent method.

Hazardous wastes designated as F020, F021, F022, F023, F026, and F027 will not be stored in areas not equipped with a secondary containment system.

c. CONTAINER MANAGEMENT

Permitted hazardous wastes managed in containers on-site are identified in the facility Part A Permit Application.

Types of containers managed on-site are described previously; compatibility of waste with containers is discussed in Section ii below.

Container management at the USE Tulsa facility consists of storage of waste in a variety of container types. Container management activities include bulking, consolidating, and decanting to combine compatible waste streams into a single container for ease of storage. Secondary containment is not required for containers that do not contain or involve free liquids and meet the requirements of 40 CFR 264.175(c).

i. CONDITION OF CONTAINERS: 40 CFR 264.171

USE Tulsa may reject any container of hazardous waste if the container is in poor condition, the container is incompatible with the waste, or if the container is not in compliance with US DOT requirements. If an accepted hazardous waste is in a container that is not in good condition (e.g., severe rusting, apparent structural defects) or if the container begins to leak, USE Tulsa personnel will transfer the hazardous waste from this container to a container that is in good condition, will provide an "over-pack" for the affected container, or manage the waste in on-site processes. Other deficiencies in containers of incoming wastes will be addressed on a "case-by-case" basis.

ii. COMPATIBILITY OF WASTE WITH CONTAINERS: 40 CFR 264.172

When placing waste in a container, USE Tulsa will use a container made of or lined with materials which will not react with, and is otherwise compatible with, the hazardous waste to be stored, so that the ability of the container to contain the waste is not impaired.

iii. MANAGEMENT OF CONTAINERS: 40 CFR 264.173

Management of containers at USE Tulsa is conducted as follows:

- Containers holding hazardous waste will always be closed during storage, except when it is necessary to add, remove, or inspect waste.

- Sampling of containers may occur during pre-acceptance, staging, or storage; sampling methods are presented in Attachment 2 - Waste Characteristics and Waste Analysis Plan.
- Any container holding hazardous waste will not be opened, handled, or stored in a manner which may rupture the container or cause it to leak.

1. HANDLING PROCEDURES

Containerized hazardous wastes may remain on the transport vehicle during completion of acceptance protocol and will be inspected daily; acceptance protocol is outlined in Attachment 2 - Waste Characteristics and Waste Analysis Plan. Acceptance protocol will be completed within ten (10) days. After the acceptance protocol is completed, wastes will be transferred into designated permitted CMAs within 24 hours of acceptance. Containerized wastes will be moved to an appropriate CMA if analysis identifies any compatibility problems. Containment (permanent or portable) will be provided for hazardous waste pending acceptance. Examples of portable containment include overpack drums, self-contained pallets and portable spill berms. Portable containment is intended to be used for non-bulk or small bulk containers that have been unloaded from the vehicle for sampling and are waiting for receipt approval.

2. CONTAINER TYPES, QUANTITY, AND STACKING ARRANGEMENTS

As discussed in Section l, USE Tulsa may accept containers of any size for management on-site. To accommodate operational requirements and depending on compatibility requirements, any container management area may be used for any container type or volume provided the permitted volume is not exceeded. If applicable, containment systems will be decontaminated prior to storage of an incompatible waste type in the unit.

Permitted storage of hazardous waste in containers occurs in four (4) CMAs on-site. Section C of this application includes details regarding permitted volumes and design parameters for these areas.

Single containers may be unloaded and/or moved manually or with mechanical drum handling equipment such as hand carts, drum dollies, forklifts, backhoe or equivalent equipment. Forklifts or industrial trucks may be used for palletized containers. Equipment is available for over-packing, repackaging, or bulking operations. Ramps (permanent or portable) as well as portable containment units may be used during unloading, staging, or storage of containers.

USE Tulsa conducts regular inspections to facilitate the detection of accumulated liquids in containment areas and to assess container status (i.e., that containers are sealed, stacked properly, and are in good condition). Specifics regarding facility inspections are presented in Attachment 4 - Inspection Schedules and Forms and Attachment 6 - Procedures to Prevent Hazards. Accumulated liquids will be removed from containment systems in CMAs within 24 hours of detection. Response to container leaks and spills (including identification of accumulated liquids in CMAs) is addressed in Attachment 5 - Contingency Plan.

Minimum aisle space of three (3) feet will be maintained in CMAs to facilitate inspections and (if necessary) the movement of emergency equipment. Where applicable, stacking of compatible wastes in containers is conducted in accordance with the National Fire Protection Association (NFPA) code. Containers may only be stacked if they have sufficient strength and stiffness to resist bending or buckling and remain vertical without perceptible leaning. Fifty-five (55) gallon size or larger containers may be double stacked during storage; pallets, skids, plywood or equivalent devices may be used to facilitate container management. Smaller containers may be stored in stacks of multiple containers. Total stack height will be limited to eight (8) feet or less unless all drums are secured on pallets and pallet racks are used. Configuration of pallets will be in rows approximately four to five (4-5) feet wide. Shipments of palletized containers may be "banded," "shrink-wrapped," or otherwise consolidated for shipping purposes and, after acceptance approval, may be placed in storage "as is." Containers holding multiple smaller containers (such as lab packs) may be double-stacked or multi-

stacked, as applicable, for the size of the consolidating container. Total volume of containerized hazardous wastes will not exceed the permitted capacity.

3. LOCATION OF IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTE

Management practices for ignitable, reactive, and incompatible wastes at USE Tulsa have been designed to minimize the potential for fires, explosions, gaseous emission, leaching, or other discharge of hazardous waste or hazardous waste constituents which could result from the mixing of incompatible wastes or materials if containers break or leak. A specific procedure for the management of these wastes is outlined in Section B.9, Prevention of Accidental Ignition, Reaction of Ignitable, Reactive, or Incompatible Waste. USE Tulsa will not place incompatible wastes, or incompatible wastes and materials in the same container, unless the requirements of 40 CFR 264.17(b) are complied with. In addition, hazardous waste will not be placed in an unwashed container that previously held an incompatible waste or material.

Containers holding ignitable or reactive wastes will be located at least 50 feet from the USE Tulsa facility property line. Any container holding a hazardous waste that is incompatible with any waste or other materials will be separated from the other materials by means of a dike, berm, wall, or other equivalent device; portable containment units may be used for this purpose.

4. MARKINGS AND LABELS FOR CONTAINERS

USE Tulsa will store wastes subject to the Land Disposal Restrictions (LDR) in accordance with the applicable requirements of 40 CFR 268.50(a). Specifically, incoming LDR wastes will be dated during acceptance procedures (i.e., the container will be clearly marked to identify its contents and the date each period of accumulation begins). Lab pack wastes will be marked on the outside of the lab pack. Palletized shipments of small containers will be marked on each side of the consolidated stack.

5. CLOSURE

USE Tulsa has developed a closure plan for final and partial closure which is presented in Attachment 8 – Closure and Post-Closure Plan with Estimates and Insurance

Information. During final closure, all hazardous waste and hazardous waste residues will be removed from CMAs. Containment structures will be decontaminated or removed.

iv. CONTAINER INSPECTIONS: 40 CFR 264.174

As required under 40 CFR 264.174, USE Tulsa will inspect areas where containers are stored, looking for leaking containers and for deterioration of containers and the containment system caused by corrosion or other factors. See Attachment 4 Inspection Schedules and Forms for details regarding inspection of CMAs.

2. TANK SYSTEMS

USE Tulsa currently uses the above ground tank system in TF-1 for storage and treatment of liquid hazardous waste and two treatment tanks (TA-2a and TA-2b) for hazardous waste treatment. Locations of the existing tanks are shown on Figure 1: A-2, Facility Layout (Existing Conditions) presented in Attachment 1- Maps and Figures. As previously described, the tanks in TF-1 will be removed and new hazardous waste tanks will be installed in TF-4. In addition, the existing treatment tank TA-2b will be replaced with a larger tank and new treatment tank TA-2c will be added. Locations of the proposed tanks are shown on Figure 1: A-2b, Facility Layout (Proposed Site Plan) presented in Attachment 1 – Maps and Figures.

Treatment activities in tanks conducted at USE Tulsa include chemical oxidation, deactivation via chemical reduction of oxidizers and reactive waste streams, alkaline chlorination of cyanide waste streams, decanting, bulking, consolidation, encapsulation, fuel bulking, neutralization, permissible dilution, precipitation, solidification, stabilization, size reduction, or equivalent procedures. Treatment activities will take place only in permitted waste management units TA-2a, TA-2b, and TA-2c. The following are descriptions of the treatment techniques:

- Deactivation via Chemical Reduction (oxidizing or reactive property waste) – The deactivation treatment technology removes the hazardous characteristics of a waste via chemical reduction reagents (such as ferrous sulfate) due to its ignitability, corrosivity, and/or reactivity. Common safety practices include examples such as removal of combustible organic material from the treatment tanks, rinsing the treatment tank prior to commencing treatment, hydration of waste by a constant flow of water via hose or spray

bars that emit a mist to control emissions, metered addition into the treatment tanks (such as slowing the speed, gaging any expected reactions), utilization of pH adjusting reagents such as lime, and utilization of reducing reagents such as ferrous sulfate or sodium sulfide, among other similar products or waste. Waste streams are reviewed in the Approvals stage as well as by qualified chemists for compatibility such as fingerprinting and other analytical procedures as deemed necessary. During treatment, contents of each container will be visually inspected prior to the addition into the treatment tanks. After a treatment is completed and the treated residual has been dug out of the treatment tank utilizing an excavator bucket, the treatment tanks will be inspected for signs of contamination to ensure no contamination potential is carried into the next batch. This is done by rinsing the tank floors and walls and then removing any residual as deemed necessary

- Neutralization (Acidic or basic waste) – Adjusting corrosive hazardous waste to a pH level desired for the purpose of rendering waste to a less hazardous, and no longer regulated, state. This includes either raising acidic waste pH or lowering alkaline waste pH. Common safety practices for acidic waste streams include examples such as creating an alkaline "slurry" utilizing pH adjusting reagents such as lime and water, hydration of waste by a constant flow of water via hose or spray bars that emit a mist to control emissions (as needed), among other similar products or waste, and metering the addition of waste and reagent into the treatment tanks (such as slowing the speed, gaging any expected reactions.) Therefore, for treating corrosive materials, the treatment/neutralization chemicals will be added to the treatment tank prior to the addition of the corrosive waste/materials. This will ensure that any reactive, corrosive, or oxidizing substances are hydrated, and in a more controlled state.

- Stabilization (metal contaminated waste) – Stabilization is the use of reagents to chemically bind waste streams generally with heavy metals to prevent them from leaching into groundwater once disposed of in a landfill. This can be accomplished using reagents such as lime kiln dust, ferrous sulfate, sodium sulfide, among other similar products or waste in order to chemically bind thus stabilize the waste from leaching.

- Alkaline Chlorination (reactive property waste) – The chemical oxidation of cyanide uses bleach to convert cyanide to a cyanate, and the high pH environment hydrolyzes the cyanate into nitrogen and carbon dioxide. Common practices include but are not limited to hydration of waste and subjecting them to reagents such as hypochlorites, permanganates, and/or peroxides, among other similar products or waste, then deactivating. Safety practices include always keeping the pH of the waste environment alkaline (>11 s.u.). Waste streams are reviewed in the Approvals stage as well as by qualified chemists for compatibility such as fingerprinting and other analytical procedures as deemed necessary. During treatment, contents of each container will be visually inspected prior to the addition into the treatment tanks. After a treatment is completed and the treated residual has been dug out of the treatment tank utilizing an excavator bucket, the treatment tanks will be inspected for signs of contamination to ensure no contamination potential is carried into the next batch. This is done by rinsing the tank floors and walls and then removing any residual as deemed necessary.

- Solidification is the addition of an absorbent reagent to eliminate free liquids and pass a Paint Filter Liquids Test (Method 9095 in SW-846 or other equivalent method).

- Chemical Oxidation (reductive or organic waste) is binding a carbon atom usually with oxygen. This method is a way to break down hazardous waste into a less dangerous state, which is no longer regulated under RCRA. Common practices include, but are not limited to, hydration of waste and subjecting the waste to reagents such as hypochlorites, permanganates, and/or peroxides, among other similar products or waste, then deactivating (as described above.)

- Macro-encapsulation of waste will be treated to comply with 40 CFR 268.45, with surface coating materials such as polymeric organics (e.g., resins and plastics) or with a jacket of inert inorganic materials to substantially reduce surface exposure (and without leaving any empty spaces) to potential leaching media. Section T of this application provides information regarding the number of tanks, tank volumes, and material of construction as well as containment system design.

Management practices for reactive and incompatible wastes at USE Tulsa have been designed to minimize the potential for fires, explosions, gaseous emission, leaching, or other discharge of hazardous waste or hazardous waste constituents which could result from the mixing of incompatible wastes or materials if tank systems ruptured or failed. Specific procedures for the management of these wastes are outlined in Attachment 6 - Procedures to Prevent Hazards. USE Tulsa will not place incompatible wastes, or incompatible wastes and materials in the same tank unless the requirements of 40 CFR 264.17 are complied with. In addition, hazardous waste will not be placed in a tank that has not been decontaminated and previously held an incompatible waste or material unless the requirements of 40 CFR 264.17(b) are met.

Where reactive waste will be stored or treated in a tank system, USE Tulsa will comply with the requirements for the maintenance of protective distances between the waste management area and any public ways, streets, alleys, or an adjoining property line that can be built upon as required in the National Fire Protection Association (NFPA) code, "Flammable and Combustible Liquids Code," Tables 2-1 through 2-6, 1990. NFPA Tables 2-1 through 2-6, 1977 or 1981, are incorporated by reference into 40 CFR 260.11).

In the waste profile reviewing stage, if an SDS accompanies the waste stream it will be reviewed to ensure current treatment technologies to be executed can account for normal processing and treatment capabilities, and current safety protocols in place. The current treatment technology for removing the reactivity characteristic is neutralization and/or deactivation, depending on the waste stream. Some common examples include organic peroxides and some other oxidizers, phosphorus-bearing waste streams, cyanides, sulfides, reductants, etc. Safety precautions for treating cyanides can be referenced above in the alkaline chlorination section of this attachment. Sulfide-bearing waste streams will be treated in alkaline or basic conditions only. Certain oxidizers that are characterized by reactive D003 waste code will be subject to the deactivation (and thereby neutralization) procedure as referenced above in this attachment. Safety precautions in place for water reactive waste and air reactive waste with a flash point at or greater than 140 degrees Fahrenheit are subject to hydration by submerging the containerized waste under water in the treatment tank, continuous water flow or spray bars into the treatment tank, and limiting the batch sizes (quantity) to control anticipated reactions in the treatment tank. Waste streams are reviewed

in the Approvals stage as well as by qualified chemists for compatibility such as fingerprinting and other analytical procedures as deemed necessary. During treatment, contents of each container will be visually inspected prior to the addition into the treatment tanks. After a treatment is completed and the treated residual has been dug out of the treatment tank utilizing an excavator bucket, the treatment tanks will be inspected for signs of contamination to ensure no contamination potential is carried into the next batch. This is done by rinsing the tank floors and walls and then removing any residual as deemed necessary.

In addition, reactive waste will not be placed in the tank systems, unless the waste is treated by deactivation/neutralization during or immediately after placement in the tank system so that:

- The resulting waste, mixture, or dissolved material no longer meets the definition of reactive waste under 261.23 and the requirements of 40 CFR 264.17(b) are complied with.
- The waste is stored or treated in such a way that it is protected from any material or conditions that may cause the waste to react.

The facility Part A Permit Application identifies specific US Environmental Protection Agency (EPA) waste codes managed onsite; waste information including associated waste characteristics are addressed in Attachment 2-Waste Characteristics and Waste Analysis Plan. Waste types managed in tank systems are addressed in the tank certification documents presented in Section T of this application.

a. EXISTING TANK SYSTEMS

i. ASSESSMENT OF EXISTING TANK SYSTEM'S INTEGRITY: 40 CFR 264.191; 40 CFR 270.16(a)

Per 40 CFR 260.10, "Existing tank system" is defined as the tank system that is used for the storage or treatment of hazardous waste and that is in operation, or for which installation has commenced on or prior to July 14, 1986. Tanks T-101, T-102, T-103 and T-107 in TF-1 and treatment tanks TA-2a and TA-2b were installed after 1986. Hence, this section does not apply to USE Tulsa.

ii. EXTERNAL CORROSION PROTECTION

This subsection for the existing aboveground tank systems of TF-1, TA-2a, and TA-2b does not apply to USE Tulsa. However, the fiberglass tanks (T-101, T-102 T-103 and T-

107) are finished with a "gel-coat" which provides weather protection, and the steel treatment tanks (TA-2a and TA-2b) are isolated from direct contact with soil or water by their steel containment.

b. NEW TANK SYSTEMS

i. ASSESSMENT OF NEW TANK SYSTEM'S INTEGRITY: 40 CFR 264.192; 40 CFR 270.16(a)

TF-4 will be developed as the new hazardous waste tank farm to replace TF-1. In addition, a larger TA-2b treatment tank will be constructed to replace existing TA-2b, and new TA-2c will be constructed. A written design assessment, reviewed and certified by an independent, qualified, registered professional engineer, on the structural integrity and suitability of each new tank system for handling hazardous waste is presented in Section T, Appendix 8 of this application. The assessment shows that the foundation, structural support, seams, connections and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength and compatibility with the waste to be managed to ensure that it will not collapse, rupture, or fail. Information provided in the assessment includes the following:

- Design standards (where applicable) according to which tank and ancillary equipment is (or will be) constructed;
- Hazardous characteristics of the wastes that are and will be handled;
- Corrosion assessment (where applicable);
- Design of operational measures to protect underground tank system components from potential damage by vehicles; and
- Design considerations to ensure that tank foundations will maintain the load of a full tank, will be anchored to prevent flotation or dislodgement; and will withstand the effects of frost heave.
- Additional evaluations, as required by 40 CFR 264,192(b), will be conducted after the new tank systems have been constructed.

ii. EXTERNAL CORROSION PROTECTION

The proposed aboveground TF-4 tanks are fiberglass reinforced plastic (FRP) tanks lined with epoxy vinyl ester resin. These tanks will not be in contact with soil or water. Therefore, this subsection for the proposed TF-4 tank system does not apply to USE Tulsa.

Proposed treatment tanks TA-2b and TA-2c are below-ground tanks consisting of carbon steel within a concrete containment vault. There are no external metal components of the treatment tank systems that are in direct contact with the soil or with water. Therefore, this subsection does not apply to USE Tulsa.

iii. TANK INSTALLATION AND TESTING

Prior to placement of a tank system in hazardous waste service, an independent, qualified installation inspector or an independent, qualified registered professional engineer will inspect the tank system for the following items: 1) weld breaks; 2) punctures; 3) scrapes of protective coatings; 4) cracks; 5) corrosion; 6) other structural damage or inadequate construction/installation. In addition, the inspection will specify how all discrepancies were (or will be) repaired, how tank systems (including ancillary equipment) was (or will be) tightness tested, and how ancillary equipment is supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.

c. DIMENSIONS AND CAPACITY OF EACH TANK SYSTEM

Details regarding dimensions and capacity of each tank system are provided in Section T of this application. Tank farms for hazardous waste tanks will have secondary containment systems. Design parameters, dimensions, and materials of construction of the secondary containment systems for the tanks are presented in Section T of this application.

d. DESCRIPTION OF FEED SYSTEMS, SAFETY CUTOFF, BYPASS SYSTEMS, AND PRESSURE CONTROLS

USE Tulsa uses closed top tanks for storing liquid hazardous waste which are equipped with loading and unloading ports and vents; tank details for existing tanks T-101, T-102, T-103 and T-107 and proposed tanks T-407, T-408 T-409 and T-410 are provided in Section T of this application. These tanks on-site are typically loaded using top fill lines and unloaded through bottom discharge lines or loaded/unloaded from bottom fill/discharge lines. Where present,

manholes are used for inspection and cleaning operations. Spill prevention controls for truck unloading, such as check valves and quick connect couplings, will be used for the TF-4 tanks. Manual controls for overfill prevention will be implemented. Additionally, high level (80% capacity) and high-high level (90% capacity) audible alarms will be installed on each tank. Lastly, the proposed TF-4 tanks will be equipped with emergency pressure release vents in the event that a tank becomes over-pressurized.

USE Tulsa uses open-top atmospheric tanks for treating hazardous wastes. Tank details for existing treatment tanks TA-2a and TA-2b and proposed treatment tanks TA-2b and TA-2c are provided in Section T of this application. Bulk and containerized waste is transferred into the tanks manually by facility personnel during operations. Overfill is prevented via manual control. Based on the above operations, automated feed systems, safety cutoffs, and bypass systems are not needed. Spill prevention controls used for transferred bulk loads from trucks to treatment tanks include using quick connect coupling on fill lines and visual observation. Waste loads from roll-offs are dumped into TA-2a, TA-2b, and TA-2c. Fugitive particulate air emissions while handling dusty materials at the treatment tanks are controlled by applying a fine mist of water over a tank using a spray bar with nozzles. Other operational techniques used to control emissions for specific waste treatment techniques are described at the beginning of Section 2. As the tanks are open top and atmospheric, pressure control are not needed.

e. TREATMENT IN T-101, T-102, T-103, AND T-107

Existing tanks T-101, T-102, T-103, and T-107 will store and treat characteristically hazardous waste. Waste types include containerized waste and bulk loads in liquid or sludge physical state. Waste streams will be combined based on compatibility determination of the fingerprint data, treatability study laboratory results, and/or generator and/or chemistry knowledge. Typical reagents include (but are not limited to) lime kiln dust, quick lime, ferrous sulfate, sodium sulfide, and sodium hydroxide. Process controls include specific instructions on anticipated safety concerns, such as order of waste, water, and reagents to be added to the treatment tank, and expected chemical reactions (if any). Volumes and/or ratios of reagents to waste to be treated will be distributed by an individual knowledgeable in chemistry to avoid impermissible dilution. The minimum mixing time shall be specified in specific Standard

Operating Procedures (SOPs) and treatment instructions, based on the waste treatment type. All treatments must be mixed into a final homogenous treated batch. The treated waste is analyzed by the laboratory for verification of treatment. If batches fail the verification treatment, the tank will undergo a retreatment. Batches that pass treatment standards will be accompanied by the appropriate laboratory analysis, manifest, and LDR paperwork as required and kept on record. Disposal of treated waste will be scheduled to an appropriate landfill and paperwork retained on file.

f. TREATMENT IN TA-2a, TA-2b, AND TA-2c

Wastes that are characteristically hazardous may be treated in Treatment Tank TA-2a, TA-2b, and TA-2c (after it is constructed). Treatment chemicals can include, but are not limited to, cement kiln dust (CKD), bed ash, fly ash, lime kiln dust (LKD), quick lime, bleach, waster, ferrous sulfate, sodium hydroxide, sawdust, or Z-pellets. Other chemicals may be used after determination of a treatment protocol through laboratory studies, Safety Data Sheet (SDS) review, chemistry knowledge, etc.

The laboratory's treatment protocol for compatibility can include treatability studies as well as generator and chemical knowledge. During treatment, contents of each container will be visually inspected prior to addition into the treatment tanks. Any material that shows signs of discrepancies or reaction other than those expected during treatment (e.g., heat generation, off gassing, bubbling) shall be communicated to the Lab Manager and the Operations Manager immediately, those containers will be reviewed, and the containers will be marked with labels that indicate the containers are on hold, as applicable. If applicable, communications will be initiated with the CSR and Corporate Sales personnel of the issue with the container.

The waste will be reviewed during the approvals process to ensure that the Subpart CC volatile organic concentrations are less than 500 parts per million (ppm) before approving for onsite treatment. Materials above 500 ppm volatile organics are not permissible for treatment in TA-2a, TA-2b, and TA-2c.

An excavator will be used to mix the waste and chemicals. The bucket of the excavator is maintained over the containment tank at all times. The bucket is cleaned before leaving the containment area.

Daily Inspection of the TA-2a, TA-2b, and TA-2c areas will be performed and documented to ensure safe and compliant operations. All spills are cleaned up immediately and management notified promptly.

Waste materials are mixed to a uniform and homogenous consistency before a representative sample is obtained. The mixture sample is tested for Toxicity Characteristic Leaching Procedure (TCLP) and Underlying Hazardous Constituent (UHC) requirements before characteristic waste can be de-classified.

Fugitive particulate air emissions while handling dusty materials are controlled using several methods. Water may be added to the mixing container prior to materials being introduced, water can be added to the containers prior to introduction to the treatment tank, or a fine spray of water can be misted over the treatment tank using a spray bar. Materials will be introduced and mixed in a manner that helps reduce the amount of dust emissions. During inclement weather processing will be adjusted to the safest manner possible.

For TA-2a, the liquid processing volume for the 42.7 yd^3 (8,625 gallons) treatment tank will be limited to 4,000-gallon batches maximum. This is required to allow for the secondary containment to hold 100% of the mixing volume (waste and reagents) and the volume in the containment occupied by the treatment tank. For TA-2b and TA-2c, the liquid processing volume for each 219.19 yd^3 (44,267 gallons) tank will be limited to 20,500-gallons. This will allow for the concrete secondary containment to hold 100% of the mixing volume and the volume in the containment occupied by the steel tank and associated framing members. USE Tulsa will perform periodic metal thickness testing using an ultrasonic probe to ensure that the wall thickness is adequate, as established in paragraph of Section T. In addition, a visual inspection shall be performed on days when the treatment tank is in use.

For waste that will undergo deactivation, chemical oxidization, or alkaline chlorination treatment technologies in the treatment tank, tank walls and floor will be inspected and cleaned of all potentially organic matter prior to beginning the oxidizing treatment. If water is used for cleaning, it can remain in the treatment tank and will be used for process water for the new mix. This will ensure that any potential oxidizing substances are hydrated and safe.

For treating corrosive materials, the treatment/neutralization chemicals will be added to the treatment tank prior to the addition of the corrosive materials. The use of water may be needed to control the heat of reaction.

For treating monolithic oxidizing waste streams or pool chemicals in the form of pucks, pre-treatment via size reduction will be performed prior to proceeding into the deactivation treatment technology. An example of accomplishing this would be utilizing the bucket of the excavator or a grinder. USE Tulsa will utilize a portable grinder, capable of reducing hockey puck sized pool cleaning wastes to a milled product. The reduction in size significantly improves the facility's ability to efficiently manage the waste streams and ensures complete deactivation prior to disposal. The portable grinder will include a single drum rotor grinder equipped with an infeed hopper, support stand, and discharge hopper. The components are manufactured with a combination of 304 stainless steel (hopper) and 316 stainless steel (grinding mechanism and support stand) for chemical compatibility. The design capacity of the grinder is 55-gallons.

The portable grinder will be operated, maintained, and closed in a manner that prevents releases that have adverse effects on human health or the environment due to migration of waste. Grinding activities will take place only within permitted facility CMAs and treatment tanks. These permitted units and their features prevent releases that may have adverse effects on human health or the environment due to migration of waste. No new containment features are proposed for the operation of portable grinder, as it will be operated within the footprint of existing units. Waste processed in the portable grinder will be done in batches. Waste will be processed expeditiously, and the unit will be cleared of all infeed material during the process of a batch. No unprocessed material will be allowed to remain in the infeed hopper at the conclusion of the batch operation. Following grinding, the milled product will either be placed in containers for future treatment or treated directly in Facility Stabilization Tanks.

The Facility has developed a program to ensure that necessary precautions are taken to prevent accidental commingling or reaction of incompatible and/or reactive wastes, or ignition of ignitable materials. The program encompasses the following elements:

- Identification of the hazardous characteristics of the waste streams during the approval process.
- Segregation of reactive or incompatible materials according to the segregation and classification system.
- Verification testing of incoming shipments includes compatibility checks on waste streams intended for bulking or combined treatment.
- Identification of sources of ignition and necessary precautions.
- Fire prevention/suppression controls include fire extinguishers, water hoses, and designated smoking areas away from waste storage and treatment areas.

Key safety measures include wearing appropriate personal protective equipment (PPE), such as eye protection, hearing protection, respiratory protection, and gloves. Employees will also receive documented training on the portable grinder, and operators should be familiar with its controls and proper operation. The portable grinder must be inspected before use. The portable grinder will be dismantled and disposed, or decontaminated and recycled, following its use and thus closure and post-closure care is not applicable.

USE Tulsa will be utilizing an Aircycle Bulb Eater 3L crushing device or equivalent. This device is considered controlled crushing and is regulated under both federal and state hazardous and universal waste regulations. By placing this device under the drum canopy, the device will be protected from the elements while in use and storage.

The Aircycle Bulb Eater 3L is a lamp crushing system that requires specific safety precautions to ensure the well-being of operators and the environment. Key safety measures include wearing appropriate PPE, such as eye protection, hearing protection, and gloves, and operating the machine in a well-ventilated area. The machine must also be inspected for damage before use, and operators should be familiar with its controls and proper operation. Operators will be required to take the Bulb Eater® 3L Certified Training – an online, 5-step program covering Bulb Eater® 3L assembly, operations, safety, and maintenance. This program includes a training video, quiz, and certificate of completion.

The Bulb Eater 3L system crushes spent- lamps of any length, u-tubes, and compact fluorescent lightbulbs (CFLs) into treatable material, and captures over 99.99% of the vapors released. The system, which is mounted to a 55-gallon drum, can hold up to 1350 4-foot lamps. A five-stage filtering process removes hazardous particulates and vapors. Once the drum is full, USE Tulsa will treat and dispose to a subtitle D disposal facility.

----------**END OF ATTACHMENT**----------

Appendix 1 – Proposed Storage and Treatment Increases

Permitted Values					
Existing			**Proposed**		
Storage			Storage		
CMA-1	10,560	gal	T-407	19,960	gal
CMA-2	4,840	gal	T-408	19,960	gal
CMA-3	30,560	gal	T-409	19,960	gal
CMA-4	181,776	gal	T-410	19,960	gal
T-101	16,800	gal	CMA-1	33,000	gal
T-102	19,960	gal	CMA-2	4,840	gal
T-103	19,960	gal	CMA-3	30,560	gal
T-107	13,077	gal	CMA-4	181,776	gal
Treatment			Treatment		
TA-2a	25,851	gal/day	TA-2a	12,000	gal/day
TA-2b	21,991	gal/day	TA-2b	82,000	gal/day
T-101	16,800	gal/day	TA-2c	82,000	gal/day
T-102	19,960	gal/day			
T-103	19,960	gal/day			
T-107	13,077	gal/day			

Existing Storage	297,533	gal	Proposed Storage	330,016	gal
Existing Treatment	117,639	gal/day	Proposed Treatment	176,000	gal/day

% Storage Increase	10.9%
% Treatment Increase	49.6%

ATTACHMENT C
REDLINE/STRIKETHROUGH PAGES AND REPLACEMENT PAGES FOR PART A FORM IN ATTACHMENT 13 OF CURRENT PERMIT

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
427	U111 6	2,000	T	S01 S02 T01	
428	U111 7	2,000	T	S01 S02 T01	
429	U111 8	2,000	T	S01 S02 T01	
430	U111 9	2,000	T	S01 S02 T01	
431	U112 0	2,000	T	S01 S02 T01	
432	U112 1	2,000	T	S01 S02 T01	
433	U112 2	2,000	T	S01 S02 T01	
434	U112 3	2,000	T	S01 S02 T01	
435	U112 4	2,000	T	S01 S02 T01	
436	U112 5	2,000	T	S01 S02 T01	
437	U112 6	2,000	T	S01 S02 T01	
438	U112 7	2,000	T	S01 S02 T01	
439	U112 8	2,000	T	S01 S02 T01	
440	U112 9	2,000	T	S01 S02 T01	
441	U113 0	2,000	T	S01 S02 T01	
442	U113 1	2,000	T	S01 S02 T01	
443	U113 2	2,000	T	S01 S02 T01	
444	U113 3	2,000	T	S01 S02 T01	
445	U113 4	2,000	T	S01 S02 T01	
446	U113 5	2,000	T	S01 S02 T01	
447	U113 6	2,000	T	S01 S02 T01	
448	U113 7	2,000	T	S01 S02 T01	
449	U113 8	2,000	T	S01 S02 T01	
450	U114 0	2,000	T	S01 S02 T01	
451	U114 1	2,000	T	S01 S02 T01	
452	U114 2	2,000	T	S01 S02 T01	
453	U114 3	2,000	T	S01 S02 T01	
454	U114 4	2,000	T	S01 S02 T01	
455	U114 5	2,000	T	S01 S02 T01	
456	U114 6	2,000	T	S01 S02 T01	
457	U114 7	2,000	T	S01 S02 T01	
458	U114 8	2,000	T	S01 S02 T01	
459	U114 9	2,000	T	S01 S02 T01	
460	U115 0	2,000	T	S01 S02 T01	
461	U115 1	2,000	T	S01 S02 T01	
462	U115 2	2,000	T	S01 S02 T01	
463	U115 3	2,000	T	S01 S02 T01	
464	U115 4	2,000	T	S01 S02 T01	
465	U115 5	2,000	T	S01 S02 T01	
466	U115 6	2,000	T	S01 S02 T01	
467	U115 7	2,000	T	S01 S02 T01	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
468	U158	2,000	T	S01 S02 T01	
469	U159	20,000	T	S01 S02 T01	
470	U160	2,000	T	S01 S02 T01	
471	U161	20,000	T	S01 S02 T01	
472	U162	2,000	T	S01 S02 T01	
473	U163	2,000	T	S01 S02 T01	
474	U164	2,000	T	S01 S02 T01	
475	U165	20,000	T	S01 S02 T01	
476	U166	2,000	T	S01 S02 T01	
477	U167	2,000	T	S01 S02 T01	
478	U168	2,000	T	S01 S02 T01	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
509	U203	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
510	U204	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
511	U205	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
512	U206	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
513	U207	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
514	U208	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
515	U209	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
516	U210	20,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
517	U211	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
518	U213	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
519	U214	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
520	U215	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
521	U216	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
522	U217	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
523	U218	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
524	U219	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
525	U220	20,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
526	U221	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
527	U222	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
528	U223	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
529	U225	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
530	U226	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
531	U227	20,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
532	U228	20,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
533	U234	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
534	U235	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
535	U236	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
536	U237	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
537	U238	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
538	U239	20,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
539	U240	20,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
540	U243	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
541	U244	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
542	U246	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
543	U247	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
544	U248	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
545	U249	20,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
546	U271	20,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
547	U278	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
548	U279	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
549	U280	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
550	U328	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
551	U353	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
552	U359	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
553	U364	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
554	U367	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
555	U372	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
556	U373	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
557	U375	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
558	U376	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
559	U377	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
560	U378	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
561	U379	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
562	U381	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
563	U382	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
564	U383	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
565	U384	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
566	U385	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
567	U386	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
568	U387	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
569	U389	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
570	U390	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
571	U391	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
572	U392	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
573	U393	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
574	U394	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
575	U395	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
576	U396	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
577	U400	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
578	U401	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
579	U402	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
580	U403	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
581	U404	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
582	U407	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
583	U409	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
584	U410	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
585	U411	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
586	U328	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
587	U353	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
588	U359	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
589	U364	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
590	U367	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
591	U372	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
592	U373	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
593	U375	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
594	U376	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
595	U377	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
596	U378	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
597	U379	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
598	U381	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
599	U382	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	
5100	U383	2,000	T	S01 S02 ~~T~~ ~~0~~ ~~1~~	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
5 5 0	U 3 2 8	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 1	U 3 5 3	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 2	U 3 5 9	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 3	U 3 6 4	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 4	U 3 6 7	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 5	U 3 7 2	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 6	U 3 7 3	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 7	U 3 8 7	20,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 8	U 3 8 9	20,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 5 9	U 3 9 4	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 6 0	U 3 9 5	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 6 1	U 4 0 4	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 6 2	U 4 0 9	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 6 3	U 4 1 0	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	
5 6 4	U 4 1 1	2,000	T	S 0 1 S 0 2 ~~T~~ ~~0~~ ~~1~~	

8. Map

Attach to this application a topographical map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all spring, rivers, and other surface water bodies in this map area. See instructions for precise requirements.

See Appendix A-1 for area and site topographic maps.

9. Facility Drawing

All existing facilities must include a scale drawing of the facility. See instructions for more detail.

See Appendix A-2 for the facility drawings.

10. Photographs

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment, and disposal areas; and sites of future storage, treatment, or disposal areas. See instructions for more detail.

See Appendix A-3 for site photographs.

11. Comments

EPA ID Number	O	K	D	0	0	0	4	0	2	3	9	6

OMB# 2050-0024; Expires 04/30/2024

United States Environmental Protection Agency
HAZARDOUS WASTE PERMIT PART A FORM

1. Facility Permit Contact

First Name Dan	MI:	Last Name Cavanaugh
Title Environmental Compliance Manager		
Email dcavanaugh@republicservices.com		
Phone 918-560-5260	Ext	Fax 918-560-5252

2. Facility Permit Contact Mailing Address

Street Address 2700 S. 25th W. Ave.		
City, Town, or Village Tulsa		
State Oklahoma	Country USA	Zip Code 74107

3. Facility Existence Date (mm/dd/yyyy)

1972

4. Other Environmental Permits

A. Permit Type	B. Permit Number	C. Description
E	2019-0826-O	Synthetic Minor Source Air Permit

5. Nature of Business

US Ecology Tulsa, Inc. is a Treatment, Storage, and Disposal Facility (TSDF) for hazardous and solid waste.

6. Process Codes and Design Capacities

Line Number		A. Process Code			B. Process Design Capacity		C. Process Total Number of Units	D. Unit Name
					(1) Amount	(2) Unit of Measure		
0	1	S	0	1	33,000	G	1	CMA-1
0	2	S	0	1	4,840	G	1	CMA-2
0	3	S	0	1	30,560	G	1	CMA-3
0	4	S	0	2	16,800	G	1	T-101
0	5	S	0	2	19,960	G	1	T-102
0	6	S	0	2	19,960	G	1	T-103
0	7	S	0	2	13,077	G	1	T-107
0	8	T	0	1	16,800	U	1	T-101
0	9	T	0	1	19,960	U	1	T-102
1	0	T	0	1	19,960	U	1	T-103
1	1	T	0	1	13,077	U	1	T-107
1	2	T	0	1	25,851	U	1	TA-2a
1	3	T	0	1	21,991	U	1	TA-2b
1	4	S	0	1	900	Y	1	CMA-4

7. Description of Hazardous Wastes (Enter codes for Items 7.A, 7.C and 7.D(1))

Line No.			A. EPA Hazardous Waste No.				B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes									
									(1) Process Codes									(2) Process Description (if code is not entered in 7.D1))
0	0	1	D	0	0	1	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	2	D	0	0	2	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	3	D	0	0	3	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	4	D	0	0	4	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	5	D	0	0	5	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	6	D	0	0	6	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	7	D	0	0	7	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	8	D	0	0	8	15,000	T	S	0	1	S	0	2	T	0	1	
0	0	9	D	0	0	9	15,000	T	S	0	1	S	0	2	T	0	1	
0	1	0	D	0	1	0	15,000	T	S	0	1	S	0	2	T	0	1	
0	1	1	D	0	1	1	15,000	T	S	0	1	S	0	2	T	0	1	
0	1	2	D	0	1	2	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	3	D	0	1	3	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	4	D	0	1	4	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	5	D	0	1	5	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	6	D	0	1	6	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	7	D	0	1	7	10,000	T	S	0	1	S	0	2	T	0	1	
0	1	8	D	0	1	8	50,000	T	S	0	1	S	0	2	T	0	1	
0	1	9	D	0	1	9	25,000	T	S	0	1	S	0	2	T	0	1	
0	2	0	D	0	2	0	25,000	T	S	0	1	S	0	2	T	0	1	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
021	D021	25,000	T	S01 S02 T01	
022	D022	25,000	T	S01 S02 T01	
023	D023	25,000	T	S01 S02 T01	
024	D024	25,000	T	S01 S02 T01	
025	D025	25,000	T	S01 S02 T01	
026	D026	25,000	T	S01 S02 T01	
027	D027	25,000	T	S01 S02 T01	
028	D028	25,000	T	S01 S02 T01	
029	D029	25,000	T	S01 S02 T01	
030	D030	25,000	T	S01 S02 T01	
031	D031	25,000	T	S01 S02 T01	
032	D032	25,000	T	S01 S02 T01	
033	D033	25,000	T	S01 S02 T01	
034	D034	25,000	T	S01 S02 T01	
035	D035	25,000	T	S01 S02 T01	
036	D036	25,000	T	S01 S02 T01	
037	D037	25,000	T	S01 S02 T01	
038	D038	25,000	T	S01 S02 T01	
039	D039	25,000	T	S01 S02 T01	
040	D040	25,000	T	S01 S02 T01	
041	D041	25,000	T	S01 S02 T01	
042	D042	25,000	T	S01 S02 T01	
043	D043	25,000	T	S01 S02 T01	
044	F001	25,000	T	S01 S02	
045	F002	25,000	T	S01 S02	
046	F003	25,000	T	S01 S02	
047	F004	25,000	T	S01 S02	
048	F005	25,000	T	S01 S02	
049	F006	50,000	T	S01 S02	
050	F007	2,000	T	S01 S02	
051	F008	2,000	T	S01 S02	
052	F009	2,000	T	S01 S02	
053	F010	2,000	T	S01 S02	
054	F011	2,000	T	S01 S02	
055	F012	2,000	T	S01 S02	
056	F019	10,000	T	S01 S02	
057	F020	2,000	T	S01 S02	
058	F021	2,000	T	S01 S02	
059	F022	2,000	T	S01 S02	
060	F023	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
061	F024	2,000	T	S01 S02	
062	F025	2,000	T	S01 S02	
063	F026	2,000	T	S01 S02	
064	F027	2,000	T	S01 S02	
065	F028	2,000	T	S01 S02	
066	F032	2,000	T	S01 S02	
067	F034	2,000	T	S01 S02	
068	F035	2,000	T	S01 S02	
069	F037	2,000	T	S01 S02	
070	F038	2,000	T	S01 S02	
071	F039	2,000	T	S01 S02	
072	K001	2,000	T	S01 S02	
073	K002	2,000	T	S01 S02	
074	K003	2,000	T	S01 S02	
075	K004	2,000	T	S01 S02	
076	K005	2,000	T	S01 S02	
077	K006	2,000	T	S01 S02	
078	K007	2,000	T	S01 S02	
079	K008	2,000	T	S01 S02	
080	K009	2,000	T	S01 S02	
081	K010	2,000	T	S01 S02	
082	K011	2,000	T	S01 S02	
083	K013	2,000	T	S01 S02	
084	K014	2,000	T	S01 S02	
085	K015	2,000	T	S01 S02	
086	K016	2,000	T	S01 S02	
087	K017	2,000	T	S01 S02	
088	K018	2,000	T	S01 S02	
089	K019	2,000	T	S01 S02	
090	K020	2,000	T	S01 S02	
091	K021	2,000	T	S01 S02	
092	K022	2,000	T	S01 S02	
093	K023	2,000	T	S01 S02	
094	K024	2,000	T	S01 S02	
095	K025	2,000	T	S01 S02	
096	K026	2,000	T	S01 S02	
097	K027	2,000	T	S01 S02	
098	K028	2,000	T	S01 S02	
099	K029	2,000	T	S01 S02	
100	K030	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
101	K031	2,000	T	S01 S02	
102	K032	2,000	T	S01 S02	
103	K033	2,000	T	S01 S02	
104	K034	2,000	T	S01 S02	
105	K035	2,000	T	S01 S02	
106	K036	2,000	T	S01 S02	
107	K037	2,000	T	S01 S02	
108	K038	2,000	T	S01 S02	
109	K039	2,000	T	S01 S02	
110	K040	2,000	T	S01 S02	
111	K041	2,000	T	S01 S02	
112	K042	2,000	T	S01 S02	
113	K043	2,000	T	S01 S02	
114	K044	2,000	T	S01 S02	
115	K045	2,000	T	S01 S02	
116	K046	2,000	T	S01 S02	
117	K047	2,000	T	S01 S02	
118	K048	50,000	T	S01 S02	
119	K049	50,000	T	S01 S02	
120	K050	50,000	T	S01 S02	
121	K051	50,000	T	S01 S02	
122	K052	50,000	T	S01 S02	
123	K060	10,000	T	S01 S02	
124	K061	2,000	T	S01 S02	
125	K062	50,000	T	S01 S02	
126	K069	2,000	T	S01 S02	
127	K071	2,000	T	S01 S02	
128	K073	2,000	T	S01 S02	
129	K083	2,000	T	S01 S02	
130	K084	2,000	T	S01 S02	
131	K085	2,000	T	S01 S02	
132	K086	2,000	T	S01 S02	
133	K087	10,000	T	S01 S02	
134	K088	2,000	T	S01 S02	
135	K093	2,000	T	S01 S02	
136	K094	2,000	T	S01 S02	
137	K095	2,000	T	S01 S02	
138	K096	2,000	T	S01 S02	
139	K097	2,000	T	S01 S02	
140	K098	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
141	K097	2,000	T	S01 S02	
142	K100	2,000	T	S01 S02	
143	K101	2,000	T	S01 S02	
144	K102	2,000	T	S01 S02	
145	K103	2,000	T	S01 S02	
146	K104	2,000	T	S01 S02	
147	K105	2,000	T	S01 S02	
148	K106	2,000	T	S01 S02	
149	K107	2,000	T	S01 S02	
150	K108	2,000	T	S01 S02	
151	K109	2,000	T	S01 S02	
152	K110	2,000	T	S01 S02	
153	K111	2,000	T	S01 S02	
154	K112	2,000	T	S01 S02	
155	K113	2,000	T	S01 S02	
156	K114	2,000	T	S01 S02	
157	K115	2,000	T	S01 S02	
158	K116	2,000	T	S01 S02	
159	K117	2,000	T	S01 S02	
160	K118	2,000	T	S01 S02	
161	K123	2,000	T	S01 S02	
162	K124	2,000	T	S01 S02	
163	K125	2,000	T	S01 S02	
164	K126	2,000	T	S01 S02	
165	K131	2,000	T	S01 S02	
166	K132	2,000	T	S01 S02	
167	K136	2,000	T	S01 S02	
168	K141	10,000	T	S01 S02	
169	K142	10,000	T	S01 S02	
170	K143	10,000	T	S01 S02	
171	K144	10,000	T	S01 S02	
172	K145	10,000	T	S01 S02	
173	K147	10,000	T	S01 S02	
174	K148	10,000	T	S01 S02	
175	K149	10,000	T	S01 S02	
176	K150	10,000	T	S01 S02	
177	K151	10,000	T	S01 S02	
178	K156	10,000	T	S01 S02	
179	K157	10,000	T	S01 S02	
180	K158	10,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
181	K159	10,000	T	S01 S02	
182	K161	10,000	T	S01 S02	
183	K169	10,000	T	S01 S02	
184	K170	10,000	T	S01 S02	
185	K171	10,000	T	S01 S02	
186	K172	10,000	T	S01 S02	
187	K174	10,000	T	S01 S02	
188	K175	10,000	T	S01 S02	
189	K176	10,000	T	S01 S02	
190	K177	10,000	T	S01 S02	
191	K178	10,000	T	S01 S02	
192	K181	10,000	T	S01 S02	
193	P001	2,000	T	S01 S02	
194	P002	2,000	T	S01 S02	
195	P003	2,000	T	S01 S02	
196	P004	2,000	T	S01 S02	
197	P005	2,000	T	S01 S02	
198	P006	2,000	T	S01 S02	
199	P007	2,000	T	S01 S02	
200	P008	2,000	T	S01 S02	
201	P009	2,000	T	S01 S02	
202	P010	2,000	T	S01 S02	
203	P011	2,000	T	S01 S02	
204	P012	2,000	T	S01 S02	
205	P013	2,000	T	S01 S02	
206	P014	2,000	T	S01 S02	
207	P015	2,000	T	S01 S02	
208	P016	2,000	T	S01 S02	
209	P017	2,000	T	S01 S02	
210	P018	2,000	T	S01 S02	
211	P020	2,000	T	S01 S02	
212	P021	2,000	T	S01 S02	
213	P022	2,000	T	S01 S02	
214	P023	2,000	T	S01 S02	
215	P024	2,000	T	S01 S02	
216	P026	2,000	T	S01 S02	
217	P027	2,000	T	S01 S02	
218	P028	2,000	T	S01 S02	
219	P029	2,000	T	S01 S02	
220	P030	2,000	T	S01 S02	
221	P031	2,000	T	S01 S02	
222	P033	2,000	T	S01 S02	
223	P034	2,000	T	S01 S02	
224	P036	2,000	T	S01 S02	
225	P037	2,000	T	S01 S02	
226	P038	2,000	T	S01 S02	
227	P039	2,000	T	S01 S02	
228	P040	2,000	T	S01 S02	
229	P041	2,000	T	S01 S02	
230	P042	2,000	T	S01 S02	
231	P043	2,000	T	S01 S02	
232	P044	2,000	T	S01 S02	
233	P045	2,000	T	S01 S02	
234	P046	2,000	T	S01 S02	
235	P047	2,000	T	S01 S02	
236	P048	2,000	T	S01 S02	
237	P049	2,000	T	S01 S02	
238	P050	2,000	T	S01 S02	
239	P051	2,000	T	S01 S02	
240	P054	2,000	T	S01 S02	
241	P056	2,000	T	S01 S02	
242	P057	2,000	T	S01 S02	
243	P058	2,000	T	S01 S02	
244	P059	2,000	T	S01 S02	
245	P060	2,000	T	S01 S02	
246	P062	2,000	T	S01 S02	
247	P063	2,000	T	S01 S02	
248	P064	2,000	T	S01 S02	
249	P065	2,000	T	S01 S02	
250	P066	2,000	T	S01 S02	
251	P067	2,000	T	S01 S02	
252	P068	2,000	T	S01 S02	
253	P069	2,000	T	S01 S02	
254	P070	2,000	T	S01 S02	
255	P071	2,000	T	S01 S02	
256	P072	2,000	T	S01 S02	
257	P073	2,000	T	S01 S02	
258	P074	2,000	T	S01 S02	
259	P075	2,000	T	S01 S02	
260	P076	2,000	T	S01 S02	
261	P077	2,000	T	S01 S02	
262	P078	2,000	T	S01 S02	
263	P081	2,000	T	S01 S02	
264	P082	2,000	T	S01 S02	
265	P084	2,000	T	S01 S02	
266	P085	2,000	T	S01 S02	
267	P087	2,000	T	S01 S02	
268	P088	2,000	T	S01 S02	
269	P089	2,000	T	S01 S02	
270	P092	2,000	T	S01 S02	
271	P093	2,000	T	S01 S02	
272	P094	2,000	T	S01 S02	
273	P095	2,000	T	S01 S02	
274	P096	2,000	T	S01 S02	
275	P097	2,000	T	S01 S02	
276	P098	2,000	T	S01 S02	
277	P099	2,000	T	S01 S02	
278	P101	2,000	T	S01 S02	
279	P102	2,000	T	S01 S02	
280	P103	2,000	T	S01 S02	
281	P104	2,000	T	S01 S02	
282	P105	2,000	T	S01 S02	
283	P106	2,000	T	S01 S02	
284	P107	2,000	T	S01 S02	
285	P108	2,000	T	S01 S02	
286	P109	2,000	T	S01 S02	
287	P110	2,000	T	S01 S02	
288	P111	2,000	T	S01 S02	
289	P112	2,000	T	S01 S02	
290	P113	2,000	T	S01 S02	
291	P114	2,000	T	S01 S02	
292	P115	2,000	T	S01 S02	
293	P116	2,000	T	S01 S02	
294	P117	2,000	T	S01 S02	
295	P118	2,000	T	S01 S02	
296	P119	2,000	T	S01 S02	
297	P120	2,000	T	S01 S02	
298	P121	2,000	T	S01 S02	
299	P122	2,000	T	S01 S02	
2100	P123	2,000	T	S01 S02	
2101	P124	2,000	T	S01 S02	
2102

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
223	P033	2,000	T	S01 S02	
224	P033	2,000	T	S01 S02	
225	P033	2,000	T	S01 S02	
226	P033	2,000	T	S01 S02	
227	P033	2,000	T	S01 S02	
228	P033	2,000	T	S01 S02	
229	P033	2,000	T	S01 S02	
230	P033	2,000	T	S01 S02	
231	P033	2,000	T	S01 S02	
232	P033	2,000	T	S01 S02	
233	P033	2,000	T	S01 S02	
234	P033	2,000	T	S01 S02	
235	P033	2,000	T	S01 S02	
236	P033	2,000	T	S01 S02	
237	P033	2,000	T	S01 S02	
238	P033	2,000	T	S01 S02	
239	P033	2,000	T	S01 S02	
240	P033	2,000	T	S01 S02	
241	P033	2,000	T	S01 S02	
242	P033	2,000	T	S01 S02	
243	P033	2,000	T	S01 S02	
244	P033	2,000	T	S01 S02	
245	P033	2,000	T	S01 S02	
246	P033	2,000	T	S01 S02	
247	P033	2,000	T	S01 S02	
248	P033	2,000	T	S01 S02	
249	P033	2,000	T	S01 S02	
250	P033	2,000	T	S01 S02	
251	P033	2,000	T	S01 S02	
252	P033	2,000	T	S01 S02	
253	P033	2,000	T	S01 S02	
254	P033	2,000	T	S01 S02	
255	P033	2,000	T	S01 S02	
256	P033	2,000	T	S01 S02	
257	P033	2,000	T	S01 S02	
258	P033	2,000	T	S01 S02	
259	P033	2,000	T	S01 S02	
260	P033	2,000	T	S01 S02	
261	P033	2,000	T	S01 S02	
262	P033	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
263	P081	2,000	T	S01 S02	
264	P082	2,000	T	S01 S02	
265	P084	2,000	T	S01 S02	
266	P085	2,000	T	S01 S02	
267	P087	2,000	T	S01 S02	
268	P088	2,000	T	S01 S02	
269	P089	2,000	T	S01 S02	
270	P092	2,000	T	S01 S02	
271	P093	2,000	T	S01 S02	
272	P094	2,000	T	S01 S02	
273	P095	2,000	T	S01 S02	
274	P096	2,000	T	S01 S02	
275	P097	2,000	T	S01 S02	
276	P098	2,000	T	S01 S02	
277	P099	2,000	T	S01 S02	
278	P101	2,000	T	S01 S02	
279	P102	2,000	T	S01 S02	
280	P103	2,000	T	S01 S02	
281	P104	2,000	T	S01 S02	
282	P105	2,000	T	S01 S02	
283	P106	2,000	T	S01 S02	
284	P108	2,000	T	S01 S02	
285	P109	2,000	T	S01 S02	
286	P110	2,000	T	S01 S02	
287	P111	2,000	T	S01 S02	
288	P112	2,000	T	S01 S02	
289	P113	2,000	T	S01 S02	
290	P114	2,000	T	S01 S02	
291	P115	2,000	T	S01 S02	
292	P116	2,000	T	S01 S02	
293					
294	P118	2,000	T	S01 S02	
295	P119	2,000	T	S01 S02	
296	P120	2,000	T	S01 S02	
297	P121	2,000	T	S01 S02	
298	P122	2,000	T	S01 S02	
299	P123	2,000	T	S01 S02	
300	P127	2,000	T	S01 S02	
301	P128	2,000	T	S01 S02	
302	P185	2,000	T	S01 S02	
303	P188	2,000	T	S01 S02	
304	P189	2,000	T	S01 S02	
305	P190	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
304	P189	2,000	T	S01 S02	
305	P190	2,000	T	S01 S02	
306	P191	2,000	T	S01 S02	
307	P192	2,000	T	S01 S02	
308	P194	2,000	T	S01 S02	
309	P196	2,000	T	S01 S02	
310	P197	2,000	T	S01 S02	
311	P198	2,000	T	S01 S02	
312	P199	2,000	T	S01 S02	
313	P201	2,000	T	S01 S02	
314	P202	2,000	T	S01 S02	
315	P203	2,000	T	S01 S02	
316	P204	2,000	T	S01 S02	
317	P205	2,000	T	S01 S02	
318	U001	2,000	T	S01 S02	
319	U002	2,000	T	S01 S02	
320	U003	2,000	T	S01 S02	
321	U004	2,000	T	S01 S02	
322	U005	2,000	T	S01 S02	
323	U006	2,000	T	S01 S02	
324	U007	2,000	T	S01 S02	
325	U008	2,000	T	S01 S02	
326	U009	2,000	T	S01 S02	
327	U010	2,000	T	S01 S02	
328	U011	2,000	T	S01 S02	
329	U012	2,000	T	S01 S02	
330	U014	2,000	T	S01 S02	
331	U015	2,000	T	S01 S02	
332	U016	2,000	T	S01 S02	
333	U017	2,000	T	S01 S02	
334	U018	2,000	T	S01 S02	
335	U019	2,000	T	S01 S02	
336	U020	2,000	T	S01 S02	
337	U021	2,000	T	S01 S02	
338	U022	2,000	T	S01 S02	
339	U023	2,000	T	S01 S02	
340	U024	2,000	T	S01 S02	
341	U025	2,000	T	S01 S02	
342	U026	2,000	T	S01 S02	
343	U027	2,000	T	S01 S02	
344	U028	2,000	T	S01 S02	
345	U029	2,000	T	S01 S02	
346	U030	2,000	T	S01 S02	
347	U031	2,000	T	S01 S02	
348	U032	2,000	T	S01 S02	
349	U033	2,000	T	S01 S02	
350	U034	2,000	T	S01 S02	
351	U035	2,000	T	S01 S02	
352	U036	2,000	T	S01 S02	
353	U037	2,000	T	S01 S02	
354	U038	2,000	T	S01 S02	
355	U039	2,000	T	S01 S02	
356	U041	2,000	T	S01 S02	
357	U042	2,000	T	S01 S02	
358	U043	2,000	T	S01 S02	
359	U044	2,000	T	S01 S02	
360	U045	2,000	T	S01 S02	
361	U046	2,000	T	S01 S02	
362	U047	2,000	T	S01 S02	
363	U048	2,000	T	S01 S02	
364	U049	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
345	U029	2,000	T	S01 S02	
346	U030	2,000	T	S01 S02	
347	U031	2,000	T	S01 S02	
348	U032	2,000	T	S01 S02	
349	U033	2,000	T	S01 S02	
350	U034	2,000	T	S01 S02	
351	U035	2,000	T	S01 S02	
352	U036	2,000	T	S01 S02	
353	U037	2,000	T	S01 S02	
354	U038	2,000	T	S01 S02	
355	U039	2,000	T	S01 S02	
356	U041	2,000	T	S01 S02	
357	U042	2,000	T	S01 S02	
358	U043	2,000	T	S01 S02	
359	U044	2,000	T	S01 S02	
360	U045	2,000	T	S01 S02	
361	U046	2,000	T	S01 S02	
362	U047	2,000	T	S01 S02	
363	U048	2,000	T	S01 S02	
364	U049	2,000	T	S01 S02	
365	U050	2,000	T	S01 S02	
366	U051	2,000	T	S01 S02	
367	U052	2,000	T	S01 S02	
368	U053	2,000	T	S01 S02	
369	U055	2,000	T	S01 S02	
370	U056	2,000	T	S01 S02	
371	U057	2,000	T	S01 S02	
372	U058	2,000	T	S01 S02	
373	U059	2,000	T	S01 S02	
374	U060	2,000	T	S01 S02	
375	U061	2,000	T	S01 S02	
376	U062	2,000	T	S01 S02	
377	U063	2,000	T	S01 S02	
378	U064	2,000	T	S01 S02	
379	U066	2,000	T	S01 S02	
380	U067	2,000	T	S01 S02	
381	U068	2,000	T	S01 S02	
382	U069	2,000	T	S01 S02	
383	U070	2,000	T	S01 S02	
384	U071	2,000	T	S01 S02	
385	U072	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
386	U073	2,000	T	S01 S02	
387	U074	2,000	T	S01 S02	
388	U075	2,000	T	S01 S02	
389	U076	2,000	T	S01 S02	
390	U077	2,000	T	S01 S02	
391	U078	2,000	T	S01 S02	
392	U079	2,000	T	S01 S02	
393	U080	2,000	T	S01 S02	
394	U081	2,000	T	S01 S02	
395	U082	2,000	T	S01 S02	
396	U083	2,000	T	S01 S02	
397	U084	2,000	T	S01 S02	
398	U085	2,000	T	S01 S02	
399	U086	2,000	T	S01 S02	
400	U087	2,000	T	S01 S02	
401	U088	2,000	T	S01 S02	
402	U089	2,000	T	S01 S02	
403	U090	2,000	T	S01 S02	
404	U091	2,000	T	S01 S02	
405	U092	2,000	T	S01 S02	
406	U093	2,000	T	S01 S02	
407	U094	2,000	T	S01 S02	
408	U095	2,000	T	S01 S02	
409	U096	2,000	T	S01 S02	
410	U097	2,000	T	S01 S02	
411	U098	2,000	T	S01 S02	
412	U099	2,000	T	S01 S02	
413	U100	2,000	T	S01 S02	
414	U101	2,000	T	S01 S02	
415	U102	2,000	T	S01 S02	
416	U103	2,000	T	S01 S02	
417	U104	2,000	T	S01 S02	
418	U105	2,000	T	S01 S02	
419	U106	2,000	T	S01 S02	
420	U107	2,000	T	S01 S02	
421	U108	2,000	T	S01 S02	
422	U109	2,000	T	S01 S02	
423	U110	2,000	T	S01 S02	
424	U111	2,000	T	S01 S02	
425	U112	2,000	T	S01 S02	
426	U113	2,000	T	S01 S02	
427	U114	2,000	T	S01 S02	
428	U115	2,000	T	S01 S02	
429	U116	2,000	T	S01 S02	
430	U117	2,000	T	S01 S02	
431	U118	2,000	T	S01 S02	
432	U119	2,000	T	S01 S02	
433	U120	2,000	T	S01 S02	
434	U121	2,000	T	S01 S02	
435	U122	2,000	T	S01 S02	
436	U123	2,000	T	S01 S02	
437	U124	2,000	T	S01 S02	
438	U125	2,000	T	S01 S02	
439	U126	2,000	T	S01 S02	
440	U127	2,000	T	S01 S02	
441	U128	2,000	T	S01 S02	
442	U129	2,000	T	S01 S02	
443	U130	2,000	T	S01 S02	
444	U131	2,000	T	S01 S02	
445	U132	2,000	T	S01 S02	
446	U133	2,000	T	S01 S02	
447	U134	2,000	T	S01 S02	
448	U135	2,000	T	S01 S02	
449	U136	2,000	T	S01 S02	
450	U137	2,000	T	S01 S02	
451	U138	2,000	T	S01 S02	
452	U139	2,000	T	S01 S02	
453	U140	2,000	T	S01 S02	
454	U141	2,000	T	S01 S02	
455	U142	2,000	T	S01 S02	
456	U143	2,000	T	S01 S02	
457	U144	2,000	T	S01 S02	
458	U145	2,000	T	S01 S02	
459	U146	2,000	T	S01 S02	
460	U147	2,000	T	S01 S02	
461	U148	2,000	T	S01 S02	
462	U149	2,000	T	S01 S02	
463	U150	2,000	T	S01 S02	
464	U151	2,000	T	S01 S02	
465	U152	2,000	T	S01 S02	
466	U153	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
427	U116	2,000	T	S01 S02	
428	U117	2,000	T	S01 S02	
429	U118	2,000	T	S01 S02	
430	U119	2,000	T	S01 S02	
431	U120	2,000	T	S01 S02	
432	U121	2,000	T	S01 S02	
433	U122	2,000	T	S01 S02	
434	U123	2,000	T	S01 S02	
435	U124	2,000	T	S01 S02	
436	U125	2,000	T	S01 S02	
437	U126	2,000	T	S01 S02	
438	U127	2,000	T	S01 S02	
439	U128	2,000	T	S01 S02	
440	U129	2,000	T	S01 S02	
441	U130	2,000	T	S01 S02	
442	U131	2,000	T	S01 S02	
443	U132	2,000	T	S01 S02	
444	U133	2,000	T	S01 S02	
445	U134	2,000	T	S01 S02	
446	U135	2,000	T	S01 S02	
447	U136	2,000	T	S01 S02	
448	U137	2,000	T	S01 S02	
449	U138	2,000	T	S01 S02	
450	U139	2,000	T	S01 S02	
451	U140	2,000	T	S01 S02	
452	U141	2,000	T	S01 S02	
453	U142	2,000	T	S01 S02	
454	U143	2,000	T	S01 S02	
455	U144	2,000	T	S01 S02	
456	U145	2,000	T	S01 S02	
457	U146	2,000	T	S01 S02	
458	U147	2,000	T	S01 S02	
459	U148	2,000	T	S01 S02	
460	U149	2,000	T	S01 S02	
461	U150	2,000	T	S01 S02	
462	U151	2,000	T	S01 S02	
463	U152	2,000	T	S01 S02	
464	U153	2,000	T	S01 S02	
465	U154	2,000	T	S01 S02	
466	U155	2,000	T	S01 S02	
467	U156	2,000	T	S01 S02	
468	U157	2,000	T	S01 S02	
469	U158	2,000	T	S01 S02	
470	U159	2,000	T	S01 S02	
471	U160	2,000	T	S01 S02	
472	U161	2,000	T	S01 S02	
473	U162	2,000	T	S01 S02	
474	U163	2,000	T	S01 S02	
475	U164	2,000	T	S01 S02	
476	U165	2,000	T	S01 S02	
477	U166	2,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
468	U158	2,000	T	S01 S02	
469	U159	20,000	T	S01 S02	
470	U160	2,000	T	S01 S02	
471	U161	20,000	T	S01 S02	
472	U162	2,000	T	S01 S02	
473	U163	2,000	T	S01 S02	
474	U164	2,000	T	S01 S02	
475	U165	20,000	T	S01 S02	
476	U166	2,000	T	S01 S02	
477	U167	2,000	T	S01 S02	
478	U168	2,000	T	S01 S02	
479	U169	2,000	T	S01 S02	
480	U170	2,000	T	S01 S02	
481	U171	2,000	T	S01 S02	
482	U172	2,000	T	S01 S02	
483	U173	2,000	T	S01 S02	
484	U174	2,000	T	S01 S02	
485	U175	2,000	T	S01 S02	
486	U176	2,000	T	S01 S02	
487	U177	2,000	T	S01 S02	
488	U178	2,000	T	S01 S02	
489	U179	2,000	T	S01 S02	
490	U180	2,000	T	S01 S02	
491	U181	2,000	T	S01 S02	
492	U182	2,000	T	S01 S02	
493	U183	2,000	T	S01 S02	
494	U184	2,000	T	S01 S02	
495	U185	2,000	T	S01 S02	
496	U186	2,000	T	S01 S02	
497	U187	2,000	T	S01 S02	
498	U188	2,000	T	S01 S02	
499	U189	2,000	T	S01 S02	
500	U190	2,000	T	S01 S02	
501	U191	2,000	T	S01 S02	
502	U192	2,000	T	S01 S02	
503	U193	2,000	T	S01 S02	
504	U194	2,000	T	S01 S02	
505	U195	2,000	T	S01 S02	
506	U196	2,000	T	S01 S02	
507	U197	2,000	T	S01 S02	
508	U198	2,000	T	S01 S02	
509	U199	2,000	T	S01 S02	
510	U200	2,000	T	S01 S02	
511	U201	2,000	T	S01 S02	
512	U202	2,000	T	S01 S02	
513	U203	2,000	T	S01 S02	
514	U204	2,000	T	S01 S02	
515	U205	2,000	T	S01 S02	
516	U206	2,000	T	S01 S02	
517	U207	2,000	T	S01 S02	
518					

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
509	U203	2,000	T	S01 S02	
510	U204	2,000	T	S01 S02	
511	U205	2,000	T	S01 S02	
512	U206	2,000	T	S01 S02	
513	U207	2,000	T	S01 S02	
514	U208	2,000	T	S01 S02	
515	U209	2,000	T	S01 S02	
516	U210	20,000	T	S01 S02	
517	U211	2,000	T	S01 S02	
518	U213	2,000	T	S01 S02	
519	U214	2,000	T	S01 S02	
520	U215	2,000	T	S01 S02	
521	U216	2,000	T	S01 S02	
522	U217	2,000	T	S01 S02	
523	U218	2,000	T	S01 S02	
524	U219	2,000	T	S01 S02	
525	U220	20,000	T	S01 S02	
526	U221	2,000	T	S01 S02	
527	U222	2,000	T	S01 S02	
528	U223	2,000	T	S01 S02	
529	U225	2,000	T	S01 S02	
530	U226	2,000	T	S01 S02	
531	U227	20,000	T	S01 S02	
532	U228	20,000	T	S01 S02	
533	U234	2,000	T	S01 S02	
534	U235	2,000	T	S01 S02	
535	U236	2,000	T	S01 S02	
536	U237	2,000	T	S01 S02	
537	U238	2,000	T	S01 S02	
538	U239	20,000	T	S01 S02	
539	U240	20,000	T	S01 S02	
540	U243	2,000	T	S01 S02	
541	U244	2,000	T	S01 S02	
542	U246	2,000	T	S01 S02	
543	U247	2,000	T	S01 S02	
544	U248	2,000	T	S01 S02	
545	U249	20,000	T	S01 S02	
546	U271	2,000	T	S01 S02	
547	U278	2,000	T	S01 S02	
548	U279	2,000	T	S01 S02	
549	U280	20,000	T	S01 S02	

Line No.	A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 7.D1))
550	U328	2,000	T	S01 S02	
551	U353	2,000	T	S01 S02	
552	U359	2,000	T	S01 S02	
553	U364	2,000	T	S01 S02	
554	U367	2,000	T	S01 S02	
555	U372	2,000	T	S01 S02	
556	U373	2,000	T	S01 S02	
557	U387	20,000	T	S01 S02	
558	U389	20,000	T	S01 S02	
559	U394	2,000	T	S01 S02	
560	U395	2,000	T	S01 S02	
561	U404	2,000	T	S01 S02	
562	U409	2,000	T	S01 S02	
563	U410	2,000	T	S01 S02	
564	U411	2,000	T	S01 S02	

8. Map

Attach to this application a topographical map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all spring, rivers, and other surface water bodies in this map area. See instructions for precise requirements.

See Appendix A-1 for area and site topographic maps.

9. Facility Drawing

All existing facilities must include a scale drawing of the facility. See instructions for more detail.

See Appendix A-2 for the facility drawings.

10. Photographs

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment, and disposal areas; and sites of future storage, treatment, or disposal areas. See instructions for more detail.

See Appendix A-3 for site photographs.

11. Comments