Rev. _____, Date _____

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Dangerous Waste Permit Application Part A Form

Date Received	Reviewed by:	Date:
Month Day Year	Approved by:	Date:
	Please refer to instructions for completing this form.	

I. This form is submitted to: (place an "X" in the appropriate box)

- ☐ Request modification to a final status permit (commonly called a "Part B" permit)
- ☐ Request a change under interim status
- ☒ Apply for a final status permit. This includes the application for the initial final status permit for a site or for a permit renewal (i.e., a new permit to replace an expiring permit).
- ☐ Establish interim status because of the wastes newly regulated on: (Date)

List waste codes:

II. EPA/State ID Number

W	A	1	1	7	0	0	2	3	4	1	9

III. Name of Facility

Naval Undersea Warfare Center Division Keyport

IV. Facility Location (Physical address not P.O. Box or Route Number)

A. Street

610 Dowell Street, (Attn: Building 1051 - Code 1023)

City or Town	State	ZIP Code
Keyport	WA	98345-7610

County Code (if known)			County Name
0	3	5	Kitsap

B. Land Type	C. Geographic Location Latitude (degrees, mins, secs)	Longitude (degrees, mins, secs)	D. Facility Existence Date Month / Day / Year
F	47 41 49 N	122 37 30	11 / 30 / 1980

V. Facility Mailing Address

Street or P.O. Box

610 Dowell Street, (Attn: Building 1051 - Code 1023)

City or Town	State	ZIP Code
Keyport	WA	98345-7610

Distribution Statement A: Approved for Public Release; Distribution is unlimited. NUWC Keyport #17-053

VI. Facility contact (Person to be contacted regarding waste activities at facility)		
Name (last)	**(first)**	
Hunt	Dale	
Job Title	**Phone Number (area code and number)**	
Dangerous Waste Program Manager	360-396-2320	
Contact Address		
Street or P.O. Box		
610 Dowell Street, (Attn: Building 1051 - Code 1023)		
City or Town	**State**	**ZIP Code**
Keyport	WA	98345-7610

VII. Facility Operator Information		
A. Name	**Phone Number (area code and number)**	
Commanding Officer, Naval Undersea Warfare Center Division Keyport	360-396-5666	
Street or P.O. Box		
610 Dowell Street		
City or Town	**State**	**ZIP Code**
Keyport	WA	98345-7610
B. Operator Type	F	
C. Does the name in VII.A reflect a proposed change in operator?	☐ Yes ☒ No	
If yes, provide the scheduled date for the change:	Month: Day: Year:	
D. Is the name listed in VII.A. also the owner? If yes, skip to Section VIII.C.	☒ Yes ☐ No	

VIII. Facility Owner Information		
A. Name	**Phone Number (area code and number)**	
Commanding Officer, Naval Undersea Warfare Center Division Keyport	360-315-5666	
Street or P.O. Box		
610 Dowell Street		
City or Town	**State**	**ZIP Code**
Keyport	WA	98345-7610
B. Operator Type	F	
C. Does the name in VII.A reflect a proposed change in operator?	☐ Yes ☒ No	
If yes, provide the scheduled date for the change:	Month: Day: Year:	

IX. NAICS Codes (5/6 digit codes)	
A. First	**B. Second**
9 2 8 1 1 0	
C. Third	**D. Fourth**

X. Other Environmental Permits (see instructions)														
A. Permit Type			B. Permit Number											C. Description
	E		S	T	7	3	5	3						State Wastewater Discharge Permit
	E		1	4	0	7	9							PSCAA Registered Facility – Synthetic Minor (GRO 8258)
	N		W	A	R	0	5	F	0	0	3			EPA Multi-Sector General Permit for Industrial Activities
	N		W	A	S	0	2	9	6	6	4	2		EPA Municipal Separate Storm Sewer System (MS4) Permit

XI. Nature of Business (provide a brief description that includes both dangerous waste and non-dangerous waste areas and activities)

The Facility, as defined in accordance to WAC 173-303-040, is the Permitted Part B Facility, Building 1051, also known as the Treatment, Storage, and Disposal Facility (TSD Facility), including the contiguous property within the attached fence-line to the building structure.

NUWC Division, Keyport is a tenant command on the Naval Base Kitsap Keyport (NBK Keyport) Installation. The Part B Permitted Facility is operated by the tenant command and the EPA/State ID number that is assigned to NUWC Division, Keyport is used for all commands and contractors located on the NBK Keyport Installation, including the TSD Facility.

NUWC Division, Keyport performs testing, evaluation, and refurbishing of underwater systems and components. Dangerous waste generation occurs at designated shops and laboratories throughout the installation where wastes are accumulated in Central Accumulation Areas (CAAs) and then transferred to the TSD Facility. Other dangerous wastes, generated on the NBK Keyport Installation and other Regional Navy Installations are received for storage and treatment at the TSD Facility.

Dangerous and non-dangerous waste activities performed at the TSD Facility may include but not limited to: container storage, lab packing, tank storage, separation, filtration, disinfection, dewatering, drum de-heading, consolidation/volume reduction, drum shredding, triple rinsing, and drying.

EXAMPLE FOR COMPLETING ITEMS XII and XIII (shown in lines numbered X-1, X-2, and X-3 below): A facility has two storage tanks that hold 1200 gallons and 400 gallons respectively. There is also treatment in tanks at 20 gallons/hr. Finally, a one-quarter acre area that is two meters deep will undergo *in situ vitrification.*

Section XII. Process Codes and Design Capacities								Section XIII. Other Process Codes								
Line Number		A. Process Codes (enter code)			B. Process Design Capacity		C. Process Total Number of Units	Line Numbe r		A. Process Codes (enter code)			B. Process Design Capacity		C. Process Total Number of Units	D. Process Description
					1. Amount	2. Unit of Measure (enter code)							1. Amount	2. Unit of Measure (enter code)		
X	**1**	**S**	**0**	**2**	**1,600**	**G**	**002**	**X**	**1**	**T**	**0**	**4**	**700**	**C**	**001**	**In situ vitrification**
X	**2**	**T**	**0**	**3**	**20**	**E**	**001**									
X	**3**	**T**	**0**	**4**	**700**	**C**	**001**									
	1	S	0	1	85,180	G	18		**1**							
	2	S	0	2	45,000	G	9		**2**							
	3	T	0	1	1,000	U	2		**3**							
	4								**4**							
	5								**5**							
	6								**6**							
	7								**7**							
	8							**1**	**8**							
	9							**1**	**9**							
1	**0**							**1**	**0**							
1	**1**							**1**	**1**							
1	**2**							**1**	**2**							
1	**3**							**1**	**3**							
1	**4**							**1**	**4**							
1	**5**							**1**	**5**							
1	**6**							**1**	**6**							
1	**7**							**1**	**7**							
1	**8**							**1**	**8**							
1	**9**							**1**	**9**							
2	**0**							**2**	**0**							
2	**1**							**2**	**1**							
2	**2**							**2**	**2**							
2	**3**							**2**	**3**							
2	**4**							**2**	**4**							
2	**5**							**2**	**5**							

XIV. Description of Dangerous Wastes

Example for completing this section: A facility will receive three non-listed wastes, then store and treat them on-site. Two wastes are corrosive only, with the facility receiving and storing the wastes in containers. There will be about 200 pounds per year of each of these two wastes, which will be neutralized in a tank. The other waste is corrosive and ignitable and will be neutralized then blended into hazardous waste fuel. There will be about 100 pounds per year of that waste, which will be received in bulk and put into tanks.

Line Number			A. Dangerous Waste No. (enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Processes									
									(1) Process Codes (enter)									(2) Process Description [If a code is not entered in D (1)]
X	**1**		**D**	**0**	**0**	**2**	**400**	**P**	**S**	**0**	**1**	**T**	**0**	**1**				
X	**2**		**D**	**0**	**0**	**1**	**100**	**P**	**S**	**0**	**2**	**T**	**0**	**1**				
X	**3**		**D**	**0**	**0**	**2**												**Included with above**
		1	D	0	0	1	750,000	P	S	0	1	S	0	2	T	0	1	
		2	D	0	0	2												Included with above
		3	D	0	0	3												Included with above
		4	D	0	0	4												Included with above
		5	D	0	0	5												Included with above
		6	D	0	0	6												Included with above
		7	D	0	0	7												and so on
		8	D	0	0	8												
		9	D	0	0	9												
	1	**0**	D	0	1	0												
	1	**1**	D	0	1	1												
	1	**2**	D	0	1	2												
	1	**3**	D	0	1	3												
	1	**4**	D	0	1	4												
	1	**5**	D	0	1	5												
	1	**6**	D	0	1	6												
	1	**7**	D	0	1	7												
	1	**8**	D	0	1	8												
	1	**9**	D	0	1	9												
	2	**0**	D	0	2	0												
	2	**1**	D	0	2	1												
	2	**2**	D	0	2	2												
	2	**3**	D	0	2	3												
	2	**4**	D	0	2	4												
	2	**5**	D	0	2	5												
	2	**6**	D	0	2	6												
	2	**7**	D	0	2	7												
	2	**8**	D	0	2	8												
	2	**9**	D	0	2	9												
	3	**0**	D	0	3	0												
	3	**1**	D	0	3	1												
	3	**2**	D	0	3	2												
	3	**3**	D	0	3	3												
	3	**4**	D	0	3	4												
	3	**5**	D	0	3	5												
	3	**6**	D	0	3	6												
	3	**7**	D	0	3	7												
	3	**8**	D	0	3	8												
	3	**9**	D	0	3	9												
	4	**0**	D	0	4	0												
	4	**1**	D	0	4	1												

	4	**2**	D	0	4	2												Included with above
	4	**3**	D	0	4	3												Included with above
	4	**4**	F	0	0	1												Included with above
	4	**5**	F	0	0	2												and so on
	4	**6**	F	0	0	3												
	4	**7**	F	0	0	4												
	4	**8**	F	0	0	5												
	4	**9**	F	0	0	6												
	5	**0**	F	0	0	8												
	5	**1**	F	0	0	9												
	5	**2**	P	0	1	0												
	5	**3**	P	0	1	2												
	5	**4**	P	0	1	5												
	5	**5**	P	0	1	8												
	5	**6**	P	0	2	9												
	5	**7**	P	0	9	8												
	5	**8**	P	1	0	6												
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	9	**5**	U	0	8	3												
	9	**6**	U	0	8	4												
	9	**7**	U	0	9	6												

	9	**8**	U	1	0	2												Included with above
	9	**9**	U	1	0	7												Included with above
1	**0**	**0**	U	1	0	8												Included with above
1	**0**	**1**	U	1	1	2												and so on
1	**0**	**2**	U	1	1	5												
1	**0**	**3**	U	1	1	6												
1	**0**	**4**	U	1	1	7												
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1	**0**	**6**	U	1	2	2												
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1	**2**	**1**	U	1	6	9												
1	**2**	**2**	U	1	8	8												
1	**2**	**3**	U	1	9	0												
1	**2**	**4**	U	1	9	6												
1	**2**	**5**	U	2	0	1												
1	**2**	**6**	U	2	0	2												
1	**2**	**7**	U	2	0	8												
1	**2**	**8**	U	2	0	9												
1	**2**	**9**	U	2	1	0												
1	**3**	**0**	U	2	1	1												
1	**3**	**1**	U	2	1	3												
1	**3**	**2**	U	2	1	7												
1	**3**	**3**	U	2	1	9												
1	**3**	**4**	U	2	2	0												
1	**3**	**5**	U	2	2	3												
1	**3**	**6**	U	2	2	5												
1	**3**	**7**	U	2	2	6												
1	**3**	**8**	U	2	2	7												
1	**3**	**9**	U	2	2	8												
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1	**4**	**1**	U	3	5	9												
1	**4**	**2**	W	P	C	B												
1	**4**	**3**	W	P	0	1												
1	**4**	**4**	W	P	0	2												
1	**4**	**5**	W	S	C	2												
1	**4**	**6**	W	T	0	1												
1	**4**	**7**	W	T	0	2												

XV. Map

Attach to this application a topographic map of the area extending to at least one (1) mile beyond property boundaries. The map must show the outline of the facility; the location of each of its existing and proposed intake and discharge structures; each of its dangerous waste treatment, storage, recycling, or disposal units; and each well where fluids are injected underground. Include all springs, rivers, and other surface water bodies in this map area, plus drinking water wells listed in public records or otherwise known to the applicant within ¼ mile of the facility property boundary. The instructions provide additional information on meeting these requirements.

See Attachment A.

XVI. Facility Drawing

All existing facilities must include a scale drawing of the facility (refer to Instructions for more detail).

See Attachment B.

XVII. Photographs

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

Photo 1: North Loading Area, December 2017

Photo 2: NW Corner, December 2017

Photo 3: SW Corner, December 2017

Photo 4: South Loading Area, December 2017

Photo 5: SE Corner, December 2017

Photo 6: SE Storage Area, December 2017

Photo 7: East Storage Area, December 2017

Photo 8: Drum Shredder, December 2017

Photo 9: NE Corner, December 2017

Photo 10: Truck Load/Unload Hose Station, December 2017

Photo 11: Lab (Rm 116), December 2017

Photo 12: Weight Scale (Rm 123), December 2017

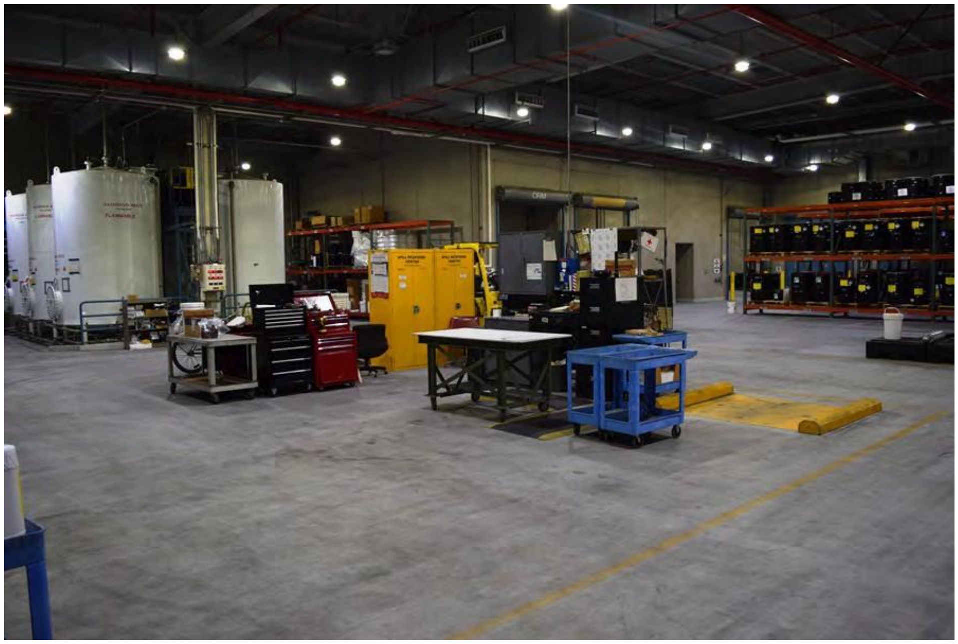

Photo 13: Receiving Area (Rm 123), December 2017

Photo 14: Tank Storage Area (Rm 124), December 2017

Photo 15: Universal Waste Storage (Rm 126), December 2017

Photo 16: Drum Washing/Paint Consolidation (Rm 128), December 2017

Photo 17: Oxidizer Storage (Rm 129), December 2017

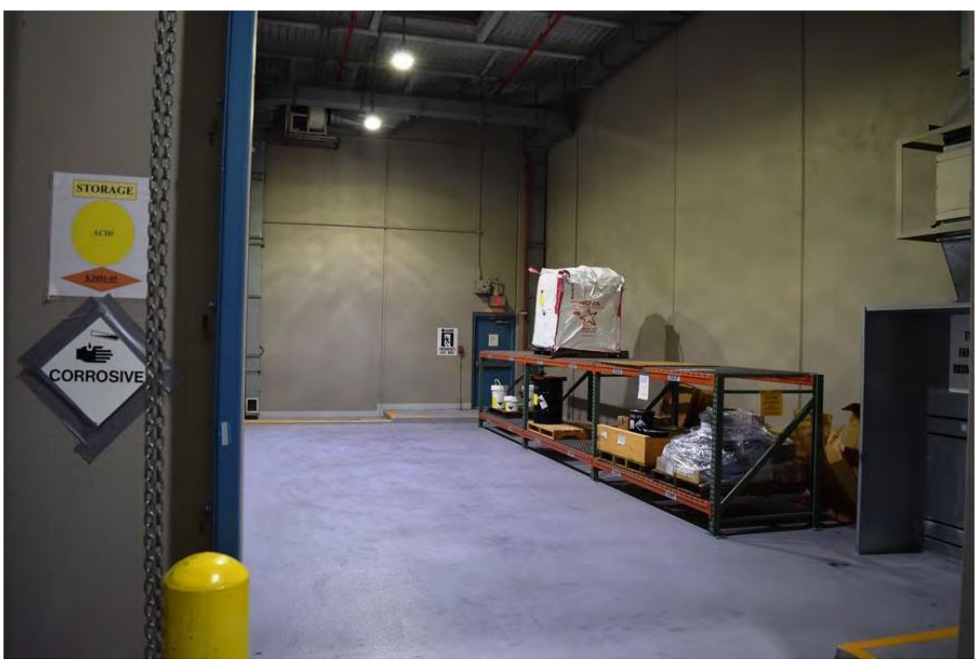

Photo 18: Acid Storage (Rm 130), December 2017

Photo 19: Reactive When Wet (Rm 131), December 2017

Photo 20: Poisons Storage (Rm 132), December 2017

Photo 21: ORG PER Storage (Rm 133), December 2017

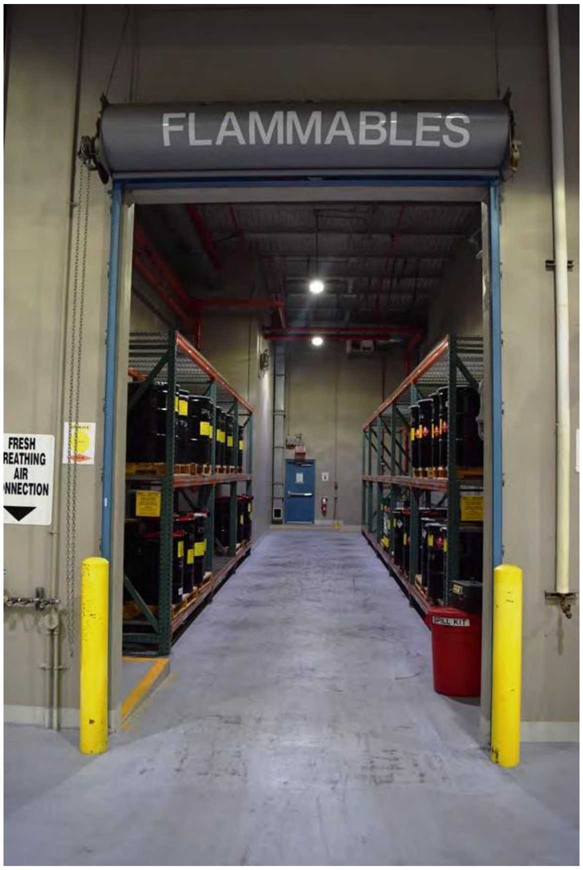

Photo 22: Flammables Storage (Rm 134), December 2017

Photo 23: Flammables Class 1A (Rm 136), December 2017

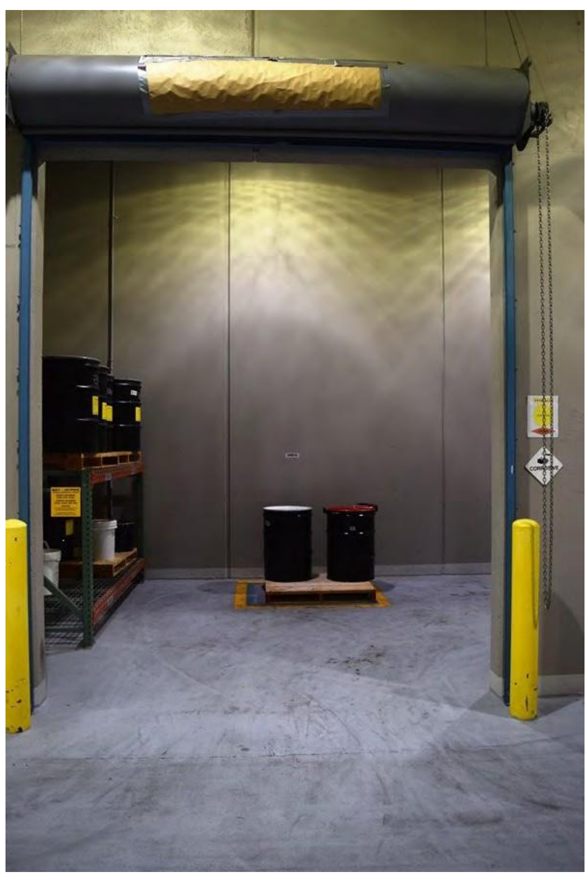

Photo 24: Alkaline Room (Rm 138), December 2017

Photo 25: Used Oil Storage (Rm 139), December 2017

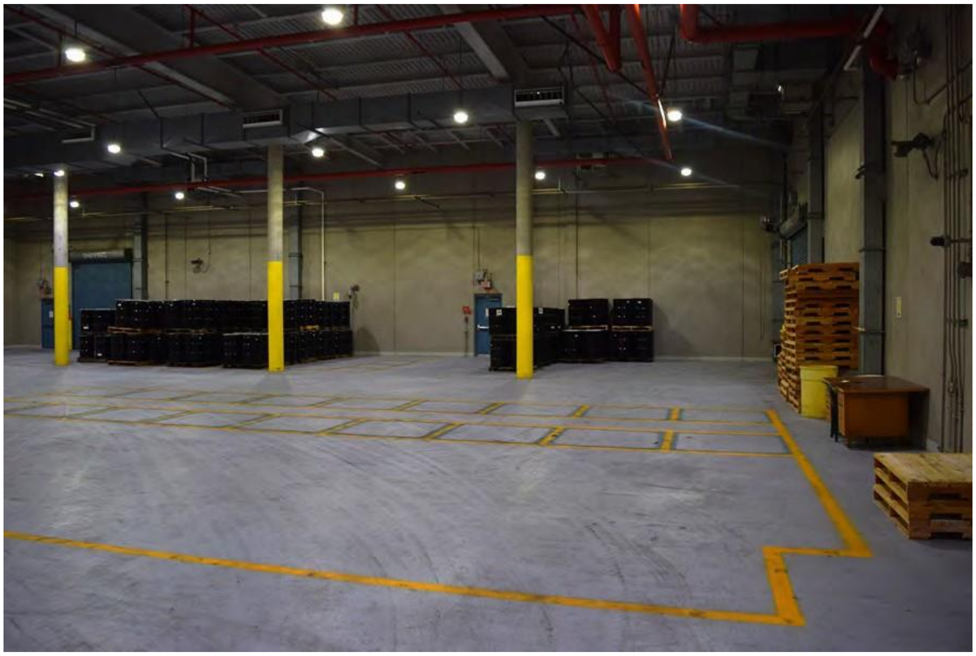

Photo 26: Shipping Area (Rm 140), December 2017

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XVIII. Certifications		
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.		
Operator Name and Official Title (type or print) Captain C. P. Hoskins Commanding Officer, Naval Undersea Warfare Center Division, Keyport	**Signature** HOSKINS.CLINTON.PATRICK.1153788401 2024.04.18 12:20:56 -07'00'	**Date Signed** 4/18/24
Facility/Property Owner Name and Official Title (type or print) Captain C. P. Hoskins Commanding Officer, Naval Undersea Warfare Center Division, Keyport	**Signature** HOSKINS.CLINTON.PATRICK.1153788401 2024.04.18 12:21:34 -07'00'	**Date Signed** 4/18/24

XIX. Comments

PART A

ATTACHMENT A

- **Section XV. Map**

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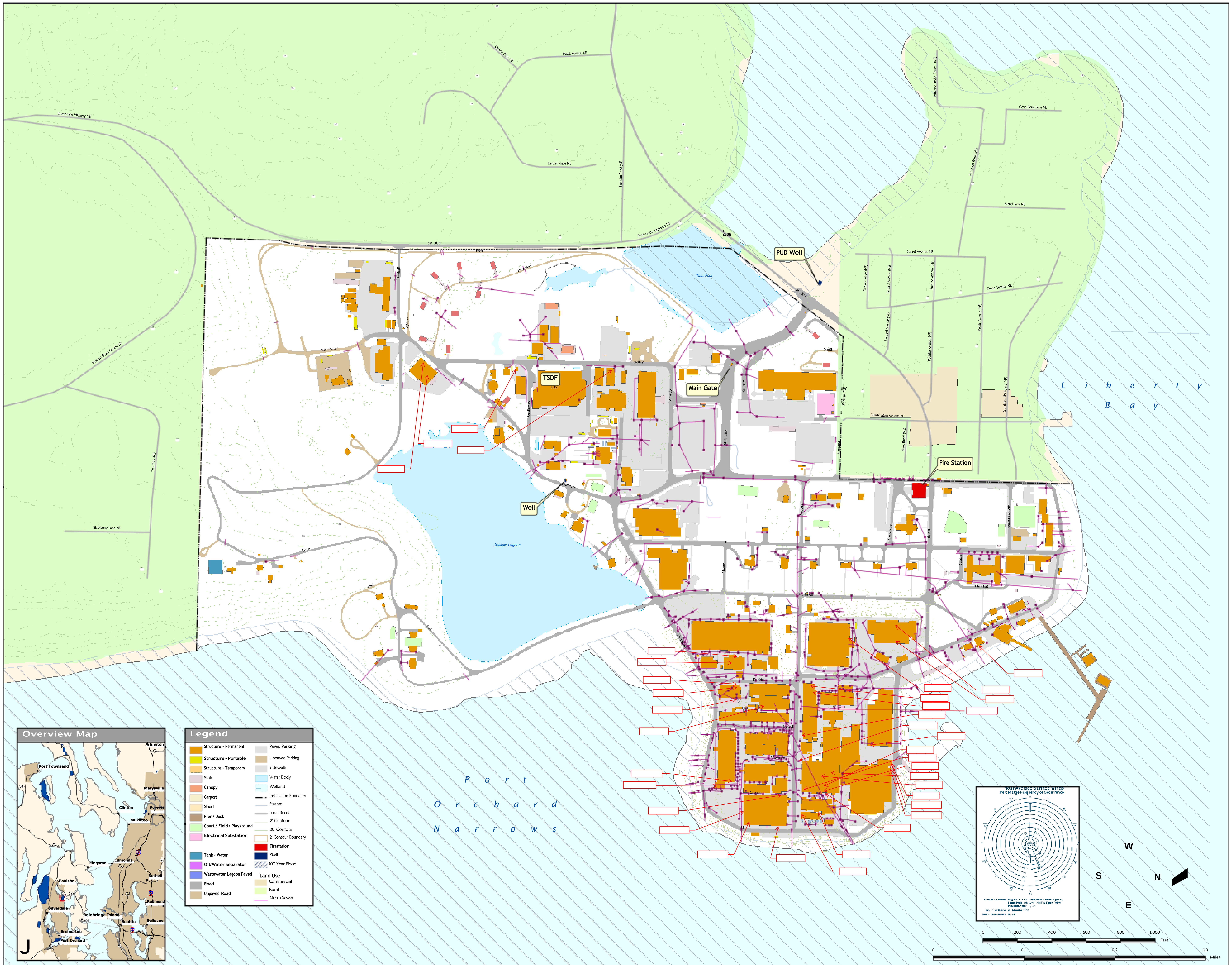

Submit questions, requests, or updates to the RSIMS Center of Excellence:
(360) 396-6047
http://www.rsims.navy.mil

SCALE
1 in = 200 ft

SIZE
37 in x 32 in

IF SHEET IS LESS THAN 37" X 32" IT IS A REDUCED PRINT AND THE SCALE IS REDUCED ACCORDINGLY

DEPARTMENT OF THE NAVY

NAVY REGION NORTHWEST

TITLE

NBK KEYPORT INSTALLATION TOPOGRAPHIC MAP

RSIMS DOCUMENT NUMBER
09 - KP - xxxxx

PRINT DATE
15 FEB 2017

PROJECTION
STATE PLANE, WA NORTH ZONE, DATUM NAD 83, FEET

Naval Undersea Warfare Center Division, Keyport

PART A

ATTACHMENT B

- **Section XVI. Facility Drawing**

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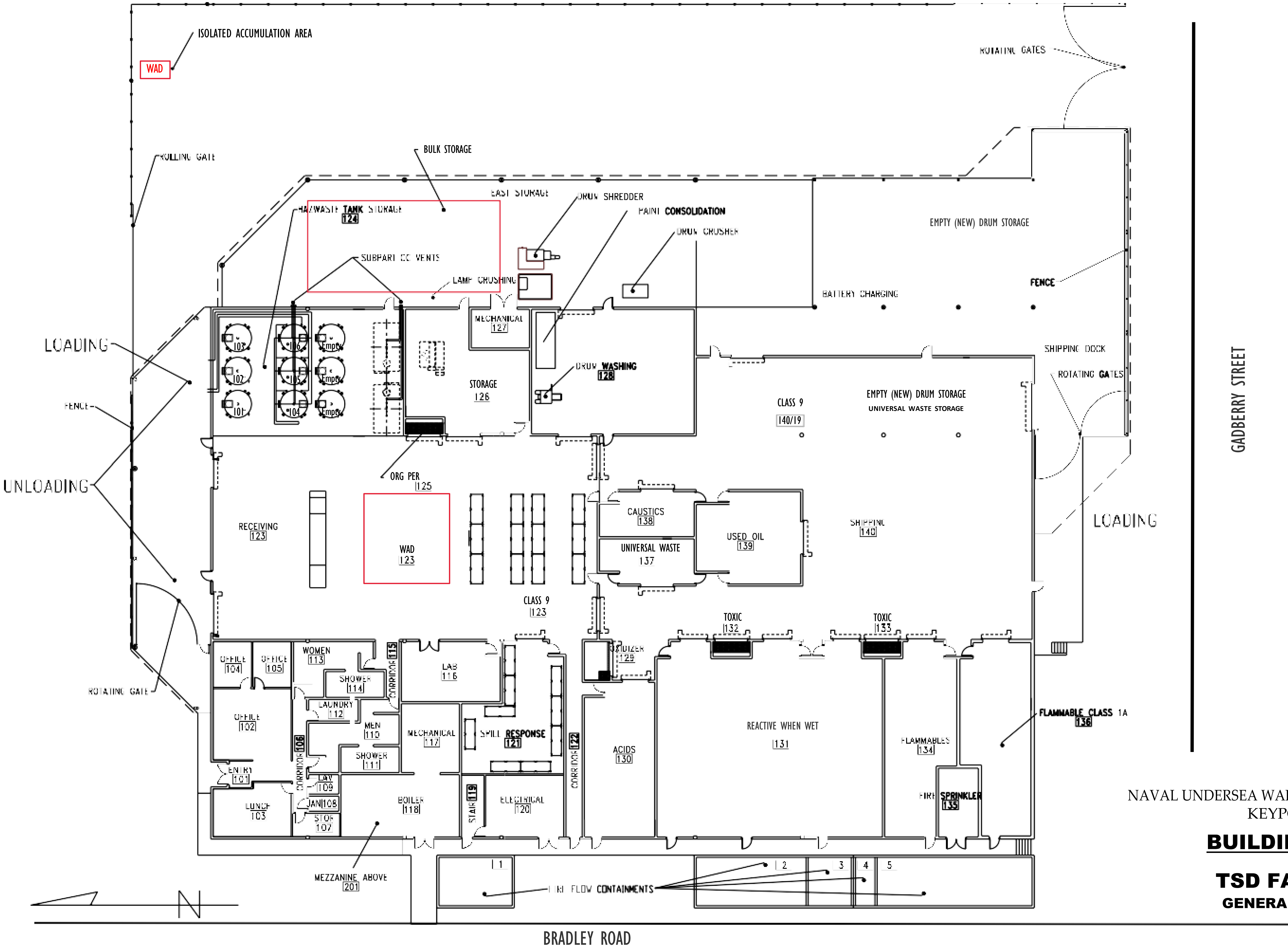

NAVAL UNDERSEA WARFARE CENTER DIVISION
KEYPORT, WA

BUILDING 1051

TSD FACILITY

GENERAL LAYOUT

SECTION B

FACILITY DESCRIPTION AND GENERAL PROVISIONS

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TABLE OF CONTENTS

Section **Page**

LIST OF TABLES

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APPENDICES

Appendix

B. FACILITY DESCRIPTION AND GENERAL PROVISIONS

WAC 173-303-806(4)(a)(i), (xi), (xviii)

B1. GENERAL FACILITY DESCRIPTION

WAC 173-303-690; -691; -692

B1.1 FACILITY OPERATIONS

B1.1.1 FACILITY LOCATION

Naval Undersea Warfare Center (NUWC) Division, Keyport is a tenant command on the Naval Base Kitsap Keyport (NBK Keyport) Installation. NBK Keyport will herein be referred to as the installation. NUWC Division Keyport manages all waste generated on the installation, owns the EPA/State ID number for the site, and owns and operates the Part B Permitted Facility. The installation occupies 343 acres, including tidelands, on a small peninsula near the town of Keyport, Washington. It is bordered by Liberty Bay on the east and north and by Port Orchard Reach on the southeast. Dogfish Bay, an extension of Liberty Bay, and the tide flats lie just to the west. Nearby communities include the town of Keyport, which is immediately adjacent to the installation; Poulsbo, which is about two miles north across Liberty Bay; and Silverdale, which is about six miles southwest. Most land use in the vicinity is low-density residential, commercial and light industrial.

The TSD Facility is located on the corner of Gadberry Street and Bradley Road. Gadberry Street borders it on the south, Bradley Road on the west, Buildings 951 and 820 to the north, and a large parking area to the east. The building is situated 50 feet from the centerline of Gadberry Street and Bradley Road.

<u>Mailing Address</u>:
Naval Undersea Warfare Center (NUWC) Division, Keyport
Code 1023 (Building 1051)
610 Dowell Street
Keyport, WA 98345-7610

B1.1.2 OWNERSHIP AND MANAGEMENT

Commanding Officer
Naval Undersea Warfare Center (NUWC) Division, Keyport

Environmental Director, NUWC Division, Keyport

Dangerous Waste Program Manager, NUWC Division, Keyport

B1.1.3 DANGEROUS WASTE CATEGORIES MANAGED

Table B1-1 lists the dangerous waste categories and processes managed at the installation.

Table B1-1. Waste stream Categories and Waste Process

Waste stream Category	Waste Process
Acids	S01,
Caustics	S01
Oil/Oily Process Waste	S01, S02, T01
Flammables and Combustibles	S01, S02, T01
Reactive when Wet	S01
Solids and Sludges	S01
Reactives and Oxidizers	S01
Fuel Wastes	S01, S02
Industrial Wastewaters	S01, S02
PCB Wastes	S01
Toxic/Carcinogenic Wastes (Not Otherwise Classified)	S01
Contaminated Debris	S01
Universal Wastes	S01

B1.1.4 PRODUCTION PROCESSES

Production processes that contribute to the dangerous waste streams at the installation include:

1. Machining
2. Painting
3. Plating
4. Assembly and Disassembly
5. Fueling and Defueling
6. Cleaning and Metal Preparation
7. Wastewater Treatment
8. Process Support

These processes are described in Section B1.2.1.

B1.1.5 OPERATIONS TO TREAT AND/OR STORE DANGEROUS WASTES

Central Accumulation Areas (CAAs) and Satellite Accumulation Areas (SAAs) are located throughout the installation. Locations of all CAAs are shown on the Topographic map located in Part A Form, Attachment A, and identified in appendix B-3.

The Industrial Waste Treatment Plant (IWTP) located on the installation is regulated by the WA Department of Ecology State Wastewater Discharge Permit #7353 and qualifies as a

Wastewater Treatment Unit (WWTU) in accordance to the Permit By Rule (PBR) provisions. PBR and Treatment By Generator (TBG) are further described in Section B1.2.5 and B1.3

Waste operations at the TSD Facility include:

A. Dangerous Waste Operations

   1. Container storage
   2. Tank storage
   3. Loose packing

Consolidation

B. Other Activities
   1. Drum de-header
   2. Consolidation/Volume Reduction/Compaction
   3. Oily wastewater separation
   4. Dewatering
   5. Aerosol can puncture
   6. Drum Shredding
   7. Triple Rinsing
   8. Disinfection
   9. Filtration
   10. Drying
   11. Separation

B1.1.6 WASTE MANAGEMENT PROCESSES THAT GENERATE WASTES

All waste generated at the installation and the TSD Facility is managed in accordance with NUWC Division Keyport Directives. These Directives are available to all employees on the installation intranet. Waste tracking is accomplished using a server-based computer database accessible to all dangerous waste management personnel. A detailed description of this waste tracking system is provided in Section C (Waste Analyses).

B1.1.7 HISTORY AND LOCATION OF UNITS REGULATED UNDER THE DANGEROUS WASTE REGULATIONS

The Installation has Sixty Solid Waste Management Units (SWMUs) and nine Areas of Concern (AOCs) that were identified in the NUWES, Keyport RCRA Facility Assessment draft report on 29 January 1992. The location of these SWMUs and AOCs are shown on an installation-wide map in appendix E1, and on individual building drawings in appendix E2. The current status of all SWMUs and AOCs are addressed in Section E (Releases from Solid Waste Management Units).

B1.2 DANGEROUS WASTE MANAGEMENT OPERATIONS AND PROCESSES

B1.2.1 HOW AND WHERE DANGEROUS WASTE IS GENERATED AT THE FACILITY

The TSD Facility generates very little dangerous waste, mostly from the consolidation process. However, dangerous waste generation occurs at designated shops and laboratories throughout the installation. Wastes are accumulated in marked compatible containers while located in the accumulation sites. These satellite wastes may be further accumulated in CAAs or they may be transferred directly to the TSD Facility. Wastes held in CAAs are transferred to the TSD Facility within 90 days from the accumulation start date.

B1.2.1.1 Dangerous Waste Generation Sites on Installation

The following is a general description of the processes that constitute the majority of the dangerous wastes generated at the installation:

1). MACHINING

A wide range of materials are machined for use in systems and subsystems, as well as support and maintenance equipment. A laser cladding operation and several large multi-axis machining centers, as well as grinding equipment are located in building 233. Metal forming and welding processes are located in building 38. Machining operations such as milling, drilling and turning are located in building 84. Welding operations also take place in building 824.

2). PAINTING

The majority of painting, of almost every type, is performed (e.g., epoxy, powder, enamel, latex) in building 84. This category includes the painting of components and various subsystem components that are refurbished or manufactured, as well as the painting of base equipment and facilities. Spray cans are used in various buildings for small jobs such as stenciling or touch up.

3. PLATING

System components are plated in building 1058 to resist corrosion or to improve properties. Keyport has type I, type II, and type III anodize capabilities for aluminum, and performs general and precious metal electroplating (including cadmium, nickel, gold, silver, and others) and a variety of cleaning, stripping, and surface finish operations. An anodize touch-up process known as Alodine treatment takes place in buildings 81a, 84, 98, 489, 514 and 1058.

4. ASSEMBLY AND DISASSEMBLY

Various system components are disassembled and reassembled during repair and/or testing in buildings 81, 82, 98, 489, 514, 894, and 1050. These operations comprise a wide range of assembly-type functions including electronic potting, mechanical and circuit board assembly, small part casting and plastics processing.

5. FUELING AND DEFUELING

Otto Fuel II, a monopropellant, requires unique handling, storage, and waste procedures. System components using Otto Fuel II must be defueled and the unused fuel is processed for re-use. These processes take place in building 514 and 1049.

6. CLEANING AND METAL PREPARATION

Cleaning operations are performed prior to assembly, painting, or plating. Nearly every type of commercially available cleaning system is employed, including sandblasting, plastic media blasting, acid baths, caustic baths, chemical solvents of all types, steam cleaning, and pressurized water cleaning. These processes take place in buildings 84 and 1058. There is also a blasting booth in building 84 that uses sodium bicarbonate instead of plastic or glass media. Alcohol and spray cans of electrical cleaner are used in various buildings for spot cleaning of solder flux or electrical connectors.

7. WASTEWATER TREATMENT

Liquid wastes that are treatable are piped or trucked to building 825, the Industrial Waste Treatment Plant (IWTP), where they are treated and discharged into the municipal sewer under Washington State Waste Water Discharge Permit #7353. The industrial operations on the installation produce heavy metal containing wastewaters. The treatment process produces an effluent that meets regulatory discharge limitations with a reduction in the sludge volume and chemical usage. The precipitated heavy metal sludge that are by-products of the process are dewatered and are deposed as a dangerous waste through the TSD Facility. Types of treatment processes at the IWTP are: metal precipitation, neutralization, clarification, flocculation, filtration, and dewatering.

8. PROCESS SUPPORT

This category covers areas which are not directly tied to a major function, but which exist by offering services to other processes as required. Examples of this support are the chemistry laboratory, the failure analysis laboratory, etc.

Table B1-2 Waste Processes by Building Number

Building Number	Processes
38	Machining and Welding
81	Alodine Treatment, Assembly and Disassembly
82	Assembly and Disassembly, Process Support
84	Machining, Alodine Treatment, Painting, Cleaning and Metal Preparation
98	Alodine Treatment, Assembly and Disassembly
206	Process Support (Laboratory)
233	Machining
489	Alodine Treatment, Assembly and Disassembly
514	Alodine Treatment, Assembly and Disassembly, Fueling and Defueling
824	Welding
825	Wastewater Treatment
894	Assembly and Disassembly
1049	Fueling and Defueling
1050	Assembly and Disassembly
1058	Plating, Cleaning and Metal Preparation

B1.2.2 HOW AND WHERE DANGEROUS WASTE GENERATED OFF-SITE ENTERS THE FACILITY

Trucks transporting dangerous wastes from locations other than the installation enter at the Main Gate located off State Route 308, from which they are directed to building 1051, the TSD Facility. The Dangerous Waste Program Manager will confirm that the waste received matches the identity of the waste on the accompanying manifest. The manifest and the load on the truck are inspected to verify:

1. The correct number of containers of each type of waste or the correct volume if transported in bulk.
2. The information on the manifest is correct.
3. The containers are not leaking, are properly labeled, and are in approved storage containers.
4. The waste listed on the manifest is also checked to ensure that there is an approved profile on file for the generator.

The Dangerous Waste Program Manager or Designator signs the manifest and the truck is then directed to unload at the TSD Facility. The waste is then entered into the tracking system as set forth in Section C (Waste Analyses) and stored onsite as set forth in Section D (Process Information). Additionally, the TSD Facility submits an electronic manifest (e-manifest) in accordance to the Hazardous Waste Electronic Manifest Establishment Act.

Sampling of containers for waste verification is conducted at the TSD Facility following waste acceptance pursuant to the procedures identified in Section C (Waste Analyses).

Discrepancies are managed according to the procedures identified in Section C (Waste Analyses).

Currently, the TSD Facility is only accepting waste from other Navy government facilities.

B1.2.3 HOW WASTE IS TRACKED

Internal waste transfers from NUWC Division, Keyport waste accumulation stations are transferred to the TSD Facility by use of a Waste Disposal Request Form. The labels on the waste material are checked against the information provided on the Waste Disposal Request Form by the TSD Facility personnel. Refer to appendix C2, Example Waste Management Forms, for an example form. The Waste Disposal Request Form follows the waste to the TSD Facility, where the information is logged into the computer tracking system.

A more detailed description of the computer-based tracking system is provided in Section C (Waste Analyses).

B1.2.4 WHERE THE WASTE IS TREATED AND/OR STORED

The TSD Facility, Building 1051, is a 44,000 square foot one-story enclosed structure with approximately 18,000 square feet of attached exterior covered area. A diagram of the TSD Facility floor plan is shown in attachment B to the Part A form. Treatment, Storage and Disposal Facility Drawings. The enclosed structure consists of three basic functional areas: (1) the warehouse which consists of the tank area, container handling and storage areas, and waste process/treatment areas; (2) personnel areas comprised of office spaces, laboratory, lunch room, and toilet/shower facilities; and (3) mechanical/storage areas comprised of a mezzanine level for heating, ventilation and air conditioning equipment, boiler rooms, electrical room, fire protection, and spill response storage. The exterior covered area consists of the truck loading/unloading dock, empty (new) drum storage, drum shredder, asbestos storage bin, battery charging station, and the soil dewatering areas.

The receiving area, room 123, is located in the center of the north end of the TSD Facility adjacent to the truck loading/unloading bay. The area includes scales; Dangerous Waste accumulation, drums for consolidating incoming partially filled drums, and a drum compactor. The area also includes several three-shelf pallet storage racks. Waste Awaiting Designation (WAD) is stored between the receiving area and the Class 9 (ORM) area in individual secondary containments until the waste has been designated and can be assigned to a compatible storage area.

The staging/shipping area, room 140, is located at the south end of the TSD Facility. This area is for organizing, inspecting, and preparing shipments of containers. The shipping area provides direct access to the covered shipping dock and truck loading facility. The area has secondary containment and fire flow containment which is shared with the tank and treatment areas.

The tank area, room 124, is located in the northeast corner of the TSD Facility and is adjacent to the truck load/unload area. The tank area houses a total of nine 5,000-gallon steel tanks for a total storage capacity of 45,000 gallons. Six vertical tanks are currently in use and described in detail in Section D (Process Information). The remaining three vertical tanks may eventually be brought on-line depending on usage and monetary constraints. All tanks are coated with chemical resistant epoxy. Air emission control is provided as discussed in Section D (Process Information). The tank area has 7,000 gallons of secondary containment in addition to fire flow containment.

The treatment process of separating two-phase systems from their natural and equilibrium states is performed in tanks 104/105 and tanks 101/102. This decanting process allows us to separate out the water layer from the rest of the waste stream in order to reduce the waste stream volume.

The enclosed container storage area has capacity for a total of 67,925 gallons of storage, and each area is separated by a minimum of 4-hour firewalls between the storage compartments. The storage compartments were determined based upon segregation of wastes according to Military/Handbook 1005/13 and 49 CFR 173. A new outside bulk storage area under the roofline within the East Storage location has been configured to store hazardous construction debris in roll-offs on a case by case basis as well as portable containers with secondary containment. We also established an isolated accumulation area for contingency purposes. This new area will increase the overall storage by less than 25% to 85,180 gallons. The total storage capacity for this new area will be 17,255 gallons.

Other major equipment items are located in room 126, which houses the chromic acid wastewater pretreatment unit and room 128, which houses the drum washer, drum de-header, and paint consolidation units. Several dumpsters are located outside, under the canopy on the east side of the TSD Facility. The drum treatment equipment in room 128 and the dumpsters are used exclusively for non-contaminated drums and metals. The dumpster contents are shipped to a recycler.

Batteries are stored in room 130 (acids), room 131 (reactive when wet), and room 138 (caustics). They are shipped out as universal waste. Due to the limited space in room 138, silver-zinc batteries may also be stored in room 140 (shipping).

Fluorescent tubes received from onsite dangerous waste accumulation sites and from offsite are stored in room 137 (Universal Waste). Tubes are stored in their original shipping containers or equivalent to protect them from breakage and are shipped off as universal waste.

The mechanical areas are located in room 117, on the west side of the building, and room 127 on the east side of the building. The TSD Facility is heated with boilers and a hydronic heating water system. Two boilers for this system are located in the boiler room, room 118, which has outside access through double doors to facilitate service and maintenance. The boiler room opens directly into the mechanical room which houses additional equipment for the heating system such as pumps, tanks, and fuel tanks. A breathing air compressor is also located in the mechanical room. Other mechanical rooms include an electrical controls room, fire protection room containing sprinkler system risers, and a 3,300 square foot mechanical mezzanine housing the heating, ventilation, and air conditioning equipment.

Room 121, the spill response storage room, is accessed off the receiving area. This storage room is approximately 1,000 square feet and is equipped with shelving and lockers for supplies and equipment for the TSD Facility and the spill responders.

B1.2.5 EQUIPMENT AND STRUCTURES USED TO TREAT AND/OR STORE DIFFERENT CATEGORIES OF DANGEROUS WASTES

The waste stream categories listed in the Part A are either stored in containers (S01), stored in tanks (S02), or treated (T01). Table B1-1 lists the waste stream categories and the waste processes of each category.

The dangerous waste process activities subject to the dangerous waste permit at the TSD Facility include:

1. Container Storage
2. Tank Storage
3. Loose Packing
4. Consolidation/Volume Reduction/Compaction
5. Separation

Containers are processed at the main receiving dock at the north end of the TSD Facility. The containers are then moved to the covered receiving area where they are inspected and sampled as set forth in Section C (Waste Analyses). Containers are logged in and placed in storage within two working days. The receiving area is capable of holding a maximum of 144 drums at one time. Drums are palletized and stored on pallet racks within the various storage compartments. The storage capacity for containerized dangerous waste inside the facility is 67,925 gallons. Containers are stored in segregated and enclosed storage areas in the TSD Facility. Each storage area has spill containment, fire flow containment, ventilation, and fire rated construction.

In the receiving area, compatible wastes may be consolidated into loose packs that contain a variety of wastes including discarded laboratory chemicals, adhesives, and paints. Items for loose packing are received at the TSD Facility in drums and bags, and metal, glass, plastic and carton containers. Loose packs are packaged according to the requirements of the Department of Transportation (DOT) in 49 CFR 173.2 and WAC 173-303-161. Items are identified to assess the hazardous characteristics and to determine proper disposal arrangements and manifesting requirements. Only trained Keyport Waste Handlers construct the loose packs.

There are nine 5,000-gallon vertical waste storage tanks in room 124. These tanks are each supported on steel legs, coated with chemical resistant epoxy and equipped with level sensors and alarms. Only six of the tanks are certified for storage of dangerous wastes at this time. Bulk dangerous waste is transported to the TSD Facility from the site of waste generation on base by tank truck. Occasionally, bulk waste will be transported in portable containers. There are two hose stations for the transfer of bulk waste into and out of tanks; the truck-load hose station and truck unload hose station. The truck arrives at the main truck load/unload bay on the north side of the TSD Facility. A transfer flex hose is connected to the manifold at the truck unload hose station. The transfer flex hoses have quick connect, no drip couplings, and are chemical resistant. If wastes are transported in a portable tank, an air-operated diaphragm pump made of chemical resistant construction is attached. The pumps are portable, skid-mounted, self-contained, and located within the secondary containment basin during operations. There are two of these portable pump units available at the TSD Facility. For off-site disposal, the contractor tank truck arrives at the loading dock on the north end of the TSD Facility. A transfer flex hose is attached to the truck tank and to the discharge manifold at the truckload hose station. The bulk waste is pumped from the storage tank to the truck tank.

Paint consolidation takes place in room 128. The process takes place under vacuum and is designed to remove all liquids and volatiles from the containers (including aerosol cans). Volatiles are filtered through a pair of carbon filters in series prior to venting to the atmosphere. The carbon filters are changed as set forth in section D (Process Information).

Drums are prepared for shredding in room 128. Residues from waste containers are consolidated in an appropriate consolidation container. The consolidation container is sealed and transferred to the appropriate storage location after the transfer process is complete. Next the top is removed from bung drums on the drum de-header. Bung drums, with the top removed, and open-top drums are washed in an enclosed industrial drum washer. Wastewater from the drum washer is piped to the oily wastewater tanks in room 124. Decontaminated drums are shredded in the drum shredder under the east canopy adjacent to room 128.

Miscellaneous minor consolidation also takes place in each of the storage areas. These wastes are received from waste accumulation sites prepackaged for safe handling. The containers are not opened at the TSD Facility unless required for verification testing per Section C (Waste Analyses), but are placed directly in the consolidation drum in the appropriate storage area immediately after inspection and logging in at the receiving area. Other consolidation/volume reduction takes place on the east storage area utilizing debris compactors. A fume hood has been installed in the room 130 (acids storage) for emergency response. If a damaged container or a container incompatible with its contents, is received at the TSD Facility; it is immediately transferred to this location, and the contents are transferred to an appropriate container under vacuum.

Because of the unique storage and handling requirements for lithium batteries (no contact with water, highly specialized fire-fighting equipment), the 'reactive when wet' storage area, room 131, is occasionally used to store and process 'A' condition lithium batteries (i.e. usable batteries). These batteries are used to power Unmanned Undersea Vehicles. When a portion of this room is used for lithium material storage and handling operations, these operations take place in a separated, marked off, specifically designated area, well away from the lithium waste storage area.

B1.3 "TREATMENT BY GENERATOR" AND "PERMIT BY RULE" PROCESSES

B1.3.1 TREATMENT BY GENERATOR

Treatment by Generator is currently not being performed at the TSD Facility. However, Treatment by Generator is performed at NUWC Keyport Bldg. 73. A 3D metal printing machine creates metal fines that are highly flammable. In order to reduce risk of ignition, the equipment Operations and Maintenance Manual directs operators to passivate the metal fines with dry quartz sand and silicone oil. This reduces flammability and makes the waste safer to handle. Waste is stored in the same Central Accumulation Area where treatment occurs (CAA K0073-15). A waste treatment log is kept on-site to document treatment dates and quantities.

B1.3.2 PERMIT BY RULE

Industrial wastewater pretreatment takes place at the Industrial Waste Treatment Plant (IWTP), Building 825. The IWTP is regulated by the WA Department of Ecology State Wastewater Discharge Permit #7353 and qualifies as a Wastewater Treatment Unit (WWTU) in accordance to the PBR provisions. The following generated wastes are treated at the IWTP and are also documented in the discharge permit.

1. Building 38 deburring machines
2. Building 514 Fuel recovery system
3. Building 1058 metal cleaning and preparation facility
4. Building 82 Battery Shop -Potassium Hydroxide Tank
5. Building 206 Laboratory – Acids
6. Other treatable waste streams – compatible wastes are processed through the IWTP on an as needed basis.

B1.4 PROCESSES INVOLVING WASTES THAT DO NOT DESIGNATE

Sludge removed from storm water catch basins throughout the installation is de-watered in a sloped area under the east canopy. These sludges have been analyzed in the past, and they have never designated as dangerous waste. Only installation-generated sludge is dewatered. The area is divided into two sections, one is in the process of drying, and the second is for new sludge. The down slope portions of the dewatering areas are surrounded by and divided by straw bales. The area is drained to a blind sump from which the wastewater is pumped to the oily wastewater tanks. Dried sludge is tested for contaminants to ensure it does not designate and disposed of at the local landfill. Sludge from catch basins in the vicinity of any documented spills is tested prior to depositing in the dewatering area and disposed of through the TSD Facility without dewatering if it designates as a dangerous waste.

Drums that have been tripled rinsed at the TSD Facility (see B1.b (5) above) are shredded at the TSD Facility under the east canopy. Rinse-water is reused to minimize waste generation and the shredded metal is recycled through the Defense Reutilization and Marketing Office (DRMO).

Used oil and oily rags are consolidated in room 139. Only wastes from known sources (Waste Disposal Request approved) are consolidated in this process. This process takes place in compliance with the requirements of WAC 173-303-515.

B1.5 SUMMARY OF ALL OTHER ENVIRONMENTAL PERMITS AT FACILITY

The installation includes the tenant command of NUWC Division, Keyport and is subject to the following permits:

1. WA State Waste Water Discharge Permit #7353
2. PSCAA Registered Facility (Synthetic Minor) GRO 8258
3. NPDES Multisector Industrial Storm water Discharge Permit #WAR05A64F

B2. SEISMIC RISK CONSIDERATIONS

WAC 173-303-806(4)(a)(xi)

The installation is classified as a Seismic Zone D2. A Seismic map of Washington State is included in appendix B1. There are no faults which have had displacement in the Holocene time, and no lineations which suggest the presence of a fault, with displacement in the Holocene time, within 3,000 feet of the TSD Facility. This seismic evaluation is based on:

1. Review of published geologic and seismicity data which included reconnaissance and local studies, interpretation of subsurface well data, and analysis of geophysical data consisting of aeromagnetic and gravity anomalies and marine seismic reflection profiles.

2. Examination of aerial photographs and Seismotectonic Maps of the Puget Sound.

The TSD Facility has been designed to seismic zone 3 requirements, which were in effect at the time the TSD Facility was designed and built.

B3. TRAFFIC INFORMATION

WAC 173-303-806(4)(a)(x)

This section provides information on traffic volumes, patterns, and vehicle type associated with access to the Naval Undersea Warfare Center (NUWC) Division, Keyport TSD Facility. Traffic control measures and transportation routes are also discussed.

The Installation is located on the Kitsap Peninsula and is in Kitsap County on Puget Sound approximately 15 miles west of Seattle. The installation shares a small peninsula with the town of Keyport, which is bordered on the north and east by Liberty Bay and by Port Orchard Reach on the southeast. State Route 308 provides vehicle access and terminates on this peninsula. State Route 308 connects with State Route 3 approximately 3 miles west of Keyport and with NBK Bangor an additional ½ mile west. State Route 3 serves as the main vehicle access to all routes leading out of Kitsap County from the installation.

The TSD Facility site is located on the installation. The site is bordered by Gadberry Street on the south, Bradley Road on the west, Buildings 951 and 820 to the north, and a large parking area to the east.

B3.1 TRAFFIC VOLUMES, PATTERNS, AND VEHICLE TYPE

The following vehicles are utilized for dangerous waste handling operations at the TSD Facility:

1. Forklifts (3)
2. Vacuum Trucks (3)
3. Flat Bed Truck (1)

These vehicles are used to transport dangerous waste from the generators and CAAs to the TSD Facility and to deliver containers to these sites. Waste collection and transfer to the TSD Facility is performed daily, based on a schedule that provides for pickup at every site within a 90-day period. Unscheduled pickups are made when requested. Delivery of containers to the generators is also made on a scheduled basis. Additional traffic volume results from commercial and contractor truck deliveries of supplies and waste shipments off site for disposal or treatment, and employee commuter traffic. An estimated fifteen loads of containers and twelve loads of bulk liquid waste are shipped off site every year for treatment and disposal.

Dangerous waste is transported off site in tanker trucks with an average capacity of 4,300 gallons or in containers on flat bed or semi-trucks with a capacity of 80 to 100 drums. Waste handling traffic on the installation from CAAs to the TSD Facility is limited to forklifts transporting portable containers of various sizes, vacuum tank trucks with capacities of up to 1,500 gallons, and flatbed trucks transporting containers.

Access to the installation is from State Route 308 through the main gate on the west boundary of the installation. All truck traffic enters and exits through the main gate. Truck access to the TSD Facility site comes through the main gate, travels east on McKittrick Road, south on “A” Street to Prichard Street, south on Prichard to Gadberry Street, and west on Gadberry to the site. Truck traffic routes are shown in appendix B2. NUWC Division, Keyport dangerous waste transport vehicles utilize various routes to and from the many pickup sites and shops on the installation.

Two main north/south arterials provide access to the TSD Facility site from other locations on the installation. Bradley Road is located along the west side of the site and serves as a major link between the main gate area and the Public Works Support Area and industrial activities located in the southern portion of the installation. A major parking area located directly west of the TSD Facility is also accessed via Bradley Road. Prichard Street is located east of the TSD Facility and runs from its intersection to the north with “A” Street and Hunnicutt road south to its terminus at Westfall Road. Prichard Street serves as the main arterial for traffic between all points within the installation. Gadberry Street runs east/west connecting Bradley Road and Prichard Street and is located along the south side of the TSD Facility. All roads consist of asphalt pavement surfaces.

A truck maneuvering area at the TSD Facility is provided along the east side of the building. The truck maneuvering area, the north truck bay, and the south truck dock are fenced and access is provided through a gate on Gadberry Street and at gates at the north end of the TSD Facility off Bradley Road. The traffic pattern within the fenced truck maneuvering area is a one-way pattern with vehicles entering through the gate at Gadberry Street, traveling north, and exiting through the north gate or through the covered truck bay at the north end of the building. Departing trucks will travel north on Bradley Road to Torpedo Road and continue on to the main gate. Refer to appendix B2.

Vacuum tank trucks transferring bulk liquid waste to the storage tanks inside the TSD Facility unload through the Truck Unload Hose Station located in the covered truck bay at the north end of the TSD Facility. Tanker trucks loading bulk liquid waste for shipment off site load at the Truck Loading Hose Station also located in the covered truck bay at the north end of the TSD Facility. Trucks enter the truck bay from the truck maneuvering area and exit through the truck bay gate to Bradley Road. Flatbed trucks transporting waste-filled containers to the TSD Facility from the CAAs arrive at the covered truck bay at the north end of the TSD Facility. Forklifts transport the portable containers into the tank storage area where their contents are transferred into the bulk storage tanks. All forklift and service vehicle traffic into and out of the building is through the covered truck bay at the north end of the TSD Facility.

Forklift and/or lift truck traffic patterns within the TSD Facility are predominantly a north-south flow between the general open warehouse areas and the segregated waste storage compartments.

Waste-filled containers delivered to the receiving area at the north end of the building are transferred by forklift to one of the enclosed waste storage compartments at the southwest side of the building through 14-foot wide corridors. Palletized containers are transferred from the storage compartments to the open staging area at the south end of the building and from there to the covered loading docks on the south and east side of the building.

Incoming supplies of clean containers are off-loaded at the east dock and transferred to the new drum storage area also located on the east side of the building. When needed, the new drums are transferred by forklift from the storage area to the receiving area via a forklift corridor on the east side of the building.

Two truck loading/unloading platforms with adjustable dock levelers are located at the south and southeast end of the TSD Facility at the shipping dock. Trucks delivering supplies or loading out waste-filled containers can utilize these docks. One of the docks is accessed by backing in from Gadberry Street. Trucks leaving this dock enter Gadberry Street and turn north on Bradley Road to return to the main gate. The second dock is accessed from within the truck maneuvering area. Trucks leaving this dock follow the one-way traffic pattern established for this area.

B3.2 TRAFFIC CONTROL

NBK Keyport is a secure military installation not accessible by the general public. All traffic enters the installation through manned security gates. No individual or vehicle is allowed to enter without first obtaining a clearance pass. Prior to obtaining a pass, all vehicles are inspected to ensure that they are in proper mechanical working order. Maximum speed limits on the installation is 20 mph or less.

Traffic on the TSD Facility site not directly related to dangerous waste activities is limited to the paved visitor parking area at the northwest corner of the site off Bradley Road. Traffic on the site is controlled by means of three gates into the fenced truck area. Each gate has a posted sign specifying that access is limited to 'authorized personnel' only. Trucks and vehicles are not operated inside the building. All container and pallet handling inside the building is performed by forklifts.

Outgoing dangerous waste shipments are pre-scheduled and contracted through the Defense Logistics Agency (DLA). All outgoing waste shipments are inspected, recorded through the waste tracking system, and manifested per Washington Department of Ecology, US Environmental Protection Agency and the Federal Department of Transportation regulations.

B3.3 ROADWAYS AND ASPHALT SURFACES

State Route 308, which provides access to the installation, is constructed of asphalt and is under the jurisdiction of the State of Washington. The roadways within the installation are asphalt or asphalt concrete and controlled by the Navy. The maximum gross vehicle weight is 80,000 pounds as established by the Washington State Department of Transportation.

There is a large volume of commercial and government operated truck traffic entering and exiting the installation on a daily basis, and all roadways within the installation are constructed to handle the maximum load limits of these trucks. The paved roadways and truck operating areas of the TSD Facility are paved with asphalt and constructed to comply with the 1991 State of Washington Department of Transportation Standard Specifications for Roads, Bridges, and Municipal Construction.

B4. TOPOGRAPHIC MAPS

WAC 173-303-806(4)(a)(xviii)

The figures referenced in this section contain information required to describe topographic data and other site features at the installation.

Please see Part A Form Attachment A for the Installation Topographic map. It shows the following details:

1. Map scale & date, a wind rose and map orientation
2. Major buildings and contour intervals sufficient to show surface water flow
3. 100-year flood plain area and surface waters
4. Legal boundaries, access control and surrounding land uses

5. Withdrawal wells (there are no injection wells at the installation)
6. Runoff control systems and CAAs

The locations of SWMUs and AOCs are shown in Section E.

SECTION B

APPENDIX B1

Seismic Map

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Seismic Design Category Maps for Residential Consrructlon in Washing1on

Plate 1: Site Class D Assumed Statewide

SECTION B

APPENDIX B2

TRAFFIC ACCESS ROUTES

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TRAFFIC ACCESS ROUTES

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SECTION B

APPENDIX B3

NBK KEYPORT INSTALLATION CENTRAL ACCUMULATION AREAS

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NBK Keyport Installation Central Accumulation Areas

BLDG #	SITE #	SITE LOCATION	DOT ID	ERG Guide No.	ERG ID Name	PROCESSES
6	K0006-01	Outside Bldg. 6, East Side (Along Quayewall)	UN1993	128	Flammable liquid, n.o.s.	Process Support: Drained fluids and painting in performing vessel/equipment maintenance.
			UN1263	128	Paint (flammable)	
73	K0073-02	Outside Bldg. 73, NW Corner	NA3082	171	Environmentally hazardous substance, liquid, n.o.s.	Machining Operations: Oil and oily water wastes, Treatment by Generator for Metal 3D Printer metal fines.
			UN1993	128	Flammable liquid, n.o.s.	
	K0073-08	Outside Bldg. 73, NW Corner	UN1993	128	Flammable liquid, n.o.s.	
			UN3082	171	Environmentally hazardous substance, liquid, n.o.s.	
			UN3175	133	Solids containing flammable liquid, n.o.s.	
	K0073-09	Bldg. 73 SW Corner	N/A	N/A	Oily Debris	
	K0073-15	Bldg. 73 Inside, 3D printing room	UN3189	135	Metal Powder, Self-Heating, n.o.s (Chromium, Nickel)	
81	K0081-01	Outside Bldg. 81A, NW Corner	NA3082	171	Environmentally hazardous substance, liquid, n.o.s.	Assembly/Disassembly and Alodine Treatments Operations: Alodine contaminated rags and wastewater; greasy rags and gloves, alcohol saturated rags, and bonding agents
			UN1950	126	Aerosols	
			UN1993	128	Flammable liquid, n.o.s.	
			UN2735	153	Amines, liquid, corrosive, n.o.s.	
			UN2810	153	Toxic liquid, organic, n.o.s.	
			UN2922	154	Corrosive liquid, toxic, n.o.s.	
			UN3175	133	Solids containing flammable liquid, n.o.s.	
			UN3264	154	Corrosive liquid, acidic, inorganic, n.o.s.	
	K0081-13	Inside, middle of room (Designated Storage Area)	UN3175	133	Solids containing flammable liquid, n.o.s.	
			UN3264	154	Corrosive liquid, acidic, inorganic, n.o.s.	
82	K0082-01	Outside Bldg. 82, East Side	UN1993	128	Flammable liquid, n.o.s.	Assembly/Disassembly and Process Support Operations: Greasy rags and gloves, alcohol saturated rags, and oily wastewater from parts washer.
			UN2735	153	Amines, liquid, corrosive, n.o.s.	
	K0082-104	Outside Bldg. 82, East End	NA	NA	Oily Water	
	K0082-105	Outside Bldg. 82, NE Corner	NA	NA	Corrosive liquids (acids and bases) and metal salts treated at Bldg. 825	
84	K0084-13	Outside Bldg. 84, East Side	NA3077	171	Environmentally hazardous substance, solid, n.o.s.	Cleaning and Metal Preparation: Greasy rags and gloves, alcohol saturated rags, washwater from parts cleaner, paints and blast media.
			UN1263	128	Paint related material (flammable)	
			UN1950	126	Aerosols	
			UN3175	133	Solids containing flammable liquid, n.o.s.	
			UN1950	126	Aerosols	
			NA3077	171	Environmentally hazardous substance, solid, n.o.s.	
			NA3077	171	Environmentally hazardous substance, solid, n.o.s.	
			NA3077	171	Environmentally hazardous substance, solid, n.o.s.	
98	K0098-01	Outside Bldg. 98, NW Corner	NA3077	171	Environmentally hazardous substance, solid, n.o.s.	Assembly/Disassembly and Alodine Treatment Operations: Greasy rags and gloves, alcohol saturated rags, oily wastewater from parts washer and alodine contaminated rags and wastewater
			UN1935	157	Cyanide solution, n.o.s.	
			UN1993	128	Flammable liquid, n.o.s.	
			UN2735	153	Amines, liquid, corrosive, n.o.s.	
			UN2810	153	Toxic liquid, organic, n.o.s.	
			UN3028	154	Batteries, dry, containing Potassium hydroxide solid	
			UN3077	171	Environmentally hazardous substance, solid, n.o.s.	
			UN3175	133	Solids containing flammable liquid, n.o.s.	
	K0098-20	Supply Cage NE Side of Bldg.	NA3077	171	Environmentally hazardous substance, solid, n.o.s.	
			NA3082	171	Environmentally hazardous substance, liquid, n.o.s.	
			UN1090	127	Acetone	
			UN1263	128	Paint (flammable)	
			UN1935	157	Cyanide solution, n.o.s.	
			UN1950	126	Aerosols	

NBK Keyport Installation Central Accumulation Areas

BLDG #	SITE #	SITE LOCATION	DOT ID	ERG Guide No.	ERG ID Name	PROCESSES
98	K0098-20	**Continuation**	UN1956	126	Compressed gas, n.o.s.	Assembly/Disassembly and Alodine Treatment Operations: Greasy rags and gloves, alcohol and fuel saturated rags, oily wastewater from parts washer and alodine contaminated rags and wastewater
			UN1993	128	Flammable liquid, n.o.s.	
			UN2735	153	Amines, liquid, corrosive, n.o.s.	
			UN2922	154	Corrosive liquid, toxic, n.o.s.	
			UN3077	171	Environmentally hazardous substance, solid, n.o.s.	
			UN3148	138	Water-reactive liquid, n.o.s.	
			UN3175	133	Solids containing flammable liquid, n.o.s.	
			UN3260	154	Corrosive solid, acidic, inorganic, n.o.s.	
			UN3264	154	Corrosive liquid, acidic, inorganic, n.o.s.	
			UN3265	153	Corrosive liquid, acidic, organic, n.o.s.	
			UN3267	153	Corrosive liquid, basic, organic, n.o.s.	
			UN3480	147	Lithium ion batteries (including lithium ion polymer batteries)	
	K0098-22	SW Corner Inside Combat Area	NA3077	171	Environmentally hazardous substance, solid, n.o.s.	
	K0098-27	Inside Bldg., Near Column E8 South Side	UN3175	133	Solids containing flammable liquid, n.o.s.	
233	K0233-02	Inside Bldg. 233, South End, Outside Men's Rm, North Wall	N/A	N/A	Oily Debris	Machining Operations: Oil and oily water wastes
489	K0489-04	Inside Bldg. 489, by Door #9	NA3077	171	Environmentally hazardous substance, solid, n.o.s.	Assembly/Disassembly and Alodine Treatment Operations: Greasy rags and gloves, shelf life expired material, alcohol and fuel saturated rags, oily wastewater from parts washer and alodine contaminated rags and wastewater.
			UN3175	133	Solids containing flammable liquid, n.o.s.	
	K0489-06	Inside Bldg. 489, Cleaning Rm	UN1993	128	Flammable liquid, n.o.s.	
	K0489-07	Inside Bldg., Between Columns C6 and D6	NA3077	171	Environmentally hazardous substance, solid, n.o.s.	
			NA3082	171	Environmentally hazardous substance, liquid, n.o.s.	
			UN1263	128	Paint (flammable)	
			UN1950	126	Aerosols	
			UN1987	127	Alcohols, n.o.s.	
			UN1993	128	Flammable liquid, n.o.s.	
			UN2735	153	Amines, liquid, corrosive, n.o.s.	
			UN2922	154	Corrosive liquid, toxic, n.o.s.	
			UN3028	154	Batteries, dry, containing Potassium hydroxide solid	
			UN3077	171	Environmentally hazardous substance, solid, n.o.s.	
			UN3090	138	Lithium metal batteries (including lithium alloy batteries)	
			UN3148	138	Water-reactive liquid, n.o.s.	
			UN3175	133	Solids containing flammable liquid, n.o.s.	
			UN3260	154	Corrosive solid, acidic, inorganic, n.o.s.	
			UN3288	151	Toxic solid, inorganic, n.o.s.	
			UN3480	147	Lithium ion batteries (including lithium ion polymer batteries)	
	K0489-08	Outside Bldg. 489, SW Corner near Door #3	NA3077	171	Environmentally hazardous substance, solid, n.o.s.	
			NA3082	171	Environmentally hazardous substance, liquid, n.o.s.	
			UN1950	126	Aerosols	

NBK Keyport Installation Central Accumulation Areas

BLDG #	SITE #	SITE LOCATION	DOT ID	ERG Guide No.	ERG ID Name	PROCESSES
489	K0489-12	Inside Bldg. 489, Env. Coordinator's Office	NA3082	171	Environmentally hazardous substance, liquid, n.o.s.	Assembly/Disassembly and Alodine Treatment Operations: Greasy rags and gloves, shelf life expired material, alcohol and fuel saturated rags, oily wastewater from parts washer and alodine contaminated rags and wastewater.
			UN1950	126	Aerosols	
			UN1993	128	Flammable liquid, n.o.s.	
			UN2735	153	Amines, liquid, corrosive, n.o.s.	
			UN3028	154	Batteries, dry, containing Potassium hydroxide solid	
			UN3175	133	Solids containing flammable liquid, n.o.s.	
			UN3259	154	Amines, solid, corrosive, n.o.s.	
			UN3480	147	Lithium ion batteries (including lithium ion polymer batteries)	
	K0489-14	Inside Bldg. 489, WT Accessories Rm	UN1993	128	Flammable liquid, n.o.s.	
514	K0514-01	Outside Bldg. 514, NW Corner	NA1993	128	Combustible liquid, n.o.s.	Assembly/Disassembly and Alodine Treatment Operations: Greasy rags and gloves, shelf life expired material, alcohol saturated rags, fuel saturated rags, aprons, and gloves, oily wastewater from parts washer and alodine contaminated rags and wastewater. Sites K0514-105 and 108 are sent to the TSD Facility and placed into tanks 103/106 and 104/105 for disposal.
			UN1950	126	Aerosols	
			UN3028	154	Batteries, dry, containing Potassium hydroxide solid	
			UN3082	171	Environmentally hazardous substance, liquid, n.o.s.	
			UN3090	138	Lithium metal batteries (including lithium alloy batteries)	
			UN3175	133	Solids containing flammable liquid, n.o.s.	
	K0514-105	Outside Bldg. 514, North End (Inside Fuel Tank Farm)	UN1993	128	Combustible liquid, n.o.s.	
	K0514-108	Outside Bldg. 514, NW Corner	UN1993	128	Flammable liquid, n.o.s.	
824	K0824-01	Outside Bldg. 824, West Side	UN1993	128	Flammable liquid, n.o.s.	Machining: Welding Operations
825	K0825-01	Inside Bldg. 825, South End	N/A	N/A	Non-Regulated Liquid/Solid	Industrial Wastewater Treatment (Permit #ST0007353)
894	K0894-01	Inside Bldg. 894, NW End	NA3077	171	Environmentally hazardous substance, solid, n.o.s.	Assembly/Disassembly Operations: Greasy rags and gloves, alcohol saturated rags, and oily wastewater from parts washer
			UN1950	126	Aerosols	
			UN1987	127	Alcohols, n.o.s.	
			UN1993	128	Flammable liquid, n.o.s.	
			UN2735	153	Amines, liquid, corrosive, n.o.s.	
			UN2922	154	Corrosive liquid, toxic, n.o.s.	
			UN3028	154	Batteries, dry, containing Potassium hydroxide solid	
			UN3090	138	Lithium metal batteries (including lithium alloy batteries)	
			UN3175	133	Solids containing flammable liquid, n.o.s.	
			UN3260	154	Corrosive solid, acidic, inorganic, n.o.s.	
			UN3267	153	Corrosive liquid, basic, organic, n.o.s.	
			UN3480	147	Lithium ion batteries (including lithium ion polymer batteries)	
1006	K1006-01	SW Inside Bay Area	NA3082	171	Environmentally hazardous substance, liquid, n.o.s.	Process Support: Material storage with expired shelf life material
			UN1090	127	Acetone	
			UN1263	128	Paint (flammable)	
			UN1950	126	Aerosols	
			UN1993	128	Flammable liquid, n.o.s.	

NBK Keyport Installation Central Accumulation Areas

BLDG #	SITE #	SITE LOCATION	DOT ID	ERG Guide No.	ERG ID Name	PROCESSES
1006	K1006-01		UN2735	153	Amines, liquid, corrosive, n.o.s.	Process Support: Material storage with expired shelf life material
		Continuation	UN2810	153	Toxic liquid, organic, n.o.s.	
			UN3028	154	Batteries, dry, containing Potassium hydroxide solid	
			UN3090	138	Lithium metal batteries (including lithium alloy batteries)	
	K1006-02	SW Inside Bay Area	UN1993	128	Flammable liquid, n.o.s.	
1050	K1050-02	Outside Bldg. 1050, SE Corner	UN1993	128	Flammable liquid, n.o.s.	Assembly/Disassembly Operations: Greasy rags and gloves, alcohol and fuel saturated rags, oily wastewater from parts washer
			UN3028	154	Batteries, dry, containing Potassium hydroxide solid	
			UN3090	138	Lithium metal batteries (including lithium alloy batteries)	
			UN3480	147	Lithium ion batteries (including lithium ion polymer batteries)	
1058	K1058-05	Outside Bldg. 1058UTSIDE BLDG. 1058, NW CORNER	NA3082	171	Environmentally hazardous substance, liquid, n.o.s.	Plating, Cleaning and Metal Preparation: Expired shelf life material.
			UN1263	128	Paint related material (flammable)	
			UN3087	141	Oxidizing solid, toxic, n.o.s.	
			UN3260	154	Corrosive solid, acidic, inorganic, n.o.s.	

SECTION C

WASTE ANALYSES

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C. WASTE ANALYSES

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C1. INTRODUCTION TO THE WASTE ANALYSIS PLAN

The Waste Analysis Plan (WAP) describes sampling methods, analytical techniques, waste acceptance procedures, problem manifest (off-installation),Waste Pick-up Request (installation) procedures, and waste tracking systems used for safe waste management and recordkeeping. The TSD Facility also uses Waste Generation Record (WGR), Waste Disposal Request (WDR) and Waste Identification Tracking (WIT) forms for waste generated within the NBK Keyport fence line that does not travel over a public roadway, as internal waste tracking system documentation; these terms are defined in Section C2 below. The forms presented in this WAP are internally developed and used by the facility. They may be revised as needed to address the permit, regulatory changes, facility operations and customer needs. All records required by this WAP are kept in either paper or electronic format as part of the TSD Facility operating record and will be made available for inspection at the request of the department.

The purpose of this plan is to describe how dangerous wastes accepted at the Naval Undersea Warfare Center (NUWC) Division Keyport Treatment Storage and Disposal (TSD) Facility (building 1051) are identified to ensure NUWC safely manages them while on site as well as to arrange for proper final disposition off-site. The TSD Facility manages all dangerous wastes generated on the NBK Keyport Installation. In addition, wastes generated at other regional U.S. Navy facilities may be accepted for treatment and storage.

Waste managed at the TSD Facility is identified through designation (testing and knowledge), bulked and/or packaged, segregated by hazard class while stored up to one year, and finally treated or shipped to off-site facilities for final disposition. Treatment processes authorized at the TSD Facility are listed in Part A.

The TSD Facility can receive, process, store, and ship off-site dangerous wastes. Details regarding tank systems, container storage areas and process equipment are provided in Section D, Process Information.

See Appendix C1 (Quality Manual) for specific decision-making responsibilities of TSD Facility personnel.

C2. DEFINITIONS

For the purposes of this WAP, the following terms are defined:

1. Compatibility - Combining of wastes without chemical or physical reaction; i.e., there is no fire, explosion, excessive heat generation or other unexpected and adverse reactions that would affect safe handling and storage.
2. Dangerous waste - Solid wastes designated in WAC 173-303-070 through 173-303-100 as dangerous, or extremely hazardous waste.

3. Designation – is the process of determining whether a waste is regulated under the dangerous waste lists, WAC 173-303-080 through 173-303-082; or characteristics, WAC 173-303-090; or criteria, WAC 173-303-100. The procedures for designating wastes are in WAC 173-303-070. A waste that has been designated as a dangerous waste may be either DW or EHW.
4. Facility Maintained Database - On-line database used to track dangerous wastes from generation to final disposal and is part of the TSD Facility operating record.
5. Generator - Any person, by site, whose act or process produces dangerous waste or whose act first causes a dangerous waste to become subject to regulation.
6. Installation Waste – Dangerous Waste generated within the Naval Base Kitsap (NBK) Keyport fence line, which does not travel over a public roadway during the course of transportation to the TSD Facility.
7. Off-Installation Waste – Dangerous Waste generated outside the NBK Keyport fence line, which requires travel over a public roadway during the course of transportation to the TSD Facility.
7. Knowledge - Sufficient information about a waste to reliably substitute for direct testing of the waste. To be sufficient and reliable, the "knowledge" used must provide information necessary to manage the waste in accordance with the requirements of WAC173-303.
8. Pick-up Request – a document used to transport waste from within the NBK Keyport installation generator Satellite Accumulation Areas (SAAs) and Central Accumulation Areas (CAAs) to the TSD Facility.
9. Process limitations - Consists of two components; physical (e.g. storage capacity of containers) and treatment limits (chemical and regulatory).
10. Profile - Details the waste stream's physical and chemical properties as well as its regulated status to assist the TSD Facility in determining how to safely manage the waste in compliance with the dangerous waste management permit requirements. The profile is based on the WGR and additional information developed to designate the waste. The completed profile is attached to the WIT in the facility maintained database. Waste profile information is documented within WGR, WIT and WDR forms, which are maintained for active waste streams.
11. Re-profiling – On a biennial basis, Keyport will review and re-evaluate an industrial waste stream's profile for changes in its chemical, physical, or biological composition, which may affect its regulatory status or the ability for the TSDF to safety accept and store it in compliance with this permit and the Dangerous Waste Regulations. . Documentation of this review will be maintained in the operating record.
12. Verification Analysis - Process used to determine that the waste stream received is the same as the waste stream described in the profile documentation or manifest, and that the waste stream matches the profile, using procedures in Section C4.2 and the Initial Waste Analysis form in Appendix C2 Waste Management Forms – Examples.
13. Waste Disposal Request (WDR) - After the TSD Facility accepts responsibility for management of a waste stream by approving a WGR, assigning a WIT number, and generating a profile, a WDR is provided to the generator. This document is signed and dated by the generator to certify composition of the waste every time the waste is picked up, accompanies the waste container to the TSD Facility and is maintained in the TSD Facility operating record.
14. Waste Generation Record (WGR) - A document filled out and submitted by the generator, providing detailed information to the TSD Facility about a new/potential waste stream. This document includes waste codes and final disposal actions. A unique WGR number is assigned in the facility maintained database for each documented waste stream accepted. This document is completed for all on and off-site waste streams. WGRs are maintained in the TSD Facility operating record.
15. Waste Identification Tracking (WIT) - All dangerous wastes managed by the TSD Facility are tracked by their WIT number in addition to the WGR number. The WIT number addresses the following:

a. The same waste may be generated in more than one location or by more than one generator. These compatible wastes are consolidated at the TSD Facility. Each generator contributing to the WIT completes and submits a WGR. The profile for each individual generator's waste stream must be consistent with the WIT's profile and final disposition options.
b. Because the same procedures are used in some of the processes generating wastes, waste streams don't necessarily change with a change in location or with a change in generator. Using historically consistent tracking numbers reduces likelihood of errors and is more efficient.

16. Waste profiling - Process of evaluating a waste stream for acceptance at the TSD Facility. Profiling includes gathering and compiling information from the generator and/or laboratory testing to determine whether the waste stream can be safely managed as well as accepted under permit conditions. Waste management alternatives, such as onsite treatment, are considered during this step. Supporting documentation and completed profiles are maintained in the TSD Facility operating record.
17. Waste Profile Questionnaire (WPQ) – Form used to submit profile details to the offsite disposal contractor.
18. Waste stream is dangerous waste from a single generator unique to a particular waste generation process. Each process waste stream is assigned a unique WGR number.
19. Waste shipment is a dangerous waste transfer from generator point A to point B by a uniform hazardous Waste Manifest, Bill of Lading, or Pick-up Request. Installation shipments that occur within the NBK Keyport fence line and do not travel over a public roadway are documented by a Pick-up Request. Incoming shipments generated from other DoD locations, and outgoing shipments are manifested according to RCRA and DOT requirements.

C3. CHEMICAL, BIOLOGICAL, AND PHYSICAL CHARACTERISTICS OF WASTE STREAMS

The majority of wastes accepted at the Building 1051 TSD Facility are generated within the NBK Keyport installation fence line. NBK Keyport, located in Keyport, Washington, houses testing and evaluation, engineering assembly, maintenance and repair, and fleet and industrial base support operations for undersea warfare systems. General industrial activities include painting, metal finishing, metal working, machining, electrical assembly, maintenance and repair, component teardown and refurbishment, component testing, and naval vessel operation and maintenance. Wastes generated within the NBK Keyport installation fence line are designated at the point of generation and are temporarily accumulated and managed within Accumulation Areas located throughout NBK Keyport in accordance with the requirements of WAC 173-303.

Industrial processes taking place at NBK Keyport that generate regulated wastes accepted at the TSD Facility includes but is not limited to the process waste streams listed in Table C3-1:

TABLE C3-1 PROCESS WASTE STREAMS

100-199 CLEANING AND DEGREASING 110 ABRASIVE BLAST WASTES 120 CLEANING AGENTS, ACIDIC 130 CLEANING AGENTS, ALKALINE 140 CHEMICAL PAINT STRIPPING WASTES 150 VAPOR DEGREASER WASTE 160 SOLVENTS/SOLVENT CLEANING 170 MECHANICAL REMOVAL 180 GENERAL CLEANING N.O.S. **200-299 SURFACE PREP AND FINISHING** 210 ELECTROPLATING WASTES 211 ETCHING WASTE 220 PAINT WASTES & THINNERS 230 DYES 240 CORROSION PREVENTATIVES 260 VARNISHES 270 WOOD PRESERVATIVES 280 HEAT TREATING WASTE **300-399 FORMING AND PRODUCTION PROCESSES** 315 RESINS/ADHESIVES/SEALANTS 320 METAL FORMING 350 WELDING FLUX 360 INSULATING MATERIALS 370 FLOORING MATERIALS 380 PLASTICS & RUBBER FORMING **400-420 LAB/MEDICAL/BIOLOGICAL WASTES** 410 LABORATORY WASTE **430-499 MISCELLANEOUS PROCESS WASTES** 440 PUMPWELL/SUMP MAINTENANCE 460 TESTING & INSPECTION WASTES 480 INSECTICIDES/HERBICIDES	**500-599 FLUID AND COMPONENT CHANGE-OUT** 510 COOLANTS 520 CUTTING FLUID WASTES 530 GREASES 540 HYDRAULIC FLUIDS 550 LUBRICANTS 560 BATTERIES 570 REFRIGERANT WASTES 580 RESIN, ION EXCHANGE 590 FILTERS, N.O.S. **600-699 MISCELLANEOUS WASTES** 610 TREATMENT PLANT WASTE 620 AIR POLLUTION CONTROL DEVICE WASTE 635 MISCELLANEOUS CONSTRUCTION/ CONTRACTOR WASTE 640 SPILL CLEAN UP WASTE 650 RECYCLING OF USED PRODUCT 660 WATER COLLECTION/RUNOFF WASTE **700-799 INORGANIC CONTAMINANTS** 710 ACID WASTES 720 ALKALINE WASTES 730 CADMIUM WASTES 740 CHROMIUM WASTES 750 LEAD WASTES 760 MERCURY WASTES 770 NICKEL WASTES 780 CYANIDE WASTES 790 OTHER INORGANIC WASTES **800-899 ORGANIC CONTAMINANTS** 820 PCB WASTES 830 ALCOHOL WASTES 840 OIL 850 DIESEL WASTES 870 OTHER NON-CHLORINATED HYDROCARBONS **900-999 MISC CHEMICAL PRODUCTS** 910 MISC CHEMICALS, N.O.S. 920 MISC OFFICE MATERIALS 940 UNUSABLE AEROSOL CANS (NON-PAINT) 950 EMPTY HM CONTAINERS (NON-AEROSOL) 985 COMMON TRASH 990 REUTILIZATION

A list of accepted waste codes at the Building 1051 TSD Facility is included in Part A. The TSD Facility does not accept radioactive, infectious or explosive wastes. Common waste streams managed at the TSD Facility includes but not limited to:

Ignitables
Corrosives (Acids and Caustics)
Reactives as defined by 40CFR261.23
Toxics
Oil, Oily Debris and Oily Wastewater
Solids and Sludge
Fuel Wastes
Industrial Wastewaters
PCB Wastes
Contaminated Debris
Universal Waste

Wastes are sampled and analyzed as described in Section C4, Waste Analysis Plan. Wastes are designated in accordance with WAC 173-303-070. Analytical requirements are summarized in Table C3-2, Waste Analysis Summary. Waste management options are described in Section B, Facility Description and General Provisions. Dangerous wastes received are treated, if possible, in accordance with this permit or in accordance with SWDP ST0007353. The majority of wastes received at the TSD Facility are shipped and disposed of off-site.

Table C3-2 Waste Analysis Summary

WASTE ANALYSIS[1]	TEST METHOD(S)[2]	STORAGE/ SHIPPING	SIMPLE CONSOLIDATION
Physical Description	ASTM D4979	✓	✓
Flash Point	ASTM D93, ASTM D56	✓	✓
pH	SW-846 9040,9041 or 9045	✓	✓
Water Content	ASTM D890	✓	✓
Specific Gravity	ASTM D1298	✓	✓
Total Cyanide	SW-846 9010	✓	✓
Total Sulfide	SW-846 9030	✓	✓
Total Metals	SW-846 6010	✓	✓
TCLP Metals	SW-846 1311/6010		
PCB	SW-846 8082/9079 EPA 600/4-81-045	✓	✓
Halogens	SW-846 8021/8260/8270/9077	✓	✓
Volatiles	SW-846 8260	✓	✓
Semi-volatiles	SW-846 8270	✓	✓
Hexane Extractable Materials (HEM)	SW-846 9071/ EPA 1664	✓	✓
Compatibility Testing	ASTM D 5058 EPA 600/2-80-076	✓	✓

[1] These are common analyses, but others may be required to completely characterize a waste per regulations (WAC 173-303).

[2] Additional methods approved per WAC 173-303-110(2) other than those listed above may be used.

✓ Generator knowledge is used to determine waste analysis selected for designation.

C4. WASTE ANALYSIS PLAN

WAC 173-303-110; -140; -300; -395; -630(7)(c) and (9); -640(1)(b), (2)(c), (3)(a), and (10); -690; -691; -692; -806(4)(a)(ii), (4)(b)(ii) and (v), and (4)(c)(x); [40 CFR Part 264 Subparts AA, BB, and CC]

C4.1 WASTE PRE-ACCEPTANCE PROCEDURES – WASTE STREAM CHARACTERIZATION AND PROFILING

The TSD Facility has developed a series of control procedures to determine the acceptability of specific wastes for management at the facility. Pre-acceptance procedures dictate what information the TSD Facility must obtain to determine the acceptability of the waste for management. At a minimum, the TSD Facility must obtain all the information required by WAC 173-303-300(2). necessary to manage waste. Pre-acceptance procedures allow TSD Facility personnel to determine the acceptability of a given waste based on permit limitations, regulatory requirements and whether the facility can safely manage the waste. See Figures C4-1 and C4-2 for a summary of these procedures.

1. To complete pre-acceptance procedures each waste stream must be designated and

    a. have a completed WGR,
    b. be acceptable, based on permit and operational constraints,
    c. be assigned a WIT number,
    d. have a valid profile (i.e., accurate and current), and
    e. have all documentation of the waste available in the operating record.

2. The decision on whether to accept or reject the waste is made based on:

    a. A review of the profile results as described in Section C4.1.2;
    b. Personnel's technical experience and judgment;
    c. Management methods available;
    d. Descriptions of wastes listed on the Part A;
    e. Determination if the waste is a restricted waste;
    f. Conditions or limitations of existing permits and regulations;
    g. Capability to manage the waste in a safe and environmentally sound manner;
    h. Profile description of the process generating the waste;
    i. Profile description of the chemical and physical properties of the waste;
    j. Results of laboratory analyses; and

k. Any additional documentation, including information that the waste is subject to the Land Disposal Restrictions (LDR) of 40 CFR Part 268, if appropriate.

3. A waste will be rejected during the pre-acceptance process for one of the following reasons:

   a. Incomplete or outdated profile provided by the waste generator;
   b. The waste cannot be treated, processed, stored or discharged at the TSD Facility because of permit limits and/or safety concerns; or
   c. The material is any of the following restricted wastes:
      1) Radioactive waste per WAC 402-12-050(49) and (50)
      2) Explosive waste per WAC 173-303-090 and 49 CFR 173.54
      3) Infectious waste per 49 CFR 240.101(p)

C4.1.1 PROFILE SYSTEM

The TSD Facility obtains profile information (as defined in Section C2) regarding each regulated waste stream before it is stored, treated or disposed. This information must contain the details necessary to manage the waste in accordance with WAC 173-303. The profile may be based on: 1) existing published or documented data on the dangerous waste; 2) waste generated from similar processes; 3) data obtained from analytical testing; or 4) generator knowledge.

The TSD Facility uses this information to determine if the waste can be accepted for storage or treatment operations conducted at the TSD Facility. Approval of a waste profile is dependent on existing permits and operational constraints.

The procedure for the completion of a waste profile is described below:

1. The generator of the waste completes and submits a WGR to the TSD Facility. The WGR provides space for recording information identifying the waste, the process generating the waste and waste storage site. The information is based on analytical testing or generator knowledge.

2. TSD Facility personnel review the WGR for completeness of physical and chemical information and to ensure it accounts for 100% of the waste constituents. They determine if the submitted WGR contains sufficient information to identify all applicable dangerous waste codes determined through the waste designation procedure required by WAC 173-303, and profile the waste according to section C4.1.1. Information from the WGR is entered into the facility maintained database.

3. If information is not sufficient, TSD Facility personnel will gather the information necessary to develop an adequate waste profile through research or analytical testing. This additional information is entered into the facility maintained database.

4. When the information is complete, the WGR is reviewed for acceptance. If a waste cannot be safely managed by the TSD Facility because of permit limitations or regulatory requirements, it will not be accepted. See C4.1 for details.

5. If the WGR is for an Off-Installation waste and would be acceptable per C4.1, profile sampling and analysis or generator knowledge are acceptable to ensure the accuracy of the WGR. (See Section C4.2.2) If analyses confirms the WGR, it is accepted.

6. After the WGR is accepted, a WIT number is assigned. All dangerous waste codes, compatibility group for storage, treatment and/or disposal method and amounts generated/disposed of; are linked to the waste stream via the WIT. Multiple generators may contribute to the same WIT only if the waste streams' profiles match and proper management of the waste will not change.

7. Information and analytical data from the WGR review process is used to create the profile of the waste stream.

8. The profile is then entered into the facility maintained database with start and end dates. The WGR and supporting documentation is maintained in the TSD Facility operating record.

9. The generator is supplied with the Waste Disposal Request (WDR) form and labels for the waste containers. A generator signed WDR certifying waste identification and composition is turned in with every waste container and bulk load submitted to the TSD Facility.

10. Waste streams are re-profiled every two years; and more often if conditions set forth in Section C4.1.1 apply.

C4.1.2 CONFIRMING/RECONFIRMING WASTE STREAM PROFILES

Each industrial waste stream, with the exception of unused commercial products, shall undergo re-profiling every two (2) years. Due to the unique SDS number assigned to pure products, they will not be re-profiled every two years. Re-profiling is conducted by completing a WGR and profile, including identifying dangerous waste constituents and characteristics necessary for proper profiling and management of the waste stream, along with accounting for 100% of the constituents. The WGR shall be submitted by the generator. A valid WIT number will be assigned. The WGR, completed profile and supporting documentation will be maintained in the TSD Facility operating record. All waste streams in the facility maintained database are automatically void at two (2) years. The generator must submit a newly updated WGR and a profile review must be completed before a waste can be shipped to the TSD Facility.

1. Except as specified in 2 below, re-profiling shall include or consist of either:

   a. Acceptable knowledge as defined by WAC 173-303-300(2) (a) and (b). The use of acceptable knowledge shall include confirmation by the generator that the process generating the dangerous waste has not significantly changed. Generator confirmation is documented by the WGR submitted to the TSD Facility verifying; or
   b. Laboratory analysis of the waste stream consisting of chemical and physical analyses using methods specified in WAC 173-303-110.

2. In addition to re-profiling every two years as required above, a waste stream shall undergo re-profiling under the following circumstances:

   a. The TSD Facility has been notified, or has reason to believe, that a process or operation generating the dangerous waste has significantly changed;

b. There is a discrepancy between the waste profile, and observed waste characteristics as determined by verification analysis or other waste analyses or waste evaluation;

c. Bulk tank waste that is a consolidation of compatible WITs shall be re-profiled prior to shipment for off-site treatment or disposal, to confirm final designation.

C4.2 INCOMING WASTE PROCEDURES

WAC 173-303-300(3); -370

C4.2.1 MANIFEST REVIEW AND PROCEDURES

WAC 173-303-370

All wastes must go through the Pre-acceptance procedures in Section C4.1.

A. INSTALLATION WASTE SHIPMENTS

Figure C4-3 depicts the Waste Check-in process for waste shipments arriving from the Installation.

For Installation wastes, a generator requests a pick-up by submitting a Waste Pick-up Request form in Appendix C2. Prior to pick-up, TSD Facility staff confirm that there is a valid WGR and profile for the waste stream and that verification analyses listed in table C4-1 was conducted on the waste stream as required. Verification analysis on a waste stream does not need to be conducted if the waste stream has a valid up-to-date profile and WAC-173-303-300(4) does not apply. This information is entered on the form. The wastes from NBK Keyport accumulation sites are transported to Bldg. 1051 (the TSD Facility) by the dangerous waste collectors. The generator is required to include a signed WDR with every container submitted to the TSD Facility to certify the waste identification and composition.

1. Before accepting for transport, trained dangerous waste collectors inspect the waste to verify the following:

   a. There is a WDR for each container of each type of waste,
   b. That the WDR(s) is/are correct (matches the waste being offered) and complete,
   c. That container labels match the WDR, and
   d. The containers are not leaking.

2. If a discrepancy is discovered, the generator is contacted to resolve the issue. Transport does not take place until the discrepancy is resolved.

3. Tracking Installation waste at the TSD Facility begins when the generator forwards a Waste Pick-up Request to the TSD Facility (See Appendix C1 (Quality Manual) for details of the waste tracking system).

4. Except as specified in #5 below, a minimum of 10% of the containers of each waste stream in each Installation waste pick up, and every bulk load in each Installation waste pick up, is subject to ASTM D4979, Standard Test Method for Physical Description Screening Analysis in Waste, by trained personnel at the time the waste is received at the TSD Facility. See Section H (Personnel Training), for required training and Appendix C2, Waste Management Forms – Examples), for a copy of the Verification Analysis form.

5. The following Installation waste streams do not require Verification Analysis included in the procedures of #4 above:

    a. If it's not a dangerous waste per WAC 173-303,
    b. If it's chemicals packaged in accordance with WAC 173-303-161,
    c. If it's an empty product container as defined in WAC 173-303-160
    d. If it's an unused commercial product in its original container with SDS, or
    e. Waste streams from known processes and which can be adequately identified using acceptable knowledge for proper management.

6. Upon verification that the waste in the shipment is properly represented by the approved and certified profile, it is moved to the appropriate storage or process area according to its waste stream category.

7. If waste does not pass verification analysis, it is placed in the WAD area located in room 123, and the generator is contacted to resolve the discrepancy. (See Section C4.3 for more details on Discrepancy Resolution).

B. OFF-INSTALLATION WASTE SHIPMENTS

Figure C4-4 depicts the Waste Check-in process for <u>waste shipments arriving from Off-Installation</u>:

1. Waste shipments are directed to the unloading area.

2. The manifest and physical load are inspected to verify the following:

    a. The information on the manifest is correct and complete.
    b. The correct number of containers of each type of waste is as indicated on the manifest.
    c. The containers are not leaking, are properly labeled and are approved storage and shipping containers.

3. The waste(s) listed on the manifest is checked to ensure that the waste is permitted for receipt at the TSD Facility and that a current WGR and profile is on file for the generator. This guarantees that:

    a. The correct waste codes have been assigned to the waste stream,
    b. The correct LDR notification and certification information has been provided, and
    c. Safe and effective management in conformance with the conditions of this permit is possible.

4. Verification analysis is performed on a minimum of 10% of the containers and every bulk load of each regulated waste stream in each waste shipment (see Section C4.2.2 and appendix C1, Quality Manual).

5. If a manifest discrepancy is discovered, the generator is contacted to resolve the issue. If an issue cannot be resolved in a timely manner, the shipment will be rejected. See Section C4.3 for more details on Discrepancy Resolution.

6. If no discrepancies are noted, material is off-loaded and a waste tracking number is applied to each container and the number is recorded on the WDR under “Login or Consolidation number.”

7. Upon verification that the waste in the shipment is properly profiled, it is moved to the appropriate storage or process area and the transporter is given a signed copy of the manifest.

8. If waste does not pass verification analysis, the generator is contacted to resolve the discrepancy.

For On- and Off-Installation wastes, waste received remains in the receiving area until verification analysis is complete. Wastes known or suspected of being reactive when wet are immediately transferred to the Reactive When Wet and compatible materials waste storage area.

Rejected wastes are placed in a dedicated secondary containment WAD area and are labeled ‘Waste Awaiting Designation’ (WAD) until the waste is properly profiled or until the manifest discrepancy is resolved. Rejected wastes must maintain their original label start date.

C4.2.2 WASTE STREAM VERIFICATION ANALYSES

Waste is designated per WAC 173-303-070. Proper characterization of a waste stream may include or consist of knowledge as defined in Section C2, or in combination with testing or obtain detailed chemical, physical, and/or biological analysis of a waste as required in WAC 173-303. Representative waste samples are analyzed to:

- Characterize the chemical properties of a waste stream,
- Confirm the initial characterization of off-station waste streams, and
- Facilitate proper treatment and storage of wastes.

Waste analysis parameters are based on knowledge of the raw materials and physical/chemical properties of each waste process, as well as historical analytical results. The usage and applicability of analyses are described herein. The analytical procedures and methods described in this text and in Table C3-2, Waste Analysis Summary, are referenced in WAC 173-303-110(3) as valid for designating waste and have been chosen to identify waste and to provide the information required to properly and safely manage wastes.

A. MANDATORY VERIFICATION ANALYSES

The following mandatory verification analyses are used to screen received waste providing a “fingerprint” identification that the waste stream is as described in the waste profile and WGR. Mandatory verification is not performed on wastes that are considered a laboratory analysis exempt waste stream, see Section C4.5.

1. Physical description is used to determine the general properties of the waste (color, physical state, layering, odor, etc.). This facilitates subjective comparison of the sampled waste with prior waste descriptions or samples. It applies to all wastes and is used to identify any obvious change in the waste’s physical properties.
2. Flash point is used to indicate the potential ignitability of the waste. This is necessary to determine appropriate storage conditions/containers, compatibility, treatment options, for DOT

shipping information and is used to identify variance from initial characterization. Flash point is not performed on solids or D001 liquids.

3. pH is used to determine the corrosive nature of the waste. This is required to identify appropriate storage containers, compatibility, treatment options and is used to identify variance from initial characterization.
4. Water content to determine the general properties of the waste and is used to identify variance from initial characterization.
5. Specific gravity provides information regarding the general chemical composition of a waste and is used to identify variance from initial characterization.
6. Halogen (Chloride) screen is used for Off-Installation receiving facility criteria and used oil.
7. Cyanide screen is used to evaluate if a waste will produce hydrogen cyanide when acidified, plating solutions or Otto fuel aqueous wastes).
8. Sulfide screen is used to evaluate if a waste will produce hydrogen sulfide when acidified. Only performed on waste streams with a pH > 7 or wastes suspected of containing sulfides (i.e. waste oils, or oil sludge).
9. VOC screen is used to verify VOC level of <500 ppm.

B. SUPPLEMENTAL ANALYSES

The following supplemental analyses can be performed when there are discrepancies between the mandatory verification analyses and the documentation, additional information is needed for management of the waste at the TSD Facility, if a change in the composition of the waste stream is suspected, or analysis is needed for LDR compliance.

1. Total metals analysis provides information regarding the general chemical composition of a waste and is used to identify variance from initial characterization.
2. TCLP is used for Off-Installation receiving facility criteria, and LDR compliance.
3. Total cyanide is used to identify potential reactivity and relevant health and safety precautions. It is necessary to determine compatibility, treatment options and is used to identify variance from initial characterization. In addition, this analysis is used for Off-Installation receiving facility criteria, and LDR compliance.
4. Total sulfide is used to identify potential reactivity and relevant health and safety precautions. It is necessary to determine compatibility, treatment options and is used to identify variance from initial characterization. In addition, this analysis is used for Off-Installation receiving facility criteria, and LDR compliance.
5. PCB (Aroclor) analysis is used for Off-Installation receiving facility criteria, and LDR compliance.
6. Volatiles analysis is used for Off-Installation receiving facility criteria, and LDR compliance. Results also used for emissions information.
7. Semi-volatiles analysis is used for Off-Installation receiving facility criteria, and LDR compliance. Results also used for emissions information.
8. Oil and grease analysis provides information regarding the general chemical composition of a waste and is used to identify variance from initial characterization. Also required for Off-Installation receiving facility criteria, and LDR compliance.
9. Paint filter test is done for LDR compliance.

These are common analyses, but others may be required to completely characterize a waste per regulations (WAC 173-303).

C. PROFILE CONFORMANCE

The use of “fingerprint” analyses is allowed for the purpose of verification analysis. “Fingerprint” analyses may also be helpful for a portion of a waste stream’s profiling and re-profiling process. Typically, waste streams are sampled and analyzed for a few key chemical and physical parameters to determine or substantiate the waste’s characteristics. This practice expedites waste designation and minimizes the time and labor involved. Generally, verification analysis parameters are selected based upon the knowledge of the waste stream. See Table C4-1 for minimum specific analyses for each waste type. See Section 4.1.2 for more detail on confirmation and verification analysis.

Verification analyses of incoming waste are compared to the waste profile information to ensure that there is not a significant variation between the received waste and its expected profile. Some variation in a waste stream is expected between containers and shipments; the intent is to identify wastes that may require different waste management practice or indicate the waste may be from a different waste generating process. Discrepancies are documented using the Verification Analysis form, see Appendix C2.

C4.3 DISCREPANCY RESOLUTION
WAC 173-303-350(3)(b); -370

A. INSTALLATION WASTE DISCREPANCY RESOLUTION

When a Discrepancy is noted regarding installation wastes, TSD Facility personnel will contact the generator by telephone and/or email to inform them of the discrepancy. If it is a minor discrepancy, that can be corrected immediately while the waste is still within the Receiving area, the generator will come to the TSD Facility and make the corrections and initial each correction. If the discrepancy cannot be immediately corrected, the waste will be rejected and either returned to the generator for resolution, or placed into WAD. Only wastes generated within the NBK Keyport fence line may be placed into WAD for administrative reasons. Placing wastes in WAD will be based on generator knowledge and personnel technical experience and judgment that the waste will be more safely managed and stored as WAD instead of returning the waste to the generator.

Rejected waste managed as WAD shall be segregated and logged in upon arrival. Designation shall be completed as soon as the waste has been sampled and laboratory analysis have been received

B. OFF-INSTALLATION WASTE DISCREPANCY RESOLUTION

For waste received from off-installation, the manifest discrepancy requirements of 40 CFR 264.72 and WAC 173-303-370 apply. This section sets criteria for manifest discrepancies, recordkeeping, unmanifested waste and rejecting a shipment.

Manifest discrepancies are significant discrepancies between the quantity or type of dangerous waste designated on the manifest or shipping paper and the quantity or type of dangerous waste a facility actually receives. Significant discrepancies in quantity are variations greater than ten percent in weight for bulk quantities (e.g. tanker trucks, portable tanks, etc.), or any variation in piece count for non-bulk quantities (i.e., any missing container or package would be a significant discrepancy). Significant discrepancies in type are obvious physical or chemical differences which can be discovered by inspection or waste analysis.

A. Steps to manage a manifest discrepancy:

1. TSD Facility personnel will contact the generator by telephone and/or email to inform of the discrepancy.
2. TSD Facility personnel will ask the generator for permission to correct the manifest to match the load. When permission is received, they will make any necessary corrections and initial each correction. Any correction made will be entered on all copies of the manifest received by the facility.
3. Immediately after the corrections are entered and initialed, the discrepancy space on the manifest (No. 18) will be completed with the following information:

    a. What the discrepancy is;
    b. A statement to the effect that "on day/month/year (name of person contacted) gave permission to correct the discrepancy stated above"; and
    c. Full signature of TSD Facility personnel correcting the discrepancy and date.

4. If the load consists of drums, and the discrepancy is a type of waste, the drum must be relabeled and marked prior to storage to match the corrected manifest and the corrected waste stream. The original accumulation start date must be carried over to the new label.
5. In the event that TSD Facility personnel cannot resolve a discrepancy within 15 days, in accordance with WAC 173-303-370(5)(c), a letter will be submitted to the Washington State Department of Ecology (Ecology) describing the discrepancy and attempts made to reconcile it, with a copy of the manifest or shipping paper at issue.

B. Steps to manage unmanifested loads:

1. If a regulated dangerous waste is received without an accompanying manifest, the Dangerous Waste Program Manager will be notified immediately.
2. The Dangerous Waste Program Manager will determine whether to accept or reject the load.
3. If the load is accepted, an unmanifested waste report meeting the requirements of WAC 173-303-390(1) must be completed and filed with Ecology within 15 days of waste receipt.

C. Steps to reject a shipment:

1. If a shipment arrives at the TSD Facility that cannot be managed properly, a determination will be made to reject it. Examples of loads that cannot be managed properly are:

    a. The waste is not listed on the TSD Facilities Part A Permit,
    b. The load does not match the manifest or WGR and the discrepancy cannot be resolved, or
    c. The waste cannot be treated, stored or disposed of at the TSD Facility.

2. The generator shall be contacted by TSD Facility personnel to:

    a. Notify them of the rejection and
    b. Obtain instruction from the generator on whether to send the shipment back to the generator or to another designated facility.
    c. If sent back to the generator, the TSD Facility is required to prepare a new manifest in accordance with WAC 173-303-370(5)(f).

D. Unmanageable, non-transportable loads:

Should a shipment arrive at the TSD Facility which cannot be properly managed due to reasons stated above, and the load cannot be safely transported back to the generator or to an alternate facility because it is damaged or would pose a risk to public health or the environment, the following steps shall be taken:

1. Examine the manifest and load to determine if the problem can be resolved with reasonable time, effort and supplies.
2. If the load cannot be rendered safe, implement the Contingency Plan.
3. Notify the generator, proper authorities and agencies as soon as possible.

See Appendix C1 (Quality Manual) for Recordkeeping details.

C4.4 PROCESS ANALYSES

Compatibility testing will be performed on all bulk waste streams being considered for consolidation. See Section D (Process Information) for details on consolidation in containers. For new liquid wastes being considered for bulk tank consolidation, ASTM D5058 will be the method of analysis. As required by this method, compatibility testing will be conducted using wastes that are in the tank at the time the new waste stream will be added, and will take place prior to discharging the new waste stream to the receiving tank to ensure these are compatible. Any new liquid waste being considered for consolidation in tanks 103 or 106 (cyanide waste tanks) will be analyzed for pH. Resulting pH must be >7 before being considered for consolidation in these tanks. In addition, for consolidation in tanks 103 or 106, compatibility testing per ASTM D5058 will include screening for hydrogen cyanide (HCN) gas generation using MSTOX 9001 gas detector or equivalent. Any HCN gas evolution exceeding the OSHA permissible exposure limit (PEL) will exclude new waste from consolidation in these tanks.

Refer to Section C4.1.1 for waste stream re-profiling details.

C4.5 WASTE GENERATED ON-SITE

The TSD Facility has a couple potential waste generating processes, which include:

- possible new waste stream developed during water decanting process while performing tank treatment, and
- rinsate generated from triple-rinse drum washing process with potentially of producing a hazardous waste designation.

C4.6 SAMPLING AND ANALYSES METHODOLOGIES
WAC 173-303-110; -300(5)(f)

Sampling methods used are as referenced in WAC 173-303-110(2). Sampling is performed by personnel who are properly trained in representative sampling methodology (refer to Section H, Personnel Training). Each bulk container is sampled.

The sampling devices are selected according to size and type of container and the specific material matrix involved. Sampling equipment is rinsed or disposed of between sampling events to avoid cross-contamination. Rinsate and/or sampling equipment is disposed with a compatible waste stream from the area where sampling occurs. Disposable sampling equipment is repackaged and disposed of appropriately in accordance with WAC 173-303.

Samples are stored in containers that are compatible with the waste. General criteria for containers are as follows:

1. The container must not distort, rupture or leak as a result of chemical interactions with constituents of waste samples.
2. The container must have adequate wall thickness to withstand handling during sample collection and transport to the laboratory.
3. The container must be of adequate size to contain the optimum sample volume.
4. Container shall be constructed from material that will not contaminate the sample with target analytes or interact with target analytes.

TSD Facility uses sampling methods presented in SW-846 (Test Methods for Evaluating Solid Waste, 3rd edition, November 1986 and subsequent updates and revisions) and ASTM Methods (American Society for Testing Materials) Standards D56, D93, D890, D1298, D4979, and D5058. Sample tracking procedures are described in Appendix C1 (Quality Manual).

The following lists waste streams that are exempt from laboratory analysis prior to pre-acceptance by the TSD Facility. The TSD Facility may perform laboratory analysis, a site visit, or request additional documentation for an acceptable profile.

1. Empty original manufacturer product containers, described in WAC-173-303-160(2).
2. Unused or expired commercial products in the original manufacturer product container with an up-to-date SDS that will allow for proper management of the waste by the TSD Facility.
3. Consumables and equipment removed from service that contain DW (including, but not limited to, ballasts, batteries, fluorescent light bulbs, and electrical equipment) that can be designated with sufficient knowledge.
4. Debris and residues from the cleanup of equipment removed from service or spills of a known substance, which an SDS can be provided.
5. Universal waste as described in WAC 173-303-573 (i.e. batteries, thermostats, mercury containing lamps and equipment).

C4.7 QUALITY ASSURANCE PROGRAM

TSD Facility personnel perform field verification analysis set forth in table C4-1. The NUWC Division Keyport Analytical Chemistry Laboratory completes all PGDN analyses and other testing required for profiling and re-profiling. When testing is not available on Installation, the TSD Facility may select other Navy or Off-Installation contract laboratories to conduct waste analyses. Laboratories employed by the TSD Facility must perform waste analysis per WAC 173-303. Additionally, labs accredited by the Washington State Department of Ecology shall be accredited for each analyte method.

C4.7.1 COMPREHENSIVE QA/QC PROGRAMS

QA/QC considerations are an integral part of laboratory analytical operations. Laboratory QA is undertaken to ensure that analytical methods generate data that are technically sound, statistically valid and can be documented. Individual QC procedures are the tools employed to measure the degree to which these QA objectives are met. Laboratories chosen must be able to address the following program elements.

A. Qualitative QA/QC Elements:

1. Documentation is a very important aspect of maintaining QA/QC procedures in the laboratory. An essential part of any QA program is the chain-of-custody protocol. This protocol allows tracking of the samples from collection through data analysis and reporting. The chain-of-custody protocol for labs begins with the immediate inspection of samples upon arrival for analysis and includes checking for documentation of adherence to the proper preservation techniques, proper accompanying paper work (e.g., chain-of-custody, shipping papers), proper sample containers and inspection of the sample itself for signs of anomalies which could jeopardize the sample integrity (i.e., evidence of tampering, broken or leaking containers).

2. The laboratory must meet the established holding times for the analytical parameters of interest. Holding times that are exceeded can result in the data being judged invalid. This can lead to the need to conduct re-sampling of the waste or to questions of TSD Facility compliance status. An acceptable lab will provide all the documentation necessary to demonstrate that the holding times for the required analyses are always met.

B. Quantitative QA/QC Elements:

Besides the qualitative measures associated with the chain-of-custody procedures, quantitative measures must also be used by the laboratory to monitor QA/QC. These measures include the analysis of method blanks, duplicates, matrix spikes and surrogate spikes. Table C4-3 presents the major QC techniques used by acceptable analytical laboratories to ensure data quality. A well-qualified lab will routinely employ these QA/QC procedures to evaluate the precision and accuracy of its analytical instrumentation to determine if inadvertent contamination has occurred or if other factors exist which could affect data quality.

C4.7.2 TECHNICAL ANALYTICAL EXPERTISE

The analytical laboratory chosen must be proficient in using established analytical methods for dangerous waste determinations. The laboratory must also be knowledgeable of any current developments in analytical methods that could affect data quality. Labs incapable of meeting the required detection limits compromise the ability to validate compliance with applicable waste management requirements. Therefore, it is recommended that laboratories employed by the TSD Facility are Washington State accredited laboratories to ensure analytical methods and data quality objectives are met and technically sound.

C4.7.3 INFORMATION MANAGEMENT

The lab must maintain effective information management systems. These systems are necessary to ensure the availability of all relevant data generated in association with a given sample set (e.g., chain-of-custody records, accuracy and precision information, and analytical results). Additionally, all analytical reports provided should present information in a clear and concise manner. A credible lab will tailor its reports to meet specific requirements. This is advantageous to assure that information is correctly used to verify regulatory compliance. The laboratory will also be able to provide the information needed to prove data validation (i.e., QA/QC documentation).

C4.8 WASTE TRACKING
WAC 173-303-300(6)

Please see Appendix C1, Quality Manual for details

C4.9 RECORDKEEPING
WAC 173-303-300(2)(b); -380(1)(c)

Please see Appendix C1, Quality Manual for details

C4.10 WASTE ANALYSIS PERSONNEL RESPONSIBILITIES
Please see Appendix C1, Quality Manual for details

Table C4-1 "Fingerprint" Parameters for Verification Analysis

TEST PARAMETER/ ANALYTICAL METHOD	LIQUID - AQUEOUS	LIQUID - ORGANIC	SLUDGE	SOLID	OIL
Physical Description/ ASTM D4979	✓	✓	✓	✓	✓
pH/ EPA SW-846 9040, 9041, 9045	✓		✓		
Flash Point/ ASTM D93, D56		✓			✓
Halogens/ EPA SW-846 9077 or field test kit					✓

Figure C4-1: Pre-Acceptance Process
(Installation Waste)

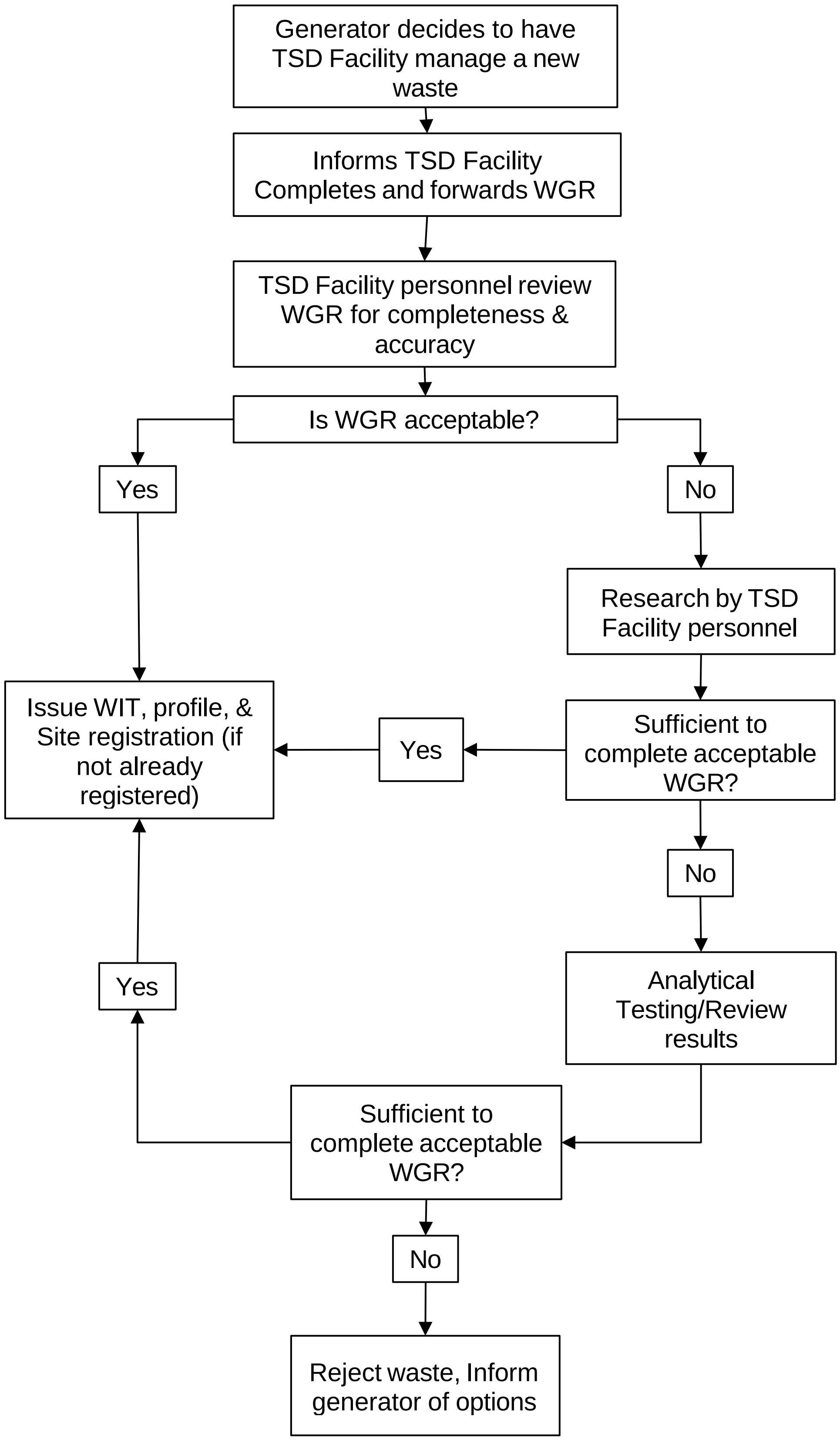
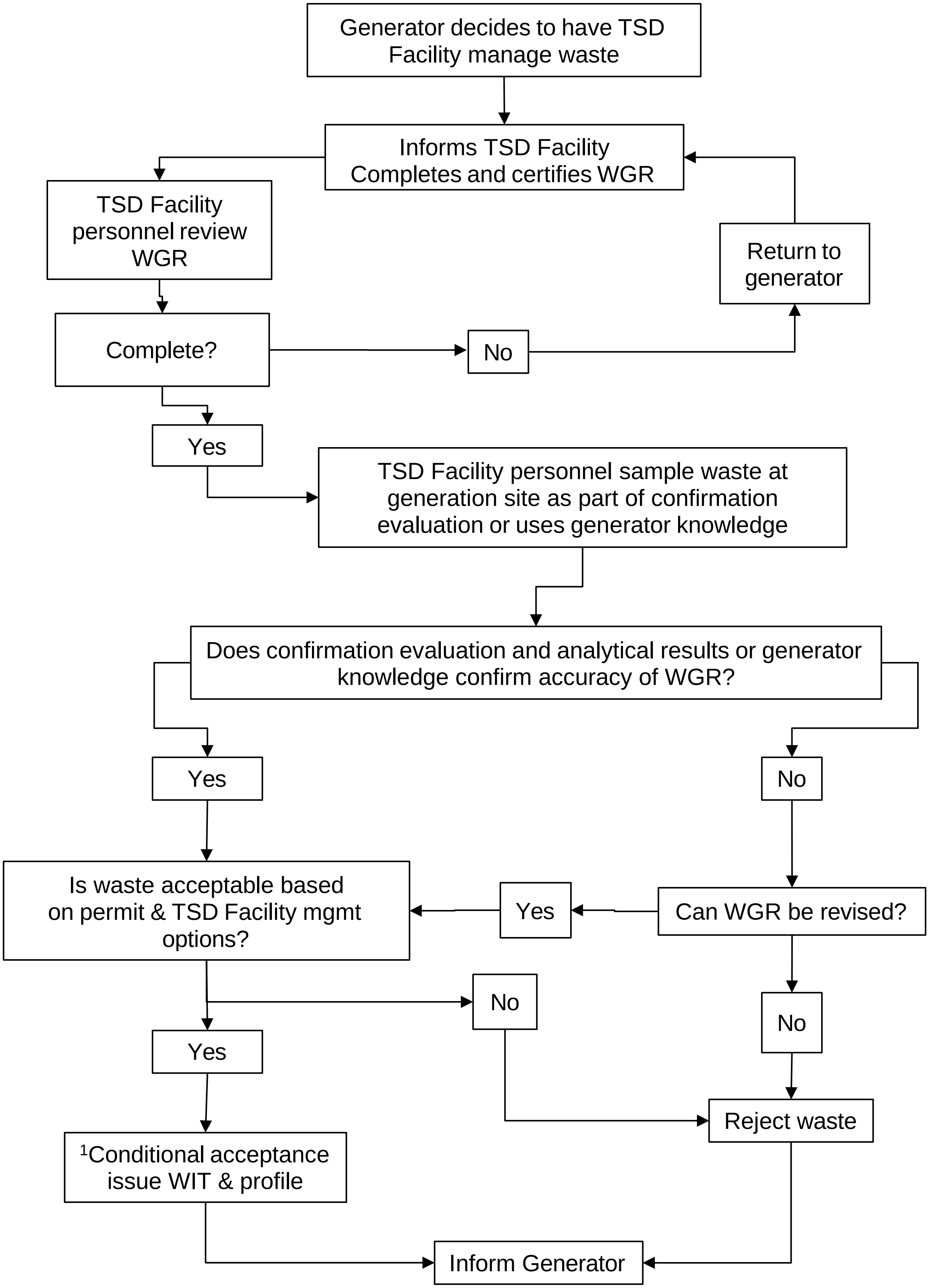


Figure C4-2: Pre-Acceptance Process
(Off-Installation Waste)



[1] Final Acceptance after waste check-in procedure

Figure C4-3: Check-In
(Installation Waste)

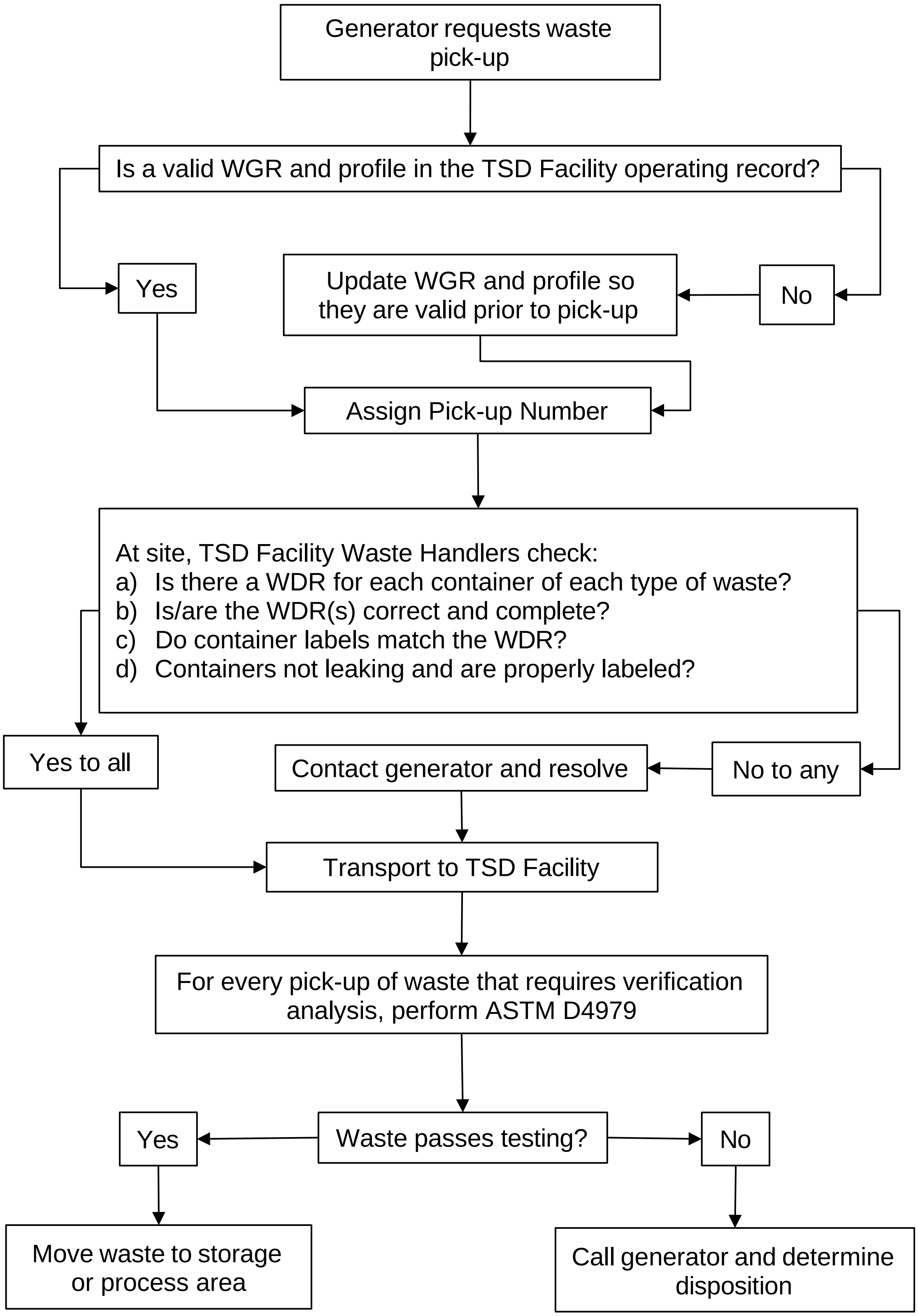
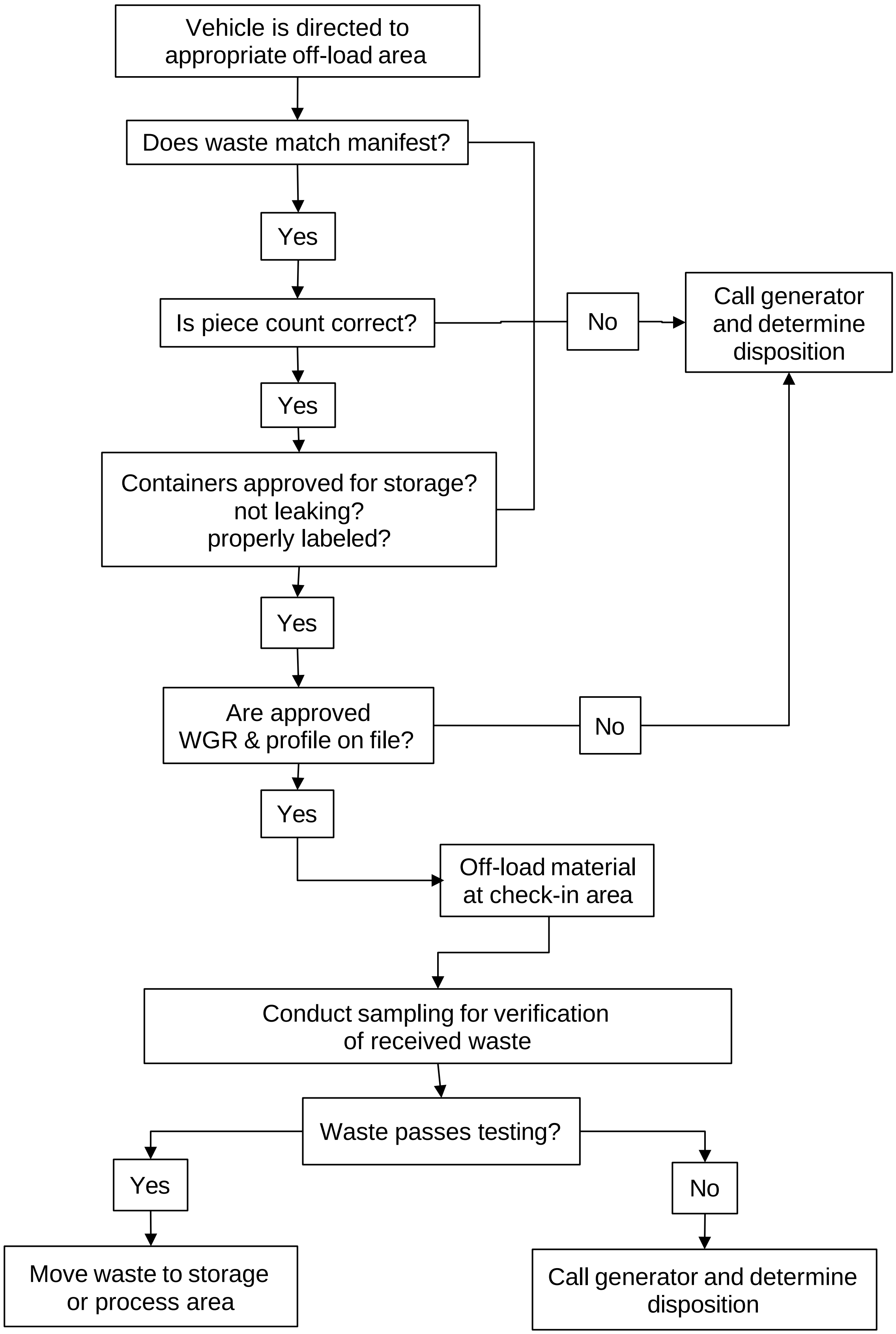


Figure C4-4: Check-In
(Off-Installation Waste)



SECTION C

APPENDIX C1

QUALITY MANUAL

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QUALITY MANUAL

NAVAL UNDERSEA WARFARE CENTER DIVISION KEYPORT
ENVIRONMENTAL BRANCH
TREATMENT, STORAGE AND DISPOSAL FACILITY (TSD Facility)
KEYPORT, WASHINGTON 98345-7610

Approved by:

____
D. HUNT
Dangerous Waste Program Manager, TSD Facility

____
T. HIATT
Environmental Branch Manager

EFFECTIVE DATE: __________________

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SECTION 1- PROGRAM DESCRIPTION

The Treatment, Storage and Disposal Facility (TSD Facility), Building 1051, as identified in Part A of Attachment A of the Permit for Storage and Treatment of Dangerous Waste is located on Naval Base Kitsap Keyport (NBK Keyport) in Keyport, Washington. The TSD Facility receives and manages dangerous wastes generated within the NBK Keyport fence-line. In addition, wastes generated at other regional Navy facilities may be accepted for treatment and storage. The TSD Facility does not accept radioactive, infectious, or explosive wastes.

The objective of the TSD Facility's Quality Assurance Program (QAP) is to guarantee compliance with local, state and federal regulations for the handling of wastes and waste records.

To accomplish this goal, TSD Facility personnel follow established policies and procedures from waste receipt to final disposition. This manual documents these measures and assures customers, regulatory agencies and other NUWC personnel of the quality of the data provided.

The program begins at the generation of a new waste stream with a waste generation request (WGR) and ends with record keeping after the final disposition of the waste. It encompasses management policies, TSD Facility Standard Operating Procedures (SOPs), sampling, testing performed by TSD Facility personnel, manifesting and record keeping.

The TSD facility uses the internal NUWC Keyport Analytical Chemistry Laboratory to perform supplemental testing for verification, confirmation, and process control purposes. Additional testing may be performed by contract laboratories accredited by the Washington State Department of Ecology.

Refer to the main body of the Waste Analysis Plan (WAP) for definitions and details of processes. See Appendix C2 for examples of documents and labels mentioned throughout this manual.

SECTION 2 - DEFINITIONS

For the purposes of this Manual, the following terms are defined:

1. Compatibility - Combining of wastes without chemical or physical reaction; i.e., there is no fire, explosion, excessive heat generation or other unexpected and adverse reactions that would affect safe handling and storage.
2. Dangerous waste - Solid wastes designated in WAC 173-303-070 through 173-303-100 as dangerous, or extremely hazardous waste.
3. Designation – is the process of determining whether a waste is regulated under the dangerous waste lists, WAC 173-303-080 through 173-303-082; or characteristics, WAC 173-303-090; or criteria, WAC 173-303-100. The procedures for designating wastes are in WAC 173-303-070. A waste that has been designated as a dangerous waste may be either DW or EHW.
4. Facility Maintained Database (FMD) - On-line database used to track dangerous wastes from generation to final disposal and is part of the TSD Facility operating record.
5. Generator - Any person, by site, whose act or process produces dangerous waste or whose act first causes a dangerous waste to become subject to regulation.

6. Installation Waste – Dangerous Waste generated within the Naval Base Kitsap (NBK) Keyport fence line that does not travel over a public roadway during the course of transportation to the TSD Facility.
7. Off-Installation Waste – Dangerous Waste generated outside the NBK Keyport fence line which requires travel over a public roadway during the course of transportation to the TSD Facility.
7. Knowledge - Sufficient information about a waste to reliably substitute for direct testing of the waste. To be sufficient and reliable, the "knowledge" used must provide information necessary to manage the waste in accordance with the requirements of WAC173-303.
8. Pick-up Request – a document used to transport waste from within the NBK Keyport installation generator Satellite Accumulation Areas (SAAs) and CAAs to the TSD Facility.
9. Process limitations - Consists of two components; physical (e.g. storage capacity of containers) and treatment limits (chemical and regulatory).
10. Profile - Details the waste stream's physical and chemical properties as well as its regulated status to assist the TSD Facility in determining how to safely manage the waste in compliance with the dangerous waste management permit requirements. The profile is based on the WGR and additional information developed to designate the waste. The completed profile is attached to the WIT in the facility maintained database. Waste profile information is documented within WGR, WIT and WDR forms, which are maintained for active waste streams.
11. Re-profiling – On a biennial basis, Keyport will review and re-evaluate an industrial waste stream's profile for changes in its chemical, physical, or biological composition, which may affect its regulatory status or the ability for the TSDF to safety accept and store it in compliance with this permit and the Dangerous Waste Regulations. Documentation of this review will be maintained in the operating record.
12. Verification - Process used to determine that the waste stream received is the same as the waste stream described in the profile documentation or manifest, and that the waste stream matches the profile, using procedures in Section C4.2 and the Initial Waste Analysis form in Appendix C2 Waste Management Forms – Examples.
13. Waste Disposal Request (WDR) - After the TSD Facility accepts responsibility for management of a waste stream by approving a WGR, assigning a WIT number, and generating a profile, a WDR is provided to the generator. This document is signed and dated by the generator to certify composition of the waste every time the waste is picked up, accompanies the waste container to the TSD Facility and is maintained in the TSD Facility operating record.
14. Waste Generation Record (WGR) - A document filled out and submitted by the generator, providing detailed information which includes waste codes and final disposal options to the TSD Facility about a new/potential waste stream. A unique WGR number is assigned in the facility maintained database for each documented waste stream accepted. This document is completed for all on and off-site waste streams. WGRs are maintained in the TSD Facility operating record.
15. Waste Identification Tracking (WIT) - All dangerous wastes managed by the TSD Facility are tracked by their WIT number in addition to the WGR number. The WIT number addresses the following:
    a. The same waste may be generated in more than one location or by more than one generator. These compatible wastes are consolidated at the TSD Facility. Each generator contributing to the WIT completes and submits a WGR. The profile for each individual generator's waste stream must be consistent with the WIT's profile and final disposition options.
    b. Because the same procedures are used in some of the processes generating wastes, waste streams don't necessarily change with a change in location or with a change in generator. Using historically consistent tracking numbers reduces likelihood of errors and is more efficient.

16. Waste profiling - Process of evaluating a waste stream for acceptance at the TSD Facility. Profiling includes gathering and compiling information from the generator and/or laboratory testing to determine whether the waste stream can be safely managed as well as accepted under permit conditions. Waste management alternatives, such as onsite treatment, are considered during this step. Supporting documentation and completed profiles are maintained in the TSD Facility operating record.
17. Waste Profile Questionnaire (WPQ) – Form used to submit profile details to the offsite disposal contractor.
18. Waste stream is dangerous waste from a single generator unique to a particular waste generation process. Each process waste stream is assigned a unique WGR number.
19. Waste shipment is a dangerous waste transfer from generator point A to point B by a uniform hazardous Waste Manifest, Bill of Lading, or Pick-up Request. Installation shipments that occur within the NBK Keyport fence line and do not travel over a public roadway are documented by a Pick-up Request. Incoming shipments generated from other DoD locations, and outgoing shipments are manifested according to RCRA and DOT requirements.

SECTION 3 - TSD FACILITY ORGANIZATION AND RESPONSIBILITIES

The TSD Facility is a part of the Naval Undersea Warfare Center (NUWC) Division, Keyport Environmental Branch. The Branch is committed to and provides an environment that encourages excellence. Everyone within the TSD Facility shares responsibility for maintaining and improving the quality of services. The position descriptions for these positions are provided in Section H, Appendix H1 (Position Descriptions). These position descriptions further detail the responsibilities, duties, and requisite qualification of current positions at the TSD Facility. Responsibilities of key positions for the TSD Facility are described below.

a) The Environmental Branch Manager is responsible for overall management of the Environmental Branch and determines quality policies and objectives for the branch. The Environmental Branch Manager is responsible for review and documentation of personnel qualifications and provides resources required to meet identified QA needs. The Environmental Branch Manager is responsible for all personnel management in the Environmental Branch, including the TSD Facility.

b) The Dangerous Waste Program Manager is responsible for ensuring that TSD Facility personnel have adequate facilities and training to perform their duties. The Program Manager:
    1) Serves as the single point of contact for all waste issues that may require federal/state agency involvement.
    2) Is responsible for keeping up with new regulatory requirements as they occur and integrating them into TSD Facility operations.
    3) Oversees training for all personnel involved in waste management and operations at the TSD Facility.
    4) Provides initial and reoccurring training to installation Waste Site managers and alternates.
    5) Is responsible for all inspections at the TSD Facility as set forth in Section F (Procedures to Prevent Hazards) of the Dangerous Waste Management Permit Application.
    6) Is part of the Change of Operations Review Panel to ensure waste stream sampling and analysis is considered for new processes.
    7) Monitors and approves treatment protocols.

8) Monitors and approves selection of final disposal option.
9) Acts as the quality manager for the TSD Facility, which includes:
    i. Oversees initial and annual training on quality requirements for the TSD Facility,
    ii. Providing oversight to ensure documentation (both paper and electronic copies) is properly filed, secured, and available upon request,
    iii. Ensuring that desk procedures or SOPs are available and up to date for the DW Handlers and DW Collectors at the TSD Facility, and
    iv. Ensures laboratories employed by the TSD Facility are certified by the Washington State Department of Ecology as an accredited laboratory following a strict Quality Assurance/Quality Control Program.
    v. Performs TSD facility performance and system audits.

c) TSD Facility personnel will follow the guidelines set forth in this manual. Under direction of the Dangerous Waste Program Manager, and following desk procedures and/or SOPs of (b)(10)(iii) above, they perform the following tasks:

Dangerous Waste Designator:
1) Is responsible for review and approval of all WGRs and profiles.
2) Provides research per WAC 173-303-300(2).
3) Requests and reviews results of analytical testing or uses generator knowledge.
4) Designates and profiles wastes.
5) Makes initial determination of acceptability of new waste streams based on permit conditions, treatability and applicable disposal regulations.
6) Ascertains the compatibility group of new wastes for storage.
7) Maintains TSD Facility waste inventory in the Facility Maintained Database (FMD).
8) Reviews and verifies test data.
9) Generates waste manifests.
10) Conducts biannual review and updating of all active process WGRs.
11) Enters all data necessary to document task completion in the FMD.
12) Assists Dangerous Waste Program Manager with Program Management duties.

Dangerous Waste Handlers
1) Sample waste streams for analytical testing.
2) Perform field screening and process testing.
3) Perform verification analysis per the Waste Analysis Plan (WAP).
4) Log in waste
5) Treat waste per TSD Facility Operating Manual.
6) Package and label waste.
7) Perform TSD Facility waste storage sites and equipment inspections.

Dangerous Waste Collectors

1) When picking up waste from approved on-station sites, verifies that the waste matches the waste description on the Hazardous Waste Pick-up Request and the Waste Disposal Request.
2) Delivers waste to the TSD Facility receiving area.

SECTION 4 – QUALITY OBJECTIVES

To be responsible environmental stewards by providing waste disposal and waste handling support and services to NBK Keyport and regional Navy activities. To maintain compliance with local, state, and Federal environmental regulations.

Quality objectives will be met by:
1) Initial and ongoing training of TSD Facility personnel.
2) Designation of waste per applicable local, state, and Federal regulations.
3) Proper documentation of waste accepted by the TSD Facility and retention of records per applicable environmental regulations.
4) Communication with customers to ensure customer needs and expectations are understood and can be fulfilled by the TSD Facility.
5) Ensuring all personnel understand the contents of the quality manual and follow requirements.
6) Ensuring resources are available to accomplish waste handling and disposal needs of the customer.

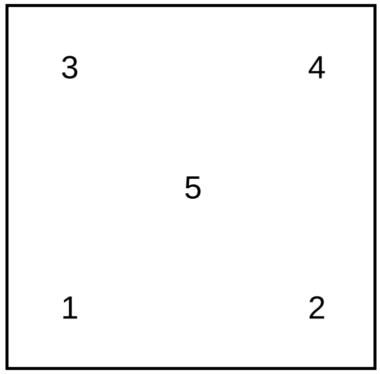
SECTION 5 – WASTE TRACKING SYSTEM

NUWC Division Keyport employs an on-line environmental management system database to track Dangerous Waste. This section describes the tracking of waste through the system and includes hard copies, logbooks, data sheets, etc. where applicable. See Table 1 for an overview of the tracking system.

1) Tracking begins with receipt of a WGR from a prospective waste generator. Each WGR is assigned a separate, unique WGR number upon entry into the NEMS..
2) If a WGR is determined to be acceptable, the profile is generated and entered into the FMD.
3) The waste is assigned a Waste Identification Tracking (WIT) number. This is entered into the FMD
4) The waste generating site and collecting site are determined and these identifiers are also entered into the FMD. Collecting site numbers follow the following format: K0514-01 (drum site) or K0514-101 (tank site), where K stands for Keyport, waste is collected at Building 514 and both are the first registered site of that type. Complete site location information is entered into the FMD.
5) The generator is sent the unique WGR number. Using this number, the generator will print WDRs containing the WGR, WIT, Generator, and collection site ID numbers that will accompany the waste to the TSD Facility at the time of pick-up. The collection container is labeled with the appropriate Non-Hazardous, Universal Waste or Dangerous Waste markers, which contain the WIT number.

6) When a waste is ready for transport to the TSD Facility, the generator submits a Hazardous Waste Pick-up Request. Upon receipt of the Request, TSD Facility staff verify that a valid and current WGR for the waste stream is on file. This information is signed off on the Request and it is posted for waste collector pick-up.
7) At the waste accumulation site, waste collectors compare the Pick-Up Request to the WDR and to the labels on the container, verify that the waste offered is the same as the waste described on the pick-up request, and verify the number of containers on the pick-up request matches the number of containers staged for pick-up. If no discrepancies are noted, the container is taken to the TSD Facility Receiving Area and the date is written on the WDR and the container. After receipt, the container must be logged-in, noting date and time, then moved from the receiving area to the proper storage site within 24 hours.
8) Waste Handlers begin log-in by assigning a pick-up number to each container that follows the format: Julian date-XX, where XX is given sequentially, starting at 11. Ex. 2019121-14 would be the fourth pick-up on May 1, 2019. This number is the unique container tracking number. It is entered into a logbook and onto the WDR and Verification Testing form. The WDR is turned in for NEMS inventory entry. The Verification Analysis form is compared to the Initial Waste Profile form and then scanned into electronic format. If any discrepancies exist, they are brought to the Dangerous Waste Program Managers attention.
9) Inventory entry includes pick-up, WGR and WIT numbers. It also includes the TSD Facility location identifier, which are given as follows:

   a. Refer to Table 2 for TSD Facility waste storage site numbering prefixes, and to Part A, Attachment A for site locations within the TSD Facility. Example: TSD-20 indicates the Dangerous When Wet storage cell. Bulk waste tanks are designated as TSD-101 through TSD-109. As they have no racks, shelves, etc. so this is their complete location designation.
   b. For cells with racks, racks are labeled A-Z from left to right. If a rack is accessed from both sides, both sides of the rack have their own designation. Example: TSD-20A denotes first rack on the left as you enter the Dangerous When Wet Storage Cell. Cells without racks have a placeholder zero in this position. Example: TSD-130 indicates that Cyanide/Sulfide Storage Cell does not have racks.
   c. For racks with shelves, shelves are numbered 1-9, with 1 being closest to the floor, 2 being next level up, etc. For cells with no shelves, a zero placeholder occupies this position.
   d. The next position A-Z is used to represent a pallet or 5-gallon container and is labeled from left to right facing the rack or row.
   e. For sites with pallets where further information is required, the last digit is 1-9 and denotes position on the pallet as required. Typical numbering of pallets is 1-5, with corners numbered left to right and middle position being 5 as below. Although the middle position is numbered, it may not be used if there is a visibility issue. Sites without pallets do not require this digit.



10) Accumulator drums at the TSD Facility are numbered as started by Julian date-0X, where X is 1 through 8 sequentially. Physical location of accumulator drums is tracked through this number.
11) In addition to FMD database entry, additions to each accumulator drum are tracked on accumulator drum sheets filed by WIT number. When the drum is full, Waste Handlers turn in the sheet and all associated WDRs to close out the drum.
12) TSD Facility tank loads are numbered by Julian date-09. Physical location of the stationary tank is tracked through this number.
13) In addition to FMD database entry, additions to bulk waste tanks are tracked in logbooks. Associated WDRs are pulled and attached to the manifest when the tank is full to close out that tank load.
14) Movements of waste within the TSD Facility and final disposition, whether treatment or shipment off-station, are tracked through the on-line FMD.

The following tables are solely for clarification of the TSD Facility waste tracking system. All wastes, whether generated on- or off-station, are tracked by this system. However, wastes received from other regional Navy facilities would not have a NUWC Division Keyport Dangerous Waste registered site number.

TABLE 1: TSD FACILITY WASTE TRACKING SYSTEM

WASTE TRACKING FOR CONTAINERS	INDENTIFIER	EXAMPLE	TRACKING
Who generated the waste?	WGR number	unique, computer-generated	tracked in FMD and on WGR, WDR in electronic or hardcopy format
What is it?	WGR number	unique, computer-generated	tracked in FMD, in logbooks and on WGR, WDR in electronic or hardcopy format
Where is waste collected?	Registered site number	K0514-01 (drum site), K0514-105 (tank site)	tracked in FMD and on WGR, WDR in electronic or hardcopy format
When was container picked up?	TSD Facility start date	MM/DD/YYYY	tracked in FMD, on container and WDR hardcopy
When was container received into TSD Facility inventory?	Inventory log-in date	MM/DD/YYYY	tracked in FMD and on WDR hardcopy
What is the unique container tracking number?	Pick-up number	K-2006121-14	tracked in FMD, logbooks, on waste container, WDR hardcopy, DD1348
What room is the container in?	TSD Facility cell site number (TSD-XX)	See Table 2	
Which rack?	Rack letter (A)		
Which shelf?	Shelf number (Y)		
Which pallet?	Pallet letter (B)		
Where on the pallet?	Position number (Z)		
Where is the container today?	Location number	TSD-XXAYBZ	tracked in FMD
How is waste to be managed?	WIT number	unique, computer-generated	tracked in FMD
When was waste shipped off-station?	Shipment date	MM/DD/YYYY	tracked in FMD and on manifest
Where was it shipped?	Receiver ID number	WAD991281767	tracked in FMD and on manifest
When did recipient facility receive shipment?	Manifest certification date	MM/DD/YYYY	tracked in FMD and on manifest
When was it finally disposed?	Disposal date	MM/DD/YYYY	tracked in FMD and on disposal certificate (if required)

TABLE 2: TSD FACILITY WASTE STORAGE SITES

SITE NAME	TSD FACILITY ROOM OR LOCATION
WAD	123 middle
OXIDIZERS DOT CLASS 5.1	129
ACID DOT CLASS 8(a)	130
CAUSTICS DOT CLASS 8 (b)	138
POISONS DOT CLASS 6.1 (or by subsidiary hazard class)	132
POISONS CLASS 6.1 (or by subsidiary hazard class)	133
FLAMMABLE/COMBUSTIBLES DOT CLASSES 3 AND 4.1	134
FLAMMABLE 1A DOT CLASS 2/COMPRESSED GASES (all hazard classes)	136
UNIVERSAL WASTE	137
USED OIL CLASS 3(a)	139
ORG PER DOT CLASS 5.2	125
DRUM DEHEADING/WASHROOM	128
ASBESTOS DUMPSTER	Outside, NE Bldg. 1051
SHIPMENT STAGING, MAIN	140
CLASS 9	140 east
REACTIVE WHEN WET AND COMPATIBLE MATERIALS DOT CLASS 4.3	131
CLASS 9	123 south
SECURED STAGING AREA FOR BULK SHIPPING CONTAINERS	Outside, East Bldg. 1051 sumped area under overhang
ACCUMULATION DRUM: PGDN CONTAMINATED DEBRIS	Outside, NE Bldg. 1051
BULK WASTE STORAGE (OILY WASTEWATER); T-101	124
BULK WASTE STORAGE (OILY WASTEWATER); T-102	124
BULK WASTE STORAGE (CYANIDE); T-103	124
BULK WASTE STORAGE (PGDN); T-104	124
BULK WASTE STORAGE (PGDN); T-105	124
BULK WASTE STORAGE (CYANIDE); T-106	124
BULK WASTE STORAGE (NOT IN USE); T-107	124
BULK WASTE STORAGE (NOT IN USE); T-108	124
BULK WASTE STORAGE (NOT IN USE); T-109	124

Exception to the Waste Tracking System:

WIT Lists and accumulator drums. In an effort to expedite waste characterization and minimize time and labor involved in database entry, WIT lists have been generated for commercial products that are in common use (example: aerosols and batteries). For each item, a virtual WGR is created with the Dangerous Waste Program Manager as generator that provides SDS information. A WIT is assigned by characteristics (example: Aerosol Flammable, Non-flammable, Adhesive, Corrosive). Generators are provided with an accumulation drum for the specific WIT. When the generator has a product to dispose, they query the FMD database, find the virtual WGR assigned and obtain the WIT number to determine the proper accumulator drum.

SECTION 6 – SAMPLING AND SAMPLE TRACKING SYSTEM

Samples obtained by TSD Facility personnel for the purpose of designation are taken in compliance with state and federal regulations as outlined in WAC173-303-110. Trained Personnel perform sampling according to the intended analytical method(s). The analytical laboratory may require different sampling containers or preservatives based on their processes or analytical method. Sampling containers and sampling devices are purchased pre-cleaned or cleaned prior to sampling. To prevent cross-contamination all sampling devices are disposed or cleaned between samples and disposed with a compatible waste. Stratified wastes are sampled to ensure a representative sample is obtained.

Samples for verification or designation analyses are tracked..

1) Sample tracking begins with the assignment of a unique sample tracking number. This number follows the format XXXX-YYYY-ZZ, where XXXX is the four digit NUWC code of the TSD Facility, YYYY is the four digit Julian date and ZZ is the sequential number of the sample taken that day, beginning with 01. This number is tracked to avoid duplicate use.
2) This number is entered on the TSD Facility Verification Analysis datasheet when tests are performed at the TSD Facility.
3) This number is also entered on the sample request form when samples are taken/sent to a laboratory. The request form contains all chain of custody information to track sampling, transport and lab receipt.
4) The sample number is also entered in the appropriate section of the online NEMS.

SECTION 7 – VERIFICATION AND SUPPLEMENTAL ANALYSES

TSD personnel perform the following tests for waste stream verification purposes to properly manage the waste received and determine compatibility for waste consolidation.

Physical Description	ASTM D4979
pH	SW 846 9041(paper)
Halogen Screen	Field test kit (oil wastes)
Flammability Screen	ASTM D4982
Specific Gravity Screen	ASTM D4979 (visual layering)
Compatibility Testing	ASTM D5058

Testing will follow methodology in Table C2-1 of the WAP. Standardized Operating Procedures (SOPs) are maintained by the Dangerous Waste Program Manager in the TSD Facility Operating Record. Verification and compatibility testing is documented on datasheets. All datasheet entries are made in ink. Amendments and/or corrections are to be made by crossing out with a single line. Write-overs are NOT ALLOWED! Each correction will be initialed and dated. Completed datasheets will be reviewed by the Dangerous Waste Program Manager or Waste Designator and will be entered into the TSD Facility operating record.

The TSD performs QC measurements in accordance with the reference method listed above. When QC measurements are not incorporated within the reference method the TSD uses alternative techniques to evaluate the accuracy of the technique, which can include, but is not limited to, periodic calibrations, verification samples (standards or blanks), and blind samples. Instrumentation is calibrated according to the reference method or manufacturer recommendations.

Supplemental analyses are performed by the NUWC Division Keyport Analytical Chemistry Laboratory or contract laboratories as needed. The NUWC Division Keyport Analytical Chemistry Laboratory maintains adherence to its internal quality control procedures according to the reference methods and the WADOE accreditation program. Contract laboratories are accredited by the Washington State Department of Ecology for the analytical method at the time of testing. A complete chain of custody accompanies samples submitted to NUWC Division Keyport Analytical Chemistry Laboratory or Contract laboratories. Preservation as required by the analytical test method is maintained during transportation of the samples to the laboratory.

The above practices are intended to ensure that the data produced and used by the TSD are precise and accurate for waste stream testing to allow for the facility to manage acceptance, rejection, treatment, storage, and consolidation.

The TSD facility verification analysis tolerances are used to ensure that the waste stream received meets the waste profile and that the constituents and characteristics of the waste are within the expected range of the waste profile and the waste has not been mixed with other wastes or materials. It is expected that there will be some variability of the waste between containers or loads. However, significant changes that may impact the handling or waste code other than that listed on the profile need to be identified. The following table includes the verification analyses and tolerance limits for which an inconsistency can indicate the waste stream is different than the intended profile.

TABLE 3: VERIFICATION ANALYSIS WITH TOLERANCE LIMITS

VERIFICATION TEST	INDENTIFIER	LIMIT	ACTION
Physical Description - Color - Turbidity - Viscosity - Physical state - Particle size - Layering	- Color variation - Clear, cloudy, opaque - Water, syrup, molasses, no flow - Liquid, solid, sludge, powder, granular - Fine, medium, coarse, chunks - Layer %, color, turbidity, viscosity, physical state	Reasonable agreement with profile	Gross differences in the physical description of a waste indicate waste stream may be from a different process – Document discrepancy and follow C4.3 in the WAP
pH	- pH range of the profile - Consolidation with TSD Tank-103/106	≤ 2 pH difference >7	Document discrepancy and follow C4.3 in the WAP
Halogen Screen (Oily waste only)	Chloride (ppm)	≥1000 ppm <1000 ppm	Ship as dangerous waste Ship as used oil.
Specific Gravity Screen	Visual Layering	Layer % or miscibility is not as expected	Document discrepancy and follow C4.3 in the WAP
Flammability Screen	Flammable or non-flammable	No tolerance of unexpected positive or negative	Document discrepancy and follow C4.3 in the WAP

Compatibility Testing	Compatible or non-compatible	No tolerance of unexpected positive or negative	Combine waste streams Do not combine waste streams

SECTION 8– RECORDKEEPING AND DOCUMENT CONTROL

Document control of required records within the TSD Facility is under the authority of the Dangerous Waste Program Manager.

There are a number of reports, forms and other types of written information that are prepared or collected at the TSD Facility. A summary of the required records is included below.

❑ Keep all Site Identification forms and related correspondence for as long as the TSD Facility is in business.

❑ Keep a copy of each Dangerous Waste Annual Report that was prepared and submitted to Ecology for a minimum of five years.

❑ Keep a copy of each WDR or manifest sent with a waste shipment and the signed manifest sent back from the dangerous waste facility for a minimum of five years.

❑ Keep a copy of each exception report sent to Ecology for a minimum of five years.

❑ Keep a copy of each Land Disposal Restriction Certification for a minimum of five years.

❑ Keep a copy of all transactions of special wastes going to municipal landfills for a minimum of five years.

❑ Keep a copy of the inspection log on the premises and available for review by Ecology staff for as long as the TSD Facility is in business.

❑ Keep the results of any laboratory analyses for as long as the TSD Facility is in business.

❑ Records (SDSs, WPQs, profile sheets, etc.) required to document designation and profiling of waste as long as the TSD Facility is in business.

SECTION 9– PERFORMANCE AND SYSTEM AUDITS

Internal audits evaluate TSD activities for compliance to the WAP and quality manual. Internal audits are intended to assess compliance with internal documented processes. The intent of internal audits is to monitor and evaluate that TSD processes are effectively implemented and functioning properly. It is the responsibility of the Dangerous Waste Program manager to perform internal audits. The manager reviews the document or process to be audited and selects valuable auditable items that can demonstrate compliance. Examples include:

- Process scope – Is the process used within its scope?
- Equipment/Materials – Does the procedure reflect the current equipment and materials being used? Do they meet technical requirements of the procedure?
- Training – Personnel performing the process are qualified?
- Procedural steps – Are specific steps of the procedure being performed? Are steps performed in the described order and frequency?
- Quality control – Are quality control elements specified in the procedure being performed and evaluated?
- Records – Are procedural records being generated? Are forms completed? Are records being retained?

If a deficiency is identified that impacts the work process, corrective actions are implemented in a timely manner to minimize recurrence.

Audits and corrective actions apply to all areas of the TSD including testing, management system, and administrative processes. The intent is to plan and implement corrective actions when departures from test procedures or quality control parameters are identified. All TSD personnel are responsible to recognize and respond to departures from the quality manual and to notify management when problems occur. Potential solutions are identified that are expected to provide the best opportunity to correct the problem and minimize recurrence. There may be many causes and solutions to a problem; the idea is to identify the best solutions to reduce the potential for recurrence considering the cost and time necessary to implement the solution(s). The Dangerous Waste Program Manager or Environmental Branch Manager authorizes resumption of work after corrective actions are taken.

SECTION C

APPENDIX C2

WASTE MANAGEMENT FORMS - Examples

The forms included in this appendix are for example only. The information contained on the forms will be included on any versions of the forms used for the same purposes, although the forms themselves may change in appearance.

Initial Waste Analysis

Date: ____________ **WGR Number:** ____________ **WIT Number:** ____________

Required Verification Testing	**Results**		
pH by EPA Method 9040 or 9045	☐ ______		
Flash Point ASTM D93, D56	☐ ______		
Paint Filter Test Method 9095	☐ ______		
Cyanide	☐ ______	**(Method 9010)**	☐ ______**(Field Test Kit)**
Halogens	☐ ______	**(Method 9077)**	☐ ______**(Field Test Kit)**
Physical Description ASTM D4979	☐ **SEE BELOW**		

Color: ____

Turbidity:
- ☐ clear
- ☐ cloudy
- ☐ opaque

Viscosity:
- ☐ like water
- ☐ like syrup
- ☐ like molasses
- ☐ no visible flow

Physical State:
- ☐ liquid
- ☐ solid
- ☐ sludge
- ☐ powder
- ☐ granular

Particle size:
- ☐ fine
- ☐ medium
- ☐ coarse
- ☐ chunks
- ☐ free liquid?
- ☐ sorbents present?

Layering? ☐ If yes, describe below:

Top layer: % ________
- Color ____________________
- Turbidity ____________________
- Viscosity ____________________
- Physical state ____________________

Middle layer: % ________
- Color ____________________
- Turbidity ____________________
- Viscosity ____________________
- Physical state ____________________

Bottom layer: % ________
- Color ____________________
- Turbidity ____________________
- Viscosity ____________________
- Physical state ____________________

Obvious odor? ☐ If yes, describe: ____________________

Analyst: ____________________

Signature: ____________________ **Date:** ____________

WASTE PICK-UP REQUEST

Return completed form to TSDF Operations Bldg. 1051 by mail or e-mail form to global address: KYPT_TSDF Hazardous Waste
For assistance call ext. 6-7992 or 6-2320

Customer:	Code:	Bldg.:	Phone #:	Date:

SHADED AREAS to be filled out by the GENERATOR

WGR#	WASTE NAME	WIT#	% Split(s) / TPM Program Code	Container Type/Size	# contr's to be picked up	Waste Collector Use only # contr's picked up	Waste Handler Use Only # contr's received
			%/TPM# %/TPM#	/			
			%/TPM# %/TPM#	/			
			%/TPM# %/TPM#	/			
			%/TPM# %/TPM#	/			
			%/TPM# %/TPM#	/			
			%/TPM# %/TPM#	/			
			%/TPM# %/TPM#	/			
			%/TPM# %/TPM#	/			
			%/TPM# %/TPM#	/			
			%/TPM# %/TPM#	/			
			%/TPM# %/TPM#	/			
			%/TPM# %/TPM#	/			

NEW DRUM DELIVERIES NEEDED

SIZE	#	TYPE
55 GAL		
30 GAL		
10 GAL		
5 GAL		
3.5 GAL		
1.5 GAL		

EMPTY DRUM PICK-UPS

SIZE	#
55 GAL	
30 GAL	
10 GAL	
5 GAL	

OFFICE WASTE

Type	#

Before accepting for transport, the waste must be inspected to verify the following:

	Verified By:
The WDR(s) is/are not connected to a WGR that is due for re-profiling and re-verification.	
There is a WDR for each container of each type of waste.	
The WDR(s) is/are correct and complete.	
Container labels match the WDR.	
Containers are not leaking, are properly labeled and are approved containers.	

WASTE RECEIVED AT TSDF BY:	DATE:

COMMENTS: ____

VERIFICATION ANALYSIS

Date: ____________________
Pick-up Number: ____________________
WGR Number: ____________________
WIT Number: ____________________

Test		Results
ASTM D4979	☐	complete page 2
pH by Method SW846 9041A	☐	______________
Halogen Screen (oily waste)	☐	______________
Flammability Screen		

Waste Pick-up Preview

Does WGR require update? Yes:_______ No:_______

If yes, enter date of update prior to pick-up: _____________

Does waste require verification analysis? Yes:_______ No:_______

If yes, mark required analysis on page 2.
If No, check at least one of the following:

- ☐ Is not a dangerous waste per WAC 173-303 criteria.
- ☐ Waste is chemicals packaged in accordance with WAC 173-303-161.
- ☐ Waste is an empty container as defined in WAC 173-303-160.
- ☐ Waste is unused commercial product in its original container with MSDS.

Previewer: ______________________________________

Signature: ______________________________________

Date: ______________________

Verification Analysis Review (Complete after verification analysis on page 2 is completed)

Do verification analysis confirm waste ID? Yes: _______ No: _______

If No: a) Describe deviation:

b) Contact generator to resolve: Contact Date: ________________
Resolution:

c) If no resolution, sample for characterization:
Sample Number: ________________
Date to Lab: ___________________
Date Results Received: _____________________

New WGR Number: __________________
New WIT Number: __________________
New Profile Number: __________________
Date update to NEMS is complete: ___________________

Reviewer: ______________________________________

Signature: ______________________________________

Date: ______________________

PHYSICAL DESCRIPTION SCREENING OF WASTE per ASTM D-4979-95 (re-approved 2003)

9.1.1 Color: ____

9.1.2 Turbidity:
- ☐ clear
- ☐ cloudy
- ☐ opaque

9.1.3 Viscosity:
- ☐ like water
- ☐ like syrup
- ☐ like molasses
- ☐ no visible flow

9.1.4 Physical State:
- ☐ liquid
- ☐ solid
- ☐ sludge
- ☐ powder
- ☐ granular

Particle size:
- ☐ fine
- ☐ medium
- ☐ coarse
- ☐ chunks
- ☐ free liquid?
- ☐ sorbents present?

9.1.5 Layering? ☐ If yes, describe below:

Top layer: % ________
- Color ________________________________
- Turbidity ________________________________
- Viscosity ________________________________
- Physical state ________________________________

Middle layer: % ________
- Color ________________________________
- Turbidity ________________________________
- Viscosity ________________________________
- Physical state ________________________________

Bottom layer: % ________
- Color ________________________________
- Turbidity ________________________________
- Viscosity ________________________________
- Physical state ________________________________

9.1.6 Obvious odor? ☐ If yes, describe: ____

Analyst: ______________________________

Signature: ______________________________

Date: ________________

SECTION D

PROCESS INFORMATION

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PROCESS INFORMATION

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Appendix

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D. PROCESS INFORMATION

WAC 173-303-160(2); -190(2), (3); -340(3); -395; -630; -640; -690; -691; -692; -806(4)(a)(viii)-(x)(i), (b), (c), (j), (k), (m)

D1. INTRODUCTION

Industrial processes at NBK Keyport generate large quantities of a variety of hazardous waste. These wastes are collected at the various Central Accumulation Areas and satellite sites and transported to the Treatment, Storage and Disposal (TSD) Facility for storage, processing, and disposal. Waste categories managed at the TSD Facility are acids, caustics, cyanides/sulfides, organic, oxidizers, flammables, toxics, reactives, and non-hazardous wastes.

D2 CONTAINERS

WAC 173-303-160(2); -190(2)(3); -340(3); -395; -630; -690; -691; -692; -806(s)(viii)-(x)(i), (b), (k), (m), and 4(b)

Containers that are stored inside the TSD Facility are stored in segregated and enclosed storage areas. Each storage area has spill containment, fire flow containment, ventilation, and fire rated construction. The storage capacity for containerized dangerous waste inside the TSD Facility is 67,925 gallons.

The waste type, room number, and total liquid capacity for each inside storage area are shown in Table D1-1.

Table D1-1. Inside Container Storage Area Designations and Storage Capacity

Waste Type Designation	**Room Number**	**Container Size (Gal)***	**Drum Quantity***	**Total Liquid Capacity (Gal)**
Receiving	123N	Up to 550	62	3,410
DOT Class 9 (Other regulated materials)	123S	Up to 550	192	10,560
WAD	123M	Up to 550	40	2,200
Organic Peroxides DOT Class 5.2	125	Up to 55	6	330
Oxidizers DOT Class 5.1	129	Up to 55	9	495
Acids DOT Class 8 (a)	130	Up to 550	36	1,980
Reactive when wet and compatible materials DOT Class 4.3	131	Up to 55	340	18,700
Toxic DOT Class 6.1 (or by subsidiary hazard class)	132	Up to 55	6	330
Toxic DOT Class 6.1 (or by subsidiary hazard class)	133	Up to 55	4	220
Flammable/Combustibles DOT Classes 3 and 4.1	134	Up to 550	144	7,920
Flammables 1A DOT Class 2/Compressed Gases (all hazard classes)	136	Up to 55	60	3,300
Universal Waste	137	150	12	660
Caustics, DOT Class 8 (b)	138	Up to 150	24	1,320
Used Oil Class 3 (a)	139	Up to 55	30	1,650
DOT Class 9 (Other regulated materials)	140/19	Up to 55	100	5,500
Shipping	140S	Up to 55	220	9,350
Total Gallons Storage				**67,925**

* “Container Size” and “Drum Quantity” are provided to derive equivalency. Different container sizes and quantity may be placed in these container management areas, but the “Total Liquid Capacity” for the area will not be exceeded.

Containers that are stored outside in the bulk storage area under the roofline within the East Storage location will be a new storage location that will add to our overall storage capacity. This area will be able to store construction debris in 40 yd roll-offs and/or portable containers with secondary containment with a maximum storage capacity of 17,035 gallons. In addition, there is a WAD isolated accumulation area used for contingency purposes with a storage capacity of 220 gallons. Therefore, the total container storage capacity for the facility has increased to 85,180 gallons (17,255 outside + 67,925 inside). This value increases our storage capacity to less than 25% of the original capacity.

D2.1 DESCRIPTION OF CONTAINERS

WAC 173-160(2); -630(2), (4)

Containers meet the Non-bulk Performance-Oriented Packaging Standards as described in 49 CFR 178.500-600. The most common containers received at the TSD Facility are 55-gallon steel drums used for solid and liquid wastes. Both new and reconditioned drums are used at the TSD Facility. Large portable containers (between 150 and 550 gallons) are less frequently used. Examples of specification data for large portable containers are shown in Appendix D1 (Portable Tank Specifications). Additionally, roll-off dumpsters received at the TSD Facility are all DOT certified containers.

Empty 55-gallon drums are ordered when the stock-on-hand drops to 50 units. Generally, this leaves a minimum of 30 drums when replacements arrive. A minimum of eight 85-gallon and five 110-gallon salvage drums are kept in stock. A minimum of two clean spare portable containers of each type and size are kept in stock at all times.

D2.2 CONTAINER MANAGEMENT PRACTICES

WAC 173-303-340(3); -395(4); -630(5), (6), (8), (9), (11); -692(2); -806(4)(a)(viii), (b)

Container storage areas are used for storage of wastes in segregated areas compatible with other wastes as shown in Table D1-2.

A flow diagram of container storage operations is shown in Figure D1-1. Containerized waste is collected as requested from waste generation processes at various NBK Keyport accumulation areas.

D2.2.1 RECEIVING

Containers arrive at the north end of the TSD Facility (see Part A, Attachment B, TSD Facility General Layout Drawing). All drum or pallet handling/loading is typically accomplished with a forklift utilizing a drum handling attachment, or pallet jack. The containers are moved to the receiving area inside the TSD Facility. Upon arrival, containers are inspected, separated by rows a minimum of 30 inches apart according to their compatibility class as defined in Table D1-2, and perform re-verification according to Section C (Waste Analysis). Containers may remain in the receiving area for no longer than 24 hours. Once processed (weighed, inventoried, etc.) the containers are palletized and stored on pallet racks within the various enclosed storage areas.

The TSD Facility does not receive dangerous waste from off-station unless there is a current waste profile on file at the TSD Facility. The TSD Facility will submit an unmanifested waste report meeting the requirements of WAC 173-303-390(1) if the TSD Facility receives a waste shipment that is not properly manifested. The TSD Facility receives undesignated wastes on an emergency basis, such as from a spill event or the discovery of a container of unknown material on the NBK Keyport property. Each waste container of undesignated waste is placed in the 'Waste Awaiting Designation' (WAD) area located within Room 123, south of receiving area. Liquid waste in WAD is placed in a dedicated secondary containment. Storage timeframe of waste in the WAD area is typically 30 days in duration.

Unless a WAD is suspected to be 'reactive when wet', it is moved to the WAD area of the TSD Facility until the profile is complete, at which time the waste is logged in as set forth above and transferred to the appropriate segregated storage area. Wastes suspected to be 'reactive when wet' are immediately transferred to Room 131, the 'reactive when wet and compatible materials' segregated storage area upon receipt into the TSD Facility.

Containerized wastes may be received at the TSD Facility from other Department of Defense activities in the Puget Sound region such as NBK Bremerton, NBK Bangor, Puget Sound Naval Shipyard, Ft Lewis, etc. providing there is a current waste profile on file at the TSD Facility. Prior to receipt, a profile from the sending station describing the waste stream in detail will be sent to the TSD Facility. Once waste designation has been completed as required in Section C (Waste Analysis) the containers may be received at the TSD Facility. Wastes are offloaded and enter the TSD Facility in the same manner as on-station wastes described in the paragraph above.

Dangerous waste containers arriving in the receiving area of the TSD Facility are visually examined for legible and proper labeling, structural integrity, and leakage. The containers are also inspected to ensure they are sealed and closed to prevent air emissions in accordance with the requirements of 40 CFR 264.1086 (c) (4) (i). Container condition is also assessed during daily inspections and during daily operations. Additionally, containers in the receiving area, storage compartments, and shipping area are inspected daily for leaks. If a container shows signs of leakage, rusting, or structural defect, the contents are put into a replacement drum or the container is moved into a salvage drum. Emptied damaged drums are rinsed and compacted or shredded for shipment off-station. If a spill or leak of a container occurs, the incident is recorded and addressed as described in Section F (Procedures to Prevent Hazards).

The receiving area is capable of holding a maximum of 62 – 55-gallon drums at one time. Within the receiving area, wastes are segregated, consolidated and logged according to the storage method as set forth below and shown in figure D1-1. Containers in the receiving and storage areas remain closed at all times, except when sampling, adding, or removing waste. Only trained Dangerous Waste Handlers perform the segregation and consolidation tasks.

Bulk outside storage at the TSD Facility is located under the roofline in the East Storage area; see Part A, Attachment B – TSD Facility General Layout. Containers consisting of large roll-off dumpsters and large portable containers received at the TSD Facility may be stored in this area. Roll-off dumpsters are required to have no free flowing liquids and large portable containers in this area are required to have secondary containment.

D2.2.2 SEGREGATION

Items for segregation are received at the TSD Facility in drums and bags, and metal, glass, plastic and carton containers.

The following segregation processes take place at the TSD Facility:

TRANSFERS

This process takes place in the receiving area and is strictly reserved for containers that do not require any repackaging to move from receiving to the segregated storage areas. Containers are logged in and inspected for condition and labeling requirements. If required, labeling is corrected/updated/replaced, and the container is moved to the appropriate segregated storage area. Information, including the date the waste container was accepted into TSD Facility, the Waste Identification Tracking (WIT) Number, and any other information listed in Section D2.3 not already on the label is added.

Segregation of solid waste streams along with trash and recyclable items are separated and sent to solid waste or recycled.

OVERPACKING

This process takes place in the receiving area. A container that has been found to be in leaking, poor or otherwise unacceptable condition is placed in a larger container without opening the original container. The new outer container is logged in, labeled, and moved to the appropriate segregated storage area. If a container is found to be leaking in any other TSD Facility area, the overpacking process can take place in that area.

LAB PACKING

This process takes place in the segregated storage areas. Lab packs are packaged according to the requirements of WAC 173-303-161 and the Department of Transportation (DOT) in CFR Title 49-173(12). Lab packs contain wastes of potentially different Waste Generator Record (WGR) numbers but in the same compatibility class (see Table D1-2). When constructing the lab pack and determining which materials may be packaged in the same container, compatibility, packaging requirements, and DOT hazard classes require that only compatible materials from the same hazard class be packaged and shipped in a common shipping container. The DOT list of hazard classes is found in 49 CFR 172.101. Lab packs are constructed with a compatible absorbent material in sufficient quantity to separate the items, prevent breakage, and absorb all free liquid within the container if breakage should occur. Wastes that are combined in a single container remain in their individual intact and unopened containers.

GENERAL

In the receiving area, solid waste, trash and recyclables are separated and sent to solid waste or recycle for disposal.

Table D1-2. Waste Incompatibility matrix

<u>IN</u>compatibility Class*	Flammables (3, 4.1 & 4.2)	Oxidizers/Organic Peroxides (5.1 & 5.2)	Class 9 / Compressed Gases (all hazard classes)	Corrosives - Acids (8a)	Corrosives - Bases (8b)	Cyanides / Sulfides (8c)	Reactive When Wet and compatible materials (4.3)	Poisons* (6.1 other than PGI Zone A, and not including cyanides / sulfides listed above
Flammables (3, 4.1 & 4.2) Room 134		X		X	X		X	
Oxidizers (5.1) Room 129	X			X		X	X	
Organic Peroxides (5.2) Room 125	X			X		X	X	
Compressed Gases (all hazard classes) Room 136 **	X							
Corrosives - Acids (8a) Room 130	X	X			X	X	X	
Corrosives - Bases (8b) Room 138	X			X			X	
Reactive When Wet and Compatible Materials (4.3) Room 131	X	X		X	X	X		
Toxics Room 132 ** and Room 133								
Class 9 Room 123S; Room 140/19								

*Compatibility is based on 49 CFR 174.81 and 40 CFR, Part 264; Appendix V. Materials will be segregated by their primary hazard class. The requirements of this table do not apply to containerized materials packaged such that an outer container provides secondary containment and segregation (e.g., lab packs, overpacks, etc.)

An "X" designates that materials are <u>**IN**</u>compatible. Incompatible materials must be placed in separate container storage rooms. Incompatible materials must be staged in separate rows a minimum of 30 inches apart in the receiving area and shipping area.

** Except when there is a subsidiary hazard class, the waste will be segregated according to that class.

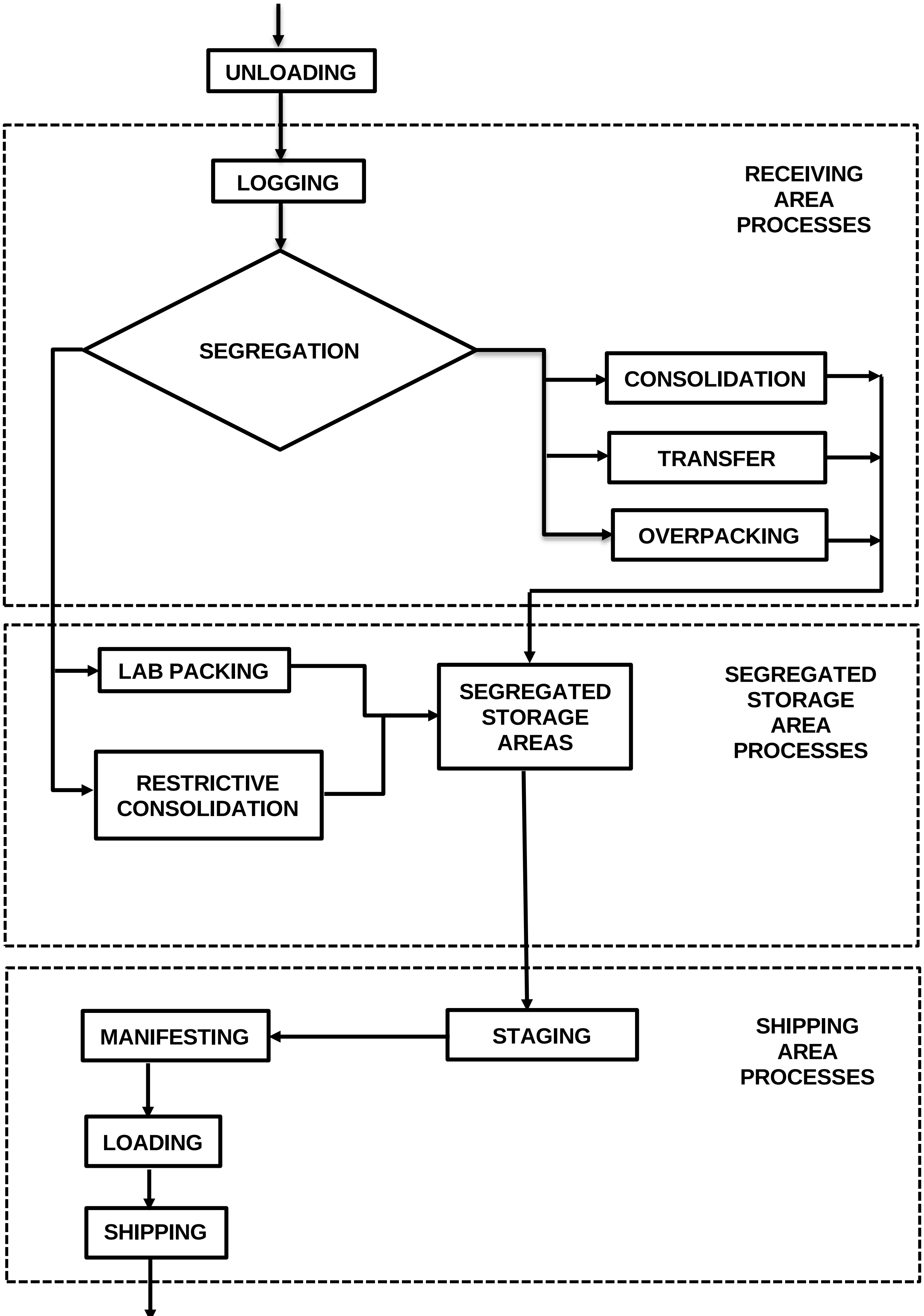

Figure D1-1, Container Storage Operations at the TSDF

D2.2.3 CONSOLIDATION

Consolidation takes place in Room 128, the drum wash area. Latex paints and associated compatible products, and oil-based paints and associated compatible products, are consolidated in dedicated drums. Aerosol cans, and pint through 5-gallon containers are punctured and drained into an open-top drum. The VOCs and propellants are captured and removed from the exhaust with a pair of carbon filters in series before venting outside the TSD Facility. See Part A, Attachment B (TSD Facility General Layout Drawing) for the exact location of this consolidation area, and Appendix D2 (Paint Consolidation Details) for details of equipment used in this consolidation process, including carbon filter breakthrough indicator calibration and filter change-out procedures. The waste paint containers are only open when placed in the paint can crusher and while it is in operation.

Drums are prepared for shredding in room 128. Residues from waste containers are consolidated in a bung drum next to a fume hood, using a 'Burpless' funnel, designed to meet the requirements of 29 CFR 1910.106(e)(2)(i). The funnel has an extension that fills the drum from the bottom, minimizing VOC generation during filling, and a lid to seal in VOCs when not in use. Waste is emptied so that the container is "empty" as defined in WAC 173-303-160(2). The consolidation container is sealed and moved to the appropriate storage location after the transfer process is complete. Fumes from the fume hood are vented outside. If the bung cannot be removed, the top of the drum will be removed using the drum de-header. Bung drums with the top removed and open-top drums are washed in an enclosed industrial drum washer. Wastewater from the drum washer is collected and shipped for disposal. Decontaminated drums are recycled or shredded in the drum shredder under the east canopy adjacent to room 128.

Consolidation also takes place within receiving and in each of the storage areas within the TSD Facility. Wastes received from accumulation areas onsite throughout the facility have been prepackaged for safe handling. Examples of such wastes received includes but is not limited to liquids sealed inside glass, metal or plastic containers placed in plastic zip-lock bags for secondary containment, and solids placed in plastic zip-lock bags prior to shipping from an accumulation site. Shipments are not received from the accumulation site unless prepared as required by the Waste Disposal Request (WDR). Pre-packaged wastes received from accumulation areas onsite meeting WDR requirements are not opened at the TSD Facility unless required for verification testing per Section C (Waste Analysis) and are then placed directly in the consolidation container in the appropriate storage area immediately after inspection and logging in at the receiving area.

Drum compaction takes place in the receiving area and on the northeast end of the facility within the East Storage area.

Drums are stored in segregated storage areas. A minimum 30-inch separation between aisles of containers is maintained at all times in the receiving, storage, and shipping areas. Rows of drums are not more than two containers wide. Drums are placed so all labels are visible from the aisle. With the exception of the Toxic and Organic Peroxides storage areas, and Class 9 room 140 - storage site 19, drums are placed on pallets, which are stored in pallet storage racks at two pallets per shelf. Pallet storage racks consist of three levels. The lower two levels are used to store palletized drums. With the exception of Class 9 room 140 - storage site19, drums or pallets are not stacked directly on top of each other. Fifty-five gallon drums are stored at up to four per pallet and 30-gallon drums are stored at up to five per pallet.

As many as four portable containers with a capacity of up to 550 gallons each may be stored on the floor in the receiving area (room 123), the acids storage area (room 130), and the flammables storage area (room 134). Portable storage containers up to 330 gallons may be stored in the used oil storage area (room 139) or the caustics storage area (room 138).

Part A, Attachment B, (TSD Facility General Layout Drawing) contains a detailed floor plan of the TSD Facility and illustrates the location, designated waste type, and room number of each storage area and the container receiving and shipping areas. The storage areas are designated according to waste compatibility as defined in Table D1-2.

In the Oxidizer storage areas, four shelf storage racks are used to store small items, and drums are placed on steel grates over the sumps. All wastes are stored in such a manner that they can be inspected from ground level.

A portion of room 140 has been set aside for the storage of a maximum of 120 – 55-gallon fuel contaminated solids and empty fuel contaminated drums (empty by RCRA definition). See Part A, Attachment B, (TSD Facility General Layout Drawing) for the exact location of this delineated area referred to elsewhere Class 9 room 140 - storage site19 or 140/19. The storage volumes of this site have been taken into account when calculating overall TSD Facility storage capacity and secondary containment requirements. Storage of Class 9 is compatible with all hazardous wastes staged in room 140S (shipping area) because it is compatible with all other storage classifications in Table D1-2. Exclusive to this storage site, drums are double-stacked, with one pallet on the floor and one pallet between the levels. Only one-size drums are stored in each double stack, for example, only 55-gallon drums are stacked with other 55-gallon drums in a double stack and only 30-gallon drums are stacked with other 30-gallon drums in a double stack. The empty drum storage area may also be utilized as a storage space for silver-zinc batteries. The batteries are managed as Universal Waste in accordance with WAC 173-303-573. The allowable quantity of all items, including batteries, will remain below Table D1-1 capacity limits at all times.

Room 131, the ‘reactive when wet and compatible materials’ storage area is used to store non-flammable materials compatible with ‘reactive when wet’ materials and wastes. These materials include, but are not limited to aluminum, cadmium, chromium, cobalt, copper, lead, lithium, magnesium, mercury, nickel, steel, tin, titanium, zinc, and alloys of these non-flammable materials.

To minimize spills that could occur during container handling, the building design features flat, level surfaces and forklift travel aisles, as well as shallow, straight ramps. In addition, there is ample maneuvering space and wide doors for safe transport of palletized drums. The storage racks are secured by anchor bolts embedded in the concrete floor and each shelf is of the appropriate size needed to accept palletized containers safely and securely. The racks are rated for 3,000 pounds per pallet and will accommodate two pallets per shelf. Two-shelf racks are designed so that drums are 1 and 6 feet above the floor.

The forklift drum handling attachment is designed to safely transport individual drums without creating unnecessary stress and strain on the drums and prevents ruptures and leaks. Drum dollies are occasionally used for the safe transport of containers.

D2.2.4 SHIPMENT

When dangerous waste is ready to be disposed offsite, the receiving TSD Facility and transporter are contacted and shipping documents prepared.

Containers are then staged in Room 140S (room 140 - shipping area) for inspection and prepared 24 hours in advance of a scheduled shipment. This area has a holding capacity for a maximum of 220 – 55-gallon containers. A minimum 30-inch separation between aisles of containers is maintained at all times in room 140S. The drums are loaded at the covered shipping dock at the south end of the TSD Facility for off-station disposal in accordance with the manifest. Incompatible materials must also be staged a minimum of 30 inches apart and in separate rows on the shipping dock.

If a shipment is delayed due to unforeseen circumstances (unexpected absence of personnel, equipment breakdown, delay of transport truck) after the shipment has already been staged in room 140S, the shipment will be held in room 140S for up to 72 hours so the shipment can take place without undue movement of the dangerous wastes. If the delay cannot be resolved within 72 hours, waste will be segregated again, as necessary, by placing containers back into their original storage areas. Any shipments held for more than 24 hours in room 140S will be recorded in the incident record.

The manifest and packing list includes the following information:

1. Drum numbers
2. Transportation manifest number
3. Name of transporter
4. DOT hazard class and identification number for the drums
5. EPA identification number
6. A description of each individual container which includes:
    a. Chemical name of all compounds and mixtures
    b. Physical state of each item
    c. Size and type of each item
    d. Amount of material in each item
    e. EPA/WDOE waste number
    f. Reportable Quantity
    g. LDR Certifications as needed

Lab packs containing material identified in 40 CFR 268 as a Land Disposal Restricted (LDR) waste must have the LDR certification accompany the load and manifest.

D2.3 CONTAINER LABELING

WAC 173-303-395(6), -630(3), -806(4)(b)(iii)

Containers are labeled with the following information:

1. Date waste container was accepted into TSD Facility
2. Waste Identification Tracking (WIT) Number
3. The words 'Hazardous Waste' or 'Dangerous Waste' and Hazard Class. Containers used to hold non-dangerous waste will be labeled as such.
4. UN/NA Number
5. Shipping Name
6. EPA/WDOE Number(s)
7. WDOE Designation
8. Generator's Name and Address
9. DOT Major Risk Label(s)
10. "Dangerous Waste" label

In addition to the above labeling required on containers in storage, the Manifest Document Number is added to the label prior to waste shipment.

Labels are legible and/or recognizable from a distance of twenty-five feet or the lettering size is a minimum of one-half inch in height. The labels are not removed unless the dangerous waste is transferred from the labeled container to another container. Labels are immediately removed and destroyed from empty containers unless the container will continue to be used for storing the same dangerous waste at the TSD Facility. If labels cannot be removed from the empty container, they are painted over. A previously used container is not used to store a different or incompatible dangerous waste. Labels are displayed in accordance with 49 CFR 172.304 and WAC 173-303-395(6) and 630(3) and are inspected for legibility during daily inspections.

Upon preparation of dangerous waste for shipping, container labels are inspected to verify labeling is correct in accordance with 40 CFR 262.31 and 262.32 and WAC 173-303-190, 395(6), and 630(3).

D2.4 SECONDARY CONTAINMENT REQUIREMENTS FOR STAGING, STORING, AND PROCESSING DANGEROUS WASTE CONTAINERS

WAC 173-303-630(7); 806(4) (b)

The loading area is covered and has a slotted drainage trench that contains any spills should they occur.

D2.4.1 SECONDARY CONTAINMENT SYSTEM DESIGN FOR CONTAINERS

This section provides design and construction information that demonstrates that the container storage areas of the building are capable of containing leakage from tanks and drums and containing major and minor spills. Operational information demonstrating that containers are kept from contact with standing liquids and are properly stored and maintained is also provided.

D2.4.2 SYSTEM DESIGN

Part A, Attachment B, (TSD Facility General Layout Drawing) contains floor plans of the container storage and handling areas. There are three types of concrete slabs used in the storage areas of the TSD Facility. A Type “D” slab is used in the following segregated storage areas: ‘Reactive when wet and compatible materials’, Acids, Flammables, Flammables 1A, Toxics, and Oxidizers. The Type “D” slab is 15½-inch thick reinforced concrete on 12 by 30 inch reinforced concrete grade beams on concrete pile and pile caps at 9 feet on center. A Type “B” slab is used in the Organic Peroxides,, Used Oil, Caustics, and Universal Bulbs segregated storage areas. The Type “B” slab is 14 inch thick reinforced concrete on 12 by 36 inch reinforced concrete grade beams on concrete piles and pile caps at 9 feet on center. A Type “E” slab is used in the Bulk Storage area and is 8-inch thick reinforced concrete on 12 x 28 inch reinforced concrete grade beams on concrete pile and pile caps at 9 feet on center. See Appendix D3 (TSD Facility Floor Plans and Details) for cross sections of both concrete floor slab designs. The concrete used meets the requirements for Structural Concrete for Buildings, 1989, per ACI-301 and Building Code Requirements for Reinforced Concrete, 1992, per ACI-318. The compressive strength for the floor slabs, grade beams, and piles and pile caps is 4,500 psi, 4,000 psi, and 3,000 psi, respectively. The concrete is reinforced with ASTM Grade 60 (number 5 sizes and larger) and ASTM Grade 40 (number 4 sizes and smaller) bars.

All container handling and storage areas are protected from weather. The receiving, shipping, and storage areas are protected within the enclosed TSD Facility structure. Bulk storage and empty containers within the east storage area is protected by a roof. Since there are no uncovered storage areas in the TSD Facility, additional volume of precipitation from a 25-year storm or 24-hour duration per WAC 173-303-630 (7) (a) and 173-303-806(4)(b)(i)(A) does not apply. All downspouts on the east, south, and west sides of the building are piped directly into the underground storm water drainage system. Downspouts for the north canopy drain onto the pavement outside the fenced area, away from the TSD Facility.

Construction features contain leaks and spills within each segregated storage compartment. Application of a non-shrink grout covered with a sealant provides an effective watertight seal between the segregated storage compartments. All concrete joints have built in water stops (See Appendix D3, TSD Facility Floor Plans and Details).

The floors of the segregated storage areas, the receiving area, and the shipping area are coated with special sealers. All areas are first coated with concrete sealer. Most areas are then treated with an epoxy matrix. The 'Reactive when wet and compatible materials' storage area is treated with a second coat of concrete sealer. Table D1-3 shows the specific coating for each area. The specifications and chemical resistance of each coating is found in Appendix D4 (Floor Coating Specifications). The sealers are compatible with the type of waste in each storage area.

Containment is provided in the Oxidizer, Toxic, and Organic Peroxide storage areas by segregated blind sumps. See Part A, Attachment B, (TSD Facility General Layout Drawing), for exact locations. All sumps are coated with epoxy matrix.

The condition of the coating is maintained and is reapplied as necessary per manufacturer instructions.

Table D1-3. Floor Coatings for Interior Container Storage and Handling Areas

Room Name	Room #	Floor Coating
Receiving Area	123N	Epoxy Matrix
Class 9	123S	Epoxy Matrix
WAD	123M	Epoxy Matrix
Organic Peroxides	125	Epoxy Matrix
Oxidizers	129	Epoxy Matrix
Acids	130	Epoxy Matrix
Reactive when wet and compatible materials	131	Sealer
Toxic	132	Epoxy Matrix
Toxic	133	Epoxy Matrix
Flammable/Combustible	134	Epoxy Matrix
Flammable 1A/compressed gases	136	Epoxy Matrix
Universal Waste	137	Epoxy Matrix
Caustics/cyanide/sulfide	138	Epoxy Matrix
Used Oil	139	Epoxy Matrix
Class 9	140/19	Epoxy Matrix
Shipping	140	Epoxy Matrix

D2.4.3 STRUCTURAL INTEGRITY OF BASE

The base of each storage room was designed to accept building codes in existence at the time the TSD Facility was designed and constructed as described in Section D2.4.2. The entire building was designed and constructed under the purview of licensed Professional Engineers in the employment of the architectural engineering firm SJO Consulting Engineers of Portland, OR. The

PE signature for the entire drawing package is shown on the legend and notes sheet included in Appendix D3 (TSD Facility Floor Plans and Details).

D2.4.4 CONTAINMENT SYSTEM CAPACITY

Each interior storage compartment is designed to contain at least 10 percent of the total volume of all containers or the volume of the largest container, whichever is greater (WAC 173-303-630 (7) (a) (iii)). The capacity of the containment for each segregated storage area is summarized in Table D1-4 with supporting calculations provided in Appendix D5 (Containment Calculations). See Part A, Attachment B, (TSD Facility General Layout Drawing) for dimensioned drawings of all rooms in the TSD Facility. Room 126 and the area under the canopy east of the building will not be used to store dangerous wastes.

Table D1-4. Containment for Interior Container Storage

Room Name	Room #	Total Liquid Storage Capacity (gallons)	Containment Capacity Required (gallons)	Containment Capacity Provided (gallons)
Receiving	123N	3,410	341	9,346
Class 9	123S	10,560	1056	9,346
WAD	123M	2,200	220	9,346
Organic Peroxides	125	330	55	1,040
Oxidizers	129	495	55	296
Acids	130	1,980	550	3,804
Reactive when wet and compatible materials	131	18,700	1870	15,222
Toxic	132	330	55	1,118
Toxic	133	220	55	1,118
Flammables/Combustibles	134	7,920	792	4,350
Flammable 1A/compressed gases	136	3,300	330	4,308
Universal Waste	137	660	150	480
Caustics	138	1,320	150	480
Used Oil	139	1,650	165	1052
Class 9	140/19	5,500	550	1,359
Room 140S (Shipping)	140S	9,350	935	7,000

The following storage areas have been designed with sloping floors:
Acids, Flammable/Combustible, Flammable 1A, Caustics, and Used Oil. Spilled liquids collect in the lowest point of the room. The liquid can then be removed using a portable pump and absorbent pads. Containment by blind sumps is provided in the Toxic and Oxidizers segregated storage areas. Locations of these sumps are shown in Part A, Attachment B, (TSD Facility General Layout Drawing), and secondary containment volume calculations are shown in Appendix D5 (Containment Calculations).

In both the receiving/Class 9 and shipping areas, containment is provided by the inclined floor design. The receiving/Class 9 area, which can hold a maximum of 254 drums, or 13,970 gallons of liquid capacity, has containment of 9,346 gallons. The shipping area, which can hold a maximum of 290 drums, or 15,950 gallons of liquid capacity, has containment of 11,941 gallons. Calculations for these secondary containment volumes are shown in Appendix D5 (Containment Calculations).

The TSD Facility is designed for 20 minutes of fire flow containment. The fire flow containment basins are uncovered and located on the west side exterior of the building. See Part A, Attachment B (TSD Facility General Layout Drawing) for locations of these sumps, and Appendix D5 (Containment Calculations) for secondary containment volume calculations. The containment basin areas have a flexible, high-density polyethylene membrane liner installed beneath the layer of drain rock, with a 2-inch layer of sand above and below the membrane liner. The liner adds an extra level of protection against possible future cracking of, and leakage through, the concrete. Performance specifications of the flexible membrane liner are found in Appendix D6 (Flexible Membrane Specifications). The basins are coated with concrete sealer and epoxy coating. The specifications and chemical resistance of each coating is found in Appendix D4 (Floor Coating Specifications). During normal operation, valves in the pipes that drain to the storm system remain open so that rainwater collected in the containment basin drains to the storm system. In the event of a fire, the valves close automatically to contain fire flow.

Additional safety design features are related to containment of spills in the segregated storage areas. The pallet racks are constructed so that the bottom of a drum on the lowest shelf is one foot above the floor level, preventing contact with liquid in the containment. The racks have wire decks to provide interior waterfall, in the event of a fire, without pooling of sprinkler water on the shelves.

The area containment surfaces and fire flow/spill containment sump surfaces are free of cracks or gaps and are inspected for cracks or damage as set forth in Section F (Procedures to Prevent Hazards).

D2.4.5 CONTROL OF RUN-ON

Most entrances into the building are elevated for truck loading/unloading. Those entrances that are level with the surrounding parking/shipping area are sloped away from the building to prevent run-on. There are no upslope areas near the building. The TSD Facility is designed to eliminate any run-on from a 25-year, 24-hour storm.

D2.4.6 REMOVAL OF LIQUIDS FROM CONTAINMENT SYSTEM

WAC 173-303-630(7)(a)(ii); -806(4)(b)(i)(E)

Containment sumps and floors are inspected daily for stains and/or spills. Spilled dangerous waste collected in the sumps is removed from the sump using a portable pump immediately following inspection. Refer to Section F (Procedures to Prevent Hazards). Procedures for spill response are dependent on the volume and type of waste spilled. Refer to Section G (Contingency Plan), for details of spill response of container spills and leakage.

D2.4.7 DEMONSTRATION THAT CONTAINMENT IS NOT REQUIRED BECAUSE CONTAINERS DO NOT CONTAIN FREE LIQUIDS, WASTES THAT EXHIBIT IGNITABILITY OR REACTIVITY, OR WASTES DESIGNATED F020–023, F026, OR F027

WAC 173-303-630(7)(c); -806(4)(b)(ii)

Containment is provided for all containers at the TSD Facility with one exception. Roll-off dumpsters that contain construction debris not containing free liquids are stored on a slope reinforced concrete floor under the East Storage roofline. Containers will not be impacted with precipitation or standing water in this area.

D2.5 PREVENTION OF REACTION OF IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTES IN CONTAINERS

D2.5.1 MANAGEMENT OF REACTIVE WASTES IN CONTAINERS

WAC 173-303-630(8)(a); -806(4)(b)(iv)

Reactive wastes are stored in containers in segregated storage areas. Waste characteristics are identified and documented through the Waste Generation Record and WIT number. Section C (Waste Analysis), has additional details of these documents. Wastes received from off-station will have been profiled before transfer to the TSD Facility as set forth in Section C (Waste Analysis), and will be stored in the segregated storage areas based on table D1-2. Accidental reaction of these wastes is prevented by the following practices, including, but not limited to: protection from sources of open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks, spontaneous ignition, and radiant heat. While reactive waste is being handled, the operator confines smoking and open flame to specially designated locations. “No Smoking” signs are conspicuously placed wherever there is a hazard from reactive waste and smoking is prohibited inside the building.

Containers holding reactive wastes are a minimum of 50 feet from the property line. Explosives, as identified in WAC 173-303-090 (7) (vi), (vii), and (viii), are not managed at the TSD Facility. Therefore, the requirements for storage of these wastes are not applicable.

The Flammable 1A compartment is designed in compliance with explosion venting requirements per Military Handbook 1032/4.4.4, 3.3.4, Uniform Building Code 910, NAVFAC DM 32.03, and Table 8, NFPA 68. The explosion venting is located on the south wall of the storage compartment.

The ‘Reactive when wet and compatible materials’ storage area is designed so that water cannot enter from the outside or from adjacent storage areas within the building. The storage area has a leak-free roof, a recessed flat concrete floor with no floor drains, and protection at the door opening so that water will not run in. Raindrop sills on the exterior doors further prevent water from entering the area. Automatic sprinklers are not present, and no other water lines pass through the space. Fire protection is provided according to NFPA 485-A94 TCR by two copper extinguishing equipment carts located just outside the storage area.

There are two types of access doors for the ‘Reactive when wet and compatible materials’ storage area: three overhead doors to provide forklift access and six personnel swing type exit doors. The personnel exit doors are 3-hour fire rated and constructed of steel. Access is not possible from the exterior of the area, and the doors are equipped with panic bars for exit from the interior of the area. The overhead doors are 3-hour fire rated.

The ‘Reactive when wet and compatible materials’ storage room was designed to the requirements of the UFC 80.310 (a) (1) through (10) for indoor storage of water reactive materials. Detached storage is required if the amount of storage of Class 2 reactive ‘Reactive when wet’ material exceeds 50,000 pounds. The ‘Reactive when wet and compatible materials’ storage area has a capacity of 900, 30-gallon drums.

The ‘Reactive when wet and compatible materials’ storage room has humidity monitoring and adequate ventilation to prevent the build-up of gases. Room ventilation is designed to ensure negative pressure.

See Part A, Attachment B, (TSD Facility General Layout Drawing) for drawings of the ‘Reactive when wet and compatible materials’ storage area and Appendix D3 (TSD Facility Floor Plans and Details) for Professional Engineer (PE) certification of the design.

D2.5.2 MANAGEMENT OF IGNITABLE AND CERTAIN OTHER REACTIVE WASTES IN CONTAINERS

WAC 173-303-630(8)(b); -806(4)(b)(iv)

Ignitable wastes are stored in containers in segregated storage areas. Waste characteristics are identified and documented. Refer to Section C (Waste Analysis) for a more detailed description of waste identification and documentation procedures. Accidental ignition of these wastes is prevented by the following practices, including, but not limited to: protection from sources of open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks, spontaneous ignition, and radiant heat. While ignitable waste is being handled, the operator confines smoking and open flame to specially designated locations. “No Smoking” signs are conspicuously placed wherever there is a hazard from ignitable waste; additionally, smoking is prohibited inside the building.

All interior storage compartment walls are 4-hour fire rated walls and the exterior walls of the building are 2-hour fire rated walls. The roof is 2-hour fire rated. All storage compartments have two exits. The separation design criterion exceeds that of the Uniform Fire Code and the Uniform Building Code.

Fire inspections required by WAC 173-303-395 (1) (d) are performed as detailed in Section F (Procedures to Prevent Hazards).

See Part A, Attachment B (TSD Facility General Layout Drawing) for drawings of the ignitable wastes storage area and Appendix D3 (TSD Facility Floor Plans and Details) for PE certification of the design.

D2.5.3 DESIGN OF AREAS TO MANAGE INCOMPATIBLE WASTES

WAC 173-303-630(9)(c); -806(4(b)(iv)

Incompatible wastes are not placed in the same container or in unwashed containers. Incompatible wastes in containers are stored in segregated storage areas. The storage areas are based upon the DOT hazard classes per 49 CFR 173 and table D1-2. The segregated areas are separated by walls designed to prevent leakage into adjacent rooms. See Part A, Attachment B, (TSD Facility General Layout Drawing) for drawings of the storage areas and Appendix D3 (Floor Plans and Details) for PE certification of the design.

Verification procedures in Section C (Waste Analysis) conducted at the time a waste stream is accepted to the TSD Facility, verify the identity of the received waste stream. Wastes generated by new processes, permitted for storage at the TSD Facility, are stored in container storage areas after profiling as set forth in Section C (Waste Analysis) to ensure compatibility with the existing waste streams in the container storage area. Should spills occur in multiple segregated storage areas simultaneously, the secondary containment basins are designed so that overflow maintains segregation of incompatible wastes.

D3 TANK SYSTEMS

WAC 173-303-395(6); - 640; -806(4)(c)

This section provides TSD Facility tank system and secondary containment design, construction, and operational information. Tables D2-1, Storage Tanks, and D2-2, Tank Storage Waste Types by Tank, provide information on the tank capacities and types of wastes stored in the tanks. The WIT numbers listed in table D2-2, reflect the wastes that can be stored in these tanks. These existing waste streams have been consolidated in tanks in the past and are proven compatible with one another. Verification procedures in Section C (Waste Analysis) conducted at the time a waste stream is accepted to the TSD Facility will verify the identity of the waste stream. Wastes generated by new processes may be stored in these tanks after profiling, as set forth in Section C (Waste Analysis) to ensure compatibility with the existing waste streams in the receiving tank. The locations of the tank systems in the TSD Facility are shown in Part A, Attachment B (TSD Facility General Layout Drawing).

Table D2-1. Storage Tanks

TSD Facility Site Name	Name	Function	Total Capacity (Gal)
TSD -101	Bulk Storage Waste (Oily Wastewater)	Storage	5,000
TSD -102	Bulk Storage Waste (Oily Wastewater)	Storage	5,000
TSD -103	Bulk Storage Waste (Cyanide Wastewater)	Storage	5,000
TSD -104	Bulk Storage Waste (Solvent Wastewater)	Storage	5,000
TSD -105	Bulk Storage Waste (Solvent Wastewater)	Storage	5,000
TSD -106	Bulk Storage Waste (Cyanide Wastewater)	Storage	5,000
TSD -107*	Empty	Storage	5,000
TSD -108*	Empty	Storage	5,000
TSD -109*	Empty	Storage	5,000

*Tank is not certified and will not be used for dangerous waste unless authorized by Ecology through a permit modification.

D3.1 DESIGN, INSTALLATION AND ASSESSMENTS OF TANK SYSTEMS

WAC 173-303-395(4); -640(2); -806(4)(a)(viii)-(x)(i), (4)(c)(i), (ii), (v), and (vi)

D3.1.1 DESIGN REQUIREMENTS

WAC 173-303-640(2)(c), (3)(a)(b); -806(4)(c)(i), (ii), (iii), and (v)

Tank design drawings for the TSD Facility tanks are provided in Appendix D7 (Tank Drawings). Tank design assessments and calculations are provided in Appendix D8 (Tank Calculations).

Tank integrity assessments for the tanks currently in use (TSD -101 through 106), certified by an independent, qualified, registered Professional Engineer, pursuant to WAC 173-303-640 (2) and (3), are provided in Appendix D9, (Tank Integrity Assessments and Certifications). The design assessments attest that the tanks have sufficient integrity and are acceptable for storing and treating dangerous waste. The assessment is conducted to demonstrate that the foundation, structural support, seams, and connections are adequately designed and that the tanks have sufficient strength and compatibility with the wastes. The design assessments and information provided in Appendix D8 (Tank Calculations) demonstrate that the tank foundations maintain the load of full tanks and verify that ancillary equipment is supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contractions.

Tank systems exterior and interior coating specifications ensure corrosion protection and compatibility with tank waste. Refer to Appendix D11, (Tank Systems Coating Specifications), which also includes manufacturer's data sheets and documentation showing conformance with the Military Specifications required in the design specifications. As Fuel is a large volume tank waste, information is provided from the Fuel technical manual stating compatibility with epoxy paint coatings.

Table D2-2. Tank Storage Waste Types by Tank

Tank Identification	Waste Type	Waste Name
TSD-101 and TSD-102	Oily Wastewater	Water & Oil
		Fuel Substitute
		Oil & Water (25-95% oil)
		Water & oil (>51% water)
TSD -103 and TSD -106	Cyanide Wastewater	Fuel Flush
TSD -104 and TSD -105	Solvent Wastewater	Fuel & Mineral Sprits
		Fuel & Agitene
		Fuel & Water
		Fuel & Alcohol
		Fuel & Fuel substitute
		Fuel, Detergent & Water
		Wash water, Oil, Coolant & HOCs
		Fuel, Water & Solvents
		Fuel Wash water, B.106
TSD -107**	None	Empty
TSD -108**	None	Empty
TSD -109**	None	Empty

* Waste Identification Tracking (WIT) Number

** Tank is not certified and is not in use

D3.1.2 INTEGRITY ASSESSMENTS

WAC 173-303-640(2)(a), (c), and (e), (3)(a, (b), and (g); -806(4)(c)(i), (ii), (iii), (v), and (vi)

Assessing structural integrity involves an external visual inspection combined with another method such as an internal inspection, leak test, ultrasonic, magnetic particle, or radiography inspection. Assessing and certifying tank systems must follow API 653 and STI SP001 standards. Results of the integrity assessment are reported for each individual tank and are certified by an independent, qualified, registered Professional Engineer (PE). Should the independent assessment indicate that the tank requires modifications or repair; the tanks will be upgraded as required before a certification is issued. If a tank fails certification, the independent PE may conditionally certify the tank based on the operational hazard and the schedule for repair. The certified assessment report and accompanying certification is maintained at the TSD Facility, please see Appendix D9 for the latest report.

In accordance with API 653 standard, all tanks shall be given a visual external inspection by an authorized inspector. This inspection must be conducted at least every five years.

D3.1.3 ADDITIONAL REQUIREMENTS FOR EXISTING TANKS

WAC 173-303-640(2)(a) and (c)(v)

As part of the integrity assessment, it must include a leak test, internal inspection, or other integrity examination that is certified by an independent, qualified, registered professional engineer, in accordance with WAC 173-810-810 (13)(a), that addresses cracks, leaks, corrosion, and erosion. Actual or estimated corrosion rates will be calculated and documented to demonstrate that the existing schedule for additional integrity assessments is adequate or needs to be revise based upon results of the assessment. Because all six tanks are equipped with spill control and continuous release detection monitoring, they are classified as Class I tanks by the STI SP001 standard and an internal inspection is not required. However, using ultrasonic thickness (UT) measurement as an alternate method and using API 653 standard (corrosion rates known), the maximum interval shall be the smaller of the calculated amount as detailed in Section 6.3.3.2.b.

D3.2 SECONDARY CONTAINMENT AND RELEASE DETECTION FOR TANK SYSTEMS

WAC 173-303-640(4); -806(4)(c)(vii)

D3.2.1 REQUIREMENTS FOR ALL TANK SYSTEMS

This section describes the secondary containment systems for the TSD Facility tank systems. Tank secondary containment systems are designed and constructed to prevent any migrated waste or accumulated liquid from escaping the system and entering the soil, groundwater, or surface water at any time during use of the tank system. The containment system is capable of detecting and collecting releases and accumulated liquids until the collected material can be removed. Liquid sensors, compatible with the wastes stored in the tanks are installed under each tank. The sensors are connected to an audible and visual alarm in the truck loading-unloading bay, and are monitored by daily security patrols.

The tank system base and containment system is constructed and coated with materials that are compatible with the wastes to be placed in the tank system and have sufficient strength, thickness, and resistance to prevent failure owing to pressure gradients, physical contact with wastes, climatic conditions, and the stress of daily operations.

The containment slab is capable of providing support, resisting pressure gradients above and below the system, and preventing failure due to settlement, compression, and uplift. The 8-inch containment walls and the 14-inch concrete slab are structurally reinforced with #5 rebar. Key-joints between the walls and slab confer a high degree of structural strength. The slab rests upon an 8-inch layer of drain rock serving to alleviate hydrostatic pressure. All concrete cold joints and slab interfaces are constructed with water stops. See Appendix D3 (TSD Facility Floor Plans and Details) for details of all foundation and floor cross sections.

Most entrances into the building are elevated for truck loading/unloading. Those entrances that are level with the surrounding parking/shipping area are sloped away from the building to prevent run-on. There are no upslope areas near the building. The TSD Facility is designed to eliminate any run-on from a 25-year, 24-hour storm.

The tank area is equipped with continuous forced air ventilation into the secondary containment designed to prevent the formation and ignition of vapors.

The coating for the base and containment is a two-component primer/epoxy matrix finish, which is abrasion and chemical resistant. Refer to Appendix D4 (Floor Coating Specifications). Application of a non-shrink grout covered with a sealant provides an effective watertight seal for the containment system. All concrete cold joints and slab interfaces are constructed with water stops. See Appendix D3 (TSD Facility Floor Plans and Details) for details and locations of the water stops.

The TSD Facility is designed to provide secondary containment of dangerous wastes and containment of fire flow water. In accordance with WAC 173-303-640 (4) (e) (i), the tank system's secondary containment system is designed to contain 100 percent of the capacity of the largest tank within its boundary and is designed and constructed to prevent lateral and vertical migration of wastes. The secondary containment system for the tank area is composed of the floor area of the tank area. The floor in the tank area, room 124, is recessed 8 inches below the floor of the adjacent receiving area and provides containment sufficient to contain a spill of approximately 11,500 gallons. Refer to Appendix D5 (Containment Calculations). This volume is sufficient to contain 100 percent of the capacity of a 5,000-gallon storage tank or 10% of the total capacity of all certified tanks in the room (3000 gallons).

The secondary containment for the tank systems is inspected for the presence or release of dangerous waste or accumulated liquid during each working day.

A fire flow or spill in excess of 7,000 gallons results in overflow into the grated spill-drainage trench located between the two ramped entranceways of the tank area. The spill-drainage trench allows the excess volume to be transferred to the exterior fire flow containment basins. The piping that connects the spill-drainage trench to the exterior basins is 6- to 8-inch, outside-coated, cast ductile iron.

The drainage system for the containment system is designed to handle the worst-case spill plus the volume of fire flow water from the sprinkler system, over the minimum design area, for a water flow of 20 minutes duration. The containment basins have approximately 31,790 gallons of containment capacity and are sized to provide 20 minutes of segregated fire flow containment combined with excess internal spill containment. See Appendix D5 (Containment Calculations), for secondary containment volumes and calculations. The basins are designed to overflow into each other when one-half full. Drainage from the basins is controlled by automatic pneumatic valves. During normal operations, the valves remain open allowing rainwater to drain into the storm water retention pond. In the event of a fire, the valves close automatically with the activation of fire alarms in the TSD Facility.

D3.2.2 ADDITIONAL REQUIREMENTS FOR SPECIFIC TYPES OF SYSTEMS

D3.2.2.1 Vault systems

WAC 173-303-640(4)(e)(ii)

All requirements for vault systems are addressed above in D-2b (1) Requirements For All Tank Systems.

D3.2.2.2 Ancillary Equipment

WAC 173-303-640(4)(f)

All ancillary equipment is located inside the secondary containment for the tanks.

D3.2.3 VARIANCES FROM SECONDARY CONTAINMENT REQUIREMENTS

WAC 173-303-640(4)(g) and (h); -640

There are no variances from secondary containment systems in effect at the TSD Facility.

D3.3 TANK MANAGEMENT PRACTICES

WAC 173-303-395 (4); -640(5)(a) and (b); -806(4)(a)(viii), (4)(c)(iii), (iv), and (ix)

Nine tanks are located in the tank area, room 124. A description of the chemical composition of the wastes stored in the tanks is provided in Table D2-2. Liquids are transferred into the tanks with the vac-truck. The tanks and liquid waste transfer piping system are provided with swing check valves located in the truck loading-unloading bay for spill prevention controls. Currently six tanks are active (see Table D2-2). Tank liquid level transmitters for tank level sensing are installed in all active tanks. Information provided by the transmitters is displayed on high-visibility, red LED display panels located in the tank area and in the tank truck-unloading bay. Visible and audible overfill alarms are incorporated into the tank truck unloading bay display panel, and are set at 4000 gallons (80% of capacity). Active tanks are also provided with a backup mechanical tank liquid level measuring device consisting of a dropdown tube, float, and measuring tape.

Wastes stored in the tank systems enter the TSD Facility in bulk and non-bulk containers such as but not limited to drums, tanker trucks, polypropylene Tuff Tanks® and stainless steel Totes®. Tank trucks are unloaded in the tank truck-unloading bay, which is contiguous with the building's north perimeter. The tank truck-unloading bay has a 2.77 percent center-sloped, concrete slab, 23 feet 4 inches wide by 121 feet long. The slab is covered by a steel awning and equipped with a blind sump for spill-containment. The containment sump is covered by a steel grating and situated in the center of the slab. The sump is 24 inches wide, 45 inches deep and 83 feet in length. Bulk loads are transferred into the tank system via a manifold-hose-connection system with quick-connect no drip couplings located in the tank truck-unloading bay. Non-bulk loads use a stringer from the tanker truck to pull the waste into the tanker tank prior to transferring the waste into the tank system. Provisions for electrical grounding of tank trucks is provided by a truck-grounding bar and cable/clamp, which is connected to the grounding circuit and located adjacent to the manifold-hose-connection station. Electrical grounding is used whenever wastes are transferred to tanks TSD -103, 104, 105 and 106 (Fuel, solvents and alcohol waste tanks). See Appendix D7 (Tank Drawings) for grounding details.

D3.4 LABELS AND SIGNS

WAC 173-303-395(6); -640(5)(d); -806(4)(c)(xi)

Storage tanks and all ancillary tank system equipment, including piping and hose-connection manifolds, are clearly labeled with the waste contained in the tank, the major risk associated with the waste being stored, and visible from 50’ to ensure proper transfer and storage of compatible wastes and to maintain waste tracking capability and integrity.

D3.5 MANAGEMENT OF IGNITABLE OR REACTIVE WASTES IN TANK SYSTEMS

WAC 173-303-640(9); -806(4)(c)(x)

Ignitable and reactive wastes are stored in tanks at the TSD Facility. In compliance with the National Fire Protection Association’s (NFPA 30) buffer zone requirements, storage tanks containing ignitable wastes are located at an adequate distance from: 1) property lines that are or can be built upon, including the opposite side of a public way, minimum distance 15 feet, and 2) the nearest side of any public way or from the nearest important building on the same property, minimum distance five feet. Actual buffer zone distances for the TSD Facility area:

- Nearest property line that is or can be built upon – 700 feet.
- Opposite side of nearest public way, Highway 303 – 750 feet.
- Nearest side of any public way – 700 feet.
- Nearest important building on the same property, Building 951 – 60 feet.

NUWC Division, Keyport is not subject to local building codes and is regulated by the Department of Defense, which has reviewed and approved the building design for the TSD Facility.

Ignitable wastes are consolidated for storage with other compatible, ignitable, and non-ignitable wastes in tanks TSD -104 and 105. Because these waste streams are tested to ensure the WIT is accurate as set forth in Section C (Waste Analysis), testing is not performed on each waste stream every time wastes of the same WIT are consolidated. The ignitable storage tanks are protected from any material or conditions which could cause the waste to ignite, in compliance with WAC 173-303-640 (9) (a) (ii). Operating precautions and design features used in the TSD Facility to prevent the ignition or reaction of ignitable wastes are discussed in Section F (Procedures to Prevent Hazards). Warning signs against smoking and open flames are posted prominently throughout the TSD Facility, as well as in the tank area.

All tanks storing reactive wastes are certified for use by an independent Professional Engineer pursuant to the requirements of WAC 173-303-640 (3) (a). Cyanide bearing wastes are stored in tanks TSD -103 and 106. Total cyanide concentrations (in solution) are typically 100 ppm. The highest range of cyanide concentrations has historically been <2,500 ppm. The pH of the processes, which generate the cyanide-containing waste streams, are consistently neutral or alkaline. Cyanide bearing waste solutions are not exposed to pH fluctuations, which minimizes the chance of off gassing of cyanide containing gases. Because these waste streams are tested to ensure the profile is accurate prior to shipping, as set forth in Section C (Waste Analysis), prior testing is not performed on individual compatible waste streams consolidated into these tanks.

Waste fuel is from a process that consists of propylene glycol dinitrate (PGDN) as the fuel source. This waste fuel is generally classified as a D001 unless there is a visible layer of fuel, and then it is classified as a D003. The fuel waste streams are stored in tanks TSD -104 and 105. According to Rev 8 of the U.S. Navy Technical Manual for Fuel dated 28 February 2019, PGDN is a non-corrosive, liquid monopropellant with an extremely low vapor pressure. The low vapor pressure minimizes the risk of potential hazards. Fuel can be made to detonate, but the conditions and stimulus required are so extreme that it is considered non-explosive. The 2-nitrodiphenylamine constituent in the fuel acts as a stabilizer to control the decomposition rate of the propylene glycol dinitrate. Fuel is thermally stable at temperatures of 150º F for several years, up to 180º F for a few months, and becomes unstable at 265º F. The temperatures in the TSD Facility are well within the recommended storage limits of -18º to 140º F. Fuel has a high flashpoint and other safety characteristics that permit it to be classified as a low fire-hazard material.

TSD Facility operation and design measures, including the electrical-grounding circuit and sprinkler system of the building, and prohibition of smoking and open flames, prevents the existence of strong initiating sources or heating-under-confinement of liquid waste in tanks in accordance with WAC 173-303-090 (7) (vi). Provisions for electrical grounding of tank trucks is provided by a truck-grounding bar and cable/clamp, which is connected to the grounding circuit and located adjacent to the manifold-hose-connection station. Electrical grounding is used whenever wastes are transferred to tanks TSD -103, 104, 105 and 106 (Fuel waste tanks).

D3.6 MANAGEMENT OF INCOMPATIBLE WASTES IN TANK SYSTEMS

WAC 173-303-640(10); -806(4)(c)(x)

Each storage tank is dedicated to storing specific, compatible wastes as shown in Table D2-2. New waste streams are tested for compatibility with wastes already in the tank prior to consolidating for storage. Because waste streams are tested to ensure the WIT is accurate as set forth in Section C (Waste Analysis), testing is not performed on each waste stream every time wastes of the same WIT are consolidated. Incompatible wastes or materials are not stored in the same tank or in an unwashed tank that previously held an incompatible material unless the requirements of WAC 173-303-395 (1) (b) are met.

Verification procedures in Section C (Waste Analysis) conducted at the time a waste stream is accepted to the TSD Facility will verify the identity of the waste stream. In the future, wastes generated by new processes may be stored in these tanks after profiling as set forth in Section C (Waste Analysis) to ensure compatibility with the existing waste streams in the receiving tank.

D3.7 PROCESS EQUIPMENT AND CONTROLS

WAC 173-303-640(5), (9), (10), (11); -806(4)(c)(iii), (iv), (xii), (xiii)

The process of separating materials by utilizing differing specific gravities to separate liquid-solid systems is performed in tanks 104/105 and 101/102. Decanting is used to separate two-phase systems from their natural separated equilibrium states. These include the following two-phase systems:

- Oil and water (Tanks 101/102)
- Solvents and water (Tanks 104/105)

The water from the oil and water decanting process is shipped separately or will be discharged in accordance with the SWDP #ST0007353. Designation from this process is from generator knowledge and lab analysis.

The decanting process of the solvent/water tank is being done to consolidate the solvents in order to increase the BTU value for this waste stream. The water from this process will be shipped separately. The designation from this process is also from generator knowledge and lab analysis.

D4 AIR EMISSIONS CONTROL

WAC 173-303-110; -640(5)(e); -690; -691; -692; -806(4)(c)(xii) and (xiii), (4)(j), (k), (m)

D4.1 PROCESS VENTS

WAC 173-303-110; -690; -806(4)(j)

D4.1.1 APPLICABILITY OF SUBPART AA STANDARDS

WAC 173-303-690

The requirements of 40 CFR 264, Subpart AA, Air Emission Standard for Process Vents, do not apply since there are no process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations that manage dangerous wastes with organic concentrations of at least 10 ppm by weight.

D4.2 EQUIPMENT LEAKS

WAC 173-303-806(4)(k); 691

D4.2.1 APPLICABILITY OF SUBPART BB STANDARDS

WAC 173-303-691; -806(4)(k); [40CFR Parts 264.1050-264.1063]

The requirements of 40 CFR 264 and 270.25, Subpart BB, Air Emission Standards for Equipment Leaks, apply to valves, pumps, compressors, pressure relief devices, sampling connection systems, open ended valves or lines, and flanges or other connectors that contain or contact dangerous waste with organic concentrations of at least 10 percent by weight.

D4.2.1.1 Equipment Subject to Subpart BB

Equipment (excluding tanks and containers) that contains or contacts dangerous waste streams with ≥ 10 percent organics is monitored monthly (see Section D4.2.2.1). All dangerous waste stored in tanks at the TSD Facility is assumed ≥ 10 percent organics. Appendix D11 (Subpart BB Equipment Details) lists all TSD Facility equipment, and required monitoring.

D4.2.1.2 Re-evaluating Applicability of Subpart BB Standards

WAC 173-303-691(1); [40CFR Part 264.1063(d)-(g); Part 264.1064(k)]

The applicability of Subpart BB standards does not need to be re-evaluated because the applicability is not based on the organic content of the waste stream.

D4.2.2 EQUIPMENT LEAKS – DEMONSTRATING COMPLIANCE

D4.2.2.1 PROCEDURES FOR IDENTIFYING EQUIPMENT LOCATION AND METHOD OF COMPLIANCE, MARKING EQUIPMENT, AND ENSURING RECORDS ARE UP-TO-DATE

WAC 173-303-691; -806(4)(k); [40CFR Part 264.1050-264.1064]

Appendix D11 (Subpart BB Equipment Details) contains photos of all TSD Facility equipment subject to Subpart BB standards. In accordance with 40 CFR 264.1050(d), each piece of equipment subject to Subpart BB standards is marked so that it can be distinguished readily from other pieces of equipment. The equipment subject to monitoring is marked in accordance with Navy standards as shown in Appendix D11. Changes or repairs to equipment and monitoring results will be recorded in the operating record on an on-going basis.

All dangerous waste at the TSD Facility that contacts equipment such as pumps, valves, flanges, caps and sampling ports is assumed to be ≥10percentorganics,isliquidandnevergas/vapor,and may at any time be a ‘light liquid’. Therefore, the percent by weight of total organics, the dangerous waste state and the method of compliance are not individually identified for each piece of equipment. The method of compliance with the standards in 40 CFR 264.1052 through 1059 for all equipment at the TSD Facility is met through monthly monitoring and documented in the operating record pursuant to WAC 173-303-691(2) and 40 CFR 264.1064(b)(1)(vi).

The TSD Facility does not have any equipment in vacuum service subject to 40 CFR 264.1054 standards.

The TSD Facility does not have any valves designated as ‘unsafe to monitor’ or difficult to monitor’.

The TSD Facility does not have any pumps, compressors, or valves designated as ‘for no detectible emissions’.

The TSD Facility does not have any pumps and compressors with dual mechanical seal systems.

D4.2.2.2 Demonstrating Compliance with D4.2.1 and D4.2.2 Procedures

WAC 173-303-691; -806(4)(k); [40 CFR Part 264.1050 – 264.1059]

Appendix D11 (Subpart BB Equipment Details) lists all TSD Facility equipment subject to Subpart BB standards.

A log of equipment will be maintained in the operating record of the TSD Facility including the following:

1. The equipment’s identification number and where it is located in the TSD Facility.
2. The type of equipment (e.g., pump, valve, sample port).
3. Date and result of most recent monitoring, and status of repair, if required.
4. For pumps exempted due to less than 300 hours per year in contact with dangerous waste, the number of hours in contact with dangerous waste during each service cycle.
5. Method of compliance with standards.

If a leak is detected in any equipment, a label marked with the equipment ID number, the date evidence of a leak was found, and the date the leak was detected will be attached to the equipment.

INSPECTION LOG

When a leak is detected, the following information will be recorded in an inspection log and shall be kept in the TSD Facility operating record:

1. The instrument and operator ID numbers and the leaking equipment ID number.
2. The date the evidence of a potential leak was found.
3. The date the leak was detected and the dates of each attempt to repair the leak.
4. Repair method applied in each attempt to repair leak.
5. ‘Above 5,000’ if the maximum instrument reading measured after each repair attempt is ≥ 5,000 ppm.
6. ‘Repair delayed’ and the reason for the delay if the leak is not repaired within 15 calendar days after discovery of the leak.
7. Documentation supporting the reason for the delay of repair of a valve in compliance with 40 CFR 264.1059 (c).
8. The signature of the operator whose decision it was that repair could not be affected without a dangerous waste management unit shutdown.
9. The expected date of successful repair of the leak if the leak is not repaired within 15 calendar days.
10. The date of successful repair of the leak.

MONITORING PROCEDURES

When monitoring procedures call out use of Method 21 in 40 CFR 60, the detection instrument will meet the performance criteria and calibration procedures as set forth in Method 21 and 40 CFR 264.1063(b). The current instrument in use is the Cosmos Portable Gas Detector XP-3160.

Leak detection will take place as follows:

1. Monitoring shall comply with Reference Method 21 in 40 CFR 60.
2. The detection instrument shall meet the performance criteria of Reference Method 21.
3. The instrument shall be calibrated before use on each day of its use by the procedures specified in Reference Method 21.
4. Calibration gases shall be:
   a) Zero air (less than 10 ppm of hydrocarbon in air).
   b) A mixture of methane of n-hexane and air at a concentration of approximately, but less than, 10,000 ppm methane or n-hexane.
   c) A mixture of methane of n-hexane and air at a concentration of approximately 5,000 ppm methane or n-hexane.
5. The instrument probe shall be traversed around all potential leak interfaces as close to the interface as possible as described in Reference Method 21, Section 8.3.
6. The leak definition concentration is 5,000 ppm.
7. If the maximum reading is ≥ 5,000 ppm, a ‘leak’ in the component has been identified. A maximum reading of < 5,000 ppm indicated the component does not ‘leak’.

A semiannual report meeting requirements in WAC 173-303-691 and 40 CFR 264.1065 will be submitted to Ecology for any period during which leaks from valves, pumps, or compressors were not repaired according to their respective regulatory requirements.

D4.3 TANKS AND CONTAINERS

WAC 173-303-110; -692; -806(4)(m)

D4.3.1 APPLICABILITY OF WAC 173-303-692 (SUBPART CC) STANDARDS

WAC 173-303-692(1); -806(4)(m); [40 CFR 264.1080, 1083]

Subpart CC standards are assumed to apply to all tanks and containers at the TSD Facility that contain liquids. All tanks at the TSD Facility are of the 'fixed roof' design, are less than 75 m^3, with a maximum organic vapor pressure limit below 76.6 kPa. Thus, tank level one controls are installed on all tanks.

Paint and associated products are consolidated in Room 128, the drum wash area. Latex paints and compatible associated products are consolidated in a dedicated drum, and oil-based paints and compatible associated products are consolidated in a separate, dedicated drum. The drum not in use in the paint consolidator is sealed until placed in use. Aerosol cans, and pint through 5-gallon containers are punctured and drained into an open-top drum. The VOCs and propellants are captured and removed from the exhaust with a pair of carbon filters in series before venting outside the TSD Facility. See Part A, Attachment B, (TSD Facility General Layout Drawing) for the exact location of this consolidation area, and Appendix D2 (Paint Consolidation Details) for details of equipment used in this consolidation process, including carbon filter breakthrough indicator calibration and filter change-out procedures. A portable VOC meter is also used as an alternate method in measuring volatiles during this process. The waste paint containers are only open when installed in the paint can crusher and while it is in operation.

All containers between 0.1 m^3 and 0.46 m^3 containing liquids may at some time contain dangerous wastes ≥ 500 ppmw average volatile organics. Thus, these containers will be managed to Subpart CC container level one standards.

Additionally, all containers > 0.46 m^3 containing liquids may at some time contain dangerous wastes ≥ 500 ppmw average volatile organics in light liquid service. Thus, these containers will be managed to Subpart CC container level two standards.

D4.3.1.1 Containers

WAC 173-303-692(2); -806(4)(m); [40 CFR 264.1086]

All containers required to meet container level one controls will meet all applicable US Department of Transportation regulations on packaging hazardous materials for transportation. These containers will have their covers and closure devices secured and maintained in the closed position except as set forth in 40 CFR 1086 (c) (3), and will be visually inspected at the time they are accepted at the TSD Facility and daily thereafter. The visual inspection will consist of a check of the container and its cover and closure devices for visible cracks, holes, gaps or other open spaces into the interior of the container when the cover and closure devices are secured in the closed position. If a defect is detected during these inspections, the operator will make the first attempt to repair the defect within 24 hours after detection, and the repair will be completed as soon as possible thereafter but no later than 5 days after detection.

All containers required to meet container level two controls will meet all applicable US Department of Transportation regulations on packaging hazardous materials for transportation, and requirements in WAC 173-303-692 and 40 CFR 64.1086(d)(1)(ii) and (iii). Transfer of dangerous waste to and from these containers will take place with a submerged-fill pipe as specified in WAC 173-303-692 and 40 CFR 264.1086(d)(2). These containers will have their covers and closure devices secured and maintained in the closed position except as set forth in 40 CFR 1086 (d) (3), and will be visually inspected at the time they are accepted at the TSD Facility and daily thereafter. The visual inspection will consist of a check of the container and its cover and closure devices for visible cracks, holes, gaps or other open spaces into the interior of the container when the cover and closure devices are secured in the closed position. If a defect is detected during these inspections, the operator will make the first attempt to repair the defect within 24 hours after detection, and the repair will be completed as soon as possible thereafter but no later than 5 days after detection.

D4.3.1.2 Tank Systems

WAC 173-303-692(2); -806(4)(m); [40 CFR 264.1086]

All waste streams stored in tanks at the TSD Facility are evaluated bi-annually as set forth in Section C (Waste Analysis).

All tanks at the TSD Facility have spring-loaded pressure-vacuum relief valves that vent to the atmosphere during normal operations for the purpose of maintaining the tank internal pressure in accordance with the tank design specifications. These vents are designed to become operational at 0.75 oz/in^2 pressure or vacuum, with no detectible emissions when the device is secured in the closed position.

All fixed roof tanks and their closure devices are inspected annually by the operator to visually check for defects that could result in air pollutant emissions. Appendix D13 (Subpart CC Equipment Details) provide inspection and equipment details for these devices.

The following operating records will be maintained at the TSD Facility for five years:

1. The tank identification number.
2. A record of each inspection including:
   - i) Date inspection was conducted.
   - ii) For each defect detected during the inspection:
     - (1) The location of the defect.
     - (2) A description of the defect.
     - (3) The date of detection.
     - (4) Corrective action taken to repair the defect.
     - (5) If the repair was not completed, the reason for the delay and the expected completion date.

SECTION D

APPENDIX D1

PORTABLE TANK SPECIFICATIONS

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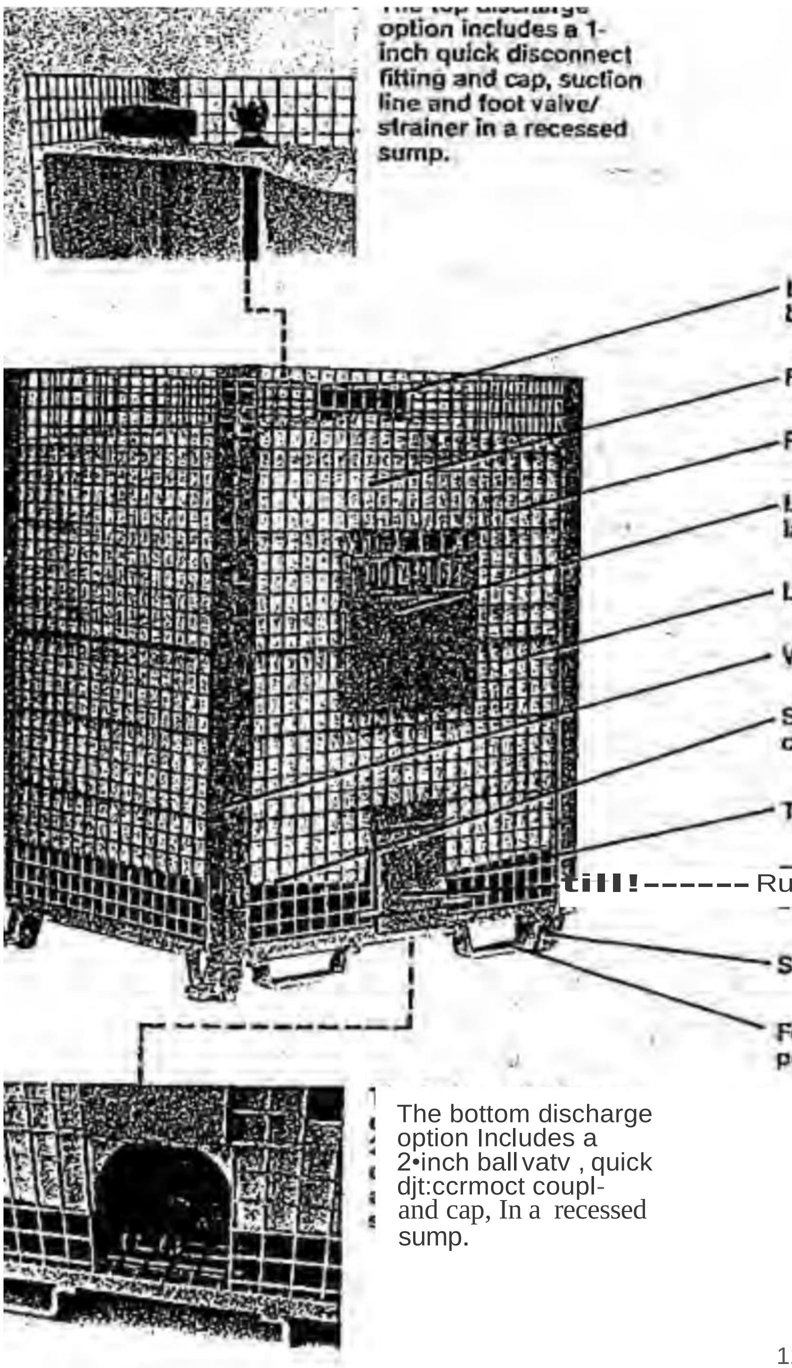
ntroduc1ng TUFF TA K. The safest, easiest, most \,.ost·effective way to handle hazardous liquids.

1)



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TUFF TANK SPECIFICATIONS

	220 Gal. (840 liter)	330 Gal. (1250 liter)
DOT Authorization:	DOT-E9052	DOT-E9052
Dimensions:	40" x 48" x 48" H	40" x 48" x 62" H
Tare Weight:	420 lbs.	550 lbs.
Authorized Gross Weight:	3790 lbs.	5600 lbs.
Maximum Liquid Density: (When filled)	15.3 lbs./gal.	15.3 lbs./gal.

Now you can;;ee the remarkable TUFF Tani<System Jn.aclign e We'll send you a VHS copy of our video presentation demonsll'alion unique features and benefits of TUFF TANK,

ror *more* infom1ation write or call:

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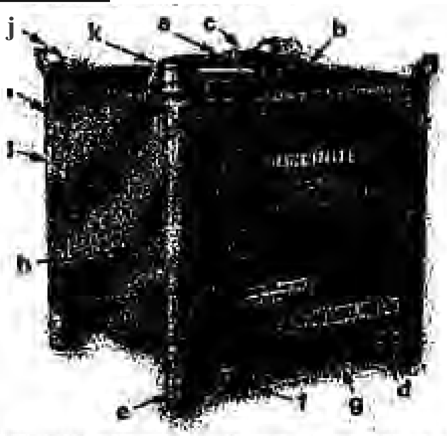
back to Products



Nominal Capacity	Nominal Length	Nominal Width	Nominal Height	Approx. Tare Weight	Max Gross Weight
300gttl (11131,l	•,• ftO&&nm)	•a· {1219mm)	w (H<lmm)	4-'0lbl (197kg)	6t82Als (2-3601<g),
3&0ga\ (11!9Gl)	· (106Gmm)	••• (1219mm)	5,1" (12951!\m)	415R>1 (216kg)	6017111, (2135kg)
41J09Dl (1484L)	4;," (10615mm)	••• (121 9mm)	57" (M 7 m m)	lb$ (23.1kg)	665311» (:r,151<9)
-4 0gal (11170l)	4Z" (1-m)	4 8 (12!90,111)	•,• (1600mm)	65t>lb!t (4919)	7678'.bf< (3,t9Cll<g)
560fltl (2.ll40L)	•2· (1066/n)n)	,a· (1219,nnl}	75' (1005mm)	tl O<bs '''-''''•)	[redacted]
25'Sg:al ("IOL)	•2 (106)	•r (10-)	••• (1Ul""")	<05!00 (1Ul<"°)	(426C lg) (ZO),,•
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•OOgal (l•BaL)	42' (IO(l<mm)	42" (1068mm)	63' (tSOClmm)	610:b& (231 9}	l (3)1S"1J)
480gal (1780L)	42' (1066mm) •	42" (1068mm)	75" (i90Smm)	5861bG (2661<91	lJ\95t:,s (3725l<g)

Liquitote

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- *UN* 31A Quafmedon Standard s;zes.Steinless •teel: allsizes up 10 5501Jallon,c:a,bonsteel: all sties up to 528 gallons.
- Custom-ms availablo.

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SECTION D

APPENDIX D2

PAINT CONSOLIDATION DETAILS

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CAN, PAIL AND AEROSOL CRUSHER
SUPER 6PJ-VC

Pierces, drains, and crushes cans, pails and aerosols.

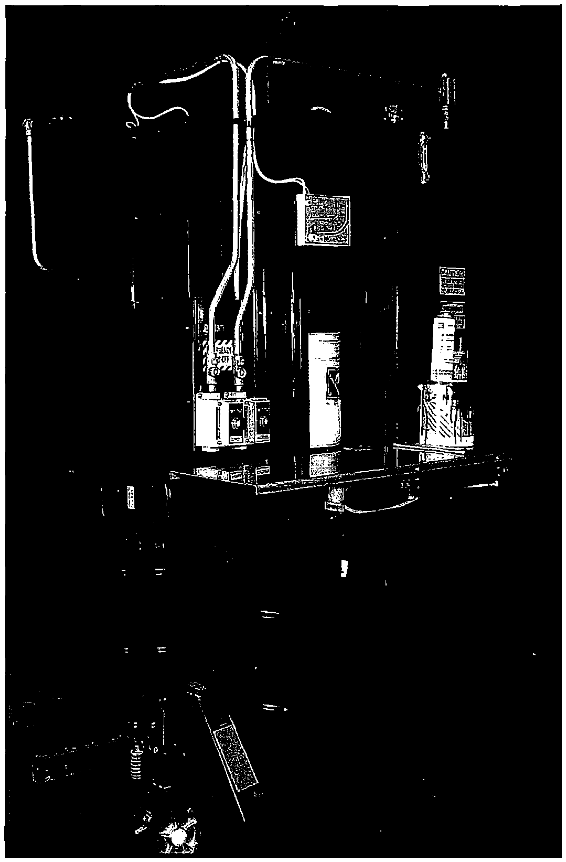
Cans are Empty by EPA Definition.

No need to remove lids!

The Super 6PJ-VC offers features not found anywhere else in the industry.

- Captures voes and propellants, keeps them out of work area, environment. Eliminates need for respirators.
- Compact design to save valuable floor space.

With the proven reliability of our Super 6PJ and the addition of the Vapor Collection System, TeeMark Offers a Complete Package at an economical price.



VERSATILE:
Processes containers from half pints to 6-gallon pails, **PLUS** 4 to 12-inch long Aerosol cans.

CAPTURES:
VOCs, Propellants, and Vapors.

SAFE, EXPLOSION PROOF

Units will not operate with door open.These crushers are completely explosion proof with self-contained explosion proof controls and power supplies. They are suitable for use with solvent based paints, aerosols propellants, and other flammable liquids.

RESULTS!

The TeeMark Super 6PJ-VC pierces, empties, crushes, and ejects up to 240 containers per hour.The Vapor Collection System collects the gases from the crushing chamber and collection drums and delivers it to a 5-inch duct.

TeeMarksuPER 6PJ-vc sPEc1F1cAr10Ns

POWER SYSTEM ALTERNATIVES:
- 1-1/2 hp' 115/230 v 1ph 20/10a w/ starter, 12/20 second cycle time
- 3 hp' 208-230/460 v, 3ph, 11-10/5a w/o starter, 12 sec cycle

Explosion Proof Class 1, Div. D

CRUSHING FORCE: 30,000 pounds
CYCLE TIME: 12 to 20 seconds
MACHINE DIMENSIONS: 55"w x 72"d x 107'h
CRUSHING CHAMBER: 16"w x 16"d x 18"h
SHIPPING WEIGHT: 1300 pounds

AIR REQUIREMENTS:
5cfm@ 80psi

COLLECTION SYSTEM:
1 hp, 115/230 volt, 1ph 12/6 amp dedicated circuit
Explosion proof motor and motor controls
Moves up to 500 cfm of air
Exhausts through a 5-inch duct

TeeMark Crushers • Aitkin, MN • 1-800-428-9900 • Fax: (218) 927-2333 • email: teemark@aitkin.com
Crusher homepage: www.teemarkcorp.com

CAN, PAIL AND AEROSOL CRUSHER
SUPER 6PJ-VC

Full cans, pails, and aerosol cans are pierced and crushed by EPA definition in twenty seconds or less. VOCs and propellants are collected and removed from work area.

MULTIPURPOSE CRUSHING!
This machine crushes six-gallon pails and most anything that is smaller. Aerosol cans, oil filters, and a variety of pails and cans are all crushed by this machine.
This crusher opens closed containers and empties the contents before crushing them flat.

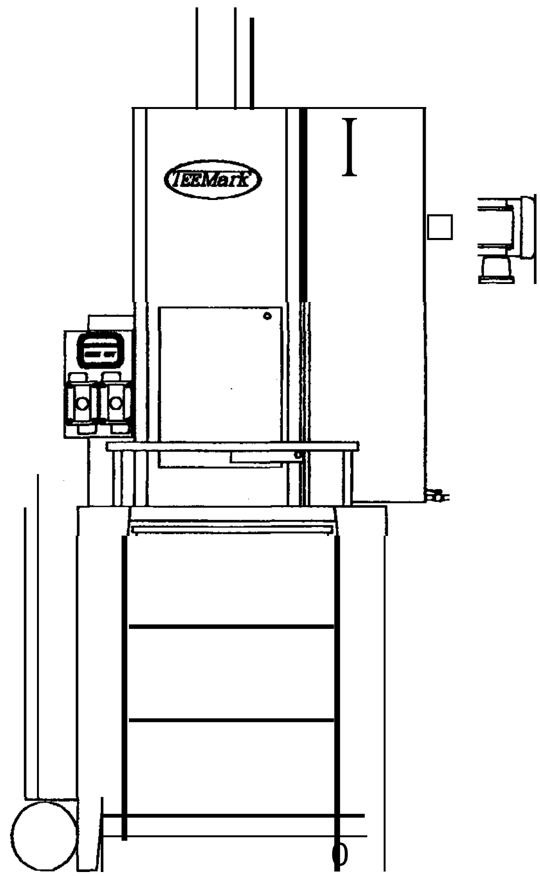
AUTOMATIC EJECTION!
The Super 6PJ-VC automatically ejects crushed containers out of crusher and into a collection devise.

CRUSHING FORCE OF 30,000 POUNDS
Crushes steel containers so you can put up to 15 crushed cans in the space required by a whole can.

CRUSHER STAND
Provides 41 inches of clearance for a 55-gallon drum on a pallet jack.

LIQUID COLLECTION CAPABILITY
Liquids that are squeezed from containers are collected in a 55-gallon drum or tote.

PERMANENT, TOTAL ENCLOSURE
Blower pulls VOCs, propellants, and vapors from crushing compartment, crushed can collection drum and liquid collection drum.



Pallet jack and roller conveyor provided

__@EM CORPORATION__

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218/927-2200 • 800/428-9900
email: teemark@aitkin.com
Crusher homepage: www.teemarkcorp.com

For more information, call us:

TOLL FREE 800/428-9900

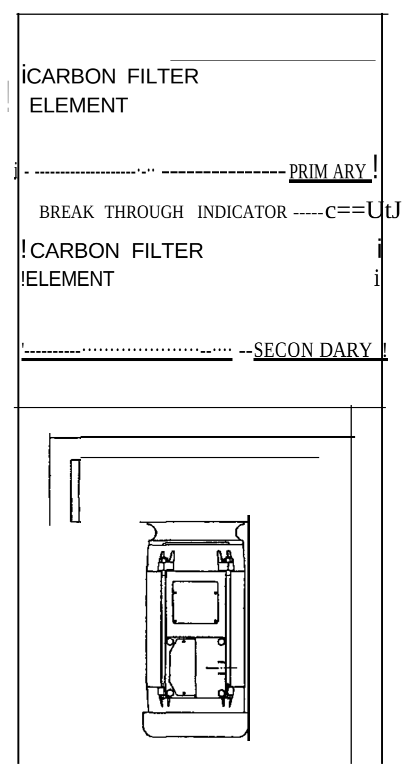
From half pints to 110 gallons, TeeMark Can and Drum Crushers prepare containers and their contents for recycling or disposal. Specifications subject to change without notice.

OPERATION AND MAINTAINENCE OF THE CARBON FILTRATION SYSTEM

CAUTION/
THE PRESENCE OF CERTAIN VOC'S WILL CAUSE
A HEAT BUILDUP WITHIN THE FILTER ELEMENTS.
UNDER THESE CONDITIONS THE BLOWER MUST BE RUN FOR
A MINIMUM OF ONE HALF HOUR AFTER PROCESSING.

The Carbon Filtration System consists of two Carbon Filter elements and a Breakthrough Indicator housed within the auxiliary cabinet located directly under the main bag filter cabinet. A Cycle Counter is also provided to track the number of cans processed. A single carbon element will adsorb the vapors from approximately 20,000 full std 12 oz. aerosol cans. As throughput approaches 15,000 cans the Breakthrough Indicator should be inspected at the end of each shift to monitor filter saturation.

Once the primary filter element has become saturated and will no longer adsorb processing vapors, the breakthrough indicator media will change from its original **purple** color to a **brown** color. At this point the primary filter element should be removed, the secondary filter element moved into the primary position, and a new element installed in the secondary position.



A new breakthrough indicator should be installed and the cycle counter reset to zero.

The filter element frames may be reused by replacing the saturated carbon with fresh carbon. The carbon is replaced by removing the side panel on the filter frame, dumping out the saturated carbon and pouring in the new carbon.

Each filter frame holds 45 lbs of carbon. New carbon is available in either 50 pound bags or 200 pound drums.
Contact the TeeMark corporation to obtain replacement carbon.

From this point the saturated carbon is handled as a hazardous waste and should be disposed of in accordance with local and federal regulations. Contact your local waste contractor for disposal.

Paint Can Crusher Carbon Filter Breakthrough test.

The carbon filter diagram on the previous page is not correct for our application because we inverted the filter unit. Thus, the primary filter is at the bottom of the filter housing, and the secondary filter is on the top of the filter housing.

In order to ensure that VOC breakthrough from the primary filter is detected before breakthrough of the secondary filter occurs, perform VOC Air Emissions check, using Method 21 test equipment and procedure as follows:

1. At the end of every Paint Can Crusher operation cycle, calibrate the VOC meter as instructed in the VOC meter users manual and method 21 in 40 CFR 60.
2. Remove the sample port plug from the intermediate sample port, and insert the sampling probe while the exhaust fan is in operation.
3. Operate the VOC meter as set forth in the VOC meter users manual and Method 21 in 40 CFR 60, and record the result in the Can Crusher Operating Record. Replace the sample port plug.
4. Repeat steps 2 and 3 for the exhaust sample port following the secondary filter.
5. Record the VOC readings for the intermediate and the exhaust sample ports in the TSDF Operating Record along with the time, date and inspector's name.
6. If sampling at the intermediate sample port indicates VOCs are present at or above 500 ppm, cycle the carbon filters as set forth below and notify the TSDF supervisor of the change and of the records in the TSDF Operating Record.

Paint Can Crusher Carbon Filter Replacement.

1. Shut down power supply to the paint can crusher.
2. Remove the carbon filter access panel.
3. Remove the lower (primary) carbon filter cartridge from the filter housing and place on a workbench.
4. Move the upper (secondary) carbon filter cartridge to the vacated lower carbon filter cartridge location in the carbon filter housing.
5. Unscrew the filter end panels of the upper carbon filter cartridge. Remove the waste carbon filter material, deposit in a hazardous waste container, and label as required. The used carbon filter material is a hazardous waste and must be handled and stored as such. Reassemble the carbon filter cartridge with new carbon filter material.
6. Place the recharged carbon filter cartridge in the vacated upper carbon filter cartridge location in the carbon filter housing.
7. Replace the carbon filter access panel.
8. Turn power to the paint can crusher on and turn exhaust fan on.
9. Sample intermediate and exhaust sample ports for VOCs as set forth above.

SECTION D

APPENDIX D3

TSDF FLOOR PLANS AND DETAILS

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STRUCTURAL NOTES & DESIGN DATA

1.0 GENERAL NOTES

1.1 GENERAL CONDITIONS

1.1.1 THE CONTRACTOR IS RESPONSIBLE FOR THE SAFETY OF ALL CONSTRUCTION ADEQUATE SHORING, BRACING, TIES, ANO SUPPORTS SHALL BE USED TO ENSURE PROPER TEMPORARY STRUCTURAL INTEGRITY DURING ALL PHASES OF CONSTRUCTION

1.1.2 THE CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF WORK SHOWN ON THE DRAWINGS ANO VERIFICATION OF EXISTING CONDITIONS AT THE SITE ANY DISCREPANCIES SHALL BE IMMEDIATELY REPORTED TO THE CONTRACTING OFFICER FOR RESOLUTION BEFORE PROCEEDING

1.13 THE CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF PENETRATIONS AND EMBEDMENTS IN STRUCTURAL ELEMENTS

1.1.4 SHOP DRAWINGS FOR STRUCTURAL STEEL, PRECAST CONCRETE AND REINFORCING SHALL BE SUBMITTED AND APPROVED BY THE CONTRACTING OFFICER PRIOR TO FABRICATION

1.2 GOVERNING SPECIFICATIONS

1.2.1 PROJECT SPECIFICATIONS

1.22 CODES ANO REFERENCES

TRI-SERVICES MANUAL, NA\IfAC P-355
- "MANUAL FOR SEISMIC DESIGN"

MILITARY DESIGN HANDBOOKS MIL-HDBK-1002

AMERICAN CONCRETE INSTITUTE "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE, 301, 304, 347, AND ACI 318-89

UNIFORM BUILDING CODE, UBC-91

AMERICAN WELDING SOCIETY
- AWS 01, STRUCTURAL WELDING CODE - STEEL
- AWS 04, STRUCTURAL WELDING CODE - REINFORCING STEEL

AMERICAN INSTITUTE OF STEEL CONSTRUCTION
- MANUAL OF STANDARD PACTICE

2.0 STRUCTURAL NOTES

2.1 STRUCTURAL CONCEPT OF COMPLETED STRUCTURE

2.1.1 GRAVITY LOADS

THE ROOF DECK CONDUCTS VERTICAL LOADS TO PURLINS & BEAMS ROOF PURLINS REACT GRAVITY LOADS AS CONCENTRATED FORCES THROUGH CONNECTIONS ON PRECAST CONCRETE WALL PANELS PRECAST WALL PANELS ARE LOCATED ON A STRUCTURAL CONCRETE FLOOR SYSTEM THAT IS SUPPORTED ON CONTINUOUS GRADE BEAMS. ALL GRADE BEAMS BEAR ON A GRID OF AUGER CAST PILES WITH CAPS

2.1.2 VERTICAL UPLIFT

VERTICAL UPLIFT LOADS ARE TRANSMITTED TO THE PILE SYSTEM IN THE SAME MANNER AS GRAVITY LOADS

2.U LATERAL LOADS

THE ROOF DIAPHRAGM TRANSMITS HORIZONTAL LOADS (WINO AND SEISMIC) TO PRECAST CONCRETE SHEAR WALLS SHEAR LOADS ARE CONDUCTED THROUGH THE STRUCTURAL FLOOR TO GRADE BEAMS GRADE BEAMS RESIST LATERAL LOADS BY MEANS OF PASSIVE EARTH PRESSURE

2.2 FOUNDATIONS

2.2.1 ALLOWABLE PILE LOADS

AUGER CAST WITH 120 KIP CAPACITY IN COMPRESSION

A ONE-THIRD INCREASE IN ALLOWABLE LOAD IS ACCEPTABLE FOR LOADING COMBINATIONS \VHICH INCLUDE SHORT DURATION LOADS, SUCH AS WINO OR SEISMIC

AUGER CAST PILES HAVE UP-LIFT CAPACITIES EQUAL TO ONE-THIRD THE COMPRESSIVE CAPACITY

2.3 MATERIALS

2.3.1 CAST IN PLACE CONCRETE

28-DAY COMPRESSIVE STRENGTH	
PILE CAPS & PILES	3,000 PSI
GRADE BEAMS & COLUMNS	4,000 PSI
STRUCTURAL SLAB	4,500 PSI
MAXIMUM SLUMP	4"

2.3.2 REINFORCING STEEL

REINFORCING BARS - #5 & LARGER:	GRADE 60
REINFORCING BARS - #4 & SMALLER:	GRADE 40
WELDED WIRE FABRIC	ASTM A185
LAP SPLICES OF REINFORCEMENT-	40 DIAMETERS

233 GROUT AT COLUMN ANO EQUIPMENT BASE CONNECTIONS

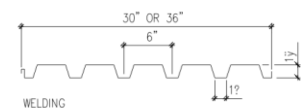
NON-SHRINK, NON-GASEOUS, NON-METALLIC, PRE-MIX TYPE, 3-DAY COMPRESSIVE STRENGTH - 5,000 PSI GROUT SHALL BE BE COMPATIBLE WITH ANY COATING APPLIED TO ITS SURFACE

2.3.4 STRUCTURAL ANO MISCELLANEOUS STEEL

- STEEL PLATES ANO SHAPES — ASTM A36
  (THIS DOES NOT PERTAIN TO THE RACK SYSTEM))
- SOUARE TUBING: A500 GRADE B, Fy = 46 KSI
- FABRICATION ANO WELDING: PER SPECIFICATIONS
- STRUCTURAL BOLTS: ASTM A325, UN
  USE LOAD INDICATOR WASHERS WHERE NOTED
- ANCHOR BOLTS, EXPANSION ANCHORS, NUTS ANO WASHERS — ASTM A307, UN
- WELDING ELECTRODES — E70XX, UN

LIGHT WEIGHT INSULATING CONCRETE
ROOF DIAPHRAGM:

DESIGN SHEAR CAPACITY	932 LBS/FT (MAX) SEE WALL PANEL DWG'S
METAL ROOF DECK	
MINIMUM YIELD	33KSI
MINIMUM SIZE	24 GA x 1y DEEP
SECTION MODULUS	Sx = .252 in3/FT Ix = .233 in3/FT



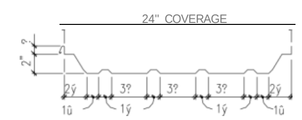
PUDDLE WELD AT EACH FLUTE AT BEAMS WALLS

- 1y SEAM WELD AT 2'-0"
- 'J? PUDDLE WELD AT 12" OC TO WALLS PARALLEL TO FLUTES

LIGHTWEIGHT CONCRETE
MINIMUM COMPRESSIVE STRENTH
DRY DENSITY

2.3.6 METAL ROOF PANEL (CANOPY)

MINIMUM YIELD STRENGTH	40 KSI
MATERIAL GAGE	24 GA
STRUCTURAL PROPERTIES	Sx = .156 in3/FT



2.3.7 OFFSITE PRECAST CONCRETE ITEMS

28 DAY COMPRESSIVE STRENGTH·	5.000 PSI MIN
ALL WALL PANEL TO PANEL CONNECTIONS ARE CONCEALED 4 HOUR FIRE RATED	
WALL PANEL THICKNESS (UN)	8 INCHES
HOLLOW CORE FLOOR PLANK DEPTH	8 INCHES
PILASTER SIZE (OPTIONAL)	12" x 12"

EMBEDDED ITEMS

COORDINATE ALL EMBEDMENTS WITH PRECAST MANUFACTURER PRIOR TO CONSTRUCTION

ALL WELDED STUD (WS) FASTENERS TO HAVE A MINIMUM ALLOWABLE SHEAR OF 10.00 Ksi ANO A MINIMUM ALLOWABLE TENSION OF 20.00 Ksi

2.3.9 REINFORCED HOLLOW MASONRY

CONCRETE MASONRY UNITS - ASTM C 90, TYPE II
8" THICK, NORMAL WEIGHT

MORTAR - TYPE S. fm = 1500psi MIN

GROUT - 2000 PSI IN 28 DAYS

PLACE GROUT IN ALL CELLS

ALL BLOCKS SHALL BE PLACED IN A RUNNING BOND PATTERN

3.0 DESIGN CRITERIA

3.1 ROOF LOADS - DEAD

ROOFING	6.0 PSF
CELLULAR, INSULATING CONCRETE	8.0 PSF
FRAMING (SELF WEIGHT)	6.0 PSF
MECHANICAL. ELECTRICAL. SPRINKLERS, HVAC, PIPING, ETC	3 PSF

3.2 ROOF LOADS - LIVE

UNIFORM	20 PSF
CONCENTRATED (ON DECK)	250 LB ON 2' X 2' AREA

3.3 FLOOR LOADS - LIVE

PALLET STORAGE	818 PSF (12 KIPS AT RACK LEGS)
OPERATIONS:	
WHEEL LOAD	6 KIPS
LIVE LOAD	480 PSF
MEZZANINES·	
LIVE LOAD	50 PSF
MECHANICAL LOAD	50 PSF
OFFICE:	
LIVE LOAD	50 PSF

3.4 ROOF LOADS -SNOW

Pf (FLAT ROOF SNOW LOAD)	0.7 CeCtlPg
WHERE·	
Ce (WIND EXPOSURE)	0.8
Ct (THERMAL FACTORS, FREEZE PROTECTED)	I.I
I (IMPORTANCE FACTOR)	11
Pg (GROUND SNOW LOAD)	20 PSF
SNOW DRIFT	CALCULATED IN ACCORDANCE WITH MIL-HDBK 1002,
Pfmin = Pg XI	22 PSF

3.5 SEISMIC (UBC SEISMIC ZONE 3)

V (BASE SHEAR)	ZIKCSW
WHERE:	
Z	0.30
I	1.25
CS	0.14
K	1.33
W	BUILDING WEIGHT
Fp (COMPONENT FORCE)	ZICpWp
Cp	0.75
Wp	WEIGHT OF COMPONENT

Fp = 0.28Wp

36 \\OND (MIL-HDBK 1002/2)

p = .0025V Chi
WHERE·

V = PEAK GUST VELOCITY	83 MPH
Ch = HEIGHT COEFFICIENT	1.0
I = IMPORTANCE FACTOR	1.15

p = 20.2 PSF
CANOPY UPLIFT (2p) = 40PSF

3.7 OVERPRESSURE AT 200 PSF

REQUIRED VENT SIZE = 0.17(NET SURFACE AREA)/1.39 PSI
= 893 SF

3.8 CATWALKS & STAIRS

UNIFORM LOAD	100 PSF
CONCENTRATED LOAD	300 lb
LATERAL LOAD	0.28 Wp

ABBREVIATIONS

BM	BEAM	LBS	POUNDS
BOP	BOTTOM OF PANEL	LLH	LONG LEG HORIZONTAL
BOT	BOTTOM	LLV	LONG LEG VERTICAL
<i_	CENTER LINE	MANUF	MANUFACTURER
COL	COLUMN	MAX	MAXIMUM
CJ	CONSTRUCTION JOINT	MECH	MECHANICAL
CLR	CLEAR	MIN	MINIMUM
CMU	CONCRETE MASONY UNIT	NTS	NOT TO SCALE
CONC	CONCRETE	OC	ON CENTER
CONT	CONTINUOUS	OPEN'G	OPENING
DIM	DIMENSION	OPP	OPPOSITE
DN	DOWN	t	PLATE
EA	EACH	PLF	LBS PER LINEAR FOOT
EF	EACH FACE	PSF	LBS PER SQUARE FOOT
EL	ELEVATION	PSI	LBS PER SQUARE INCH
ELEC	ELECTRICAL	REINF	REINFORCED/REINFORCING
EMBED	EMBEDDED	RO	ROUGH OPENING
EO	EQUAL	SJ	SAW-CUT CONTROL JOINT
EXP JT	EXPANSION JOINT	SHT	SHEET
EW	EACH WAY	SIM	SIMILAR
FB	FLAT BAR	SO	SQUARE
FF	FINISH FLOOR	STIFF	STIFFENER
FOC	FACE OF CONCRETE	TOP	TOP OF PANEL
GA	GAGE	TWS	THREADED WELDED STUD
GR BM	GRADE BEAM	TYP	TYPICAL
HORZ	HORIZONTAL	UN	UNLESS NOTED
K	KIPS (1000 LBS)	VERT	VERTICAL
		W/	WITH
		WS	WELDED HEADED STUD
		WWF	WELDED WIRE FABRIC

ttAS-BUILr CONDITIONS SHOWN — PR(P'DBY OFC — JAN 96 — APP MSW

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S-1

REGISTERED PROFESSIONAL ENGINEER EDWARD H. ADAMS No. 40462 Exp. 3/31/96 CIVIL STATE OF CALIFORNIA

OCT 19 1993

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SUPV. | CH. ENGR.
SUBMITTED BY | DATE 10/20/93
FIRM MEMBER (TITLE)
E.I.C. | FIRE PROT.
SEC. HD | DIV.
SATISFACTORY TO | DATE
TITLE

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SILVERDALE, WASHINGTON

NAVAL UNDERSEA WARFARE CENTER DIVISION
KEYPORT, WA

HAZARDOUS WASTE
TSD (P-370)
LEGEND SHEET AND NOTES

NAVFAC DRAWING NO. 6405171

F 80091

CONST. CONTR NO NH255-9--C-7J97

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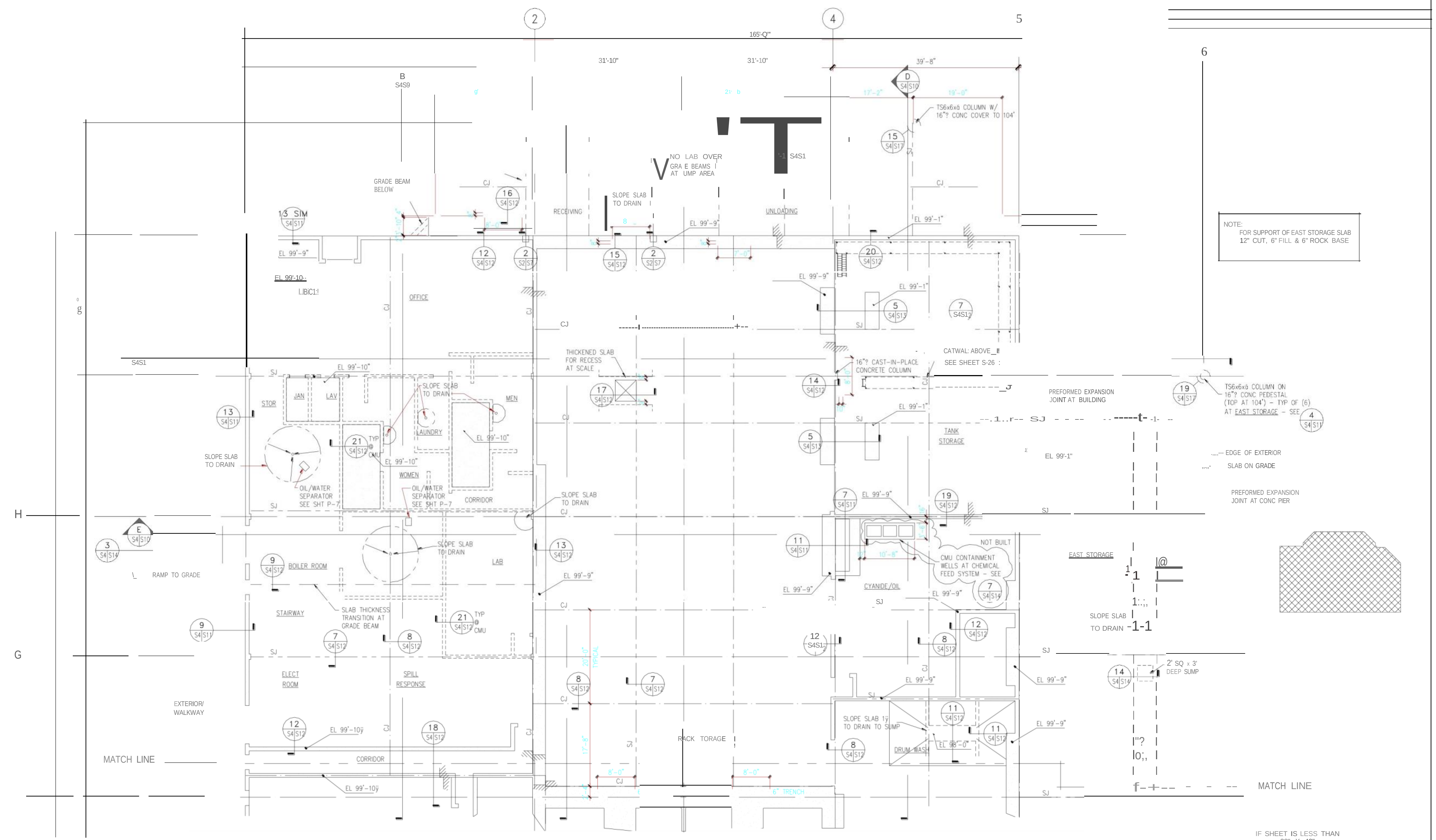

NOTES

PLACE FLOOR SLAB ON 2" OF CLEAN MOIST SAND OVER 10 MIL VAPOR BARRIER BETWEEN GRADE BEAMS

SEE SHEET S-12 FOR SLAB THICKNESS AND REINFORCING

SEE SHEET S-13 FOR DEFERRED SLAB AREAS

SEE ARCHITECTURAL FOR FINISH FLOOR AND TOP OF DEFERRED SLAB ELEVATIONS

COORDINATE WALL ANCHORAGE PLATE LOCATIONS WITH WALL PANEL MANUFACTURER

SEE MECHANICAL FOR UNDER SLAB PIPING LOCATION AND ELEVATIONS

PROVIDE WATERSTOPS AT ALL SLAB COLD JOINTS

NORTH FLOOR SLAB PLAN

S4 S4 SCALE: 1/8" = 1'-0"

LEGEND

CMU WALLS

1½ DEPRESSION FOR DEFERRED SLABS AND

TRENCH DRAINS PER ARCH'L PLANS

SUMPS - SEE ARCH'L PLANS

SLAB STEP PER ARCH'L DWGS

STEEL BOLLARD - SEE

GRAPHIC SCALE

5' 0 5' 10' 15' 20' 25'

1/8"

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S-4

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KEYPORT, WA

HAZARDOUS WASTE
TSD (P-370)
NORTH FLOOR SLAB PLAN

F 80091 6405174

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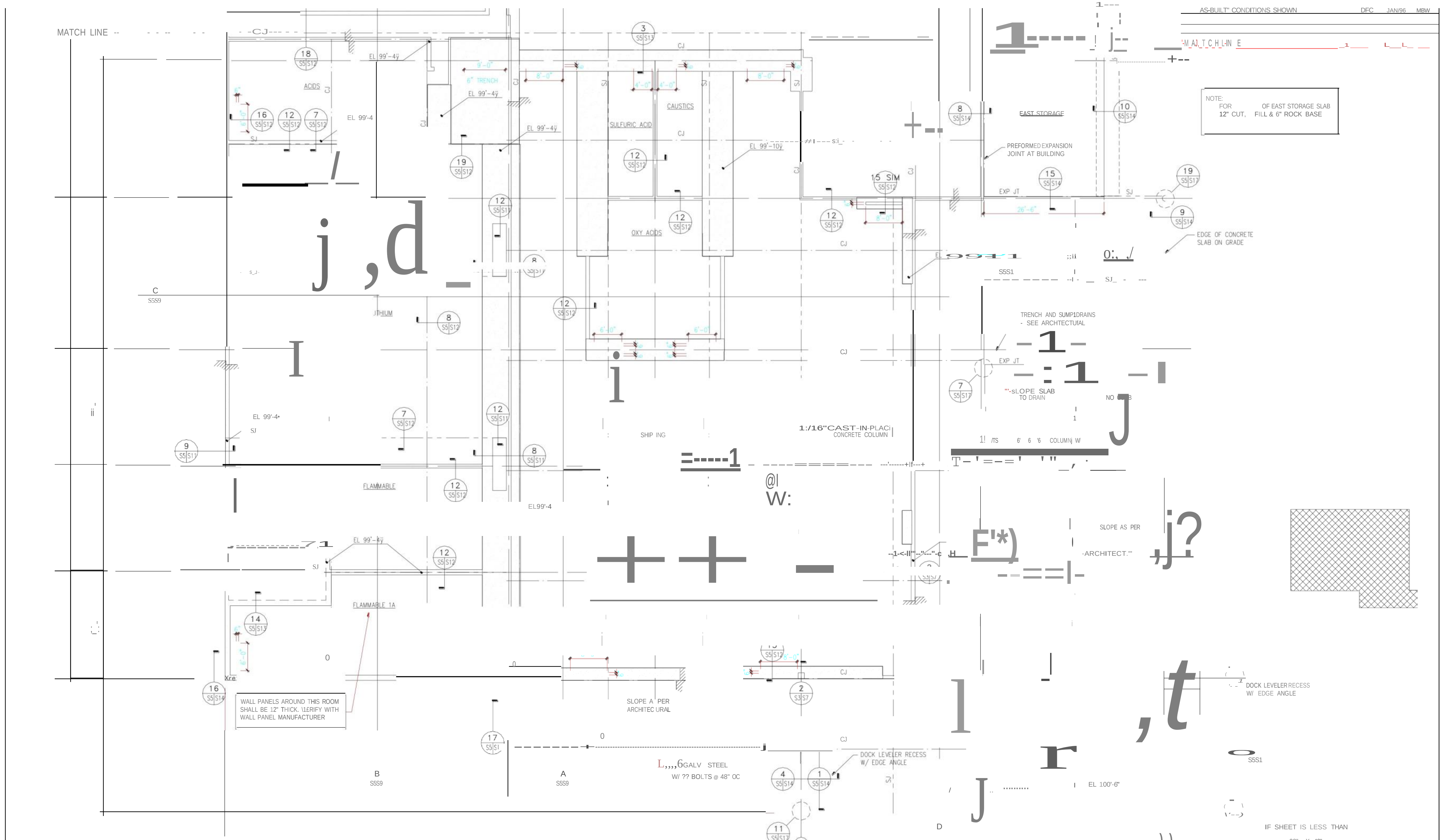

NOTES

PLACE FLOOR SLAB ON 2" OF CLEAN MOIST SAND OVER 10 MIL VAPOR BARRIER BETWEEN GRADE BEAMS

SEE SHEET S-12 FOR SLAB THICKNESS AND REINFORCING

SEE SHEET S-13 FOR DEFERRED SLAB AREAS

SEE ARCHITECTURAL FOR FINISH FLOOR AND TOP OF DEFERRED SLAB ELEVATIONS

COORDINATE WALL ANCHORAGE PLATE LOCATIONS WITH WALL PANEL MANUFACTURER

6. SEE MECHANICAL FOR UNDER SLAB PIPING LOCATION AND ELEVATIONS

PROVIDE WATERSTOPS AT ALL SLAB COLD JOINTS

SOUTH FLOOR SLAB PLAN

AS SS SCALE: 1/8" = 1'-0"

LEGEND

CMU WALLS

DEPRESSION FOR WALLS, DEFERRED SLABS AND RAMPS

TRENCH DRAINS PER ARCH'L PLANS

SUMPS - SEE ARCH'L PLANS

SLAB STEP PER ARCH'L DWGS

STEEL BOLLARD - SEE @

GRAPHIC SCALE

5' 0 5' 10' 15' 20' 25'

1/8"

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S-5

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NAVAL UNDERSEA WARFARE CENTER DIVISION KEYPORT, WA

HAZARDOUS WASTE TSO (P-370)

SOUTH FLOOR SLAB PLAN

6405175

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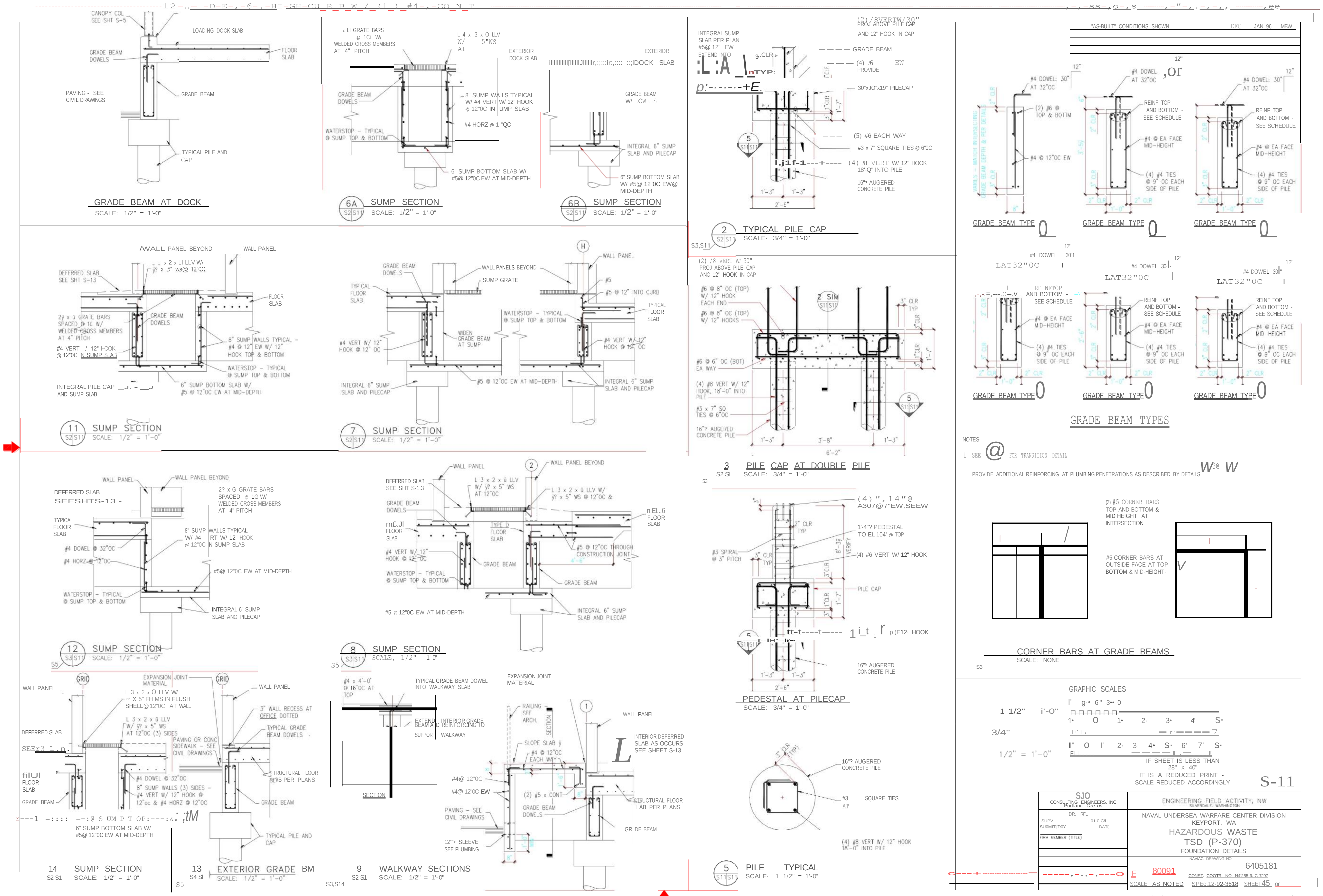

CANOPY COL SEE SHT S-5
LOADING DOCK SLAB
FLOOR SLAB
GRADE BEAM DOWELS
GRADE BEAM
PAVING - SEE CIVIL DRAWINGS
TYPICAL PILE AND CAP
GRADE BEAM AT DOCK
SCALE: 1/2" = 1'-0"
6A SUMP SECTION
SCALE: 1/2" = 1'-0"
WATERSTOP - TYPICAL @ SUMP TOP & BOTTOM
8" SUMP WALLS TYPICAL W/ #4 VERT W/ 12" HOOK @ 12"OC IN SUMP SLAB
#4 HORZ @ 1"OC
6" SUMP BOTTOM SLAB W/ #5@ 12"OC EW AT MID-DEPTH
EXTERIOR DOCK SLAB
GRADE BEAM W/ DOWELS
INTEGRAL 6" SUMP SLAB AND PILECAP
6" SUMP BOTTOM SLAB W/ #5@ 12"OC EW@ MID-DEPTH
6B SUMP SECTION
SCALE: 1/2" = 1'-0"
INTEGRAL SUMP SLAB PER PLAN #5@ 12" EW
GRADE BEAM
30"x30"x19" PILECAP
(5) #6 EACH WAY
#3 x 7" SQUARE TIES @ 6"OC
(4) #8 VERT W/ 12" HOOK 18'-0" INTO PILE
16" AUGERED CONCRETE PILE
2 TYPICAL PILE CAP
SCALE: 3/4" = 1'-0"
"AS-BUILT" CONDITIONS SHOWN
#4 DOWEL: 30" AT 32"OC
REINF TOP AND BOTTOM - SEE SCHEDULE
#4 @ EA FACE MID-HEIGHT
(4) #4 TIES @ 9" OC EACH SIDE OF PILE
GRADE BEAM TYPE
GRADE BEAM TYPES
11 SUMP SECTION
SCALE: 1/2" = 1'-0"
DEFERRED SLAB SEE SHT S-13
WALL PANEL BEYOND
WALL PANEL
#4 VERT / 12" HOOK @ 12"OC IN SUMP SLAB
INTEGRAL PILE CAP AND SUMP SLAB
6" SUMP BOTTOM SLAB W/ #5 @ 12"OC EW AT MID-DEPTH
7 SUMP SECTION
SCALE: 1/2" = 1'-0"
WALL PANELS BEYOND
SUMP GRATE
WIDEN GRADE BEAM AT SUMP
#5 @ 12"OC EW AT MID-DEPTH
INTEGRAL 6" SUMP SLAB AND PILECAP
(2) #8 VERT W/ 30" PROJ ABOVE PILE CAP AND 12" HOOK IN CAP
#6 @ 8" OC (TOP) W/ 12" HOOK EACH END
#6 @ 6" OC (BOT) EA WAY
(4) #8 VERT W/ 12" HOOK, 18'-0" INTO PILE
#3 x 7" SQ TIES @ 6"OC
16" AUGERED CONCRETE PILE
3 PILE CAP AT DOUBLE PILE
SCALE: 3/4" = 1'-0"
NOTES
PROVIDE ADDITIONAL REINFORCING AT PLUMBING PENETRATIONS AS DESCRIBED BY DETAILS
(2) #5 CORNER BARS TOP AND BOTTOM & MID HEIGHT AT INTERSECTION
#5 CORNER BARS AT OUTSIDE FACE AT TOP BOTTOM & MID-HEIGHT
CORNER BARS AT GRADE BEAMS
SCALE: NONE
12 SUMP SECTION
SCALE: 1/2" = 1'-0"
8 SUMP SECTION
SCALE: 1/2" = 1'-0"
1'-4"Ø PEDESTAL TO EL 104' @ TOP
(4) #6 VERT W/ 12" HOOK
#3 SPIRAL @ 3" PITCH
PILE CAP
16" AUGERED CONCRETE PILE
PEDESTAL AT PILECAP
SCALE: 3/4" = 1'-0"
GRAPHIC SCALES
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S-11
14 SUMP SECTION
SCALE: 1/2" = 1'-0"
13 EXTERIOR GRADE BM
SCALE: 1/2" = 1'-0"
9 WALKWAY SECTIONS
SCALE: 1/2" = 1'-0"
5 PILE - TYPICAL
SCALE: 1 1/2" = 1'-0"
16" AUGERED CONCRETE PILE
#3 SQUARE TIES
(4) #8 VERT W/ 12" HOOK 18'-0" INTO PILE
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FOUNDATION DETAILS
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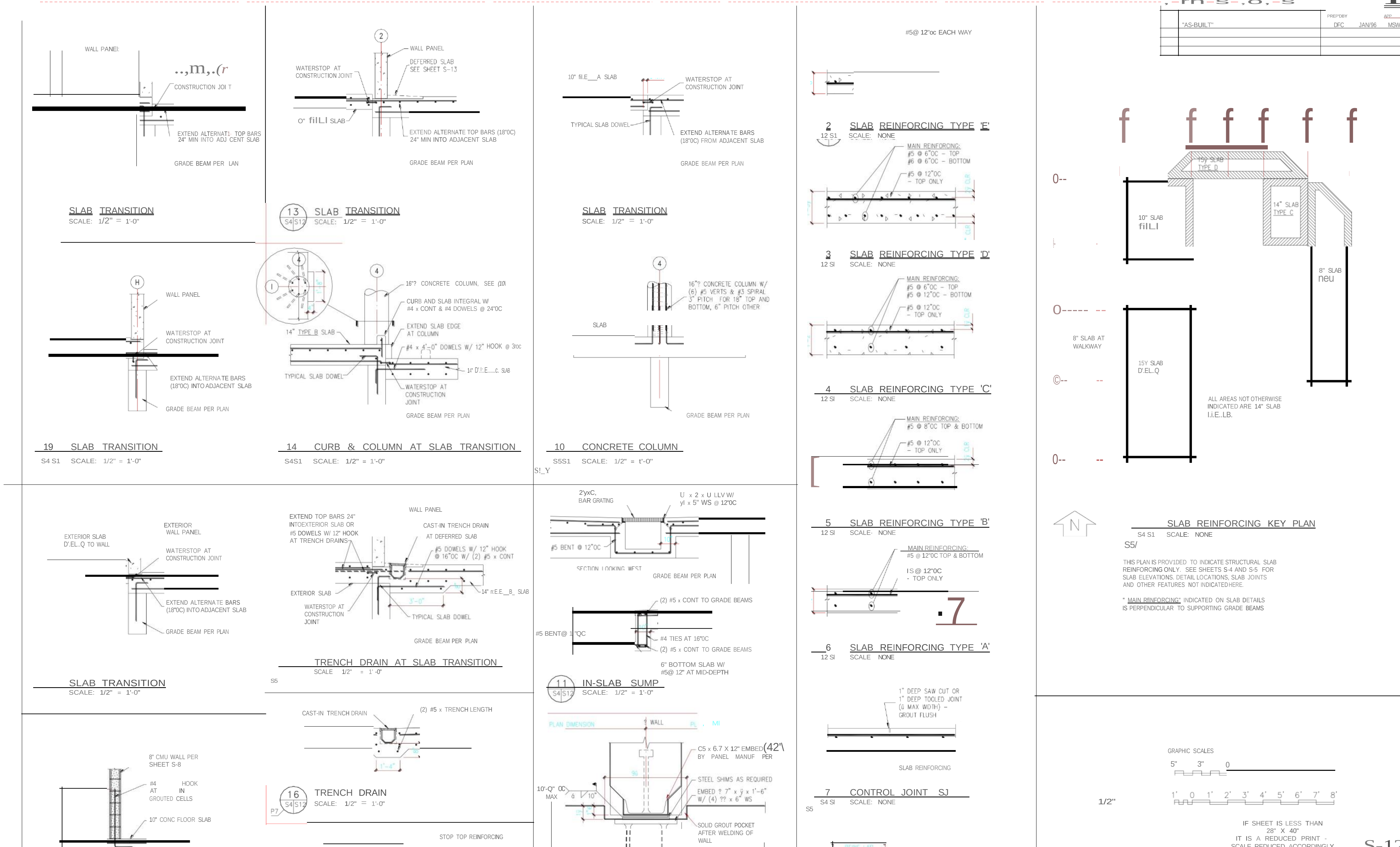

"AS-BUILT" DFC JAN/96 MSW

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KEYPORT, WA

HAZARDOUS WASTE
TSD (P-370)
FOUNDATION DETAILS

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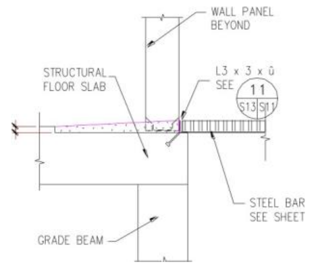
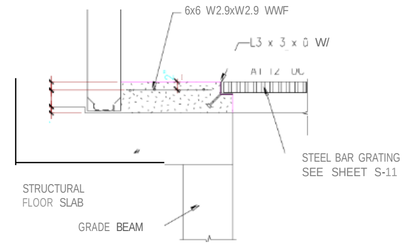
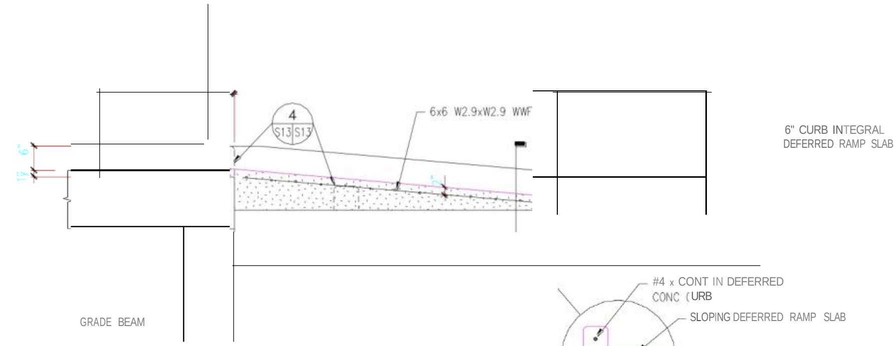


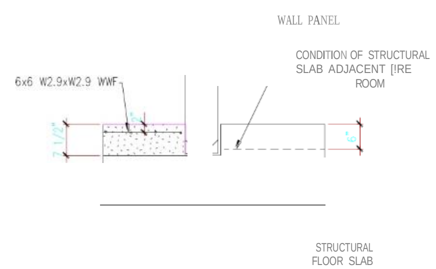
13 SLAB RECESS AT GRATING
13S1 SCALE: 3/4" = 1'-0"



9 SLAB RECESS AT GRATING
13S1 SCALE· 3/4" = 1'-0"



5 SLAB RECESSES AT RAMP
13S1 SCALE: 3/4" = 1'-0"



14 SLAB RECESS AT WALL PANEL
13S1 SCALE: 3/4" = 1'-0"

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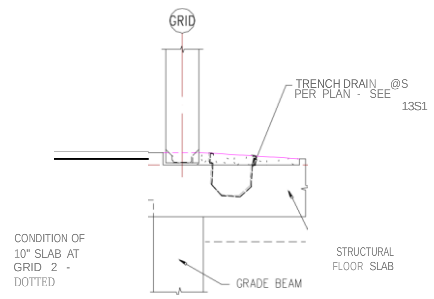
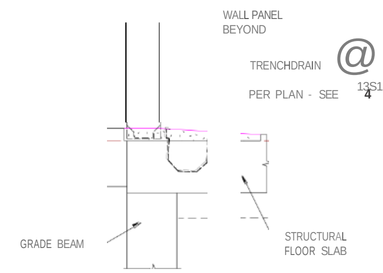
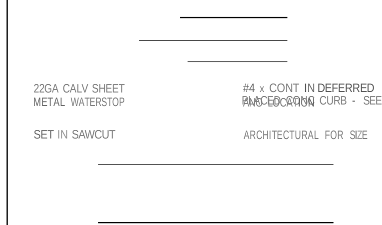


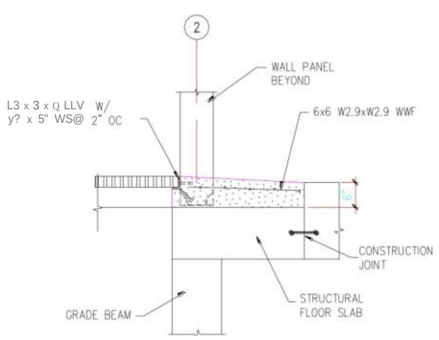
10 SLAB RECESS AT WALL PANEL
13S1 SCALE· 3/4" = 1'-0"



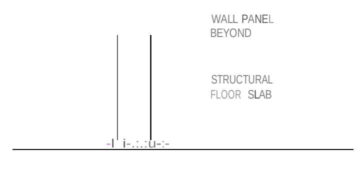
6 SLAB RECESS AT EXTERIOR WALL
13S1 SCALE: 3/4" = 1'-0"



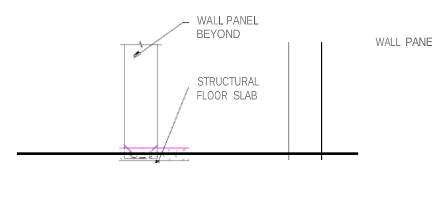
2 DEFERRED CURB
13S1 SCALE: 3/4" = 1'-0"



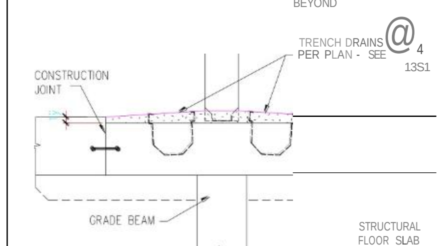
15 SLAB RECESS AT SUMP
13S1 SCALE: 3/4" = 1'-0"



11 SLAB RECESS AT WALL PANEL
13 S1 SCALE 3/4" = 1'-0"

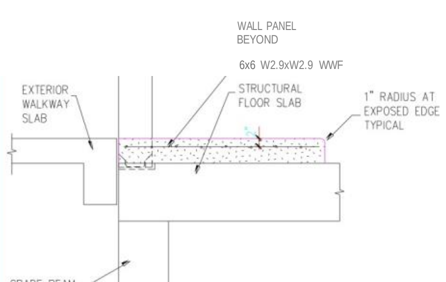


7 SLAB RECESS AT WALL PANEL
13S1 SCALE: 3/4" = 1'-0"

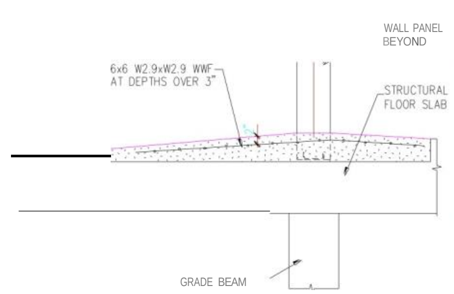


3 SLAB RECESS AT THRESHOLD
13 S1 SCALE 3/4" = 1'-0"

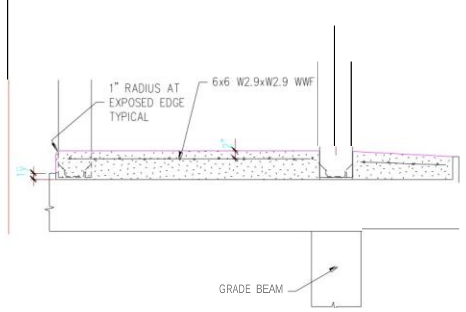
SS



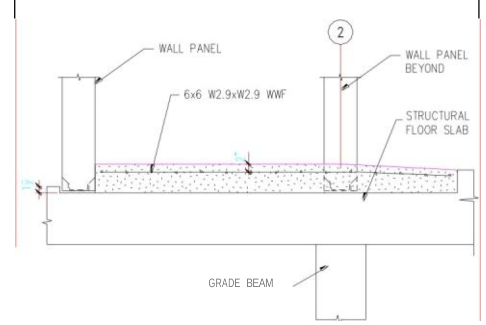
16 DEFERRED SLAB AT WALKWAY
13 S1 SCALE: 3/4" 1'-0"



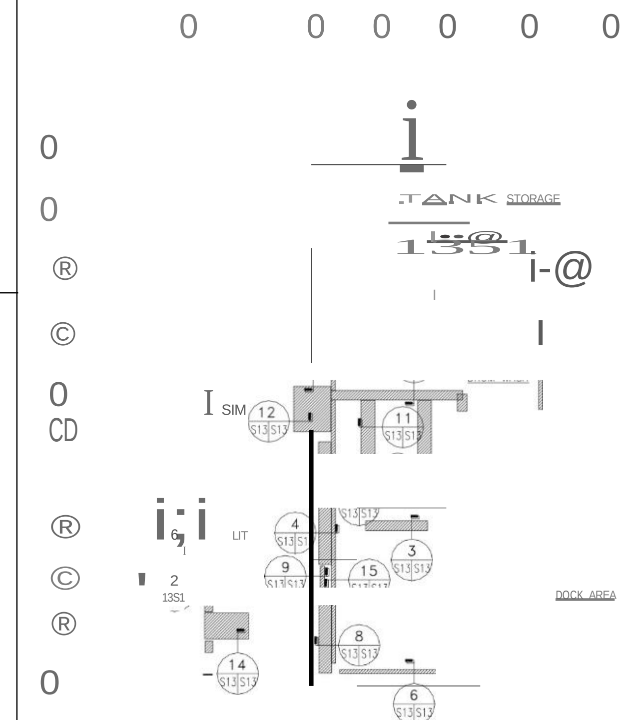
12 SLAB RECESS AT TRANSITION
13 S1 SCALE: 3/4" 1'-0"



8 SLAB RECESS AT ALCOVE LANDING
13S1 SCALE: 3/4" = 1'-0"



4 SLAB RECESS AT ALCOVE
13 S1 SCALE: 3/4" 1'-0"



DEFERRED SLAB PLAN
13S1 SCALE: 1/32" 1'-0"

NOTES & LEGEND

C=:J INDICATES AREAS OF DEFERRED SLABS TO BE PLACED AFTER ERECTING WALLS

SEE SHEETS S4, S5 AND S12 FOR STRUCTURAL FLOOR SLAB CONSTRUCTION AND DETAILS

SEE ARCHITECTURAL FOR FINISH FLOOR ELEVATIONS AND DEFERRED SLAB LOCATIONS AND DIMENSIONS

SEE MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS FOR DEFERRED CONCRETE HOUSEKEEPING PADS AND PEDESTALS

APPLY EPOXY BONDING COMPOUND TO HARDENED CONCRETE PRIOR TO PLACING DEFERRED SLAB

PROVIDE WIRE MESH REINFORCING AT SLAB THICKNESSES IN EXCESS OF 3"

GRAPHIC SCALES

1/32" = 1'-0" 20· 0 20· 40· 50· 50· 100·

3/4" = 1'-0" 1' 0 1' 2' 3' 4' 5'

IF SHEET IS LESS THAN 28" X 40" IT IS A REDUCED PRINT - SCALE REDUCED ACCORDINGLY

"AS-BUILT" DFC JAN 96 MSW

S-13

SJO CONSULTING ENGINEERS, INC Portland Ore on

DEPARTMENT OF NAVY

ENGINEE: o SH!ITb VITY, NW

NAVAL UNDERSEA WARFARE CENTER DIVISION KEYPORT, WA

HAZARDOUS WASTE TSO (P-370)

DEFERRED SLAB PLAN AND DETAILS

6405183

F 80091

AS NOTED SPEC. 12-92-3618 SHEET 47

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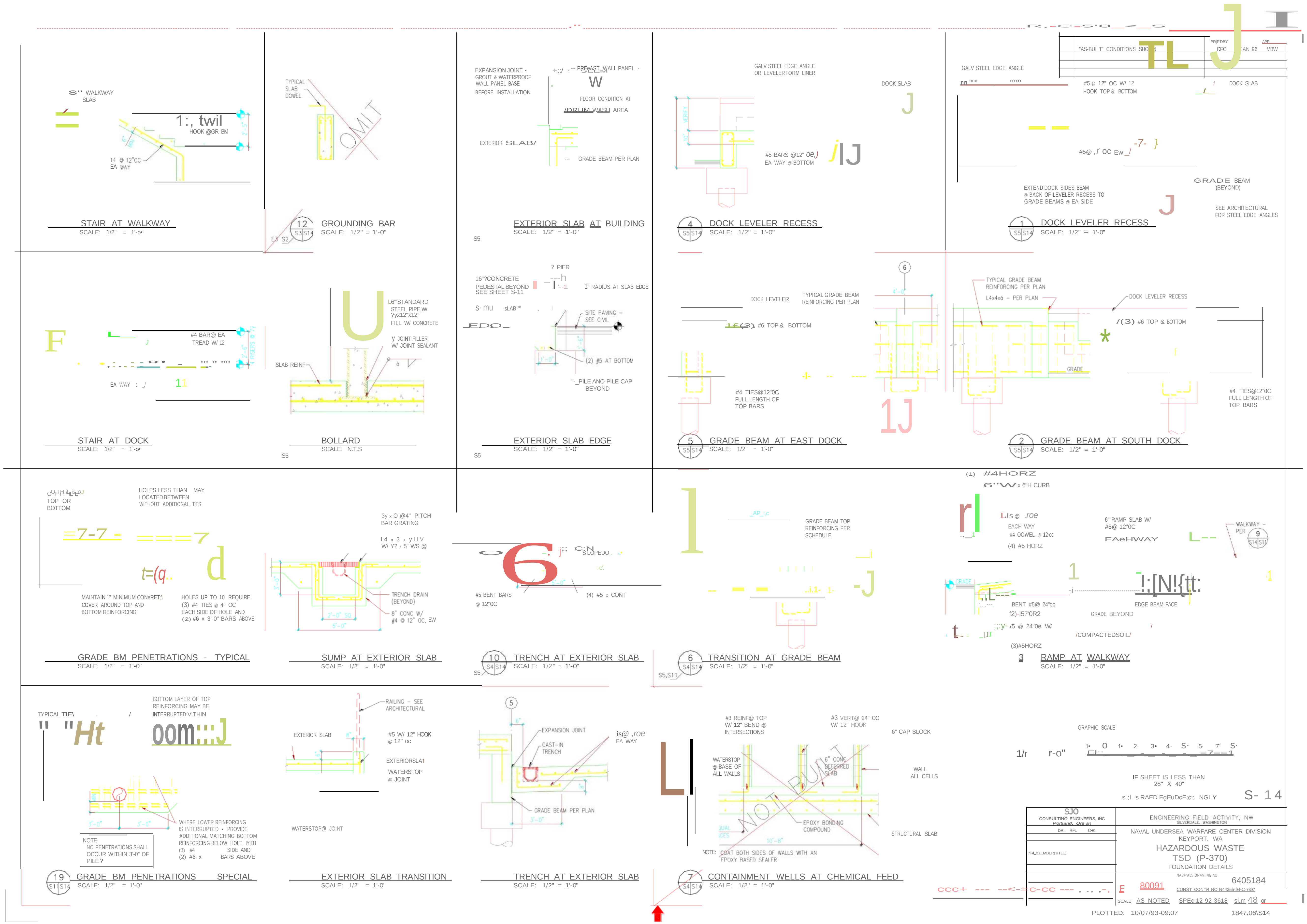
STAIR AT WALKWAY
SCALE: 1/2" = 1'-0"
12 GROUNDING BAR
SCALE: 1/2" = 1'-0"
EXTERIOR SLAB AT BUILDING
SCALE: 1/2" = 1'-0"
4 DOCK LEVELER RECESS
SCALE: 1/2" = 1'-0"
1 DOCK LEVELER RECESS
SCALE: 1/2" = 1'-0"
STAIR AT DOCK
SCALE: 1/2" = 1'-0"
BOLLARD
SCALE: N.T.S
EXTERIOR SLAB EDGE
SCALE: 1/2" = 1'-0"
5 GRADE BEAM AT EAST DOCK
SCALE: 1/2" = 1'-0"
2 GRADE BEAM AT SOUTH DOCK
SCALE: 1/2" = 1'-0"
GRADE BM PENETRATIONS - TYPICAL
SCALE: 1/2" = 1'-0"
SUMP AT EXTERIOR SLAB
SCALE: 1/2" = 1'-0"
10 TRENCH AT EXTERIOR SLAB
SCALE: 1/2" = 1'-0"
6 TRANSITION AT GRADE BEAM
SCALE: 1/2" = 1'-0"
3 RAMP AT WALKWAY
SCALE: 1/2" = 1'-0"
19 GRADE BM PENETRATIONS SPECIAL
SCALE: 1/2" = 1'-0"
EXTERIOR SLAB TRANSITION
SCALE: 1/2" = 1'-0"
TRENCH AT EXTERIOR SLAB
SCALE: 1/2" = 1'-0"
7 CONTAINMENT WELLS AT CHEMICAL FEED
SCALE: 1/2" = 1'-0"
"AS-BUILT" CONDITIONS SHOWN
DFC
JAN 96
MBW
GALV STEEL EDGE ANGLE OR LEVELERFORM LINER
DOCK SLAB
#5 BARS @12" OC EA WAY @ BOTTOM
GALV STEEL EDGE ANGLE
#5 @ 12" OC W/ 12 HOOK TOP & BOTTOM
EXTEND DOCK SIDES BEAM @ BACK OF LEVELER RECESS TO GRADE BEAMS @ EA SIDE
GRADE BEAM (BEYOND)
SEE ARCHITECTURAL FOR STEEL EDGE ANGLES
EXPANSION JOINT - GROUT & WATERPROOF WALL PANEL BASE BEFORE INSTALLATION
PRECAST WALL PANEL
FLOOR CONDITION AT DRUM WASH AREA
EXTERIOR SLAB
GRADE BEAM PER PLAN
TYPICAL SLAB DOWEL
OMIT
8" WALKWAY SLAB
HOOK @GR BM
14 @ 12"OC EA WAY
#4 BAR@ EA TREAD W/ 12
EA WAY
6"STANDARD STEEL PIPE W/ ?yx12"x12" FILL W/ CONCRETE
JOINT FILLER W/ JOINT SEALANT
SLAB REINF
PIER
16"?CONCRETE PEDESTAL BEYOND SEE SHEET S-11
1" RADIUS AT SLAB EDGE
SITE PAVING - SEE CIVIL
(2) #5 AT BOTTOM
PILE AND PILE CAP BEYOND
DOCK LEVELER
TYPICAL GRADE BEAM REINFORCING PER PLAN
(3) #6 TOP & BOTTOM
#4 TIES@12"OC FULL LENGTH OF TOP BARS
TYPICAL GRADE BEAM REINFORCING PER PLAN
L4x4x6 - PER PLAN
DOCK LEVELER RECESS
(3) #6 TOP & BOTTOM
GRADE
#4 TIES@12"OC FULL LENGTH OF TOP BARS
TOP OR BOTTOM
HOLES LESS THAN MAY LOCATED BETWEEN WITHOUT ADDITIONAL TIES
MAINTAIN 1" MINIMUM CONCRETE COVER AROUND TOP AND BOTTOM REINFORCING
HOLES UP TO 10 REQUIRE (3) #4 TIES @ 4" OC EACH SIDE OF HOLE AND (2) #6 x 3'-0" BARS ABOVE
BAR GRATING
TRENCH DRAIN (BEYOND)
8" CONC W/ #4 @ 12" OC, EW
#5 BENT BARS @ 12"OC
(4) #5 x CONT
SLOPE
GRADE BEAM TOP REINFORCING PER SCHEDULE
(1) #4HORZ
6" x 6"H CURB
EACH WAY
#4 DOWEL @ 12oc
(4) #5 HORZ
6" RAMP SLAB W/ #5@ 12"OC EACH WAY
WALKWAY - PER 9 S14
BENT #5@ 24"oc
GRADE BEYOND
EDGE BEAM FACE
#5 @ 24"oc W/
COMPACTED SOIL
(3)#5HORZ
TYPICAL TIE
BOTTOM LAYER OF TOP REINFORCING MAY BE INTERRUPTED
WHERE LOWER REINFORCING IS INTERRUPTED - PROVIDE ADDITIONAL MATCHING BOTTOM REINFORCING BELOW HOLE WITH (3) #4 SIDE AND (2) #6 x BARS ABOVE
NOTE: NO PENETRATIONS SHALL OCCUR WITHIN 3'-0" OF PILE
RAILING - SEE ARCHITECTURAL
EXTERIOR SLAB
#5 W/ 12" HOOK @ 12" oc
EXTERIOR SLAB
WATERSTOP @ JOINT
WATERSTOP@ JOINT
EXPANSION JOINT
CAST-IN TRENCH
EA WAY
GRADE BEAM PER PLAN
#3 REINF@ TOP W/ 12" BEND @ INTERSECTIONS
#3 VERT@ 24" OC W/ 12" HOOK
6" CAP BLOCK
WATERSTOP @ BASE OF ALL WALLS
6" CONC DEFERRED SLAB
NOT PART
WALL ALL CELLS
EPOXY BONDING COMPOUND
STRUCTURAL SLAB
NOTE: COAT BOTH SIDES OF WALLS WITH AN EPOXY BASED SEALER
GRAPHIC SCALE
IF SHEET IS LESS THAN 28" X 40" SCALE EQUALLY ACCORDINGLY
S-14
SJO CONSULTING ENGINEERS, INC Portland, Oregon
ENGINEERING FIELD ACTIVITY, NW SILVERDALE, WASHINGTON
NAVAL UNDERSEA WARFARE CENTER DIVISION KEYPORT, WA
HAZARDOUS WASTE TSD (P-370)
FOUNDATION DETAILS
6405184
80091
SCALE AS NOTED
SPEC 12-92-3618
SHEET 48
PLOTTED: 10/07/93-09:07
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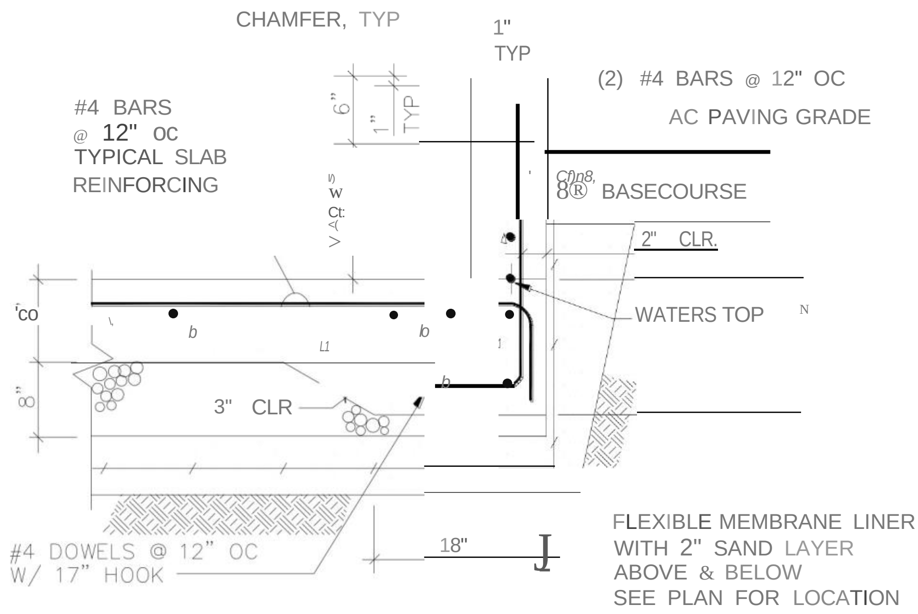
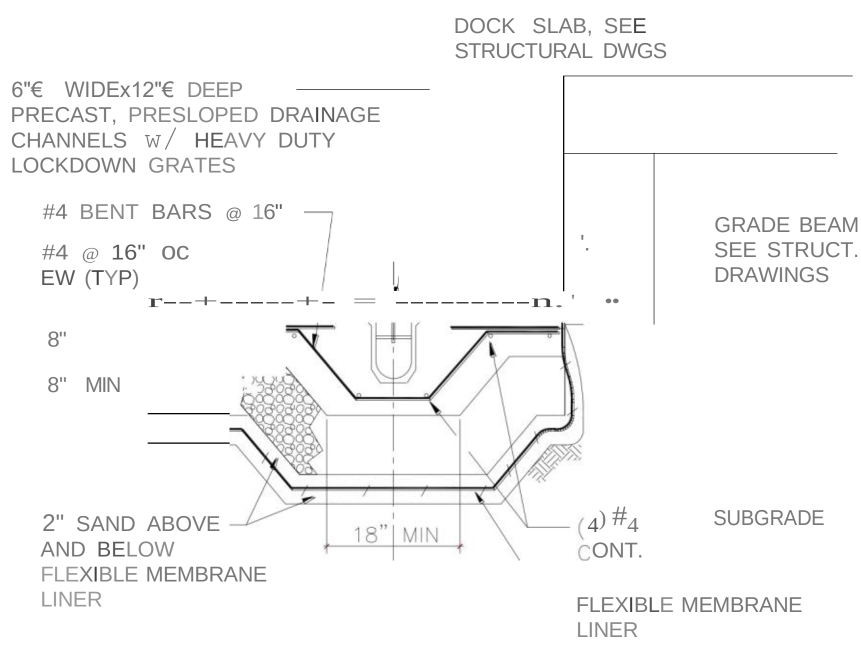


11
C5 | C9
RAMP RETAINING WALL
SCALE NONE



12
C6 | C9
C10
PRECAST TRENCH DRAIN W LINER
SCALE NONE

SECTION D

APPENDIX D4

FLOOR COATING SPECIFICATIONS

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1.7 QUALIFICATIONS OF INSTALLER

Installation shall be performed by an applicator approved by the manufacturer of the floor surfacing materials. The Contractor shall furnish a written statement from the manufacturer that the installer is acceptable.

PART 2 PRODUCTS

2.1 MATERIALS

Materials used in the flooring shall be the products of a single manufacturer. Materials shall meet the following requirements:

2.1.1 Complete System

40 CFR 264.175: The complete system must be sufficiently impervious to contain leaks or spills.

2.1.2 Primer or Floor Wall Sealer

One coat, high build, 2 component epoxy, clear, VOC compliant primer that is recommended by the manufacturer to penetrate into the pores of the substrate and bond with the floor or wall surfacing matrix to form a permanent monolithic bond between substrate and surfacing matrix or act as a chemical and wear resistant floor general purpose sealer with 96 percent solids by volume and a dry film thickness of 6.0 to 8.0 MILS.

2.1.3 Binder

Thermo-setting epoxy or medium reactive non-thixotropic modified polyester.

2.1.4 Fillers

Insert mineral or cellulosic material as recommended by the manufacturer for use with the binder.

2.1.5 Top Coating Color

Light gray as selected from manufacturer’s standard colors.

2.1.6 Physical Properties

The complete system after curing shall have the following properties when tested in accordance with the test methods listed for each property.

2.1.6.1 Epoxy Matrix Floor Surfacing – Do not use in Room 139 (Oxy-acids)

a. Compressive Strength: ASTM C 579; 10,000 psi minimum at 7 days.

b. Tensile Strength: ASTM C 307; 1,500 psi minimum at 7 days.

c. Flexural Modulus of Elasticity: ASTM C 580; 500,000 psi minimum at 7 days.

d. Thermal Coefficient of Expansion: ASTM C 531; 0.00004 inches per inch-degree F maximum.

e. Shrinkage: ASTM C 531; 0.5 percent maximum.

f. Bond Strength: ACI 503R, 300 psi minimum with 100 percent concrete failure (2,500 psi Compressive Strength Concrete).

g. Flame Spread Index: ASTM E 162; 25 maximum.

h. Smoke Deposited: ASTM E 162, 4 mg maximum.

i. Abrasion Resistance: ASTM D 4060; 15 mg maximum weight loss.

j. Impact Resistance: MIL-D-3134; no visible signs of chipping, cracking, or detachment and not more than 0.05 inch of permanent indentation.

k. Indentation: MIL-D-3134; no signs of cracking or detachment with initial indentation not to exceed two percent.

l. Resistance to Elevated Temperature: MIL-D-3134; no flow or slip exceeding 0.063 inch; no softening.

m. Non-slip Properties: MIL-D-3134; factors of friction not less than shown in Table II.

TABLE II

Contracting Surface	Factor of Static Friction Condition			Factors of Sliding Friction Condition		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	0.60	0.50	-----	0.30	0.40	-----
Rubber	0.60	0.70	0.30	0.40	0.70	0.10

n. Moister Absorption: MIL-D-3134; 1.0 percent maximum.

o. Chemical Resistance: ASTM D 1308; no effect when exposed to the following reagents for 7 days:

(1) Acetic Acid: 28 percent solution
(2) Ammonium Hydroxide: 10 percent solution
(3) Citric Acid: 5 percent solution
(4) Coffee
(5) Coca Cola Syrup
(6) Isopropyl Alcohol
(7) Mineral Oil
(8) Sodium Hydroxide: 50 percent solution
(9) Tri-Sodium Phosphate: 5 percent solution
(10) Urea: 6.6 percent solution
(11) Sulfuric Acid: 18 and 93 percent solutions

2.1.6.2 Polyester Matrix Floor Surfacing – Use only in Room 139

a. Compressive Strength: ASTM C 579; 10,000 psi minimum at 7 days.

b. Tensile Strength: ASTM C 307, 1,500 psi minimum at 7 days.

c. Flexural Modulus of Elasticity: ASTM C 580; 1,000,000 psi minimum at 7 days.

d. Thermal Coefficient of Expansion: ASTM C 531; 0.00004 inches per inch degree F maximum.

e. Shrinkage: ASTM C 531; 1.0 percent maximum.

f. Bond Strength: ACI 503R, 300 psi minimum with 100 percent concrete failure.

g. Flame Spread Index: ASTM E 162; 25 maximum.

h. Smoke Deposited: ASTM E 162; 4 gm maximum.

i. Abrasion Resistance: ASTM D 4060; no more than 1.0 mil loss of thickness.

j. Porosity: ASTM D 4060; no more than 8 percent gain in weight and no evidence of cracking, peeling, blistering, or loss of adhesion.

k. Impact Resistance: ASTM D 4060; no evidence of cracking, spalling, or loss of adhesion.

l. Fungistatic and Bacteriostatic Resistance: ASTM D 4060; no support for growth of fungus or bacteria.

m. Ultraviolet Light Resistance: ASTM D 4060; no evidence of chalking, cracking, peeling, blistering, or loss of adhesion.

n. Thermal Shock Resistance: ASTM D 4060; no evidence of cracking, peeling, blistering, spalling, or loss of adhesion.

o. Stain Resistance: ASTM D 4060; no permanent staining.

p. Adhesion: ASTM D 4060; 90 percent failure of concrete substrate.

q. Non-Slip Properties: MIL-D-3134; factors of friction not less than show in Table III.

TABLE III

Contracting Surface	Factor of Static Friction Condition			Factors of Sliding Friction Condition		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	0.60	0.50	-----	0.30	0.40	-----
Rubber	0.60	0.70	0.30	0.40	0.70	0.10

r. Chemical Resistance: ASTM D 1308; no effect when exposed to the following reagents for 7 days.

(1) Acetic Acid: 28 percent solution
(2) Ammonium Hydroxide: 10 percent solution
(3) Citric Acid: 5 percent solution
(4) Coffee
(5) Coca Cola Syrup
(6) Isopropyl Alcohol
(7) Mineral Oil
(8) Sodium Hydroxide: 5 percent solution
(9) Tri-Sodium Phosphate: 5 percent solution
(10) Urea: 6.6 percent solution
(11) Nitric Acid: 30 percent solution

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Remove all dirt, dust, debris, and other loose particles by sweeping or vacuum cleaning.

3.1.1 Concrete Surfaces

3.1.1.1 Acid Etching

Apply a 10 percent solution of muriatic acid at a rate of one quart per each 10 square feet of concrete surface. Allow the solution to stand until it stops bubbling but not less than five minutes. Remove the acid and wash the surfaces several times, as required, to remove all traces of the acid. Always dilute acid by pouring into water. Use face shield rubber gloves, and other safety equipment when using acids, alkalies, or solvents.

SECTION D

APPENDIX D5

CONTAINMENT CALCULATIONS

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There are two exterior spill containments around the NUWC, Keyport Treatment, Storage and Disposal Facility:

1. THE NORTH LOADING AREA (fire zone 5):

Picture 1: the north spill containment area viewed from the northwest.

Picture 2: the north spill containment area viewed from the northeast.

The north area is used to offload solid dangerous wastes, offload bulk liquid dangerous waste in drums and portable totes from 55 gallons to 500 gallons, and to transfer Otto Fuel II waste from a tank truck that holds up to 750 gallons, from an oily wastewater tank truck that holds up to 1,500 gallons, and to a bulk liquid dangerous waste tank truck that holds up to 5,000 gallons. Transfers occur four to six times per year: three to five involving Otto Fuel II/Alcohol, one involving Otto Fuel II/Cyanide.

The blind sump measures 83’ X 2’ X (56”/12) deep for a containment volume of 5,795 gallons.

The blind sump contains five buttresses for internal support. The volume of each buttress is (41.5”/12) X 1’ X 2’, for a total volume of 52 gallons each.

Pictures 3 & 4: The north area blind sump. Pictures of the sump and buttresses are not feasible because the grates prevent showing any detail.

The net volume of the blind sump is 5,795 gallons minus 5 buttresses of 52 gallons each for a net volume of 5,535 gallons.

1.1 Fire Flow Calculations for the North Loading Area.

In addition to the sump and floor containment areas, overflow from the blind sump flows to a small trench that flows to two exterior containment areas before it overflows the perimeter berms. Fire flow calculations are provided in the table below. Note that the fire containment area valves remain open and overflow to a retention pond unless a fire occurs.

1.1 Spill -Only Calculations for the North Loading Area.

Spill containment capacity of the blind sump is 5,535 gallons.

From the P-370 drawings, the elevation difference between the top of the blind sump and the small trench that flows to the two exterior containment areas before it overflows the perimeter berms is one inch.

The location of the small trench is about 5 ft. away from the back wall (see the drawing). Thus, 1974 ft^2 containment area is subject to 1-in depth for a spill containment capacity of 1,230 gallons.

Total north loading area spill containment capacity is 5,535 + 1,230 = 6,765 gallons.

The worst case spill is 5,000 gallons from a tank truck for offsite shipping.

The north loading area excess spill containment capacity is 6,765 – 5,000 = 1,765 gallons.

There are six compartments in the blind sump, so each can fill to 1,765 / 6 = 294 gallons before the excess capacity is met. At 156” X 24” = 3,744 in^2, each compartment can fill to 294 gallons * 231 in^3/gal / 3,744 in^2 = 18” deep before the excess capacity is met.

Per WAC 173-303-630(7)(b), given the above excess capacity, it may be used to contain run-on during periods in between transfers. Pumping out any collected rainwater immediately prior to a scheduled transfer is encouraged, and considered a best management practice. Pumping out all collected rainwater throughout the trench will be required when the stormwater level in any one compartment exceeds 17 inches deep, or during the period of October through May, every 30 days, whichever comes sooner. Under no circumstance will rainwater be allowed to collect up to 15 inches of depth in four or more compartments.

No equipment other than the 5,000 gallon shipping tank truck shall be located in the north loading area more than five feet from the building wall during transfers to the shipping truck.

2. <u>THE SOUTH SHIPPING DOCK (fire zone 2):</u>

Pictures 5 & 6: the south loading dock spill containment area and associated sump.

2.2 Spill and Fire Flow Calculations for only the South Shipping Dock Area.

The South Shipping Dock sump measures 7’ X 5’ X (65”/12) deep for a containment volume of 1,418 gallons, at which point the contents flow automatically to the storm drain, which drains to a sedimentation pond that is equipped with an oil/water separator prior to discharge to the lagoon.

From the table the fire flow requirement for the shipping dock is 402 gallons.

As calculated above, the capacity of the sump is 1,418 gallons. The maximum spill is 55 gallons.

The excess capacity for the shipping dock area is 1,418 – 402 – 55 = 961 gallons

The alarm float activates when the tank contents reach 3 ft. deep, at which time there is 785 gallons in the sump, so when the alarm goes off, 176 gallons of spill capacity remains in the sump, or more than three times the expected maximum spill volume.

Per WAC 173-303-630(7)(b), given the above excess capacity, it may be used to contain run-on during periods in between transfers. Pumping out any collected rainwater immediately prior to a scheduled transfer operation is encouraged, and considered a best management practice. Pumping will be required when the south spill containment sump fills to the alarm activation level or during the period of October through May, every 30 days, whichever comes sooner. The sump high level alarm system will be checked for functionality on an annual basis.

SECONDARY AND FIRE FLOW CONTAINMENT CALCULATIONS

ROOM NAME	SECONDARY CONTAINMENT							FIRE FLOW											
COLUMN	B	C	D	E	F	G	H	I	J	K	L	N	N	O	P	Q	R	S	T
receiving	123N	4,870	2	6,071	550	3,410	341	0.35	3,000	1,124	0	1,124	20	22,470	23,020	16,949	1+2	31,790	14,841
ORM	123S	2,627	2	3,275	55	10,560	1,056	included in receiving calculation											
DW tanks	124	2,320	8	11,569	5,000	30,000	3,000	0.35	2,400	899	0	899	20	17,976	22,976	11,407	1+2	31,790	20,383
cyanides/sulfides	125	35	52	1,118	55	330	55	0.35	60	22	0	28	20	560	615	0	1+2	31,790	31,790
drum wash	128	1,948	2	2,429	0	0	0	0.35	1,950	730	0	730	20	14,606	14,606	12,177	1+2	31,790	19,613
oxidizers (trench & sump)	129			296	55	495	55	0.35	100	37	0	37	20	749	804	508	1+2	31,790	31,282
acids	130	1,017	6	3,804	550	1,980	550	0.35	1,020	382	0	382	20	7,640	8,190	4,386	3	7,480	3,094
dangerous when wet	131	4,070	6	15,222	55	18,700	1,870	no fire flow											
poisons	132	35	52	1,118	55	330	55	0.35	60	22	0	28	20	560	615	0	1+2	31,790	31,790
organic peroxides	133	35	52	1,118	55	220	55	0.35	60	22	0	28	20	560	615	0	1+2	31,790	31,790
flammables/combustibles	134	1,163	6	4,350	550	7,920	792	0.25	1,170	313	394	707	20	14,140	14,690	10,340	5	26,928	16,588
flammable 1A (comp gas)	136	1,152	6	4,308	55	3,300	330	0.60	1,200	770	394	1,164	20	23,288	23,343	19,035	5	26,928	7,893
toner cartridges	137	385	2	480	150	660	150	0.35	380	142	0	142	20	2,846	2,996	2,516	3	7,480	4,964
caustics	138	385	2	480	150	1,320	150	0.35	380	142	0	142	20	2,846	2,996	2,516	4	3,366	850
used oil	139	844	2	1,052	55	2,970	297	0.35	860	322	0	322	20	6,441	6,496	5,444	3	7,480	2,036
ORM	140/19	1,090	2	1,359	55	6,600	660	0.35	1,090	408	0	408	20	8,164	8,219	6,860	1+2	31,790	24,930
room 140S (shipping)	140	8,488	2	10,582	55	9,350	935	0.35	1,910	715	0	715	20	14,306	14,361	3,779	1+2	31,790	28,011
north loading area		2,584	1	6,765	5,000	5,000	5,000	0.35	3,340	1,251	0	1,251	20	25,017	30,017	23,252	1+2	31,790	8,538
south shipping dock		435		1,418	55	220	55	0.35	435	45	0	45	9	402	457	no flow to ext cont'ments			

COLUMN EXPLANATION:

A - Room Name

B - Room Number

C - Room Area in square feet from the P-370 table

D - 2^{0} Containment Height in inches is from onsite measurement

E - 2^{0} Containment Vol. in gals, is column C * column D converted to gals

F - Single Largest Container in the room from the Permit Appl. app D-10 table

G - Tot Liquid Storage Cap in the room from the Permit Appl. table D1-4

H - Minimum Spill Containment Volume for the room, the larger of 10% of column G or all of column F from the Permit Application table D1-4

I - Fire Flow Density (gallons per minute per square foot) from the P-370 table

J - Fire Flow Design Area from the P-370 table

K - Ceiling Flow from the P-370 table, it is column I multiplied by column J multiplied by FF=1.07

L - In-Rack Flow from the P-370 table

M - Maximum Fire Flow in GPM from the P-370 table, it is column K plus column L w/ a 28 GPM min

N - Fire Flow Time in minutes from the P-370 table

O - Total Fire Flow is column M multiplied by column N

P - Total Fire Flow Plus Largest Single Container is column F plus column

Q - Overflow to Exterior Containments, in gallons is column P minus column E

R - Exterior Containment Compartment Number, from the drawings

S - Exterior Containment Volume, from the drawings

T - Volume in gallons, column S minus column Q

ABBREVIATIONS			
BLDG	BUILDING	NO	NORMALLY OPEN
BOP	BOTTOM OF PIPE	OH	ORDINARY HAZARD
CENTR	CENTRIFUGAL	OS&Y	OUTSIDE STEM & YOKE
EH	EXTRA HAZARD	RM	ROOM
!	FIRE LINE	TY?	TYPICAL
FDC	FIRE DEPARTMENT CONNECTION	TS	TAMPER SWITCH
ff	FINISH FLOOR		
FIN CLG	FINISH CEILING		
FIN FLR	FINISH FLOOR		
LH	LIGHT HAZARD		
NC	NORMALLY CLOSED		

SYMBOLS	
A	IN-RACK SPRINKLER HEAD (AT DIFFERENT LEVELS)
C,	IN-RACK SPRINKLER RISER
e	GATE VALVE (HANDLE FACING VIEI'IER)
[:ex]	BALL VALVE
0	DIAPHRAGM VALVE
	SOLENOID VALVE
	GATE VALVE (OS&Y)
[>(J	GLOBE VALVE
N	CHECK VALVE
6	PRESSURE SWITCH

ROOM i	AREA	HAZARD CLASS	OVERHEAD DENSITY ($gpm/11^2$)	DESIGN AREA ROOM	DESIGN AREA AS DESIGN	TYPE	ZONE OVERHEAD	ZONE IN-RACK	HEAD TEMP OVERHEAD	HEAD TEMP IN-RACK
101	ENTRY	ORDINARY	0.16	130	3000	WET PIPE	6	NONE	165T	NONE
102	OFFICE			528						
103	LUNCH ROOM			360						
104	OFFICE			168						
105	OFFICE			168						
106	CORRIDOR			172						
107	STORAGE			105						
108	JANITOR'S CLOSET			32						
109	LAVATORY			54						
110	WOMEN'S RESTROOM			384						
111	WOMEN'S SHOWER			144						
112	LAUNDRY			88						
113	MEN'S RESTROOM			332						
114	MEN'S SHOWER			144						
115	CORRIDOR			72						
116	LABORATORY		0.20	645						
117	MECHANICAL ROOM			378						
118	BOILER ROOM		j	703						
119	STAIR		016	133						
120	ELECTRICAL			456						
121	SPILL RESPONSE			1065						
122	CORRIDOR		V	349						
123	RECEIVING	EX HAZ	035	7497			4		286'F	
124	WASTE OIL TANK STORAGE			2301						
125	ORG PER			58						
126	CYANIDE / OIL TREATMENT			1208						
127	MECHANICAL			216						
128	DRUM WASH			1900						
129	OXIDIZER			96			3			
130	ACIDS			1028			3			
131	LITHIUM		NONE	4154	NONE	NONE	NONE		NONE	
132	POISONS		035	58	3000	WET PIPE	3	NONE	286'F	
133	POISONS		035	58			3	NONE		NONE
134	FLAMMABLES		0.25	1210			I	IA		165'F
135	SPRINKLER RISER ROOM		0.16	252			I	NONE	165'F	NONE
136	FLAMMABLES IA		060	1170			I	18	286'F	165'F
137	UNIVERSAL WASTE		035	381			3	NONE		NONE
138	CAUSTICS			381			3			
139	USED OILS			864			3			
140	SHIPPING		j	9468			3			
201	MEZZANINE	ORO	0.20	5124			6			
LO DOCK	NORTH LOADING DOCK	EX HAZ	0.35	2477	3900-*f	ORY PIPE	5			
E STOR	EAST STORAGE			6362			2			
BATT CHRG	BATTERY CHARGING			760						
DRUM STOR	DRUM STORAGE			1520						
SHIP DOCK	SHIPPING DOCK			2878						

* 130% OF DESIGN AREA

FIRE PROTECTION SCHEDULE

FP1FP1 SCALE NONE

"AS-BUILT" PREP"DBY DFC JAN 96 APP MSW

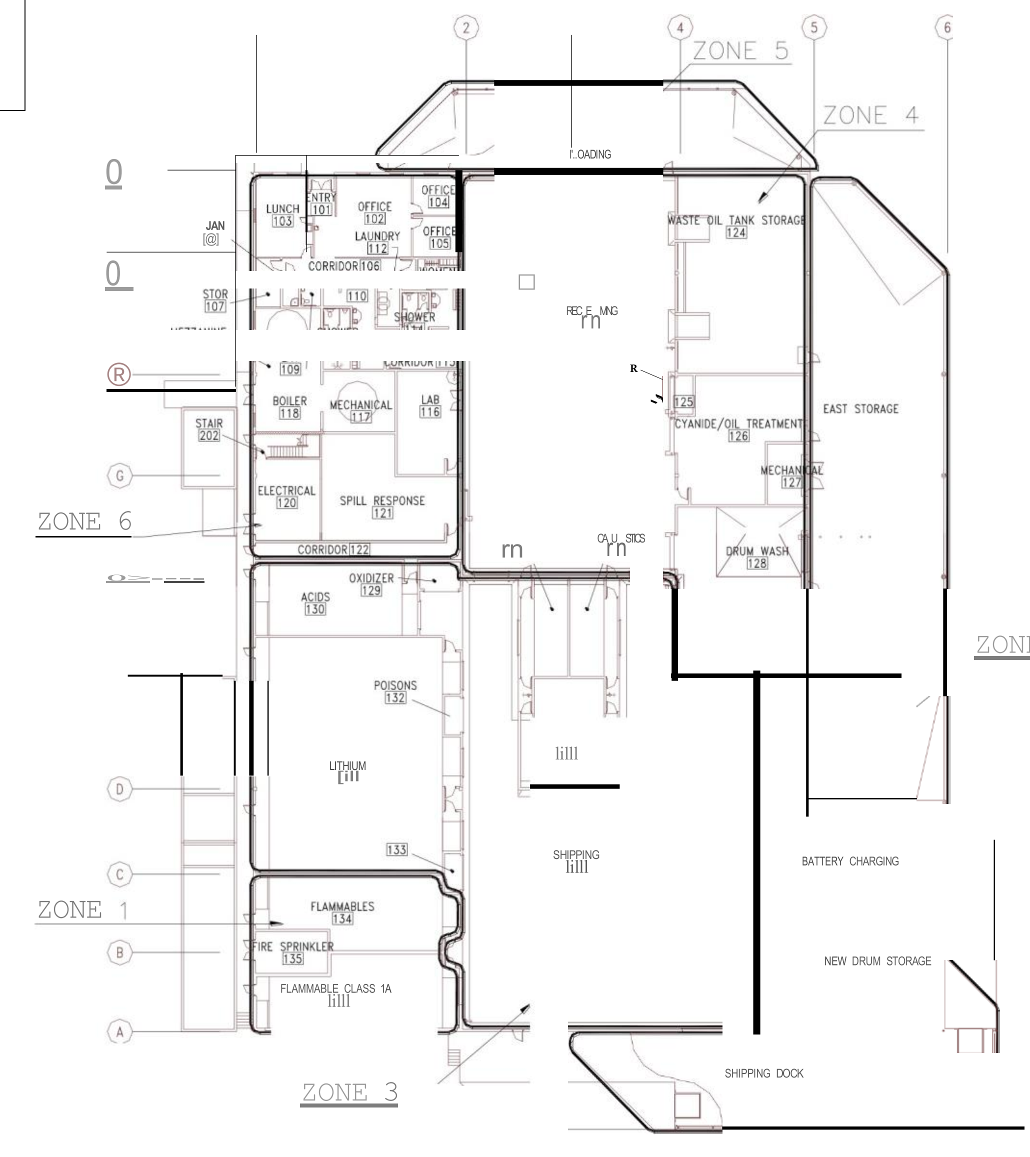
NOTES:

IN-RACK SPRINKLERS IN ROOMS 134 ANO 136 AT EACH RACK LEVEL. CALCULATE 6 HEADS ON EACH LEVEL

2 SPRINKLER HEADS IN ZONES 2 AND 5 AND ROOMS 130, 137, 138, ANO 139 TO BE CORROSION RESISTANT

3. ALL EXPOSED PIPING TO BE PAINTED

FOR PIPE PENETRATIONS THROUGH FIRE WALLS REFER TO ARCHITECTURAL DETAIL 18 & 19 ON DRAWING A-21



2 FIRE PROTECTION ZONES

FP1FP1 SCALE· NONE

IF SHEET IS LESS THAN 28" X 40" IT IS A REDUCED PRINT - SCALE REDUCED ACCORDINGLY

FP-1

MELOTT AND ASSOCIATES INC

11650 SW. BEL AIRE LANE BEAVERTON OR 97005

VOICE OR FAX (50.3} 64.3-5608

SJO CONSULTING ENGINEERS, INC. Portland, Oregon

DSGN. RM DR. JHJ CHK. WS

SUPV. CH. ENGR.

SUBMITTED BY DATE 10/25/93

FIRM MEMBER (TITLE) PRIN

E.I.C. FIRE PROT

SEC. HD. DIV. HD.

SATISFACTORY TO

TITLE

CONCURRENCE DATE APPROVED

EFD FOR COMMANDER NAVFAC

ENGINEERING FIELD ACTIVITY, NW

SILVERDALE, WASHINGTON

NAVAL UNDERSEA WARFARE CENTER DIVISION KEYPORT. WA

HAZARDOUS WASTE TSD (P-370)

LEGEND, SCHEDULE & FP ZONES

NAVFACDRAII1NGNO 6405225

E 80091

CONST. CONTR. NO. N44255-9-C-7397

SCALE NONE SPEC. 12-92-3618 SHEET 89 OF

PLOTTED 10/13/93-13: 54 1847.06\FPO

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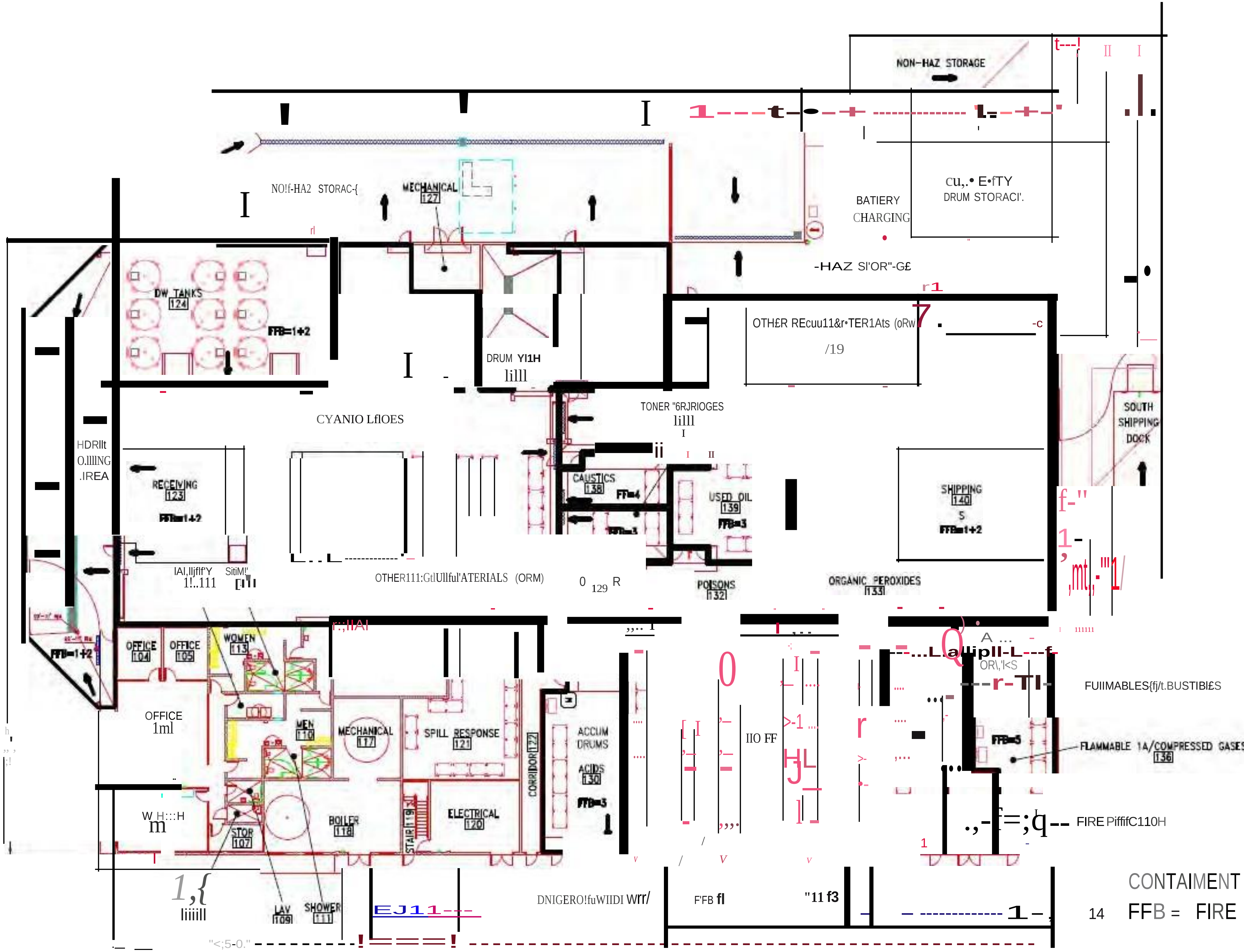

CONTAIMENT CALCULATION DRAWING

14 FFB = FIRE FLOWBASIN

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SECTION D

APPENDIX D6

FLEXIBLE MEMBRANE LINER SPECIFICATIONS

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2.1 FLEXIBLE MEMBRANE LINER

2.1.1 HDPE Liner Specifications

Liners to be ASTM D 1248 High Density Polyethylene, 60 mil thickness, according to the following specifications:

Property	Test Method	Value	Units
Specific Gravity, Min.	ASTM D 1505	0.94	
Tensile Strength @ Yield, Min.	ASTM D 638-IV	2200	PSI
Tensile Strength @ Break, Min.	ASTM D 638-IV	3500	PSI
Tear Resistance, Min.	ASTM D 1004-C	700	PSI
Carbon Black Content		2 – 3	%
Env. Stress Resistance	ASTM D 1693	1500	Hrs.

2.2 WELD MATERIAL

All welding material shall be of a type recommended and supplied by the manufacturer and shall be delivered in the original sealed containers – each with an indelible label bearing the brand name, manufacturer's mark number, and complete directions as to proper storage.

2.3 PENETRATIONS

Provide manufacturer's standard factory fabricated penetration assemblies. Make penetration assemblies of the same base material as liner

PART 3 EXECUTION

3.1 SURFACE PREPARATION

3.1.1 Soil or Granular Subgrade in accordance with Section 02221, "Earthwork for Structures and Pavements." Remove vegetation, boulders, and rocks larger than ¾ inch (20 mm) in size and other sharp objects. Fill in holes,

SECTION D

APPENDIX D7

TANK DRAWINGS

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DESCRIPTION	DATE	BY	REV

REVISIONS

FMF

Flohr Metal Fabricators, Inc.
Seattle Washington

(6) HAZARDOUS WASTE TSD TANKS
T-1, T-2, T-3, T-20, T-21 AND T-40

FOR

BODENHAMMER, INC.

NAVAL UNDERSEA WARFARE CENTER KEYPORT, WA

SCALE ½"=1'-0" & NOTED	DRAWN BY MRT	JOB NO. F2323
DATE 5/3/94	APPROVED	DWG NO. F23232

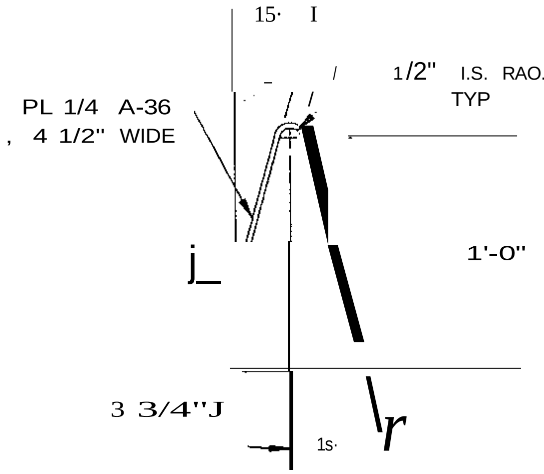
CHECKED BY SHEET 2 OF 3

NOZZLE SCHEDULE

ITEM	SIZE	TYPE	DESCRIPTION
A	2”	RFWN	DRAIN / OUTLET
B	3”	RFWN	OVERFLOW
C	2”	RFWN	INLET (TRUCK)
D	3”	RFWN	LEVEL INSTRUMENT
E	2”	RFWN	INLET (DRUM OR TOTE)
F	3”	RFWN	VENT
G	24”	PLATE	SHELL MANHOLE
H	24”	PLATE	ROOF HATCH

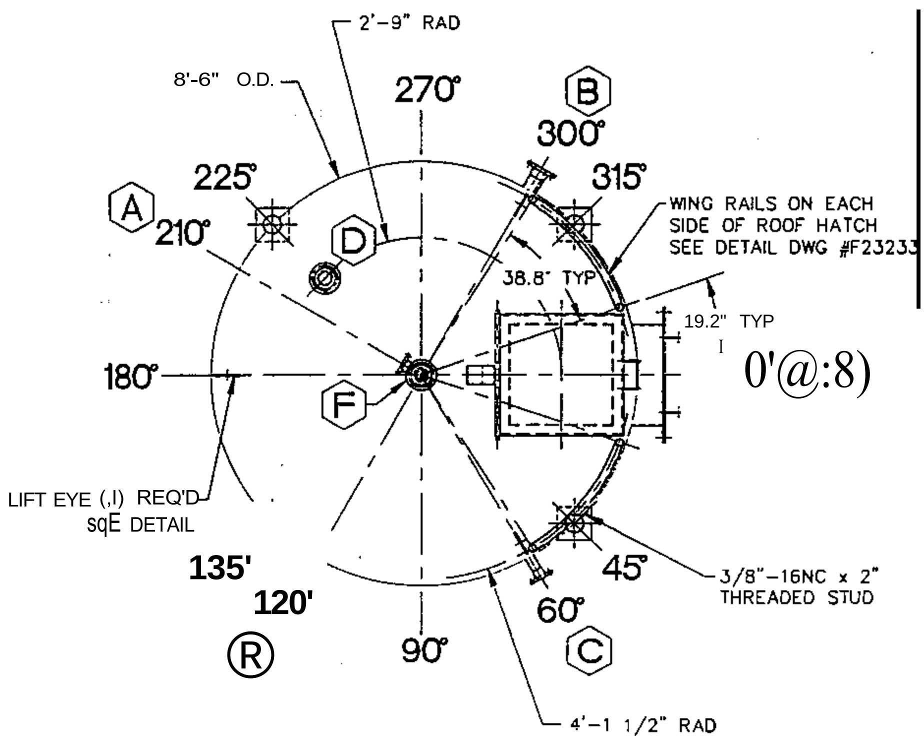
GENERAL NOTES

1. ALL DESIGN AND CONSTRUCTION SHALL BE PER API 620 AND CONTRACT SPECIFICATION #13205.
2. ALL WELDING SHALL BE PER ASME SECTION IX.
3. ALL PLATE MATERIAL SHALL BE ASTM A-36.
4. ALL PIPE MATERIAL SHALL BE ASTM 1-53B ERW.
5. ALL FLANGE MATERIAL SHALL BE ASTM A-105, CLASS 150, RAISED FACE WELDING NECK TYPE.
6. ALL PIPE FITTINGS SHALL BE ASTM A-234 WPB.
7. ALL SHELL MANHOLE AND ROOF HATCH GASKETS SHALL BE RUBBER.
8. REMOVE ALL SHARP EDGES AND CORNERS THAT MAY BE INJURIOUS TO PERSONNEL.
9. ALL BOLT HOLES SHALL STRADDLE NATURAL VESSEL CENTERLINES.
10. EXTERIOR COATING PER CONTRACT SPEC. #09874.
11. INTERIOR COATING PER CONTRACT SPEC. #09875.
12. CORROSION ALLOWANCE 1/16”.
13. 1.2 SPECIFIC GRAVITY.
14. APPLY FMF LABEL.



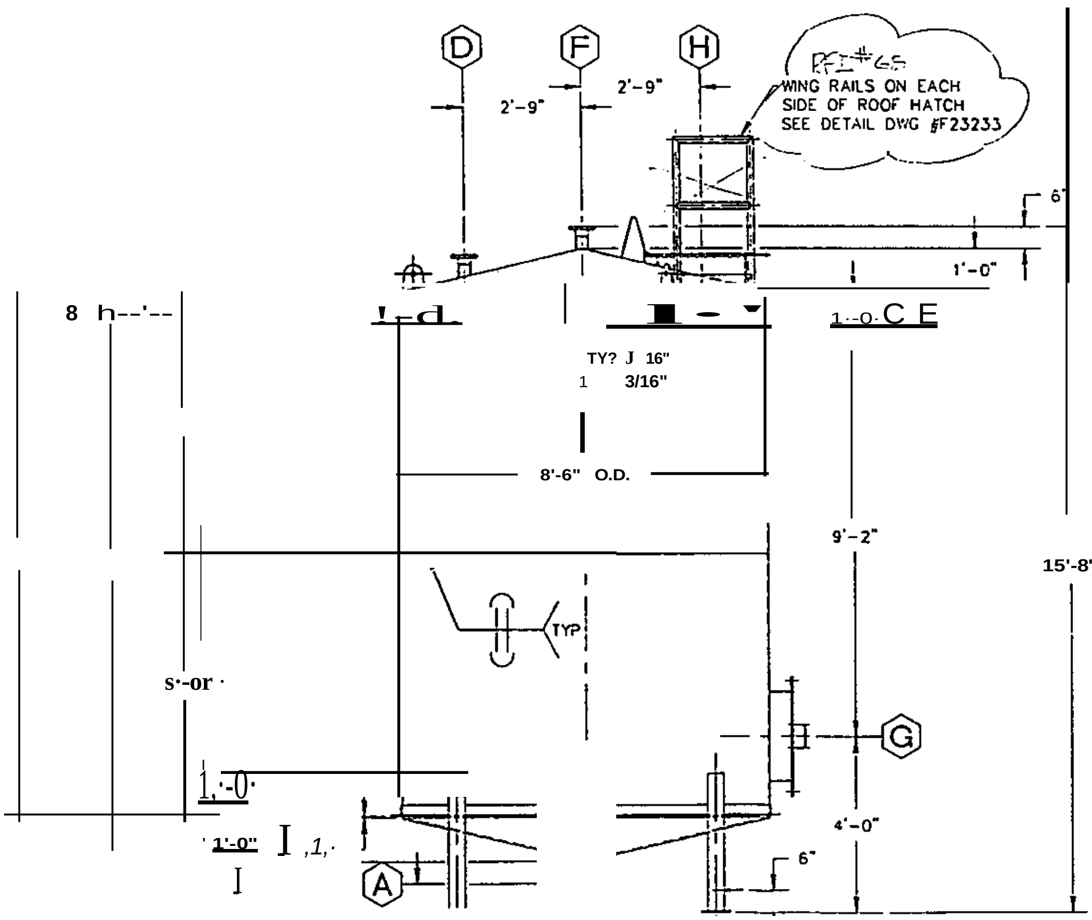
LID STOP DETAIL

SCALE: 1"-6"

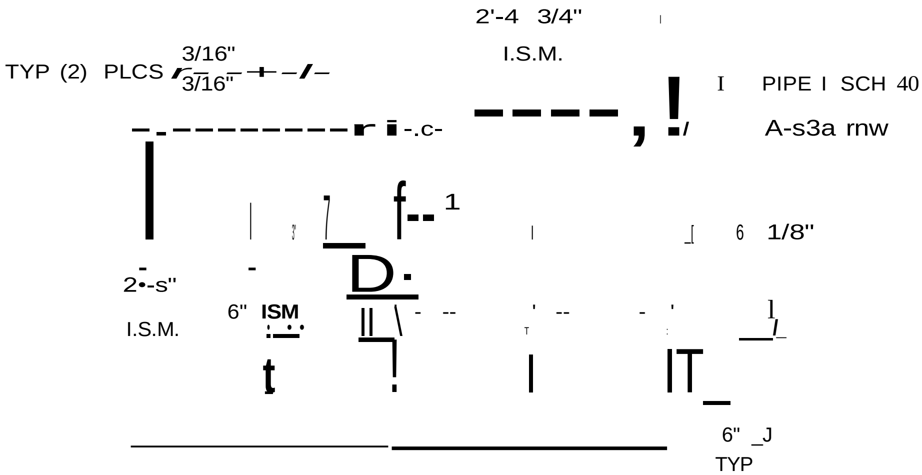


PLAN VIEW

PLAN VIEW

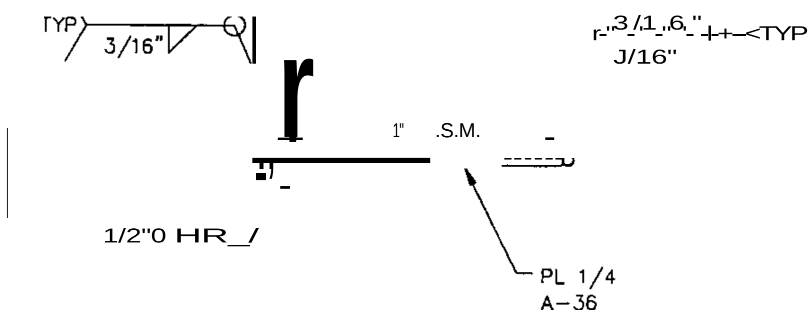


D
F
H
2'-9"
2'-9"
RFI #65
WING RAILS ON EACH
SIDE OF ROOF HATCH
SEE DETAIL DWG #F23233
6"
1'-0"
TYP
16"
3/16"
8'-6" O.D.
9'-2"
15'-8'
TYP
G
4'-0"
6"
1'-0"
A

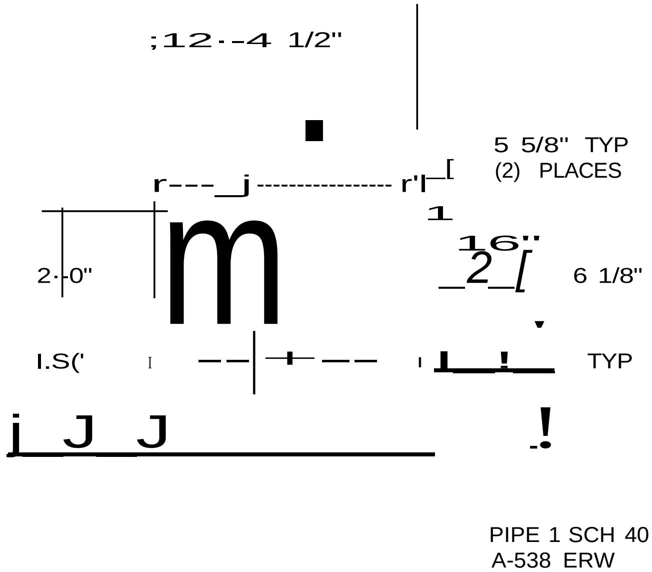


COVER PLAN DETAIL

SCALE: 1/2" = 1'-0"

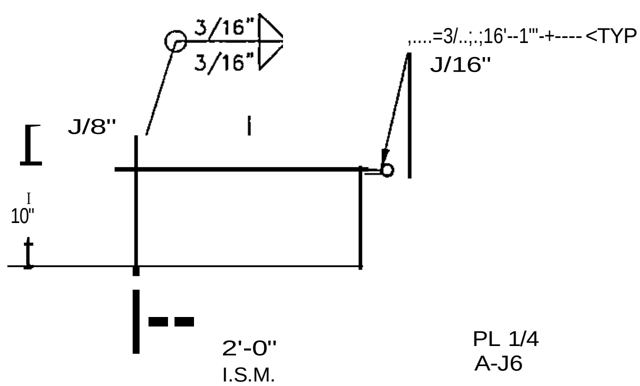


COVER ELEVATION Q TAIL

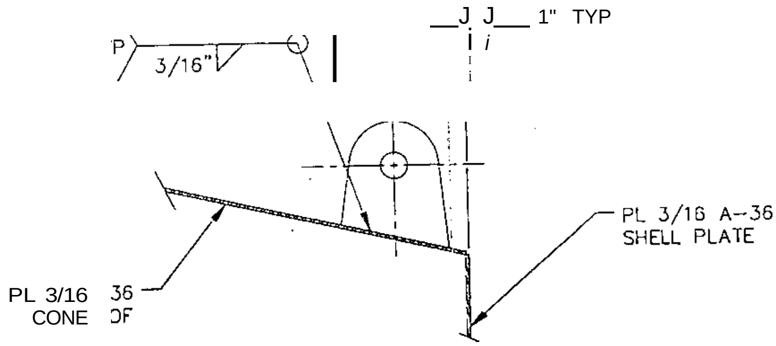


NECK/FLANGE PLAN DETAIL

SCALE: 1/2" = 1'-0"

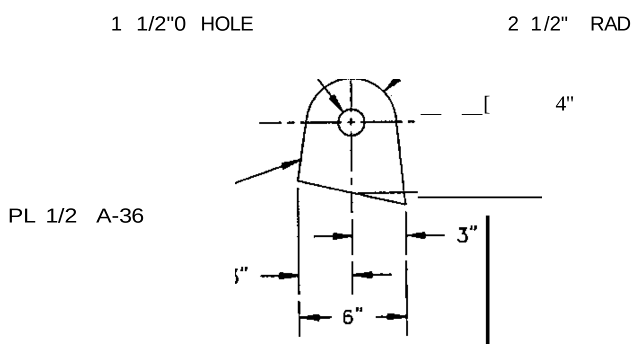


NECK/FLANGE ELEVATION DETAIL



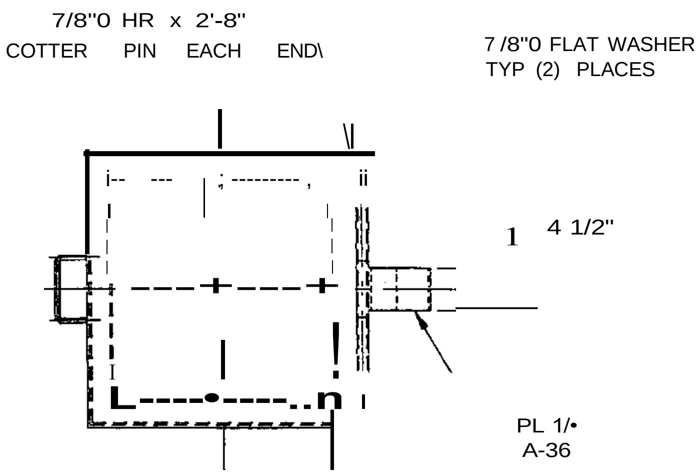
LIFT EYE ATTACHMENT DETAIL

TYP (3) PLCS SCALE: 1"=6"



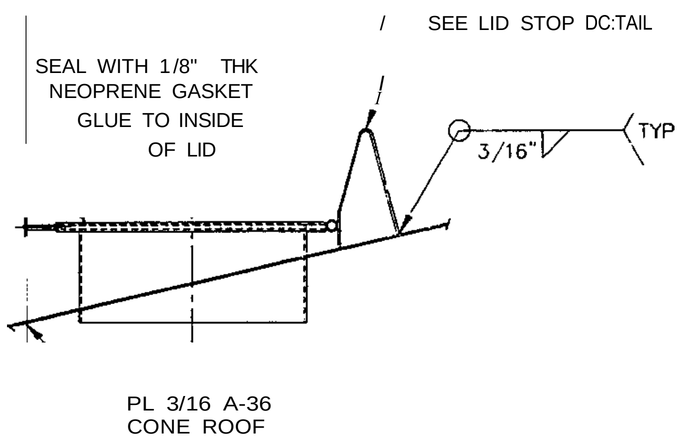
LIFT EYE DETAIL

TYP (3) PLCS SCALE: 1"=6"

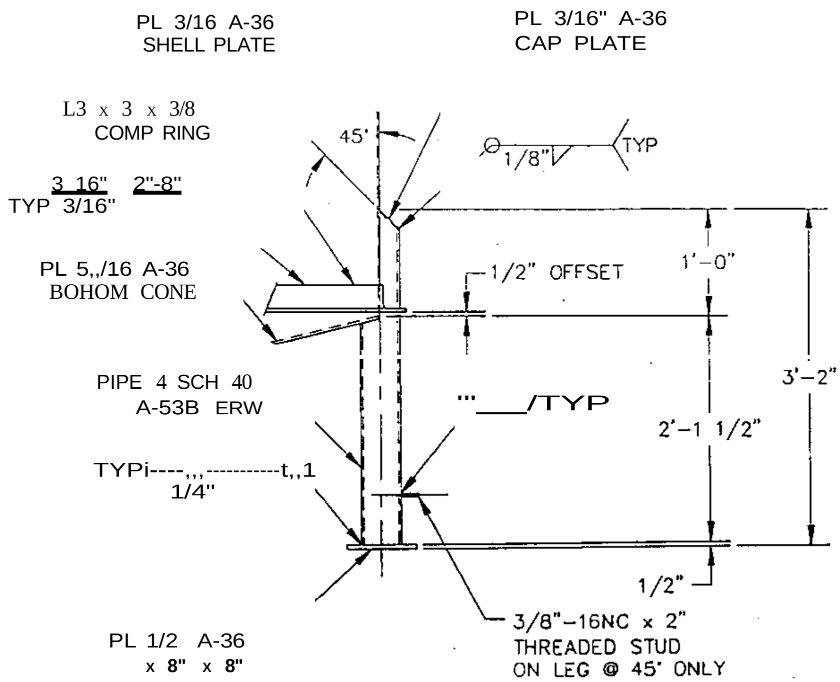


H¥\TCH PLAN DETAIL

SCALE: 1/2" = 1'-0"

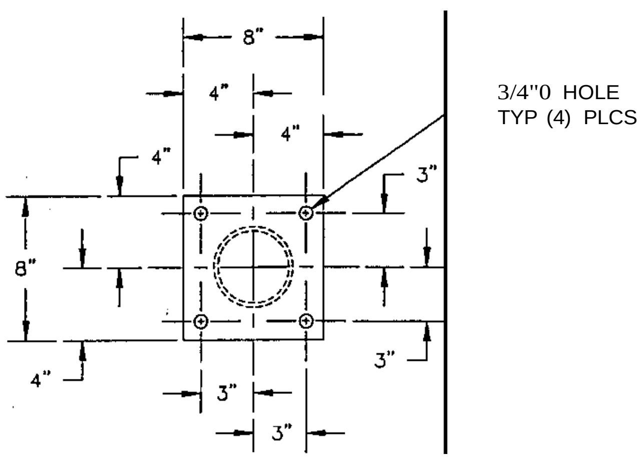


HArbH ELEVATION DETAIL



LEG DETAIL

TYP (4) PLCS SCALE:1"=1'-O"



FOOT DETAIL

TYP (4) PLCS SCALE: 1"=6"

DESCRIPTION	DATE	BY	REV

REVISIONS

FMF

Flohr Metal Fabricators, Inc.
Seattle Washington

(6) HAZARDOUS WASTE TSD TANKS
T-4, T-5 AND 5-22
FOR
BODENHAMMER, INC.
NAVAL UNDERSEA WARFARE CENTER KEYPORT, WA

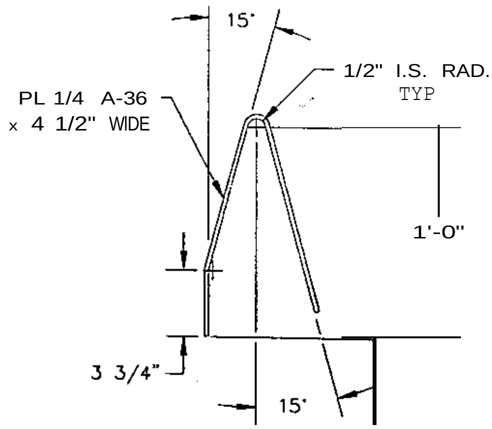
SCALE ½"=1'-0" & NOTED	DRAWN BY MRT	JOB NO. F2323
DATE 5/3/94	APPROVED	DWG NO. F23232

NOZZLE SCHEDULE

ITEM	SIZE	TYPE	DESCRIPTION
A	2”	RFWN	DRAIN / OUTLET
B	3”	RFWN	OVERFLOW
C	2”	RFWN	INLET (TRUCK)
D	3”	RFWN	LEVEL INSTRUMENT
E	2”	RFWN	INLET (DRUM OR TOTE)
F	3”	RFWN	VENT
G	24”	PLATE	SHELL MANHOLE
H	24”	PLATE	ROOF HATCH

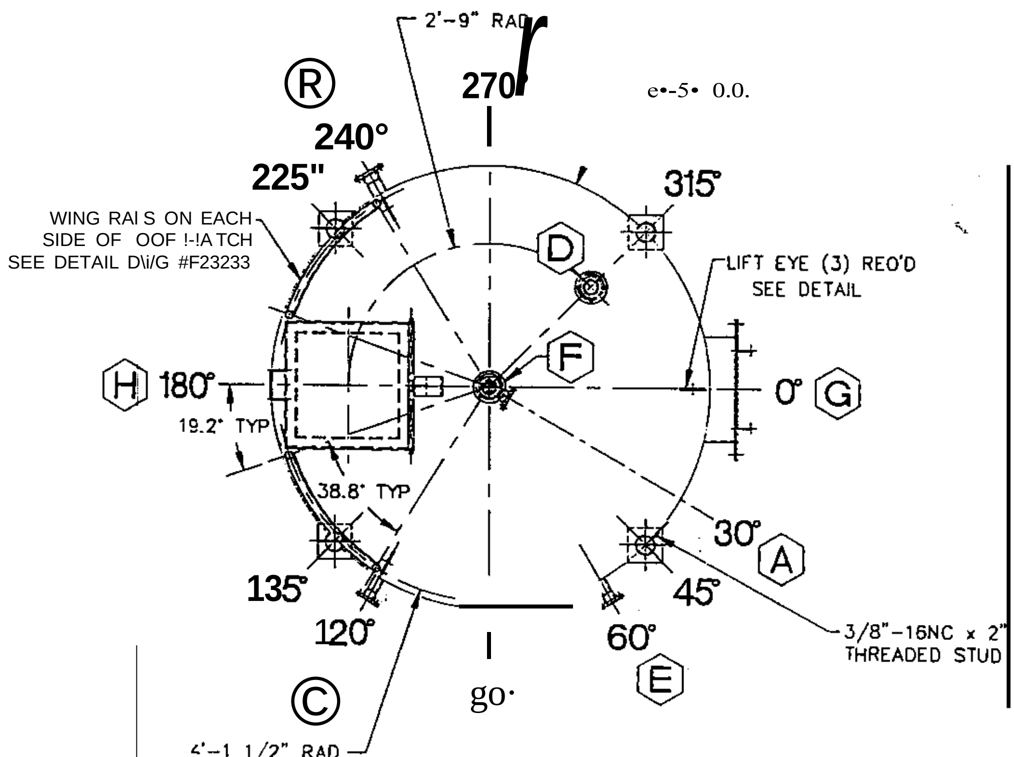
GENERAL NOTES

1. ALL DESIGN AND CONSTRUCTION SHALL BE PER API 620 AND CONTRACT SPECIFICATION #13205.
2. ALL WELDING SHALL BE PER ASME SECTION IX.
3. ALL PLATE MATERIAL SHALL BE ASTM A-36.
4. ALL PIPE MATERIAL SHALL BE ASTM 1-53B ERW.
5. ALL FLANGE MATERIAL SHALL BE ASTM A-105, CLASS 150, RAISED FACE WELDING NECK TYPE.
6. ALL PIPE FITTINGS SHALL BE ASTM A-234 WPB.
7. ALL SHELL MANHOLE AND ROOF HATCH GASKETS SHALL BE RUBBER.
8. REMOVE ALL SHARP EDGES AND CORNERS THAT MAY BE INJURIOUS TO PERSONNEL.
9. ALL BOLT HOLES SHALL STRADDLE NATURAL VESSEL CENTERLINES.
10. EXTERIOR COATING PER CONTRACT SPEC. #09874.
11. INTERIOR COATING PER CONTRACT SPEC. #09875.
12. CORROSION ALLOWANCE 1/16”.
13. 1.2 SPECIFIC GRAVITY.
14. APPLY FMF LABEL.

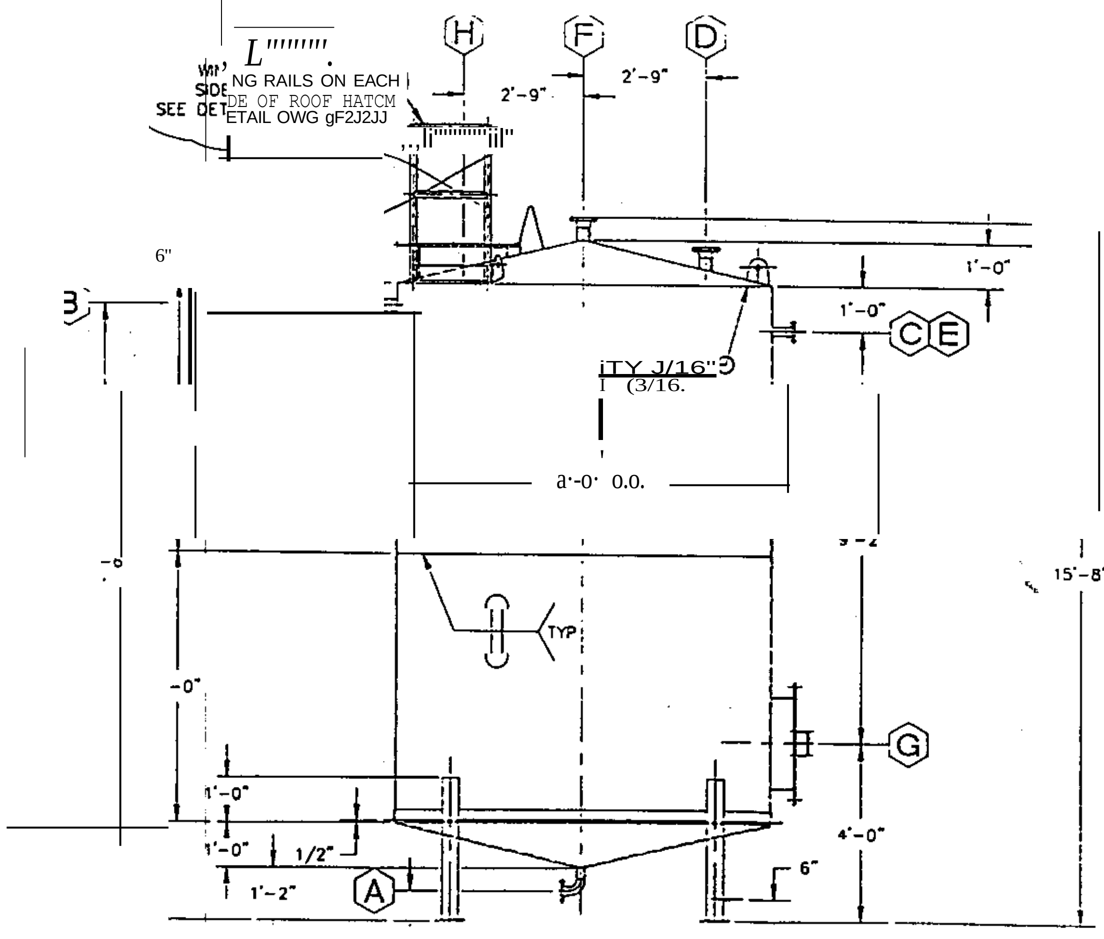


LID STOP DETAIL

SCALE: 1"-6"

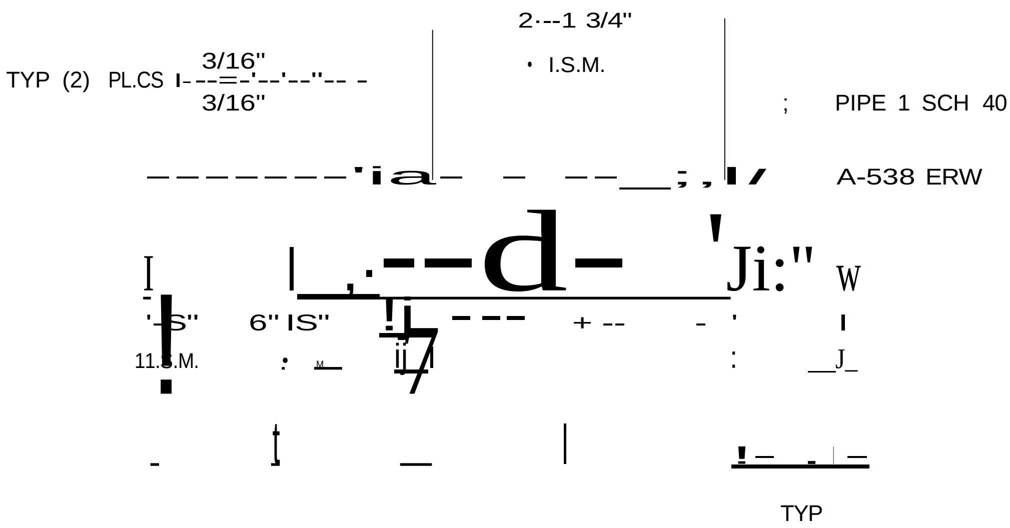


PLAN VIEW



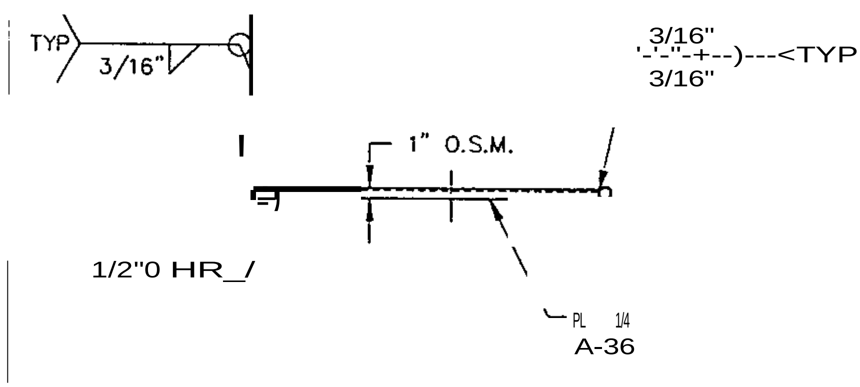
ELEVAIION VIEW

SEE PLAN VIEW FOR CORRECT ORIENTATION

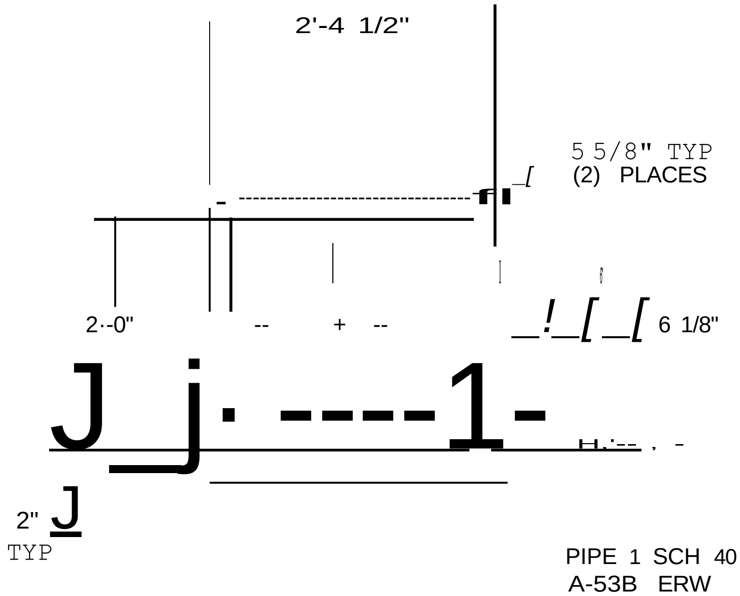


COVER PLAN DETAIL

SCALE: 1/2" = 1'-0"

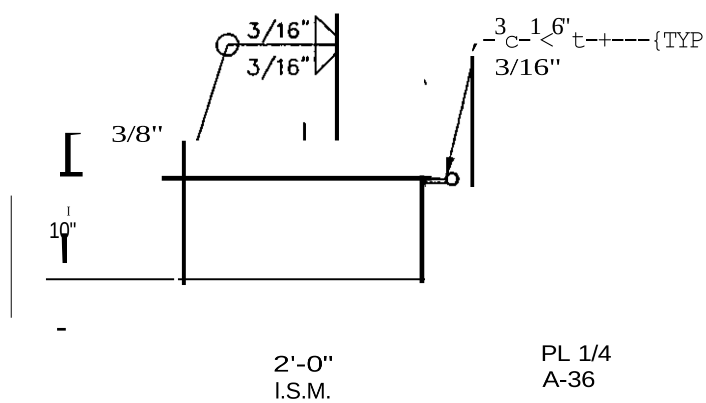


COVER ELEVATION DETAIL

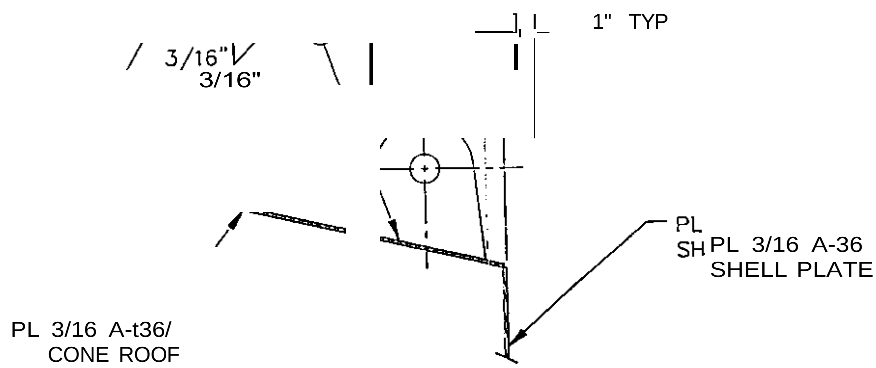


NECK/FLANGE PLAN DETAIL

SCALE: 1/2" = 1'-0"

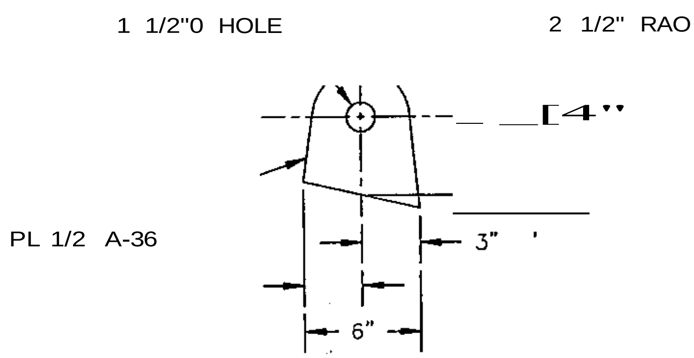


NEbK/FLANGE ELEVATION DETAIL,



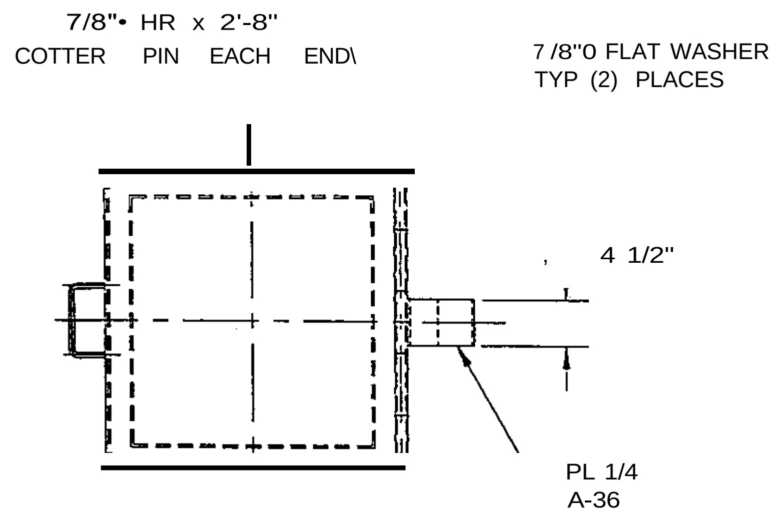
LIFT EYE ATTACHMENT DETAIL

TYP (3) PLCS SCALE: 1"=6"



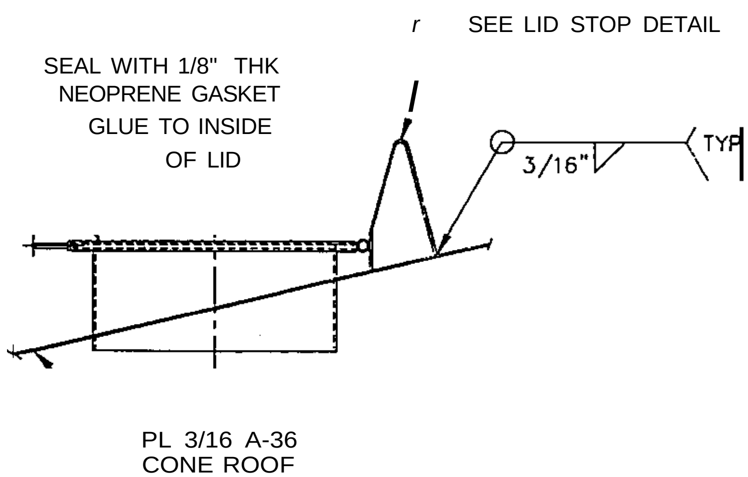
LIFT EYE DETAIL

TYP (3) PLCS SCALE: 1"=6"

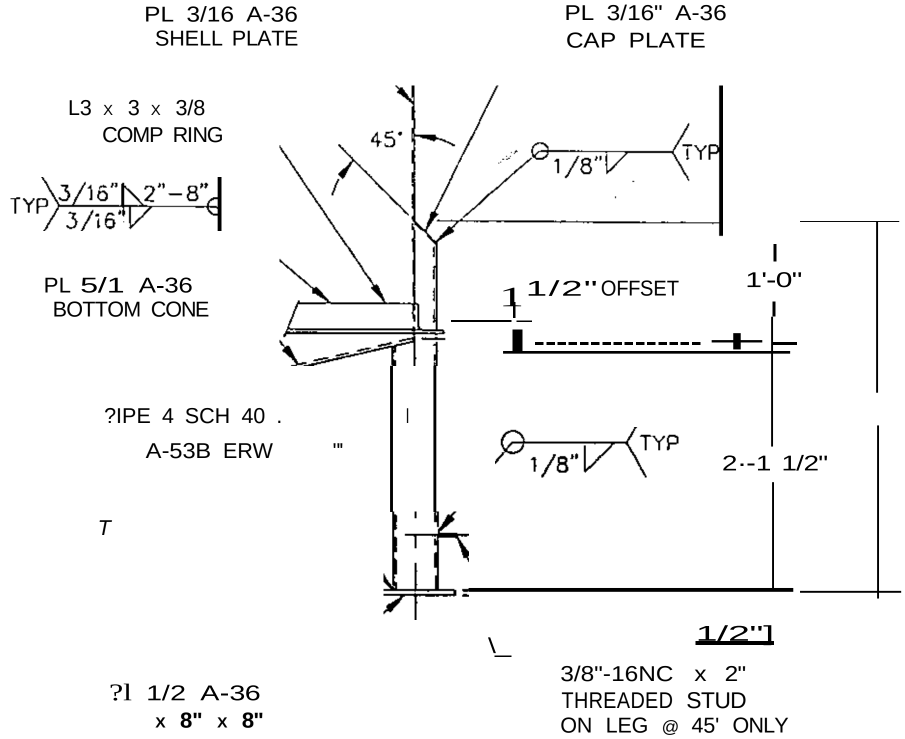


HATCH PLAN DETAIL

SCALE: 1/2" = 1'-0"



HA+cH ELEVA"(ION DETAIL



LEG DETAIL

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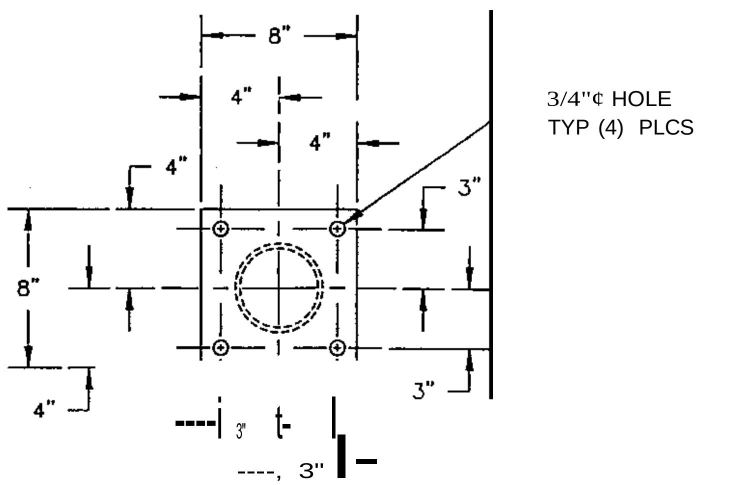


FOOT DETAIL

TYP **(4)** PLCS SCALE: 1"=6"

GENERAL NOTES

1. WORK WITH DRAWINGS #F23231 AND F23232

DESCRIPTION	DATE	BY	REV

REVISIONS

FMF Flohr Metal Fabricators, Inc.
Seattle Washington

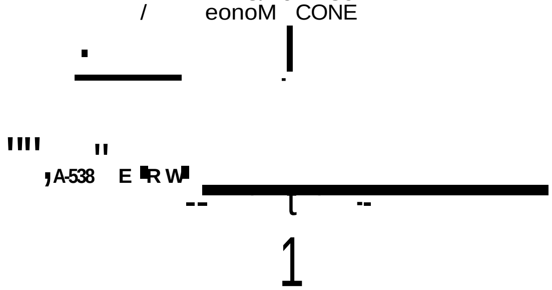
(6) HAZARDOUS WASTE TSD TANKS
T-4, T-5 AND 5-22
FOR

BODENHAMMER, INC.

NAVAL UNDERSEA WARFARE CENTER KEYPORT, WA

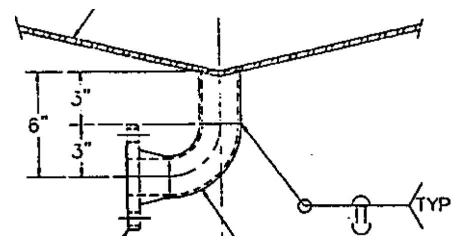
SCALE 1”=6” & NOTED	DRAWN BY MRT	JOB NO. F2323
DATE 5/18/94	APPROVED	DWG NO. F23233

PL 5/16 A-36
eonoM CONE



2•,isoc A-1os_/
.., WN FLANGE

PL 5/16 A-36
BOTTOM CONE



20 1506 A-105
RFWN FLANGE

PIPE 2 SCH 40
A-234 WPB 90" ELBOW

ELEVATION VIEW

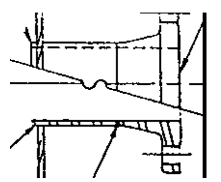
SIDE VIIW

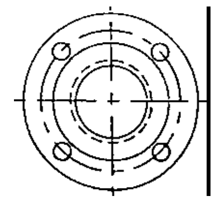
@ - DRAIN/OUTLET DETAIL

i-6" MI7N

PI PE 3 SCi-1 40 \ r1 !
A-S3B IERW

30 ISO# A-10S
RFWN FLANGE





...., 16"
TYP/16·· -
!
PL 3/16 11-36
SHELL

0 ZS, (

SIDE\SECTION VIEW

END VIEW

@ - OVERFLOW DETAIL

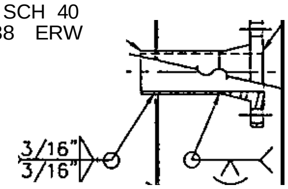
t-6" MIN--j

PL 3/16 A-36
SHELL

PI PE 2 SCH 40
A-538 ERW

20 150[redacted]05

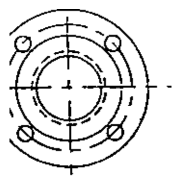
HRO



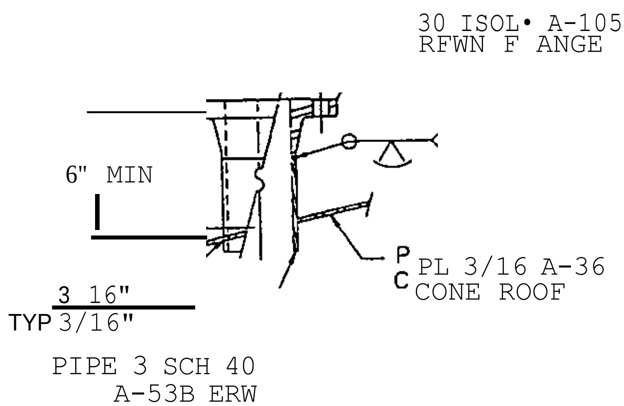
SIDE/SECTION VIEW

EMO VIEW

©® - INLET (TRUCK, DRUM OR TOTE) DETAIL

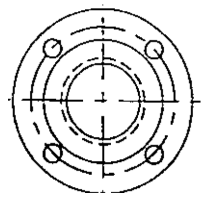


TOP VIEW

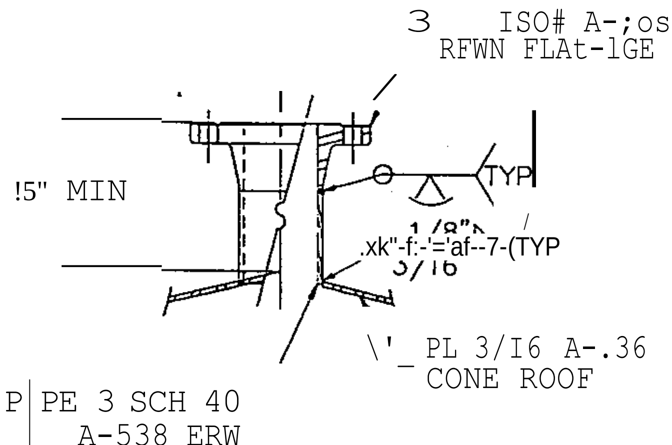


SIOE\SECTION VIEW

@ - LEVEL INSTRUMENT DETAIL



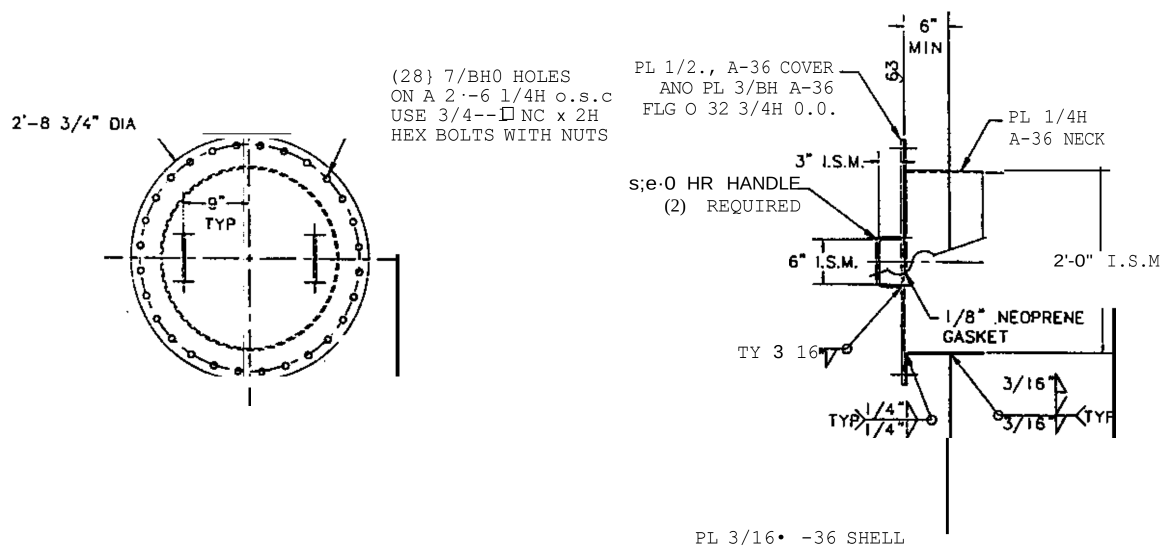
TOP VIEW



SIDE\SECTION VIEW

® - VENT DETAIL

NOTE: MACHINE FLANGE ONLY AFTER FABRICATION



T

@ - 24' SHELL **MANHOLE** DETAIL

SCALE: 1 1/2., = 1'-0"

SECTION 13205

STEEL TANKS WITH FIXED ROOFS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN PETROLEUM INSTITUTE (API)

API PUBL 2009	1988 Safe Welding and Cutting Practices in Refineries, Gas Plants, and Petrochemical Plants
API STD 601	1988 Metallic Gaskets for Raised-Face Pipe Flanges and Flanged Connections (Double-Jacketed Corrugated and Spiral-Wound)
API STD 650	1988 (Addendum 1992) Welded Steel Tanks for Oil Storage
API STD 2000	1992 Venting Atmospheric and Low Pressure Storage Tanks (Non-refrigerated and Refrigerated)
API STD 2550	1965 (Rev. 1992) Measurement and Calibration of Upright Cylindrical Tanks.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B16.5	1988 (Errata 1988; Addendum B16.5A-1992) Pipe Flanges and Flanged Fittings (ASME/ANSI B16.5)
ASME B16.9	1993 Factory-Made Wrought Steel Butt welding Fittings (ASME/ANSI B16.9)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 182/A 182M	1992 (Rev. A) Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service
ASTM A 193/A 193M	1992 (Rev. A) Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service

ASTM A 194/A 194M	1992 (Rev. A) Carbon and Alloy-Steel Nuts for Bolts for High-Pressure and High-Temperature Service
ASTM A 312/A 312M	1991 (Rev. A) Seamless and Welded Austenitic Stainless Steel Pipes
ASTM A 403/A 403M	1991 Wrought Austenitic Stainless Steel Piping Fittings

MILITARY SPECIFICATIONS (MIL)

MIL-A-907	(Rev. E) Antiseize Thread Compound, High Temperature
MIL-G-1086	(Rev. E) Gasket Material, Synthetic Rubber (For Bolted Steel Tanks

1.3 SUBMITTALS

Submit the following in accordance with Section 01300, “Submittals.”

1.3.1 SD-02; Manufacturer’s Catalog Data

a. Structural steel

b. Pipe and fittings

c. Flange bolting

d. Gaskets

e. Tank level gauge

f. Venting

g. Roof manholes

h. Shell access holes

i. Oil-resistant coating system

1.3.2 SD-04, Drawings

a. Steel tank

1.3.2.1 Drawing Requirements

Drawings for the steel tank shall be prepared by a registered structural engineer. Include erection diagrams and detail drawings of tank

1.2.3 SD-05, Design Data

a. Steel tank design calculations

1.2.3.1 Data Requirements

Calculations for the steel tank design shall be prepared by a registered structural engineer.

1.2.4 SD-08, Statements

a. Welding procedures and procedure qualifications

b. Qualifications of non-destructive test examiners

c. Tank calibration experience

1.2.4.1 Test Examiners

Submit proof of compliance of non-destructive test examiners with API STD 650. Submit certified data on tank calibration experience.

1.2.5 SD-10, Test Reports

a. Structural steel tests (including toughness test data)

1.2.6 SD-18, Records

a. Tank calibration record

b. Weld inspection reports

Submit reports for inspection of welds, and radiographs, to the Contracting Officer.

1.2.7 SD-19, Operation and Maintenance Manuals

a. Venting, Data Package 2

Submit data package in accordance with Section 01730, “Operation and Maintenance Data.”

1.3 COPIES OF API PUBLICATIONS

Provide four copies of API PUBL 2009, API STD 650, API STD 2000, and API STD 2550.

1.4 RELATED REQUIREMENTS

Materials, design, fabrication, welding, erection, testing, and appurtenances shall be in accordance with API STD 650 and API STD 2000, except as otherwise specified herein. Section 15011, “Mechanical General Requirements,” applies to this section except as specified otherwise.

1.6 DESIGN REQUIREMENTS

Tank shall be designed to resist the following loads and forces:

a. Wind: 5 knots (Otto Fuel Tanks Only T50, 51, 53, 53)

b. Seismic Zone: 3

c. The following combinations of loads, with corresponding percentages of basic stresses to be used in design, shall be allowed:

Load Combination	Percentage of Allowable Stress
Dead load + live load	100
Dead load + live load + wind load	133
Dead load + live load + seismic load	133

e. Determine forces from seismic loading in accordance with API STD 650.

f. The usable capacity of the tank shall be not less than 5,000 U.S. standard gallons. The tank shall be not more than nine feet in diameter, and shall be approximately 15 feet in height.

1.6.1 Corrosion Allowance

Make allowance of 1/16 inch in thickness of steel for corrosion loss. Corrosion allowance shall be applied to the interior of the shell, roof, and to surfaces of interior structural members.

1.6.2 Design Metal Temperature

API STD 650 60° F, API STD 650 20° F. (Otto Fuel Tanks Only.)

1.7 TANK CALIBRATION EXPERIENCE

Perform calibration of the tank using a qualified organization that can certify to at least two years of prior successful and accurate experience in calibrating tanks of comparable type and size.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to the following requirements except that materials not definitely specified shall conform to API STD 650.

2.3.1 Inlet and Outlet Piping

Stainless Steel for Inlet and Outlet.

2.3.1.1 Pipe

ASTM A 312/A 312M, Schedule 40, Type 304L or 316L.

2.3.1.2 Fittings

a. Butt welding: ASTM A 403/A 403M, Class WP, Schedule 40, Type 304L or 316L.

2.3.1.3 Flanges

ASME B16.5 Class 150, ASTM A 182/A 182M, Type 304L or 316L.

2.3.1.4 Flange Bolting

Bolts: ASTM A 193/A 193M, Grade B7; nuts: ASTM A 194/A 194M, Grade 7.

2.4 PIPE FLANGE GASKETS

API STD 601, spiral-wound type

2.5 GASKETS FOR MANHOLES, CLEANOUTS, CONNECTIONS, AND COVERS

Provide rubber gaskets, MIL-R-6855, for covers which are not bolted.

2.6 INTERIOR PROTECTIVE COATING SYSTEM

Section 09875, “Interior Coating System for Welded Steel Petroleum Storage Tanks.”

2.7 EXTERIOR PROTECTIVE COATING SYSTEM

Section 09874, “Exterior Coating System for Welded Steel Petroleum Storage Tanks.”

2.8 APPURTENANCES

2.8.1 Tank Level Gauge

Tank level gauge shall be provided as specified under Section 16402, “Interior Wiring Systems.”

2.8.2 Venting

Provide open vent at the center or as indicated with galvanized steel bird screen with ¼ inch (6.3 mm) opening and a 0.135 inch (3.43 mm) minimum wire diameter.

2.8.3 Roof Manholes

Provide one 24 inch (610 mm) minimum square manholes for access to the interior of the tank through the roof. Locate one manhole adjacent to the platform of the stairway on one end of a diameter of the tank. Provide other manholes as indicated. Provide hinged and weathertight manhole covers with a formed fit.

2.8.4 Shell Access Holes

Provide one 30-inch (762-mm) diameter access holes. Locate the access hole in the tank shell as indicated and at a height convenient for personnel access into the tank. Provide access holes with welded steel plate frames and covers. Secure the cover plates with corrosion-resistant bolts and nuts. Provide access holes with gaskets and smooth gasket seats.

2.8.5 Fittings and Piping

provide fittings and piping and other miscellaneous items as necessary to permit tank operations.

2.8.5.1 Product Inlet Connections

Product inlet connections shall consists of an external flange, a nozzle through the tank shell, supports, and an internal expanding cone, as indicated. The flange shall be 150-pound, conforming to ASME B16.5 with slip-on or welded neck.

2.8.5.2 Product Outlet Connection

Product outlet connection shall consist of an external flange, a nozzle located to bottom of tank, elbows, product withdrawal line assembly, and supports, as indicated.

3.2.1.1 Prohibition of Protective Coatings on Surfaces to be Welded

Remove protective coatings on surfaces to be welded and on surfaces not less than one inch from weld preparation. “Weld-through” inorganic zinc coatings and similar coatings will not be permitted.

3.2.2 Nozzles

Nozzles less than two inches in size shall be flanged. Sizes two inches in size or larger shall be flanged and shall have reinforcing plate. Nozzles for pipe connections inside the tank shall be flanged inside and outside of tank. Reinforcing plates for shell nozzles shall be rolled to the curvature o the shell.

3.3 INSTALLATION

3.3.1 Tanks

Install tanks on concrete base, with anchor bolts, set, and level, and grout in place in accordance with Section 03300, "Cast-in-Place Concrete."

3.3.2 Equipment Foundations

Locate equipment foundations as shown on the drawings. Size, weight, and design shall preclude shifting of equipment under operating conditions. Foundations shall meet the requirements of the equipment manufacturer. Concrete shall conform to Section 03300, "Cast-in-Place Concrete," and grout shall be approved non-shrinking.

3.3.3 Equipment Installation

Install equipment in accordance with installation instructions of the manufacturers. Grout equipment mounted on concrete foundations before installing piping. Install piping in such a manner so as not to place a strain on the equipment. Do not bolt flanged joints tight unless they match. Grade, anchor, guide, and support piping without low pockets.

3.3.4 Grounding

Connect building grounding to tank grounding log in accordance with Section 16402, "Interior Wiring Systems."

3.4 FIELD QUALITY CONTROL

The Contracting Officer will conduct field inspections and witness field tests and trial operations specified in this section. The Contractor shall perform all trial operations and field tests and provide all labor, equipment, and incidentals required for testing.

3.4.1 Weld Inspection

Perform inspection of welds in accordance with API STD 650. Inspect butt welds requiring complete penetration and complete fusion by the radiographic method.

3.4.2 Tightness Test and Welding Repairs

Perform tightness test and repairs in accordance with API STD 650, except as modified herein, prior to blast cleaning and application of the protective coating.

3.4.2.1 Test of Tank Bottom

Test tank bottom immediately after completion and prior to installing any columns. Test seams in bottom of tank by applying a commercial soap film and subjecting the seam to a vacuum. Use a glass top vacuum box with hypalon or neoprene sealing gasket. Apply a commercial bubble forming solution to the weld or area to be tested; position the vacuum box over the solution the area and slowly pull a partial vacuum. Observe the solution film for bubble formation between 0-2 psi differential pressure. Continue to open the valve until a differential pressure of 5 psi (34.5 kPa) or 11.5 feet (3.61-m) of water or 10.2-inches (259 mm) of mercury is achieved and hold for at least 20 seconds while continuing to observe the solution for bubbles.

3.4.4 Re-testing

Deficiencies found shall be rectified and work effected by such deficiencies shall be completely re-tested at the Contractor’s expense.

3.4.5 Tank Level Gauge

Test the tank level gauge system in accordance with the manufacturer’s testing procedure.

SECTION 15400

PLUMBING SYSTEMS

PART 1 GENERAL

1.1 GENERAL

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A112.19.5	1979 (Rev. 1990) Trim for Water-Closet Bowls, Tanks and Urinals
ANSI A112.36.2M	1991 Cleanouts
ANSI B16.18	1984 Cast Copper Alloy Solder Joint Pressure Fittings
ANSI B16.23	1992 Cast Copper Alloy Solder Joint Drainage Fittings – DWV
ANSI B16.24	1991 (Errata 1991) Cast Copper Alloy Pipe Flanges and Flanged Fittings Class 150, 300, 400, 600, 900, 1500, and 2500
ANSI Z21.22	1986 (Addenda 1990) Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems
ANSI Z358.1	1990 Emergency Eyewash and Shower Equipment

AMERICAN PETROLEUM INSTITUTE

API STD 601	1988 Metallic Gaskets for Raised-Face Pipe Flanges and Flanged Connections (Double-Jacketed Corrugated and Spiral-Wound)

AIR-CONDITIONING AND REFRIGERATION INSTITUTE (ARI)

ARI 1010	1984 Drinking-Fountains and Self-Contained, Mechanically-Refrigerated Drinking-Water Coolers

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME A112.6.1M	1979 Supports for the Off-the-Floor Plumbing Fixtures for Public Use
ASME A112.18.1M	1989 Plumbing Fixture Fittings
ASME/ANSI A112.19.1M	1987 Enameled Cast Iron Plumbing Fixtures
ASME/ANSI A112.19.2M	1990 Vitreous China Plumbing Fixtures
ASME/ANSI A112.19.3M	1987 Stainless Steel Plumbing Fixtures (Designed for Residential Use)
ASME A112.21.1M	1991 Floor Drains
ASME/ANSI B16.1	1989 Cast Iron Pipe Flanges and Flanged Fittings
ASME/ANSI B16.5	1988 (Errata 1988) Pipe Flanges and Flanged Fittings (ASME/ANSI B16.9)
ASME/ANSI B16.22	1989 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
ASME/ANSI B16.26	1988 Cast Copper Alloy Fittings for Flared Copper Tubes
ANSI/ASME B16.29	1986 Wrought Copper and Wrought Copper Alloy Solder Joint Draining Fittings – DWV
ANSI/ASME B16.32	1984 Cast Copper Alloy Solder Joint Fittings for Solvent Drainage Systems.

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE 1003	1981 Water Pressure Reducing Valves for Domestic Water Supply Systems
ASSE 1019	1978 Wall Hydrants, Frost Proof Automatic Draining, Anti-Backflow Types

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 47	1990 Ferritic Malleable Iron Castings
ASTM A 53	1990 (Rev. B) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM A 74	1987 Cast Iron Soil Pipe and Fittings
ASTM A 182/A 182M	1998 (Rev. A) Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service
ASTM A 183	1983 (Rev. 1990) Carbon Steel Track Bolts and Nuts
ASTM A 193/A 193M	1990 (Rev. A) Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
ASTM A 240	1992 (Rev. B) Heat Resisting Chromium and Chromium Nickel, Stainless Steel Plate, Sheet, and Strip for Pressure Vessels
ASTM A 312/A 312M	1992 (Rev. A) Seamless Copper and Welded Austentic Stainless Steel Pipes
ASTM A 403/A 403M	1991 Wrought Austenitic Stainless Steel Piping Fittings
ASTM A 536	1984 Ductile Iron Castings
ASTM B 32	1992 Solder Metal
ASTM B 42	1992 (Rev. A) Seamless Copper Pipe, Standard Sizes
ASTM B 88	1992 Seamless Copper Water Tube
ASTM B 306	1992 Copper Drainage Tube (DWV)
ASTM C 564	1988 Rubber Gaskets for Cast Iron Soil Pipe and Fittings
ASTM D 2000	1990 Rubber Products in Automotive Applications
ASTM D 2665	1991 (Rev. B) Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
ASTM F 441	1989 Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C104/A21.4	1990 Cement-Mortar Lining for Ductile-Iron Pipe for Water
AWWA C105/A21.5	1988 Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids
AWWA C111/A21.11	1990 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115/A21.15	1988 Flanged Ductile-Iron Pipe with Threaded Flanges
ANSI/AWWA C151/A21.51	1991 Ductile-Iron Pipe, Centrifually Cast, for Water or Other Liquids
AWWA C651	1986 (Addendum 1990) Disinfecting Water Mains

CAST IRON SOIL PIPE INSTITUTE (CISPI)

CISPI HSN	1985 Neoprene Rubber Gaskets for Hub and Spigot Cast Iron Soil Pipe and Fittings
CISPI 301	1990 Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications
CISPI 310	1990 Couplings for Use in Connection with Hubless Cast Iron Soil Pipe and Fitting

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)

FCCCHR-USC	1992 List of Approved Backflow Prevention Assemblies

INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS (IAPMO)

IAPMO UPC	1991 Uniform Plumbing Code

MILITARY SPECIFICATIONS (MIL)

MIL-C-27487	(Rev. G) Coupling Halves, Quick-Disconnect, Cam-Locking Type
MIL-G-1086	(Rev. E) Gasket Material, Synthetic Rubber (For Bolted Steel Tanks)
MSS SP-69	1991 Pipe Hangers and Supports – Selection and Application
MSS SP-80	1987 Bronze Gate, Globe, Angle and Check Valves

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 211	1992 Chimneys, Fireplaces, Vents, and Solid Fuel Burning Applications

UNDERWRITERS LABORATORIES INC. (UL)

UL 430	1986 Waste Disposers

1.2 RELATED REQUIREMENTS

Selection 15011, "Mechanical General Requirements," applies to this section with the additions and modifications specified herein.

1.3 SYSTEM DESCRIPTION

Provide new plumbing systems, complete and ready for operation. Plumbing systems including manufacturer's products shall be in accordance with the required and advisory provisions of IAPMO UPC. Plumbing systems include piping less than 5 feet outside of building walls and piping beyond 5 feet outside of building walls including connections to existing exterior distribution system.

1.4 SUBMITTALS

Submit the following in accordance with Section 01300, "Submittals."

a. Pipe and fittings

b. Valves

c. Plumbing fixtures

d. Water heaters

e. Pipe hangers and supports

f. Pressure gages

g. Water meters

h. Strainers

i. Drains

k. electric water coolers

l. Thermometers

For pumps, include certified pup test curves.

1.4.2 SD-19, Operation and Maintenance Manuals

a. Water heaters, Data Package 2

b. Electric water coolers, Data Package 2

Submit operation and maintenance data in accordance with Section 01730, “Operation and Maintenance Data.”

1.5 QUALITY ASSURANCE

Plumbing systems including fixtures, equipment, materials, installation, and workmanship shall be in accordance with the Plumbing Code except as modified herein. In the Plumbing Code referred to herein, the advisory provisions shall be considered to be mandatory, as though the word “shall” had been substituted for the word “should” wherever it appears; reference to the “authority having jurisdiction,” the Administrative Authority, the Plumbing Official, and the Design Engineer shall be interpreted to mean the Contracting Officer. Capacity of equipment shall be not less than that indicated.

PART 2 PRODUCTS

2.1 DRAIN, WASTE, AND VENT (DWV) PIPE AND FITTINGS

Fittings shall be long radius fittings, except fittings in vent piping may be short radius fittings. Minimum size piping shall be 2 inches for buried piping and 1.5 inches for aboveground piping.

2.1.1 Buried Piping

Provide piping up to but not more than six inches aboveground or floor slab on grade.

2.1.1.1 Cast-Iron Hubless Pipe and Fittings

CISPI 301 with CISPI 310 couplings.

2.1.1.2 Cast-Iron Hub and Spigot Pipe and Fittings

ASTM A 74 with ASTM C 564 or CISPI HSN rubber compression gasket joints.

2.1.1.3 Plastic Pipe, Fittings, and Solvent Cement

a. Polyvinyl Chloride (PVC) System: ASTM D 2665

2.1.2 Aboveground Piping

2.1.2.1 Cast-Iron Hubless Pipe and Fittings

CISPI 301 with CISPI 310 couplings.

2.1.2.2 Cast-Iron Hub and Spigot Pipe and Fittings

ASTM A 74 with ASTM C 564 or CISPI HSN rubber compression gasket joints.

2.1.2.3 Plastic Pipe, Fittings, and solvent Cement

a. Polyvinyl Chloride (PVC) System: ASTM D 2665

2.1.2.4 Copper Tubing

ASTM B 306, with ANSI B16.23, ANSI/ASME B16.29, or ANSI/ASME B16.32 solder joint fittings using ASTM B 32, alloy Grade Sb5 or alloy Grade Sn96 solder, and flux containing not more than 0.2 percent lead.

2.1.2.5 Grooved-End Steel Piping for Roof Drainage Only

ASTM A 53, Schedule 40, hot-dip galvanized, cut grooved-end steel pipe; ASTM A 47 or ASTM A 536, hot-dip galvanized, grooved-end fittings, and mechanical couplings; ASTM A 183 coupling nuts and bolts; ASTM D 2000 rubber gaskets or water service. Fittings, mechanical couplings, and rubber gaskets shall be supplied by the same manufacturer.

2.1.2.6 Stainless Steel Pipe and Fittings for Process Piping

a. Pipe: ASTM A 312/A 312M, Schedule 40, Type 304L or 316L.

b. Welding: Butt fittings shall conform to ASME B16.9.

c. Fittings: Butt welding per ASTM A 403/A 403M, Class WP Schedule 40, Type 304L or 316L.

   Threaded per ASME/ANSI B16.1, Class 3000 lb., ASTM A 182/A 182M, Type 304L or 316L, forged.

d. Flanges: ASME/ANSI B16.5, Class 150, ASTM A 182/A 182M, Type 304L or 316L.

e. Flange Bolts: ASTM A 193/A 193M, Grade B7.

f. Flange Nuts: ASTM A 193/A 193M, Grade 7.

g. Flange Gasket: API STD 601, spiral-wound type.

h. Hose Connections: MIL-C-27487, threaded end.

i. Ball Valves: ASTM A 182/A 182M, Type 304L or 316L, Flanged end, 150#.

j. Check Valves: ASTM A 182/A 182M, Type 304L or 316L, Flanged end, 150#.

2.1.3 Cleanouts

ANSI A112.36.2M; provide threaded bronze or thermoplastic or PVC plastic cleanout plugs.

2.1.3.1 Floor Cleanouts

Provide cast-iron or ductile-iron floor cleanout with anchor flange, adjustable height polished bronze, nickel bronze, stainless steel, or chromium-plated copper alloy rim an scoriated floor plate with “CO” cast in the plate, and countersunk screws for installing floor plate flush with finished floor.

2.1.3.2 Wall Cleanouts

Provide polished stainless steel or chromium-plated copper alloy cover plate and secure to cleanout plug with countersunk stainless steel screw.

2.1.3.3. Cleanouts Exterior to Buildings

Provide cast-iron or polyvinyl chloride (PVC) cleanouts and countersunk plugs. Provide cast-iron cleanout box with cover.

2.1.4 Drains

ASME A112.21.1M; provide cast-iron or ductile-iron drains and clamping rings for use with membrane waterproofing. Provide P-traps for each floor drain.

2.1.4.1 Flush Strainer Floor Drains

Provide with double drainage flange, perforated or slotted cast bronze or nickel bronze, polished stainless steel, or chromium-plated copper alloy strainer, and adjustable collar. Drains of sizes 2, 3, and 4 inches shall have strainers with minimum free drainage area of 5, 11, and 18 square inches, respectively.

2.1.4.2 Shower Floor Drains

Provide as specified for flush strainer floor drains, except that finish shall be polished stainless steel or chromium-plated copper alloy where fire separation requirements are not violated.

2.1.4.3 Extended Rim Floor Drains

Provide as specified for flush strainer floor drains, except strainer body shall have one-inch extended rim installed flush with finished floor.

2.1.4.4 Floor Sinks (Drains)

Provide cast-iron body with white acid-resisting porcelain enameled or epoxy interior, double drainage flange, nickel bronze rim and slotted grate, removable stainless steel or aluminum slotted buckets, and P-trap.

2.1.5 Overview Piping (Containment Drainage)

2.1.5.1 Ductile Iron Piping (DIP)

a. Pipe and Fittings: Ductile-iron pipe shall conform to AWWA C104/A21.4, AWWA C105/A21.5, and ANSI/AWWA C151/A21.51 and shall be Thickness Class 50 minimum. Fittings shall have pressure rating at least equivalent to that of the pipe. Ends of pipe and fitting shall be suitable for the joints specified in the following paragraph.

b. Joints, General: Joints for pipe and fittings shall be flanged. Push-on or mechanical joints conforming to AWWA O111/A2.11 for below grade ductile-iron pipe for overflow containment. (RFI-1)

2.1.5.2 Poly Vinyl Chloride (PVC) Plastic Piping

a. Pipe and Fittings: ASTM D 2655; provide PVC pipe and fittings, Schedule 40, with solvent welded end joints.

b. End Connections, General: Pipe sections are belled on one end for solvent welding. Flanged ends may be used for connections to outlet valves.

2.1.5.3 Flag Valve

ASTM A 240, Type 304 Stainless Steel fabrication, with clamping band as indicated on drawings.

2.2 DOMESTIC WATER PIPING

2.2.1 Buried Piping and Aboveground Piping

2.2.1.1 Copper Tubing

ASTM B 88, Type L for aboveground piping, Type K for buried piping, with ANSI B16.18 or ASME/ANSI B16.22 solder joint fittings; or with ASME/ANSI B16.26 flared joint fittings. Provide ASTM B 42 copper pipe nipples with threaded end connections. Provide ASTM B 32, alloy Grade Sb5 or alloy Grade Sn96 lead-free solder (less than 0.2% lead). Provide copper tubing for pipe sizes four inches or smaller.

2.2.1.2 Cast Ductile-Iron Piping

Sizes larger than four inches, outside coated, AWWA C104/A21.4 cement mortar lined, ANSI/AWWA C151/A21.51 ductile-iron pipe, AWWA C111/A21.11 rubber gasket joints, and AWWA C110/A21.10 fittings. Provide concrete thrust blocks at the elbow where the buried piping turns up toward the floor, and restrain the pipe riser with steel rods from the elbow to the flange above the floor. Aboveground piping shall have flanged end connections conforming to AWWA C115/A21.15 for flanged pipe and AWWA C110/A21.10 for flanged fittings.

2.2.2 Water Valves

Provide valves suitable for minimum of 125 psig and minimum of 180° F hot water. Valves shall have threaded end connections with a union on all but one side of the valve, or solder end connections for connections between bronze valves and copper tubing. Ball valves may be provided in lieu of gate valves. Provide blue finish and red finish on handwheels for valves in cold domestic water piping and hot domestic water piping, respectively.

2.2.2.1 Gate Valves

MSS SP-80, Class 125.

2.2.2.2. Globe and Angel Valves

MSS SP-80, Class 125.

2.2.2.3 Check Valves

MSS SP-80, Class 125, swing check.

2.2.2.4 Ball Valves

Full port design, copper alloy. Valves shall have two-position lever handles.

2.2.2.5 Hose Bibbs

Provide angle type copper alloy hose bibb with lockshield and removable handwheel or tee-handle. Inlet shall have internal threads. Outlet shall have vacuum breaker with 0.75 inch external hose threads.

2.2.2.6 Non-freeze Wall Hydrant

ASSE 1019, cast bronze, with lockshield and removable handwheel or tee-handle, one-inch external thread inlet, 0.75-inch external hose thread outlet with automatic draining vacuum breaker. Hydrant shall be of sufficient length to extend through walls and place the valve seat inside the building or in the crawl space. Bonnet and valve stem shall be removable from outside of the building.

2.2.2.7 Combination Pressure and Temperature Relief Valves

ANSI Z21.22 copper alloy body, automatic reseating, test lever, and discharge capacity based on AGA temperature steam rating.

2.2.2.8 Pressure Relief Valves

ANSI Z21.22 copper alloy body, automatic reseating with test lever.

2.2.2.9 Water Temperature Mixing Valves

Provide Copper alloy or cast-iron body valve of the pressure equalizing type. Valve shall be of the adjustable thermostatic type and shall mix the hot water and cold water to deliver hot water at a set temperature.

2.2.2.10 Water Pressure Reducing Valves

ASSE 1003, bronze body, threaded end, with separate, attached strainer. Set point range from 0 psig to 100 psig.

2.2.3 Strainers

Strainers shall have blow off outlet with pipe nipple and gate valve and discharge pipe nipple. Copper alloy or cast-iron body. Provide stainless steel strainer element with perforations of 0.047 inch.

2.2.4 Pressure Gates

Provide single style pressure gage for water with 4.5 inch dial, brass or aluminum case, bronze tube, gate cock, pressure snubber, and siphon. Provide scale range suitable for the intended service.

2.2.5 Thermometers

Provide bi-metal dial type thermometers with stainless steel case, stem, and fixed thread connection; 5-inch diameter dial with glass face gasketed within the case; accuracy within 2 percent of scale range. Provide scale range suitable for the intended service.

2.2.6 Dielectric Connections

Provide at connections between copper and ferrous metal piping materials. ASTM F 441, Schedule 80, CPVC threaded pipe nipples, four inch minimum length, may e provided for dielectric connections in pipe sizes two inches and smaller.

2.2.7 Backflow Preventers (RPBFP)

Reduced pressure principle type. Furnish proof that each make, model/design, and size of backflow preventer being furnished for the project is approved by and has a current "Certificate of Approval" from the FCCCHR-USC. Listing of the particular make, model/design, and size in the current FCCCHR-USC will be acceptable as the required proof.

2.3 MISCELLANEOUS PIPING MATERIALS

2.3.1 Flanges

ASME/ANSI B16.1, Class 125, for use in ferrous piping; SAME/ANSI B16.22 or ANSI B16.24 or use in copper tubing; with MIL-R-2855 full face flat type synthetic rubber gaskets.

2.3.2 Escutcheon Plates

Provide one piece or split hinge metal plates for piping entering floors, walls, and ceilings in exposed spaces. Provide chromium-plated or polished stainless steel finish on copper alloy plates in finished spaces. Provide paint finish on metal in unfinished spaces.

2.3.3 Pipe Sleeves

2.3.3.1 Sleeves in Masonry and Concrete Walls, Floors, Roofs

ASTM A 53, Schedule 40 or Standard Weight, hot-dip galvanized steel, pipe sleeves.

2.3.3.2 Sleeves in Non-Masonry or –Concrete Walls, Floors, and Roofs

Provide 26 gage hot-dip galvanized steel sheet.

2.3.4 Pipe Sleeves

Provide where piping passes entirely through walls, ceilings, roofs, and floors. Secure sleeves in position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, ceilings, roofs, and floors. Provide one-inch minimum clearance between exterior of piping or pipe insulation, and interior of sleeve or core-drilled hole. Firmly pack space with mineral wool insulation. Seal space at both ends of sleeve or core-drilled hole with plastic waterproof cement which will dry to a firm but pliable mass, or provide a mechanically adjustable segmented elastomeric seal. In fire walls and fire floors, seal both ends of sleeves or core-drilled holes with UL listed fill, void, or cavity material.

a. Sleeves in masonry and concrete walls, floors, and roofs: Provide steel pipe sleeves. Sleeves are not required where drain, waste, and vent (DWV) piping passes through concrete floor slabs located on grade. Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in the core-drilled hole are completely grouted smooth.

b. Sleeves in other than masonry and concrete walls, floors, and roofs: Provide 26 gage galvanized steel sheet.

2.3.5 Pipe Hangers and Supports

Provide MSS SP-58 and MSS SP-60, Type 1 with adjustable type steel support rods, except as specified or indicated otherwise. Attach to steel joints with Type 19 or 23 clamps and retaining straps. Attach to Steel W or S beams with Type 22, 28, 29, or 30 clamps. Attach to steel angles with vertical web steel channels with Type 20 clamp with beam clamp channel adapter. Attach to horizontal web steel channel and wood with drilled hole on centerline and double nut and washer. Attach to concrete with Type 18 insert or drilled expansion anchor. Provide Type 40 insulation protection shield for insulated piping.

2.3.6 Access Doors

Provide 12- by 12-inch factory prefabricated and primed flush face steel access doors including steel door frame with continuous hinges and turn-screw-operated latch. Door frame shall be for installation in plaster and masonry walls. Furnish doors under this section to provide proper access to concealed valves; install doors under the appropriate section of this specification.

2.3.7 Washing Machine Connector Box

Provide recessed wall box fabricated of aluminum, PVC plastic stainless steel, or hot-dip galvanized steel. Provide hot-dip galvanized steel with epoxy or baked-on enamel finish. Provide drain nipple and locknut with cover nut for locking drain outlet to box. Provide bras pipe fittings for connecting each supply pipe to valve and locking to box. Provide hot water and cold water supply valves similar to hose bibbs, except valve inlet connections shall be of the compression type or union type.

2.4 FIXTURES, FITTINGS, ACCESSORIES, AND SUPPLIES

Provide control-stop valves in each supply to each fixture. The finish of fittings, accessories, and supplies exposed to view shall be chromium-plated per ASME A112.18.1M. Centerset faucets shall be top-mounted with inlets on not greater than four-inch centers. Provide special roughing-in for wheelchair fixtures.

2.4.1 Tank Type Water Closets (P-1)

ASME A112.19.2M, close-coupled, white vitreous china, water conservation type, floor-mounted, floor or wall outlet as indicated, siphon jet, elongated bowl, black solid plastic elongated open-front seat with cover, and ANSI A112.19.5 trim. Non-float swing type flush valves are not acceptable. Water flushing volume shall not exceed 3.5 gallons per flush.

2.4.2 Flush Valve Type Urinals (P-2)

ASME A112.19.2M, white vitreous china, wall-mounted, wall outlet, siphon jet, integral trap, extended side shields, and ANSI A112.19.5 trim. Provide large diaphragm (not less than 2.625 inches upper chamber inside diameter at the point where the diaphragm is sealed between the upper and lower chambers), non-hold-open flush valve of chrome plated cast brass, including vacuum breaker and angle (control-stop) valve with back check. Water flushing volume of the flush valve and urinal combination shall not exceed 1.5 gallons per flush from 15 to 90 psi. Provide ASME A11.6.1M concealed wall hangers with thru-bolts and back plates for mounting.

2.4.3 Lavatories (P-3A)

ASME/ANSI A112.19.1M, white enameled cast-iron, or ASME A112.19.2M white vitreous china with ASME A112.6.1M concealed arm carrier support, shelf back type, minimum dimensions of 20 inches wide by 18 inches front to rear. Provide ASME A112.18.1M copper alloy centerset single handle faucets with pop-up drain fittings, and 1.25 inch adjustable P-traps. Provide ASME A112.6.1M concealed wall hangers with thru-bolts and back plates for mounting.

2.4.4 Wheelchair Lavatories (P-3B)

ASME/ANSI A112.19.1M, white vitreous china, contoured front rim, front concealed overflow, ASME A112.6.1M concealed arm carrier support and chair carrier, minimum dimensions of 20 inches wide by 27 inches front to rear, 29 inch minimum clearance from bottom of front rim to floor, 34 inch from rim height above floor. Provide ASME A112.18.1M copper alloy centerset single handle faucets, gooseneck spout with aerator 5 inches above rim, 4 inch wrist action handles, perforated grid strainers with offset tailpiece, and 1.25 inch adjustable P-trap. Faucets with wrist action handles shall open within one-quarter turn in opposite directions.

2.4.5 Countertop (Kitchen) Sinks (P-12)

ASME/ANSI A112.19.3M, 20 gage stainless steel with integral mounting rim, minimum dimensions of 25 inches wide by 22 inches front to rear, 7 inches deep single compartment with ledge back and undersides coated with sound dampening material. Provide top-mounted ASME A112.18.1M copper alloy centerset single handle faucets, swing spout with aerator, and stainless steel drain outlets with cup strainers. Provide 1.5 inch adjustable P-trap with drain piping to vertical vent stack. Provide UL 430 waste disposer unit in right compartment.

2.4.6 Wheelchair Electric Water Cooler (P-7)

ARI 1010, wall-mounted bubbler style with ASME A112.6.1M concealed chair carrier, air-cooled condensing unit, 4.75 gph minimum capacity, stainless steel splash receptor, and all stainless steel cabinet, with 27 inch minimum knee clearance from front to bottom of unit to floor and 36 inch maximum spout height above floor. Bubblers shall also be controlled by push levers, by push bars, or touch pads one on each side or one on front and both sides of cabinet.

2.4.7 Shower Supply Fittings

ASME A112.18.1M, ball joint, self-cleaning adjustable spray pattern shower heads with 3-gpm flow control devices, connected to concealed pipe connected to copper alloy pressure balance single control type mixing valves with front access integral screwdriver stops. Anchor the mixing valves and the pipe to each showerhead in wall to prevent movement.

2.4.8 Mop Sink (P-4)

Precast terrazzo Mop Sink: Terrazzo shall be made of marble chips cast in white Portland cement to produce a compressive strength of not less than 3000 psi 7 days after casting. Provide brass body drains with nickel bronze strainers cast integral with terrazzo. Provide stainless steel rim guard for mop sink.

2.4.9 Combination Emergency Shower and Eyewash (P-5)

ANSI Z358.1, column mounted on a floor flange. Design combination unit so components can be operated individually from a common fixture supply line. Provide a 10 inch diameter stainless steel deluge showerhead with elbow, stay-open ball valve operated by pull rod and 8 inch diameter ring or triangular handle, and eyewash with stainless steel receptor and two spray outlets. Provide eyewash with stay-open ball valve operated by foot treadle and push handle.

2.4.10 Oil Interceptors

Cast iron or welded steel coated inside and outside with white acid resistance epoxy, with internal air relief bypass, bronze cleanout plug, double wall trap seal, removable combination pressure equalizing and flow diffusing baffle and sediment bucket, horizontal baffle, vent connection gas and watertight gasketed nonskid cover. Sized for 15 gpm with inlet and outlet connections as indicated.

2.5 DOMESTIC WATER HEATERS GAS

Gas-fired water heaters, glass-lined steel tanks, high efficiency type insulated with polyurethane foam insulation, replaceable anodes, with adjustable range thermostat to allow hot water settings between 110° and 180° F. Provide posted operating instructions for water heaters.

2.5.1 Gas Vents

NFPA 211, Type B, of the prefabricated multi-wall UL listed type.

2.5.2 Gas Piping System

See Section 15492, “Fuel Gas Piping.”

PART 3 EXECUTION

3.1 INSTALLATION

Installation of plumbing systems including fixtures, equipment, materials, and workmanship shall be in accordance with the Plumbing Code, except as modified herein. When fixtures require both hot water and cold water supplies, provide the hot water supply to the left of the cold water supply. Plastic piping shall not penetrate firewalls or fire floors and shall be used on one side of firewalls and fire floors not closer than six inches to the penetration.

3.1.1 Threaded Connections

Jointing compound for pipe threads shall be polytetrafluoroethylene (PTFE) pipe thread paste, pipe cement and oil, or PTFE powder and oil; apply only on male threads. Provide exposed ferrous pipe threads with one coat of primer applied to a minimum dry film thickness of 1.0 mil.

3.1.3.1 Piping to Receive Insulation

Provide temporary wood spacers between the insulation protection shield and the pipe in order to properly slope the piping and to establish final elevations. Temporary wood spacers shall be of the same thickness as the insulation to be provided under Section 15250, “Insulation of Mechanical Systems.”

3.1.3.2 Maximum Spacing Between Supports

a. Vertical Piping: Support metal piping at each floor, but at not more than 10 foot intervals, with pipe riser clamps or offset pipe clamps.

b. Horizontal Piping: Support cast-iron piping at five foot intervals, except for pipe exceeding five foot length, provide supports at intervals equal to the pipe length but not exceeding 10 feet. Support steel piping and copper tubing as follows:

MAXIMUM SPACING (FEET)

Nominal Pipe Size (inches)	One and under	1.25	1.5	2	
Steel Pipe	7		8	9	10
Copper Tube	6		7	8	8

3.1.4 Encased Buried Piping

Completely encase buried copper water piping and cast iron DWV and water piping with polyethylene tube or sheet in accordance with AWWA C105/A21.5.

3.1.5 Installation of Pipe Sleeves

Provide pipe sleeves where piping passes through walls, floors, roofs, and partitions. Secure Sleeves in proper position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, floors, roofs, and partitions. Provide not less than 0.25-inch space between exterior of piping or pipe insulation and interior of sleeve. Firmly pack space with mineral wool insulation. Seal at both ends of the sleeve with plastic waterproof cement which will dry to a firm but pliable mass, or provide a segmented elastomeric seal. Seal both ends of penetrations through fire walls and fire floors to maintain fire resistive integrity with UL listed fill, void, or cavity material. Extend sleeves in floor slabs three inches above the finished floor, except sleeves are not required where DWV piping passes through concrete floor slabs located on grade.

3.2 NAMEPLATES

Provide laminated plastic nameplates for equipment, gages, thermometers, and valves; stop valves in supplies to fixtures will not require nameplates. Laminated plastic shall be 0.125-inch thick melamine plastic, black with white center core. Surface shall be a matte finish. Corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be minimum of 0.25-inch high normal block lettering. Key nameplates to a chart and schedule for each system. Frame charts and schedules under glass and place where directed near each system. Furnish two copies of each chart and schedule. Each inscription shall identify its function. Equipment nameplates shall show the following information.

a. Manufacturer, type, and model number

b. Contact number and accepted date

c. Capacity or size

d. System in which installed

e. System which it controls

3.3 FIELD QUALITY CONTROL

3.3.1 Inspections

Prior to initial operation, inspect piping system for compliance with drawings, specifications, and manufacturer’s submittals.

3.3.2 Field Testing

Before final acceptance of the work, test each system as in service to demonstrate compliance with the contract requirements. Perform the following tests in addition to the test specified in the Plumbing Code, except as modified herein. Correct defects in the work provided by the Contractor, and repeat tests until work is in compliance with contract requirements. Furnish water, electricity, instruments, connecting devices, and personnel for performing tests.

3.3.2.1 Hydrostatic Testing Water and Process Piping

Before applying insulation, hydrostatically test each piping system at not less than 120 psig with no leakage or reduction in gage pressure for two hours.

3.3.2.3 Overflow Piping (Containment Drainage)

Before backfilling drain piping trenches, (whether before or after structural grade beams are poured) cap ends of each system, fill each section with water for test with not less than a 10 foot head of water. Allow to stand full until a thorough inspection has been made, but not less than two hours. Any leaks discovered shall be repaired, after which, the section shall be retested.

3.4 DISINFECTION

Disinfect new water piping in accordance with AWWA C651. Fill piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for a minimum of 24 hours. Flush solution from systems with clean water until maximum residual chlorine content is not greater than 0.2 parts per million or residual chlorine content of domestic water supply.

HAZARDOUS WASTE TSD FACILITY
STEEL TANKS WITH FIXED ROOFS

REF.: Specification section 13205

2.31. - Inlet and outlet piping

FMF will provide carbon steel pipe and flanges for all inlet and outlet pipes that weld to the carbon steel tank.

It is standard practice to separate dissimilar metals of this type, therefore the separation could be made at the first flange connection.

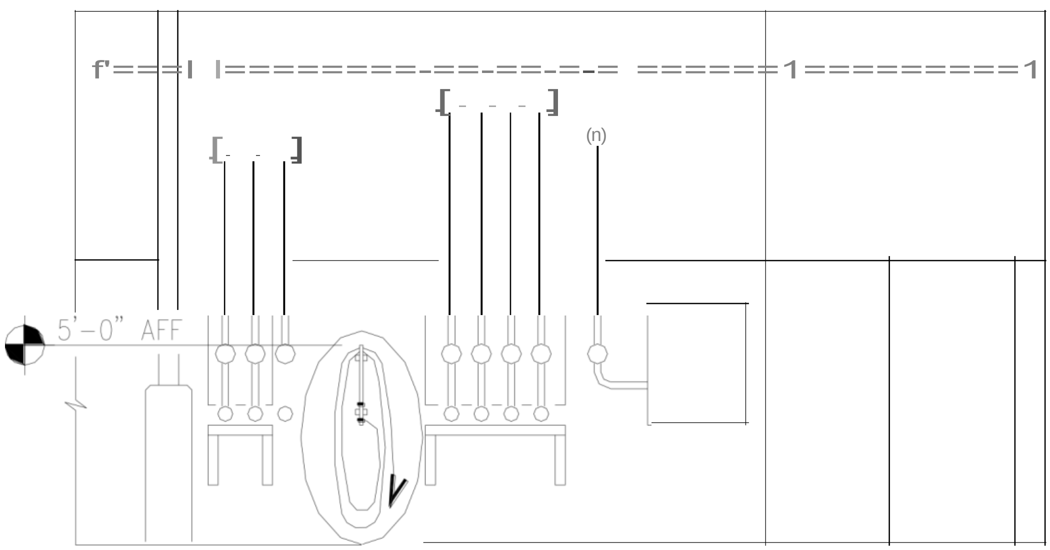
2.3.3 - Nozzle

Per our calculations submitted by a registered professional engineer. Nozzle reinforcing is not required.

Hazards Waste TSD Facility
Steel tanks with fixed roofs

Reference: Submittals section 13205 1.2.1

- Structural steel: FMF will use industry standard materials conforming to ASTM A-36 carbon steel.
- Pipe and fittings: FMF will use industry standard materials conforming to ASTM A-53B ERW, ASTM A234 WPE carbon steel.
- Flange bolting: FMF will use industry standard materials conforming to ASTM A105. Class 150, RFSO welding neck carbon steel. All boltholes to straddle natural vessel.
- Gaskets: FMF will use industry standard materials conforming to military spec MIL-R-6855.
- Tank level: Gauge; by others.
- Venting: FMF has provided a nozzle to the first flange only.
- Roof manholes: See submittal drawing.
- Shell access holes: See submittal drawing.
- Oil – resistant coating system: attached.



CP-2

TRUCK GROUNDING BAR & CABLE/CLAMP
SEE GROUNDING BAR DETAIL BELOW

U x 1" COPPER BAR

20'-o" OF #1/o STRANDED COPPER
WELDING CABLE WITH RUBBER JACKET
AND HEAVY DUTY ALLIGATOR CLIP ON
END FOR TRUCK ATTACHMENT

BOLTED GROUNDING CONNECTION FOR REPLACEMENT
OF GROUNDING CABLE

TO BLDG GND
GRID, BONDED TO
COPPER BAR

CONCRETE WALL

FRONT

SIDE

GROUNDING BAR DETAIL

9
E3 E3

TRUCK GROUNDING DETAIL
SCALE: NONE

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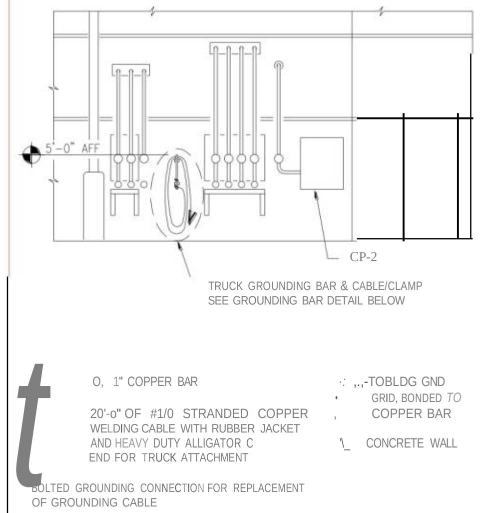
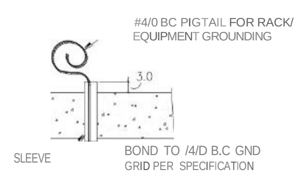
SYM	DESCRIPTION	PREP'D BY	DATE	APPROVED
	REVISIONS			
1	AS-BUILT CONDITIONS SHOWN	DFC	JAN 96	MBW

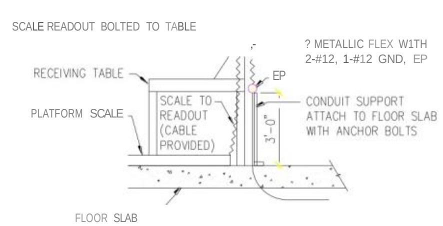


GROUNDING BAR DETAIL

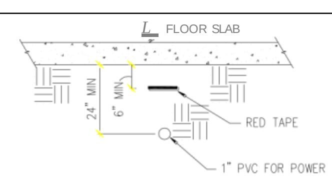
TRUCK GROUNDING DETAIL
SCALE: NONE



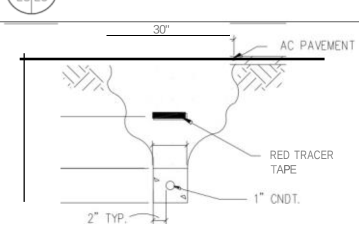
EQUIPMENT GROUNDING
SCALE: NONE



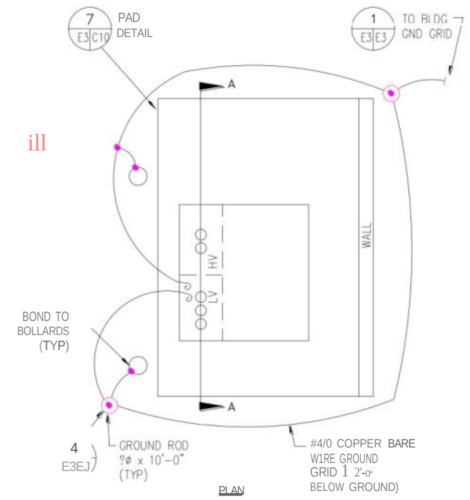
SCALE MOUNTING DETAIL
SCALE: NONE

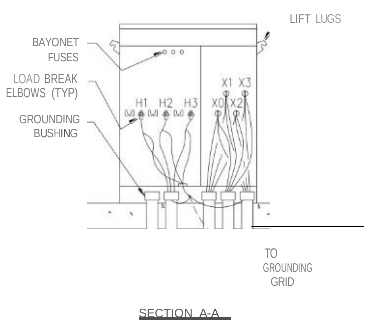


12 SINGLE CONDUIT UNDER SLAB
E3 E3 SCALE: NONE

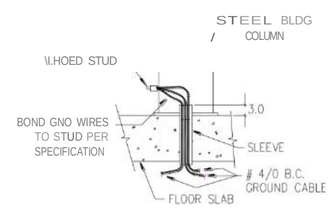


13 SINGLE CONDUIT DUCT
E3 E3 SCALE: NONE

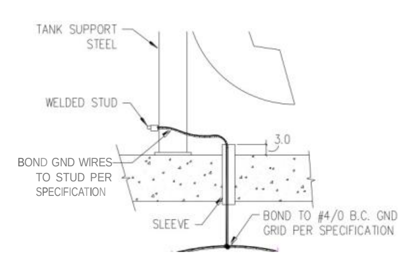




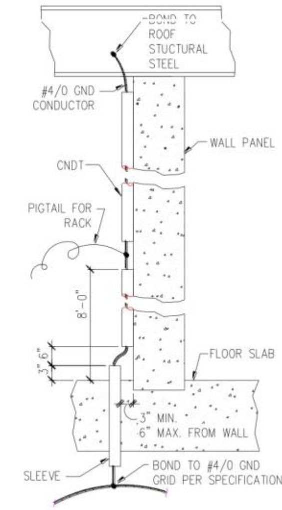
6 TRANSFORMER DETAIL
E3 E3 SCALE: NONE



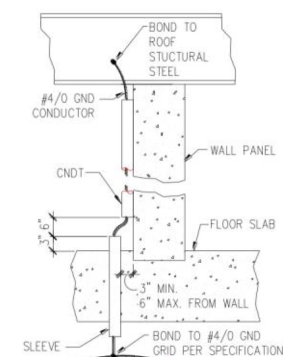
7 GROUNDING: STEEL BLDG COLUMN
E3 E3 SCALE: NONE



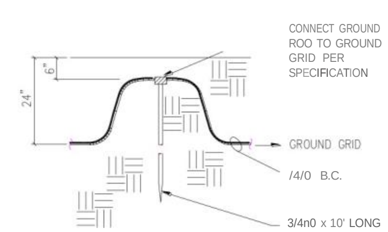
8 GROUNDING: PROCESS TANKS
E3 E3 SCALE: NONE



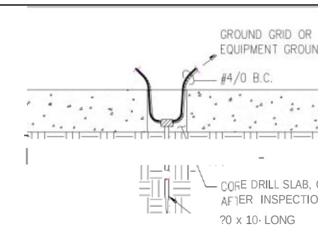
2 GROUNDING: TO RACKS & ROOF
E3 E3 SCALE: NONE



GROUNDING: ROOF
SCALE: NONE



4 EXTERIOR GROUND ROD DETAIL
E3 E3 SCALE: NONE



5 INTERIOR GROUND ROD DETAIL
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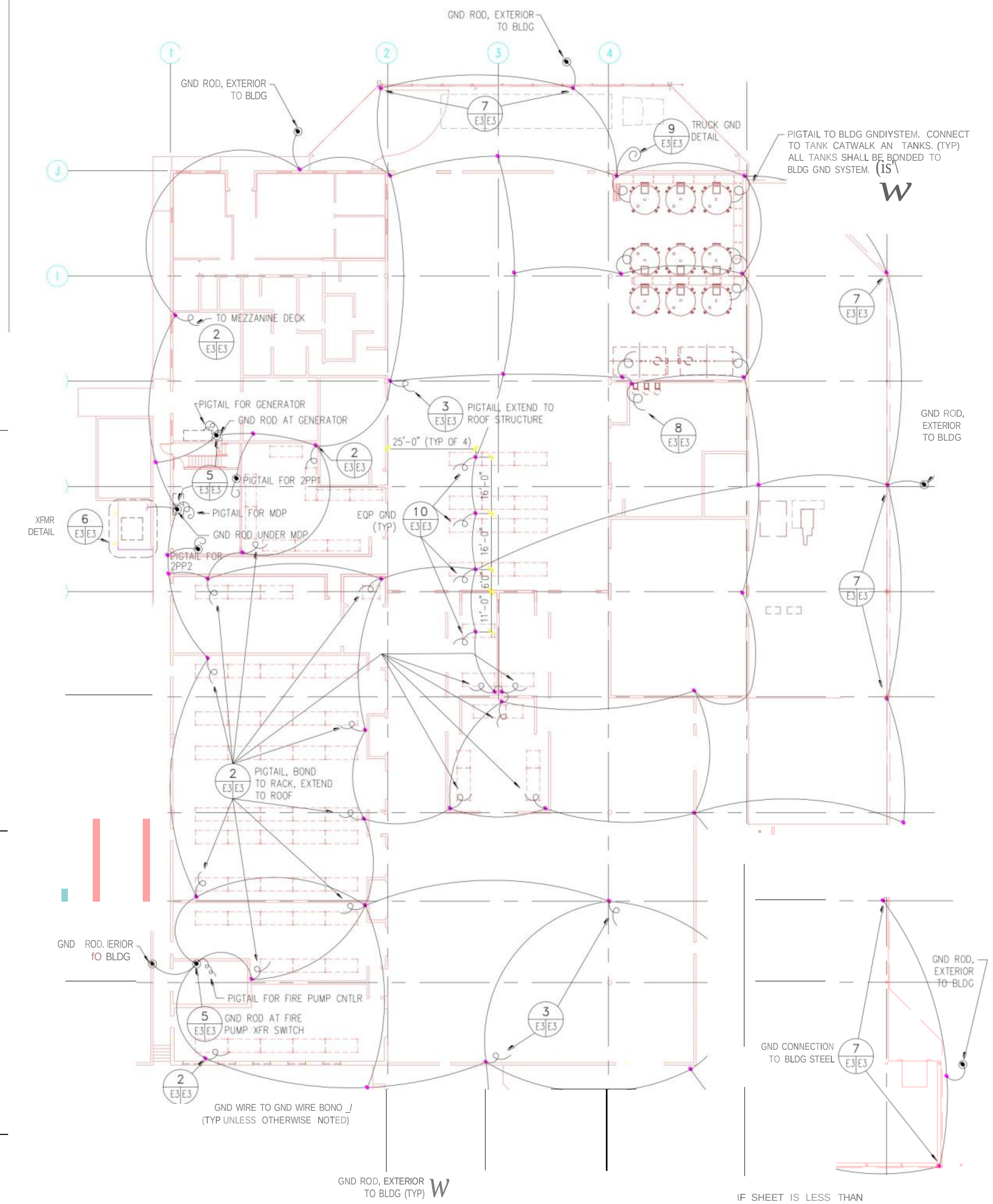

IF SHEET IS LESS THAN
28" X 40"
IT IS A REDUCED PRINT -
SCALE REDUCED ACCORDINGLY

GROUNDING PLAN
E3 E3 SCALE 1/16" = 1'-0"

GRAPHIC SCALE
1/16"
10' 0 10' 20' 30' 40' 50'

CONSULTING ENGINEERS, INC
Portland, Oregon

DEPARTMENT OF NAVY
NAVAL FACILITIES ENGINEERING COMMAND
ENGINEERING FIELD ACTIVITY, NW
SILVERDALE, WASHINGTON

NAVAL UNDERSEA WARFARE CENTER DIVISION
KEYPORT, WA
HAZARDOUS WASTE
TSO (P-370)
GROUNDING PLAN & DETAILS

E-3
6405231
80091
CONST.CONTR.NO.N44255-94-C-7397

PLOTTED: 10/15/93-19 32 1847 06\E03-0.D

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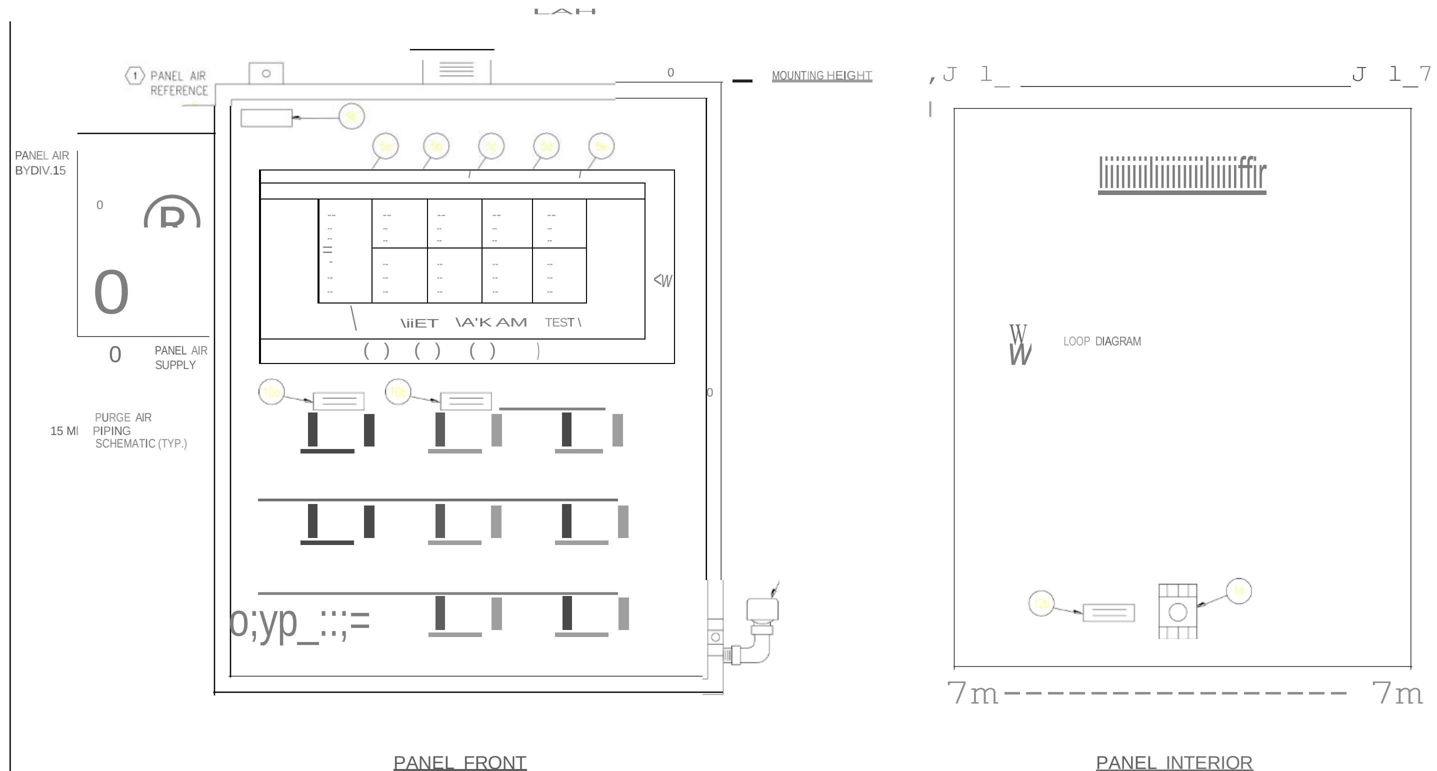
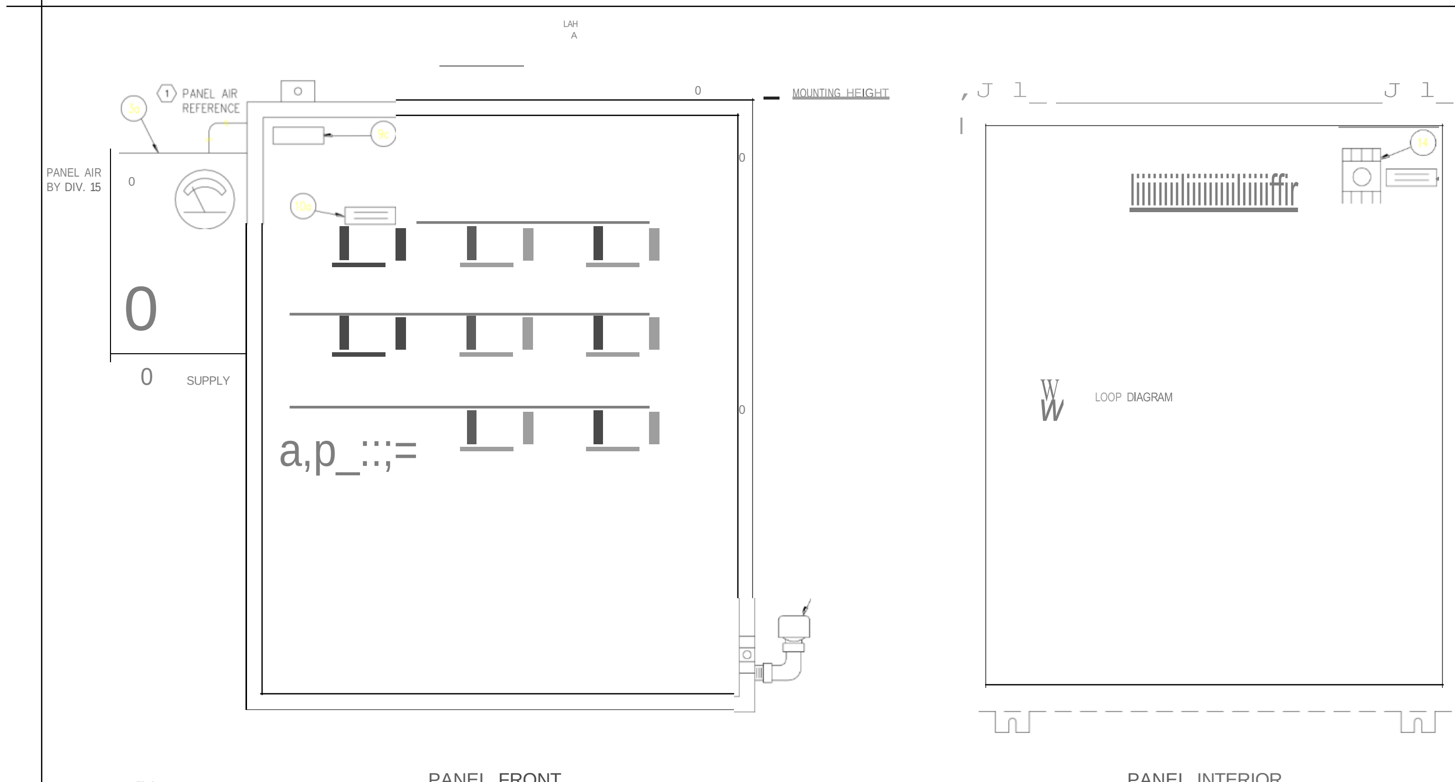
	PREP'D BY		APP
"AS-BUILT"	DFC	JAN 96	MSW



2 TRUCK UNLOADING LEVEL PANEL CP-2
ESE1 SCALE: NONE
E18



PROVIDE PANEL PRESSURIZATION AIR CONNECTIONS

FROM PANEL PRESSURIZATION SYSTEM TO PROTECTED ENCLOSURE PER DWG M-18, DETAIL 1 AND MANUFACTURER'S RECOMENDATION. PANEL PIPING SHOWN IS SCHEMATIC

3 TANK FARM LEVEL PANEL CP-1
E8 E1 SCALE: NONE
E18

GRAPHIC SCALES

NOT USED
SCALE: NONE

PANEL COMPONENTS:

0 NOT USED

0 ENCLOSURE 36"H x 30"W x 16"0; NEMA 12; SINGLE DOOR; PAINTED: OFF-WHITE ENAMEL

0 ENCLOSURE: 24"H x 20"W x 10"0; NEMA 12; SINGLE DOOR; PAINTED: OFF-WHITE ENAMEL

0 NOT USED

0 PANEL 33"H x 27"W; PAINTED: WHITE ENAMEL

0 PANEL 21"H x 17"W; PAINTED: WHITE ENAMEL

0 PANEL PRESSURIZATION SYSTEM (PCV): PANEL AUTOMATIC AIR PURGING AND PRESSURIZATION SYSTEM SUITABLE FOR TYPE Z" PURGING. SYSTEM TO INCLUDE INTEGRAL AIR SUPPLY REGULATOR, ENCLOSURE PRESSURE INDICATOR, EXPLOSION PROOF PRESSURE LOSS ALARM SWITCH, AND RAPID EXCHANGE CONTROL VALVE, MOUNT TO LEFT HAND SIDE OF ENCLOSURE.

0 DIGITAL PANEL METER: PANEL MOUNTED 'MTH 3 1/2 DIGIT HIGH VISIBILITY, .56" HIGH RED LED DISPLAY; 4-20mA ANALOG INPUT; DUAL ALARM RELAY OUTPUTS; NEMA 4 SEALED METAL FRONT BEZEL; PROGRAMMABLE ALARM SET POINTS, ZERO VALUE, ANO RANGE; 120 VOLT POWER

0 SAME AS 4a ABOVE EXCEPT: WITH 4-20mA ANALOG RETRANSMISSION; WITHOUT DUAL ALARM RELAY OUTPUTS

0 SOLID STATE ANNUNCIATOR: 'MTH CASKETED DOOR SUITABLE FOR PANEL PURGING. FLUSH PANEL MOUNTED TEN CHANNEL ANNUNCIATOR 24 VOLT DC SIGNAL INPUT, RELAY CONTACT OUTPUT. 2 7/8" x 3 1/4" ENGRAVED WHITE LIGHTBOX WITH BACKLIGHTED LEGENDS PER TABLE 1 ORY CONTACT SA@ 120VAC FOR ALARM HORN. ALARM HORN ACKNOWLEDGE, LAMP TEST, ANO RESET PUSHBUTTONS ANNUNCIATOR POWER 120VAC

ALARM SEQUENCE "AF" AS FOLLOWS

	CONDITION			
DEVICE	SIGNAL CONTACT NORMAL	SIGNAL CONTACT GOES OFF-NORMAL	SILENCE BY PUSHBUTTON	SIGNAL CONTACT RETURNS TO NORMAL
LAMPS	OFF	BRIGHT FLASH	STEADY BRIGHT	OFF
HORN	OFF	ON	OFF	OFF

0 ENCLOSURE PROTECTION VENT: GRAVITY OPERATED, PRESSURE RELIEF VALVE MATCHED TO ENCLOSURE PURGE SYSTEM

0 TERMINAL BLOCKS: CHANNEL MOUNTING TYPE, TUBULAR SCREW TYPE TERMINALS CAPABLE OF HANDLING #22-#12 AWG CONDUCTORS; 600VAC INSULATION CAPACITY; APPROXIMATELY 0.24" THICK x 1.31"' HIGH x 1.6" 'MOE

j NAMEPLATES: FLEXIBLE LAMINAT.ED PLASTIC; THREE-PLY, WHITE SURFACE, BLACK CORE; ENGRAVED W1TH ROUND TIP (V-BOTTOMS ARE NOT ACCEPTABLE); ENGRAVE AS SHOWN ON TABLES 2,3,4 AND 5. FASTEN TO PANEL FACES WITH FOAM TAPE

0 ALARM HORN: VIBRATING HORN, 120VAC, SUITABLE FOR CLASS 1 DIV 2, GROUP C & D ENVIRONMENT. \OO DECIBEL MINIMUM AT 10 FEET. MOUNT ON TOP OF ENCLOSURE UNLESS INDICATED OTHERWISE

0 CONTROL RELAY: DPDT; 120VAC COIL; CONTACTS RATED MINIMUM 120VAC AT 10AMPS

0 FUSED TERMINAL STRIPS: SAME AS 8 ABOVE. EXCEPT W1TH S'MTCH AND FUSE ARRANGEMENT; APPROXIMATELY 0.36" THICK x 2.3" HIGH x 3.1 WIDE SUITABLE FOR FUSE SIZE O 10

TABLE 1 LIGHTBOX LEGENDS

0	LINE 1	LINE 2	LINE 3	LINE 4
o	TANK #1	OTHER WASTE WATER	TANK FULL	LAH-1B
b	TANK #2	OTHER WASTE WATER	TANK FULL	LAH-2B
c	TANK #3	WASTE OIL	TANK FULL	LAH-3B
d	TANK #4	OIL/WATER	TANK FULL	LAH-48
e	TANK #5	OIL/WATER	TANK FULL	LAH-58
l	TANK 1120	CYANIDE/OIL FEED	TANK FULL	LAH-20B
o	TANK #21	CYANIDE/OIL FEED	TANK FULL	LAH-21B
h	TANK #22	CYANIDE METAL WASTE	TANK FULL	LAH-22B
i	TANK 1140	EFFLUENT COLLECTION	TANK FULL	LAH-40B
k	AIR	PRESSURE	FAILURE	

TABLE 2, PANEL NAMEPLATES

0	LINE 1	LINE 2
b	TRUCK UNLOADING LEVEL PANEL	CP-2
c	TANK FARM LEVEL PANEL	CP-1

TABLE 3, DIGITAL PANEL METER LEGENDS

0	LINE 1	LINE 2	LINE 3 I(CP-1)	LINE 3 (CP-2)
0	TANK #1 - OTHER WASTE WATER	PERCENT (%) FULL	LI-1A	LI-18
b	TANK #2 - OTHER WASTE WATER	PERCENT (%) FULL	LI-2A	LI-28
c	TANK #3 - WASTE OIL	PERCENT (%) FULL	LI-3A	LI-38
d	TANK #4 - OIL/WATER	PERCENT (%) FULL	LI-4A	LI-4B
e	TANK 115 - OIL/WATER	PERCENT (%) FULL	LI-SA	LI-SB
f	TANK #20 - CYANIDE/OIL FEED	PERCENT (%) FULL	LI-20A	LI-20B
Q	TANK #21 - CYANIDE/OIL FEED	PERCENT (%) FULL	LI-21A	LI-21B
h	TANK #22 - CYANIDE METAL WASTE	PERCENT (%) FULL	LI-22A	LI-22B
i	TANK #40 - EFFLUENT COLLECTION	PERCENT (%) FULL	LI-40A	LI-40B

TABLE 5 CONTROL RELAY LEGENDS

0	LINE 1
0	CONTROL RELAY CP- 7
b	CONTROL RELAY CP-8

IF SHEET IS LESS THAN
28" X 40"
IT IS A REDUCED PRINT -
SCALE REDUCED ACCORDINGLY

E-15

CONSULTING ENGINEERS. 1Nc
Portland. Ore on
OR. JAC CHK
CH. mGR
FIRMM(M8(R(TITL()
EFDFORC MANDERNAYrAC

ENGINEERING FIELD ACTIVITY, NW
SILV!:RDALE. WASHINGTON
NAVAL UNDERSEA WARFARE CENTER DIVISION
KEYPORT, WA
HAZARDOUS WASTE
TSO (P-37D)
TANK LEVEL INDICATOR PANELS
NAYrAC.DRA\\1NGNO 6405243
S00 91 CONST CONTR NO N44255-9•-c-n91
SCALE AS NOTED SPEc.12-92-3618 SHEET 107or

PLOTTED 08/25/93-17 35 1847.06\E15-0.0WG

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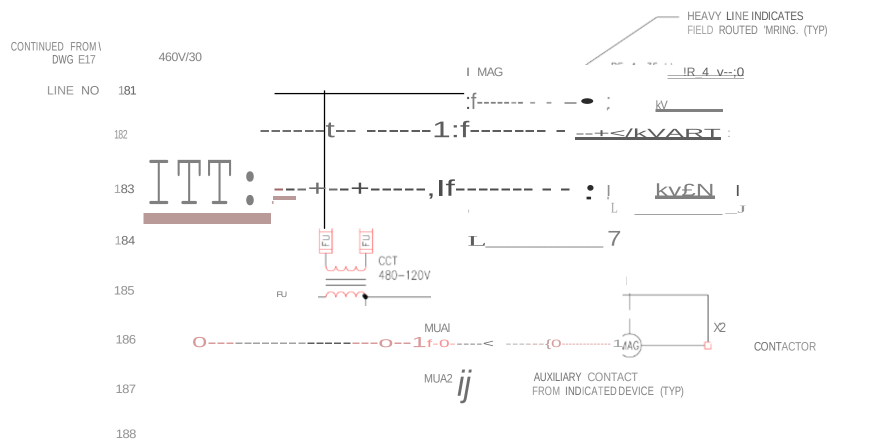
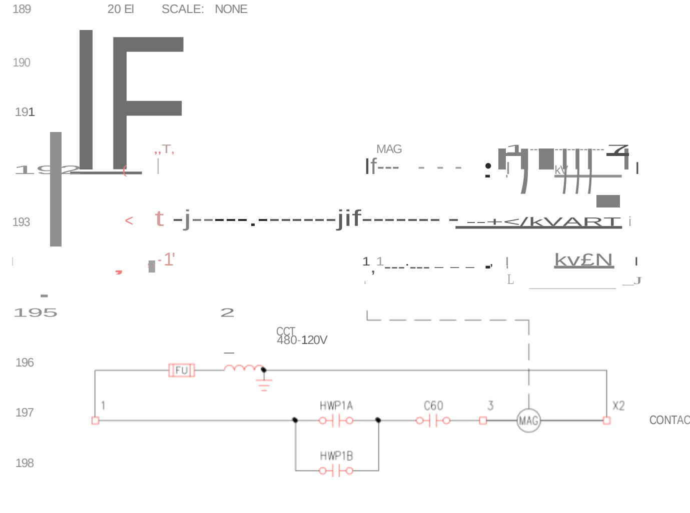
SYM	DESCRIPTION	PREP'D BY	DATE	APPROVED
	"AS-BUILr	OFC	JAN96	MBW

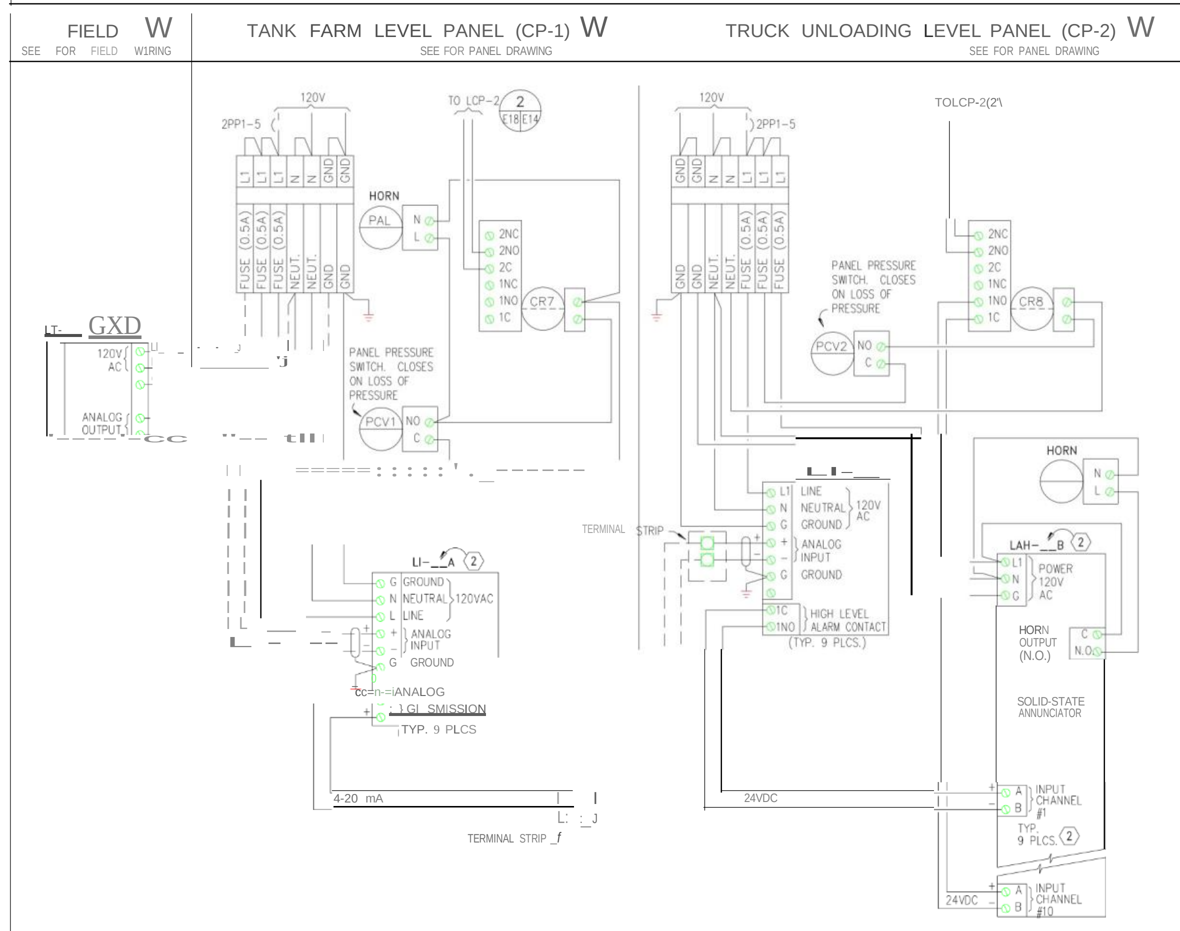


3 MCC1 POWER FACTOR CORRECTION
20 E1 SCALE: NONE



4 MCC2 POWER FACTOR CORRECTION
20 E1 SCALE: NONE

NOT USED
SCALE NONE



2 TANK LEVEL LOOP DIAGRAM
15 E1 SCALE: NONE

NOTES:

(i) ULTRASONIC LEVEL SENSOR: SELF CONTAINED; SUITABLE FOR CLASS 1, DIV 2 ENVIRONMENT: SENSING RANGE: 1'-30'; ACCURACY: ANALOG OUTPUT - 1/4% OF FULL SCALE; ISOLATED 4-20mA ANALOG OUTPUT: 120VAC INPUT POWER

0 : :LLiRv; s RD A(R R STATN:; ALLE t A ; E(2 ; ; TANK); AND LEVEL ALARM ANNUNCIATION (1 INPUT CHANNEL PER TANK) AS SHOWN IN TABLE 1, THIS PAGE.

(I> THIS NOTE NO LONGER USED

© DC INPUT VOLTAGE GENERATED INTERNALLY BY ANNUNCIATOR

TABLE 1 - ULTRASONIC TANK LEVEL SENSOR INSTRUMENTS

TANK	INSTRUMENT NOS			
	LEVEL TRANSMITTER (LOCAL)	LEVEL INDICATOR (CP-1)	LEVEL INDICATOR (CP-2)	LEVEL ALARM (HIGH) (CP-2)
1-t	LT-1	LI-IA	LI-18	LAH-18
1-2	LT-2	LI-2A	LI-28	LAH-28
1-3	LT-3	LI-3A	LI-3B	LAH-38
T-4	LT-4		LI-4B	LAH-48
1-5	LT-5		LI-5B	LAH-58
T-20	LT-20	LI-20A	LI-20B	LAH-20B
T-21	LT-21	LI-21A	LI-218	LAH-218
T-22	LT-22	LI-22A	LI-22B	LAH-228
T-40	LT-40	LI-40A	LI-40B	LAH-408

IF SHEET IS LESS THAN 28" X 40" IT IS A REDUCED PRINT - SCALE REDUCED ACCORDINGLY

E-18

SJO
CONSULTING ENGINEERS. INC.
Portland. Ore on

ENGINEERING FIELD ACTIVITY, NW
SILVERDALE, WASHINGTON

NAVAL UNDERSEA WARFARE CENTER STATION
KEYPORT, WA

HAZARDOUS WASTE
TSD (P-370)
TANK LEVEL LOOP DIAGRAM

6405246

80091 CONST. CONTR NO. N44255-94-C-7397

SCALE AS NOTED SPEC 12-92-3618 SHEET 110 OF

PLOTTED: 10/19/93-17: 40 1847.06\E18-

SECTION D

APPENDIX D8

TANK CALCULATIONS

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1-11A?..A Dous
Vs/A:';,TE.
-"T50 TA S

BY ::ivJ

DAl'c. S/u l9'1 51-lEET .J... CE'_

FILE FZ323-C

DE.S\GN PE.I<: APL C..ZO; g, Ed, IC\C\O
e,!...c:.," D•.o. " 1z.'-o SM/SM
Cot-ITE.N'rS "' OIL-/ W,-,..TE.1?, -i;. C><A>-111)& METAL. WA:::>,E
$.G. = \.Z (FO CE.SIC:,'N}
ScJS.MIC. -ZOJ-'E
Co =s,o... A\..'-OW : '/.,.,

TANK WEIGHT

SHE.LL. - 2500
K0::>F' 459
CO E - 766

CONTENTS - 52400

ruL.L 'INE.\Gi -:: 5b \2.S
EI-\p,:-r WE.lb\-'-i -= 312':)

SEISMIC OVERTURNING

FROM UBC:

$$F_s = \frac{ZIC}{R_w} W$$

SE.l MI.C E
I. I,O C= 2.lS
2-• .
R'...,. 3

F_s = C.3'1(.1.0,<z.15) (sbi2.s')

F_s = 15 434 LB (HORIZONTAL)

THOMAS J. WOLFE
STATE OF WASHINGTON
24143
REGISTERED
PROFESSIONAL ENGINEER

Thomas J. Wolfe

5 ft;; •C,'-\
E11.r \,)- So -"-\'-I

VERTICAL SEISMIC LOAD

MOMENT @ BOTTOM JOINT:

$M = (F_S)(6) = (15434)(6) = 92604$ FT·LB

'-IE1Z".I' Lc..o.c, = I.\M / .C -::- (4'1, "\U,0'-\') FT•L8. / 8.5 FT

= 43578 LB

STATIC HEAD @ BOTTOM JOINT = (.433)(12)(1.2) = 6.23 PSI

FROM API 620 SECTION 3.10.2.4 :

FOR SHELL : $T_1 = \frac{R_c}{2}\left[P + \frac{W+F}{A_t}\right]$

'N !=-12.E ?• C:...?.. l.fVi,,,·
W =S. l"a.':. L

9

•.S'1\ \N'

S, L' • ' • - ¾lt$- 4 '5lS \
lo.U Ill -

. e.w.o--z.c s1\:>e T, " - 1s2.. '5. ...

S\.[- S I -1- '-\l,S,S1
'Z tc,,-i_ \i I

WINDWARD SIDE ⇒ $T_1 = +120$ LB/IN

l Z= Pl::'c_ =(t.,,.l}:',f. s,')
T?..= ?.\S L&/ii-,

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l-\A?..A OOU'::,
YVASTE.
·!=>D :, AN!:..'$

BY. ·jc.J-IF1LEmZ:,-c
DATE S/r1l9'1

fV\A><. CO!-<. E I\JI;'. W>AO " $-152.3\ ^{LB}/_{IN}$
MAK TE.N:,1L.E. La.a.<:> "' $+318\ ^{LB}/_{IN}$

FOR $^3/_{16}$ PL A 36 :

ALLOWABLE TENSION = 16000 (TABLE 3-1)

$t_{CORR} = {}^3/_{16} - {}^1/_{16} = {}^1/_8$"

$\frac{t-c}{R} = .00245$

<u>ALLOW COMPRESSION</u> = $1{,}800{,}000 \left(\frac{t-c}{R} \right)$
= 4412 PSI

<u>AC.T\JAL.</u> <u>5T 'E.":.':.</u>

TENSILE = 2544 PSI

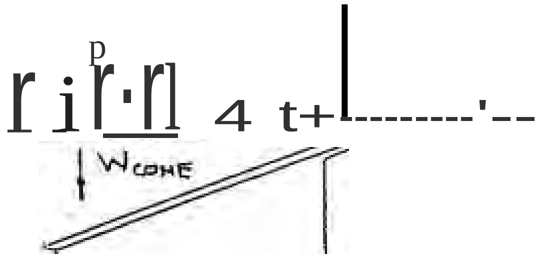
h:),<. E. " . 'o':, ·,
M:..-.- <u>AL<..D.. ,</u> "_ (Jt.o::o·)(:. t,S') " <u>I7::ioa:)</u>

COMPRESSION = $\frac{152.3}{.125}$ = 1219 PSI (< 4412)

1, ::;.,,.au_ 1:, 0,'1::-. ro P,ze:i,s\:>li!:'..E 1, S.E1:::.M• <>S

Rohr Metal Fabricators, Inc. 3920 6th Avenue N.W. Seattle, Washington 98107 (206) 633-2222	•1-\A"l:.Aet:,olJS Y'./A!:,Tc ,""i;,l::>TA '=>	B'l' ::::ftJ Flt-=FZ;!.l:!)-C DATI. S/11j9'1 i_ CF_

BOTTOM CONE



$P_{LIQ.} = 6.23$ PSI

\Ncc,,..e; -:: 19'-\l,, LS

/ !) e.lS!"" !L / t) t:> ""-T'

_F:: ::.SI. .S<,,17,s. ..'.99"'\';

(.::,0,-,,-.,.,.,.,0.. Oi= h:>

Se.ISM•"'- l.oAO)

$\alpha = 76.76°$ ($\frac{1}{2}$ APEX ANGLE)

F

FREE &:>0-<

R:) \.: &:reT.01"\ Co,-iE:

$$T_1 = \left[\frac{R}{2\cos\alpha}\right]\left[P + \frac{W+F}{A_t}\right]$$

$$T_1 = \left[\frac{51}{2\cos 76.76}\right]\left[6.23 + \frac{1946-99753}{8171}\right]$$

$$\underline{T_1 = -639 \quad \text{LB/IN}}$$

IN STEADY STATE W/ NO SEISMIC LOAD :

f" 'il.1'2.$ (01:>.x> WT oi-,:...

W-= l"\"1t,,

p: G,.2..

$T_1 = -44.6$ LB/IN

(4>.?;3,")($ f)

-l'l. : c:::,s 0(-:: <.o 11...lc. =. 1 l -, ,.

M1t-1 {: C.D s = T2. ll.OCO •·'oS -:. .102. + /11., :: . lI..'-\':>

∴ 5/8" ⌀ IS O.K. FOR CONE

ROOF

IJ5E AP:X:. G:,50
o(TA,-!_, (I)/51) [:,,2.'-\o (> APT MIN OF 9 ui_° :

$$= \frac{D}{400 \sin\alpha} = \frac{.S}{400 \sin\alpha} = .0927$$

$$t + C.A. = .09 + 1/16 = .155$$

?
▪ ▪ ::V.1o ff "" :::UF'f',c.,E"',
fu Rcor

Re:11, FO\l:C.'c.t'\Ec .,. Al' 'i3oilOI"\ C.ONE ....0 :S.'-"E.\..L. .Y<J\'•-.lT

I::°
R4= e 0 • '•t.. A I< .o..G.1.£
1to.1t.,°

l<?i. " 22.2..1

W_H = . lo ,l R'i.<'t.)i-. C. G ,1.,.J(µ.-21)'.,1..;.") 1 : "'I,'-\\\ \
W_C = .L. ,IR (le.- c.)' : .1,J(s1)(..\7.:. °" \,')\":, I

Q"' Tc:. w " Tt.s VJc.- 1,'c .'51N0

T-z.." 1:,-07 (wt)
T"l.S.-. 1:.W, (s...-r a')
,, = ..; <\ C.s1-n ...,)

Q: (l Bl':('l.'-111) + (!.\$)(l- \":>! - (- <\'(«:,1')(SIN lb,li..)
Q• .. l\l'i

Ac. = Q/ .i \l.coo • • ':> -: Z..8

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HAZARDOUS WASTE TSD TANKS

B't' :rid . f}LE F2;$2.3,-C

DATE S/1119'1 Sf-IEE.TCF_

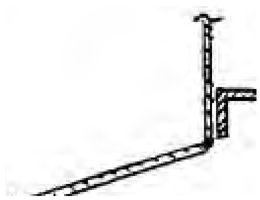
AVAILABLE AREA = $(W_u + W_c)(3/16 - 1/16) = .75 \text{ IN}^2$

REQ'D ADD'L REINF. = 2.825 - .75 = 2.075 IN^2

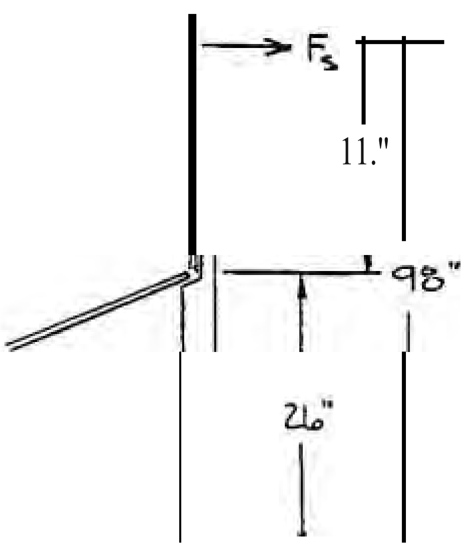
FOR ∠ 3×3×3/8 , $A_x = 2.11 \text{ IN}^2$

}./111-1. R'e:ic fto::fl:!.:no"' :=- -9\._S._R ...
. llo'S

$\boxed{\therefore\ \angle\ 3\times3\times3/8 \text{ IS O.K.}}$



LEGS.



MOMENT @ CONE Jo1 't -=. 9"2-t.o'-\ FT-1..-:.
"' I\\\ 'Z..'-\% IN'\.':.

'JE!CI l=.o f"e leo-= 4\-.;\ / '1D

=- \0 ?r\S L i, YLeG.

LEG MOMENT @ BASE = $(F_3/4)(26)(.75) = 75241$

FOR 4" SCH 40: $.,,_ •. .2.\ IN^3
All.- = 3,ll IN^2
r • ,_.S, ,,_,

SEE "BEDNAR"

BENDING STRESS = M/S_x = $100321/3.21$ = 23439

AXIAL COMP. = P/A = $10895/3.17$ = 3437

ALLOWABLE BENDING = 31.oco ,. , loO "- I. -=- Zf!:,lZ. 'E

ALLOWABLE COMP lS=

$$\frac{\quad}{+\frac{L^2}{18000\,r^2}} = 17708$$

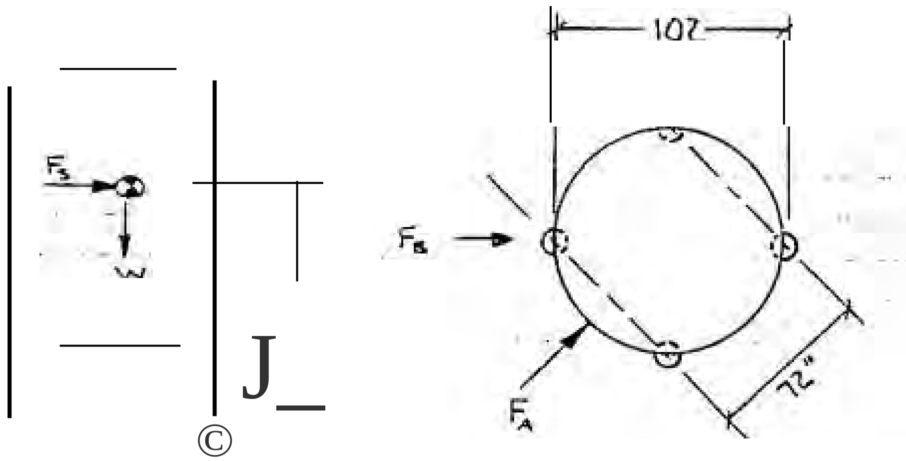
(USE 15000)

= 15000 × 1.33 = 19950

$$\frac{\sigma}{\sigma_a} + \frac{F}{F_A} \qquad \frac{23439}{28728} + \frac{3437}{19950} = .988 \; (< 1.0)$$

$\boxed{\text{∴ 4" SCH 40 PIPE IS SUFFICIENT}}$

ANCHORAGE



SEISMIC LOAD FROM DIRECTION "A" :

1 •o:

( )(C\s) -(w)(?.) -( )(,'t-1 o

W =St,,\.-Z.$ (SHT 1

F • 1'5 '.!.'-1 (SHT 1

F0 = (.1')(",!?,) - (5<..\'l.'!.')(l.) / ,z_

Fo: - 10,') (>-\- \o)

F :- 70':.3/z_ • - ':,'t" (LB \=E. LE&) (No IJ?1..1::

SEISMIC LOAD FROM DIRECTION "B"

2-lv\ ..,o:

Z. (F>)(o,'6)- (-w')(::,,') -(Vfu')(,01.._) = o

in,• -l Z. .1':, Li!, (NO UP'-' '")

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HAZARDOUS WASTE TSD TANKS

B'I' ___ f.llE FZ:,Z::,-C.

DATE.S/1119'1 - T OF

WIND lOAO

ASSUME 18 PSF WIND LOAD (INCLUDING SHAPE FACTOR)

W,..c """,. (1 ') 'L (s.,') FT (, ')
:cl'o¾ U:!.

TANK EMPTY WEIGHT 3725 (SHT 1)

WIND LOAD FROM DIRECTION "A" (SEE SHT 8)

(i:-.,_,)('is') - (WX. tol -(F© (7z.') "0

1="0::. G.¼.S

F _ ... G::i Co-':>/, -= IS.ZS 1..s. I.S.""

WIND LOAD FROM DIRECTION "B" (SEE SHT 8)

$(F_w)(98) - (W)(51) - (F_m)(102) = 0$

$F_m = -98.5$ (NO UPLIFT)

MAX UPLIFT = 318.25 LB

$\boxed{\therefore \text{(4) 5/8" BOLTS PER LEG, AS SHOWN ON DRAWING IS ADEQUATE}}$

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t\A cous
V-.JAST-E:.
""f5D t'A S

B'I' ::&-7-··181.EZ:SZ.:,-c
DA S/rr /q'i SHE.T- JQ. OF_

MANWAY REINFORCEMENT

21•1• i-\AKWAY

d CO\':.'h.OO'eD - Z.'i.\l.':,
\:. - /,.•, (coe D \'.:>)
t_"EO< : y •• (OC,€.t:,)
""Eu.

$$A_{REQ'D} = (d_{CORR})(t_{MIN})(E')$$

$$t_{MIN} = \frac{T_2}{SE} : \quad (l!.,000;(\} \quad \bullet Q \ \backslash 9$$

-o -

'E: I 51,-,c..e. toc...-
NO"' , Wt\..

E' 1.0 (NOZZ NOT IN WELD

A_{REQ} = (Z'-i,12.)(.o\C\9\ (1.0'\
.I.\

AVAILABLE MATERIAL IN SHELL:

A:,= (d= ')(t,. 0"'- t.,.._, '\

-: (Z..'1,ll..':,) (i2, - ,OIC\"\)
= Z..'5

$\N<..E ExC.€>5 A EA I 5\-\E.U.... (:z_.,S
I'::, G EA,E.R. ,__,...._"1 A=. o (,½Ibo)
A RE?A\::l l:. NOT l:.6Nl t:.b

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\-\A""CA IJ:5, ""A'!:,TE t:, TA.N'c::.S

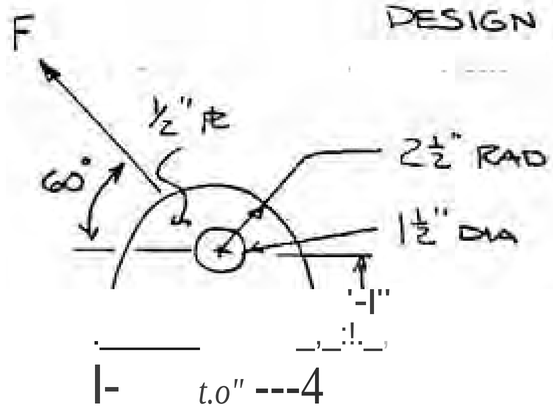
-rr;.] ,, Fll.E -F232.5-C.
D.4.IE siu/9'l !:HE.Tl cF_

LIFT LUG

EMPTY WT = 3725 (SHT 1)

LOAD PER LUG = $3725/3$ = 1242

DESIGN LOAD = (1242)(2) = 2484 LB



IE.NSIOM: Z'-\ 1-\1 , c;.Q = 2'..3io'b

P. zai:,s

'Z,:. ¼, 1/(z..e,- ,1S)(.!>)

''l.,. 32.1 l's•

Hot=.n:... <ol-\ ENT" ZSG:.5 eas G::0. t"f '-,

tv"C>KEH, -:, l\'-l '-\'Y..l\) -:.. 51 IN• L

$$I_{@\,BASE} = \frac{bh^3}{12} = (.5)(6)^3/12 = 9\ \text{IN}^4$$

$$S_{BASE} = I/c = 9/3 =$$,. o ,. l

BENDING STRESS = σ = M/S = $5736/3$ = 1912 PSI

WELD STRESS = P/A_w = $2868/(.707)(.1875)(12)$

1803 PSI

∴ 3 LUGS AS SHOWN

DESIGN BASIS

DESIGN ff'i<: .A?!. C,,"':D ..IS N01:_APP 0 1E
.. A"::, IT .J'::> llMITED .TO FLAT.BOTJO 't.TA.N\<,'::>_R 1lJ'l6
·-- ..01-1 (:.RAD ,_THE!?c , .J:ES.IC-,N -1:'AS. _BEE'!'\. _..
PE.P::fORME'D 11\l NCE .WIT\-\ Af'I. Cac..O .
SEISMIC DE.'S\ I":> 11\\.AcccrOAr CE WI1't,
UBC..1 iE:, API foW AND I:>::O PEITA\ IV
FlAT MI10M TA \<S lt--1 "IBEIR DEl'Alltt:l SEl'::>1\-\\C
PROCE'DUK'ES .

TANK SYSI.EM ASSESSMENI

May lS, 1995

Prepared F r:
Naval Undersea Warfare Center, Keyport Division
MCON P-370 Hazardous Waste TSD Facility

in accordance wilh WAC 17.3--303

Tanks numben?d T•l through T-5. T-20 through T-22 and T-40 on NA.VFAC Drawing No. 6405150 and the piping i.ystems attached thereto havt been designed with surfident structural inteVffY and are acceptable for **the .storing** and treating o(da.ngen>us WclStes.

(i) pcsioi Ssodards .

tJbe tank systems have beetl igned totlvlolloWing standards (among others) to insure their suitability.

API 650 .. Welded steel storag tanks
ASTM A 312A/ A 312M • Stairtless st.eel pipe
MIL-P•24441- f¥,xy-polymude coatlnga

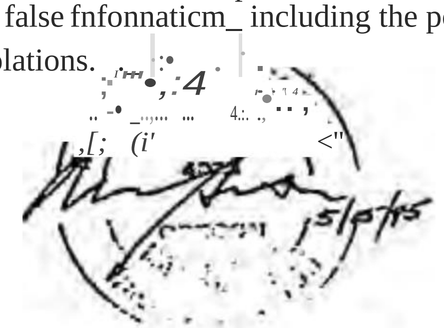
See atlac:hed Speci.fiatloo SectioN *098'151* 13205. and 15400. The foundadon .-.n<l walls have been designed to adequately support the tank systems.

(ii) Panmws Waste Qw:acte:ri$ttc:s

tank systiems have been tMdle wtthcNt s t corrosion a wide variety of oils and waste water contaminabed with cyanides,, heavy metals, salt water, IOlvents, alcohols, adds and/or Materials w attack 3°' &taiNess steel *or* epoxy- poJyamlde coating., should be handled in other systems.

f Some of these wastes may be a>mbustib told[. or corrosive u defined by AC 173-3M-090, WAC 173-303--101, or the Code.

f P,eN)ty of law that this U5eS5IIU!J'tt and all attachnents were prepared under *y* d.itectiM or supervuion ln 1CC0rdaace with • system designed to assure dat pmoanel properly ga.ther and evaluateh Womwion submitted.. Based n my lnqufty of 0-.e person( ) who the system. or those dmctli for gatherirtg the infonnatian, the Woimation submitted is, to the beet of y knowledge and belief, *tni* eccwate. and tompletie. I 11111 aWiU'e that there am uic:.ant pemUtes for submitting false fnfonnaticm_ including the possil,fllty of 6ne an imprisonment *(or* lcnowing violations.



SECTION D

APPENDIX D9

TANK INTEGRITY ASSESSMENTS AND CERTIFICATIONS

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Final Study Report

Naval Facilities Engineering Systems Command Northwest
Tank Integrity Testing
Naval Undersea Warfare Center, Naval Base Kitsap Keyport

Contract No.: N44255-15-D-0011
Delivery Order No.: N4425520F4167

Submitted to

Naval Facilities Engineering Systems Command Northwest
Naval Undersea Warfare Center
Naval Base Kitsap Keyport
Keyport, Washington

August 2021

Submitted by

WSP USA
33301 Ninth Avenue South, Suite 300
Federal Way, Washington 98003-2600

WA16.0094.49

TANK INTEGRITY TESTING STUDY REPORT
NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND NORTHWEST
NAVAL UNDERSEA WARFARE CENTER, NAVAL BASE KITSAP KEYPORT
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LIST OF ACRONYMS AND ABBREVIATIONS

API	**American Petroleum Institute**
APP	**accident prevention plan**
Ecology	**Washington State Department of Ecology**
Mistras	**Mistras Group, Inc.**
NUWC	**Naval Undersea Warfare Center**
SSHO	**site safety and health officer**
STI	**Steel Tank Institute**
UT	**ultrasonic thickness**
WAC	**Washington Administrative Code**

EXECUTIVE SUMMARY

Underwater training exercises conducted by the Naval Undersea Warfare Center (NUWC) in Keyport, Washington, involve retrieving practice torpedoes that are propelled by Otto fuel monopropellant (propylene glycol dinitrate). Cleaning operations for the practice torpedoes result in the generation of a waste streams at NUWC consisting of spent cleaning solvents (alcohol) derived from torpedo engine compartment flushing (flushing operation), and Otto fuel/seawater mixtures derived from depressurization of the torpedo fuel compartment (ullage operation).

A byproduct of Otto fuel combustion is cyanide, and flushing wastes are treated on site using alkalinity adjustment and chlorination to reduce cyanide concentrations. Other waste streams generated at NUWC include acidic and plating wastewater, a result of metal finishing operations, including anodize stripping, acid pickling and passivation, and sodium bicarbonate surface blasting. These waste streams are designated as dangerous waste under Washington Administrative Code (WAC) 173-303, and the Building 1051 facility has obtained a dangerous waste treatment and storage permit from the Washington State Department of Ecology (Permit ID No. WA1170023419).

The waste storage tanks are required to be tested for structural integrity at five-year intervals pursuant to the existing permit. An assessment of the 12 tanks (11 tanks in dangerous waste facility plus one additional tank) was completed pursuant to the requirements of WAC 173-303-640(2) reference g and appropriate industry standards. The assessment found that 8 of the 12 tanks are suitable for continued service with no repairs recommended at this time. Two of the tanks were found suitable for continued service with optional repairs recommended. Two of the tanks, Tank K0825-105 and K0825-108, were found to be structurally suitable for service but require corrective action (cleaning and recoating) for compliance with WAC 173-303-640.

1.0 AUTHORIZATION

WSP USA was authorized on June 2, 2020 (Revision 01) by the Naval Facilities Engineering Systems Command Northwest, under Contract No. N44255-15-D-0011, Delivery Order N4425520F4167**,** to complete integrity testing of the 12 tanks listed below in Table 1.

2.0 OBJECTIVE

The purpose of the integrity assessment was to determine if the 12 tank systems located at the Naval Undersea Warfare Center (NUWC) dangerous waste treatment and storage facility are fit for continued use and/or the need for any repairs.

The assessment evaluated each tank for the presence of current leaks, the adequacy and integrity of secondary containment, and whether the tank systems were designed with sufficient structural strength to ensure that they will not collapse, rupture, or fail. Two of the 12 tanks required internal visual inspection. The following 12 tanks were evaluated.

Table 1. Tanks Designated for Inspection

Tank Designation	Capacity (gallons)	Material of Construction	Configuration	Hatches	Contents
K0514-105	1,350	Stainless Steel	Double Wall	Top	Otto Fuel/Alcohol
K0514-108 $^{\alpha}$	1,350	Stainless Steel	Double Wall	Top	Otto Fuel/Alcohol
K1051-101	5,000	Steel	Single Wall	Top and Side	Otto Fuel/Alcohol
K1051-102	5,000	Steel	Single Wall	Top and Side	Otto Fuel/Alcohol
K1051-103	5,000	Steel	Single Wall	Top and Side	Otto Fuel/Cyanide
K1051-104	5,000	Steel	Single Wall	Top and Side	Otto Fuel/Alcohol
K1051-105	5,000	Steel	Single Wall	Top and Side	Otto Fuel/Alcohol
K1051-106	5,000	Steel	Single Wall	Top and Side	Otto Fuel/Cyanide
K0825-105 *	40,000	Steel	Single Wall	Open Top and Side	Acidic Wastewater
K0825-108 *	40,000	Steel	Single Wall	Open Top and Side	Acidic Wastewater
K1058-101	1,000	Plastic	Double Wall	Top	Plating Wastewater
K1058-102	10,000	Fiberglass Reinforced Plastic	Double Wall	Top and Side	Plating Wastewater

Key:
* Tanks requiring internal inspection
α Not part of Dangerous Waste program

3.0 PROCEDURE

The tank assessment followed the requirements of WAC 173-303-640(2), reference g, and the relevant portions of Steel Tank Institute (STI) Standard SP001-05, *Standard for the Inspection of Aboveground Storage Tanks* (STI, 2011); American Petroleum Institute (API) Standard 653, *Tank Inspection, Repair, Alteration, and Reconstruction* (API, 2014); and Washington State Department of Ecology's Publication No. 94-114, reference (f), *Guidance for Assessing and Certifying Tank Systems that Store and Treat Dangerous Waste* (Ecology, 2014).

Subsequent to the in-service and out-of-service assessments, Mistras Group, Inc. (Mistras) performed calculations to validate the structural adequacy of the tank systems and calculated the size of secondary containment based on measurements made in the field for the three single-walled tanks (Tanks K1051-104 through -106).

On 14 August 2020 and 16 August 2020, an in-service assessment of 10 out of the 12 tanks was completed by Mistras. A representative of WSP was on site to perform as the site safety and health officer (SSHO). Prior to the on-site assessment, the SSHO prepared an accident prevention plan (APP) that incorporated Mistras' activity hazard analysis.

During the in-service assessment, the exterior of each of the tanks was inspected for indications of leaks. The condition of the shell and secondary containment coatings was noted and the general structural integrity of the tanks, foundations, bottoms, access structures, and tank appurtenances was examined. Ultrasonic thickness (UT) measurements were made of the shell and appropriate appurtenances at a frequency and location consistent with the API 653 and STI SP001 standards.

It should be noted that because 10 out of the 12 tanks are equipped with spill control and continuous release detection monitoring (i.e., they are elevated so leaks can be observed), they are classified as Class I tanks by the STI SP001 standard, and because their rate capacity is below 30,000 gallons, an internal inspection is not required. Similarly, Ecology regulation and guidance does not require out-of-service internal inspections when testing, such as UT, is performed, and industry standards, such as the STI SP001 standard, is followed.

On 16 December 2020 and 30 June 2021, an out-of-service assessment of the remaining two tanks, K0825-108 and K0825-105, was completed by Mistras. This involved confined space entry into the two tanks. A representative of WSP was on site to perform as the SSHO. Prior to the out-of-service assessment, the SSHO prepared an APP for submittal to NUWC that incorporated Mistras' activity hazard analysis.

During the out-of-service assessment, the interior and exterior of the tanks were inspected for indications of leaks. The condition of the internal and external shell coatings was noted and the general structural integrity of the tanks, foundations, bottoms, access structures, and tank appurtenances was also examined. UT measurements were made of the shell and appropriate appurtenances at a frequency and locations consistent with the API 653 and STI SP001 standards.

Following the completion of the in-service and out-of-service inspections, Mistras provided a suitability for service conclusion for each tank, tank drawings, and photographs, as well as certification by a registered professional engineer per WAC 173-303-810 as required by WAC 173-303-640(2). The certified assessment reports prepared by Mistras are provided in Appendices A to L.

4.0 COST ESTIMATES

In accordance with Mistras' results of the tank assessments, a cost estimate was prepared for recoating the concrete secondary containment for Tanks K0825-105 and K0825-108. The estimate was based on vendor quotes for epoxy coating meeting Specification MIL-P-14441, Epoxy-polyamide Coatings. Costs are based on the estimated area of concrete secondary containment (20 square feet) assuming the area of coating failure is in the floor area under the two tanks. The cost estimate and the Basis of Cost Estimate are provided in Appendix M.

5.0 SURVEY RESULTS AND RECOMMENDATIONS

As noted in Mistras' final reports detailing the survey results (Appendices A to L), 8 of the 12 tanks are suitable for continued service with no repairs recommended at this time. Two of the tanks were found suitable for continued service with optional repairs recommended. Two of the tanks, Tank K0825-105 and K0825-108, were found to be structurally suitable for service but require corrective action for compliance with WAC 173-303-640.

The inspection found that concrete coating within the curbed area of the tank is cracking and scaling in several areas and the bare concrete is beginning to erode to the east of Tank K0825-108. For compliance, the concrete containment area must be cleaned and recoated as needed and the coating applied to the concrete containment area must be repaired to eliminate all discontinuities per WAC 173-303-640(4)(c)(i). The areas that require repair were marked with orange paint by the inspector and can also be referenced in the inspection report of Tank K0825-105. Once this issue has been corrected and implemented, Mistras will need to return to verify the correction and upon verification, can issue a revised certification report.

WSP completed cost estimates for recoating the concrete secondary containment for Tanks K0825-105 and K0825-108. The cost estimate is provided in Appendix E. The estimate can assist in developing budgets and planning for future maintenance needs.

The tank systems should continue to be assessed at five-year intervals in accordance with WAC 173-303-640, and the Navy should continue with normal maintenance and facility-conducted visual inspections. A summary of all twelve tank inspection results are included in Table 2 below.

Table 2. Tank Inspection Summary

Tank Designation	Component	Recommendation	Recommendation Priority	Notes
K0514-105	NA	NA	NA	No work required
K0514-108	NA	NA	NA	No work required

Tank Designation	Component	Recommendation	Recommendation Priority	Notes
K1051-101	NA	NA	NA	No work required
K1051-102	NA	NA	NA	No work required
K1051-103	NA	NA	NA	No work required
K1051-104	NA	NA	NA	No work required
K1051-105	NA	NA	NA	No work required
K1051-106	NA	NA	NA	No work required
K0825-105*	Foundation	Clean and recoat the concrete containment area	Mandatory	Coating failure and early stages of erosion in concrete observed; refer to inspection report for locations
	Vegetation	Remove vegetation and debris from containment area	Optional	Vegetation removal will limit moisture retention and help prevent coating failure
	Tank Bottom	Recoat the bottom of the tank	Optional	Bottom coating is relatively aged and brittle
	Chime (External Bottom Plate Projection)	Replace sealant between chime and the concrete pad and clean and recoat the chime	Optional	Replacement and recoating can mitigate underside corrosion and maximize life of floor
	Repad	Perform particle testing on corner weld and repad welds	Optional	The current repad configuration is not typical design and should be checked for stress cracking
	Baffle	Clean and recoat baffles	Optional	Coating failure and delamination found
	I-Beams at Top of Tank	Clean and recoat I-beams	Optional	I-beam maintenance will assure sound structural reinforcement
K0825-108*	Foundation	Clean and recoat the concrete containment area	Mandatory	Areas marked with orange paint
	Vegetation	Remove vegetation from containment area	Optional	Moss near tank can accelerate corrosion
	Chime (External Bottom Plate Projection)	Replace sealant between chime and the concrete pad and recoat the chime	Optional	Replacement and recoating can mitigate underside corrosion and maximize life of floor
	Shell	Repair interior and external shell coating	Optional	Coat repair will maximize tank life
	Baffle	Clean and recoat baffles	Optional	Coating failure and delamination found

Tank Designation	Component	Recommendation	Recommendation Priority	Notes
	Shell Nozzle	Repair or replace the PVC fitting on 1-inch NPS nozzle on west side of tank if needed	Optional	The PVC piping is cracked directly above steel flange
	Manway and Transfer Line	Recoat inner neck	Optional	Major coating failure and corrosion observed
	I-Beams at Top of Tank	Clean and recoat I-beams	Optional	I-beam maintenance will assure sound structural reinforcement
K1058-101	Foundation	Clean and recoat tank steel support system	Optional	Coating failure observed in several areas of support system
	Plastic Tank Shell	Refer to manufacturer's manual for projected tank life	Optional	Age of the tank is unknown and thickness readings could not be obtained
K1058-102	Foundation	Clean and recoat concrete area	Optional	Coating is cracked and chipped in several areas
	Foundation	Remove all vegetation and debris from containment area	Optional	Moss could pose a slipping hazard and retains moisture near the tank
	Fiberglass Shell	Clean the tank and remove all mildew from shell	Optional	Mildew layer could visually obstruct tank defects
	Roof	Clean roof and remove all moss, vegetations, and debris	Optional	Moss and debris could pose safety hazard and accelerate degradation
	Ladder and Handrails	Clean and recoat the access structures	Optional	Coating failure and surface corrosion observed on ladder and handrails
	Shell and Roof	Consult manufacturer's manual on remedies for fiberglass degradation	Optional	There are minor areas where fibers are exposed in fiberglass

Key:
* = Tanks requiring internal inspection
NA = Not applicable, no repair recommendations provided
NPC = Nominal pipe size
PVC = Polyvinyl chloride

6.0 REFERENCES

American Petroleum Institute (API), 2014. Tank Inspection, Repair, Alteration, and Reconstruction, API Standard 653, 5th Edition. Washington, DC. November.

Steel Tank Institute (STI), 2011. Standard for the Inspection of Aboveground Storage Tanks, SP001, 5th Edition. Lake Zurich, Illinois. September.

Washington State Department of Ecology (Ecology), 2014. Guidance for Assessing and Certifying Tank Systems, Revised Publication 94-114. Olympia, Washington. November.

Washington State Department of Ecology (Ecology), 2009. Fact Sheet for State Waste Discharge Permit ST-7353 - Naval Undersea Warfare Center Division Keyport. Keyport, Washington.

APPENDIX C

INSPECTION REPORT TANK K1051-101

WSP

NUWC

Tank K1051-101

In Service Inspection

Above Ground Storage Tank Inspection Report

In accordance with
WAC 173-303-640
Dangerous Waste
Regulations

WSP

Tank K1051-101

In Service Inspection

Keyport, WA

October 14, 2020 to October 14, 2020

Report Number 40865710-3

Prepared By :
7820 South 212th St. St. 110
Kent, WA, 98032

www.mistrasgroup.com

Inspection Date
October 14, 2020

Table of Contents

1.0 Job Information

Job Location :

Naval Undersea Warfare Center
610 Dowell Street
Keyport, WA
98345-7610

Customer Representative : Grace Roberts

Customer Phone Number : 206-431-2295

Job Charge Number : N44255-15-D-0011

Report Number : 40865710-3

Mistras Work Order Number : T67726-40865710

Inspection Personnel Provided :

Alec Arpino
API 653 Certified Inspector
API 653 (77549)/UTT/MT

Brandon Gonzalez
Level II Technician
MFL/UTT/PT

2.0 Tank Inspection Data Sheet

General :

Tank Number	K1051-101
Owner	U.S. Navy
Design Standard	Unknown
Tank Location	Keyport, WA
Product	Otto Fuel/ Alcohol
Specific Gravity	1.0
Manufacturer	Flohr Metal Fabrication
Manufacture Date	1994
Cathodic Protection	No
Data Plate Present	Yes
Data Plate Condition	Good Condition

Dimensions :

Diameter (ft)	8.75
Height (ft)	13.02
Capacity Nominal (Gallons)	5,551

Geometry :

Foundation	Concrete Pad with Steel Supports
Bottom	Cone Bottom
Shell	Butt Welded
Fixed Roof Type	Self-Supported Cone

Access :

Stairway	None
Roof Access	Yes

Coatings :

Bottom	Internal Thin Film Epoxy
Shell	External White
Roof	External White

3.0 Suitability for Service

WSP on behalf of the U.S. Navy has contracted Mistras Group, Inc. to perform a in service inspection on Tank K1051-101 located in Building 1051 of the Naval Undersea Warfare Center located in Keyport, WA. This inspection was performed in accordance with the current criteria set forth in WAC 173-303-640 Dangerous Waste Regulations.

There were no issues found that would require repair at this time. The Navy should continue with routine maintenance and observation of the tank. The next formal WAC 173-303-640 inspection should be conducted per the established schedule which is 5 years per the current SPCC Plan for this site.

Tank K1051-101 can be considered suitable for continued service.

TANK 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 fine and imprisonment for knowing violations."[1]

____
George Roni, P.E.

1) Per WAC 173-303-810 as required by WAC 173-303-640 (2)

4.0 Inspection Findings

WSP on behalf of the U.S. Navy has contracted Mistras Group, Inc. to perform an in Service Inspection on Tank K1051-101 located in Keyport, WA. This inspection was performed in accordance Washington State Dangerous Waste Regulations WAC 173-303-640 (2).

Tank K1051-101 is a shop built, 2 course Above Ground Storage Tank in Otto Fuel/ Alcohol service. This tank is 8.75 feet in diameter, and 13.02 feet in height and is equipped with a Fixed Cone Roof. The following details all inspection findings.

Foundation

This tank was installed on a concrete pad. The tank is elevated above the concrete pad by (4) 4 inch steel pipe support legs. Each support leg has an 8” X 8” X 1/2” steel pad at the base that is anchored to the concrete foundation via (4) 1/2 inch anchor bolts.

The steel pipe support legs showed no evidence of dents, deformations, corrosion, pitting or other visible damage. The concrete at the base of each leg showed no evidence of cracking, spalling or broken concrete. The supports, footings, the anchor nuts and bolts are all coated. No coating failure or oxidation was noted.

The tank anchoring system was secure. There was no evidence of elongation, corrosion, pitting or damage to the steel pads or the anchor nuts and bolts.

The tank sits within a below grade epoxy lined concrete vault. The vault appeared to structurally sound and showed no evidence of cracking, spalling or broken concrete. It appears that epoxy coating had been previously repaired at various locations around the vault. The repaired areas and the rest of the epoxy coating appeared well adhered and fluid tight.

The volume of the containment is large enough to contain the contents of the tank in the event of leaks or catastrophic failure, which is also in compliance with WAC 173-303-640.

Cone Bottom

The cone bottom in Tank K1051-101 consists of 2 plates. The nominal floor plate thickness is 0.3125”. The lowest UT reading found was 0.300”.

The exterior surfaces of the tank showed no evidence of leaks from the plates, the plate to plate weld seams or the bottom to shell weld. There was no evidence of active corrosion, pitting or coating failure occurring on the plates or welds of the bottom. There was no evidence of dents, bulges or other deformations noted on the bottom plates.

At the apex of the bottom there is a 4 inch stainless steel nipple welded to the tank that reduces to a 2” line. There was no evidence of leaks from the attachment welds of the nozzle to the bottom. There was no evidence of leaks from the associated piping in the immediate area of the tank bottom attachment.

Shell

The shell on Tank K1051-101 consists of 2 courses and all joints are Butt Welded. A visual inspection and ultrasonic examination of the shell was conducted, the following details all findings.

The bottom of the shell to bottom transition has a reinforcement ring consisting of a 2-1/2 inch steel angle. The top of the reinforcement ring is fully fillet welded and the bottom is stitch welded. There was no evidence of weld failures or deformations noted to the reinforcement ring.

There was no evidence of bulges, dents or abnormal deformations noted to the tank shell. There was no evidence of leaks in the shell plates, shell to shell horizontal or vertical welds, the shell to cone weld or the shell to roof weld. There was no evidence of active corrosion or pitting noted on the shell exterior.

The shell coating appeared to be in very good condition.

The shell plates were ultrasonically inspected externally to verify the remaining thickness of the shell plates. Ultrasonic thickness readings were obtained on the shell in 4 equally spaced locations at approximately 6.87 feet. Each scan was conducted in one of the 4 cardinal directions. A total of 4 readings per course were obtained.

Section 6.1 of this report details all ultrasonic thickness (UT) readings obtained, detailing the low's to highs per course. There were no abnormally low readings noted on the shell. The lowest reading of 0.179" was located on the 1st course on the West drop.

Shell Nozzles

A visual inspection and ultrasonic examination of all accessible shell nozzles and manways was conducted to evaluate the current condition of each nozzle. Visual inspection of each nozzle included evaluation of the external neck, all attachment welds, and flange faces.

There was no evidence of leaks from the nozzle attachment welds, the flanges, the flange bolting and associated valves or nearby attached piping. There is no evidence of coating failure occurring on the nozzles or couplings.

The attached piping appears to be stainless steel and the nozzles are carbon steel. There is no evidence of galvanic reactions taking place due to the dissimilar metals. The flange faces appear to be raised and have Teflon type PTFE gasket material. The nozzle bolting appears tight and secure with proper thread engagements on the bolting.

All nozzles and manways were ultrasonically inspected (UT) by recording four readings on the top, bottom and both sides of each neck, one reading on each flange and the manway cover. There was no abnormally low thickness readings obtained. Section 6.5 details all data from UT exam.

Fixed Roof

The roof plates on Tank K1051-101 have a nominal thickness of 0.187 inches. The fixed roof plates were ultrasonically examined to determine the average remaining thickness. A total of 16 readings were obtained on the roof, four readings per each cardinal direction. There was no evidence of thinning or corrosion on the roof plates. Section 6.3 details all the data from the UT exam.

The fixed roof plates were visually inspected. All plates were evaluated to determine the condition of the external coating system. Aside from a coating of dust the roof coating is in good condition. There was no evidence of corrosion, pitting, dents, bulges or other deformations to the roof plates.

There was no evidence of leaks in the roof plates, the roof plate to plate welds or the shell to roof weld.

Fixed Roof Nozzles

All fixed roof nozzles were visually inspected. The following details the findings from this inspection.

All roof nozzles were ultrasonically inspected to verify remaining thickness. A total of 4 readings per nozzle were obtained. All fixed roof nozzles were visually inspected. The following details the findings from this inspection.

There was no evidence of leaks from the roof nozzles attachment welds, flanges, and flange bolting, associated valves or attached piping in the immediate area around the piping.

The roof top manway cover is securely attached to the roof with a hinge pin. There was no damage noted to the pin or the cover. There is a 3 inch nozzle attached to the manway cover for the liquid level float and tape gauge system. The system was not operated but appeared to be in satisfactory condition. There was no evident damage to the 3 inch nozzle or the flange face. The manway showed no evidence of coating failure, corrosion, pitting or other damage.

The 4 inch center roof vent piping runs to outside the building. The piping goes through the East wall and appears to have a pressure/vacuum style vent attached at the end of the piping run. The vent was unable to be inspected due to its location and inaccessibility. The pressure/vacuum vent appeared to be in acceptable condition from the ground with no obvious visual defects noted.

All roof nozzles were ultrasonically inspected to verify remaining thickness. A total of 4 readings per nozzle were obtained. There were no abnormally low readings noted on the roof nozzles. Section 6.6 details the data from the UT exam.

Access Ways & Handrails

The roof is accessible from a free standing ladder and catwalk system. This catwalk is used to access all the tanks inside the containment for visual inspections and gauging purposes.

The ladder and the catwalk are in acceptable condition. There was no damage noted to the ladder frame or rungs. The steps showed no signs of damage to the frame, the treads or the handrails. The catwalk showed no damage to the frame, the grating or the handrails. Much of the handrail was covered in black plastic during the inspection.

The catwalk supports are 3” X 3” square piping uprights that are anchored to the concrete by (2) 3/4 inch anchor bolts at each support location. There is 2-1/2 inch angle iron braces used as cross bracing. There were no evident weld failures, damage to the support structures, attachment hardware or the anchorage locations. The attachment hardware appears to be tight and secure. The catwalk grating is galvanized and in acceptable condition. The grating is tack welded into place. There were no signs of weld failure. There was no evidence of corrosion caused thinning or holes noted in the grating.

The 2 inch steel pipe handrails are 42 inches high at the top rail, 24 inches at the mid-rail with 4 inch toe boards. There were no signs of holes, corrosion or pitting noted in the top rail, the mid-rail or the uprights.

Miscellaneous Appurtenances

For product level gauging, this tank is equipped with a float and tape style gauging system. This unit was found to be in what appears to be visually acceptable condition with no apparent damage noted. The unit was not operated at the time of inspection.

The tank is equipped with a Delta Controls roof transponder. The unit model is an 872C-V-10-2NPT-6SE-IS-CC with a serial number of UGD9966-A2. The unit appeared in satisfactory condition with no apparent damage to the unit noted.

For electrical safety issues and lightning protection, this tank is equipped with (1) 1/2 inch braided grounding cable. The cable was found to be satisfactory condition. The cable is attached to the reinforcement ring on one end and attached to a grounding bar that is embedded into the concrete foundation.

Inspectors Signature:

M. Alec Arpino
API 653
Certification No. 77549 Exp. 12/31/2023

Reviewed by:

George Roni, PE
API 653 Cert. No. 2042, Exp. 4/30/2023

Mistras Services has evaluated the condition of this tank based on the observations and measurements made by the tank Inspector. While our evaluation accurately describes the condition of the tank at the time of inspection, the tank owner/operator must independently assess the inspection information/report provided by Mistras Services and any conclusions reached by the tank owner/operator and any action taken or omitted to be taken are the sole responsibility of the owner/operator. With respect to inspection and testing, Mistras Services warrants only that the services have been performed in accordance with accepted industry practice. If any such services fail to meet the foregoing warranty, Mistras Services shall re-perform the service to the same extent and on the same conditions as the original service.

The preceding paragraph sets forth the exclusive remedy for claims based on failure or of defect in materials or services, whether such claim is made in contract or tort (including negligence) and however instituted, and, upon expiration of the warranty period, all such liability shall terminate. The foregoing warranty is exclusive and in lieu of all other warranties, whether written, oral, implied or statutory. NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE SHALL APPLY, nor shall Mistras Services be liable for any loss or damage whatsoever by reason of its failure to discover, report, repair or modify latent defects or defects inherent in the design of any tank inspected. In no event, whether a result of breach of contract, warranty or tort (including negligence) shall Mistras Services be liable for any consequential or incidental damages including, but not limited to,

5.0 Calculations

5.1 Thickness Calculations

Calculations for Shell & Cone-Shaped Tank Bottom - per API 620

Date of Inspection: 1014/20				
Owner	NUWC			
Tank No.	K1051-101			
Diameter, D	8.750	ft	105.00	inches
Shell Height, H	12.000	ft	144.00	inches
Fill Height	12.000	ft	144.00	inches
Original Shell thickness	0.188	inches		
Measured Shell thickness, t_c	0.180	inches		
Original Cone thickness	0.313	inches		
Measured Cone thickness, t_h	0.301	inches		
Specific Gravity of contents of tank, SG	1.000			
Depth of Cone, d	12.25	inches	1.0208	ft
S, allowable tensile stress of shell & cone	15,200	psi		
Joint Efficiency cone-to-shell & long cone joints, E_1	0.70			
Joint Efficiency shell vertical joints, E_2	0.70			
Operating Pressure at top of tank, P_o	0.00	psi	0	psf

Note that per API 620 the max. operating pressure at top of tank is 15 psig.

O.D. of connection at bottom of cone (if none enter 0)	4.50	inches

1/2 Apex angle, alpha = a	1.331679	radians	76.2996	degrees		
Total Pressure, P at plane AA	748.80	psf (includes hydrostatic head + P_o)			5.20	psi

Plane AA is at the Spring Line.

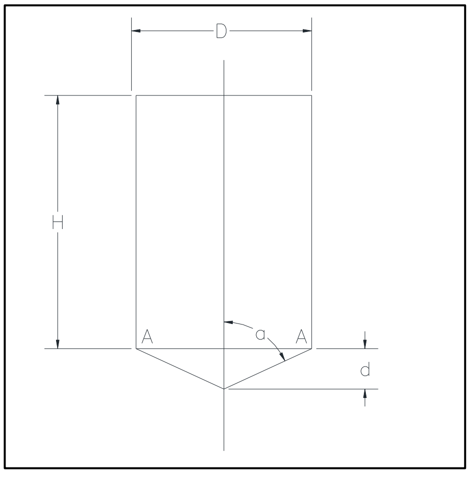


Figure No. A1

1) Shell Unit Forces @ Plane AA, See Figure No. A2

Sum $F_x = 0$

$2T_{2s} = PD$

$T_{2s} = PD/2$

$T_{2s} =$ 273 lb/in

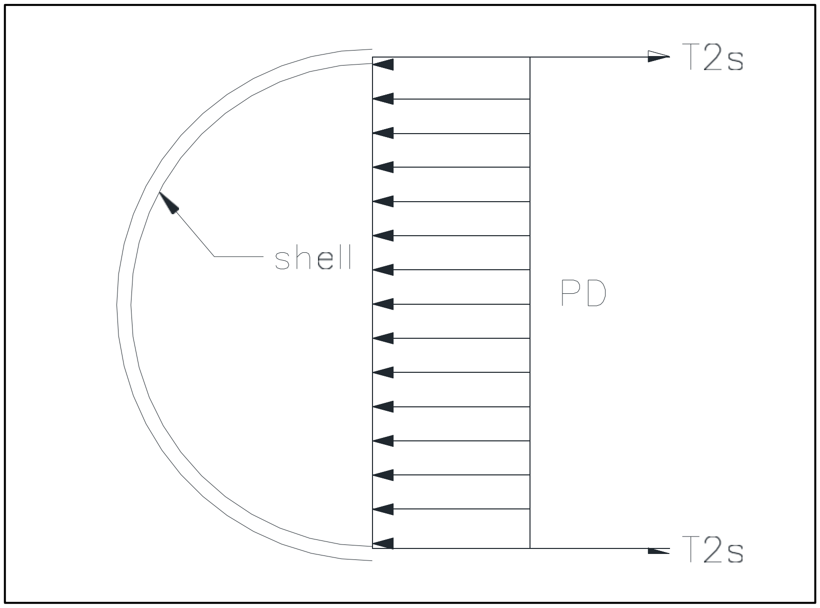


Figure No. A2

2) Cone unit force, T_2, the latitudinal unit force. Also known as the circumferential unit force.
See Figure No. A3

R_2, radius of curvature of cone at A

$R_2 = AB/\cos(a)$

$R_2 =$ 221.664 inches

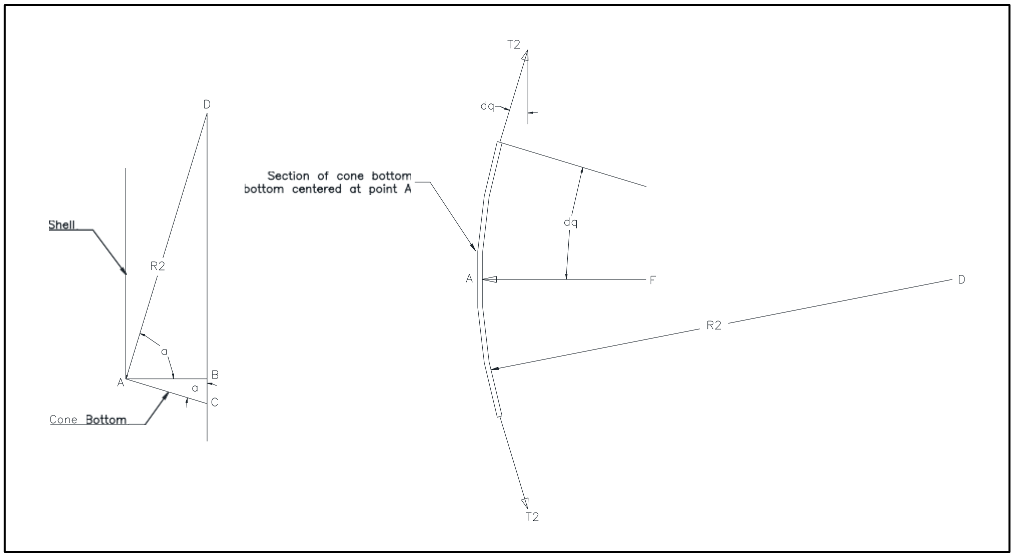
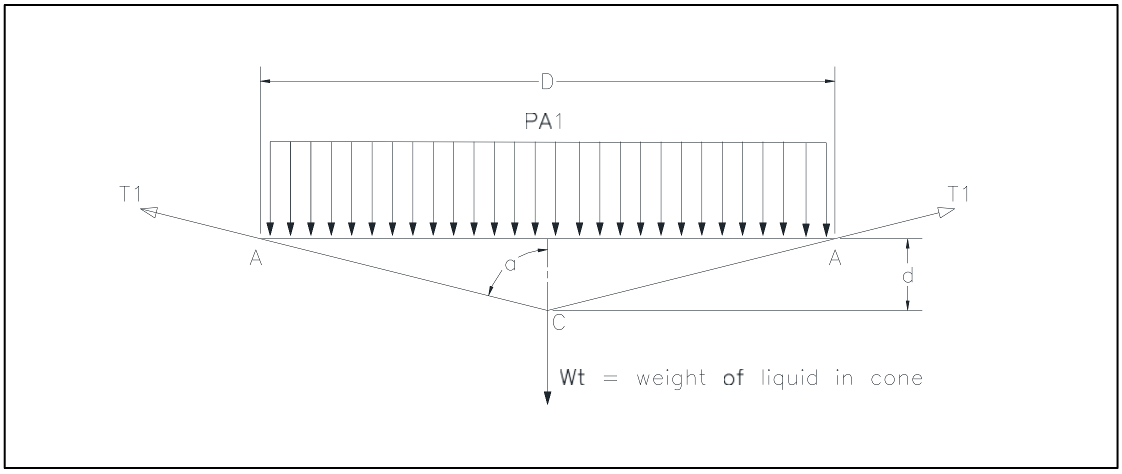


Figure No. A3

Sum of $F_x = 0$

F = the force on 1 inch wide section	$F - 2T_2 * Sin(dq) = 0$
of cone at point A with an infinitesimal	$2PdqR_2 = 2T_2Sin(dq)$ and for small dq, Sin(dq) = dq
arc length = 2 x dq	$PR_2 = T_2$
$F = P(1)(2)(dq)(R_2)$	$T_2 = PR_2$
$F = 2PdqR_2$	$T_2 =$ 1153 lb/in

3) Cone unit force, T_1, the Meridional unit force. See Figure No. A4



<u>Figure No. A4</u>

A_1 = PI/4 * D^2

A_1 = 8659.015 square inches 60.13205 square feet

V, Volume of Cone = (PI*D/2*D/2*d)/3

V = 20.461599 ft^3

W_t = SG* 62.4 lb/ft^3 * V

W_t = 1,277 lb

Sum F_y = 0

T_1Cos(a)PI*D - W_t -PA_1 =0

T_1 = (W_t + PA_1)/Cos(a)PI*D

T_1 = 593 lb/in

4) Knuckle Region Reinforcement Check per API 620 3.12

The measured cone bottom thickness is defined as t_h here, t_h = 0.301 inches

The measured shell thickness is defined as t_c here, t_c = 0.180 inches

R_2, radius of curvature of cone at A = 221.66 inches

R_c, radius of curvature shell = 52.5 inches

w_h = 0.6* sqrt(R_2 *t_h)

w_h = 4.900971 inches

w_c = 0.6* sqrt(R_c *t_c)

w_c = 1.844451 inches

Additional attached reinforcement area Ad

Ad = 1.1875

Available reinforcing area, A_a = w_h*t_h + w_c*t_c+Ad

A_a = 2.994693 sq inches

T_1 = 593 lb/in

T_{2s} = 273 lb/in

T_2 = 1153 lb/in

Per API 620, the magnitude of the total circumferential force acting on any vertical cross section through the compression ring region shall be computed as follows:

Q = T_2w_h + $T_{2s}w_c$ -T_1R_cSin(a) Note that if Q is negative, compression is indicated.

Q = 5,649 + 504 - 30,230

Q = -24,077

A_c, the required compression ring reinforcing area = Q/15,000

A_c = 1.605145 sq. inches

A_a > Ac

2.994693 > 1.6051447 TRUE

and since Q is negative the following condition must be true also.

$w_h Sin(a)$ > $0.015 * R_c$
4.761526 > 0.7875 TRUE

<u>Since both conditions are true, knuckle region is adequately reinforced.</u>

5) Check Measured Shell Thickness vs Required Shell Thickness

The required shell thickness is $t_{cr} = T_{2s}/SE_2$

0.025658 However, thickness must be at least 0.100" per API 653, so final required shell thickness is 0.100

t_c > t_{cr}
0.180 > 0.100 TRUE

6) Check Measured Cone Bottom Thickness vs Required Cone Bottom Thickness at Plane A-A

The required cone thickness, t_{hr}, is the greater of the following 2 formulas

$t_{hr} = T_1/SE_1$ or $t_{hr} = T_2/SE_1$
t_{hr} = 0.055702 t_{hr} = 0.108332

t_{hr} = 0.108332 However, thickness must be at least 0.100" per API 653, so final required cone bottom thickness is: t_{hr} = 0.108 inches

t_h > t_{hr}
0.301 0.108 TRUE

7) Tank Volume or Capacity Calculation

V_{total} = Volume of Cone + Volume of Shell
20.4616 ft^3 + (PI/4) $*D^2*H$
20.4616 + 721.5846

V_{total} = 742 ft^3 or 5,551 gallons

5.2 Seismic Calculations

SEISMIC ANALYSIS
For Tank Supported above grade on legs

1) Input Data

Tank Location			Keyport, WA		
Tank no.			K1051-101		
dia, D			8.75	ft	
shell height, Ht			12	ft	
fill height, H			12	ft. This is height from top liquid surface to bottom of tank.	
floor thk			0.295	in	
roof thk			0.187	in	
slope roof, ϑ	0.062418	radians	3.5763	degrees	This is standard slope of 3/4" in 12".
shell thk, t			0.189	in	
sg liquid, G			1.000		
density steel			490	lb/sq ft	
Proportion of roof supported by shell			1	1 indicates 100%.	
Seismic zone factor, Z			0.300	See fig E-1 & Table E-2	
Importance Factor			1.00	See E.3.1	
Site coefficient			1.5	See table E-3	
Lateral force coefficient, C1			0.6		
For cone bottom supported above the grade, the depth of cone, Xb			1.1666	feet	
Height, L that shell sup above grade			2.17	feet	
Height from bottom of tank to grade, m			1.0034	feet	
b, the width of the base			7.5	feet	
Slope floor, a	0.260588	radians	14.9306	degrees	
1/2 apex angle of cone floor =			1.310208	radians	75.0694 degrees
		Radius	4.375	ft	
		D/H	0.7292	The diameter/fill height ratio from above	

2) Weights

a) Shell

Plate Area	330	sq ft
plate weight/sq ft	7.718	lb/sq ft
weight shell plate	2,546	lb
misc shell weight	200	lb

Total shell weight	2,746	lb

b) Roof

no. Rafters	0	
length rafters	0	
Type of rafter (shape)		
lb/ft rafters	0	lb/ft
weight rafters	0	lb

Plate Area = PI*(r/cos(ϑ))^2

Plate Area	60.37	sq ft
plate weight/sq ft	7.636	lb/sq ft
Plate weight	461	lb
snow load	0	lb
misc weight	100	lb
Total Roof weight, Wr	561	lb

c) Cone Bottom

Plate Area = PI*(r/cos(gamma))^2

Plate Area	64.41	sq ft
plate weight/sq ft	12.046	lb/sq ft
Plate weight	776	lb
misc weight	100	lb
Bottom weight,Wb	876	lb

3) Determination of Additional Seismic Inputs

Natural period of 1st sloshing mode, T

T = k* sq root (D)		For D/H =	0.73	k =	0.58	from Figure E-4
T	1.716	seconds		S =	1.5	from table E-3

Is T < 4.5s? true, so C2=0.75S/T

C2 = 0.75S/T

C2 0.656

W1 & W2

D/H = 0.73

The weight of liquid, Wt

Wtshell = pi/4*D^2*62.4*sg*Ht

3,752 x Ht

Wtshell = 45,027 lb

Wtcone = ((pi*r^2*depth of cone)/3)*62.4*sg

Wtcone = 1,459 lb

Wt = Wtshell + Wtcone

Wt 46,486 lb

W1 = Wt*W1/Wt		W1/Wt =	0.820	from fig E-2
W1	38,119	lb		
W2		W2/Wt =	0.160	from fig E-2
W2	7,438	lb		

X1 & X2

X1/H =	0.42	from fig E-3
X1=	5.04	ft
X2/H =	0.76	from fig E-3
X2	9.12	

Xs = height from cg of shell to bottom of tank = 7.1666 feet

4) Calculation of Overturning Moment, M

M = Z*I*(C1*Ws*Xs'+C1*Wr*Ht'+C1*Wb*Xb'+C1*W1*X1'+C2*W2*X2') ft lb

m	1.0034	see above
Z	0.3	see above
I	1	see above
C1	0.6	see above
C2	0.656	see above
Ws	2,746	shell weight
Xs'	8.17	the height from grade to Fs
Wr	561	roof weight
Wb	876	bottom weight
Xb'	2	the height from the grade to Fb
Ht'	14.17	the height from grade to Fr
W1	38,119	effective weight of liquid responsible for impulse force
X1'	6.04	the height from the grade to F1
W2	7,438	effective weight of liquid responsible for sloshing or convective force of liquid.
X2'	10.12	the height from the grade to F2

Z*I =	0.3			
C1*Ws*Xs'=	13,460	Lateral Force, Fs =	494	Impulse force of tank shell
C1*Wr*Ht'=	4,769	Lateral Force, Fr =	101	Impulse force of tank roof
C1*W1*X1'=	138,219	Lateral Force, F1 =	6,861	Impulse force of liquid
C1*Wb*Xb' =	158	Lateral Force, Fb =	158	Impulse force of tank bottom
C2*W2*X2'=	49,373	Lateral Force, F2 =	1,463	Convective, or sloshing force

				of the liquid	
M=	61,794	ft lb	Total Lateral Force, Ft =	9,077	lb

5) Check Stability of Tank:

The resisting Moment is Mr = (weight of tank + the weight of fluid) x 1/2 of the base width

weight of tank =	4,183	lb
weight of liquid =	46,486	lb
width of base =	7.5	ft

Mr = 190,007 ft-lb

Safety Factor for overturning =	Mr/M		
Safety Factor for overturning =	**3.07**	**> 1.5**	**O.K., Tank is stable**

Note that if a tank is found to be unstable that indicates that tank anchors are needed to resist the uplift forces at the base plate to grade interface that will occur during an earthquake. An unstable tank is susceptible to tipping during an earthquake.

6) Check Need for Anchors Due Solely to Lateral Loads

Total weight of liquid	46,486	lb
Total weight of tank	4,183	lb
Total weight, W	50,669	lb
Coefficient of friction =	0.030	Between steel & ice, the worst possible case.

Frictional Force resisting the total lateral force = W*coefficient of static friction between base plates & grade

Ff = 1,520

Is Ff > Ft * 1.5 **Not true, therefore anchors are needed for lateral seismic forces**

The shear force on each bolt, assuming 4 anchor bolts are used is = 2,269 lb

The anchors should be sized and designed to provide at least this much strength plus a safety margin and a corrosion allowance for the bolts.

7) Check Vertical Forces at Anchor Points
Both Seismic and Dead Load.

Vertical Load, P =	W =	-50,669	lb, this force is given a negative sign to indicate a downward
N, number of anchor locations =		4	direction.
For 4 anchor points, I =4*(b/2)^2 =		56.250	sq ft.
c =		3.750	ft

Max anchor forces, F = P/N + - Mc/I

Mc/I =	4,120	lb	
F =	-8,548	lb	If negative that indicates a downward force and
and F =	-16,787	lb	no tension in anchor bolt.

Foot print size of 1 base plate =	100	sq inches
Bearing stress = F/footprint area =	167.9	psi
Allowable compressive strength of the foundation under the base plates =	1,500	psi, the foundation is concrete, and the concrete is assumed to have at least this strength.

Safety factor
= 1,500 divided by 167.9 = 8.94

Safety Factor = 8.94 > 1.5 O.K., Foundation strength is acceptable

6.0 Ultrasonic Thickness Data

6.1 Shell Plates UT

The following table details all readings (in) from the shell UT survey.

Data and Statistics		1	2	3	4	*Readings Line Average*
Course 2	4	0.180	0.181	0.180	0.179	0.180
	3	0.182	0.181	0.181	0.180	0.181
	2	0.180	0.180	0.182	0.181	0.181
	1	0.182	0.181	0.180	0.179	0.181
Course 1	4	0.184	0.184	0.184	0.184	0.184
	3	0.184	0.182	0.185	0.181	0.183
	2	0.183	0.184	0.185	0.181	0.183
	1	0.184	0.183	0.182	0.180	0.182
Scan Line Average		0.182	0.182	0.182	0.182	0.182

The tables below presents the statistics of the thickness readings (in) obtained on the Shell plates.

Course #	Min	Avg	Max
2	0.179	0.181	0.182
1	0.180	0.182	0.185
Global	0.179	0.182	0.185

6.2 Cone Bottom Plates UT

The following table details all readings (in) obtained on the Fixed Roof plates.

Plate ID \ Reading ID	1	2	3	4	*Avg*
North	0.302	0.302	0.304	0.303	0.303
South	0.305	0.304	0.305	0.305	0.305
West	0.302	0.302	0.302	0.302	0.302
East	0.302	0.302	0.302	0.302	0.302
Avg	0.303	0.303	0.303	0.303	0.303

The table below presents the statistics of the thickness readings obtained on the roof plates.

UT Summary	
Maximum	0.305
Average	0.303
Minimum	0.302

6.3 Fixed Roof Plate UT

The following table details all readings (in) obtained on the Fixed Roof plates.

Plate ID \ Reading ID	1	2	3	4	*Avg*
North	0.183	0.183	0.185	0.184	0.183
South	0.183	0.183	0.184	0.184	0.184
West	0.186	0.185	0.184	0.185	0.185
East	0.185	0.183	0.183	0.183	0.184
Avg	0.184	0.184	0.183	0.184	0.184

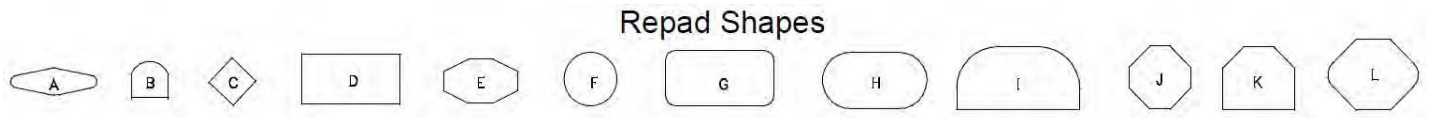
The table below presents the statistics of the thickness readings obtained on the roof plates.

UT Summary	
Maximum	0.186
Average	0.184
Minimum	0.183

6.4 Shell Nozzle and Appurtenance Table

Item	Type	Service	Pipe Size (in)	Station (ft)	Center Line Elevation (ft)	Distance From Shell to Flange Face (in)
A	Manway	Access	24.0	0	20.5	5.875
B	Nozzle	Transfer	3.0	9.1	135.0	7.0
C	Nozzle	Transfer	2.0	18.2	129.0	6.75
D	Nozzle	Transfer	2.0	23.0	129.0	7.0
E	Nozzle	Bottom Draw	2.0	--	--	N/A

Note: The data represented in the weld spacing column is the minimum spacing measured. H, V, or N indicates which is the minimum distance from the nozzle measured. (H=Horizontal Weld, V=Vertical Weld, N=Nozzle Weld)



6.5 Shell Nozzle UT

Item	Type	Service	Pipe Size (in)	Top (in)	Bottom (in)	Right (in)	Left (in)	Repad Thickness (in)	Flange Thickness (in)	Cover Thickness (in)	Comments
A	Manway	Access	24.0	0.244	0.240	0.242	0.242	--	0.444	0.486	
B	Nozzle	Transfer	3.0	0.220	0.219	0.212	0.211	--	0.950	--	
C	Nozzle	Transfer	2.0	--	--	--	--	--	--	--	
D	Nozzle	Transfer	2.0	0.149	0.151	0.150	0.154	--	0.749	--	
E	Nozzle	Bottom Draw	2.0	0.285	0.254	0.252	0.247	--	--	--	SS

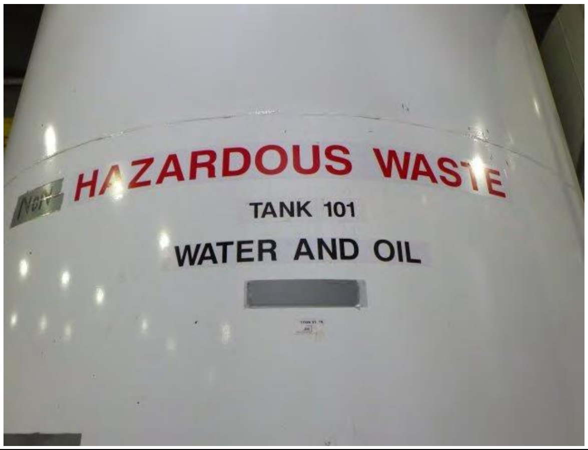
6.6 Fixed Roof Nozzle UT

Item	Type	Service	Pipe Size (in)	North (in)	South (in)	East (in)	West (in)	Comments
AA	Hatch	Access	22.0 x 22.0	0.243	0.241	0.243	0.243	
AB	Nozzle	Vent	4.0	0.207	0.210	0.210	0.208	
AC	Nozzle	HLA	4.0	0.210	0.210	0.210	0.208	

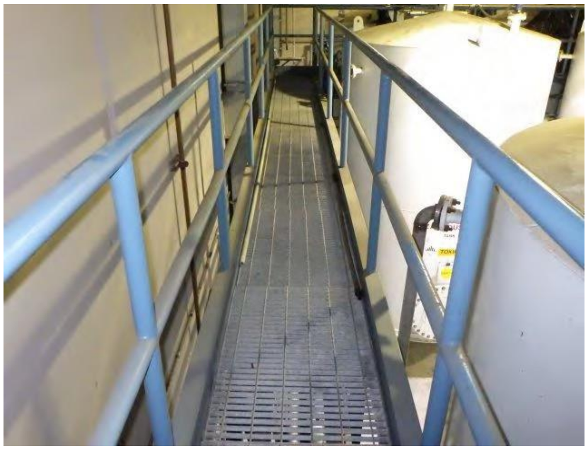
7.0 Shell Corrosion Rates

Course	$t_{previous}$ Previous Thickness (in)	Year Obtained	t_{actual} Actual Thickness (in)	Year Obtained	C_r Corrosion Rate (in/yr.)	t_{min} Minimum Allowable Thickness (in)	R_L Remaining Life (yr.)
2	0.188	1994	0.179	2020	0.00033	0.100	239.69
1	0.188	1994	0.180	2020	0.00031	0.100	257.89

8.0 Photographs

<table>
<tr><th>Dike area standoff</th><th>Tank label</th></tr>
<tr><td></td><td>
</td></tr>
<tr><th>Data Plate</th><th>Manway A</th></tr>
<tr><td>
</td><td>
</td></tr>
<tr><th>Nozzle B</th><th>Ground</th></tr>
<tr><td></td><td></td></tr>
</table>

Nozzle C	Nozzle D
	
Bottom Drain E	Tank Support (Typ.)
	
Tank Roof	Tank Roof
	

Area Standoff	Roof Standoff
	

9.0 NDE Equipment Used

The equipment utilized for the inspection of the tank included of the following :

Pit Gauge

Manufacturer	Model	Serial No
W.R. Thorpe	1	1.979.912

Ultrasonic Transducers

Manufacturer	Model	Serial No	MHz	Diameter
Olympus	D790-SM	865199	5	0.375

UT Equipment

Manufacturer	Model	Serial No
Olympus	38DL Plus	130573601
Olympus	304 SS	0743-07

10.0 Inspector Certifications

energy API

AMERICAN PETROLEUM INSTITUTE
Individual Certification Programs: ICP™

API Individual Certification Programs
verifies that

Michael Alec Arpino

has met the requirements for API certification

API-653 Aboveground Storage Tank Inspector

Certification Number *77549*

Original Certification Date *December 31, 2017*

Current Certification Date *December 31, 2017*

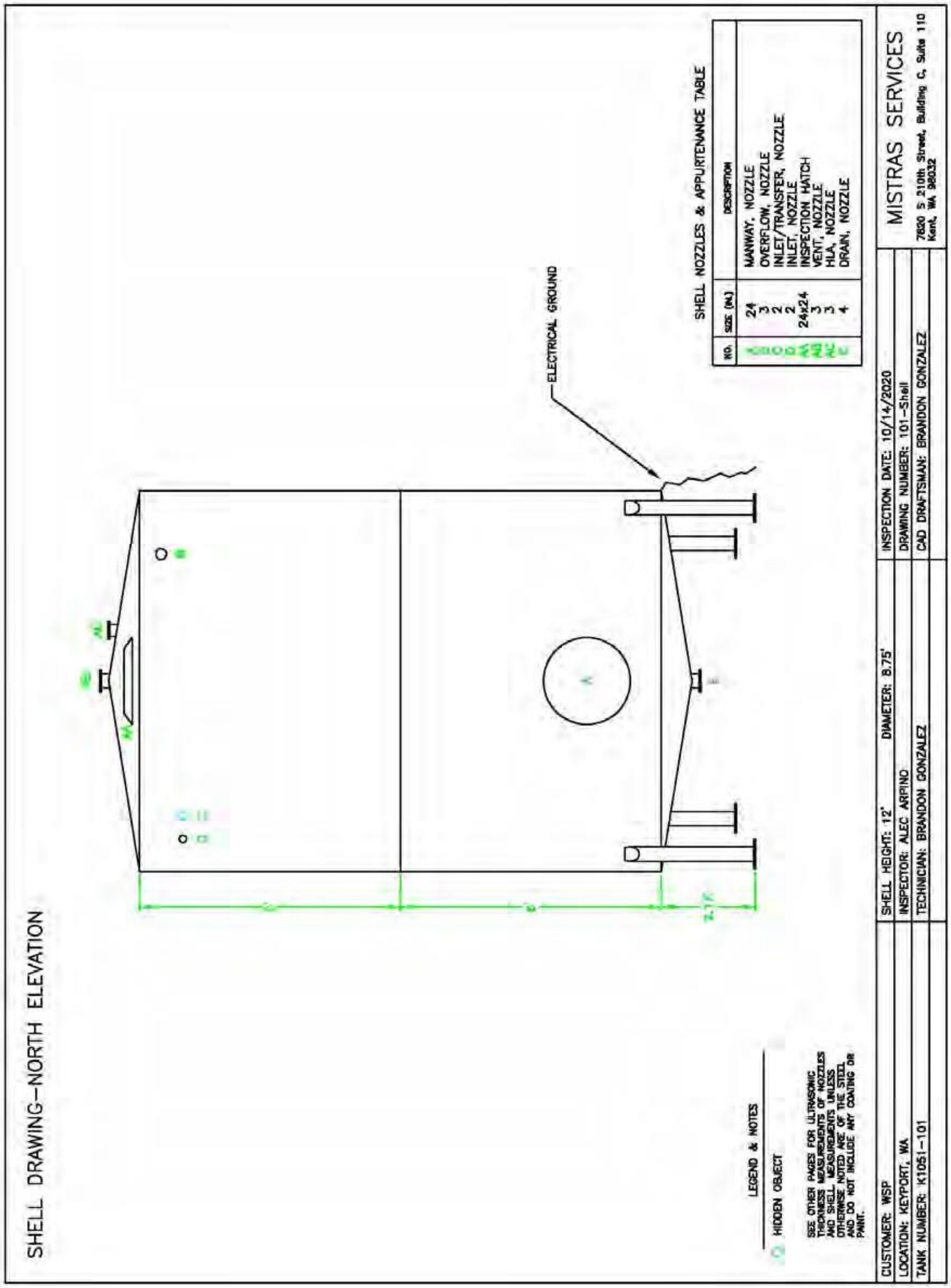
Expiration Date *December 31, 2020*

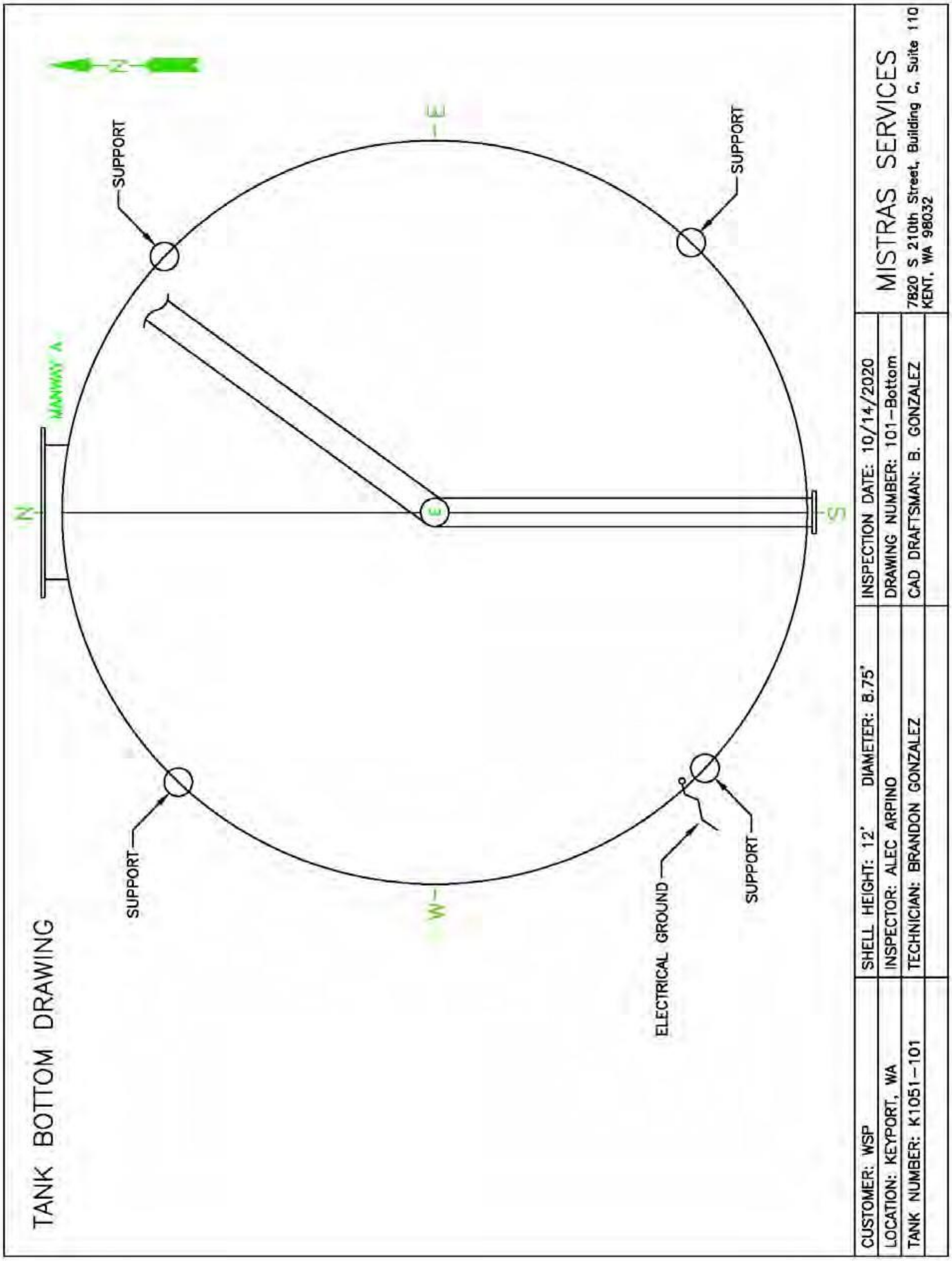
Manager, Individual Certification Programs

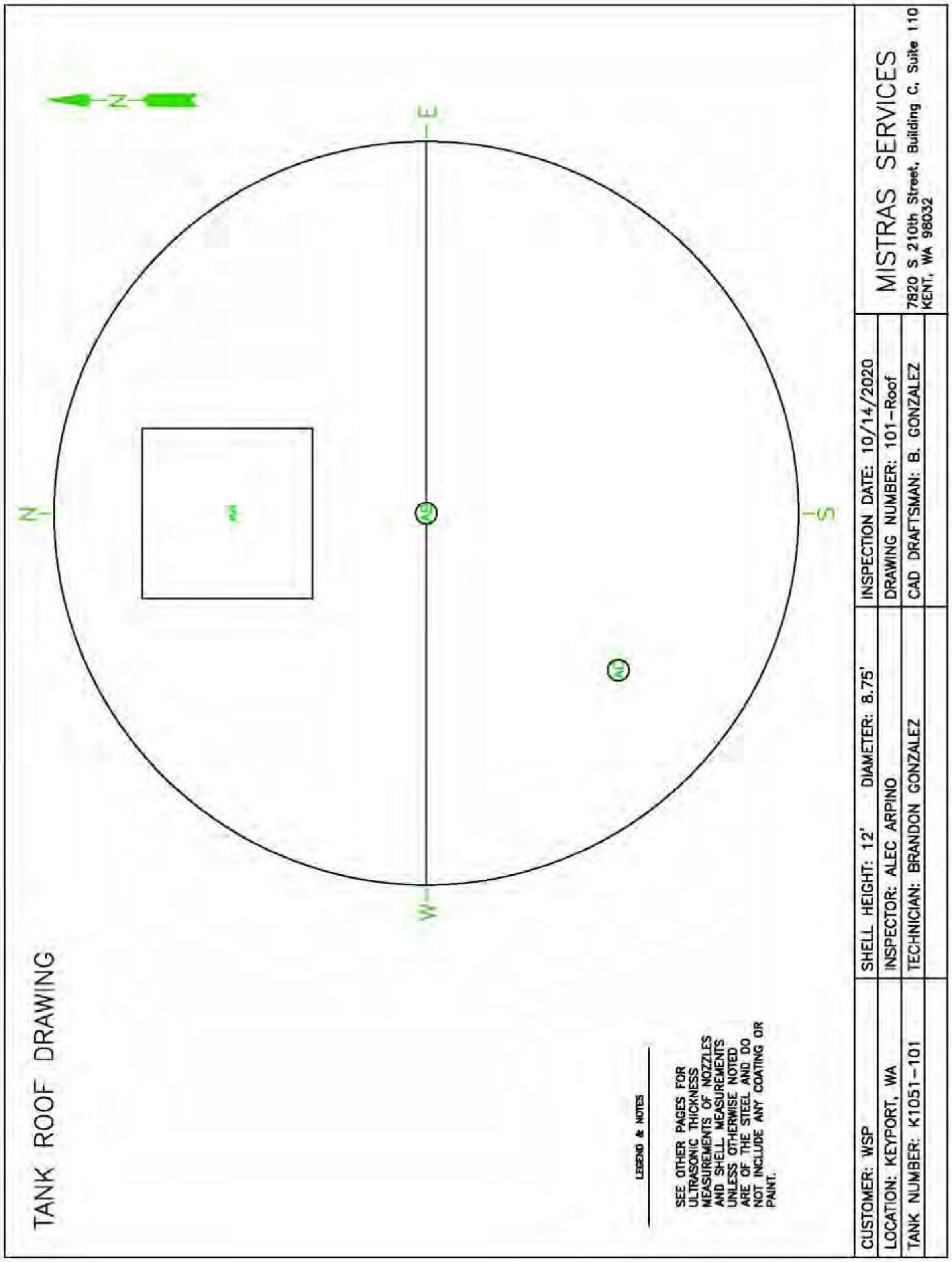
ICP

2015-027 | PDF

11.0 Drawings




TANK BOTTOM DRAWING
N
SUPPORT
SUPPORT
SUPPORT
SUPPORT
MANWAY A
E
S
W
ELECTRICAL GROUND
CUSTOMER: WSP
LOCATION: KEYPORT, WA
TANK NUMBER: K1051-101
SHELL HEIGHT: 12' DIAMETER: 8.75'
INSPECTOR: ALEC ARPINO
TECHNICIAN: BRANDON GONZALEZ
INSPECTION DATE: 10/14/2020
DRAWING NUMBER: 101-Bottom
CAD DRAFTSMAN: B. GONZALEZ
MISTRAS SERVICES
7820 S. 210th Street, Building C, Suite 110
KENT, WA 98032


TANK ROOF DRAWING
N
E
S
W
LEGEND & NOTES
SEE OTHER PAGES FOR ULTRASONIC THICKNESS MEASUREMENTS OF NOZZLES AND SHELL MEASUREMENTS UNLESS OTHERWISE NOTED ARE OF THE STEEL AND DO NOT INCLUDE ANY COATING OR PAINT.
CUSTOMER: WSP
SHELL HEIGHT: 12'
DIAMETER: 8.75'
INSPECTION DATE: 10/14/2020
LOCATION: KEYPORT, WA
INSPECTOR: ALEC ARPINO
DRAWING NUMBER: 101-Roof
TANK NUMBER: K1051-101
TECHNICIAN: BRANDON GONZALEZ
CAD DRAFTSMAN: B. GONZALEZ
MISTRAS SERVICES
7820 S 210th Street, Building C, Suite 110
KENT, WA 98032

12.0 Appendix A – References

References:

1) Washington State Department of Ecology, Dangerous Waste Regulations, Chapter 173-303 WAC
2) Conversations with the client
3) API RP 652, Lining of Above Ground Petroleum Storage Tanks
4) API RP 651, Cathodic Protection of Above Ground Storage Tanks
5) API Guide for the Inspection of Refinery Equipment – Chapter 13, Atmospheric and Low Pressure Tanks
6) API Standard 650, Welded Steel Tanks for Oil Storage
7) API Standard 653, Tank Inspection, Repair, Alteration, and Reconstruction
8) API Standard 620, Design and Construction of Large, Welded, Low Pressure Storage Tanks

APPENDIX D

INSPECTION REPORT TANK K1051-102

Above Ground Storage Tank Inspection Report

In accordance with
WAC 173-303-640
Dangerous Waste
Regulations

WSP

Tank K1051-102

In Service Inspection

Keyport, WA

October 14, 2020 to October 14, 2020

Report Number 40865710-4

Prepared By :
7820 South 212th St. St. 110
Kent, WA, 98032

www.mistrasgroup.com

MISTRAS A World of NDT Solutions Services Division

Inspection Date
October 14, 2020

Table of Contents

1.0 Job Information

Job Location :	**Naval Undersea Warfare Center**
	610 Dowell Street
	Keyport, WA
	98345-7610
Customer Representative :	Grace Roberts
Customer Phone Number :	206-431-2295
Job Charge Number :	N44255-15-D-0011
Report Number :	40865710-4
Mistras Work Order Number :	T67726-40865710
Inspection Personnel Provided :	Alec Arpino
	API 653 Certified Inspector
	API 653 (77549)/UTT/MT
	Brandon Gonzalez
	Level II Technician
	MFL/UTT/PT

2.0 Tank Inspection Data Sheet

General :

Tank Number	K1051-102
Owner	U.S. Navy
Design Standard	Unknown
Tank Location	Keyport, WA
Product	Otto Fuel/ Alcohol
Specific Gravity	1.0
Manufacturer	Flohr Metal Fabrication
Manufacture Date	1994
Cathodic Protection	No
Data Plate Present	Yes
Data Plate Condition	Good Condition

Dimensions :

Diameter (ft)	8.75
Height (ft)	13.02
Capacity Nominal (Gallons)	5,551

Geometry :

Foundation	Concrete Pad with Steel Support Legs
Bottom	Cone Down
Shell	Butt Welded
Fixed Roof Type	Self-Supported Cone

Access :

Stairway	None
Roof Access	Yes

Coatings :

Bottom	Internal Thin Film Epoxy
Shell	External White
Roof	External White

3.0 Suitability for Service

WSP on behalf of the U.S. Navy has contracted Mistras Group, Inc. to perform a in service inspection on Tank K1051-102 located in Building 1051 of the Naval Undersea Warfare Center located in Keyport, WA. This inspection was performed in accordance with the current criteria set forth in WAC 173-303-640 Dangerous Waste Regulations.

There were no issues found that would require repair at this time. The Navy should continue with routine maintenance and observation of the tank. The next formal WAC 173-303-640 inspection should be conducted per the established schedule which is 5 years per the current SPCC Plan for this site.

Tank K1051-102 can be considered suitable for continued service.

TANK 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 fine and imprisonment for knowing violations."[1]

George Roni, P.E.

1) Per WAC 173-303-810 as required by WAC 173-303-640 (2)

Mistras Services has evaluated the condition of this tank based on the observations and measurements made by the tank Inspector. While our evaluation accurately describes the condition of the tank at the time of inspection, the tank owner/operator must independently assess the inspection information/report provided by Mistras Services and any conclusions reached by the tank owner/operator and any action taken or omitted to be taken are the sole responsibility of the owner/operator. With respect to inspection and testing, Mistras Services warrants only that the services have been performed in accordance with accepted industry practice. If any such services fail to meet the foregoing warranty, Mistras Services shall re-perform the service to the same extent and on the same conditions as the original service.

The preceding paragraph sets forth the exclusive remedy for claims based on failure or of defect in materials or services, whether such claim is made in contract or tort (including negligence) and however instituted, and, upon expiration of the warranty period, all such liability shall terminate. The foregoing warranty is exclusive and in lieu of all other warranties, whether written, oral, implied or statutory. NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE SHALL APPLY, nor shall Mistras Services be liable for any loss or damage whatsoever by reason of its failure to discover, report, repair or modify latent defects or defects inherent in the design of any tank inspected. In no event, whether a result of breach of contract, warranty or tort (including negligence) shall Mistras Services be liable for any consequential or incidental damages including, but not limited to, loss of profit or revenues, loss of use of equipment tested or services by Mistras Services or any associated damage to facilities, down-time costs or claims of other damages.

4.0 Inspection Findings

WSP on behalf of the U.S. Navy has contracted Mistras Group, Inc. to perform an in Service Inspection on Tank K1051-102 located in Keyport, WA. This inspection was performed in accordance Washington State Dangerous Waste Regulations WAC 173-303-640 (2).

Tank K1051-102 is a shop built 2 course Above Ground Storage Tank in Otto Fuel/ Alcohol service. This tank is 8.75 feet in diameter, and 13.02 feet in height and is equipped with a Fixed Cone Roof. The following details all inspection findings.

Foundation

This tank was installed on a concrete pad. The tank is elevated above the concrete pad by (4) 4 inch steel pipe support legs. Each support leg has an 8" X 8" X 1/2" steel pad at the base that is anchored to the concrete foundation via (4) 1/2 inch anchor bolts. The anchor bolts are embedded into the concrete foundation and secured at the top of the plate.

The steel pipe support legs showed no evidence of dents, deformations, corrosion, pitting or other visible damage. The concrete at the base of each leg showed no evidence of cracking, spalling or broken concrete. The supports, footings, the anchor nuts and bolts are all coated. No coating failure or oxidation was noted.

The anchor system was found to be secure and in serviceable condition. There was no evidence of elongation, corrosion, pitting or damage to the steel pads or the anchor nuts and bolts.

The tank sits within a below grade epoxy lined concrete vault. The vault appeared to structurally sound and showed no evidence of cracking, spalling or broken concrete. It appears that epoxy coating had been previously repaired at various locations around the vault. The repaired areas and the rest of the epoxy coating appeared well adhered and fluid tight.

The volume of the containment is large enough to contain the entire volume of the tank in the event of leaks or catastrophic failure, which is also in compliance with WAC 173-303-640.

Cone Bottom

The cone bottom in Tank K1051-102 is made up of 2 plates. The nominal floor plate thickness is 0.3125 inches. The lowest UT reading found was 0.309.

The exterior surfaces of the tank showed no evidence of leaks from the plates, the plate to plate weld seams or the bottom to shell weld. There was no evidence of active corrosion, pitting or coating failure occurring on the plates or welds of the bottom. There was no evidence of dents, bulges or other deformations noted on the bottom plates.

At the apex of the bottom there is a 4 inch stainless steel nipple welded to the tank that reduces to a 2" line. There was no evidence of leaks from the attachment welds of the nozzle to the bottom. There was no evidence of leaks from the associated piping in the immediate area of the tank bottom attachment.

Shell

The shell on Tank K1051-102 consists of 2 courses and all joints are Butt Welded. A visual inspection and ultrasonic examination of the shell was conducted, the following details all findings.

The bottom of the shell to bottom transition has a reinforcement ring consisting of a 2-1/2 inch steel angle. The top of the reinforcement ring is fully fillet welded and the bottom is stitch welded. There is caulking in between the stitch welds along the bottom. There was no evidence of weld failures or deformations noted to the reinforcement ring.

There was no evidence of bulges, dents or abnormal deformations noted to the tank shell. There was no evidence of leaks in the shell plates, shell to shell horizontal or vertical welds, the shell to cone weld or the shell to roof weld. There was no evidence of active corrosion or pitting noted on the shell exterior.

The shell coating appeared to be in very good condition.

The shell plates were ultrasonically inspected externally to verify the remaining thickness of the shell plates. Ultrasonic thickness readings were obtained on the shell in 4 equally spaced locations at approximately 6.87 feet. Each scan was conducted in one of the 4 cardinal directions. A total of 4 readings per course were obtained.

Section 6.1 of this report details all ultrasonic thickness (UT) readings obtained, detailing the low's to highs per course. There were no abnormally low readings noted on the shell. The lowest reading of 0.183” was located on the 2nd course on the North drop.

Shell Nozzles

A visual inspection and ultrasonic examination of all accessible shell nozzles and manways was conducted to evaluate the current condition of each nozzle. Visual inspection of each nozzle included evaluation of the external neck, all attachment welds, and flange faces.

There was no evidence of leaks from the nozzle attachment welds, the flanges, the flange bolting and associated valves or nearby attached piping. There is no evidence of coating failure occurring on the nozzles or couplings.

The attached piping appears to be stainless steel and the nozzles are carbon steel. There is no evidence of galvanic reactions taking place due to the dissimilar metals. The flange faces appear to be raised and have Teflon type PTFE gasket material. The nozzle bolting appears tight and secure with proper thread engagements on the bolting.

All nozzles and manways were ultrasonically inspected (UT) by recording four readings on the top, bottom and both sides of each neck, one reading on each flange and the manway cover. There was no abnormally low thickness readings obtained. Section 6.5 details all data from UT exam.

Fixed Roof

The roof plates on Tank K1051-102 have a nominal thickness of 0.187 inches. The fixed roof plates were ultrasonically examined to determine the average remaining thickness. A total of 16 readings were obtained on the roof, four readings per each cardinal direction. There was no evidence of thinning or corrosion on the roof plates. Section 6.3 details all the data from the UT exam.

The fixed roof plates were visually inspected. All plates were evaluated to determine the condition of the external coating system. Aside from a coating of dust, the roof coating is in good condition. There was no evidence of corrosion, pitting, dents, bulges or other deformations to the roof plates.

There was no evidence of leaks in the roof plates, the roof plate to plate welds or the shell to roof weld.

Fixed Roof Nozzles

All fixed roof nozzles were visually inspected. The following details the findings from this inspection.

All roof nozzles were ultrasonically inspected to verify remaining thickness. A total of 4 readings per nozzle were obtained. All fixed roof nozzles were visually inspected.

There was no evidence of leaks from the roof nozzles attachment welds, flanges, and flange bolting, associated valves or attached piping in the immediate area around the piping.

The roof top manway cover is securely attached to the roof with a hinge pin. There was no damage noted to the pin or the cover. There is a 3 inch nozzle attached to the manway cover for the liquid level float and tape gauge system. The system was not operated but appeared to be in satisfactory condition. There was no evident damage to the 3 inch nozzle or the flange face. The manway showed no evidence of coating failure, corrosion, pitting or other damage.

The 4 inch center roof vent piping runs to outside the building. The piping goes through the East wall and appears to have a pressure/vacuum style vent attached at the end of the piping run. The vent was unable to be inspected at the time of inspection due to its location and inaccessibility. The pressure/vacuum vent appeared to be in acceptable condition from the ground with no obvious visual damage noted.

All roof nozzles were ultrasonically inspected to verify remaining thickness. A total of 4 readings per nozzle were obtained. There were no abnormally low readings noted on the roof nozzles. Section 6.6 details the data from the UT exam.

Access Ways & Handrails

The roof is accessible from a free standing ladder and catwalk system. This catwalk is used to access all the tanks inside the containment for visual inspections and gauging purposes.

The ladder and the catwalk are in acceptable condition. There was no damage noted to the ladder frame or rungs. The steps showed no signs of damage to the frame, the treads or the handrails. The catwalk showed no damage to the frame, the grating or the handrails. Much of the handrail was covered in black plastic during the inspection.

The catwalk supports are 3” X 3” square piping uprights that are anchored to the concrete by (2) 3/4 inch anchor bolts at each support location. There is 2-1/2 inch angle iron braces used as cross bracing. There were no evident weld failures, damage to the support structures, attachment hardware or the anchorage locations. The attachment hardware appears to be tight and secure. The catwalk grating is galvanized and in acceptable condition. The grating is tack welded into place. There were no signs of weld failure. There was no evidence of corrosion caused thinning or holes noted in the grating.

The 2 inch steel pipe handrails are 42 inches high at the top rail, 24 inches at the mid-rail with 4 inch toe boards. There were no signs of holes, corrosion or pitting noted in the top rail, the mid-rail or the uprights.

Miscellaneous Appurtenances

For product level gauging, this tank is equipped with a float and tape style gauging system. This unit was found to be in what appears to be visually acceptable condition with no apparent damage noted. The unit was not operated at the time of inspection.

The tank is equipped with a Delta Controls roof transponder. The unit model is an 872C-V-10-2NPT-6SE-IS-CC with a serial number of UGD9966-A2. The unit appeared in satisfactory condition with no apparent damage to the unit noted.

For electrical safety issues and lightning protection, this tank is equipped with (1) 1/2 inch braided grounding cable. The cable was found to be satisfactory condition. The cable is attached to the reinforcement ring on one end and attached to a grounding bar that is embedded into the concrete foundation.

Inspectors Signature: ______________________

M. Alec Arpino
API 653
Certification No. 77549 Exp. 12/31/2023

Reviewed by:

George Roni

____

George Roni, PE
API 653 Cert. No. 2042, Exp. 4/30/2023

Mistras Services has evaluated the condition of this tank based on the observations and measurements made by the tank Inspector. While our evaluation accurately describes the condition of the tank at the time of inspection, the tank owner/operator must independently assess the inspection information/report provided by Mistras Services and any conclusions reached by the tank owner/operator and any action taken or omitted to be taken are the sole responsibility of the owner/operator. With respect to inspection and testing, Mistras Services warrants only that the services have been performed in accordance with accepted industry practice. If any such services fail to meet the foregoing warranty, Mistras Services shall re-perform the service to the same extent and on the same conditions as the original service.

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5.0 Calculations

5.1 Thickness Calculations

Calculations for Shell & Cone-Shaped Tank Bottom - per API 620

Date of Inspection: 10/14/2020

Owner	NUWC			
Tank No.	K1051-102			
Diameter, D	8.750	ft	105.00	inches
Shell Height, H	12.000	ft	144.00	inches
Fill Height	12.000	ft	144.00	inches
Original Shell thickness	0.188	inches		
Measured Shell thickness, t_c	0.184	inches		
Original Cone thickness	0.313	inches		
Measured Cone thickness, t_h	0.309	inches		
Specific Gravity of contents of tank, SG	1.000			
Depth of Cone, d	12.25	inches	1.0208	ft
S, allowable tensile stress of shell & cone	15,200	psi		
Joint Efficiency cone-to-shell & long cone joints, E_1	0.70			
Joint Efficiency shell vertical joints, E_2	0.70			
Operating Pressure at top of tank, P_o	0.00	psi	0	psf

Note that per API 620 the max. operating pressure at top of tank is 15 psig.

O.D. of connection at bottom of cone (if none enter 0)	4.50	inches

1/2 Apex angle, alpha = a	1.331679	radians	76.2996	degrees		
Total Pressure, P at plane AA	748.80	psf (includes hydrostatic head + P_o)			5 20	psi

Plane AA is at the Spring Line.

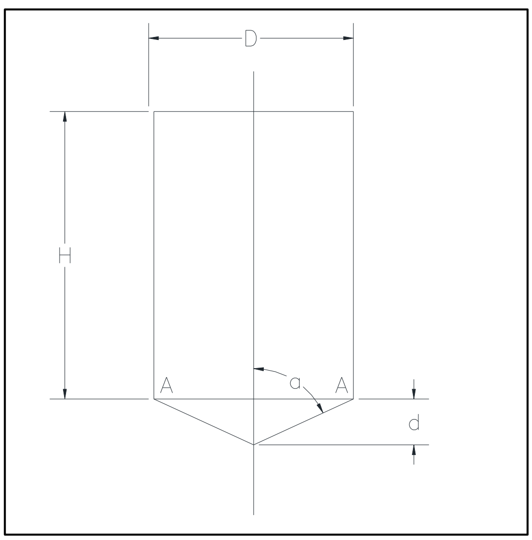


Figure No. A1

1) Shell Unit Forces @ Plane AA, See Figure No. A2

Sum F_x = 0

$2T_{2s}$ = PD

T_{2s} = PD/2

T_{2s} = 273 lb/in

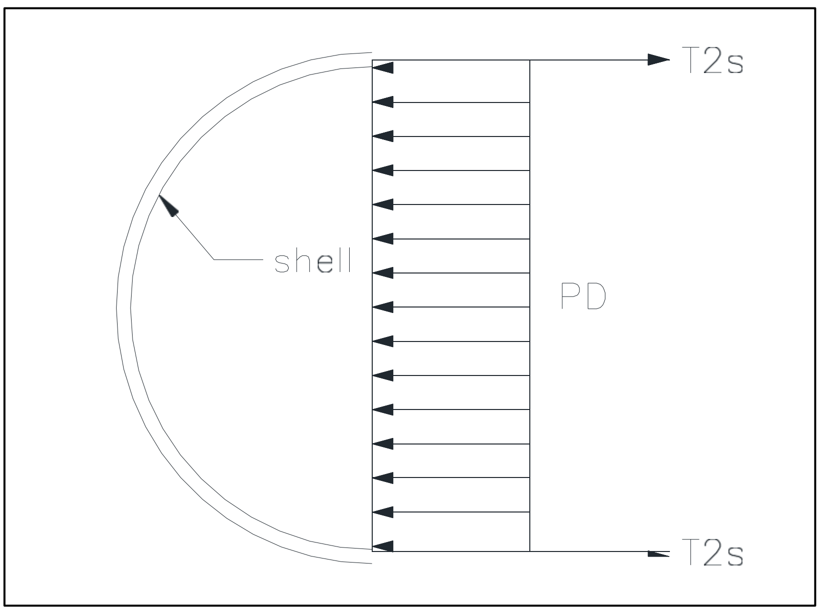


Figure No. A2

2) Cone unit force, T_2, the latitudinal unit force. Also known as the circumferential unit force. See Figure No. A3

R_2, radius of curvature of cone at A

R_2 = AB/cos(a)

R_2 = 221.664 inches

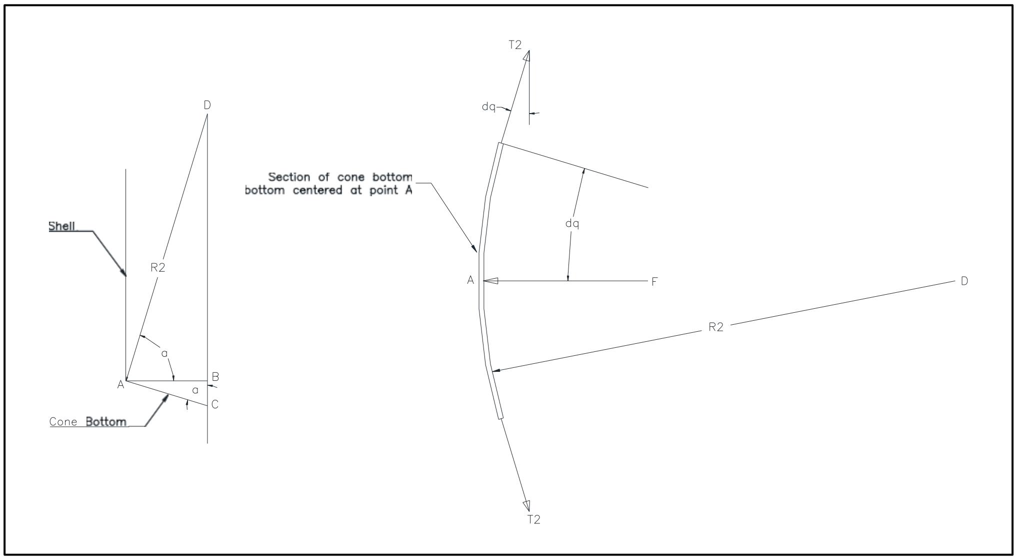


Figure No. A3

Sum of $F_x = 0$

F = the force on 1 inch wide section	$F - 2T_2*Sin(dq) = 0$
of cone at point A with an infinitesimal	$2PdqR_2 = 2T_2Sin(dq)$ and for small dq, $Sin(dq) = dq$
arc length = 2 x dq	$PR_2 = T_2$
$F = P(1)(2)(dq)(R_2)$	$T_2 = PR_2$
$F = 2PdqR_2$	$T_2 =$ 1153 lb/in

3) Cone unit force, T_1, the Meridional unit force. See Figure No. A4

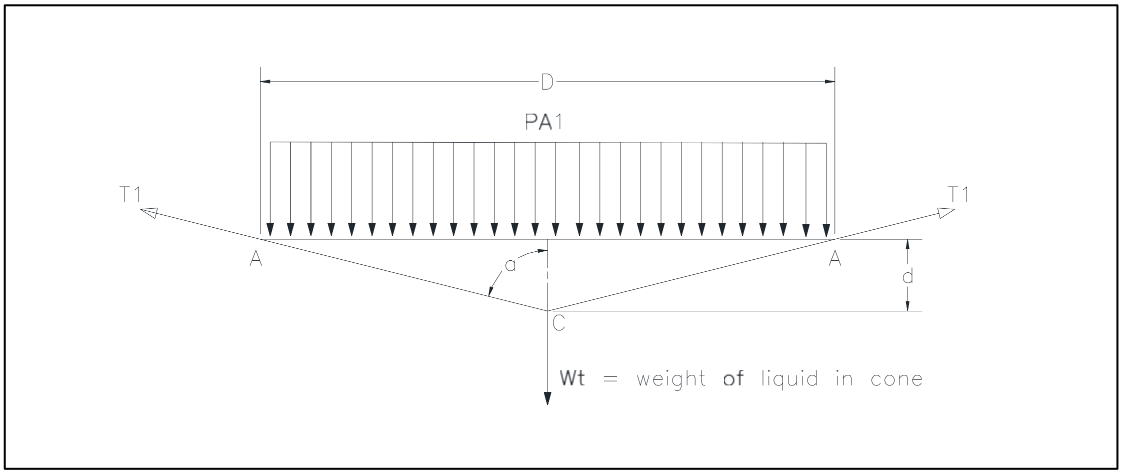


Figure No. A4

$A_1 = PI/4 * D^2$

$A_1 =$ 8659.015 square inches 60.13205 square feet

V, Volume of Cone = (PI*D/2*D/2*d)/3

V = 20.461599 ft^3

$W_t = SG* 62.4\ lb/ft^3 * V$

$W_t =$ 1,277 lb

Sum $F_y = 0$

$T_1Cos(a)PI*D - W_t - PA_1 = 0$

$T_1 =$ $(W_t + PA_1)/Cos(a)PI*D$

$T_1 =$ 593 lb/in

4) Knuckle Region Reinforcement Check per API 620 3.12

The measured cone bottom thickness is defined as t_h here, t_h =	0.309	inches
The measured shell thickness is defined as t_c here, t_c =	0.184	inches
R_2, radius of curvature of cone at A =	221.66	inches
R_c, radius of curvature shell =	52.5	inches

$w_h = 0.6* sqrt(R_2 *t_h)$

$w_h =$ 4.965673 inches

$w_c = 0.6* sqrt(R_c *t_c)$

$w_c =$ 1.864832 inches

Additional attached reinforcement area Ad

Ad = 1.1875

Available reinforcing area, A_a = $w_h*t_h + w_c*t_c+Ad$

$A_a =$ 3.065022 sq inches

$T_1 =$ 593 lb/in

$T_{2s} =$ 273 lb/in

$T_2 =$ 1153 lb/in

Per API 620, the magnitude of the total circumferential force acting on any vertical cross section through the compression ring region shall be computed as follows:

$Q = T_2w_h + T_{2s}w_c - T_1R_cSin(a)$ Note that if Q is negative, compression is indicated.

Q = 5,724 + 509 - 30,230

Q = -23,997

A_c, the required compression ring reinforcing area = Q/15,000

$A_c =$ 1.599802 sq. inches

A_a > Ac

3.065022 > 1.5998018 TRUE

and since Q is negative the following condition must be true also.

$w_h Sin(a)$ > $0.015 * R_c$
4.824387 > 0.7875 TRUE

Since both conditions are true, knuckle region is adequately reinforced.

5) Check Measured Shell Thickness vs Required Shell Thickness

The required shell thickness is $t_{cr} = T_{2s}/SE_2$

0.025658 However, thickness must be at least 0.100" per API 653, so final required shell thickness is 0.100

t_c > t_{cr}
0.184 > 0.100 TRUE

6) Check Measured Cone Bottom Thickness vs Required Cone Bottom Thickness at Plane A-A

The required cone thickness, t_{hr}, is the greater of the following 2 formulas

$t_{hr} = T_1/SE_1$ or $t_{hr} = T_2/SE_1$

$t_{hr} =$ 0.055702 $t_{hr} =$ 0.108332

$t_{hr} =$ 0.108332 However, thickness must be at least 0.100" per API 653, so final required cone bottom thickness is: $t_{hr} =$ 0.108 inches

t_h > t_{hr}
0.309 0.108 TRUE

7) Tank Volume or Capacity Calculation

V_{total} = Volume of Cone + Volume of Shell

20.4616 ft^3 + $(PI/4) *D^2*H$
20.4616 + 721.5846

$V_{total} =$ 742 ft^3 or 5,551 gallons

5.2 Seismic Calculations

For Tank Supported above grade on legs

1) Input Data

Tank Location			Keyport, WA			
Tank no.			K1051-102			
dia, D			8.75	ft		
shell height, Ht			12	ft		
fill height, H			12	ft. This is height from top liquid surface to bottom of tank.		
floor thk			0.312	in		
roof thk			0.190	in		
slope roof, ϑ	0.062418	radians	3.5763	degrees	This is standard slope of 3/4" in 12".	
shell thk, t			0.187	in		
sg liquid, G			1.000			
density steel			490	lb/sq ft		
Proportion of roof supported by shell			1	1 indicates 100%.		
Seismic zone factor, Z			0.300	See fig E-1 & Table E-2		
Importance Factor			1.00	See E.3.1		
Site coefficient			1.5	See table E-3		
Lateral force coefficient, C1			0.6			
For cone bottom supported above the grade, the depth of cone, Xb			1.1666	feet		
Height, L that shell sup above grade			2.17	feet		
Height from bottom of tank to grade, m			1.0034	feet		
b, the width of the base			7.5	feet		
Slope floor, a	0.260588	radians	14.9306	degrees		
1/2 apex angle of cone floor =			1.310208	radians	75.0694	degrees
		Radius	4.375	ft		
		D/H	0.7292	The diameter/fill height ratio from above		

2) Weights

a) Shell

Plate Area	330	sq ft
plate weight/sq ft	7.636	lb/sq ft
weight shell plate	2,519	lb
misc shell weight	200	lb
Total shell weight	2,719	lb

b) Roof

no. Rafters	0	
length rafters	0	
Type of rafter (shape)		
lb/ft rafters	0	lb/ft
weight rafters	0	lb
Plate Area = PI*(r/cos(ϑ))^2		
Plate Area	60.37	sq ft
plate weight/sq ft	7.758	lb/sq ft
Plate weight	468	lb
snow load	0	lb
misc weight	100	lb
Total Roof weight, Wr	568	lb

c) Cone Bottom

Plate Area = PI*(r/cos(gamma))^2		
Plate Area	64.41	sq ft
plate weight/sq ft	12.740	lb/sq ft
Plate weight	821	lb
misc weight	100	lb
Bottom weight,Wb	921	lb

3) Determination of Additional Seismic Inputs

Natural period of 1st sloshing mode, T

T = k* sq root (D)		For D/H =	0.73	k =	0.58	from Figure E-4
T	1.716	seconds		S =	1.5	from table E-3
Is T < 4.5s?	true, so C2=0.75S/T					

C2 = 0.75S/T
C2 0.656

W1 & W2
D/H = 0.73

The weight of liquid, Wt

Wtshell = pi/4*D^2*62.4*sg*Ht
3,752 x Ht
Wtshell = 45,027 lb

Wtcone = ((pi*r^2*depth of cone)/3)*62.4*sg
Wtcone = 1,459 lb

Wt = Wtshell + Wtcone
Wt 46,486 lb

W1 = Wt*W1/Wt W1/Wt = 0.820 from fig E-2

W1	38,119	lb	
W2		W2/Wt =	0.160 from fig E-2
W2	7,438	lb	
X1 & X2			
X1/H =	0.42	from fig E-3	
X1=	5.04	ft	
X2/H =	0.76	from fig E-3	
X2	9.12		

Xs = height from cg of shell to bottom of tank = 7.1666 feet

4) Calculation of Overturning Moment, M

M = Z*I*(C1*Ws*Xs'+C1*Wr*Ht'+C1*Wb*Xb'+C1*W1*X1'+C2*W2*X2') ft lb

m	1.0034	see above
Z	0.3	see above
I	1	see above
C1	0.6	see above
C2	0.656	see above
Ws	2,719	shell weight
Xs'	8.17	the height from grade to Fs
Wr	568	roof weight
Wb	921	bottom weight
Xb'	2	the height from the grade to Fb
Ht'	14.17	the height from grade to Fr
W1	38,119	effective weight of liquid responsible for impulse force
X1'	6.04	the height from the grade to F1
W2	7,438	effective weight of liquid responsible for sloshing or convective force of liquid.
X2'	10.12	the height from the grade to F2

Z*I =	0.3			
C1*Ws*Xs'=	13,328	Lateral Force, Fs =	489	Impulse force of tank shell
C1*Wr*Ht'=	4,832	Lateral Force, Fr =	102	Impulse force of tank roof
C1*W1*X1'=	138,219	Lateral Force, F1 =	6,861	Impulse force of liquid
C1*Wb*Xb' =	166	Lateral Force, Fb =	166	Impulse force of tank bottom

C2*W2*X2'=	49,373		Lateral Force, F2 =	1,463	Convective, or sloshing force of the liquid
M=	61,775	ft lb	Total Lateral Force, Ft =	9,082	lb

5) Check Stability of Tank:

The resisting Moment is Mr = (weight of tank + the weight of fluid) x 1/2 of the base width

weight of tank =	4,208	lb
weight of liquid =	46,486	lb
width of base =	7.5	ft

Mr = 190,101 ft-lb

Safety Factor for overturning = Mr/M

Safety Factor for overturning = **3.08** **> 1.5** **O.K., Tank is stable**

Note that if a tank is found to be unstable that indicates that tank anchors are needed to resist the uplift forces at the base plate to grade interface that will occur during an earthquake. An unstable tank is susceptible to tipping during an earthquake.

6) Check Need for Anchors Due Solely to Lateral Loads

Total weight of liquid	46,486	lb	
Total weight of tank	4,208	lb	
Total weight, W	50,694	lb	
Coefficient of friction =	0.030	Between steel & ice, the worst possible case.	

Frictional Force resisting the total lateral force = W*coefficient of static friction between base plates & grade

Ff = 1,521

Is Ff > Ft * 1.5 **Not true, therefore anchors are needed for lateral seismic forces**

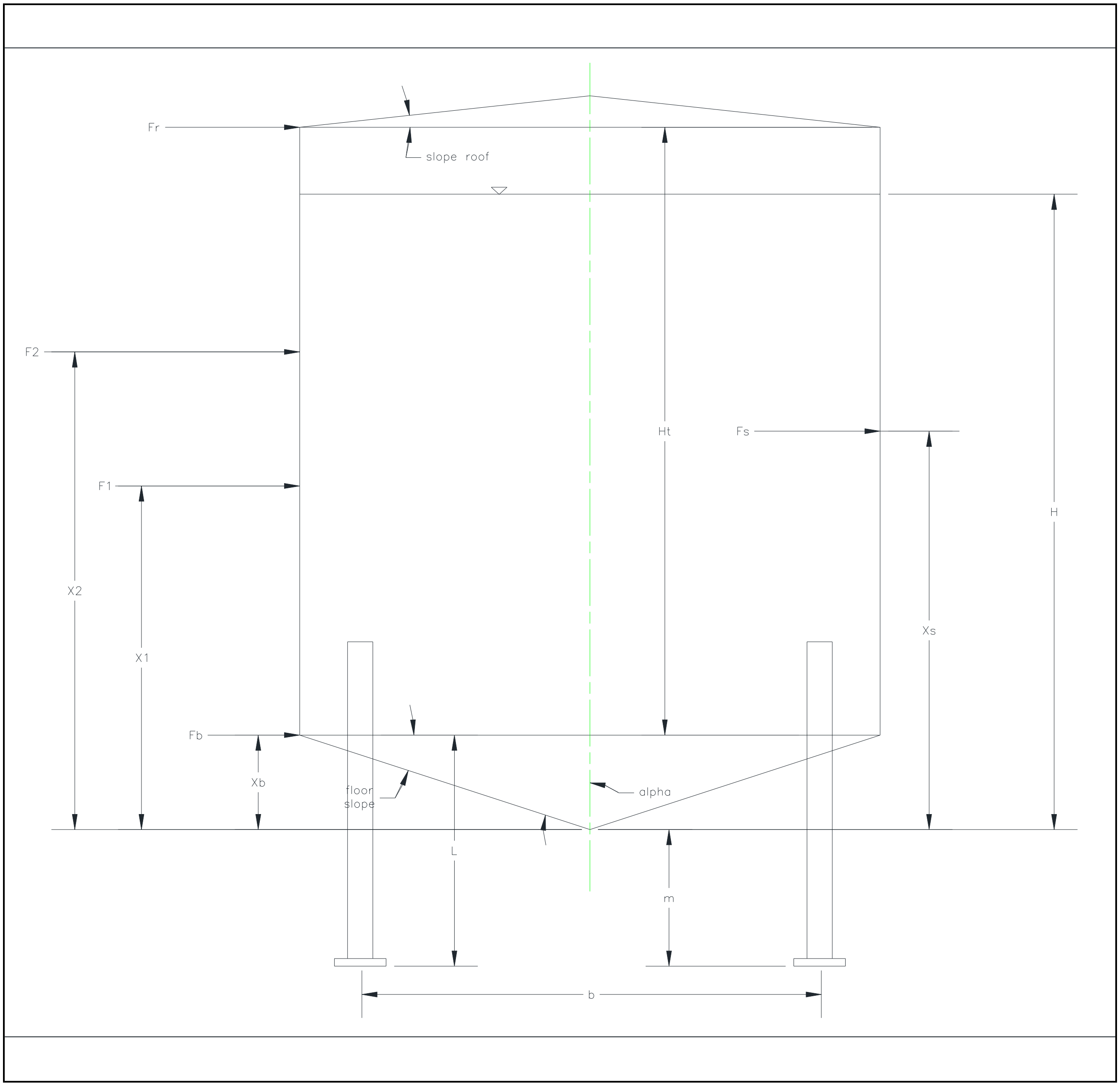
The shear force on each bolt, assuming 4 anchor bolts are used is = 2,270 lb

The anchors should be sized and designed to provide at least this much strength plus a safety margin and a corrosion allowance for the bolts.

7) Check Vertical Forces at Anchor Points
Both Seismic and Dead Load.

Vertical Load, P =	W =	-50,694	lb, this force is given a negative sign to indicate a downward
N, number of anchor locations =		4	direction.
For 4 anchor points, I =4*(b/2)^2 =		56.250	sq ft.

c =			3.750	ft	
Max anchor forces, F = P/N + - Mc/I					
		Mc/I =	4,118	lb	
		F =	-8,555	lb	If negative that indicates a downward force and
		and F =	-16,792	lb	no tension in anchor bolt.
Foot print size of 1 base plate =			100	sq inches	
Bearing stress = F/footprint area =			167.9	psi	
Allowable compressive strength of the foundation under the base plates =			1,500	psi, the foundation is concrete, and the concrete is assumed to have at least this strength.	
Safety factor =	1,500	divided by	167.9	=	8.93
	Safety Factor	**=**	**8.93**	**> 1.5**	**O.K., Foundation strength is acceptable**


Fr
slope roof
F2
Ht
Fs
F1
H
X2
Xs
X1
Fb
Xb
floor slope
alpha
L
m
b

6.0 Ultrasonic Thickness Data

6.1 Shell Plates UT

The following table details all readings (in) from the shell UT survey. All scan drops were equally spaced at 6.87 ft.

Data and Statistics		North	East	South	West	*Readings Line Average*
Course 2	4	0.185	0.184	0.184	0.185	0.185
	3	0.184	0.185	0.184	0.184	0.184
	2	0.183	0.184	0.185	0.184	0.184
	1	0.183	0.184	0.186	0.185	0.185
Course 1	4	0.185	0.184	0.184	0.186	0.185
	3	0.186	0.185	0.185	0.184	0.185
	2	0.186	0.184	0.184	0.185	0.185
	1	0.185	0.184	0.184	0.185	0.185
Scan Line Average		0.187	0.185	0.184	0.185	0.185

The tables below presents the statistics of the thickness readings (in) obtained on the Shell plates.

Course #	Min	Avg	Max
2	0.183	0.184	0.186
1	0.184	0.185	0.186
Global	0.183	0.184	0.186

6.2 Cone Bottom Plates UT

The following table details all readings (in) obtained on the cone bottom plates.

Plate ID \ Reading ID	1	2	3	4	*Avg*
North	0.310	0.311	0.311	0.312	0.311
South	0.310	0.310	0.311	0.312	0.311
West	0.309	0.309	0.310	0.311	0.310
East	0.310	0.309	0.310	0.311	0.310
Avg	0.310	0.310	0.311	0.312	0.310

The table below presents the statistics of the thickness readings obtained on the cone plates.

UT Summary	
Maximum	0.312
Average	0.310
Minimum	0.309

6.3 Fixed Roof Plates UT

The following table details all readings (in) obtained on the Fixed Roof plates.

Plate ID \ Reading ID	1	2	3	4	*Avg*
North	0.186	0.187	0.185	0.185	0.186
South	0.183	0.19	0.188	0.185	0.187
West	0.189	0.191	0.186	0.19	0.189
East	0.185	0.185	0.186	0.185	0.185
Avg	0.186	0.188	0.186	0.186	0.187

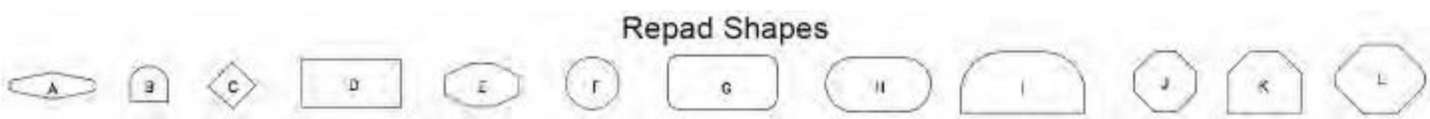
The table below presents the statistics of the thickness readings obtained on the roof plates.

UT Summary	
Maximum	0.191
Average	0.187
Minimum	0.183

6.4 Shell Nozzle and Appurtenance Table

Item	Type	Service	Pipe Size (in)	Station (ft)	Center Line Elevation (ft)	Distance from Shell to Flange Face (in)
A	Manway	Access	24.0	0	20.5	5.875
B	Nozzle	Transfer	3.0	9.1	135.0	7.0
C	Nozzle	Transfer	2.0	18.2	129.0	6.75
D	Nozzle	Transfer	2.0	23.0	129.0	7.0
E	Nozzle	Bottom Draw	2.0	–	–	–

Note: The data represented in the weld spacing column is the minimum spacing measured. H, V, or N indicates which is the minimum distance from the nozzle measured. (H=Horizontal Weld, V=Vertical Weld, N=Nozzle Weld)



6.5 Shell Nozzle UT

Item	Type	Service	Pipe Size (in)	Top (in)	Bottom (in)	Right (in)	Left (in)	Repad Thickness (in)	Flange Thickness (in)	Cover Thickness (in)	Comments
A	Manway	Access	24.0	0.242	0.242	0.243	0.243	–	0.423	0.508	
B	Nozzle	Transfer	3.0	0.207	0.209	0.217	0.208	–	0.945	–	
C	Nozzle	Transfer	2.0	0.148	0.145	0.147	0.147	–	0.719	–	
D	Nozzle	Transfer	2.0	0.147	0.148	0.145	0.147	–	0.742	–	
E	Nozzle	Bottom Draw	2.0	0.248	0.241	0.243	0.243	–	–	–	

6.6 Fixed Roof Nozzle UT

Item	Type	Service	Pipe Size (in)	North (in)	South (in)	East (in)	West (in)	Comments
AA	Hatch	Access	22.0 x 22.0	0.243	0.242	0.245	0.239	
AB	Nozzle	Vent	4.0	0.208	0.211	0.209	0.211	
AC	Nozzle	HLA	4.0	0.209	0.210	0.212	0.209	

7.0 Shell Corrosion Rates

Course	$t_{previous}$ Previous Thickness (in)	Year Obtained	t_{actual} Actual Thickness (in)	Year Obtained	C_r Corrosion Rate (in/yr.)	t_{min} Minimum Allowable Thickness (in)	R_L Remaining Life (yr.)
2	0.188	1994	0.183	2020	0.00019	0.100	431.19
1	0.188	1994	0.184	2020	0.00015	0.100	545.49

8.0 Photographs

Tank Labeling

Data Plate

Manway

Nozzle B

Nozzle B Piping

Nozzle C

Nozzle D

Bottom Nozzle E

Bottom Nozzle E

Support Leg

Support Anchor

Ground Cable

Standoff	Roof
	
Roof Manway	**Roof**
	
Containment Area	**Walkway**
	

Walkway	Standoff
	

9.0 NDE Equipment Used

The equipment utilized for the inspection of the tank included of the following :

Pit Gauge

Manufacturer	Model	Serial No
W.R. Thorpe	1	1.979.912

Ultrasonic Transducers

Manufacturer	Model	Serial No	MHz	Diameter
Olympus	D790-SM	865199	5	0.375

UT Equipment

Manufacturer	Model	Serial No
Olympus	38DL Plus	130573601

10.0 Inspector Certifications

AMERICAN PETROLEUM INSTITUTE
Individual Certification Programs: ICP™

API Individual Certification Programs

verifies that

Michael Alec Arpino

has met the requirements for API certification

API-653 Aboveground Storage Tank Inspector

Certification Number *77549*

Original Certification Date *December 31, 2017*

Current Certification Date *December 31, 2017*

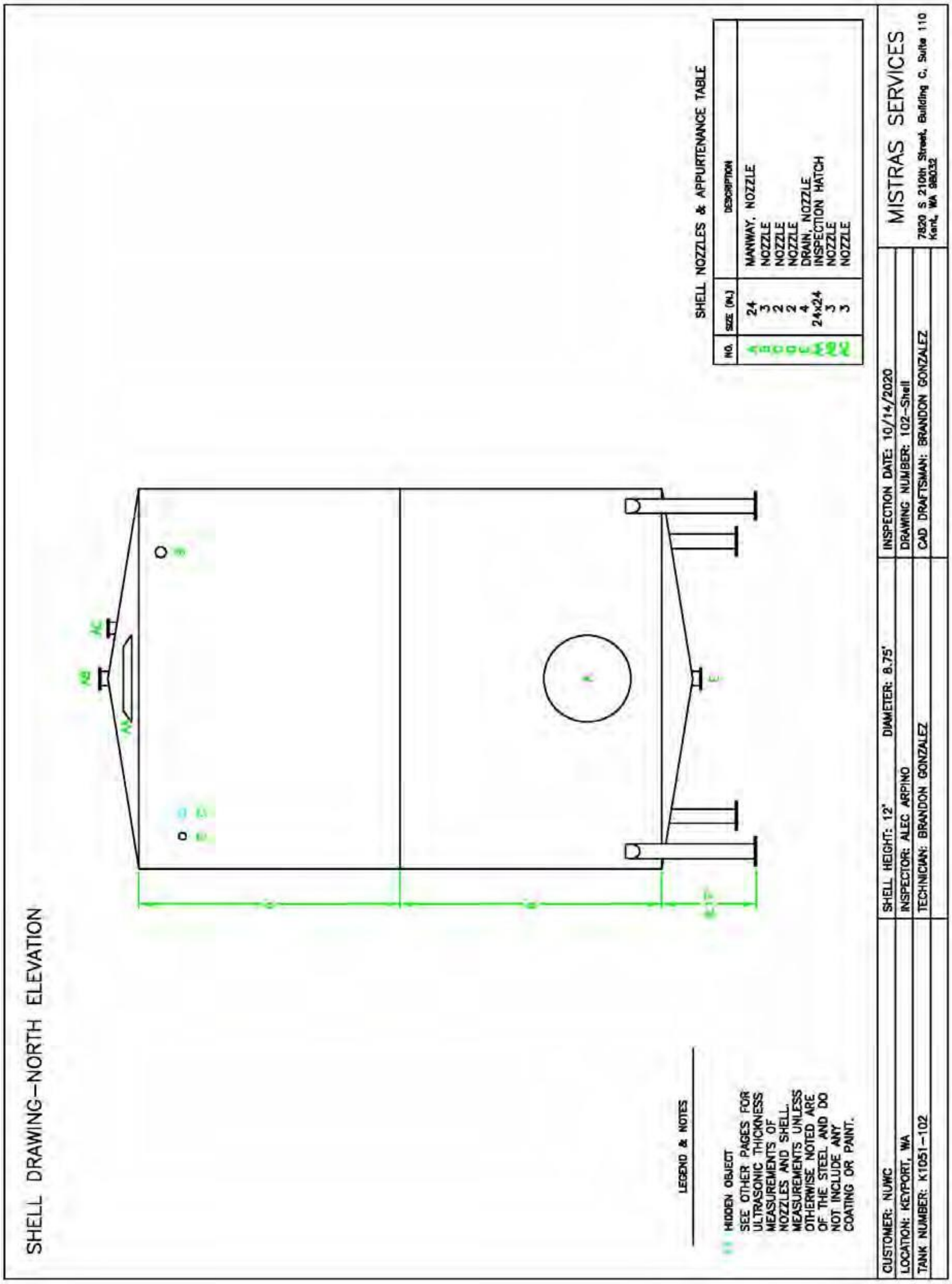
Expiration Date *December 31, 2020*

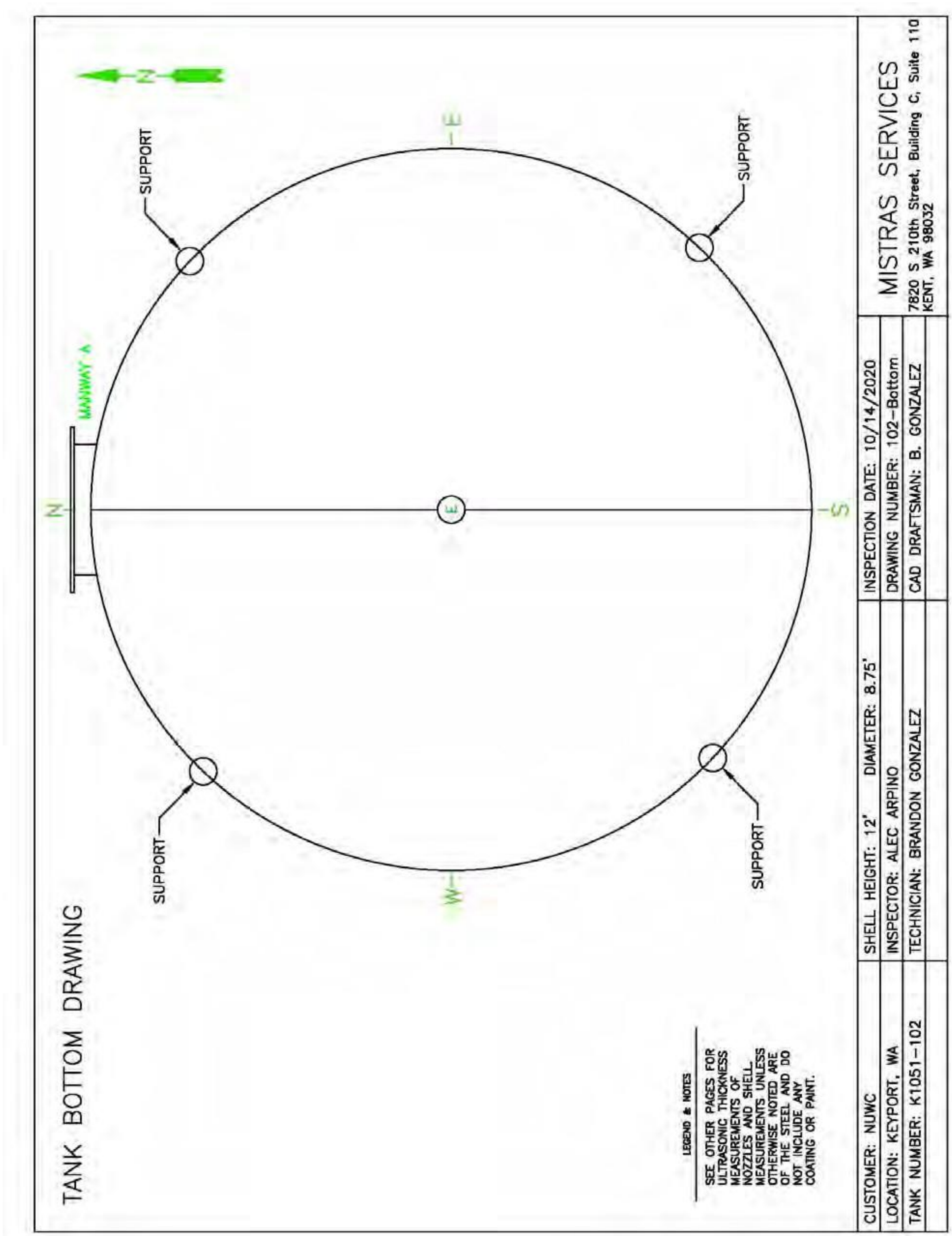
Manager, Individual Certification Programs

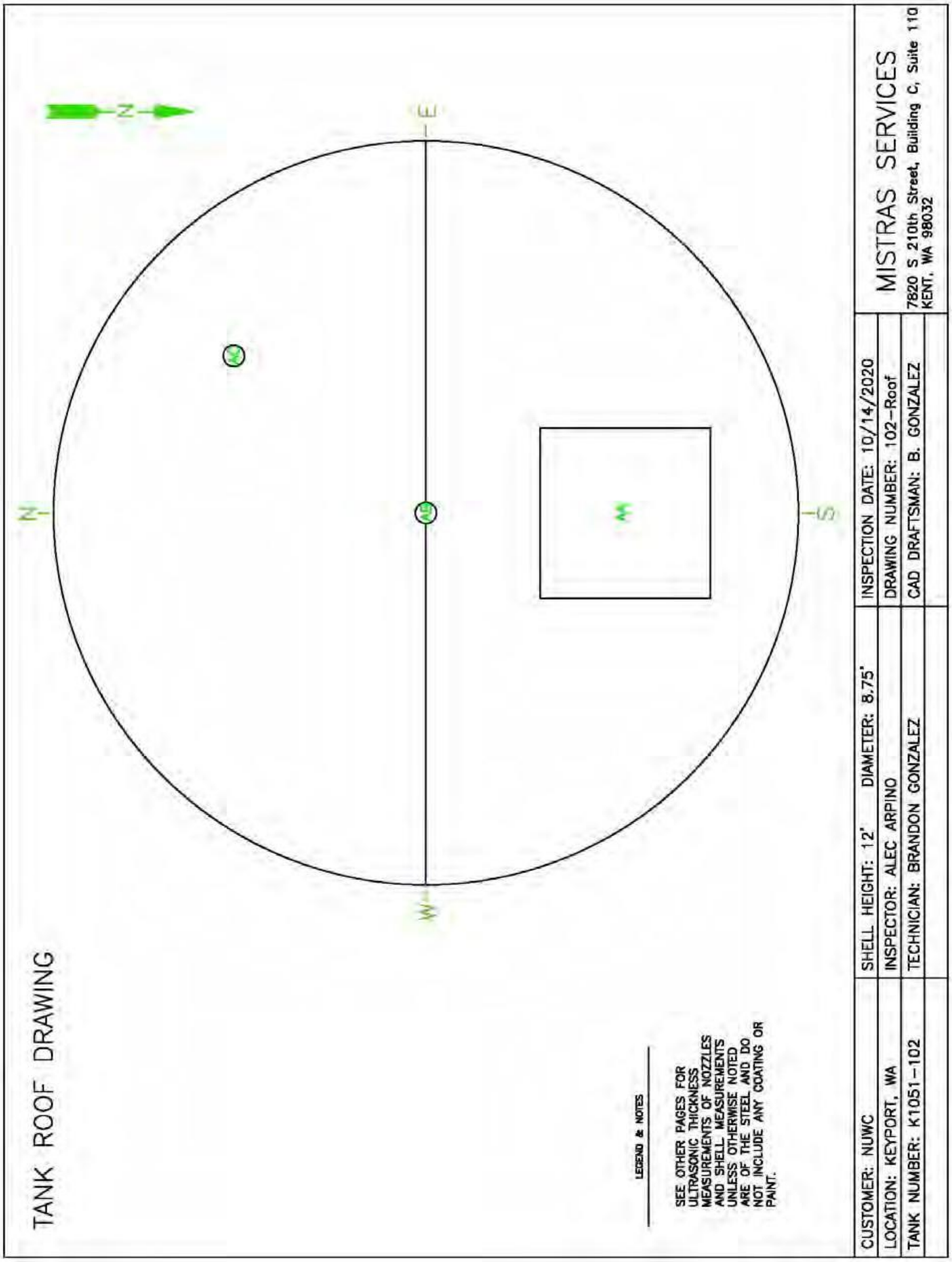
ICP

2015-027 | PDF

11.0 Drawings




TANK BOTTOM DRAWING
N
MANWAY A
SUPPORT
SUPPORT
SUPPORT
SUPPORT
E
W
S
LEGEND & NOTES
SEE OTHER PAGES FOR ULTRASONIC THICKNESS MEASUREMENTS OF NOZZLES AND SHELL MEASUREMENTS. UNLESS OTHERWISE NOTED ARE OF THE STEEL AND DO NOT INCLUDE ANY COATING OR PAINT.
CUSTOMER: NUWC
LOCATION: KEYPORT, WA
TANK NUMBER: K1051-102
SHELL HEIGHT: 12'
DIAMETER: 8.75'
INSPECTOR: ALEC ARPINO
TECHNICIAN: BRANDON GONZALEZ
INSPECTION DATE: 10/14/2020
DRAWING NUMBER: 102-Bottom
CAD DRAFTSMAN: B. GONZALEZ
MISTRAS SERVICES
7820 S 210th Street, Building C, Suite 110
KENT, WA 98032


TANK ROOF DRAWING
N
N
E
S
W
M
LEGEND & NOTES
SEE OTHER PAGES FOR ULTRASONIC THICKNESS MEASUREMENTS OF NOZZLES AND SHELL MEASUREMENTS UNLESS OTHERWISE NOTED ARE OF THE STEEL AND DO NOT INCLUDE ANY COATING OR PAINT.
CUSTOMER: NUWC
LOCATION: KEYPORT, WA
TANK NUMBER: K1051-102
SHELL HEIGHT: 12'
DIAMETER: 8.75'
INSPECTOR: ALEC ARPINO
TECHNICIAN: BRANDON GONZALEZ
INSPECTION DATE: 10/14/2020
DRAWING NUMBER: 102-Roof
CAD DRAFTSMAN: B. GONZALEZ
MISTRAS SERVICES
7820 S. 210th Street, Building C, Suite 110
KENT, WA 98032

12.0 Appendix A – References

References:

1) Washington State Department of Ecology, Dangerous Waste Regulations, Chapter 173-303 WAC
2) Conversations with the client
3) API RP 652, Lining of Above Ground Petroleum Storage Tanks
4) API RP 651, Cathodic Protection of Above Ground Storage Tanks
5) API Guide for the Inspection of Refinery Equipment – Chapter 13, Atmospheric and Low Pressure Tanks
6) API Standard 650, Welded Steel Tanks for Oil Storage
7) API Standard 653, Tank Inspection, Repair, Alteration, and Reconstruction
8) API Standard 620, Design and Construction of Large, Welded, Low Pressure Storage Tanks

APPENDIX E

INSPECTION REPORT TANK K1051-103

WSP

Naval Undersea Warfare Center

Tank K1051-103

In Service Inspection

Above Ground Storage Tank Inspection Report

In accordance with
WAC 173-303-640
Dangerous Waste
Regulations

WSP

Tank K1051-103

In Service Inspection

Keyport, WA

October 14, 2020 to October 14, 2020

Report Number 40865710-5

Prepared By :
7820 South 212th St. St. 110
Kent, WA, 98032

www.mistrasgroup.com

MISTRAS
A World of NDT Solutions
Services Division

Inspection Date
October 14, 2020

Table of Contents

1.0 Job Information

Job Location :	**Naval Undersea Warfare Center**
	610 Dowell Street
	Keyport, WA
	98345-7610
Customer Representative :	Grace Roberts
Customer Phone Number :	206-431-2295
Job Charge Number :	N442555-15-D-0011-00
Report Number :	40875710-5
Mistras Work Order Number :	T67726-40865710
Inspection Personnel Provided :	Alec Arpino
	API 653 Certified Inspector
	API 653 (77549)/UTT/MT
	Brandon Gonzalez
	Level II Technician
	MFL/UTT/PT

2.0 Tank Inspection Data Sheet

General :

Tank Number	K1051-103
Owner	U.S. Navy
Design Standard	Unknown
Tank Location	Keyport, WA
Product	Otto Fuel/ Cyanide
Specific Gravity	1.23
Manufacturer	Flohr Metal Fabrication
Manufacture Date	1994
Cathodic Protection	No
Data Plate Present	Yes
Data Plate Condition	Good Condition

Dimensions :

Diameter (ft)	8.75
Height (ft)	13.02
Capacity Nominal (Gallons)	5,551.0

Geometry :

Foundation	Concrete Pad with Steel Support Legs
Bottom	Cone Down Butt Welded
Shell	Butt Welded
Fixed Roof Type	Self-Supported Fixed Cone

Access :

Stairway	None
Roof Access	Yes

Coatings :

Bottom	Internal Thin Film Epoxy
Shell	External White
Roof	External White

3.0 Suitability for Service

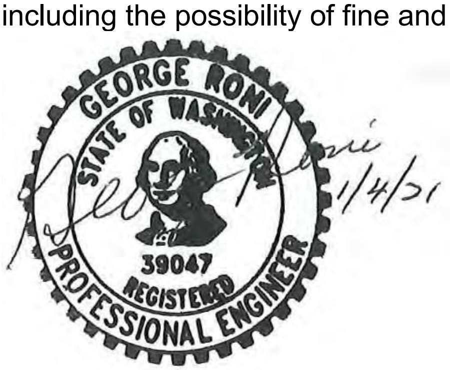
WSP on behalf of the U.S. Navy has contracted Mistras Group, Inc. to perform a in service inspection on Tank K1051-103 located in Building 1051 of the Naval Undersea Warfare Center located in Keyport, WA. This inspection was performed in accordance with the current criteria set forth in WAC 173-303-640 Dangerous Waste Regulations.

There were no issues found that would require repair at this time. The Navy should continue with routine maintenance and observation of the tank. The next formal WAC 173-303-640 inspection should be conducted per the established schedule which is 5 years per the current SPCC Plan for this site.

Tank K1051-103 can be considered suitable for continued service.

TANK 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 fine and imprisonment for knowing violations."[1]



George Roni, P.E.

1) Per WAC 173-303-810 as required by WAC 173-303-640 (2)

Mistras Services has evaluated the condition of this tank based on the observations and measurements made by the tank Inspector. While our evaluation accurately describes the condition of the tank at the time of inspection, the tank owner/operator must independently assess the inspection information/report provided by Mistras Services and any conclusions reached by the tank owner/operator and any action taken or omitted to be taken are the sole responsibility of the owner/operator. With respect to inspection and testing, Mistras Services warrants only that the services have been performed in accordance with accepted industry practice. If any such services fail to meet the foregoing warranty, Mistras Services shall re-perform the service to the same extent and on the same conditions as the original service.

The preceding paragraph sets forth the exclusive remedy for claims based on failure or of defect in materials or services, whether such claim is made in contract or tort (including negligence) and however instituted, and, upon expiration of the warranty period, all such liability shall terminate. The foregoing warranty is exclusive and in lieu of all other warranties, whether written, oral, implied or statutory. NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE SHALL APPLY, nor shall Mistras Services be liable for any loss or damage whatsoever by reason of its failure to discover, report, repair or modify latent defects or defects inherent in the design of any tank inspected. In no event, whether a result of breach of contract, warranty or tort (including negligence) shall Mistras Services be liable for any consequential or incidental damages including, but not limited to, loss of profit or revenues, loss of use of equipment tested or services by Mistras Services or any associated damage to facilities, down-time costs or claims of other damages.

4.0 Inspection Findings

WSP on behalf of the U.S. Navy has contracted Mistras Group, Inc. to perform an in Service Inspection on Tank K1051-103 located in Keyport, WA. This inspection was performed in accordance Washington State Dangerous Waste Regulations WAC 173-303-640 (2).

Tank K1051-103 is a shop built, 2 course Above Ground Storage Tank in Otto Fuel/Cyanide Waste service. This tank is 8.75 feet in diameter, and 13.02 feet in height and is equipped with a Fixed Cone Roof. The following details all inspection findings.

Foundation

This tank was installed on a concrete pad. The tank is elevated above the concrete pad by (4) 4 inch steel pipe support legs. Each support leg has an 8” X 8” X 1/2” steel pad at the base that is anchored to the concrete foundation via (4) 1/2 inch anchor nuts and bolts. The anchor bolts are embedded into the concrete foundation and secured at the top of the plate.

The steel pipe support legs showed no evidence of dents, deformations, corrosion, pitting or other visible damage. The concrete at the base of each leg showed no evidence of cracking, spalling or broken concrete. The supports, footings, the anchor nuts and bolts are all coated. No coating failure or oxidation was noted.

The anchor nuts and bolts were found to be tight and secure. There was no evidence of elongation, corrosion, pitting or damage to the steel pads or the anchor nuts and bolts.

The tank sits within a below grade epoxy lined concrete vault. The vault appeared to structurally sound and showed no evidence of cracking, spalling or broken concrete. It appears that epoxy coating had been previously repaired at various locations around the vault. The repaired areas and the rest of the epoxy coating appeared well adhered and fluid tight.

The volume of the containment is large enough to contain the contents of the tank in the event of leaks or catastrophic failure, which is also in compliance with WAC 173-303-640.

Cone Bottom

The cone bottom in Tank K1051-103 is made up of 2 plates. The nominal floor plate thickness is 0.3125 inches. The lowest UT reading found was 0.303”.

The exterior surfaces of the tank showed no evidence of leaks from the plates, the plate to plate weld seams or the bottom to shell weld. There was no evidence of active corrosion, pitting or coating failure occurring on the plates or welds of the bottom. There was no evidence of dents, bulges or other deformations noted on the bottom plates.

At the apex of the bottom there is a 4 inch stainless steel nipple welded to the tank that reduces to a 2” line. There was no evidence of leaks from the attachment welds of the nozzle to the bottom. There was no evidence of leaks from the associated piping in the immediate area of the tank bottom attachment.

Shell

The shell on Tank K1051-103 consists of 2 courses and all joints are Butt Welded. A visual inspection and ultrasonic examination of the shell was conducted, the following details all findings.

The bottom of the shell to bottom transition has a reinforcement ring consisting of a 2-1/2 inch steel angle. The top of the reinforcement ring is fully fillet welded and the bottom is stitch welded. There is caulking in between the stitch welds along the bottom. There was no evidence of weld failures or deformations noted to the reinforcement ring.

There was no evidence of bulges, dents or abnormal deformations noted to the tank shell. There was no evidence of leaks in the shell plates, shell to shell horizontal or vertical welds, the shell to cone weld or the shell to roof weld. There was no evidence of active corrosion however there is 0.040" mechanical pit located on the South 2nd course just above the horizontal weld line. It would appear that the pit is part of a shell repair which was not properly filled in. The pit is coated therefore not corroding and the pit does not violate t-min therefor no repairs are required.

The shell coating appeared to be in very good condition.

The shell plates were ultrasonically inspected externally to verify the remaining thickness of the shell plates. Ultrasonic thickness readings were obtained on the shell in 4 equally spaced locations at approximately 6.87 feet. Each scan was conducted in one of the 4 cardinal directions. A total of 4 readings per course were obtained.

Section 6.1 of this report details all ultrasonic thickness (UT) readings obtained, detailing the low's to highs per course. There were no abnormally low readings noted on the shell. The lowest reading of 0.181" was located on the North drop.

Shell Nozzles

A visual inspection and ultrasonic examination of all accessible shell nozzles and manways was conducted to evaluate the current condition of each nozzle. Visual inspection of each nozzle included evaluation of the external neck, all attachment welds, and flange faces.

There was no evidence of leaks from the nozzle attachment welds, the flanges, the flange bolting and associated valves or nearby attached piping. There is no evidence of coating failure occurring on the nozzles or couplings.

The attached piping appears to be stainless steel and the nozzles are carbon steel. There is no evidence of galvanic reactions taking place due to the dissimilar metals. The flange faces appear to be raised and have Teflon type PTFE gasket material. The nozzle bolting appears tight and secure with proper thread engagements on the bolting.

All nozzles and manways were ultrasonically inspected (UT) by recording four readings on the top, bottom and both sides of each neck, one reading on each flange and the manway cover. There was no abnormally low thickness readings obtained. Section 6.5 details all data from UT exam.

Fixed Roof

The roof plates on Tank K1051-103 have a nominal thickness of 0.187 inches. The fixed roof plates were ultrasonically examined to determine the average remaining thickness. A total of 16 readings were obtained on the roof, four readings per each cardinal direction. There was no evidence of thinning or corrosion on the roof plates. Section 6.3 details all the data from the UT exam.

The fixed roof plates were visually inspected. All plates were evaluated to determine the condition of the external coating system. Aside from a coating of dust the roof coating is in good condition. There was no evidence of corrosion, pitting, dents, bulges or other deformations to the roof plates.

There was no evidence of leaks in the roof plates, the roof plate to plate welds or the shell to roof weld.

Fixed Roof Nozzles

All fixed roof nozzles were visually inspected. The following details the findings from this inspection.

All roof nozzles were ultrasonically inspected to verify remaining thickness. A total of 4 readings per nozzle were obtained. All fixed roof nozzles were visually inspected. The following details the findings from this inspection.

There was no evidence of leaks from the roof nozzles attachment welds, flanges, and flange bolting, associated valves or attached piping in the immediate area around the piping.

The roof top manway cover is securely attached to the roof with a hinge pin. There was no damage noted to the pin or the cover. There is a 3 inch nozzle attached to the manway cover for the liquid level float and tape gauge system. The system was not operated but appeared to be in satisfactory condition. There was no evident damage to the 3 inch nozzle or the flange face. The manway showed no evidence of coating failure, corrosion, pitting or other damage.

The 4 inch center roof vent piping runs to outside the building. The piping goes through the East wall and appears to have a pressure/vacuum style vent attached at the end of the piping run. The vent was unable to be inspected at the time of inspection due to its location and inaccessibility. The pressure/vacuum vent appeared to be in acceptable condition from the ground with no obvious visual damage noted.

All roof nozzles were ultrasonically inspected to verify remaining thickness. A total of 4 readings per nozzle were obtained. There were no abnormally low readings noted on the roof nozzles. Section 6.6 details the data from the UT exam.

Access Ways & Handrails

The roof is accessible from a free standing ladder and catwalk system. This catwalk is used to access all the tanks inside the containment for visual inspections and gauging purposes.

The ladder and the catwalk are in acceptable condition. There was no damage noted to the ladder frame or rungs. The steps showed no signs of damage to the frame, the treads or the handrails. The catwalk showed no damage to the frame, the grating or the handrails. Much of the handrail was covered in black plastic during the inspection.

The catwalk supports are 3” X 3” square piping uprights that are anchored to the concrete by (2) 3/4 inch anchor bolts at each support location. There is 2-1/2 inch angle iron braces used as cross bracing. There were no evident weld failures, damage to the support structures, attachment hardware or the anchorage locations. The attachment hardware appears to be tight and secure. The catwalk grating is galvanized and in acceptable condition. The grating is tack welded into place. There were no signs of weld failure. There was no evidence of corrosion caused thinning or holes noted in the grating.

The 2 inch steel pipe handrails are 42 inches high at the top rail, 24 inches at the mid-rail with 4 inch toe boards. There were no signs of holes, corrosion or pitting noted in the top rail, the mid-rail or the uprights.

Miscellaneous Appurtenances

For product level gauging, this tank is equipped with a float and tape style gauging system. This unit was found to be in what appears to be visually acceptable condition with no apparent damage noted. The unit was not operated at the time of inspection.

The tank is equipped with a Delta Controls roof transponder. The unit model is an 872C-V-10-2NPT-6SE-IS-CC with a serial number of UGD9966-A2. The unit appeared in satisfactory condition with no apparent damage to the unit noted.

For electrical safety issues and lightning protection, this tank is equipped with (1) 1/2 inch braided grounding cable. The cable was found to be satisfactory condition. The cable is attached to the reinforcement ring on one end and attached to a grounding bar that is embedded into the concrete foundation.

Inspectors Signature: ______________________________

M. Alec Arpino
API 653
Certification No. 77549 Exp. 12/31/2023

Reviewed by:

____
George Roni, PE
API 653 Cert. No. 2042, Exp. 4/30/2023

Mistras Services has evaluated the condition of this tank based on the observations and measurements made by the tank Inspector. While our evaluation accurately describes the condition of the tank at the time of inspection, the tank owner/operator must independently assess the inspection information/report provided by Mistras Services and any conclusions reached by the tank owner/operator and any action taken or omitted to be taken are the sole responsibility of the owner/operator. With respect to inspection and testing, Mistras Services warrants only that the services have been performed in accordance with accepted industry practice. If any such services fail to meet the foregoing warranty, Mistras Services shall re-perform the service to the same extent and on the same conditions as the original service.

The preceding paragraph sets forth the exclusive remedy for claims based on failure or of defect in materials or services, whether such claim is made in contract or tort (including negligence) and however instituted, and, upon expiration of the warranty period, all such liability shall terminate. The foregoing warranty is exclusive and in lieu of all other warranties, whether written, oral, implied or statutory. NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE SHALL APPLY, nor shall Mistras Services be liable for any loss or damage whatsoever by reason of its failure to discover, report, repair or modify latent defects or defects inherent in the design of any tank inspected. In no event, whether a result of breach of contract, warranty or tort (including negligence) shall Mistras Services be liable for any consequential or incidental damages including, but not limited to,

5.0 Calculations

Calculations for Shell & Cone-Shaped Tank Bottom - per API 620

Date of Inspection: 10/14/2020

Owner	NUWC			
Tank No.	K1051-103			
Diameter, D	8.750	ft	105.00	inches
Shell Height, H	12.000	ft	144.00	inches
Fill Height	12.000	ft	144.00	inches
Original Shell thickness	0.188	inches		
Measured Shell thickness, t_c	0.181	inches		
Original Cone thickness	0.313	inches		
Measured Cone thickness, t_h	0.303	inches		
Specific Gravity of contents of tank, SG	1.230			
Depth of Cone, d	12.25	inches	1.0208	ft
S, allowable tensile stress of shell & cone	15,200	psi		
Joint Efficiency cone-to-shell & long cone joints, E_1	0.70			
Joint Efficiency shell vertical joints, E_2	0.70			
Operating Pressure at top of tank, P_o	0.00	psi	0	psf

Note that per API 620 the max. operating pressure at top of tank is 15 psig.

O.D. of connection at bottom of cone (if none enter 0)		4.50	inches			
1/2 Apex angle, alpha = a	1.331679	radians		76.2996	degrees	
Total Pressure, P at plane AA	921.02	psf (includes hydrostatic head + P_o)			6.40	psi

Plane AA is at the Spring Line.

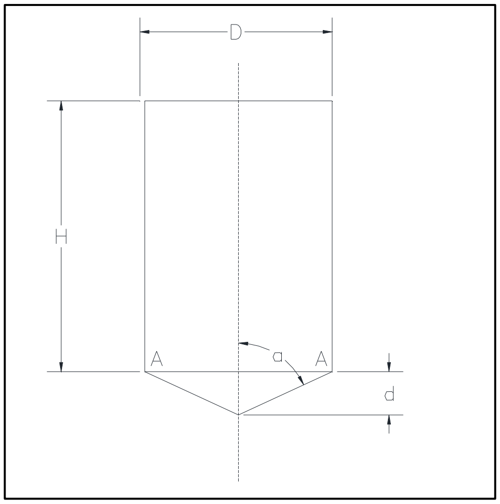


Figure No. A1

1) Shell Unit Forces @ Plane AA, See Figure No. A2

Sum F_x = 0

$2T_{2s}$ = PD

T_{2s} = PD/2

T_{2s} = 336 lb/in

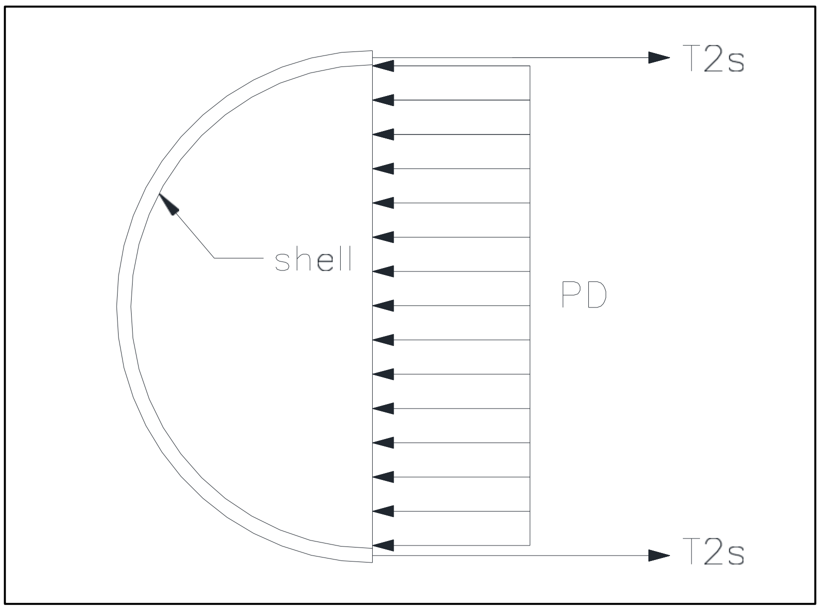


Figure No. A2

2) Cone unit force, T_2, the latitudinal unit force. Also known as the circumferential unit force. See Figure No. A3

R_2, radius of curvature of cone at A

R_2 = AB/cos(a)

R_2 = 221.664 inches

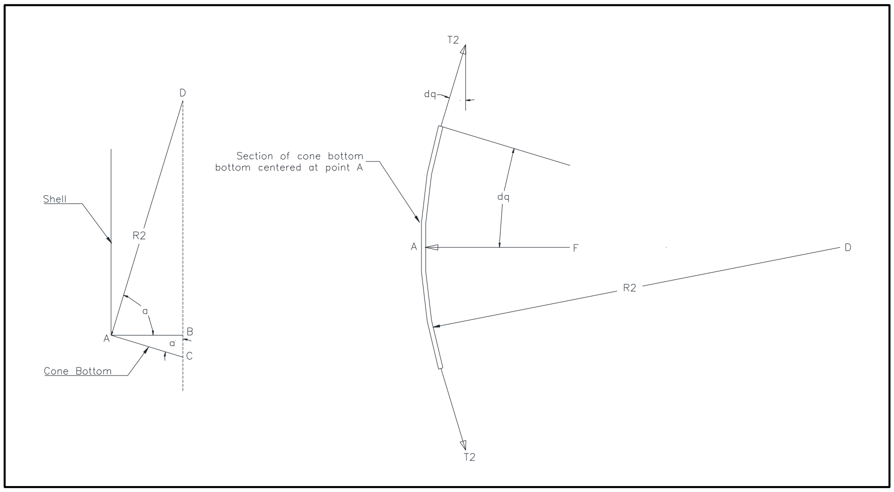


Figure No. A3

F = the force on 1 inch wide section
of cone at point A with an infinitesimal
arc length = 2 x dq
$F = P(1)(2)(dq)(R_2)$
$F = 2PdqR_2$

Sum of $F_x = 0$
$F - 2T_2*Sin(dq) = 0$
$2PdqR_2 = 2T_2Sin(dq)$ and for small dq, Sin(dq) = dq
$PR_2 = T_2$
$T_2 = PR_2$
$T_2 =$ 1418 lb/in

3) Cone unit force, T_1, the Meridional unit force. See Figure No. A4

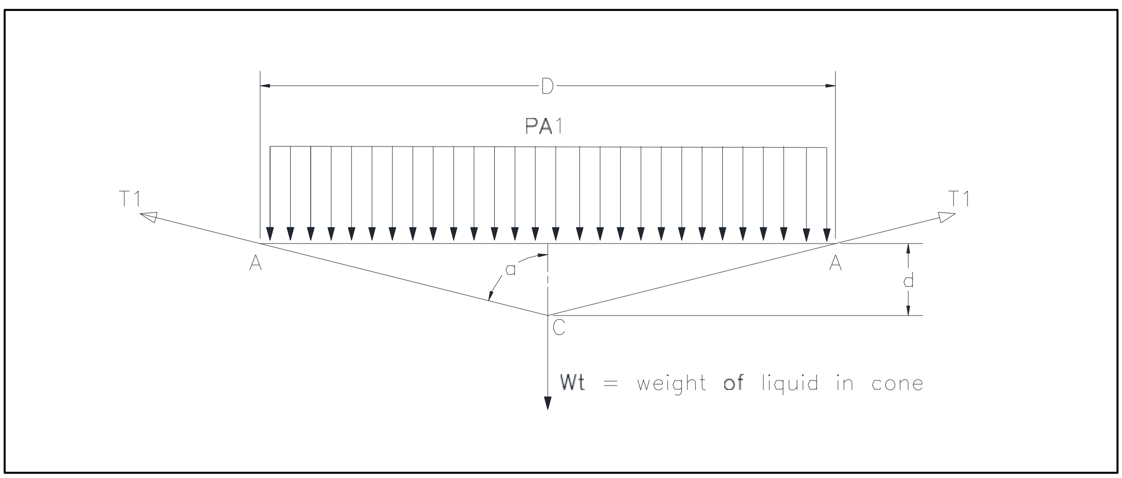


Figure No. A4

$A_1 = PI/4 * D^2$

A_1 = 8659.015 square inches 60.13205 square feet

V, Volume of Cone = (PI*D/2*D/2*d)/3
V = 20.461599 ft^3

W_t = SG* 62.4 lb/ft^3 * V
W_t = 1,570 lb

Sum F_y = 0
T_1Cos(a)PI*D - W_t -PA_1 =0
T_1 = (W_t + PA_1)/Cos(a)PI*D
T_1 = 729 lb/in

4) Knuckle Region Reinforcement Check per API 620 3.12

The measured cone bottom thickness is defined as t_h here, t_h = 0.303 inches
The measured shell thickness is defined as t_c here, t_c = 0.181 inches
R_2, radius of curvature of cone at A = 221.66 inches
R_c, radius of curvature shell = 52.5 inches

w_h = 0.6* sqrt(R_2 *t_h)
w_h = 4.917226 inches

w_c = 0.6* sqrt(R_c *t_c)
w_c = 1.849568 inches

Additional attached reinforcement area Ad
Ad = 1.1875

Available reinforcing area, A_a = w_h*t_h + w_c*t_c+Ad
A_a = 3.012191 sq inches

T_1 = 729 lb/in
T_{2s} = 336 lb/in
T_2 = 1418 lb/in

Per API 620, the magnitude of the total circumferential force acting on any vertical cross section through the compression ring region shall be computed as follows:

Q = T_2w_h + $T_{2s}w_c$ -T_1R_cSin(a) Note that if Q is negative, compression is indicated.
Q = 6,971 + 621 - 37,183
Q = -29,590

A_c, the required compression ring reinforcing area = Q/15,000
A_c = 1.972677 sq. inches

A_a > Ac
3.012191 > 1.972677 TRUE

and since Q is negative the following condition must be true also.

w_hSin(a)	>	0.015 * R_c	
4.777319	>	0.7875	TRUE

<u>Since both conditions are true, knuckle region is adequately reinforced.</u>

5) Check Measured Shell Thickness vs Required Shell Thickness

The required shell thickness is t_{cr} = T_{2s}/SE_2

0.031559 However, thickness must be at least 0.100" per API 653, so final required shell thickness is 0.100

t_c	>	t_{cr}	
0.181	>	0.100	TRUE

6) Check Measured Cone Bottom Thickness vs Required Cone Bottom Thickness at Plane A-A

The required cone thickness, t_{hr}, is the greater of the following 2 formulas

$t_{hr} = T_1/SE_1$	or	$t_{hr} = T_2/SE_1$	
t_{hr} =	0.068513	t_{hr} =	0.133248

t_{hr} = 0.133248 However, thickness must be at least 0.100" per API 653, so final required cone bottom thickness is: t_{hr} = 0.133 inches

t_h	>	t_{hr}	
0.303		0.133	TRUE

7) Tank Volume or Capacity Calculation

V_{total} = Volume of Cone + Volume of Shell

20.4616 ft^3 + (PI/4) *D^2*H

20.4616 + 721.5846

V_{total} = 742 ft^3 or 5,551 gallons

5.2 Seismic Calculations

SEISMIC ANALYSIS
For Tank Supported above grade on legs

1) Input Data

Tank Location			Keyport, WA		
Tank no.			K1051-103		
dia, D			8.75	ft	
shell height, Ht			12	ft	
fill height, H			12	ft. This is height from top liquid surface to bottom of tank.	
floor thk			0.296	in	
roof thk			0.186	in	
slope roof, ϑ	0.062418	radians	3.5763	degrees	This is standard slope of 3/4" in 12".
shell thk, t			0.187	in	
sg liquid, G			1.230		
density steel			490	lb/sq ft	
Proportion of roof supported by shell			1	1 indicates 100%.	
Seismic zone factor, Z			0.300	See fig E-1 & Table E-2	
Importance Factor			1.00	See E.3.1	
Site coefficient			1.5	See table E-3	
Lateral force coefficient, C1			0.6		
For cone bottom supported above the grade, the depth of cone, Xb			1.1666	feet	
Height, L that shell sup above grade			2.17	feet	
Height from bottom of tank to grade, m			1.0034	feet	
b, the width of the base			7.5	feet	
Slope floor, a	0.260588	radians	14.9306	degrees	
1/2 apex angle of cone floor =			1.310208	radians	75.0694 degrees
		Radius	4.375	ft	
		D/H	0.7292	The diameter/fill height ratio from above	

2) Weights

a) Shell

Plate Area	330	sq ft
plate weight/sq ft	7.636	lb/sq ft
weight shell plate	2,519	lb
misc shell weight	200	lb

Total shell weight	2,719	lb

b) Roof

no. Rafters	0	
length rafters	0	
Type of rafter (shape)		
lb/ft rafters	0	lb/ft
weight rafters	0	lb
Plate Area = PI*(r/cos(ϑ))^2		
Plate Area	60.37	sq ft
plate weight/sq ft	7.595	lb/sq ft
Plate weight	458	lb
snow load	0	lb
misc weight	100	lb
Total Roof weight, Wr	558	lb

c) Cone Bottom

Plate Area = PI*(r/cos(gamma))^2		
Plate Area	64.41	sq ft
plate weight/sq ft	12.087	lb/sq ft
Plate weight	778	lb
misc weight	100	lb
Bottom weight,Wb	878	lb

3) Determination of Additional Seismic Inputs

Natural period of 1st sloshing mode, T

T = k* sq root (D)		For D/H =	0.73	k =	0.58	from Figure E-4
T	1.716	seconds		S =	1.5	from table E-3
Is T < 4.5s?	true, so C2=0.75S/T					

C2 = 0.75S/T
C2 0.656

W1 & W2
D/H = 0.73

The weight of liquid, Wt

Wtshell = pi/4*D^2*62.4*sg*Ht			Wtcone = ((pi*r^2*depth of cone)/3)*62.4*sg		
	4,615	x Ht			
Wtshell =	55,383	lb	Wtcone =	1,459	lb

Wt = Wtshell + Wtcone
Wt 56,842 lb

W1 = Wt*W1/Wt		W1/Wt =	0.820	from fig E-2
W1	46,611	lb		
W2		W2/Wt =	0.160	from fig E-2
W2	9,095	lb		

X1 & X2

X1/H =	0.42	from fig E-3
X1=	5.04	ft
X2/H =	0.76	from fig E-3
X2	9.12	

Xs = height from cg of shell to bottom of tank = 7.1666 feet

4) Calculation of Overturning Moment, M

M = Z*I*(C1*Ws*Xs'+C1*Wr*Ht'+C1*Wb*Xb'+C1*W1*X1'+C2*W2*X2') ft lb

m	1.0034	see above
Z	0.3	see above
I	1	see above
C1	0.6	see above
C2	0.656	see above
Ws	2,719	shell weight
Xs'	8.17	the height from grade to Fs
Wr	558	roof weight
Wb	878	bottom weight
Xb'	2	the height from the grade to Fb
Ht'	14.17	the height from grade to Fr
W1	46,611	effective weight of liquid responsible for impulse force
X1'	6.04	the height from the grade to F1
W2	9,095	effective weight of liquid responsible for sloshing or convective force of liquid.
X2'	10.12	the height from the grade to F2

Z*I =	0.3			
C1*Ws*Xs'=	13,328	Lateral Force, Fs =	489	Impulse force of tank shell
C1*Wr*Ht'=	4,748	Lateral Force, Fr =	101	Impulse force of tank roof
C1*W1*X1'=	169,012	Lateral Force, F1 =	8,390	Impulse force of liquid
C1*Wb*Xb' =	158	Lateral Force, Fb =	158	Impulse force of tank bottom
C2*W2*X2'=	60,372	Lateral Force, F2 =	1,789	Convective, or sloshing force

				of the liquid	
M=	74,285	ft lb	Total Lateral Force, Ft =	10,927	lb

5) Check Stability of Tank:

The resisting Moment is Mr = (weight of tank + the weight of fluid) x 1/2 of the base width

weight of tank =	4,156	lb
weight of liquid =	56,842	lb
width of base =	7.5	ft

Mr = 228,742 ft-lb

Safety Factor for overturning = Mr/M

Safety Factor for overturning = **3.08** **> 1.5** **O.K., Tank is stable**

Note that if a tank is found to be unstable that indicates that tank anchors are needed to resist the uplift forces at the base plate to grade interface that will occur during an earthquake. An unstable tank is susceptible to tipping during an earthquake.

6) Check Need for Anchors Due Solely to Lateral Loads

Total weight of liquid	56,842	lb	
Total weight of tank	4,156	lb	
Total weight, W	60,998	lb	
Coefficient of friction =	0.030	Between steel & ice, the worst possible case.	

Frictional Force resisting the total lateral force = W*coefficient of static friction between base plates & grade

Ff = 1,830

Is Ff > Ft * 1.5 **Not true, therefore anchors are needed for lateral seismic forces**

The shear force on each bolt, assuming 4 anchor bolts are used is = 2,732 lb

The anchors should be sized and designed to provide at least this much strength plus a safety margin and a corrosion allowance for the bolts.

7) Check Vertical Forces at Anchor Points
Both Seismic and Dead Load.

Vertical Load, P =	W =	-60,998	lb, this force is given a neagtive sign to indicate a downward
N, number of anchor locations =		4	direction.
For 4 anchor points, I =4*(b/2)^2 =		56.250	sq ft.
c =		3.750	ft

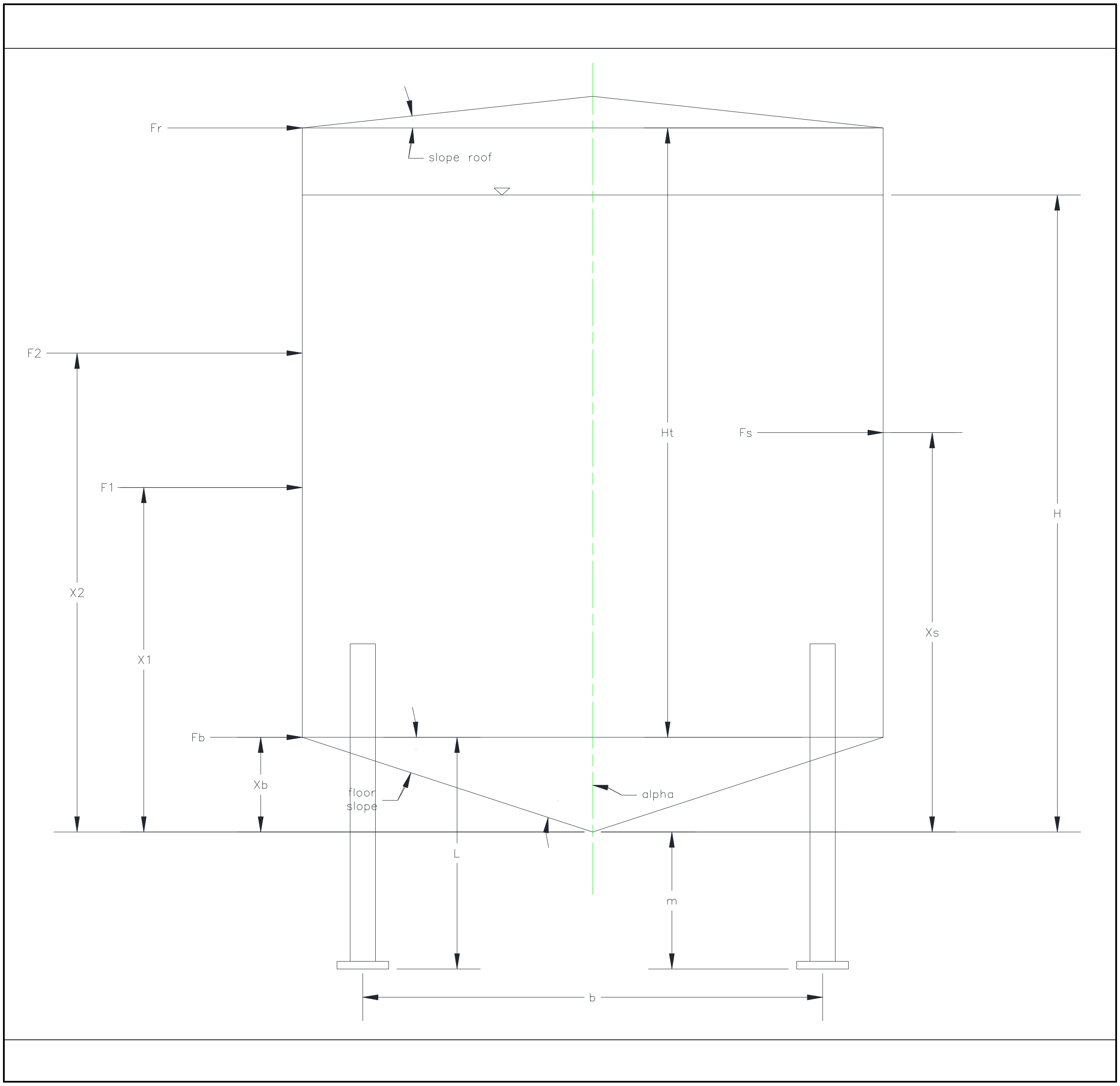
Max anchor forces, F = P/N + - Mc/I

Mc/I =	4,952	lb	
F =	-10,297	lb	If negative that indicates a downward force and
and F =	-20,202	lb	no tension in anchor bolt.

Foot print size of 1 base plate =	100	sq inches
Bearing stress = F/footprint area =	202.0	psi
Allowable compressive strength of the foundation under the base plates =	1,500	psi, the foundation is concrete, and the concrete is assumed to have at least this strength.

Safety factor = 1,500 divided by 202.0 = 7.43

Safety Factor = 7.43 > 1.5 **O.K., Foundation strength is acceptable**


Fr
slope roof
F2
Ht
Fs
F1
H
X2
X1
Xs
Fb
Xb
floor slope
alpha
L
m
b

6.0 Ultrasonic Thickness Data

6.1 Shell Plates UT

The following table details all readings (in) from the shell UT survey. All scan drops were equally spaced at 6.87 ft.

Data and Statistics		North	East	South	West	*Readings Line Average*
Course 2	4	0.181	0.182	0.182	0.185	*0.183*
	3	0.181	0.182	0.182	0.186	*0.183*
	2	0.182	0.183	0.182	0.187	*0.184*
	1	0.181	0.182	0.184	0.187	*0.184*
Course 1	4	0.181	0.182	0.182	0.189	*0.184*
	3	0.181	0.184	0.183	0.188	*0.184*
	2	0.181	0.182	0.183	0.189	*0.184*
	1	0.181	0.182	0.182	0.188	*0.183*
Scan Line Average		*0.181*	*0.182*	*0.183*	*0.187*	*0.183*

The tables below presents the statistics of the thickness readings (in) obtained on the Shell plates.

Course #	Min	Avg	Max
2	0.181	0.183	0.187
1	0.181	0.183	0.189
Global	0.181	0.183	0.189

6.2 Cone Bottom Plates UT

The following table details all readings (in) obtained on the cone bottom plates.

Plate ID \ Reading ID	1	2	3	4	*Avg*
North	0.303	0.304	0.303	0.303	*0.303*
South	0.303	0.303	0.304	0.304	*0.303*
West	0.305	0.305	0.305	0.305	*0.305*
East	0.303	0.303	0.303	0.304	*0.303*
Avg	*0.304*	*0303.*	*0.303*	*0.303*	*0.304*

The table below presents the statistics of the thickness readings obtained on the cone plates.

UT Summary	
Maximum	0.305
Average	0.304
Minimum	0.303

6.3 Fixed Roof Plates UT

The following table details all readings (in) obtained on the Fixed Roof plates.

Plate ID \ Reading ID	1	2	3	4	*Avg*
North	0.187	0.189	0.189	0.188	*0.188*
South	0.186	0.185	0.185	0.186	*0.186*
West	0.186	0.186	0.185	0.186	*0.186*
East	0.186	0.188	0.187	0.189	*0.188*
Avg	*0.186*	*0.187*	*0.187*	*0.187*	*0.187*

The table below presents the statistics of the thickness readings obtained on the roof plates.

UT Summary	
Maximum	0.189
Average	0.187
Minimum	0.185

6.4 Shell Nozzle and Appurtenance Table

Item	Type	Service	Pipe Size (in)	Station (ft)	Center Line Elevation (ft)	Distance From Shell to Flange Face (in)
A	Manway	Access	24.0	0	20.5	5.875
B	Nozzle	Transfer	3.0	9.1	135.0	7.0
C	Nozzle	Transfer	2.0	18.2	129.0	6.75
D	Nozzle	Transfer	2.0	23.0	129.0	7.0
E	Nozzle	Bottom Draw	2.0	N/A	N/A	N/A

Note: The data represented in the weld spacing column is the minimum spacing measured. H, V, or N indicates which is the minimum distance from the nozzle measured. (H=Horizontal Weld, V=Vertical Weld, N=Nozzle Weld)

6.5 Shell Nozzle UT

Item	Type	Service	Pipe Size (in)	Top (in)	Bottom (in)	Right (in)	Left (in)	Flange Thickness (in)	Cover Thickness (in)	Comments
A	Manway	Access	24.0	0.244	0.243	0.242	0.243	0.426	0.493	
B	Nozzle	Transfer	3.0	0.209	0.209	0.210	0.208	0.914	–	
C	Nozzle	Transfer	2.0	0.147	0.148	0.146	0.148	0.698	–	
D	Nozzle	Transfer	2.0	0.145	0.148	0.146	0.148	0.686	–	
E	Nozzle	Bottom Draw	2.0	0.290	0.274	0.267	0278	–	–	

6.6 Fixed Roof Nozzle UT

Item	Type	Service	Pipe Size (in)	North (in)	South (in)	East (in)	West (in)	Comments
AA	Hatch	Access	22.0 x 22.0	0.243	0.241	0.240	0.241	
AB	Nozzle	Vent	4.0	0.209	0.210	0.210	0.208	
AC	Nozzle	HLA	4.0	0.208	0.209	0.211	0.210	

7.0 Shell Corrosion Rates

Course	$t_{previous}$ Previous Thickness (in)	Year Obtained	t_{actual} Actual Thickness (in)	Year Obtained	C_r Corrosion Rate (in/yr.)	t_{min} Minimum Allowable Thickness (in)	R_L Remaining Life (yr.)
2	0.188	1994	0.181	2020	0.00027	0.100	300.57
1	0.188	1994	0.181	2020	0.00027	0.100	300.57

8.0 Photographs

Tank Labeling

Data Plate

Nozzle B

Nozzle B Piping

Ground

Nozzle C

Nozzle D

Tank Support

Tank Support Anchor

Bottom Draw

Bottom Draw Reducer	Roof
	
Roof	Roof
	
Containment Area Overview	Containment Area Overview
	

Containment Area Overview	Containment Area Overview
	
Walkway	Walkway
	
Walkway	Area Overview
	

Ladder


9.0 NDE Equipment Used

The equipment utilized for the inspection of the tank included of the following :

Pit Gauge

Manufacturer	Model	Serial No
W.R. Thorpe	1	1.979.912

Ultrasonic Transducers

Manufacturer	Model	Serial No	MHz	Diameter
Olympus	D790-SM	865199	5	0.375

UT Equipment

Manufacturer	Model	Serial No
Olympus	38DL Plus	130573601
UTT Pole Crawler	MC-2258	1103095

10.0 Inspector Certifications

energy API

AMERICAN PETROLEUM INSTITUTE
Individual Certification Programs: ICP™

API Individual Certification Programs

verifies that

Michael Alec Arpino

has met the requirements for API certification

API-653 Aboveground Storage Tank Inspector

Certification Number *77549*

Original Certification Date *December 31, 2017*

Current Certification Date *December 31, 2017*

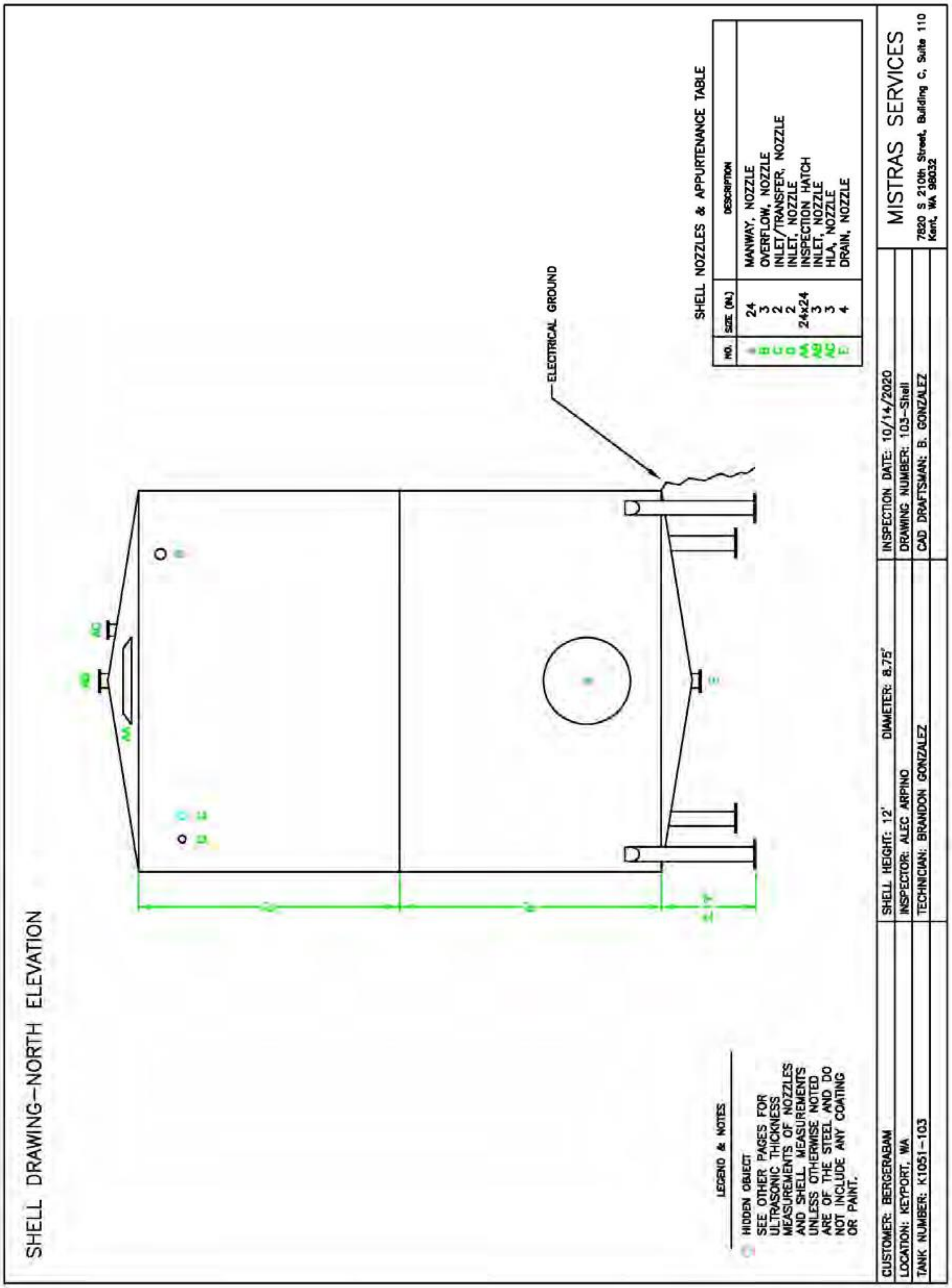
Expiration Date *December 31, 2020*

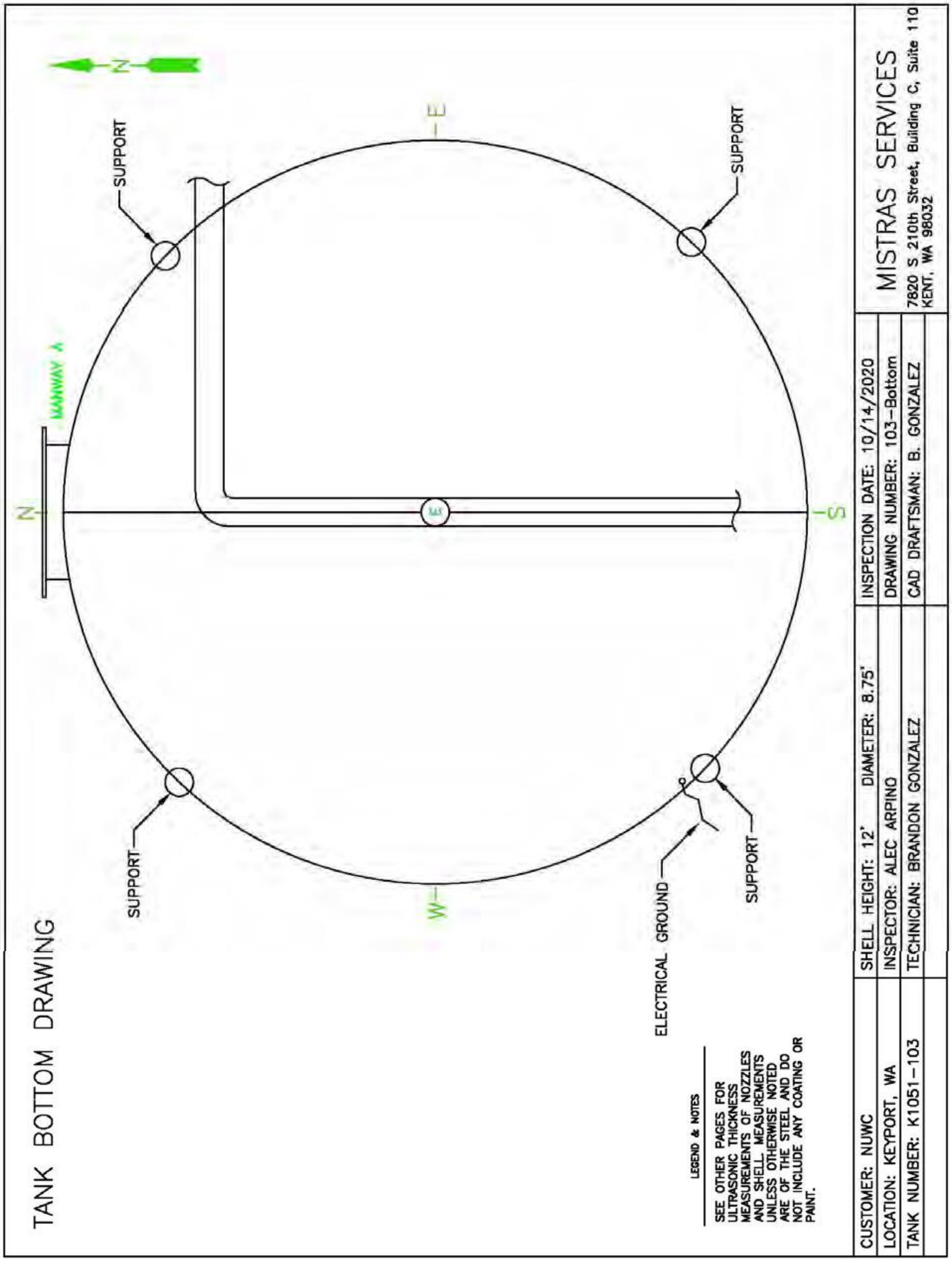
Manager, Individual Certification Programs

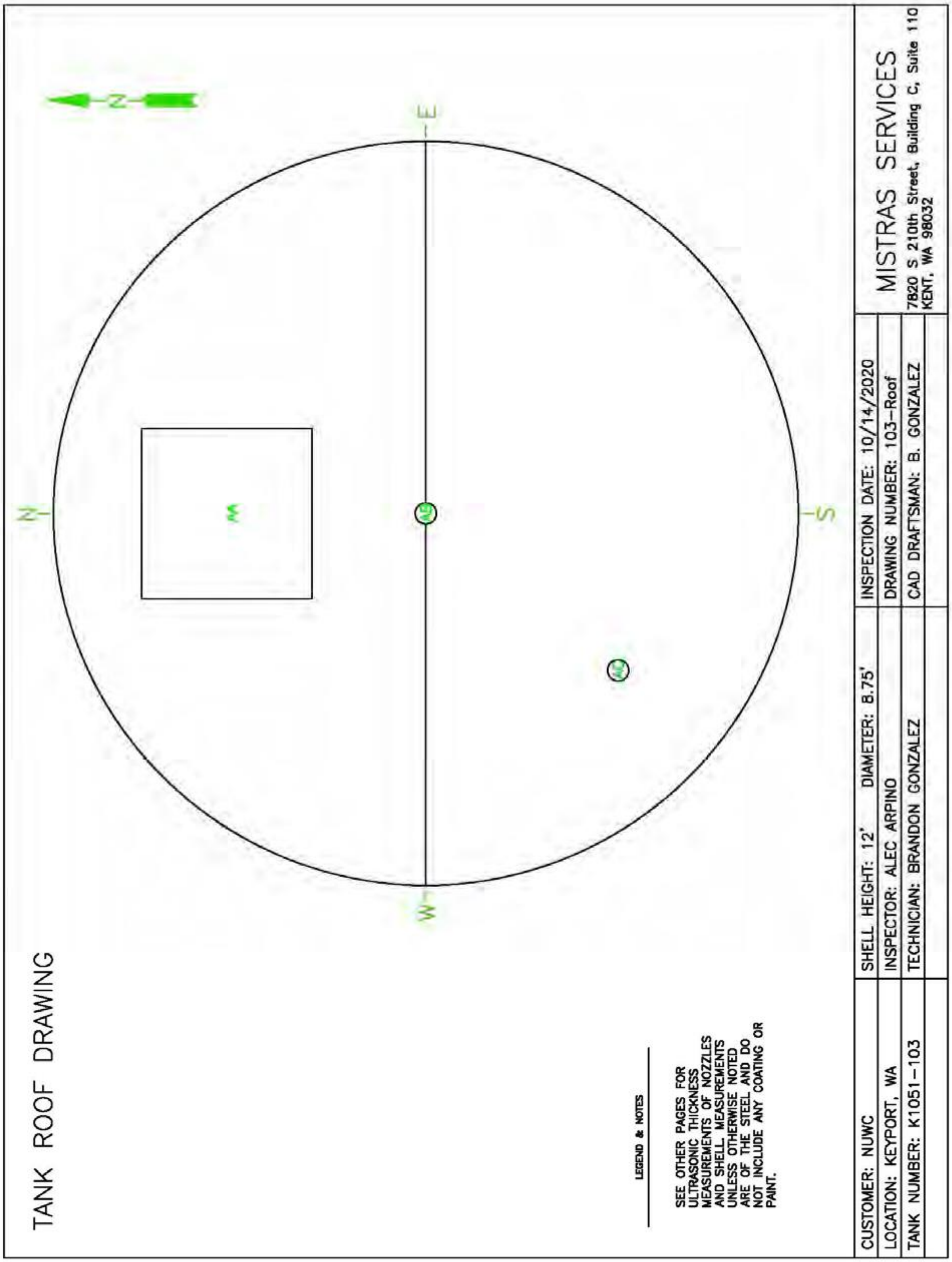
ICP

2015-027 | PDF

11. Drawings


SHELL DRAWING—NORTH ELEVATION
SHELL NOZZLES & APPURTENANCE TABLE
NO.
SIZE (IN.)
DESCRIPTION
24
MANWAY, NOZZLE
3
OVERFLOW, NOZZLE
2
INLET/TRANSFER, NOZZLE
2
INLET, NOZZLE
24x24
INSPECTION HATCH
3
INLET, NOZZLE
3
HLA, NOZZLE
4
DRAIN, NOZZLE
ELECTRICAL GROUND
AD
AC
AA
E
LEGEND & NOTES
HIDDEN OBJECT
SEE OTHER PAGES FOR ULTRASONIC THICKNESS MEASUREMENTS OF NOZZLES AND SHELL MEASUREMENTS UNLESS OTHERWISE NOTED ARE OF THE STEEL AND DO NOT INCLUDE ANY COATING OR PAINT.
CUSTOMER: BERGERABAM
LOCATION: KEYPORT, WA
TANK NUMBER: K1051-103
SHELL HEIGHT: 12'
DIAMETER: 8.75'
INSPECTOR: ALEC ARPINO
TECHNICIAN: BRANDON GONZALEZ
INSPECTION DATE: 10/14/2020
DRAWING NUMBER: 103-Shell
CAD DRAFTSMAN: B. GONZALEZ
MISTRAS SERVICES
7820 S 210th Street, Building C, Suite 110
Kent, WA 98032


TANK BOTTOM DRAWING
N
E
S
W
SUPPORT
SUPPORT
SUPPORT
SUPPORT
MANWAY A
ELECTRICAL GROUND
LEGEND & NOTES
SEE OTHER PAGES FOR ULTRASONIC THICKNESS MEASUREMENTS OF NOZZLES AND SHELL. MEASUREMENTS UNLESS OTHERWISE NOTED ARE OF THE STEEL AND DO NOT INCLUDE ANY COATING OR PAINT.
CUSTOMER: NUWC
LOCATION: KEYPORT, WA
TANK NUMBER: K1051-103
SHELL HEIGHT: 12'
DIAMETER: 8.75'
INSPECTOR: ALEC ARPINO
TECHNICIAN: BRANDON GONZALEZ
INSPECTION DATE: 10/14/2020
DRAWING NUMBER: 103-Bottom
CAD DRAFTSMAN: B. GONZALEZ
MISTRAS SERVICES
7820 S 210th Street, Building C, Suite 110
KENT, WA 98032


TANK ROOF DRAWING
N
E
S
W
LEGEND & NOTES
SEE OTHER PAGES FOR ULTRASONIC THICKNESS MEASUREMENTS OF NOZZLES AND SHELL. MEASUREMENTS UNLESS OTHERWISE NOTED ARE OF THE STEEL AND DO NOT INCLUDE ANY COATING OR PAINT.
CUSTOMER: NUWC
LOCATION: KEYPORT, WA
TANK NUMBER: K1051-103
SHELL HEIGHT: 12'
DIAMETER: 8.75'
INSPECTOR: ALEC ARPINO
TECHNICIAN: BRANDON GONZALEZ
INSPECTION DATE: 10/14/2020
DRAWING NUMBER: 103-Roof
CAD DRAFTSMAN: B. GONZALEZ
MISTRAS SERVICES
7820 S 210th Street, Building C, Suite 110
KENT, WA 98032

12.0 Appendix A – References

References:

1) Washington State Department of Ecology, Dangerous Waste Regulations, Chapter 173-303 WAC
2) Conversations with the client
3) API RP 652, Lining of Above Ground Petroleum Storage Tanks
4) API RP 651, Cathodic Protection of Above Ground Storage Tanks
5) API Guide for the Inspection of Refinery Equipment – Chapter 13, Atmospheric and Low Pressure Tanks
6) API Standard 650, Welded Steel Tanks for Oil Storage
7) API Standard 653, Tank Inspection, Repair, Alteration, and Reconstruction
8) API Standard 620, Design and Construction of Large, Welded, Low Pressure Storage Tanks

APPENDIX F

INSPECTION REPORT TANK K1051-104

WSP

Naval Undersea Warfare Center

Tank K1051-104

In Service Inspection

Above Ground Storage Tank Inspection Report

In accordance with
WAC 173-303-640
Dangerous Waste
Regulations

WSP

Tank K1051-104

In Service Inspection

Keyport, WA

October 14, 2020 to October 14, 2020

Report Number 40865710-6

Prepared By :
7820 South 212th St. St. 110
Kent, WA, 98032

www.mistrasgroup.com

Inspection Date
October 14, 2020

Table of Contents

1.0 Job Information

Job Location :	**Naval Undersea Warfare Center**
	610 Dowell Street
	Keyport, WA
	98345-7610
Customer Representative :	Grace Roberts
Customer Phone Number :	206-431-2295
Job Charge Number :	N442555-15-D-0011-00
Report Number :	40304587-6
Mistras Work Order Number :	T67726-40865710
Inspection Personnel Provided :	Alec Arpino
	API 653 Certified Inspector
	API 653 (77549)/UTT/MT
	Brandon Gonzalez
	Level II Technician
	MFL/UTT/PT

2.0 Tank Inspection Data Sheet

General :

Tank Number	K1051-104
Owner	U.S. Navy
Design Standard	Unknown
Tank Location	Keyport, WA
Product	Otto Fuel/ Alcohol
Specific Gravity	1.23
Manufacturer	Flohr Metal Fabrication
Manufacture Date	1994
Cathodic Protection	No
Data Plate Present	Yes
Data Plate Condition	Good Condition

Dimensions :

Diameter (ft)	8.23
Height (ft)	13.02
Capacity Nominal (Gallons)	5,551.0

Geometry :

Foundation	Concrete Pad with Steel Support Legs
Bottom	Cone Down Butt Welded
Shell	Butt Welded
Fixed Roof Type	Self-Supported Fixed Cone

Access :

Stairway	None
Roof Access	Yes

Coatings :

Bottom	Internal Thin Film Epoxy
Shell	External White
Roof	External White

3.0 Suitability for Service

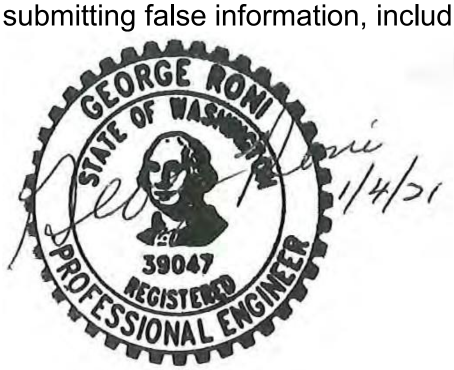
WSP on behalf of the U.S. Navy has contracted Mistras Group, Inc. to perform a in service inspection on Tank K1051-104 located in Building 1051 of the Naval Undersea Warfare Center located in Keyport, WA. This inspection was performed in accordance with the current criteria set forth in WAC 173-303-640 Dangerous Waste Regulations.

There were no issues found that would require repair at this time. The Navy should continue with routine maintenance and observation of the tank. The next formal WAC 173-303-640 inspection should be conducted per the established schedule which is 5 years per the current SPCC Plan for this site.

Tank K1051-104 can be considered suitable for continued service.

TANK 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 fine and imprisonment for knowing violations."[1]



George Roni, P.E.

1) Per WAC 173-303-810 as required by WAC 173-303-640 (2)

Mistras Services has evaluated the condition of this tank based on the observations and measurements made by the tank Inspector. While our evaluation accurately describes the condition of the tank at the time of inspection, the tank owner/operator must independently assess the inspection information/report provided by Mistras Services and any conclusions reached by the tank owner/operator and any action taken or omitted to be taken are the sole responsibility of the owner/operator. With respect to inspection and testing, Mistras Services warrants only that the services have been performed in accordance with accepted industry practice. If any such services fail to meet the foregoing warranty, Mistras Services shall re-perform the service to the same extent and on the same conditions as the original service.

The preceding paragraph sets forth the exclusive remedy for claims based on failure or of defect in materials or services, whether such claim is made in contract or tort (including negligence) and however instituted, and, upon expiration of the warranty period, all such liability shall terminate. The foregoing warranty is exclusive and in lieu of all other warranties, whether written, oral, implied or statutory. NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE SHALL APPLY, nor shall Mistras Services be liable for any loss or damage whatsoever by reason of its failure to discover, report, repair or modify latent defects or defects inherent in the design of any tank inspected. In no event, whether a result of breach of contract, warranty or tort (including negligence) shall Mistras Services be liable for any consequential or incidental damages including, but not limited to, loss of profit or revenues, loss of use of equipment tested or services by Mistras Services or any associated damage to facilities, down-time costs or claims of other damages.

4.0 Inspection Findings

WSP on behalf of the U.S. Navy has contracted Mistras Group, Inc. to perform an in Service Inspection on Tank K1051-104 located in Keyport, WA. This inspection was performed in accordance Washington State Dangerous Waste Regulations WAC 173-303-640 (2).

Tank K1051-104 is a shop built 2 course Above Ground Storage Tank in Otto Fuel/ Alcohol service. This tank is 8.75 feet in diameter, and 13.02 feet in height and is equipped with a Fixed Cone Roof. The following details all inspection findings.

Foundation

This tank was installed on a concrete pad. The tank is elevated above the concrete pad by (4) 4 inch steel pipe support legs. Each support leg has an 8” X 8” X 1/2” steel pad at the base that is anchored to the concrete foundation via (4) 1/2 inch anchor bolts. The anchor bolts are embedded into the concrete foundation and secured at the top of the plate by the nuts.

The steel pipe support legs showed no evidence of dents, deformations, corrosion, pitting or other visible damage. The concrete at the base of each leg showed no evidence of cracking, spalling or broken concrete. The supports, footings, the anchor nuts and bolts are all coated. No coating failure or oxidation was noted.

The anchor nuts and bolts were found to be tight and secure. There was no evidence of elongation, corrosion, pitting or damage to the steel pads or the anchor nuts and bolts.

The tank sits within a below grade epoxy lined concrete vault. The vault appeared to structurally sound and showed no evidence of cracking, spalling or broken concrete. It appears that epoxy coating had been previously repaired at various locations around the vault. The repaired areas and the rest of the epoxy coating appeared well adhered and fluid tight.

The volume of the containment is large enough to contain the contents of the tank in the event of leaks or catastrophic failure, which is in compliance with WAC 173-303-640.

Cone Bottom

The cone bottom in Tank K1051-104 is made up of 2 plates. The nominal floor plate thickness is 0.3125 inches.

The exterior surfaces of the tank showed no evidence of leaks from the plates, the plate to plate weld seams or the bottom to shell weld. There was no evidence of active corrosion, pitting or coating failure occurring on the plates or welds of the bottom. There was no evidence of dents, bulges or other deformations noted on the bottom plates.

At the apex of the bottom there is a 4 inch stainless steel nipple (pipe section) welded to the tank. There was no evidence of leaks from the attachment welds of the nipple to the bottom or the weld to the T-reducer section.

There was no evidence of leaks from the associated piping in the immediate area of the tank bottom attachment.

Shell

The shell on Tank K1051-104 consists of 2 courses and all joints are Butt Welded. A visual inspection and ultrasonic examination of the shell was conducted, the following details all findings.

The bottom of the shell to bottom transition has a reinforcement ring consisting of a 2-1/2 inch angle iron. The top of the reinforcement ring is fully fillet welded and the bottom is stitch welded. There is caulking in between the stitch welds along the bottom. There was no evidence of weld failures or deformations noted to the reinforcement ring.

There was no evidence of bulges, dents or abnormal deformations noted to the tank shell. There was no evidence of leaks in the shell plates, shell to shell horizontal or vertical welds, the shell to cone weld or the shell to roof weld. There was no evidence of active corrosion or pitting noted on the shell exterior.

The shell coating appeared to be in very good condition.

The shell plates were ultrasonically inspected externally to verify the remaining thickness of the shell plates. Ultrasonic thickness readings were obtained on the shell in 4 equally spaced locations at approximately 6.68 feet. Each scan was conducted in one of the 4 cardinal directions. A total of 4 readings per course were obtained.

Section 6.1 of this report details all ultrasonic thickness (UT) readings obtained, detailing the low's to highs per course. There were no abnormally low readings noted on the shell. The lowest reading of 0.180 was located at the top of the 2nd course on the West drop.

Shell Nozzles

A visual inspection and ultrasonic examination of all accessible shell nozzles and manways was conducted to evaluate the current condition of each nozzle. Visual inspection of each nozzle included evaluation of the external neck, all attachment welds, and flange faces.

There was no evidence of leaks from the nozzle attachment welds, the flanges, the flange bolting and associated valves or nearby attached piping. There is no evidence of coating failure occurring on the nozzles or couplings.

The attached piping appears to be stainless steel and the nozzles are carbon steel with the exception of pipe nipple E which is stainless steel. There is no evidence of galvanic reactions taking place due to the dissimilar metals. The flange faces appear to be raised and have Teflon type PTFE gasket material. The nozzle bolting appears tight and secure with proper thread engagements on the bolting.

All nozzles and manways were ultrasonically inspected (UT) by recording four readings on the top, bottom and both sides of each neck, one reading on each flange and the manway cover. There were no abnormally low thickness readings obtained. Section 6.5 details all data from UT exam.

Fixed Roof

The roof plates on Tank K1051-104 have a nominal thickness of 0.187 inches. The fixed roof plates were ultrasonically examined to determine the average remaining thickness. A total of 16 readings were obtained on the roof, four readings per each cardinal direction. There was no evidence of thinning or corrosion on the roof plates. Section 6.3 details all the data from the UT exam.

The fixed roof plates were visually inspected. All plates were evaluated to determine the condition of the external coating system. Aside from a coating of dust the roof coating is in good condition. There was no evidence of corrosion, pitting, dents, bulges or other deformations to the roof plates.

There was no evidence of leaks in the roof plates, the roof plate to plate welds or the shell to roof weld.

Fixed Roof Nozzles

All fixed roof nozzles, nipples and couplings were visually inspected. The following details the findings from this inspection.

All roof nozzles were ultrasonically inspected to verify remaining thickness. A total of 4 readings per nozzle were obtained. All fixed roof nozzles and couplings were visually inspected. The following details the findings from this inspection.

There was no evidence of leaks from the roof nozzle and coupling attachment welds, flanges, flange bolting, threaded connections, associated valves or attached piping in the immediate area around the piping.

The roof top manway cover is securely attached to the roof with a hinge pin. There was no damage noted to the pin or the cover. There is a 3 inch nozzle attached to the manway cover for the liquid level float and tape gauge system. The system was not operated but appeared to be in satisfactory condition. There was no evident damage to the 3 inch nozzle or the flange face. The manway showed no evidence of coating failure, corrosion, pitting or other damage.

The 4 inch center roof vent piping runs to outside the building. The piping goes through the East wall and appears to have a pressure/vacuum style vent attached at the end of the piping run. The vent was unable to be inspected at the time of inspection due to its location and inaccessibility. The pressure/vacuum vent appeared to be in acceptable condition from the ground with no obvious visual damage noted.

All roof nozzles were ultrasonically inspected to verify remaining thickness. A total of 4 readings per nozzle were obtained. There were no abnormally low readings noted on the roof nozzles. Section 6.6 details the data from the UT exam.

Access Ways & Handrails

The roof is accessible from a free standing ladder and catwalk system. This catwalk is used to access all the tanks inside the containment for visual inspections and gauging purposes.

The ladder and the catwalk are in acceptable condition. There was no damage noted to the ladder frame or rungs. The steps showed no signs of damage to the frame, the treads or the handrails. The catwalk showed no damage to the frame, the grating or the handrails. Much of the handrail was covered in black plastic during the inspection.

The catwalk supports are 3” X 3” square piping uprights that are anchored to the concrete by (2) 3/4 inch anchor bolts at each support location. There is 2-1/2 inch angle iron braces used as cross bracing. There were no evident weld failures, damage to the support structures, attachment hardware or the anchorage locations. The attachment hardware appears to be tight and secure. The catwalk grating is galvanized and in acceptable condition. The grating is tack welded into place. There were no signs of weld failure. There was no evidence of corrosion caused thinning or holes noted in the grating.

The 2 inch steel pipe handrails are 42 inches high at the top rail, 24 inches at the mid-rail with 4 inch toe boards. There were no signs of holes, corrosion or pitting noted in the top rail, the mid-rail or the uprights.

Miscellaneous Appurtenances

For product level gauging, this tank is equipped with a float and tape style gauging system. This unit was found to be in what appears to be visually acceptable condition with no apparent damage. The unit was not operated at the time of inspection.

The tank is equipped with a Delta Controls roof transponder. The unit model is an 872C-V-10-2NPT-6SE-IS-CC with a serial number of UGD9966-A2. The unit appeared in satisfactory condition with no apparent damage to the unit noted.

For electrical safety issues and lightning protection, this tank is equipped with (1) 1/2 inch braided grounding cable. The cable was found to be satisfactory condition. The cable is attached to the reinforcement ring on one end and attached to a grounding bar that is embedded into the concrete foundation.

Inspectors Signature: ______________________________

Alec Arpino
API 653
Certification No. 77549 Exp. 12/31/2023

Reviewed by:

____
George Roni, PE
API 653 Cert. No. 2042, Exp. 4/30/23

Mistras Services has evaluated the condition of this tank based on the observations and measurements made by the tank Inspector. While our evaluation accurately describes the condition of the tank at the time of inspection, the tank owner/operator must independently assess the inspection information/report provided by Mistras Services and any conclusions reached by the tank owner/operator and any action taken or omitted to be taken are the sole responsibility of the owner/operator. With respect to inspection and testing, Mistras Services warrants only that the services have been performed in accordance with accepted industry practice. If any such services fail to meet the foregoing warranty, Mistras Services shall re-perform the service to the same extent and on the same conditions as the original service.

The preceding paragraph sets forth the exclusive remedy for claims based on failure or of defect in materials or services, whether such claim is made in contract or tort (including negligence) and however instituted, and, upon expiration of the warranty period, all such liability shall terminate. The foregoing warranty is exclusive and in lieu of all other warranties, whether written, oral, implied or statutory. NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE SHALL APPLY, nor shall Mistras Services be liable for any loss or damage whatsoever by reason of its failure to discover, report, repair or modify latent defects or defects inherent in the design of any tank inspected. In no event, whether a result of breach of contract, warranty or tort (including negligence) shall Mistras Services be liable for any consequential or incidental damages including, but not limited to,

5.0 Calculations
5.1 Thickness Calculations
Calculations for Shell & Cone-Shaped Tank Bottom - per API 620

Date of Inspection:	10/14/2020				
Owner	NUWC				
Tank No.	K1051-104				
Diameter, D	8.750	ft	105.00	inches	
Shell Height, H	12.000	ft	144.00	inches	
Fill Height	12.000	ft	144.00	inches	
Original Shell thickness	0.188	inches			
Measured Shell thickness, t_c	0.183	inches			
Original Cone thickness	0.330	inches			
Measured Cone thickness, t_h	0.303	inches			
Specific Gravity of contents of tank, SG	1.230				
Depth of Cone, d	12.25	inches	1.0208	ft	
S, allowable tensile stress of shell & cone	15,200	psi			
Joint Efficiency cone-to-shell & long cone joints, E_1	0.70				
Joint Efficiency shell vertical joints, E_2	0.70				
Operating Pressure at top of tank, P_o	0.00	psi	0	psf	

Note that per API 620 the max. operating pressure at top of tank is 15 psig.

O.D. of connection at bottom of cone (if none enter 0)	4.50	inches			
1/2 Apex angle, alpha = a	1.331679	radians	76.2996	degrees	
Total Pressure, P at plane AA	921.02	psf (includes hydrostatic head + P_o)		6.40	psi

Plane AA is at the Spring Line.

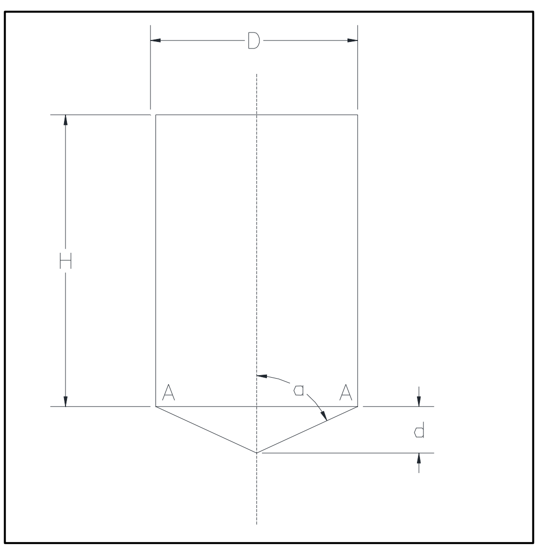


Figure No. A1

1) Shell Unit Forces @ Plane AA, See Figure No. A2

Sum F_x = 0

$2T_{2s}$ = PD

T_{2s} = PD/2

T_{2s} = 336 lb/in

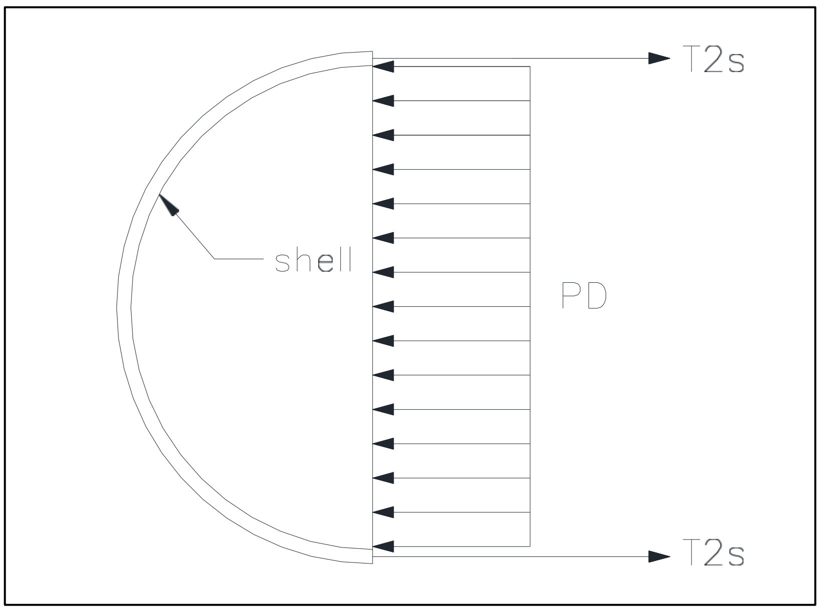


Figure No. A2

2) Cone unit force, T_2, the latitudinal unit force. Also known as the circumferential unit force.
See Figure No. A3

R_2, radius of curvature of cone at A

R_2 = AB/cos(a)

R_2 = 221.664 inches

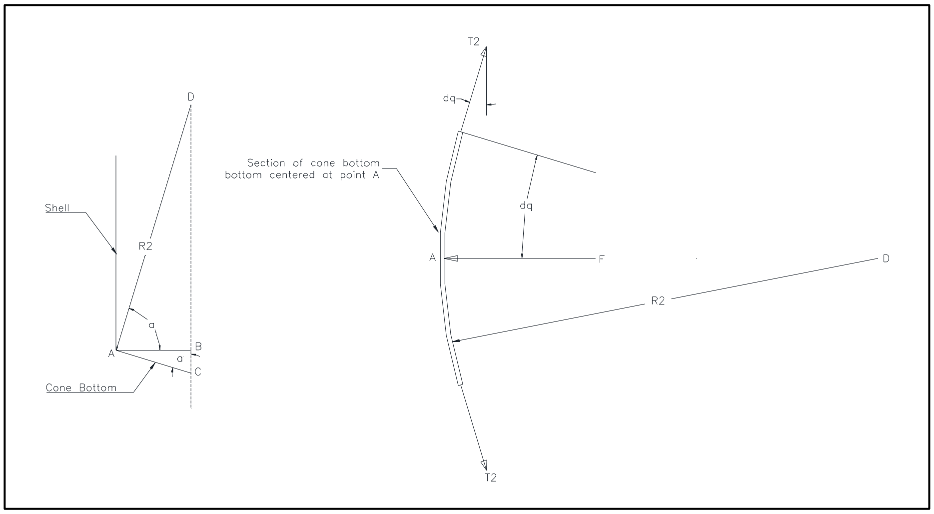


Figure No. A3

Sum of $F_x = 0$

F = the force on 1 inch wide section of cone at point A with an infinitesimal arc length = 2 x dq

$F = P(1)(2)(dq)(R_2)$

$F = 2PdqR_2$

$F - 2T_2*Sin(dq) = 0$

$2PdqR_2 = 2T_2Sin(dq)$ and for small dq, $Sin(dq) = dq$

$PR_2 = T_2$

$T_2 = PR_2$

$T_2 =$ 1418 lb/in

3) Cone unit force, T_1, the Meridional unit force. See Figure No. A4

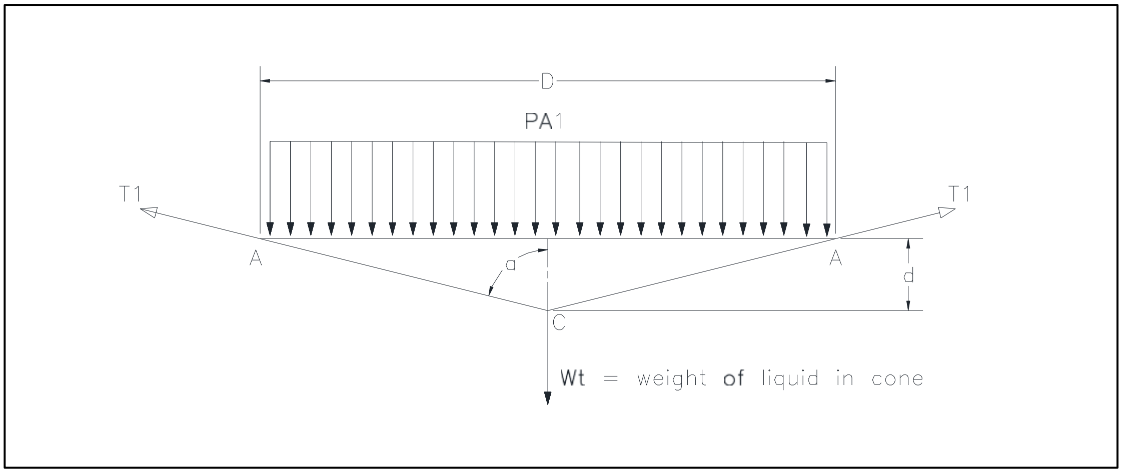


Figure No. A4

$A_1 = PI/4 * D^2$

A_1 = 8659.015 square inches 60.13205 square feet

V, Volume of Cone = (PI*D/2*D/2*d)/3
V = 20.461599 ft^3

W_t = SG* 62.4 lb/ft^3 * V
W_t = 1,570 lb

Sum F_y = 0
T_1Cos(a)PI*D - W_t -PA_1 =0
T_1 = (W_t + PA_1)/Cos(a)PI*D
T_1 = 729 lb/in

4) Knuckle Region Reinforcement Check per API 620 3.12

The measured cone bottom thickness is defined as t_h here, t_h =	0.303	inches
The measured shell thickness is defined as t_c here, t_c =	0.183	inches
R_2, radius of curvature of cone at A =	221.66	inches
R_c, radius of curvature shell =	52.5	inches

w_h = 0.6* sqrt(R_2 *t_h)
w_h = 4.917226 inches

w_c = 0.6* sqrt(R_c *t_c)
w_c = 1.859758 inches

Additional attached reinforcement area Ad
Ad = $\boxed{1.1875}$

Available reinforcing area, A_a = w_h*t_h + w_c*t_c+Ad
A_a = 3.017755 sq inches

T_1 = 729 lb/in
T_{2s} = 336 lb/in
T_2 = 1418 lb/in

Per API 620, the magnitude of the total circumferential force acting on any vertical cross section through the compression ring region shall be computed as follows:

Q = T_2w_h + $T_{2s}w_c$ -T_1R_cSin(a) Note that if Q is negative, compression is indicated.
Q = 6,971 + 624 - 37,183
Q = -29,587

A_c, the required compression ring reinforcing area = Q/15,000
A_c = 1.972449 sq. inches

A_a	>	Ac	
3.017755	>	1.9724489	TRUE

and since Q is negative the following condition must be true also.

$w_h Sin(a)$	>	$0.015 * R_c$	
4.777319	>	0.7875	TRUE

Since both conditions are true, knuckle region is adequately reinforced.

5) Check Measured Shell Thickness vs Required Shell Thickness

The required shell thickness is $t_{cr} = T_{2s}/SE_2$

0.031559 However, thickness must be at least 0.100" per API 653, so final required shell thickness is 0.100

t_c	>	t_{cr}	
0.183	>	0.100	TRUE

6) Check Measured Cone Bottom Thickness vs Required Cone Bottom Thickness at Plane A-A

The required cone thickness, t_{hr}, is the greater of the following 2 formulas

$t_{hr} = T_1/SE_1$ or $t_{hr} = T_2/SE_1$

$t_{hr} =$ 0.068513 $t_{hr} =$ 0.133248

$t_{hr} =$ 0.133248 However, thickness must be at least 0.100" per API 653, so final required cone bottom thickness is: $t_{hr} =$ 0.133 inches

t_h	>	t_{hr}	
0.303		0.133	TRUE

7) Tank Volume or Capacity Calculation

V_{total} = Volume of Cone + Volume of Shell

20.4616 ft^3 + (PI/4) $*D^2*H$

20.4616 + 721.5846

$V_{total} =$ 742 ft^3 or 5,551 gallons

5.2 Seismic Calculations

SEISMIC ANALYSIS
For Tank Supported above grade on legs

1) Input Data

Tank Location			Keyport, WA				
Tank no.			K1051-104				
dia, D			8.75	ft		8.75	
shell height, Ht			12	ft			
fill height, H			12	ft. This is height from top liquid surface to bottom of tank.			
floor thk			0.318	in			
roof thk			0.190	in			
slope roof, ϑ	0.062418	radians	3.5763	degrees	This is standard slope of 3/4" in 12".		
shell thk, t			0.188	in			
sg liquid, G			1.230				
density steel			490	lb/sq ft			
Proportion of roof supported by shell			1	1 indicates 100%.			
Seismic zone factor, Z			0.300	See fig E-1 & Table E-2			
Importance Factor			1.00	See E.3.1			
Site coefficient			1.5	See table E-3			
Lateral force coefficient, C1			0.6				
For cone bottom supported above the grade, the depth of cone, Xb			1.125	feet			
Height, L that shell sup above grade			2.20833	feet			
Height from bottom of tank to grade, m			1.08333	feet			
b, the width of the base			6.7	feet			
Slope floor, a	0.25169	radians	14.42077	degrees			
1/2 apex angle of cone floor =			1.319106	radians	75.57923	degrees	
		Radius	4.375	ft			
		D/H	0.7292	The diameter/fill height ratio from above			

2) Weights

a) Shell

Plate Area	330	sq ft
plate weight/sq ft	7.677	lb/sq ft
weight shell plate	2,532	lb
misc shell weight	200	lb
Total shell weight	2,732	lb

b) Roof

no. Rafters	0	
length rafters	0	
Type of rafter (shape)		
lb/ft rafters	0	lb/ft
weight rafters	0	lb
Plate Area = PI*(r/cos(ϑ))^2		
Plate Area	60.37	sq ft
plate weight/sq ft	7.758	lb/sq ft
Plate weight	468	lb
snow load	0	lb
misc weight	100	lb
Total Roof weight, Wr	568	lb

c) Cone Bottom

Plate Area = PI*(r/cos(gamma))^2		
Plate Area	64.11	sq ft
plate weight/sq ft	12.985	lb/sq ft
Plate weight	832	lb
misc weight	100	lb
Bottom weight,Wb	932	lb

3) Determination of Additional Seismic Inputs

Natural period of 1st sloshing mode, T

T = k* sq root (D)		For D/H =	0.73	k =	0.58	from Figure E-4
T	1.716	seconds		S =	1.5	from table E-3
Is T < 4.5s?	true, so C2=0.75S/T					

C2 = 0.75S/T
C2 0.656

W1 & W2
D/H = 0.73

The weight of liquid, Wt

Wtshell = pi/4*D^2*62.4*sg*Ht
4,615 x Ht
Wtshell = 55,383 lb

Wtcone = ((pi*r^2*depth of cone)/3)*62.4*sg
Wtcone = 1,407 lb

Wt = Wtshell + Wtcone
Wt 56,790 lb

W1 = Wt*W1/Wt		W1/Wt =	0.850	from fig E-2
W1	48,272	lb		
W2		W2/Wt =	0.180	from fig E-2
W2	10,222	lb		

X1 & X2

X1/H =	0.45	from fig E-3	0.45
X1=	5.40	ft	
X2/H =	0.82	from fig E-3	0.82
X2	9.84		

Xs = height from cg of shell to bottom of tank = 7.125 feet

4) Calculation of Overturning Moment, M

M = Z*I*(C1*Ws*Xs'+C1*Wr*Ht'+C1*Wb*Xb'+C1*W1*X1'+C2*W2*X2') ft lb

m	1.08333	see above
Z	0.3	see above
I	1	see above
C1	0.6	see above
C2	0.656	see above
Ws	2,732	shell weight
Xs'	8.21	the height from grade to Fs
Wr	568	roof weight
Wb	932	bottom weight
Xb'	2	the height from the grade to Fb
Ht'	14.21	the height from grade to Fr
W1	48,272	effective weight of liquid responsible for impulse force
X1'	6.48	the height from the grade to F1
W2	10,222	effective weight of liquid responsible for sloshing or convective force of liquid.
X2'	10.92	the height from the grade to F2

Z*I =	0.3			
C1*Ws*Xs'=	13,456	Lateral Force, Fs =	492	Impulse force of tank shell
C1*Wr*Ht'=	4,845	Lateral Force, Fr =	102	Impulse force of tank roof
C1*W1*X1'=	187,777	Lateral Force, F1 =	8,689	Impulse force of liquid
C1*Wb*Xb' =	168	Lateral Force, Fb =	168	Impulse force of tank bottom
C2*W2*X2'=	73,219	Lateral Force, F2 =	2,011	Convective, or sloshing force of the liquid

M=	83,839	ft lb	Total Lateral Force, Ft =	11,462	lb

5) Check Stability of Tank:

The resisting Moment is Mr = (weight of tank + the weight of fluid) x 1/2 of the base width

weight of tank =	4,233	lb
weight of liquid =	56,790	lb
width of base =	6.7	ft

Mr = 204,428 ft-lb

Safety Factor for overturning = Mr/M

Safety Factor for overturning = **2.44** **> 1.5** **O.K., Tank is stable**

Note that if a tank is found to be unstable that indicates that tank anchors are needed to resist the uplift forces at the base plate to grade interface that will occur during an earthquake. An unstable tank is susceptible to tipping during an earthquake.

6) Check Need for Anchors Due Solely to Lateral Loads

Total weight of liquid	56,790	lb
Total weight of tank	4,233	lb
Total weight, W	61,023	lb
Coefficient of friction =	0.030	Between steel & ice, the worst possible case.

Frictional Force resisting the total lateral force = W*coefficient of static friction between base plates & grade

Ff = 1,831

Is Ff > Ft * 1.5 **Not true, therefore anchors are needed for lateral seismic forces**

The shear force on each bolt, using 16 anchor bolts = 716 lb

The anchors should be sized and designed to provide at least this much strength plus a safety margin and a corrosion allowance for the bolts.

The 4 ea. 1/2 inch anchor bolts provide adequate strength to resist this shear force.

7) Check Vertical Forces at Anchor Points
Both Seismic and Dead Load.

Vertical Load, P =	W =	-61,023	lb, this force is given a negative sign to indicate a downward
N, number of anchor locations =		4	direction.
For 4 anchor points, I =4*(b/2)^2 =		44.890	sq ft.
c =		3.350	ft

Max anchor forces, F = P/N + - Mc/I

Mc/I =	6,257	lb	
F =	-8,999	lb	If negative that indicates a downward force and no tension in anchor bolt.
and F =	-21,512	lb	

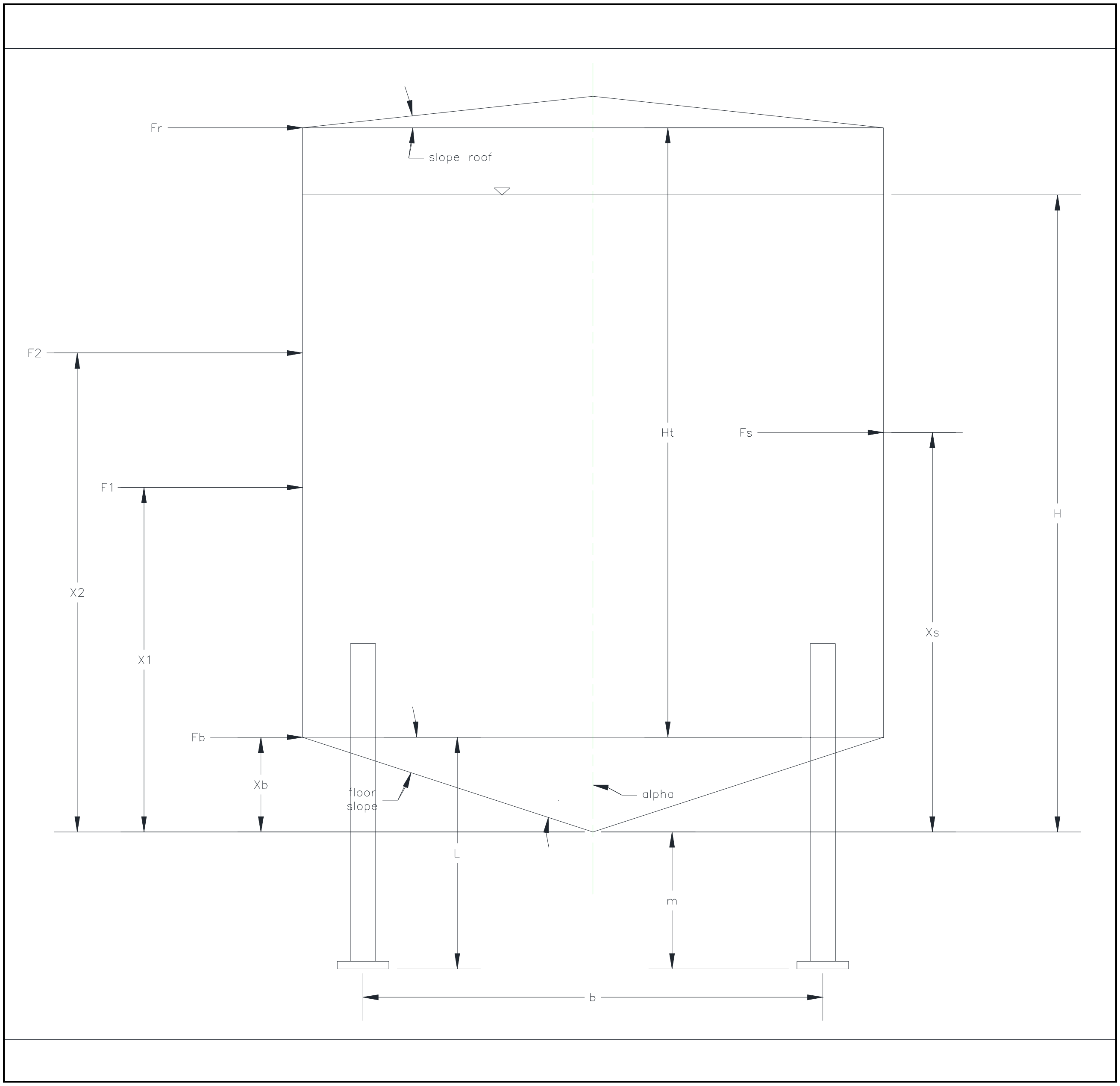
Foot print size of 1 base plate = 64 sq inches

Bearing stress = F/footprint area = 336.1 psi

Allowable compressive strength of the foundation under the base plates = 1,500 psi, the foundation is concrete, and the concrete is assumed to have at least this strength.

Safety factor = 1,500 divided by 336.1 = 4.46

Safety Factor = 4.46 > 1.5 O.K., Foundation strength is acceptable


Fr
slope roof
F2
Ht
Fs
F1
H
X2
X1
Xs
Fb
Xb
floor slope
alpha
L
m
b

6.0 Ultrasonic Thickness Data

6.1 Shell Plates UT

The following table details all readings (in) from the shell UT survey. All scan drops were equally spaced at 6.87 ft.

Data and Statistics		North	East	South	West	*Readings Line Average*
Course 2	**4**	0.185	0.183	0.185	0.183	0.184
	3	0.184	0.183	0.185	0.185	0.184
	2	0.183	0.185	0.185	0.181	0.183
	1	0.183	0.183	0.185	0.180	0.183
Course 1	**4**	0.183	0.185	0.186	0.186	0.185
	3	0.184	0.184	0.187	0.185	0.185
	2	0.183	0.185	0.186	0.184	0.185
	1	0.183	0.185	0.187	0.184	0.185
Scan Line Average		0.186	0.183	0.184	0.186	0.184

The tables below presents the statistics of the thickness readings (in) obtained on the Shell plates.

Course #	Min	Avg	Max
2	0.180	0.184	0.185
1	0.183	0.185	0.187
Global	0.180	0.184	0.187

6.2 Cone Bottom Plates UT

The following table details all readings (in) obtained on the cone bottom plates.

Plate ID \ Reading ID	1	2	3	4	5	6	7	8	*Avg*
North to South	0.305	0.305	0.307	0.305	0.305	0.306	0.308	0.311	0.307
East to West	0.309	0.311	0.312	0.303	0.310	0.308	0.308	0.310	0.309
Avg	0.307	0.308	0.310	0.304	0.308	0.307	0.308	0.310	0.308

The table below presents the statistics of the thickness readings obtained on the floor plates.

UT Summary	
Maximum	0.312
Average	0.308
Minimum	0.303

The following chart depicts the minimum thickness reading per plate

6.3 Fixed Roof Plates UT

The following table details all readings (in) obtained on the Fixed Roof plates.

Plate ID \ Reading ID	1	2	3	4	5	6	7	8	*Avg*
North to South	0.189	0.188	0.189	0.190	0.190	0.191	0.188	0.189	0.189
East to West	0.190	0.189	0.187	0.188	0.188	0.188	0.189	0.187	0.188
Avg	0.189	0.188	0.188	0.189	0.189	0.189	0.188	0.188	0.189

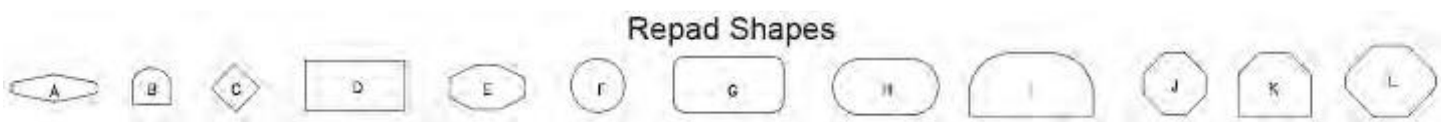
The table below presents the statistics of the thickness readings obtained on the roof plates.

UT Summary	
Maximum	0.191
Average	0.189
Minimum	0.187

6.4 Shell Nozzle and Appurtenance Table

Item	Type	Service	Pipe Size (in)	Station (ft)	Center Line Elevation (ft)	Distance From Shell to Flange Face (in)
A	Manway	Access	24.0	0	20.5	5.875
B	Nozzle	Transfer	3.0	9.1	135	7
C	Nozzle	Transfer	2.0	18.2	129	6.75
D	Nozzle	Transfer	2.0	23	129	7
E	Pipe Nipple	Bottom Draw	4.0	–	–	–

Note: The data represented in the weld spacing column is the minimum spacing measured. H, V, or N indicates which is the minimum distance from the nozzle measured. (H=Horizontal Weld, V=Vertical Weld, N=Nozzle Weld)



6.5 Shell Nozzle UT

Item	Type	Service	Pipe Size (in)	Top (in)	Bottom (in)	Right (in)	Left (in)	Repad Thickness (in)	Flange Thickness (in)	Cover Thickness (in)	Comments
A	Manway	Access	24.0	0.241	0.241	0.243	0.244	–	0.498	0.490	
B	Nozzle	Transfer	3.0	0.208	0.210	0.209	0.210	–	0.961	–	
C	Nozzle	Transfer	2.0	0.145	0.148	0.148	0.148	–	0.685	–	
D	Nozzle	Transfer	2.0	0.148	0.148	0.149	0.148	–	0.725	–	
E	Pipe Nipple	Bottom Draw	4.0	0.109	0.108	0.112	0.107	–	–	–	Stainless Steel

6.6 Fixed Roof Nozzle UT

Item	Type	Service	Pipe Size (in)	North (in)	South (in)	East (in)	West (in)	Comments
AA	Hatch	Access	22.0 x 22.0	0.243	0.243	0.243	0.243	
AB	Coupling	Air Line	0.50	–	–	–	–	
AC	Nozzle	HLA	3.0	0.209	0.210	0.210	0.208	
AD	Nozzle	Vent	3.0	0.211	0.214	0.211	0.209	

7.0 Shell Corrosion Rates

Course	$t_{previous}$ Previous Thickness (in)	Year Obtained	t_{actual} Actual Thickness (in)	Year Obtained	C_r Corrosion Rate (in/yr.)	t_{min} Minimum Allowable Thickness (in)	R_L Remaining Life (yr.)
2	0.188	1994	0.180	2020	0.00031	0.100	257.89
1	0.188	1994	0.183	2020	0.00019	0.100	428.10

8.0 Photographs

Tank Labeling

Data Plate

Manway

Ground

Nozzle B	Nozzle C
	
Nozzle D	**Nozzle E (Bottom Draw)**
	
Nozzle E (Bottom Draw)	**Roof**
	

Roof

Area Overview

Area Overview

Area Overview

Walkway

Walkway

Walkway	Area Overview
	
Ladder	
	

9.0 NDE Equipment Used

The equipment utilized for the inspection of the tank included of the following :

Pit Gauge

Manufacturer	Model	Serial No
W.R. Thorpe	1	1.979.912

Ultrasonic Transducers

Manufacturer	Model	Serial No	MHz	Diameter
Olympus	D790-SM	865199	5	0.375

UT Equipment

Manufacturer	Model	Serial No
Olympus	38DL Plus	130573601
UTT Pole Crawler	MC-2258	1103095

10.0 Inspector Certifications

AMERICAN PETROLEUM INSTITUTE
Individual Certification Programs: ICP

API Individual Certification Programs
verifies that

Michael Alec Arpino

has met the requirements for API certification

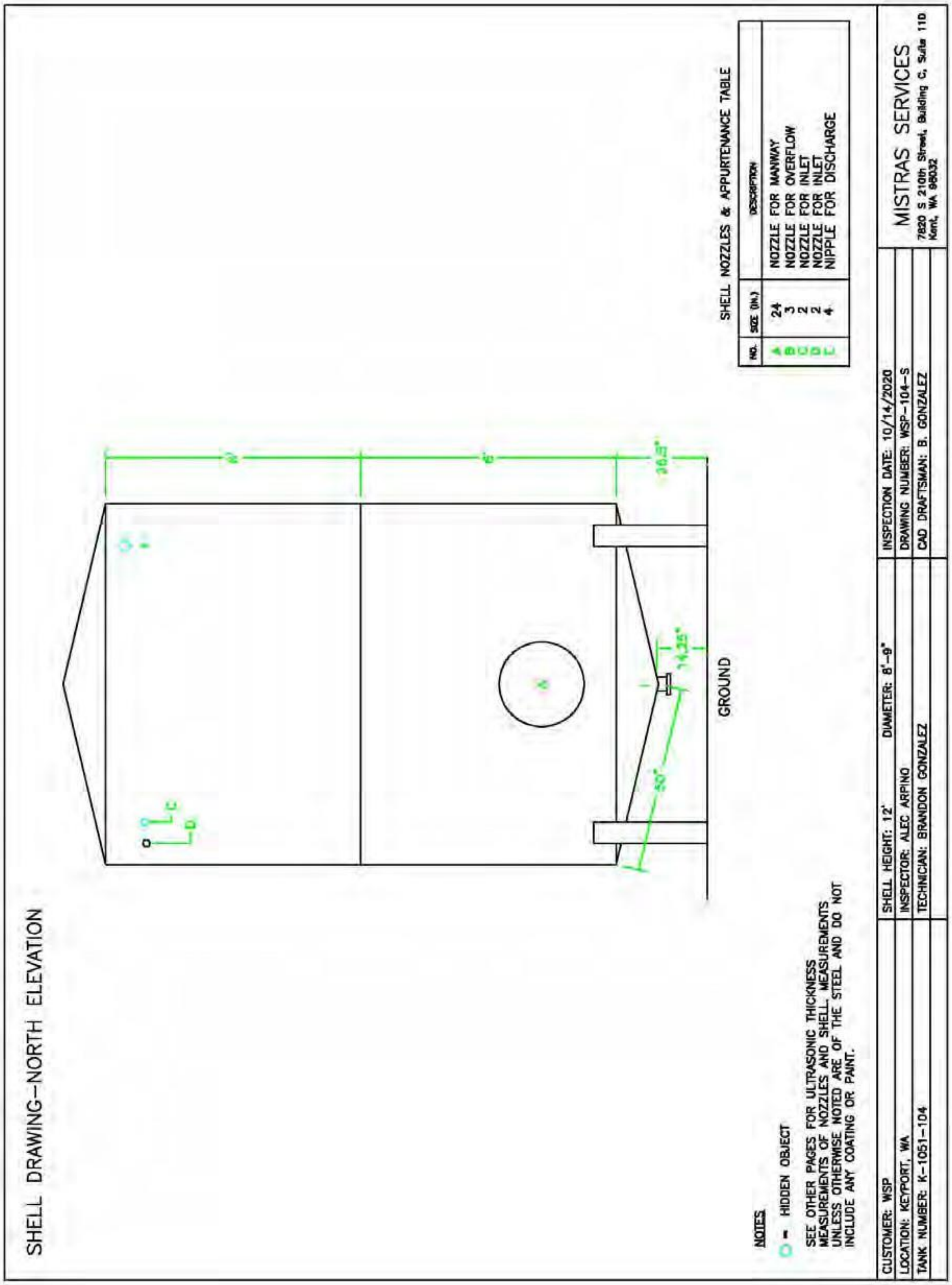
API-653 Aboveground Storage Tank Inspector

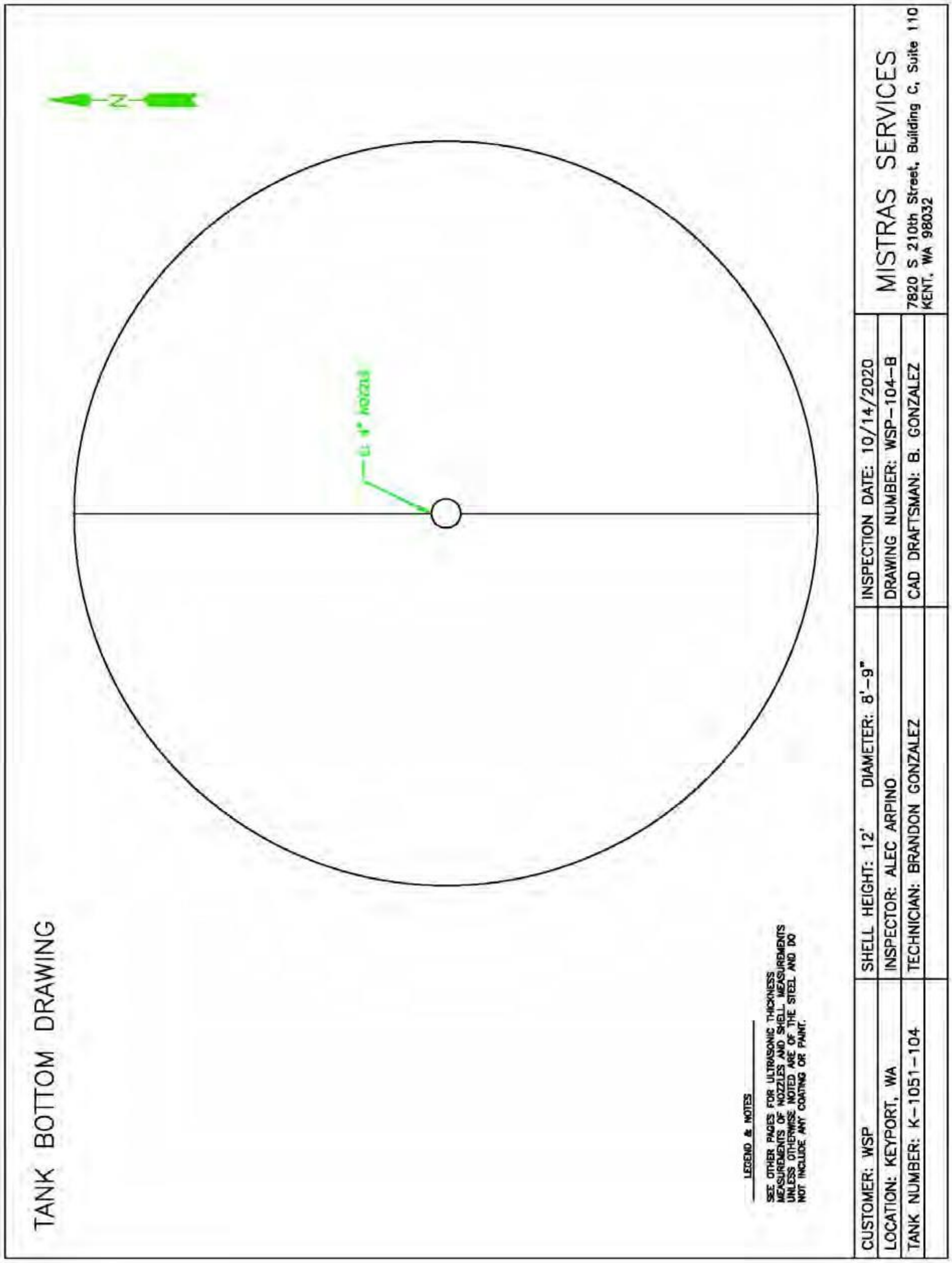
Certification Number	77549
Original Certification Date	December 31, 2017
Current Certification Date	December 31, 2017
Expiration Date	December 31, 2020

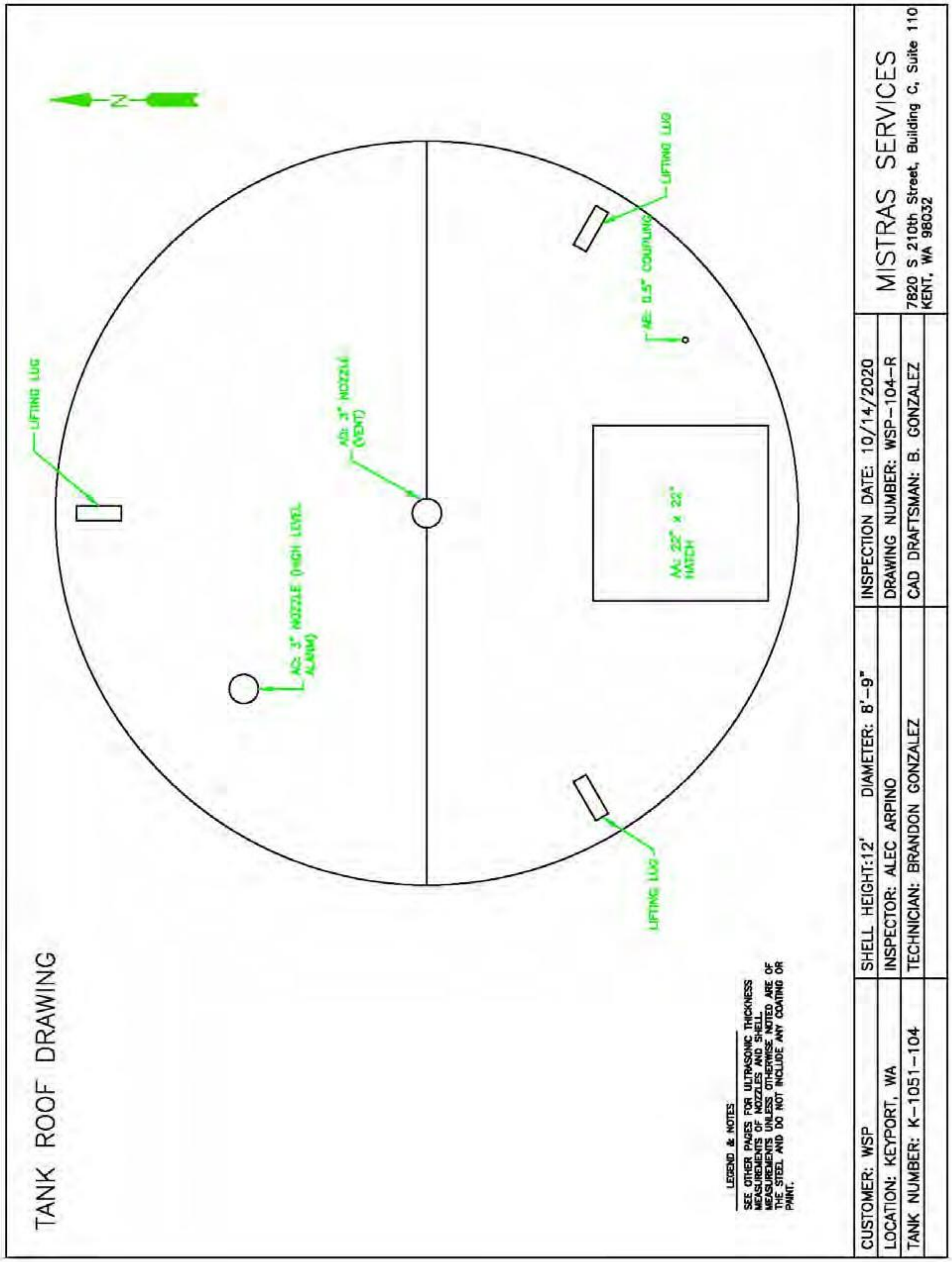
Manager, Individual Certification Programs

ICP

11.0 Drawings




N
℄ 4" NOZZLE
TANK BOTTOM DRAWING
LEGEND & NOTES
SEE OTHER PAGES FOR ULTRASONIC THICKNESS MEASUREMENTS OF NOZZLES AND SHELL MEASUREMENTS UNLESS OTHERWISE NOTED ARE OF THE STEEL AND DO NOT INCLUDE ANY COATING OR PAINT.
CUSTOMER: WSP
LOCATION: KEYPORT, WA
TANK NUMBER: K-1051-104
SHELL HEIGHT: 12' DIAMETER: 8'-9"
INSPECTOR: ALEC ARPINO
TECHNICIAN: BRANDON GONZALEZ
INSPECTION DATE: 10/14/2020
DRAWING NUMBER: WSP-104-B
CAD DRAFTSMAN: B. GONZALEZ
MISTRAS SERVICES
7820 S 210th Street, Building C, Suite 110
KENT, WA 98032


TANK ROOF DRAWING
N
LIFTING LUG
LIFTING LUG
LIFTING LUG
AO: 3" NOZZLE (VENT)
AO: 3" NOZZLE (HIGH LEVEL ALARM)
AE: 0.5" COUPLING
AA: 22" x 22" HATCH
LEGEND & NOTES
SEE OTHER PAGES FOR ULTRASONIC THICKNESS MEASUREMENTS OF NOZZLES AND SHELL. MEASUREMENTS UNLESS OTHERWISE NOTED ARE OF THE STEEL AND DO NOT INCLUDE ANY COATING OR PAINT.
CUSTOMER: WSP
SHELL HEIGHT:12'
DIAMETER: 8'-9"
INSPECTION DATE: 10/14/2020
LOCATION: KEYPORT, WA
INSPECTOR: ALEC ARPINO
DRAWING NUMBER: WSP-104-R
TANK NUMBER: K-1051-104
TECHNICIAN: BRANDON GONZALEZ
CAD DRAFTSMAN: B. GONZALEZ
MISTRAS SERVICES
7820 S 210th Street, Building C, Suite 110
KENT, WA 98032

12.0 Appendix A – References

References:

1) Washington State Department of Ecology, Dangerous Waste Regulations, Chapter 173-303 WAC
2) Conversations with the client
3) API RP 652, Lining of Above Ground Petroleum Storage Tanks
4) API RP 651, Cathodic Protection of Above Ground Storage Tanks
5) API Guide for the Inspection of Refinery Equipment – Chapter 13, Atmospheric and Low Pressure Tanks
6) API Standard 650, Welded Steel Tanks for Oil Storage
7) API Standard 653, Tank Inspection, Repair, Alteration, and Reconstruction
8) API Standard 620, Design and Construction of Large, Welded, Low Pressure Storage Tanks

APPENDIX G

INSPECTION REPORT TANK K1051-105

WSP

Naval Undersea Warfare Center

Tank K1051-105

In Service Inspection

Above Ground Storage Tank Inspection Report

In accordance with
WAC 173-303-640
Dangerous Waste
Regulations

WSP

Tank K1051-105

In Service Inspection

Keyport, WA

October 14, 2020 to October 14, 2020

Report Number 40865710-7

Prepared By :
7820 South 212th St. St. 110
Kent, WA, 98032

www.mistrasgroup.com

Inspection Date
October 14, 2020

Table of Contents

1.0 Job Information

Job Location :

Naval Undersea Warfare Center
610 Dowell Street
Keyport, WA
98345-7610

Customer Representative : Grace Roberts

Customer Phone Number : 206-431-2295

Job Charge Number : N442555-15-D-0011-00

Report Number : 40304587-7

Mistras Work Order Number : T67726-40865710

Inspection Personnel Provided :

Alec Arpino
API 653 Certified Inspector
API 653 (77549)/UTT/MT

Brandon Gonzalez
Level II Technician
MFL/UTT/PT

2.0 Tank Inspection Data Sheet

General :

Tank Number	K1051-105
Owner	U.S. Navy
Design Standard	Unknown
Tank Location	Keyport, WA
Product	Otto Fuel/ Alcohol
Specific Gravity	1.23
Manufacturer	Flohr Metal Fabrication
Manufacture Date	1994
Cathodic Protection	No
Data Plate Present	Yes
Data Plate Condition	Good Condition

Dimensions :

Diameter (ft)	8.23
Height (ft)	13.02
Capacity Nominal (Gallons)	5,551.0

Geometry :

Foundation	Concrete Pad with Steel Support Legs
Bottom	Cone Down Butt Welded
Shell	Butt Welded
Fixed Roof Type	Self-Supported Fixed Cone

Access :

Stairway	None
Roof Access	Yes

Coatings :

Bottom	Internal Thin Film Epoxy
Shell	External White
Roof	External White

3.0 Suitability for Service

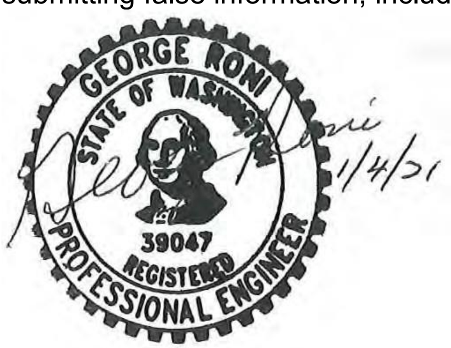
WSP on behalf of the U.S. Navy has contracted Mistras Group, Inc. to perform a in service inspection on Tank K1051-105 located in Building 1051 of the Naval Undersea Warfare Center located in Keyport, WA. This inspection was performed in accordance with the current criteria set forth in WAC 173-303-640 Dangerous Waste Regulations.

There were no issues found that would require repair at this time. The Navy should continue with routine maintenance and observation of the tank. The next formal WAC 173-303-640 inspection should be conducted per the established schedule which is 5 years per the current SPCC Plan for this site.

Tank K1051-105 can be considered suitable for continued service.

TANK 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 fine and imprisonment for knowing violations."[1]



George Roni, P.E.

1) Per WAC 173-303-810 as required by WAC 173-303-640 (2)

Mistras Services has evaluated the condition of this tank based on the observations and measurements made by the tank Inspector. While our evaluation accurately describes the condition of the tank at the time of inspection, the tank owner/operator must independently assess the inspection information/report provided by Mistras Services and any conclusions reached by the tank owner/operator and any action taken or omitted to be taken are the sole responsibility of the owner/operator. With respect to inspection and testing, Mistras Services warrants only that the services have been performed in accordance with accepted industry practice. If any such services fail to meet the foregoing warranty, Mistras Services shall re-perform the service to the same extent and on the same conditions as the original service.

The preceding paragraph sets forth the exclusive remedy for claims based on failure or of defect in materials or services, whether such claim is made in contract or tort (including negligence) and however instituted, and, upon expiration of the warranty period, all such liability shall terminate. The foregoing warranty is exclusive and in lieu of all other warranties, whether written, oral, implied or statutory. NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE SHALL APPLY, nor shall Mistras Services be liable for any loss or damage whatsoever by reason of its failure to discover, report, repair or modify latent defects or defects inherent in the design of any tank inspected. In no event, whether a result of breach of contract, warranty or tort (including negligence) shall Mistras Services be liable for any consequential or incidental damages including, but not limited to, loss of profit or revenues, loss of use of equipment tested or services by Mistras Services or any associated damage to facilities, down-time costs or claims of other damages.

4.0 Inspection Findings

WSP on behalf of the U.S. Navy has contracted Mistras Group, Inc. to perform an in Service Inspection on Tank K1051-105 located in Keyport, WA. This inspection was performed in accordance Washington State Dangerous Waste Regulations WAC 173-303-640 (2).

Tank K1051-105 is a shop built 2 course Above Ground Storage Tank in Otto Fuel/ Alcohol service. This tank is 8.75 feet in diameter, and 13.02 feet in height and is equipped with a Fixed Cone Roof. The following details all inspection findings.

Foundation

This tank was installed on a concrete pad. The tank is elevated above the concrete pad by (4) 4 inch steel pipe support legs. Each support leg has an 8” X 8” X 1/2” steel pad at the base that is anchored to the concrete foundation via (4) 1/2 inch anchor bolts. The anchor bolts are embedded into the concrete foundation and secured at the top of the plate by the nuts.

The steel pipe support legs showed no evidence of dents, deformations, corrosion, pitting or other visible damage. The concrete at the base of each leg showed no evidence of cracking, spalling or broken concrete. The supports, footings, the anchor nuts and bolts are all coated. No coating failure or oxidation was noted.

The anchor nuts and bolts were found to be tight and secure. There was no evidence of elongation, corrosion, pitting or damage to the steel pads or the anchor nuts and bolts.

The tank sits within a below grade epoxy lined concrete vault. The vault appeared to structurally sound and showed no evidence of cracking, spalling or broken concrete. It appears that epoxy coating had been previously repaired at various locations around the vault. The repaired areas and the rest of the epoxy coating appeared well adhered and fluid tight.

The volume of the containment is large enough to contain the contents of the tank in the event of leaks or catastrophic failure, which is also in compliance with WAC 173-303-640.

Cone Bottom

The cone bottom in Tank K1051-105 is made up of 2 plates. The nominal floor plate thickness is 0.3125 inches.

The exterior surfaces of the tank showed no evidence of leaks from the plates, the plate to plate weld seams or the bottom to shell weld. There was no evidence of active corrosion, pitting or coating failure occurring on the plates or welds of the bottom. There was no evidence of dents, bulges or other deformations noted on the bottom plates.

At the apex of the bottom there is a 4 inch stainless steel nipple (pipe section) welded to the tank. There was no evidence of leaks from the attachment welds of the nipple to the bottom or the weld to the T-reducer section.
There was no evidence of leaks from the associated piping in the immediate area of the tank bottom attachment.

Shell

The shell on Tank K1051-105 consists of 2 courses and all joints are Butt Welded. A visual inspection and ultrasonic examination of the shell was conducted, the following details all findings.

The bottom of the shell to bottom transition has a reinforcement ring consisting of a 2-1/2 inch angle iron. The top of the reinforcement ring is fully fillet welded and the bottom is stitch welded. There is caulking in between the stitch welds along the bottom. There was no evidence of weld failures or deformations noted to the reinforcement ring.

There was no evidence of bulges, dents or abnormal deformations noted to the tank shell. There was no evidence of leaks in the shell plates, shell to shell horizontal or vertical welds, the shell to cone weld or the shell to roof weld. There was no evidence of active corrosion or pitting noted on the shell exterior.

The shell coating appeared to be in very good condition.

The shell plates were ultrasonically inspected externally to verify the remaining thickness of the shell plates. Ultrasonic thickness readings were obtained on the shell in 4 equally spaced locations at approximately 6.68 feet. Each scan was conducted in one of the 4 cardinal directions. A total of 4 readings per course were obtained.

Section 6.1 of this report details all ultrasonic thickness (UT) readings obtained, detailing the low's to highs per course. There were no abnormally low readings noted on the shell. The lowest reading of 0.182” was located on the 1st course on the East drop.

Shell Nozzles

A visual inspection and ultrasonic examination of all accessible shell nozzles and manways was conducted to evaluate the current condition of each nozzle. Visual inspection of each nozzle included evaluation of the external neck, all attachment welds, and flange faces.

There was no evidence of leaks from the nozzle attachment welds, the flanges, the flange bolting and associated valves or nearby attached piping. There is no evidence of coating failure occurring on the nozzles or couplings.

The attached piping appears to be stainless steel and the nozzles are carbon steel with the exception of pipe nipple E which is stainless steel. There is no evidence of galvanic reactions taking place due to the dissimilar metals. The flange faces appear to be raised and have Teflon type PTFE gasket material. The nozzle bolting appears tight and secure with proper thread engagements on the bolting.

All nozzles and manways were ultrasonically inspected (UT) by recording four readings on the top, bottom and both sides of each neck, one reading on each flange and the manway cover. There was no abnormally low thickness readings obtained. Section 6.5 details all data from UT exam.

Fixed Roof

The roof plates on Tank K1051-105 have a nominal thickness of 0.187 inches. The fixed roof plates were ultrasonically examined to determine the average remaining thickness. A total of 16 readings were obtained on the roof, four readings per each cardinal direction. There was no evidence of thinning or corrosion on the roof plates. Section 6.3 details all the data from the UT exam.

The fixed roof plates were visually inspected. All plates were evaluated to determine the condition of the external coating system. Aside from a coating of dust the roof coating is in good condition. There was no evidence of corrosion, pitting, dents, bulges or other deformations to the roof plates.

There was no evidence of leaks in the roof plates, the roof plate to plate welds or the shell to roof weld.

Fixed Roof Nozzles

All fixed roof nozzles, nipples and couplings were visually inspected. The following details the findings from this inspection.

All roof nozzles were ultrasonically inspected to verify remaining thickness. A total of 4 readings per nozzle were obtained. All fixed roof nozzles and couplings were visually inspected. The following details the findings from this inspection.

There was no evidence of leaks from the roof nozzle and coupling attachment welds, flanges, flange bolting, threaded connections, associated valves or attached piping in the immediate area around the piping.

The roof top manway cover is securely attached to the roof with a hinge pin. There was no damage noted to the pin or the cover. There is a 3 inch nozzle attached to the manway cover for the liquid level float and tape gauge system. The system was not operated but appeared to be in satisfactory condition. There was no evident damage to the 3 inch nozzle or the flange face. The manway showed no evidence of coating failure, corrosion, pitting or other damage.

The 4 inch center roof vent piping runs to outside the building. The piping goes through the East wall and appears to have a pressure/vacuum style vent attached at the end of the piping run. The vent was unable to be inspected at the time of inspection due to its location and inaccessibility. The pressure/vacuum vent appeared to be in acceptable condition from the ground with no obvious visual damage noted.

All roof nozzles were ultrasonically inspected to verify remaining thickness. A total of 4 readings per nozzle were obtained. There were no abnormally low readings noted on the roof nozzles. Section 6.6 details the data from the UT exam.

Access Ways & Handrails

The roof is accessible from a free standing ladder and catwalk system. This catwalk is used to access all the tanks inside the containment for visual inspections and gauging purposes.

The ladder and the catwalk are in acceptable condition. There was no damage noted to the ladder frame or rungs. The steps showed no signs of damage to the frame, the treads or the handrails. The catwalk showed no damage to the frame, the grating or the handrails. Much of the handrail was covered in black plastic during the inspection.

The catwalk supports are 3” X 3” square piping uprights that are anchored to the concrete by (2) 3/4 inch anchor bolts at each support location. There is 2-1/2 inch angle iron braces used as cross bracing. There were no evident weld failures, damage to the support structures, attachment hardware or the anchorage locations. The attachment hardware appears to be tight and secure. The catwalk grating is galvanized and in acceptable condition. The grating is tack welded into place. There were no signs of weld failure. There was no evidence of corrosion caused thinning or holes noted in the grating.

The 2 inch steel pipe handrails are 42 inches high at the top rail, 24 inches at the mid-rail with 4 inch toe boards. There were no signs of holes, corrosion or pitting noted in the top rail, the mid-rail or the uprights.

Miscellaneous Appurtenances

For product level gauging, this tank is equipped with a float and tape style gauging system. This unit was found to be in what appears to be visually acceptable condition with no apparent damage noted. The unit was not operated at the time of inspection.

The tank is equipped with a Delta Controls roof transponder. The unit model is an 872C-V-10-2NPT-6SE-IS-CC with a serial number of UGD9966-A2. The unit appeared in satisfactory condition with no apparent damage to the unit noted.

For electrical safety issues and lightning protection, this tank is equipped with (1) 1/2 inch braided grounding cable. The cable was found to be satisfactory condition. The cable is attached to the reinforcement ring on one end and attached to a grounding bar that is embedded into the concrete foundation.

Inspectors Signature: ____
Alec Arpino
API 653
Certification No. 77549 Exp. 12/31/2023

Reviewed by:

____
George Roni, PE
API 653 Cert. No. 2042, Exp. 4/30/23

Mistras Services has evaluated the condition of this tank based on the observations and measurements made by the tank Inspector. While our evaluation accurately describes the condition of the tank at the time of inspection, the tank owner/operator must independently assess the inspection information/report provided by Mistras Services and any conclusions reached by the tank owner/operator and any action taken or omitted to be taken are the sole responsibility of the owner/operator. With respect to inspection and testing, Mistras Services warrants only that the services have been performed in accordance with accepted industry practice. If any such services fail to meet the foregoing warranty, Mistras Services shall re-perform the service to the same extent and on the same conditions as the original service.

The preceding paragraph sets forth the exclusive remedy for claims based on failure or of defect in materials or services, whether such claim is made in contract or tort (including negligence) and however instituted, and, upon expiration of the warranty period, all such liability shall terminate. The foregoing warranty is exclusive and in lieu of all other warranties, whether written, oral, implied or statutory. NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE SHALL APPLY, nor shall Mistras Services be liable for any loss or damage whatsoever by reason of its failure to discover, report, repair or modify latent defects or defects inherent in the design of any tank inspected. In no event, whether a result of breach of contract, warranty or tort (including negligence) shall Mistras Services be liable for any consequential or incidental damages including, but not limited to,

5.0 Calculations
5.1 Thickness Calculations

Calculations for Shell & Cone-Shaped Tank Bottom - per API 620

Date of Inspection: 10/14/2020

Owner	NUWC			
Tank No.	K1051-105			
Diameter, D	8.500	ft	102.00	inches
Shell Height, H	12.000	ft	144.00	inches
Fill Height	12.000	ft	144.00	inches
Original Shell thickness	0.188	inches		
Measured Shell thickness, t_c	0.182	inches		
Original Cone thickness	0.313	inches		
Measured Cone thickness, t_h	0.303	inches		
Specific Gravity of contents of tank, SG	1.230			
Depth of Cone, d	14.00	inches	1.1667	ft
S, allowable tensile stress of shell & cone	15,200	psi		
Joint Efficiency cone-to-shell & long cone joints, E_1	0.70			
Joint Efficiency shell vertical joints, E_2	0.70			
Operating Pressure at top of tank, P_o	0.00	psi	0	psf

Note that per API 620 the max. operating pressure at top of tank is 15 psig.

O.D. of connection at bottom of cone (if none enter 0)	4.50	inches

1/2 Apex angle, alpha = a	1.291143	radians	73.97702	degrees		
Total Pressure, P at plane AA	921.02	psf (includes hydrostatic head + P_o)			6.40	psi

Plane AA is at the Spring Line.

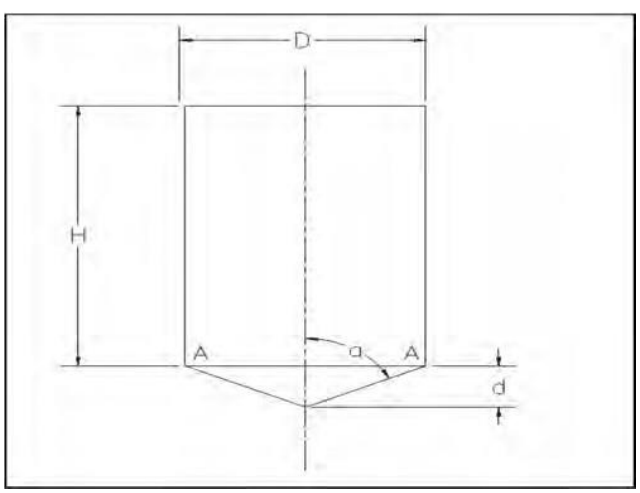


Figure No. A1

1) Shell Unit Forces @ Plane AA, See Figure No. A2

Sum F_x = 0

$2T_{2s}$ = PD

T_{2s} = PD/2

T_{2s} = 326 lb/in

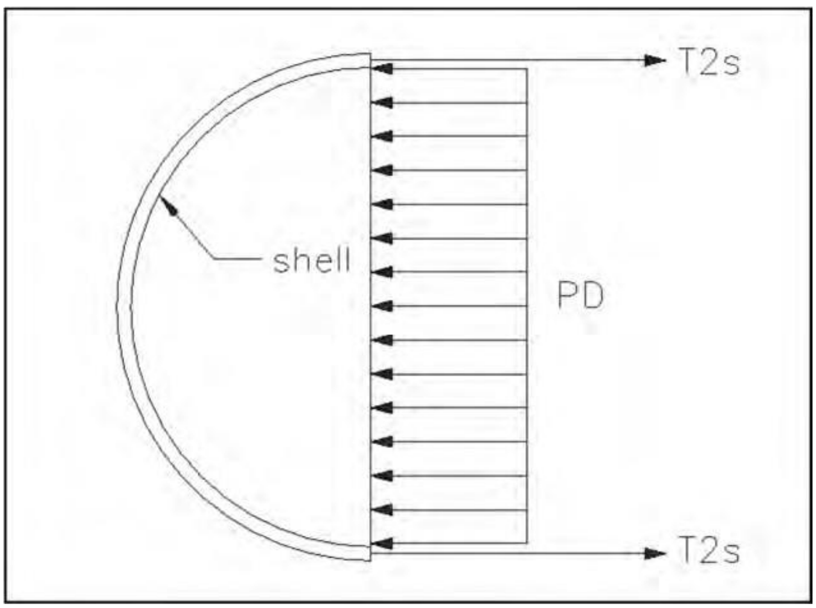


Figure No. A2

2) Cone unit force, T_2, the latitudinal unit force. Also known as the circumferential unit force. See Figure No. A3

R_2, radius of curvature of cone at A

R_2 = AB/cos(a)

R_2 = 184.7673 inches

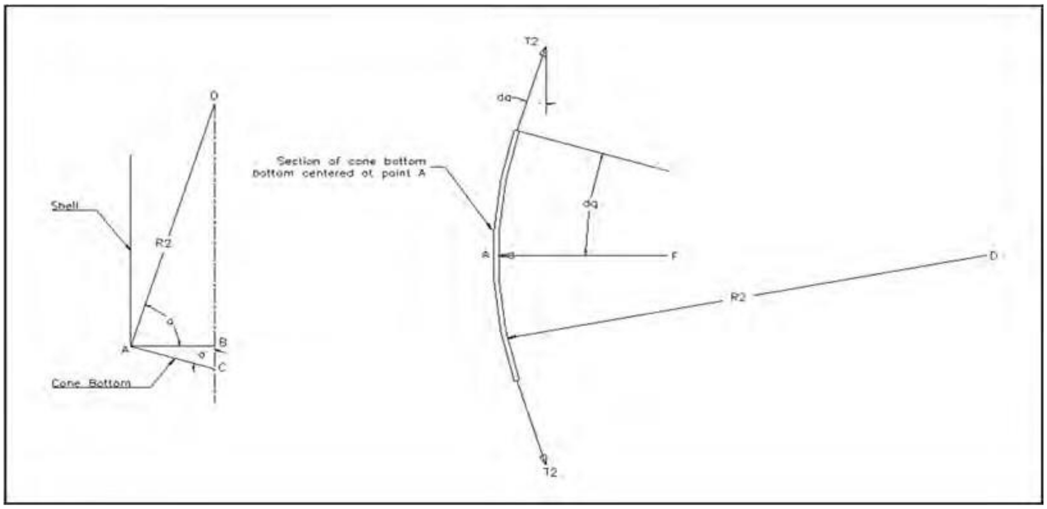


Figure No. A3

Sum of $F_x = 0$

F = the force on 1 inch wide section	$F - 2T_2 \ast Sin(dq) = 0$
of cone at point A with an infinitesimal	$2PdqR_2 = 2T_2Sin(dq)$ and for small dq, Sin(dq) = dq
arc length = 2 x dq	$PR_2 = T_2$
$F = P(1)(2)(dq)(R_2)$	$T_2 = PR_2$
$F = 2PdqR_2$	$T_2 =$ 1182 lb/in

3) Cone unit force, T_1, the Meridional unit force. See Figure No. A4

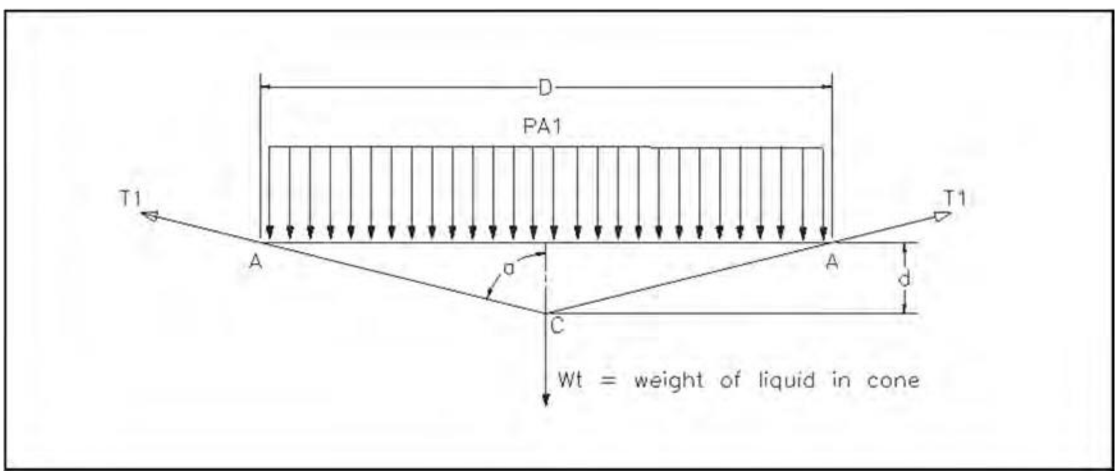


Figure No. A4

A_1 = PI/4 * D^2

A_1 = 8171.282 square inches 56.74502 square feet

V, Volume of Cone = (PI*D/2*D/2*d)/3

V = 22.067507 ft^3

W_t = SG* 62.4 lb/ft^3 * V

W_t = 1,694 lb

Sum F_y = 0

T_1Cos(a)PI*D - W_t -PA_1 =0

T_1 = (W_t + PA_1)/Cos(a)PI*D

T_1 = 610 lb/in

4) Knuckle Region Reinforcement Check per API 620 3.12

The measured cone bottom thickness is defined as t_h here, t_h =	0.303	inches
The measured shell thickness is defined as t_c here, t_c =	0.182	inches
R_2, radius of curvature of cone at A =	184.77	inches
R_c, radius of curvature shell =	51	inches

w_h = 0.6* sqrt(R_2 *t_h)

w_h = 4.489367 inches

w_c = 0.6* sqrt(R_c *t_c)

w_c = 1.827982 inches

Additional attached reinforcement area Ad

Ad = 1.1875

Available reinforcing area, A_a = w_h*t_h + w_c*t_c+Ad

A_a = 2.880471 sq inches

T_1 = 610 lb/in

T_{2s} = 326 lb/in

T_2 = 1182 lb/in

Per API 620, the magnitude of the total circumferential force acting on any vertical cross section through the compression ring region shall be computed as follows:

Q = T_2w_h + $T_{2s}w_c$ -T_1R_cSin(a) Note that if Q is negative, compression is indicated.

Q = 5,305 + 596 - 29,903

Q = -24,001

A_c, the required compression ring reinforcing area = Q/15,000

A_c = 1.600096 sq. inches

A_a	>	Ac	
2.880471	>	1.6000955	TRUE

and since Q is negative the following condition must be true also.

$w_h Sin(a)$	>	$0.015 * R_c$	
4.31496	>	0.765	TRUE

<u>Since both conditions are true, knuckle region is adequately reinforced.</u>

5) Check Measured Shell Thickness vs Required Shell Thickness

The required shell thickness is $t_{cr} = T_{2s}/SE_2$

0.030658 However, thickness must be at least 0.100" per API 653, so final required shell thickness is 0.100

t_c	>	t_{cr}	
0.182	>	0.100	TRUE

6) Check Measured Cone Bottom Thickness vs Required Cone Bottom Thickness at Plane A-A

The required cone thickness, t_{hr}, is the greater of the following 2 formulas

$t_{hr} = T_1/SE_1$ or $t_{hr} = T_2/SE_1$

$t_{hr} =$ 0.057334 $t_{hr} =$ 0.111069

$t_{hr} =$ 0.111069 However, thickness must be at least 0.100" per API 653, so final required cone bottom thickness is: $t_{hr} =$ 0.111 inches

t_h	>	t_{hr}	
0.303		0.111	TRUE

7) Tank Volume or Capacity Calculation

V_{total} = Volume of Cone + Volume of Shell

22.06751 ft^3 + (PI/4) $*D^2*H$

22.06751 + 680.9402

$V_{total} =$ 703 ft^3 or 5,259 gallons

5.2 Seismic Calculations

SEISMIC ANALYSIS
For Tank Supported above grade on legs

1) Input Data

Tank Location			Keyport, WA			
Tank no.			K1051-105			
dia, D			8.5	ft		
shell height, Ht			12	ft		
fill height, H			12	ft. This is height from top liquid surface to bottom of tank.		
floor thk			0.3125	in		
roof thk			0.188	in		
slope roof, ϑ	0.062418	radians	3.5763	degrees	This is standard slope of 3/4" in 12".	
shell thk, t			0.188	in		
sg liquid, G			1.230			
density steel			490	lb/sq ft		
Proportion of roof supported by shell			1	1 indicates 100%.		
Seismic zone factor, Z			0.300	See fig E-1 & Table E-2		
Importance Factor			1.00	See E.3.1		
Site coefficient			1.5	See table E-3		
Lateral force coefficient, C1			0.6			
For cone bottom supported above the grade, the depth of cone, Xb			1.1666	feet		
Height, L that shell sup above grade			2.3333	feet		
Height from bottom of tank to grade, m			1.1667	feet		
b, the width of the base			7.5	feet		
Slope floor, a	0.267896	radians	15.3493	degrees		
1/2 apex angle of cone floor =			1.3029	radians	74.6507	degrees
		Radius	4.25	ft		
		D/H	0.7083	The diameter/fill height ratio from above		

2) Weights

a) Shell

Plate Area	320	sq ft
plate weight/sq ft	7.677	lb/sq ft
weight shell plate	2,460	lb
misc shell weight	200	lb
Total shell weight	2,660	lb

b) Roof

no. Rafters	0	
length rafters	0	
Type of rafter (shape)		
lb/ft rafters	0	lb/ft
weight rafters	0	lb
Plate Area = PI*(r/cos(ϑ))^2		
Plate Area	56.97	sq ft
plate weight/sq ft	7.677	lb/sq ft
Plate weight	437	lb
snow load	0	lb
misc weight	100	lb
Total Roof weight, Wr	537	lb

c) Cone Bottom

Plate Area = PI*(r/cos(gamma))^2		
Plate Area	61.02	sq ft
plate weight/sq ft	12.760	lb/sq ft
Plate weight	779	lb
misc weight	100	lb
Bottom weight,Wb	879	lb

3) Determination of Additional Seismic Inputs

Natural period of 1st sloshing mode, T

T = k* sq root (D)		For D/H =	0.71	k =	0.58	from Figure E-4
T	1.691	seconds		S =	1.5	from table E-3
Is T < 4.5s?	true, so C2=0.75S/T					

C2 = 0.75S/T
C2 0.665

W1 & W2
D/H = 0.71

The weight of liquid, Wt

Wtshell = pi/4*D^2*62.4*sg*Ht			Wtcone = ((pi*r^2*depth of cone)/3)*62.4*sg		
	4,355	x Ht			
Wtshell =	52,264	lb	Wtcone =	1,377	lb

Wt = Wtshell + Wtcone
Wt 53,640 lb

W1 = Wt*W1/Wt   W1/Wt = 0.820 from fig E-2

W1	43,985	lb	
W2		W2/Wt =	0.160 from fig E-2
W2	8,582	lb	

X1 & X2

X1/H =	0.42	from fig E-3
X1=	5.04	ft
X2/H =	0.76	from fig E-3
X2	9.12	

Xs = height from cg of shell to bottom of tank = 7.1666 feet

4) Calculation of Overturning Moment, M

M = Z*I*(C1*Ws*Xs'+C1*Wr*Ht'+C1*Wb*Xb'+C1*W1*X1'+C2*W2*X2') ft lb

m	1.1667	see above
Z	0.3	see above
I	1	see above
C1	0.6	see above
C2	0.665	see above
Ws	2,660	shell weight
Xs'	8.33	the height from grade to Fs
Wr	537	roof weight
Wb	879	bottom weight
Xb'	2	the height from the grade to Fb
Ht'	14.33	the height from grade to Fr
W1	43,985	effective weight of liquid responsible for impulse force
X1'	6.21	the height from the grade to F1
W2	8,582	effective weight of liquid responsible for sloshing or convective force of liquid.
X2'	10.29	the height from the grade to F2

Z*I =	0.3			
C1*Ws*Xs'=	13,300	Lateral Force, Fs =	479	Impulse force of tank shell
C1*Wr*Ht'=	4,621	Lateral Force, Fr =	97	Impulse force of tank roof
C1*W1*X1'=	163,802	Lateral Force, F1 =	7,917	Impulse force of liquid
C1*Wb*Xb' =	158	Lateral Force, Fb =	158	Impulse force of tank bottom
C2*W2*X2'=	58,736	Lateral Force, F2 =	1,713	Convective, or sloshing force of the liquid
M=	72,185 ft lb	Total Lateral Force, Ft =	10,364 lb	

5) <u>Check Stability of Tank:</u>

The resisting Moment is Mr = (weight of tank + the weight of fluid) x 1/2 of the base width

weight of tank =	4,076	lb
weight of liquid =	53,640	lb
width of base =	7.5	ft

Mr = 216,436 ft-lb

Safety Factor for overturning = Mr/M

Safety Factor for overturning = **3.00** **> 1.5** **O.K., Tank is stable**

Note that if a tank is found to be unstable that indicates that tank anchors are needed to resist the uplift forces at the base plate to grade interface that will occur during an earthquake. An unstable tank is susceptible to tipping during an earthquake.

6) <u>Check Need for Anchors Due Solely to Lateral Loads</u>

Total weight of liquid	53,640	lb	
Total weight of tank	4,076	lb	
Total weight, W	57,716	lb	
Coefficient of friction =	0.030	Between steel & ice, the worst possible case.	

Frictional Force resisting the total lateral force = W*coefficient of static friction between base plates & grade

Ff = 1,731

Is Ff > Ft * 1.5 **<u>Not true, therefore anchors are needed for lateral seismic forces</u>**

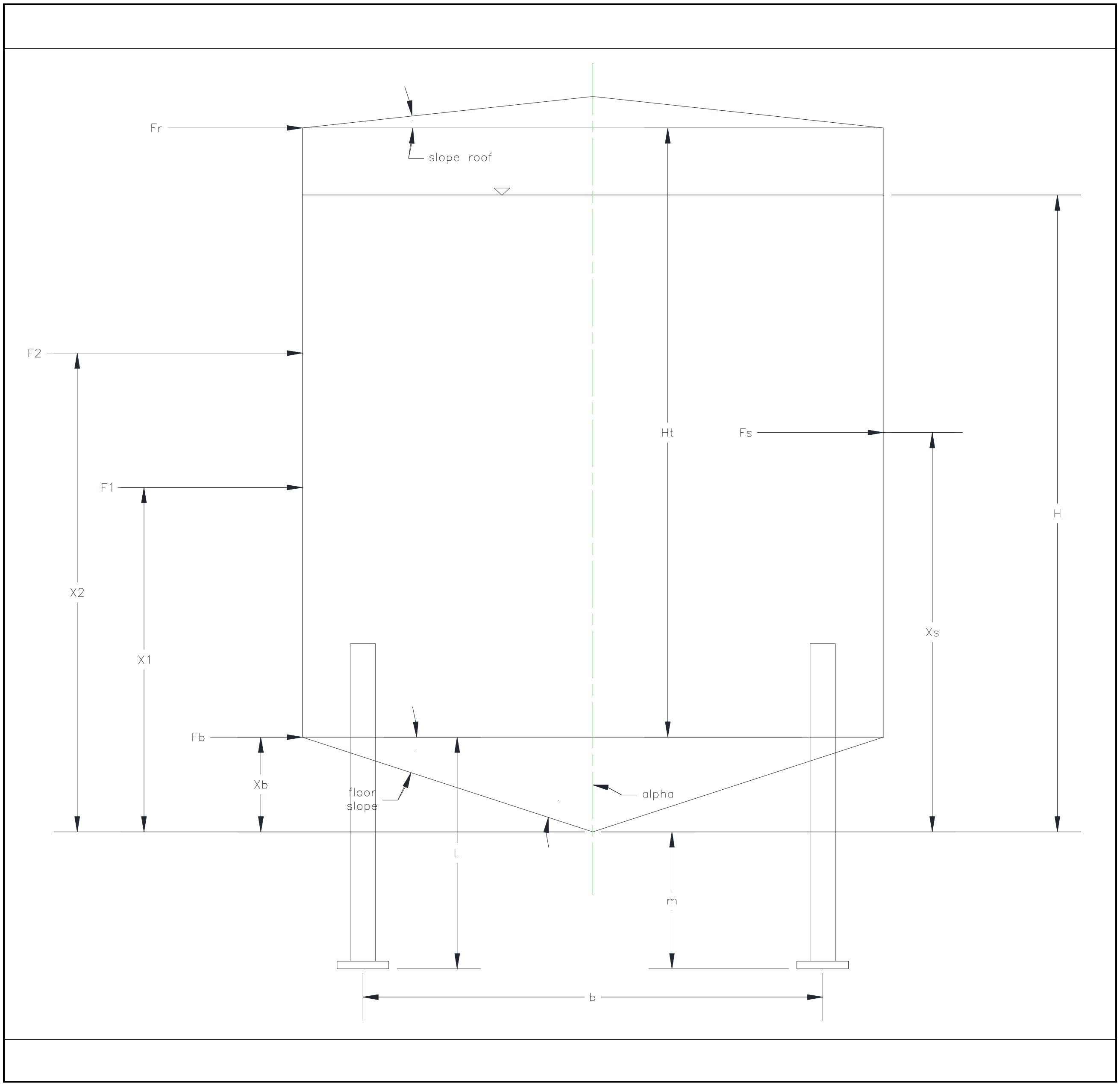
The shear force on each bolt, 16 anchor bolts are used is = 648 lb

The 16 ea. 1/2 anchors bolts should provide at least this much strength plus a safety margin and a corrosion allowance for the bolts.

7) Check Vertical Forces at Anchor Points
Both Seismic and Dead Load.

Vertical Load, P =	W =	-57,716	lb, this force is given a negative sign to indicate a downward
N, number of anchor locations =		4	direction.
For 4 anchor points, I =4*(b/2)^2 =		56.250	sq ft.
c =		3.750	ft
Max anchor forces, F = P/N + - Mc/I			
	Mc/I =	4,812	lb

	F =	-9,617	lb	If negative that indicates a downward force and
	and F =	-19,241	lb	no tension in anchor bolt.
Foot print size of 1 base plate =		100	sq inches	
Bearing stress = F/footprint area =		192.4	psi	
Allowable compressive strength of the foundation under the base plates =		1,500	psi, the foundation is concrete, and the concrete is assumed to have at least this strength.	
Safety factor = 1,500	divided by	192.4	=	7.80
Safety Factor	**=**	**7.80**	**> 1.5**	**O.K., Foundation strength is acceptable**


Fr
slope roof
F2
Ht
Fs
F1
H
X2
Xs
X1
Fb
Xb
floor slope
alpha
L
m
b

6.0 Ultrasonic Thickness Data

6.1 Shell Plates UT

The following table details all readings (in) from the shell UT survey. All scan drops were equally spaced at 6.87 ft.

Data and Statistics		North	East	South	West	*Readings Line Average*
Course 2	4	0.184	0.186	0.187	0.186	0.186
	3	0.184	0.185	0.187	0.186	0.186
	2	0.185	0.185	0.187	0.187	0.186
	1	0.184	0.186	0.186	0.186	0.186
Course 1	4	0.185	0.182	0.185	0.186	0.185
	3	0.185	0.182	0.184	0.184	0.184
	2	0.185	0.184	0.184	0.184	0.184
	1	0.185	0.183	0.184	0.184	0.184
Scan Line Average		0.186	0.185	0.184	0.186	0.185

The tables below presents the statistics of the thickness readings (in) obtained on the Shell plates.

Course #	Min	Avg	Max
2	0.184	0.186	0.187
1	0.182	0.184	0.186
Global	0.182	0.185	0.187

6.2 Cone Bottom Plates UT

The following table details all readings (in) obtained on the cone bottom plates.

Plate ID \ Reading ID	1	2	3	4	5	6	7	8	*Avg*
North to South	0.307	0.307	0.308	0.303	0.308	0.308	0.307	0.304	0.307
East to West	0.305	0.306	0.305	0.305	0.306	0.305	0.305	0.306	0.305
Avg	0.306	0.307	0.307	0.304	0.307	0.307	0.306	0.305	0.306

The table below presents the statistics of the thickness readings obtained on the floor plates.

UT Summary	
Maximum	0.308
Average	0.306
Minimum	0.303

6.3 Fixed Roof Plates UT

The following table details all readings (in) obtained on the Fixed Roof plates.

Plate ID \ Reading ID	1	2	3	4	5	6	7	8	*Avg*
North to South	0.186	0.186	0.187	0.188	0.187	0.187	0.186	0.188	0.187
East to West	0.188	0.187	0.187	0.185	0.188	0.186	0.185	0.185	0.186
Avg	0.187	0.187	0.187	0.186	0.188	0.187	0.186	0.186	0.187

The table below presents the statistics of the thickness readings obtained on the roof plates.

UT Summary	
Maximum	0.188
Average	0.187
Minimum	0.185

6.4 Shell Nozzle and Appurtenance Table

Item	Type	Service	Pipe Size (in)	Station (ft)	Center Line Elevation (ft)	Distance From Shell to Flange Face (in)
A	Manway	Access	24.0	0	21.0	6.0
B	Nozzle	Transfer	3.0	9.0	138.5	5.75
C	Nozzle	Transfer	2.0	18.0	133.0	5.75
D	Nozzle	Transfer	2.0	22.75	132.5	5.375
E	Pipe Nipple	Bottom Draw	4.0	–	–	–

Note: The data represented in the weld spacing column is the minimum spacing measured. H, V, or N indicates which is the minimum distance from the nozzle measured. (H=Horizontal Weld, V=Vertical Weld, N=Nozzle Weld)

6.5 Shell Nozzle UT

Item	Type	Service	Pipe Size (in)	Top (in)	Bottom (in)	Right (in)	Left (in)	Repad Thickness (in)	Flange Thickness (in)	Cover Thickness (in)	Comments
A	Manway	Access	24.0	0.243	0.241	0.242	0.244	–	0.410	0.487	
B	Nozzle	Transfer	3.0	0.208	0.211	0.208	0.209	–	0.944	–	
C	Nozzle	Transfer	2.0	0.148	0.145	0.148	0.148	–	0.726	–	
D	Nozzle	Transfer	2.0	0.148	0.148	0.147	0.148	–	0.720	–	
E	Pipe Nipple	Bottom Draw	4.0	0.108	0.105	0.108	0.109	–	–	–	Stainless Steel

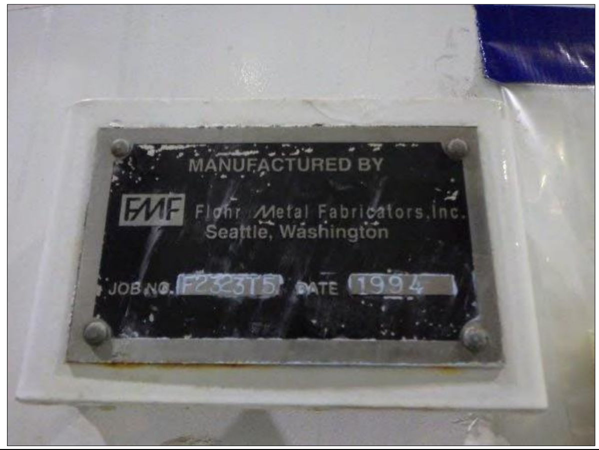
6.6 Fixed Roof Nozzle UT

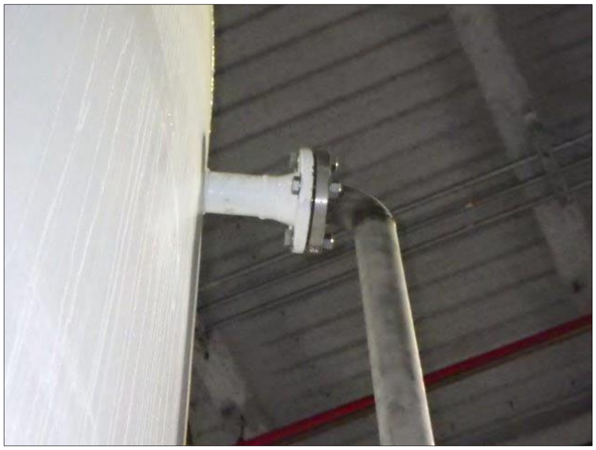
Item	Type	Service	Pipe Size (in)	North (in)	South (in)	East (in)	West (in)	Comments
AA	Hatch	Access	22.0 x 22.0	0.242	0.242	0.242	0.243	
AB	Coupling	Air Line	0.75	–	–	–	–	
AC	Nozzle	HLA	4.0	0.215	0.209	0.210	0.210	
AD	Nozzle	Vent	4.0	0.208	0.210	0.206	0.207	

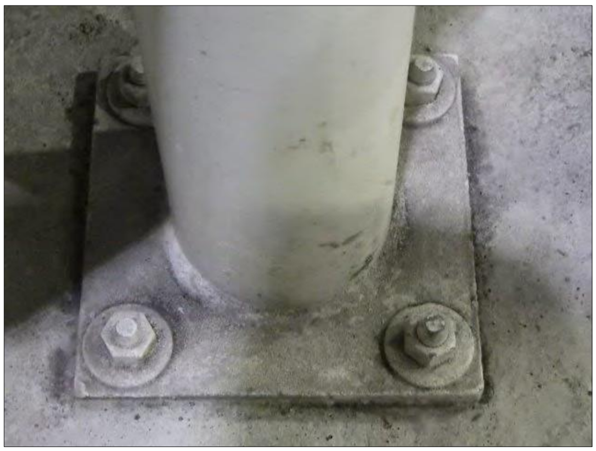
7.0 Shell Corrosion Rates

Course	$t_{previous}$ Previous Thickness (in)	Year Obtained	t_{actual} Actual Thickness (in)	Year Obtained	C_r Corrosion Rate (in/yr.)	t_{min} Minimum Allowable Thickness (in)	R_L Remaining Life (yr.)
2	0.188	1994	0.184	2020	0.00016	0.100	541.57
1	0.188	1994	0.182	2020	0.00023	0.100	352.45

8.0 Photographs

Tank Labeling	Data Plate
	
Manway	**Ground**
	
Nozzle B	**Nozzle C**
	

Nozzle D	Bottom Draw
	
Bottom Draw	Support Leg
	
Stiffener	Standoff
	

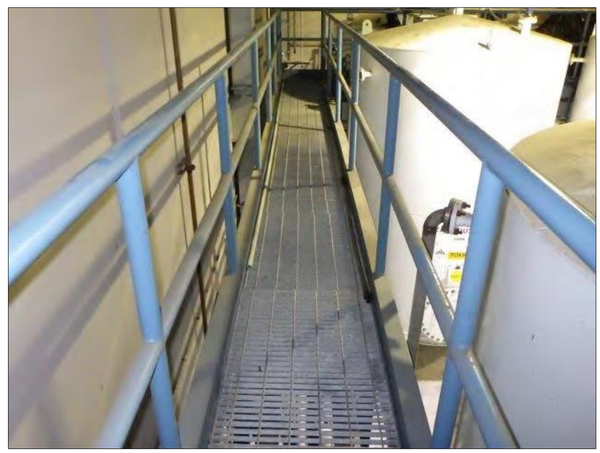
Standoff	Support Leg
	
Anchor Plate	Roof
	
Roof	Area Overview
	

Area Overview

Area Overview

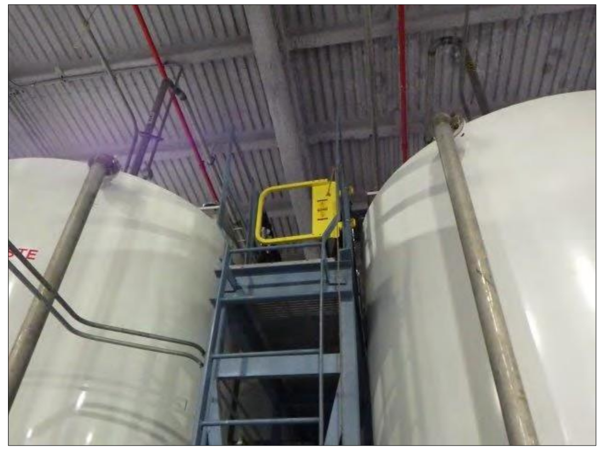
Walkway

Walkway



Walkway

Area Overview

Ladder	Ladder
	

9.0 NDE Equipment Used

The equipment utilized for the inspection of the tank included of the following :

Pit Gauge

Manufacturer	Model	Serial No
W.R. Thorpe	1	1.979.912

Ultrasonic Transducers

Manufacturer	Model	Serial No	MHz	Diameter
Olympus	D790-SM	865199	5	0.375

UT Equipment

Manufacturer	Model	Serial No
Olympus	38DL Plus	130573601
UTT Pole Crawler	MC-2258	1103095

10.0 Inspector Certifications

AMERICAN PETROLEUM INSTITUTE
Individual Certification Programs: ICP

API Individual Certification Programs

verifies that

Michael Alec Arpino

has met the requirements for API certification

API-653 Aboveground Storage Tank Inspector

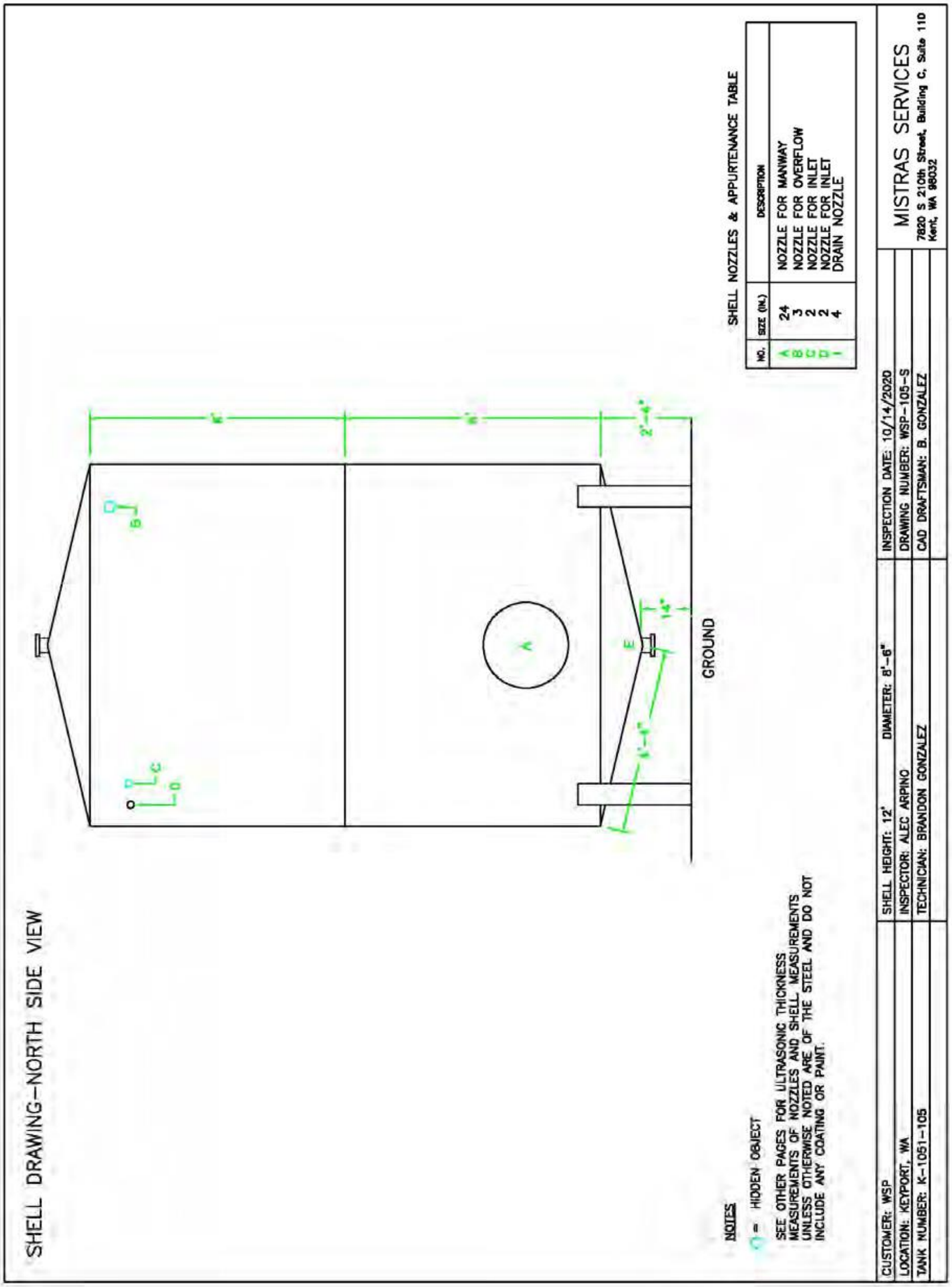
Certification Number	*77549*
Original Certification Date	*December 31, 2017*
Current Certification Date	*December 31, 2017*
Expiration Date	*December 31, 2020*

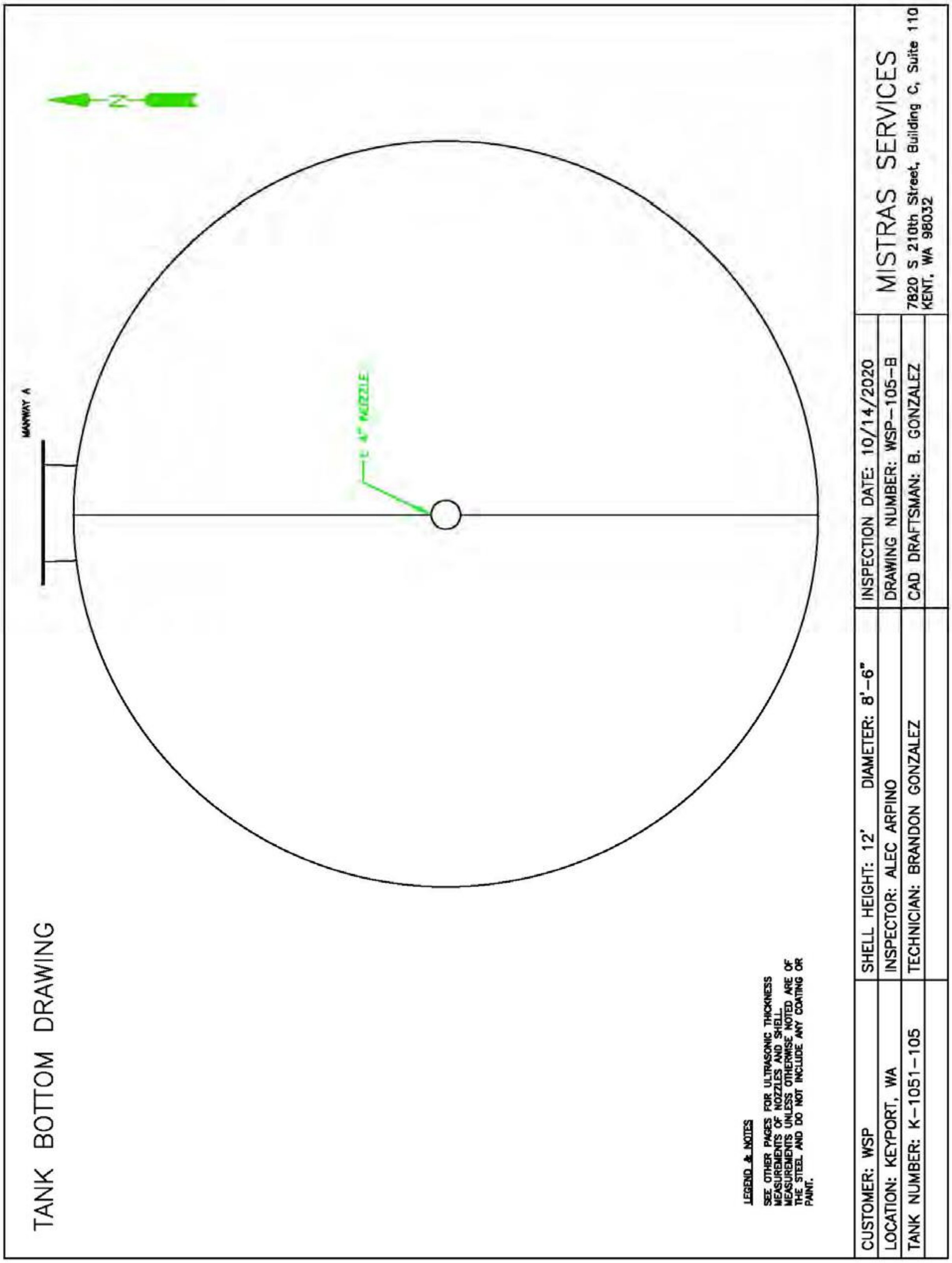
Manager, Individual Certification Programs

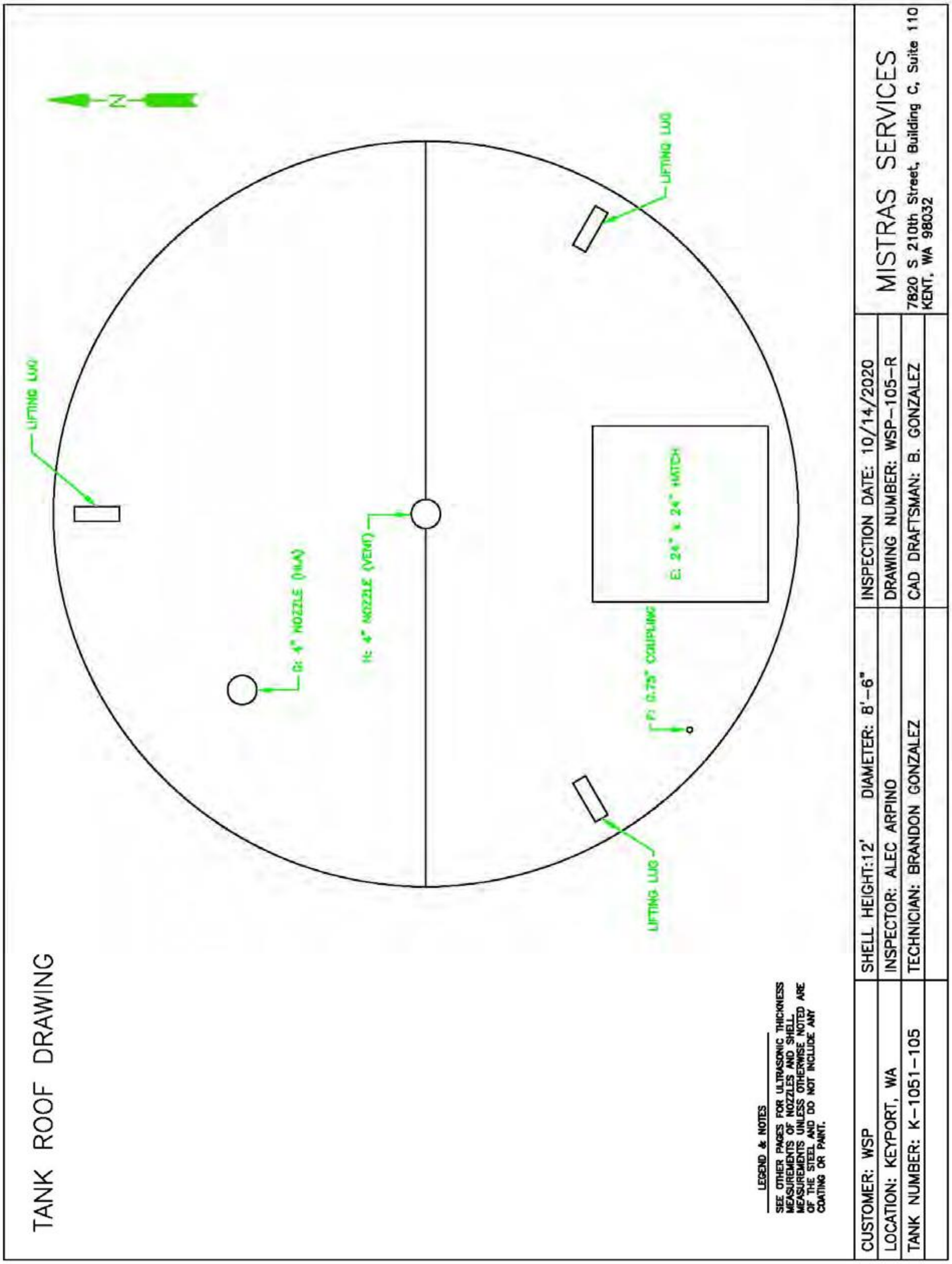
ICP

2015-027 | PDF

11.0 Drawings




TANK BOTTOM DRAWING
LEGEND & NOTES
SEE OTHER PAGES FOR ULTRASONIC THICKNESS MEASUREMENTS OF NOZZLES AND SHELL. MEASUREMENTS UNLESS OTHERWISE NOTED ARE OF THE STEEL AND DO NOT INCLUDE ANY COATING OR PAINT.
N
MANWAY A
℄ 4" NOZZLE
CUSTOMER: WSP
SHELL HEIGHT: 12' DIAMETER: 8'-6"
INSPECTION DATE: 10/14/2020
LOCATION: KEYPORT, WA
INSPECTOR: ALEC ARPINO
DRAWING NUMBER: WSP-105-B
TANK NUMBER: K-1051-105
TECHNICIAN: BRANDON GONZALEZ
CAD DRAFTSMAN: B. GONZALEZ
MISTRAS SERVICES
7820 S 210th Street, Building C, Suite 110
KENT, WA 98032


TANK ROOF DRAWING
N
LIFTING LUG
LIFTING LUG
LIFTING LUG
G: 4" NOZZLE (HLA)
H: 4" NOZZLE (VENT)
F: 0.75" COUPLING
E: 24" x 24" HATCH
LEGEND & NOTES
SEE OTHER PAGES FOR ULTRASONIC THICKNESS MEASUREMENTS OF NOZZLES AND SHELL. MEASUREMENTS UNLESS OTHERWISE NOTED ARE OF THE STEEL AND DO NOT INCLUDE ANY COATING OR PAINT.
CUSTOMER: WSP
SHELL HEIGHT:12'
DIAMETER: 8'-6"
INSPECTION DATE: 10/14/2020
LOCATION: KEYPORT, WA
INSPECTOR: ALEC ARPINO
DRAWING NUMBER: WSP-105-R
TANK NUMBER: K-1051-105
TECHNICIAN: BRANDON GONZALEZ
CAD DRAFTSMAN: B. GONZALEZ
MISTRAS SERVICES
7820 S 210th Street, Building C, Suite 110
KENT, WA 98032

12.0 Appendix A – References

References:

1) Washington State Department of Ecology, Dangerous Waste Regulations, Chapter 173-303 WAC
2) Conversations with the client
3) API RP 652, Lining of Above Ground Petroleum Storage Tanks
4) API RP 651, Cathodic Protection of Above Ground Storage Tanks
5) API Guide for the Inspection of Refinery Equipment – Chapter 13, Atmospheric and Low Pressure Tanks
6) API Standard 650, Welded Steel Tanks for Oil Storage
7) API Standard 653, Tank Inspection, Repair, Alteration, and Reconstruction
8) API Standard 620, Design and Construction of Large, Welded, Low Pressure Storage Tanks

APPENDIX H

INSPECTION REPORT TANK K1051-106

WSP

Tank K1051-106

Naval Undersea Warfare Center

In Service Inspection

Above Ground Storage Tank Inspection Report

In accordance with
WAC 173-303-640
Dangerous Waste
Regulations

WSP

Tank K1051-106

In Service Inspection

Keyport, WA

October 14, 2020 to October 14, 2020

Report Number 40865710-8

Prepared By :
7820 South 212th St. St. 110
Kent, WA, 98032

www.mistrasgroup.com

Inspection Date
October 14, 2020

Table of Contents

1.0 Job Information

Job Location :	**Naval Undersea Warfare Center**
	610 Dowell Street
	Keyport, WA
	98345-7610
Customer Representative :	Grace Roberts
Customer Phone Number :	206-431-2295
Job Charge Number :	N442555-15-D-0011-00
Report Number :	40304587-8
Mistras Work Order Number :	T67726-40865710
Inspection Personnel Provided :	Alec Arpino
	API 653 Certified Inspector
	API 653 (77549)/UTT/MT
	Brandon Gonzalez
	Level II Technician
	MFL/UTT/PT

2.0 Tank Inspection Data Sheet

General :

Tank Number	K1051-106
Owner	U.S. Navy
Design Standard	Unknown
Tank Location	Keyport, WA
Product	Otto Fuel/ Cyanide
Specific Gravity	1.23
Manufacturer	Flohr Metal Fabrication
Manufacture Date	1994
Cathodic Protection	No
Data Plate Present	Yes
Data Plate Condition	Good Condition

Dimensions :

Diameter (ft)	8.75
Height (ft)	13.02
Capacity Nominal (Gallons)	5,551.0

Geometry :

Foundation	Concrete Pad with Steel Support Legs
Bottom	Cone Down Butt Welded
Shell	Butt Welded
Fixed Roof Type	Self-Supported Fixed Cone

Access :

Stairway	None
Roof Access	Yes

Coatings :

Bottom	Internal Thin Film Epoxy
Shell	External White
Roof	External White

3.0 Suitability for Service

BergerABAM on behalf of the U.S. Navy has contracted Mistras Group, Inc. to perform a in service inspection on Tank K1051-106 located in Building 1051 of the Naval Undersea Warfare Center located in Keyport, WA. This inspection was performed in accordance with the current criteria set forth in WAC 173-303-640 Dangerous Waste Regulations.

There were no issues found that would require repair at this time. The Navy should continue with routine maintenance and observation of the tank. The next formal WAC 173-303-640 inspection should be conducted per the established schedule which is 5 years per the current SPCC Plan for this site.

Tank K1051-106 can be considered suitable for continued service.

TANK 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 fine and imprisonment for knowing violations."[1]

George Roni, P.E.

1) Per WAC 173-303-810 as required by WAC 173-303-640 (2)

Mistras Services has evaluated the condition of this tank based on the observations and measurements made by the tank Inspector. While our evaluation accurately describes the condition of the tank at the time of inspection, the tank owner/operator must independently assess the inspection information/report provided by Mistras Services and any conclusions reached by the tank owner/operator and any action taken or omitted to be taken are the sole responsibility of the owner/operator. With respect to inspection and testing, Mistras Services warrants only that the services have been performed in accordance with accepted industry practice. If any such services fail to meet the foregoing warranty, Mistras Services shall re-perform the service to the same extent and on the same conditions as the original service.

The preceding paragraph sets forth the exclusive remedy for claims based on failure or of defect in materials or services, whether such claim is made in contract or tort (including negligence) and however instituted, and, upon expiration of the warranty period, all such liability shall terminate. The foregoing warranty is exclusive and in lieu of all other warranties, whether written, oral, implied or statutory. NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE SHALL APPLY, nor shall Mistras Services be liable for any loss or damage whatsoever by reason of its failure to discover, report, repair or modify latent defects or defects inherent in the design of any tank inspected. In no event, whether a result of breach of contract, warranty or tort (including negligence) shall Mistras Services be liable for any consequential or incidental damages including, but not limited to, loss of profit or revenues, loss of use of equipment tested or services by Mistras Services or any associated damage to facilities, down-time costs or claims of other damages.

4.0 Inspection Findings

WSP on behalf of the U.S. Navy has contracted Mistras Group, Inc. to perform an in Service Inspection on Tank K1051-106 located in Keyport, WA. This inspection was performed in accordance Washington State Dangerous Waste Regulations WAC 173-303-640 (2).

Tank K1051-106 is a shop built 2 course Above Ground Storage Tank in Otto Fuel/ Cyanide service. This tank is 8.75 feet in diameter, and 13.02 feet in height and is equipped with a Fixed Cone Roof. The following details all inspection findings.

Foundation

This tank was installed on a concrete pad. The tank is elevated above the concrete pad by (4) 4 inch steel pipe support legs. Each support leg has an 8” X 8” X 1/2” steel pad at the base that is anchored to the concrete foundation via (4) 1/2 inch anchor bolts. The anchor bolts are embedded into the concrete foundation and secured at the top of the plate by the nuts.

The steel pipe support legs showed no evidence of dents, deformations, corrosion, pitting or other visible damage. The concrete at the base of each leg showed no evidence of cracking, spalling or broken concrete. The supports, footings, the anchor nuts and bolts are all coated. No coating failure or oxidation was noted.

The anchor nuts and bolts were found to be tight and secure. There was no evidence of elongation, corrosion, pitting or damage to the steel pads or the anchor nuts and bolts.

The tank sits within a below grade epoxy lined concrete vault. The vault appeared to structurally sound and showed no evidence of cracking, spalling or broken concrete. It appears that epoxy coating had been previously repaired at various locations around the vault. The repaired areas and the rest of the epoxy coating appeared well adhered and fluid tight.

The volume of the containment is large enough to contain the contents of the tank in the event of leaks or catastrophic failure, which is also in compliance with WAC 173-303-640.

Cone Bottom

The cone bottom in Tank K1051-106 is made up of 2 plates. The nominal floor plate thickness is 0.3125 inches.

The exterior surfaces of the tank showed no evidence of leaks from the plates, the plate to plate weld seams or the bottom to shell weld. There was no evidence of active corrosion, pitting or coating failure occurring on the plates or welds of the bottom. There was no evidence of dents, bulges or other deformations noted on the bottom plates.

At the apex of the bottom there is a 2 inch carbon steel nozzle with a 90° bend welded to the tank. There was no evidence of leaks from the attachment welds of the nozzle to the bottom. There was no evidence of leaks from the associated piping in the immediate area of the tank bottom attachment.

Shell

The shell on Tank K1051-106 consists of 2 courses and all joints are Butt Welded. A visual inspection and ultrasonic examination of the shell was conducted, the following details all findings.

The bottom of the shell to bottom transition has a reinforcement ring consisting of a 2-1/2 inch angle iron. The top of the reinforcement ring is fully fillet welded and the bottom is stitch welded. There is caulking in between the stitch welds along the bottom. There was no evidence of weld failures or deformations noted to the reinforcement ring.

There was no evidence of bulges, dents or abnormal deformations noted to the tank shell. There was no evidence of leaks in the shell plates, shell to shell horizontal or vertical welds, the shell to cone weld or the shell to roof weld. There was no evidence of active corrosion or pitting noted on the shell exterior.

The shell coating appeared to be in very good condition.

The shell plates were ultrasonically inspected externally to verify the remaining thickness of the shell plates. Ultrasonic thickness readings were obtained on the shell in 4 equally spaced locations at approximately 6.87 feet. Each scan was conducted in one of the 4 cardinal directions. A total of 4 readings per course were obtained.

Section 6.1 of this report details all ultrasonic thickness (UT) readings obtained, detailing the low's to highs per course. There were no abnormally low readings noted on the shell. The lowest reading of 0.180" was located on the 2nd course on the West drop.

Shell Nozzles

A visual inspection and ultrasonic examination of all accessible shell nozzles and manways was conducted to evaluate the current condition of each nozzle. Visual inspection of each nozzle included evaluation of the external neck, all attachment welds, and flange faces.

There was no evidence of leaks from the nozzle attachment welds, the flanges, the flange bolting and associated valves or nearby attached piping. There is no evidence of coating failure occurring on the nozzles or couplings.

The attached piping appears to be stainless steel and the nozzles are carbon steel. There is no evidence of galvanic reactions taking place due to the dissimilar metals. The flange faces appear to be raised and have Teflon type PTFE gasket material. The nozzle bolting appears tight and secure with proper thread engagements on the bolting.

All nozzles and manways were ultrasonically inspected (UT) by recording four readings on the top, bottom and both sides of each neck, one reading on each flange and the manway cover. There were no abnormally low thickness readings obtained. Section 6.5 details all data from UT exam.

Fixed Roof

The roof plates on Tank K1051-106 have a nominal thickness of 0.187 inches. The fixed roof plates were ultrasonically examined to determine the average remaining thickness. A total of 16 readings were obtained on the roof, four readings per each cardinal direction. There was no evidence of thinning or corrosion on the roof plates. Section 6.3 details all the data from the UT exam.

The fixed roof plates were visually inspected. All plates were evaluated to determine the condition of the external coating system. Aside from a coating of dust the roof coating is in good condition. There was no evidence of corrosion, pitting, dents, bulges or other deformations to the roof plates.

There was no evidence of leaks in the roof plates, the roof plate to plate welds or the shell to roof weld.

Fixed Roof Nozzles

All fixed roof nozzles were visually inspected. The following details the findings from this inspection.

All roof nozzles were ultrasonically inspected to verify remaining thickness. A total of 4 readings per nozzle were obtained. All fixed roof nozzles were visually inspected. The following details the findings from this inspection.

There was no evidence of leaks from the roof nozzles attachment welds, flanges, and flange bolting, associated valves or attached piping in the immediate area around the piping.

The roof top manway cover is securely attached to the roof with a hinge pin. There was no damage noted to the pin or the cover. There is a 3 inch nozzle attached to the manway cover for the liquid level float and tape gauge system. The system was not operated but appeared to be in satisfactory condition. There was no evident damage to the 3 inch nozzle or the flange face. The manway showed no evidence of coating failure, corrosion, pitting or other damage.

The 4 inch center roof vent piping runs to outside the building. The piping goes through the East wall and appears to have a pressure/vacuum style vent attached at the end of the piping run. The vent was unable to be inspected at the time of inspection due to its location and inaccessibility. The pressure/vacuum vent appeared to be in acceptable condition from the ground with no obvious visual damage noted.

All roof nozzles were ultrasonically inspected to verify remaining thickness. A total of 4 readings per nozzle were obtained. There were no abnormally low readings noted on the roof nozzles. Section 6.6 details the data from the UT exam.

Access Ways & Handrails

The roof is accessible from a free standing ladder and catwalk system. This catwalk is used to access all the tanks inside the containment for visual inspections and gauging purposes.

The ladder and the catwalk are in acceptable condition. There was no damage noted to the ladder frame or rungs. The steps showed no signs of damage to the frame, the treads or the handrails. The catwalk showed no damage to the frame, the grating or the handrails. Much of the handrail was covered in black plastic during the inspection.

The catwalk supports are 3" X 3" square piping uprights that are anchored to the concrete by (2) 3/4 inch anchor bolts at each support location. There is 2-1/2 inch angle iron braces used as cross bracing. There were no evident weld failures, damage to the support structures, attachment hardware or the anchorage locations. The attachment hardware appears to be tight and secure. The catwalk grating is galvanized and in acceptable condition. The grating is tack welded into place. There were no signs of weld failure. There was no evidence of corrosion caused thinning or holes noted in the grating.

The 2 inch steel pipe handrails are 42 inches high at the top rail, 24 inches at the mid-rail with 4 inch toe boards. There were no signs of holes, corrosion or pitting noted in the top rail, the mid-rail or the uprights.

Miscellaneous Appurtenances

For product level gauging, this tank is equipped with a float and tape style gauging system. This unit was found to be in what appears to be visually acceptable condition with no apparent damage noted. The unit was not operated at the time of inspection.

The tank is equipped with a Delta Controls roof transponder. The unit model is an 872C-V-10-2NPT-6SE-IS-CC with a serial number of UGD9966-A2. The unit appeared in satisfactory condition with no apparent damage to the unit noted.

For electrical safety issues and lightning protection, this tank is equipped with (1) 1/2 inch braided grounding cable. The cable was found to be satisfactory condition. The cable is attached to the reinforcement ring on one end and attached to a grounding bar that is embedded into the concrete foundation.

Inspectors Signature:

Alec Arpino
API 653
Certification No. 77549 Exp. 12/31/2023

Reviewed by:

George Roni, PE
API 653 Cert. No. 2042, Exp. 4/30/23

Mistras Services has evaluated the condition of this tank based on the observations and measurements made by the tank Inspector. While our evaluation accurately describes the condition of the tank at the time of inspection, the tank owner/operator must independently assess the inspection information/report provided by Mistras Services and any conclusions reached by the tank owner/operator and any action taken or omitted to be taken are the sole responsibility of the owner/operator. With respect to inspection and testing, Mistras Services warrants only that the services have been performed in accordance with accepted industry practice. If any such services fail to meet the foregoing warranty, Mistras Services shall re-perform the service to the same extent and on the same conditions as the original service.

The preceding paragraph sets forth the exclusive remedy for claims based on failure or of defect in materials or services, whether such claim is made in contract or tort (including negligence) and however instituted, and, upon expiration of the warranty period, all such liability shall terminate. The foregoing warranty is exclusive and in lieu of all other warranties, whether written, oral, implied or statutory. NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE SHALL APPLY, nor shall Mistras Services be liable for any loss or damage whatsoever by reason of its failure to discover, report, repair or modify latent defects or defects inherent in the design of any tank inspected. In no event, whether a result of breach of contract, warranty or tort (including negligence) shall Mistras Services be liable for any consequential or incidental damages including, but not limited to,

5.0 *Calculations*

5.1 Thickness Calculations

Calculations for Shell & Cone-Shaped Tank Bottom - per API 620

Date of Inspection: 10/14/2020

Owner	NUWC			
Tank No.	K1051-106			
Diameter, D	8.750	ft	105.00	inches
Shell Height, H	12.000	ft	144.00	inches
Fill Height	12.000	ft	144.00	inches
Original Shell thickness	0.188	inches		
Measured Shell thickness, t_c	0.181	inches		
Original Cone thickness	0.313	inches		
Measured Cone thickness, t_h	0.308	inches		
Specific Gravity of contents of tank, SG	1.230			
Depth of Cone, d	12.25	inches	1.0208	ft
S, allowable tensile stress of shell & cone	15,200	psi		
Joint Efficiency cone-to-shell & long cone joints, E_1	0.70			
Joint Efficiency shell vertical joints, E_2	0.70			
Operating Pressure at top of tank, P_o	0.00	psi	0	psf

Note that per API 620 the max. operating pressure at top of tank is 15 psig.

O.D. of connection at bottom of cone (if none enter 0)	4.50	inches		
1/2 Apex angle, alpha = a	1.331679	radians	76.2996	degrees
Total Pressure, P at plane AA	921.02	psf (includes hydrostatic head + P_o)	6.40	psi

Plane AA is at the Spring Line.

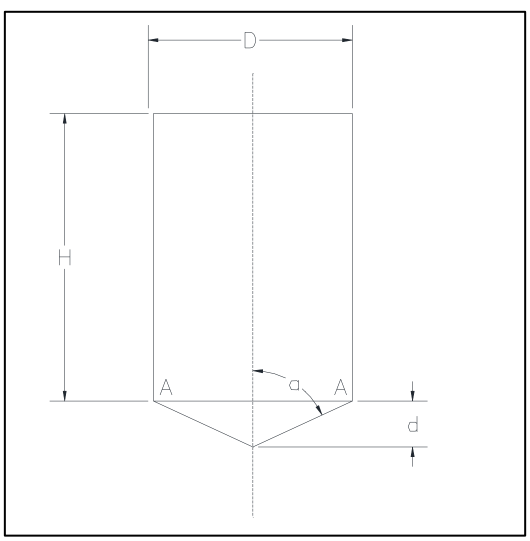


Figure No. A1

1) Shell Unit Forces @ Plane AA, See Figure No. A2

Sum $F_x = 0$

$2T_{2s} = PD$

$T_{2s} = PD/2$

$T_{2s} =$ 336 lb/in

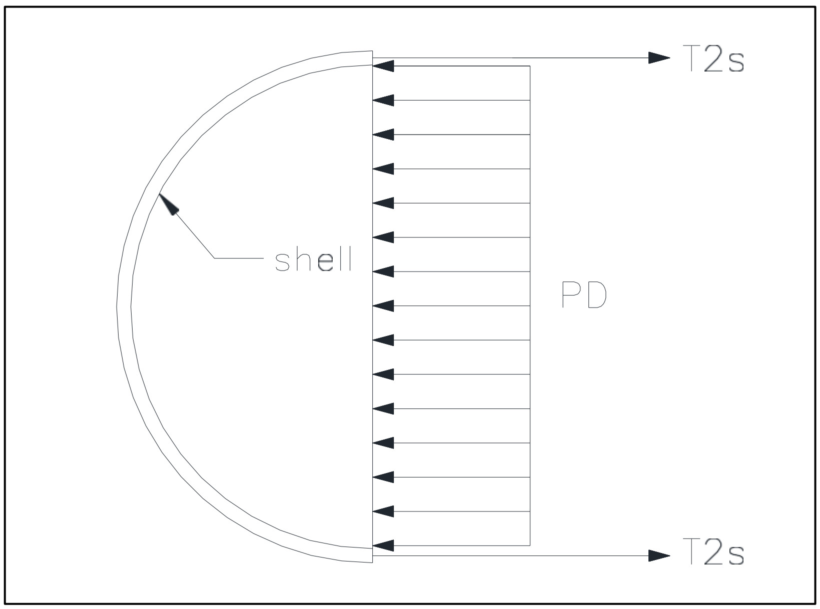


Figure No. A2

2) Cone unit force, T_2, the latitudinal unit force. Also known as the circumferential unit force. See Figure No. A3

R_2, radius of curvature of cone at A

$R_2 = AB/\cos(a)$

$R_2 =$ 221.664 inches

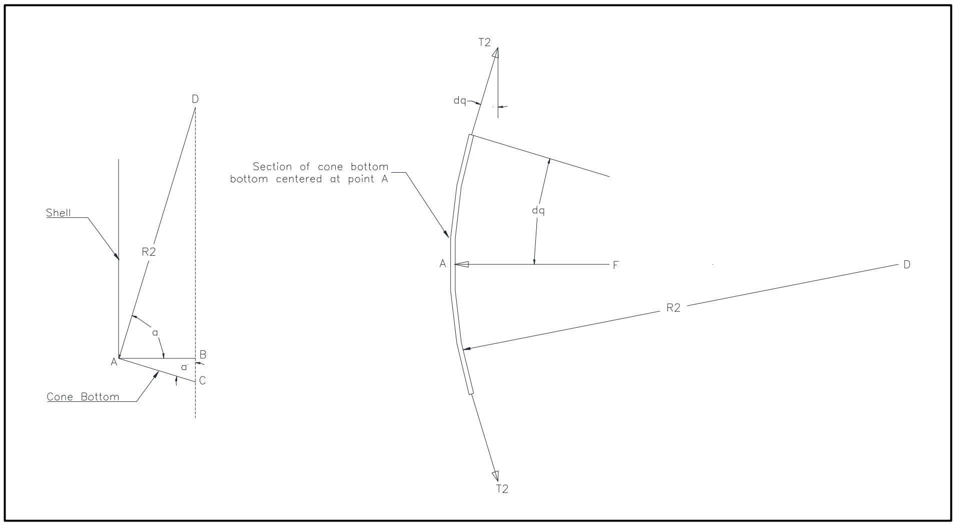


Figure No. A3

Sum of $F_x = 0$

F = the force on 1 inch wide section of cone at point A with an infinitesimal arc length = 2 x dq

$F = P(1)(2)(dq)(R_2)$

$F = 2PdqR_2$

$F - 2T_2{*}\text{Sin}(dq) = 0$

$2PdqR_2 = 2T_2\text{Sin}(dq)$ and for small dq, Sin(dq) = dq

$PR_2 = T_2$

$T_2 = PR_2$

$T_2 =$ 1418 lb/in

3) Cone unit force, T_1, the Meridional unit force. See Figure No. A4

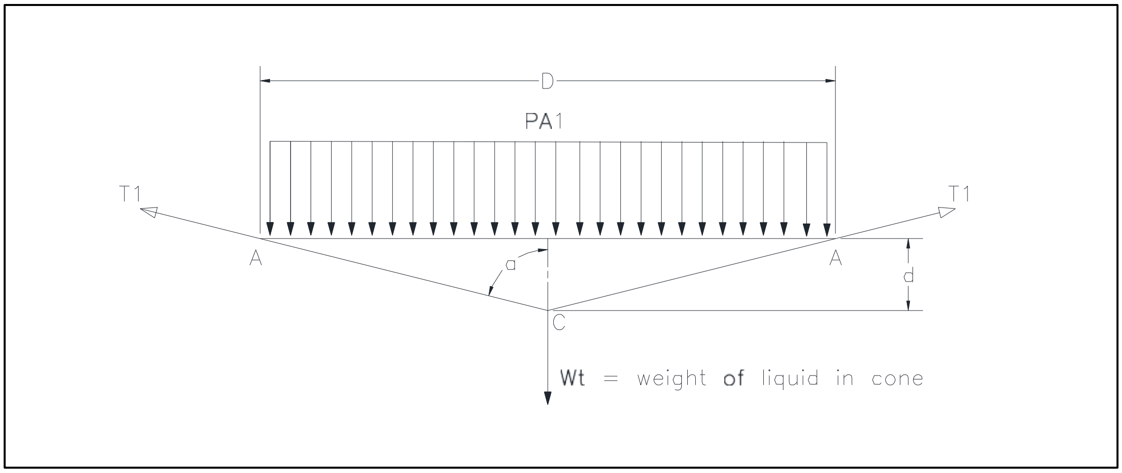


Figure No. A4

A_1 = PI/4 * D^2

A_1 = 8659.015 square inches 60.13205 square feet

V, Volume of Cone = (PI*D/2*D/2*d)/3

V = 20.461599 ft^3

W_t = SG* 62.4 lb/ft^3 * V

W_t = 1,570 lb

Sum F_y = 0

T_1Cos(a)PI*D - W_t -PA_1 =0

T_1 = (W_t + PA_1)/Cos(a)PI*D

T_1 = 729 lb/in

4) Knuckle Region Reinforcement Check per API 620 3.12

The measured cone bottom thickness is defined as t_h here, t_h =	0.308	inches
The measured shell thickness is defined as t_c here, t_c =	0.181	inches
R_2, radius of curvature of cone at A =	221.66	inches
R_c, radius of curvature shell =	52.5	inches

w_h = 0.6* sqrt(R_2 *t_h)

w_h = 4.957631 inches

w_c = 0.6* sqrt(R_c *t_c)

w_c = 1.849568 inches

Additional attached reinforcement area Ad

Ad = 1.1875

Available reinforcing area, A_a = w_h*t_h + w_c*t_c+Ad

A_a = 3.049222 sq inches

T_1 = 729 lb/in

T_{2s} = 336 lb/in

T_2 = 1418 lb/in

Per API 620, the magnitude of the total circumferential force acting on any vertical cross section through the compression ring region shall be computed as follows:

Q = T_2w_h + $T_{2s}w_c$ -T_1R_cSin(a) Note that if Q is negative, compression is indicated.

Q = 7,029 + 621 - 37,183

Q = -29,533

A_c, the required compression ring reinforcing area = Q/15,000

A_c = 1.968858 sq. inches

A_a	>	Ac	
3.049222	>	1.968858	TRUE

and since Q is negative the following condition must be true also.

$w_h Sin(a)$	>	$0.015 * R_c$	
4.816574	>	0.7875	TRUE

Since both conditions are true, knuckle region is adequately reinforced.

5) Check Measured Shell Thickness vs Required Shell Thickness

The required shell thickness is $t_{cr} = T_{2s}/SE_2$

0.031559 However, thickness must be at least 0.100" per API 653, so final required shell thickness is 0.100

t_c	>	t_{cr}	
0.181	>	0.100	TRUE

6) Check Measured Cone Bottom Thickness vs Required Cone Bottom Thickness at Plane A-A

The required cone thickness, t_{hr}, is the greater of the following 2 formulas

$t_{hr} = T_1/SE_1$ or $t_{hr} = T_2/SE_1$

$t_{hr} =$ 0.068513 $t_{hr} =$ 0.133248

$t_{hr} =$ 0.133248 However, thickness must be at least 0.100" per API 653, so final required cone bottom thickness is: $t_{hr} =$ 0.133 inches

t_h	>	t_{hr}	
0.308		0.133	TRUE

7) Tank Volume or Capacity Calculation

V_{total} = Volume of Cone + Volume of Shell

20.4616 ft^3 + $(PI/4) *D^2*H$

20.4616 + 721.5846

$V_{total} =$ 742 ft^3 or 5,551 gallons

5.2 Seismic Calculations

SEISMIC ANALYSIS
For Tank Supported above grade on legs

1) Input Data

Tank Location			Keyport, WA		
Tank no.			K1051-106		
dia, D			8.75	ft	
shell height, Ht			12	ft	
fill height, H			12	ft. This is height from top liquid surface to bottom of tank.	
floor thk			0.302	in	
roof thk			0.185	in	
slope roof, ϑ	0.062418	radians	3.5763	degrees	This is standard slope of 3/4" in 12".
shell thk, t			0.183	in	
sg liquid, G			1.230		
density steel			490	lb/sq ft	
Proportion of roof supported by shell			1	1 indicates 100%.	
Seismic zone factor, Z			0.300	See fig E-1 & Table E-2	
Importance Factor			1.00	See E.3.1	
Site coefficient			1.5	See table E-3	
Lateral force coefficient, C1			0.6		
For cone bottom supported above the grade, the depth of cone, Xb			1.1666	feet	
Height, L that shell sup above grade			2.17	feet	
Height from bottom of tank to grade, m			1.0034	feet	
b, the width of the base			7.5	feet	
Slope floor, a	0.260588	radians	14.9306	degrees	
1/2 apex angle of cone floor =			1.310208	radians	75.0694 degrees
		Radius	4.375	ft	
		D/H	0.7292	The diameter/fill height ratio from above	

2) Weights

a) Shell

Plate Area	330	sq ft
plate weight/sq ft	7.473	lb/sq ft
weight shell plate	2,465	lb
misc shell weight	200	lb
Total shell weight	2,665	lb

b) Roof

no. Rafters	0	
length rafters	0	
Type of rafter (shape)		
lb/ft rafters	0	lb/ft
weight rafters	0	lb
Plate Area = PI*(r/cos(ϑ))^2		
Plate Area	60.37	sq ft
plate weight/sq ft	7.554	lb/sq ft
Plate weight	456	lb
snow load	0	lb
misc weight	100	lb
Total Roof weight, Wr	556	lb

c) Cone Bottom

Plate Area = PI*(r/cos(gamma))^2		
Plate Area	64.41	sq ft
plate weight/sq ft	12.332	lb/sq ft
Plate weight	794	lb
misc weight	100	lb
Bottom weight,Wb	894	lb

3) Determination of Additional Seismic Inputs

Natural period of 1st sloshing mode, T

T = k* sq root (D)		For D/H =	0.73	k =	0.58	from Figure E-4
T	1.716	seconds		S =	1.5	from table E-3
Is T < 4.5s?	true, so C2=0.75S/T					

C2 = 0.75S/T
C2 0.656

W1 & W2
D/H = 0.73

The weight of liquid, Wt

Wtshell = pi/4*D^2*62.4*sg*Ht			Wtcone = ((pi*r^2*depth of cone)/3)*62.4*sg		
	4,615	x Ht			
Wtshell =	55,383	lb	Wtcone =	1,459	lb

Wt = Wtshell + Wtcone
Wt 56,842 lb

W1 = Wt*W1/Wt   W1/Wt = 0.820 from fig E-2

W1	46,611	lb		
W2		W2/Wt =	0.160	from fig E-2
W2	9,095	lb		

X1 & X2

X1/H =	0.42	from fig E-3
X1=	5.04	ft
X2/H =	0.76	from fig E-3
X2	9.12	

Xs = height from cg of shell to bottom of tank = 7.1666 feet

4) Calculation of Overturning Moment, M

M = Z*I*(C1*Ws*Xs'+C1*Wr*Ht'+C1*Wb*Xb'+C1*W1*X1'+C2*W2*X2') ft lb

m	1.0034	see above
Z	0.3	see above
I	1	see above
C1	0.6	see above
C2	0.656	see above
Ws	2,665	shell weight
Xs'	8.17	the height from grade to Fs
Wr	556	roof weight
Wb	894	bottom weight
Xb'	2	the height from the grade to Fb
Ht'	14.17	the height from grade to Fr
W1	46,611	effective weight of liquid responsible for impulse force
X1'	6.04	the height from the grade to F1
W2	9,095	effective weight of liquid responsible for sloshing or convective force of liquid.
X2'	10.12	the height from the grade to F2

Z*I =	0.3				
C1*Ws*Xs'=	13,064		Lateral Force, Fs =	480	Impulse force of tank shell
C1*Wr*Ht'=	4,727		Lateral Force, Fr =	100	Impulse force of tank roof
C1*W1*X1'=	169,012		Lateral Force, F1 =	8,390	Impulse force of liquid
C1*Wb*Xb' =	161		Lateral Force, Fb =	161	Impulse force of tank bottom
C2*W2*X2'=	60,372		Lateral Force, F2 =	1,789	Convective, or sloshing force of the liquid
M=	74,201	ft lb	Total Lateral Force, Ft =	10,920	lb

5) Check Stability of Tank:

The resisting Moment is Mr = (weight of tank + the weight of fluid) x 1/2 of the base width

weight of tank =	4,115	lb
weight of liquid =	56,842	lb
width of base =	7.5	ft

Mr = 228,590 ft-lb

Safety Factor for overturning = Mr/M

Safety Factor for overturning = **3.08** **> 1.5** **O.K., Tank is stable**

Note that if a tank is found to be unstable that indicates that tank anchors are needed to resist the uplift forces at the base plate to grade interface that will occur during an earthquake. An unstable tank is susceptible to tipping during an earthquake.

6) Check Need for Anchors Due Solely to Lateral Loads

Total weight of liquid	56,842	lb	
Total weight of tank	4,115	lb	
Total weight, W	60,957	lb	
Coefficient of friction =	0.030	Between steel & ice, the worst possible case.	

Frictional Force resisting the total lateral force = W*coefficient of static friction between base plates & grade

Ff = 1,829

Is Ff > Ft * 1.5 **Not true, therefore anchors are needed for lateral seismic forces**

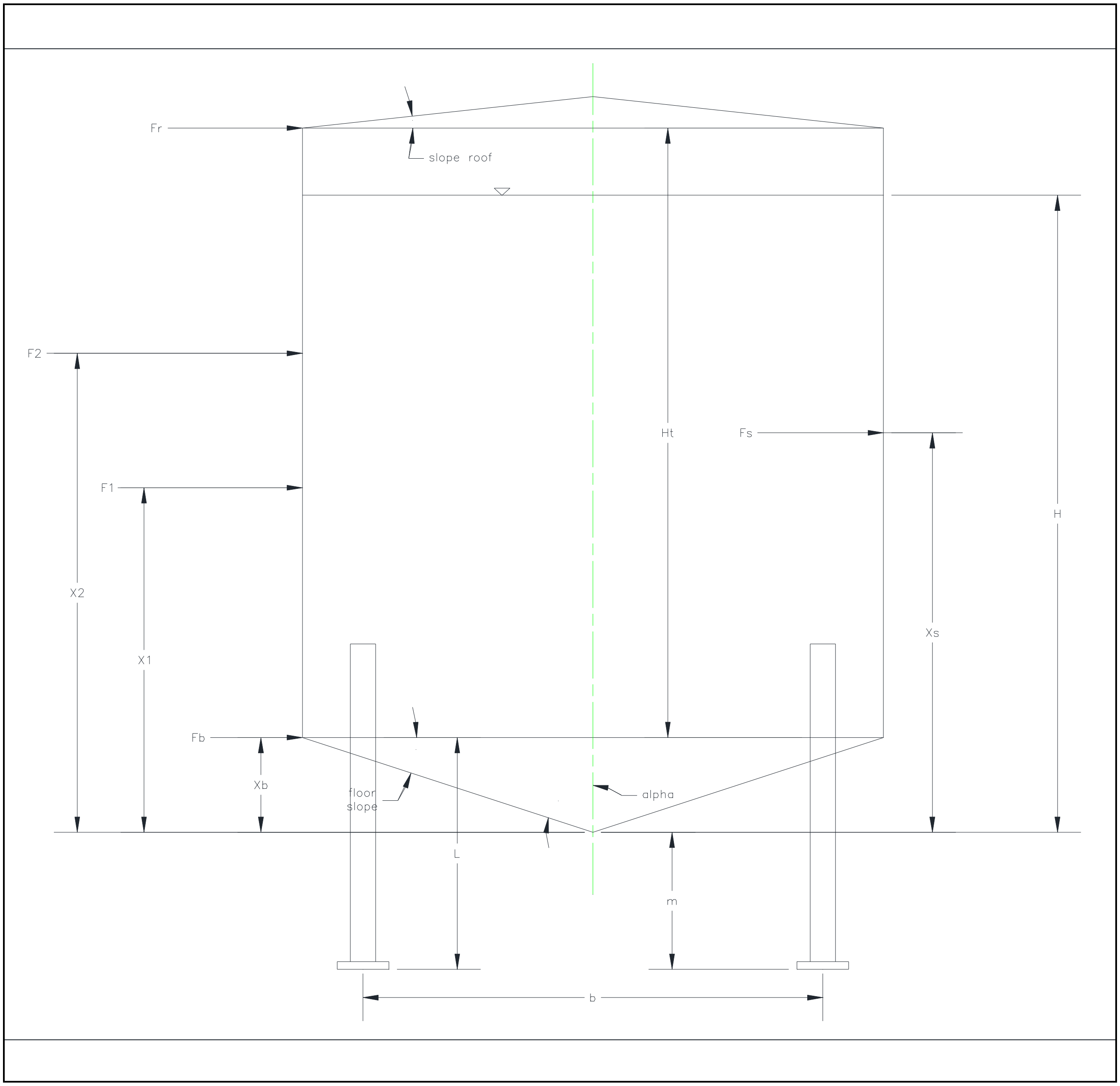
The shear force on each bolt, using 16 anchor bolts is = 682 lb

The anchors should provide at least this much strength plus a safety margin and a corrosion allowance for the bolts.

7) Check Vertical Forces at Anchor Points
Both Seismic and Dead Load.

Vertical Load, P =	W =	-60,957	lb, this force is given a negative sign to indicate a downward
N, number of anchor locations =		4	direction.
For 4 anchor points, I =4*(b/2)^2 =		56.250	sq ft.
c =		3.750	ft
Max anchor forces, F = P/N + - Mc/I			
	Mc/I =	4,947	lb

		F =	-10,293	lb	If negative that indicates a downward force and
		and F =	-20,186	lb	no tension in anchor bolt.
Foot print size of 1 base plate =			100	sq inches	
Bearing stress = F/footprint area =			201.9	psi	
Allowable compressive strength of the foundation under the base plates =			1,500	psi, the foundation is concrete, and the concrete is assumed to have at least this strength.	
Safety factor =	1,500	divided by	201.9	=	7.43
	Safety Factor	**=**	**7.43**	**> 1.5**	**O.K., Foundation strength is acceptable**


Fr
slope roof
F2
Ht
Fs
F1
H
X2
Xs
X1
Fb
Xb
floor slope
alpha
L
m
b

6.0 Ultrasonic Thickness Data

6.1 Shell Plates UT

The following table details all readings (in) from the shell UT survey. All scan drops were equally spaced at 6.87 ft.

Data and Statistics		1	2	3	4	*Readings Line Average*
Course 2	4	0.184	0.184	0.182	0.181	0.183
	3	0.183	0.185	0.182	0.182	0.183
	2	0.182	0.184	0.181	0.180	0.182
	1	0.182	0.184	0.183	0.181	0.182
Course 1	4	0.185	0.185	0.182	0.185	0.184
	3	0.185	0.184	0.181	0.185	0.184
	2	0.186	0.184	0.186	0.185	0.185
	1	0.185	0.186	0.185	0.185	0.185
Scan Line Average		0.184	0.185	0.183	0.183	0.184

The tables below presents the statistics of the thickness readings (in) obtained on the Shell plates.

Course #	Min	Avg	Max
2	0.180	0.182	0.185
1	0.181	0.185	0.186
Global	0.180	0.184	0.186

6.2 Cone Bottom Plates UT

The following table details all readings (in) obtained on the cone bottom plates.

Plate ID \ Reading ID	1	2	3	4	5	6	7	8	*Avg*
North to South	0.320	0.315	0.314	0.308	0.310	0.310	0.311	0.312	0.313
East to West	0.315	0.309	0.313	0.313	0.314	0.316	0.315	0.313	0.313
Avg	0.317	0.312	0.314	0.310	0.312	0.313	0.313	0.313	0.313

The table below presents the statistics of the thickness readings obtained on the cone plates.

UT Summary	
Maximum	0.320
Average	0.313
Minimum	0.308

6.3 Fixed Roof Plates UT

The following table details all readings (in) obtained on the Fixed Roof plates.

Plate ID \ Reading ID	1	2	3	4	5	6	7	8	*Avg*
North to South	0.186	0.188	0.187	0.187	0.186	0.186	0.187	0.186	0.187
East to West	0.185	0.186	0.186	0.185	0.186	0.188	0.186	0.187	0.186
Avg	0.186	0.187	0.187	0.186	0.186	0.187	0.187	0.187	0.186

The table below presents the statistics of the thickness readings obtained on the roof plates.

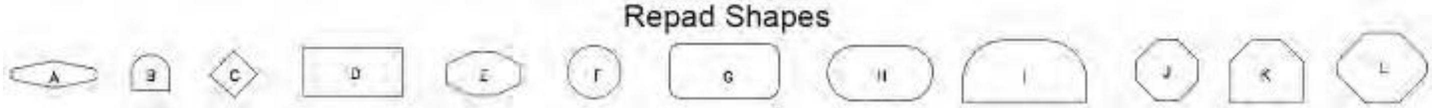
UT Summary	
Maximum	0.188
Average	0.186
Minimum	0.185

6.4 Shell Nozzle and Appurtenance Table

Item	Type	Service	Pipe Size (in)	Station (ft)	Center Line Elevation (ft)	Distance From Shell to Flange Face (in)
A	Manway	Access	24.0	0	20.5	5.875
B	Nozzle	Transfer	3.0	9.1	135.0	7.0
C	Nozzle	Transfer	2.0	18.2	129.0	6.75
D	Nozzle	Transfer	2.0	23.0	129.0	7.0
E	Nozzle	Bottom Draw	2.0	–	–	–

Note: The data represented in the weld spacing column is the minimum spacing measured. H, V, or N indicates which is the minimum distance from the nozzle measured. (H=Horizontal Weld, V=Vertical Weld, N=Nozzle Weld)

Repad Shapes



6.5 Shell Nozzle UT

Item	Type	Service	Pipe Size (in)	Top (in)	Bottom (in)	Right (in)	Left (in)	Repad Thickness (in)	Flange Thickness (in)	Cover Thickness (in)	Comments
A	Manway	Access	24.0	0.242	0.243	0.242	0.242	–	0.466	0.491	
B	Nozzle	Transfer	3.0	0.219	0.210	0.209	0.212	–	0.975	–	
C	Nozzle	Transfer	2.0	0.149	0.149	0.150	0.149	–	0.690	–	
D	Nozzle	Transfer	2.0	0.148	0.146	0.148	0.148	–	0.712	–	
E	Nozzle	Bottom Draw	2.0	0.145	0.144	0.145	0.145	–	–	–	

6.6 Fixed Roof Nozzle UT

Item	Type	Service	Pipe Size (in)	North (in)	South (in)	East (in)	West (in)	Comments
AA	Hatch	Access	22.0 x 22.0	0.243	0.243	0.244	0.243	
AB	Nozzle	Vent	4.0	0.210	0.208	0.208	0.208	
AC	Nozzle	HLA	4.0	0.210	0.209	0.209	0.210	

7.0 Shell Corrosion Rates

Course	$t_{previous}$ Previous Thickness (in)	Year Obtained	t_{actual} Actual Thickness (in)	Year Obtained	C_r Corrosion Rate (in/yr.)	t_{min} Minimum Allowable Thickness (in)	R_L Remaining Life (yr.)
2	0.188	1994	0.180	2020	0.00029	0.100	275.09
1	0.188	1994	0.181	2020	0.00027	0.100	298.42

8.0 Photographs

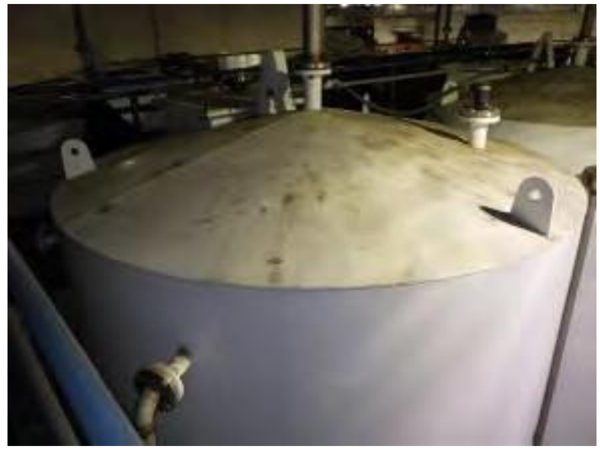
Tank Labeling

Data Plate

Manway

Ground

Nozzle B	Nozzle B Piping
	
Nozzle C	Nozzle D
	
Bottom Draw	Support Leg
	

Roof	Roof
	
Area Overview	Area Overview
	
Area Overview	Walkway
	

Walkway	Walkway
	
Area Overview	Ladder
	

9.0 NDE Equipment Used

The equipment utilized for the inspection of the tank included of the following :

Pit Gauge

Manufacturer	Model	Serial No
W.R. Thorpe	1	1.979.912

Ultrasonic Transducers

Manufacturer	Model	Serial No	MHz	Diameter
Olympus	D790-SM	865199	5	0.375

UT Equipment

Manufacturer	Model	Serial No
Olympus	38DL Plus	130573601
UTT Pole Crawler	MC-2258	1103095

10.0 Inspector Certifications

energy API

AMERICAN PETROLEUM INSTITUTE
Individual Certification Programs: ICP™

API Individual Certification Programs

verifies that

Michael Alec Arpino

has met the requirements for API certification

API-653 Aboveground Storage Tank Inspector

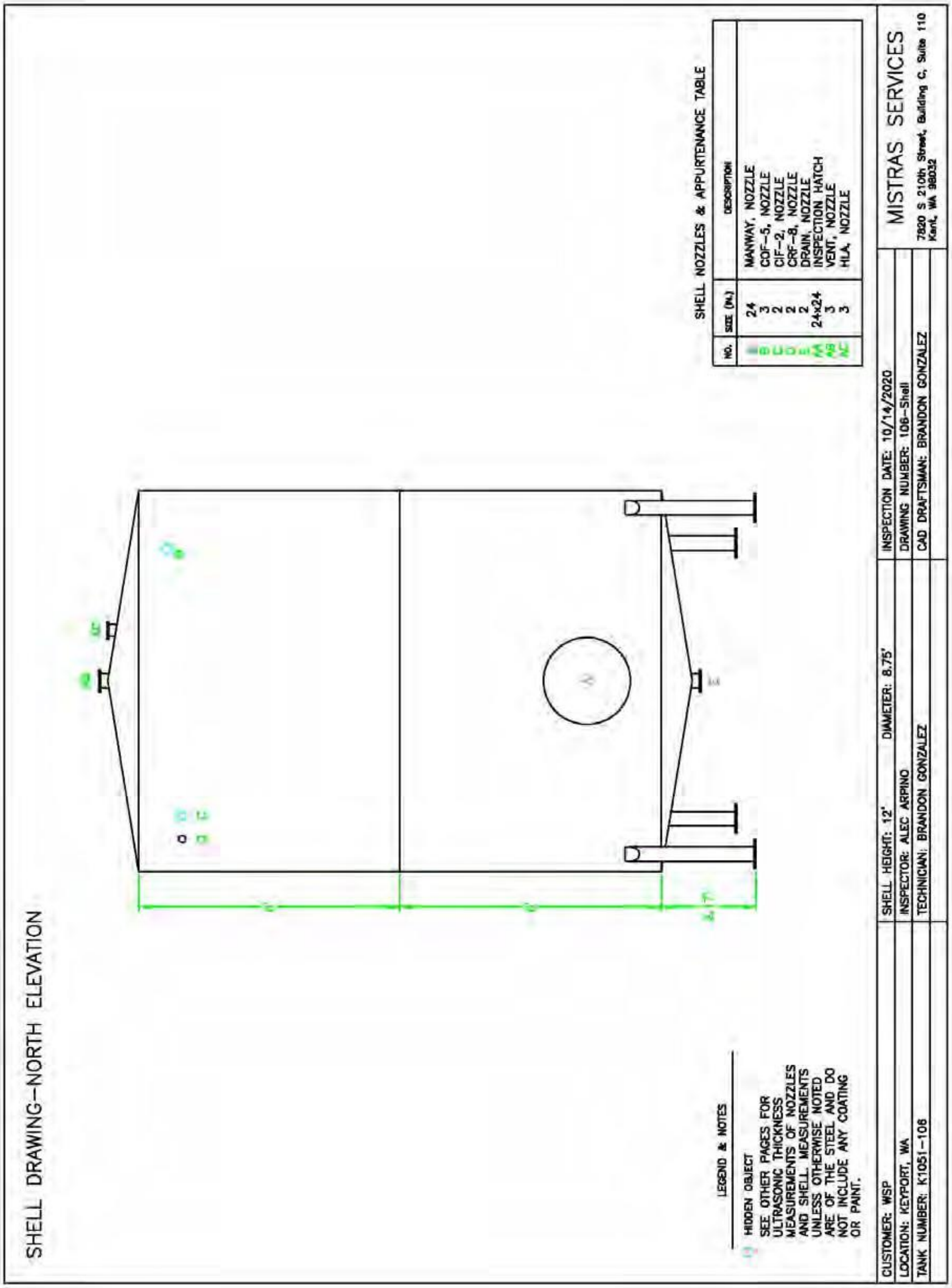
Certification Number	*77549*
Original Certification Date	*December 31, 2017*
Current Certification Date	*December 31, 2017*
Expiration Date	*December 31, 2020*

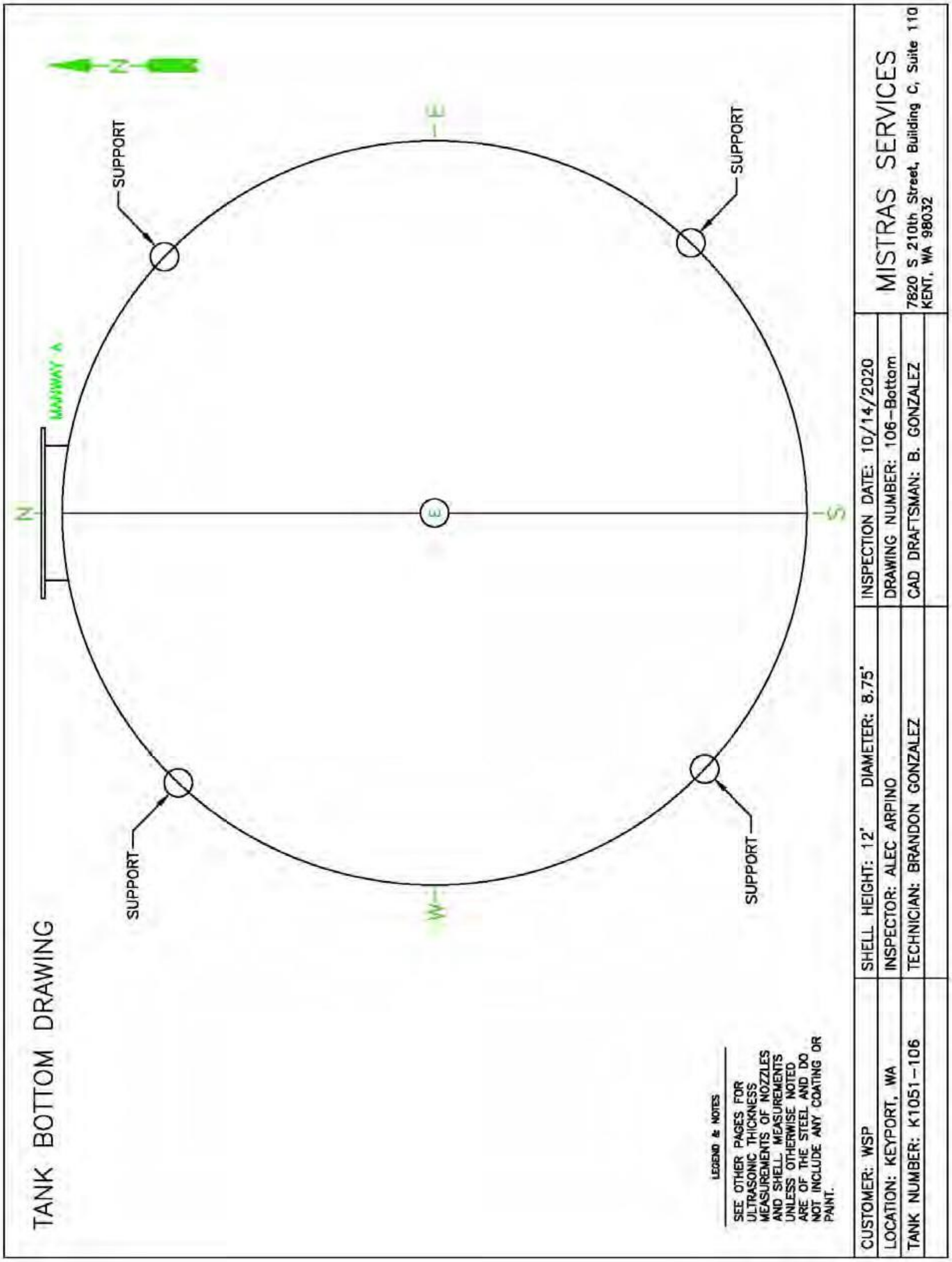
Manager, Individual Certification Programs

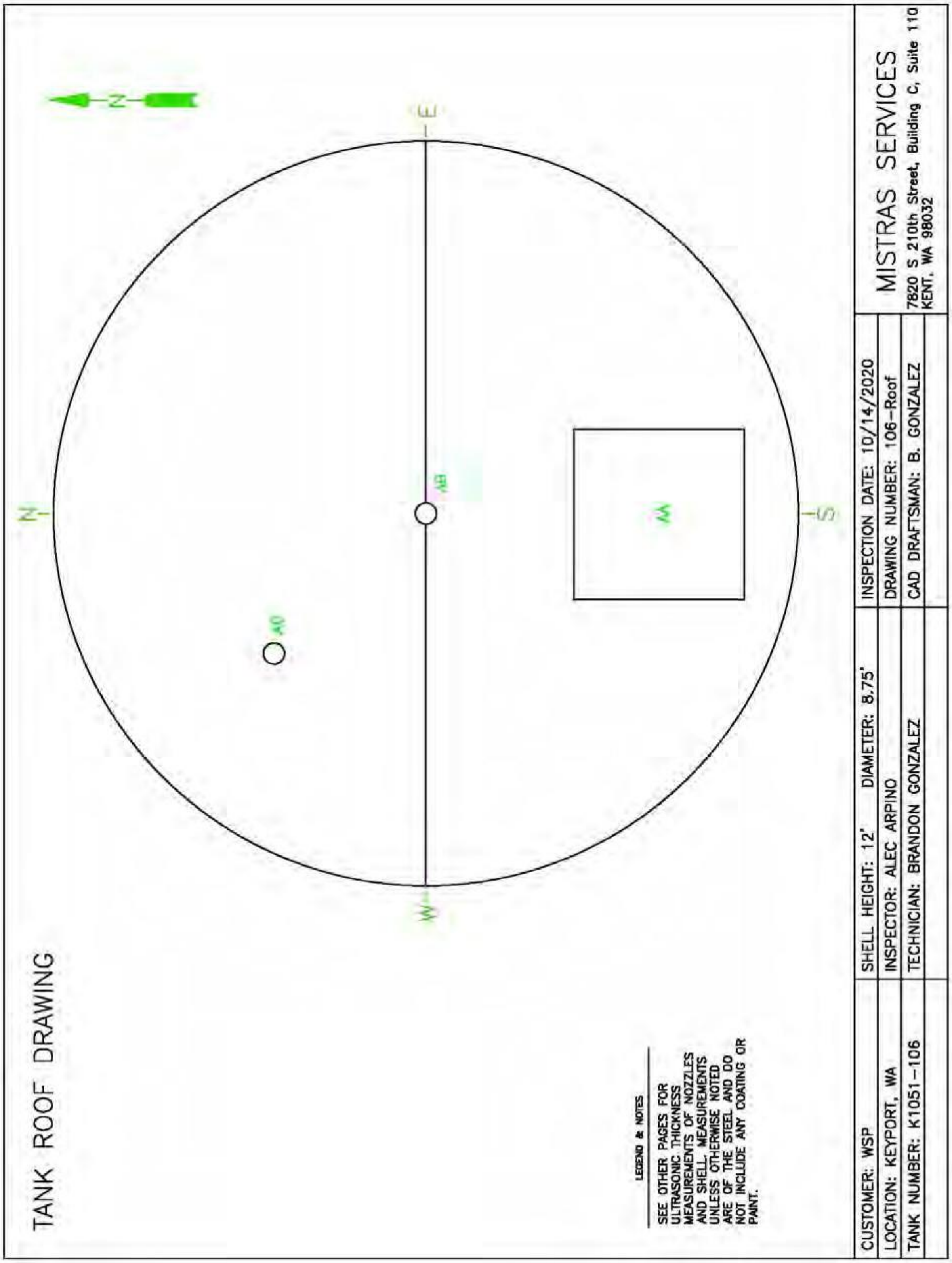
ICP

2015-027 | PDF

11.0 Drawings




TANK BOTTOM DRAWING
N
E
S
W
MANWAY A
SUPPORT
SUPPORT
SUPPORT
SUPPORT
LEGEND & NOTES
SEE OTHER PAGES FOR ULTRASONIC THICKNESS MEASUREMENTS OF NOZZLES AND SHELL. MEASUREMENTS UNLESS OTHERWISE NOTED ARE OF THE STEEL AND DO NOT INCLUDE ANY COATING OR PAINT.
CUSTOMER: WSP
LOCATION: KEYPORT, WA
TANK NUMBER: K1051-106
SHELL HEIGHT: 12' DIAMETER: 8.75'
INSPECTOR: ALEC ARPINO
TECHNICIAN: BRANDON GONZALEZ
INSPECTION DATE: 10/14/2020
DRAWING NUMBER: 106-Bottom
CAD DRAFTSMAN: B. GONZALEZ
MISTRAS SERVICES
7820 S. 210th Street, Building C, Suite 110
KENT, WA 98032


TANK ROOF DRAWING
N
E
S
W
LEGEND & NOTES
SEE OTHER PAGES FOR ULTRASONIC THICKNESS MEASUREMENTS OF NOZZLES AND SHELL. MEASUREMENTS UNLESS OTHERWISE NOTED ARE OF THE STEEL AND DO NOT INCLUDE ANY COATING OR PAINT.
CUSTOMER: WSP
LOCATION: KEYPORT, WA
TANK NUMBER: K1051-106
SHELL HEIGHT: 12'
DIAMETER: 8.75'
INSPECTOR: ALEC ARPINO
TECHNICIAN: BRANDON GONZALEZ
INSPECTION DATE: 10/14/2020
DRAWING NUMBER: 106-Roof
CAD DRAFTSMAN: B. GONZALEZ
MISTRAS SERVICES
7820 S 210th Street, Building C, Suite 110
KENT, WA 98032

12.0 Appendix A – References

References:

1) Washington State Department of Ecology, Dangerous Waste Regulations, Chapter 173-303 WAC
2) Conversations with the client
3) API RP 652, Lining of Above Ground Petroleum Storage Tanks
4) API RP 651, Cathodic Protection of Above Ground Storage Tanks
5) API Guide for the Inspection of Refinery Equipment – Chapter 13, Atmospheric and Low Pressure Tanks
6) API Standard 650, Welded Steel Tanks for Oil Storage
7) API Standard 653, Tank Inspection, Repair, Alteration, and Reconstruction
8) API Standard 620, Design and Construction of Large, Welded, Low Pressure Storage Tanks

SECTION D

APPENDIX D10

TANK SYSTEMS COATING SPECIFICATIONS

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SECTION 09875

INTERIOR COATING SYSTEM FOR WELDED STEEL STORAGE TANKS

PART 1 GENERAL

1.1 REFERENCES

The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.134	Respiratory Protection
29 CFR 1910.1000	Air Contaminants
29 CFR 1910.1018	Inorganic Arsenic
29 CFR 1910.1025	Lead
29 CFR 1910.1200	Hazard Communication
40 CFR 260	Hazardous Waste Management Systems: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Generators of Hazardous Waste
40 CFR 263	Transporters of Hazardous Waste
40 CFR 264	Owners and Operators of Hazardous Wastes Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities

MILITARY SPECIFICATION (MIL)

MIL-B-131	(Rev. H) Barrier Materials, Watervaporproof, Greaseproof, Flexible, Heat-Sealable
MIL-P-3420	(Rev. F) Packaging Materials, Volatile Corrosion Inhibitor Treated, Opaque
MIL-S-22262	(Rev. A) (Am. 2) Abrasive Blasting Media Ship Hull Blast Cleaning
MIL-P-24441	(Rev. B) Paint, Epoxy-Polyamide

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC VIS 1	1989 Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs)
SSPC SP 5	1989 White Metal Blast Cleaning
SSPC SP 7	1989 Brush-Off Blast Cleaning
SSPC PA 2	1982 Measurement of Dry Paint Thickness with Magnetic Gages.

1.3 SUBMITTALS

Submit the following in accordance with Section 01300, “Submittals.”

1.3.1 SD-06, Instructions

a. Coating system

Before applications, submit three copies of formulator’s printed instructions to include brand names, catalog numbers, and names of manufacturers. The instructions shall include detailed mixing and application procedures, number and types of coats required, minimum and maximum application temperatures, curing procedures, pot life, and shelf life.

1.3.2 SD-08, Statements

a. Operation procedures

b. Material safety data sheets

1.3.2.1 Statement Requirements

Submit four copies of the industrial hygienist certification of the operation procedures and personal protection equipment the Contractor is proposing to use. Provide six copies of materials safety data sheets for materials to be used at the job site in accordance with CFR 29 CFR 1910.1200.

1.3.3 SD-10, Test Reports

a. Blasting abrasive

1.2.4 SD-13, Certificates

a. Coating system

Before delivery of the coating system, submit four copies of certificates.

1.3 DELIVERY AND STORAGE

Epoxy materials should be shipped and stored out of the sun and weather, preferably in air conditioned spaces.

1.4 SAFETY

The Contractor shall ensure that employees are trained in the requirements of CFR 29 CFR 1910.1200 and understand the information contained in the MSDS for their protection against toxic and hazardous chemical effects.

1.5 GOVERNMENT-FURNISHED MATERIALS AND SERVICES

The Government will furnish, without cost, all test fuel products for leakproof testing of coated tank as specified in the paragraph titled "Final Inspection."

1.6 JOB SITE REFERENCES

The contractor shall have a t least one copy of each of SSPC SP 5, SSPC PA 2, and SSPC IS 1 at the job site and made available to the Contracting Officer.

PART 2 PRODUCTS

2.1 COATING SYSTEM

Shall conform to the respective specifications and to the requirements specified herein.

2.1.1 Primer

Epoxy-Polyamide, Green Primer, Formula 150 of MIL-P-24441.

2.1.2 Intermediate Coat

Epoxy-Polyamide, Haze Gray Intermediate Coat, Formula 151 of MIL-P-24441.

2.1.3 Top Coat

Epoxy-Polyamide, White Top Coat, Formula 152 of MIL-P-25551.

2.2 BLASTING ABRASIVE

Abrasive shall be sharp, washed, salt-free, angular, crushed wet bottom boiler slag or nickel slag, free from feldspar or other constituents that tend to break down and remain on the surface. Abrasive shall not contain magnetic materials and shall conform to MIL-S-22262, Type I (Inorganic materials).

2.3 VAPORTIGHT MATERIAL

MIL-B-131 or MIL-P-3420.

PART 3 EXECUTION

3.1 PROTECTION FROM TOXIC AND HAZARDOUS CHEMICAL AGENTS

During tank cleaning, cleanup, surface preparation, and paint application phases, ensure that employees are adequately protected from toxic and hazardous chemical agents which exceed the concentrations in CFR 29 CFR 1910.1000, CFR 29 CFR 1910.1018, and CFR 29 CFR 1910.1025. Comply with respiratory protection requirements in CFR 29 CFR 1910.134.

3.1.1 Epoxy-Polyamide Coating Hazards

MIL-P-24441 formulations have a minimum flash point of 95° F (35° C). Solvent fumes from epoxy paints systems are combustible and toxic. Precautions shall be taken to prevent their accumulations, particularly in confined spaces. In addition to fire and toxic hazards, epoxy coatings can cause allergic reactions when allowed to come in contact with the skin. Prompt skin cleanup after contact using soap and water, not solvents, is recommended. Solvents will thin and spread the paint over the skin, permitting deeper penetration and increasing the hazards of a delayed allergic reaction.

3.2. VENTILATION

Provide ventilation inside tanks throughout course of work as required to maintain a vapor-free condition. Use exhaust fans, either explosion-proof electrically operated or air-driven. Fans shall have sufficient capacity to hold vapor concentration below four percent of lower explosive limit as determined with an approved explosive meter. Keep fans in operation whenever workmen are in tanks and as long as may be necessary for proper application and curing of coatings. Ventilation shall meet at least minimum safety requirements appropriate to thinners or chemicals used. During application of the coating system, provide a minimum of 10 air changes per hour. Where this is not feasible due to size of tank or limitations in number and size of manhole openings, then provide suction ductwork extending to areas of heaviest concentrations including lowest levels of tank. In no case shall exhaust fan capacity be less than 10,000 CFM except for small tanks of 250,000 gallons capacity or less. Ventilate tanks during abrasive blasting and during application and curing of coating. Provide heating, cooling, or dehumidification if required to satisfy conditions specified in paragraph titled “Weather Conditions.”

3.3 CLEAN AND REPAIR SURFACE

Brush-off blast clean surfaces to receive epoxy coating in accordance with SSPC SP 7. Remove abrasive and dust from the surfaces by brushing, blowing with dry compressed air, and vacuuming, and then remove loose material from the tank interior. Examine the tank interior for defects. Test bottom weld seams and suspect areas with a vacuum box. Use a glass top vacuum box with Hypalon or neoprene sealing gasket. Apply a commercial bubble forming solution to the weld or area to be tested; position the vacuum box over the area and pull a partial vacuum. Observe the solution film for bubble formation between 0-2 psi (0-14 kPa) differential pressure. Continue to open the valve until a differential pressure of 5 psi (34 kPa) is achieved and hold for at least 20 seconds while continuing to observe the solution for bubbles. Correct defects found, such as cracks or splits, by welding. Grind off rough surfaces on weld seams, sharp edges, and corners to a radius of not less than 1/8 inch (3 mm).

3.4 ABRASIVE BLAST

3.4.1 Equipment

Use blasting equipment of the conventional air, force-feed, or pressure type. No water blasting or vapor blasting will be permitted in order to keep steel surfaces moisture-free. Use a nozzle of such size that a pressure of 90 plus or minus 10 psig (621 plus or minutes 59 kPa) will be maintained at the nozzle. Filter air supply so that the air is free of oil and moisture. Blow the compressed air through a clean white cloth to check for oil and moisture.

3.4.2 Surface Standard

Inspect the tank walls and select plate with similar characteristics and surface profile for use as a surface standard. White blast clean one or more foot-square steel panels in accordance with SSPC SP 5. White metal blast surfaces shall conform to SSPC VIS 1. Record the blast nozzle type and size, air pressure at the nozzle or compressor, distance of nozzle from the panel, and angle of blast to establish procedures for blast cleaning to develop a one- to 2-mil (25.4 to 50.8 micron) anchor pattern. Use a surface profile comparator, appropriate to the abrasive being used, to determine the profile of the standard panel before an after the white blast. A Keane-Tator surface profile comparator to determine the anchor pattern has been found useful. Keep the surface standard wrapped and sealed in vapor tight material for use as a standard of comparison for the steel surfaces throughout the course of the work.

3.4.3 Preparation

Abrasive blast steel surfaces to white metal in accordance with SSPC SP 5 as described in and as determined by the paragraph entitled “Surface Standard.” Blast surfaces in sections or blocks small enough to permit application of the epoxy coating system during the same work shift. After blasting, remove abrasive and dust from the surfaces by brushing and vacuuming. Remove loose material from the tank interior. Fill voids, pits, sharp depressions, or other imperfections by welding as approved by the Contracting Officer. Apply application of pretreatment wash primer within eight hours of blasting. Inspect the blasted surfaces with black light to check for fluorescence from compressor oil. Surfaces to receive coating shall be free of oil.

3.4.4 Disposal of Used Abrasive

Test used abrasive in accordance with CFR 40 CFR 261 to determine if it is a hazardous waste using the EP toxicity test for metals. Handle and dispose of abrasive determined to be hazardous waste in accordance with CFR 40 CFR 260, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, and 40 CFR 266. Dispose of abrasive which is not hazardous waste at a landfill off Government property in accordance with applicable regulations. The contract price will be adjusted if the used abrasive is determined to be hazardous waste. However, payment for disposal of hazardous waste will not be made until a completed manifest from the treatment or disposal facility is returned, and a copy furnished to the Government.

3.4.5 Recycled Abrasive

Recycled abrasive at the job site shall be screened and air washed to remove dirt and fines. New abrasive shall then be added so that the combined new and recycled abrasive mixture shall meet specified abrasive requirements for chemical composition, moisture, friability, silica, anchor pattern, and oil content. Do not recycle abrasive which has picked up toxic or hazardous material. Nickel slag shall not be recycled.

3.5 WEATHER CONDITIONS

Coating operations shall be done only when the ambient air temperature is above 40° F, below 95° F, and the steel surface temperature is more than 5° F above the dew-point of the ambient air. Coatings shall not be applied to damp or wet surfaces or while there is any precipitation.

3.6 EPOXY-POLYAMIDE COATING APPLICATION

Epoxy-polyamide coatings, MIL-P-24441, shall be in accordance with manufacturer’s application procedures applied by brushing, spraying, or dip application.

3.7 APPLICATION THICKNESS

Unless otherwise specified, apply each coat of paint to produce approximately three mils dry film thickness (DFT). Application which yields in excess of 4.0 mils dry film thickness to be avoided to prevent sagging. Time between coats shall not exceed seven days.

1st – Formula 150 Epoxy-Polyamide Green Primer, MIL-P-24441 – 2 to 4 mils DFT

2ND – Formula 151 Epoxy-Polyamide Haze Gray Intermediate Coat, MIL-P-24441 – 2 to 4 mils DFT

3rd – Formula 152 Epoxy-Polyamide White Top Coat, MIL-P=24441 – 2 to 4 mils DFT

3.8.2 Coating System

During coating application, ground nozzles and metallic components against static discharges. Surfaces to receive coating shall be free of dust, dirt, oil, and other contaminants as determined by visual examination. Use clean canvas shoe covers when walking on prepared surfaces. Coat interior steel surfaces of the tank including the bottom, shell, ceiling, or underside of floating roof, where applicable; internal piping; roof legs, where applicable; other internal, structural-steel and appurtenances.

3.8.2 General Procedure

The first coat, Formula 150 green primer, shall be applied as soon as possible after the blast cleaning and always the same day. If visible rusting does occur after blasting, regardless of the time interval, the rusted surface shall be re-blasted prior to applying the specified primer. The coating system shall be applied by experienced applicators. Welds, lap seams, reinforcing beams, and sharp edges shall be brush painted before spray painting of each coat of paint over the entire tank interior. The epoxy intermediate, Formula 151, and top coat Formula 152, shall be applied successively allowing a drying time of not less than 16 hours nor more than seven days between each coat. Each coat of the 3 coats shall have a dry film thickness of approximately 3 mils. The total dry film thickness of the complete system shall be not less than 8 mils. If necessary to obtain the required minimum thickness of 8 mils, and additional top coat of Formula 152 shall be applied.

3.9 FIELD TESTS AND INSPECTIONS

3.9.1 General

Use clean canvas shoe covers when walking on coated surfaces. Advise the Contracting Officer when the work in progress is at the following steps so that appropriate inspection may be made:

Step	Action
Prior to preparation of tank(s) for cleaning and repair	Safety inspection
After cleaning of tank(s) and prior to abrasive blasting	Safety inspection, removal of dirt, trash debris, and any hindrance to abrasive
After abrasive blasting	Surface inspection for appropriate finish for coating application as specified in the paragraph entitled "APPLICATION OF COATING SYSTEM"
During and after coating application	Coating application inspection as specified in paragraphs entitled "APPLICATION OF COATING SYSTEM" and "Final Inspection"
After final cleanup	Clean up inspection specified in the paragraph entitled "FINAL CLEANUP"

3.9.2 Final Inspection

Following completion and cure of the coating system, inspect the surfaces for pinholes, blisters, inadequate coating thickness, and other defects. Correct imperfections found. Measure the dry film thickness in accordance with SSPC PA 2 at 10 equally spaced points within a 10-foot by 10-foot (3-m by 3-m) area as designated by the Contracting Officer. Discard the high and low values, and average the remaining eight values as the coating thickness. If the average is less than the specified minimum dry film thickness, take additional readings in adjacent areas to define the extent of the thin area. Re-coat such areas with the white top coat, Formula 152 as necessary, to achieve the specified thickness. Re-coat within the time period specified in the paragraph titled "APPLICATION OF COATING SYSTEM." Brush blast or hand sand any coated areas that exceed 48 hours to remove the glossy surface before applying the additional top coat.

3.9.3 Fill Test

After the work has been inspected and approved, fill test the tanks. Allow a cure time of at least 14 days after the final coat has been applied before carrying out the fill test. Remove the blind flanges and reconnect tank piping ready for service. The Government will provide the necessary liquid and labor to fill the tanks. Advise the Contracting Officer, in writing, at least 10 days in advance of the need for this service. Fill tanks half full and check that drain valves are closed and check tanks for leaks. Keep tanks half full the first 12 hours of test, then fill tanks to full capacity, and check that drain valves are closed and check tanks for leaks. Monitor tank levels hourly during the first 24 hours of the fill test and notify the Contracting Officer immediately of any leaks detected. Padlock drain valves closed for the duration of the test and provide one

3.10 FINAL CLEANUP

Following completion of the work, remove all debris, equipment, and materials from the site. Remove temporary connections to Government or Contractor furnished water and electrical services. Restore all existing facilities in and around the work areas to their original condition.

SECTION 09874

EXTERIOR COATING SYSTEM FOR WELDED STEEL PETROLEUM STORAGE TANKS

PART 1 GENERAL

1.1 REFERENCES

The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.134	Respiratory Protection
29 CFR 1910.1000	Air Contaminants
29 CFR 1910.1200	Hazard Communication

FEDERAL STANDARDS (FED-STD)

FED-STD-595	(Rev. B) Colors

MILITARY SPECIFICATIONS (MIL)

MIL-B-131	(Rev. H) Barrier Materials, Watervaporproof, Greaseproof, Flexible, Heat-Sealable
MIL-P-3420	(Rev. F) Packaging Materials, Volatile Corrosion Inhibitor Treated, Opaque
MIL-P-24441	(Rev. B) Paint, Epoxy-Polyamide
MIL-C-81907	(Am. 1) Coating System, Polyurethane, Aliphatic, Weather Resistant
MIL-C-85285	(Rev. B) (Am. 2) Coatings: Polyurethane, High-Solids

MILITARY STANDARDS (MIL-STD)

MIL-STD-161	(Rev. F) (Notice 2) Identification Methods for Bulk Petroleum Products Systems Including Hydrocarbon Missile Fuels

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC VIS 1	1989 Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs)
SSPC SP 10	1991 Near-White Blast Cleaning
SSPC PA 2	1991 Measurement of Dry Paint Thickness with Magnetic Gages

1.2 SUBMITTALS

a. Coating system

Before application, submit three copies of supplier's (formulator's) printed instructions which include brand names, catalog numbers, and names of manufacturers. Instructions shall include detailed mixing and application procedures except as modified herein, number and types of coats required, minimum and maximum application temperatures, curing procedures, pot life, and shelf life.

1.2.2 SD-08, Statements

a. Material safety data sheets

Provide six copies of material safety data sheets (MSDS) for materials to be used at the job site in accordance with CFR 29 CFR 1910.1200.

1.2.3 SD-13, Certificates

a. Coating system

Submit four certificates of compliance attesting that the materials proposed for use meet the requirements specified.

1.3 DELIVERY AND STORAGE

Epoxy and polyurethane materials should be shipped and stored out of the sun and weather, preferably in air conditioned spaces.

1.4 SAFETY

The Contractor shall ensure that employees are trained in the requirements of CFR 29 CFR 1910.1200 and understand the information contained in the material safety data sheets for their protection against toxic and hazardous chemical effects.

1.5 JOB SITE REFERENCES

The Contractor shall have at least one copy each of SSPC SP 10, SSPC PA 2, and SSPC VIS 1 at the job site and made available to the Contracting Officer.

PART 2 PRODUCTS

2.1 COATING SYSTEM

Shall conform to the respective specifications and to the requirements specified herein.

2.1.1 Primer

Epoxy polyamide, zinc rich primer, formula 159 of MIL-P-24441.

2.1.2 Intermediate Coat

Epoxy polyamide, No. 50 gray intermediate coat, formula 157 of MIL-P-24441.

2.1.3. Topcoat

Polyurethane coating topcoat of MIL-C-85285, Type II (white FED-STD-595 color number 17925).

2.2 COLOR

Piping, conduit, and tank identification shall be in accordance with MIL-STD 161. Mark direction of fluids in accordance with MIL-STD-161.

PART 3 EXECUTION

3.1 PROTECTION FROM TOXIC AND HAZARDOUS CHEMICAL AGENTS

During tank cleaning, cleanup, surface preparation, and paint application phases, ensure employees are adequately protected from toxic and hazardous chemical agents which exceed the concentrations in CFR 29 CFR 1910.1000. Comply with respirator protection requirements in CFR 29 CFR 1010.134.

3.1.1 Epoxy-Polyamide Coating Hazards

MIL-P-24441 formulations have a minimum flash point of 95° F (35° C). Solvent fumes from epoxy paint systems are combustible and toxic. Take suitable precautions to prevent their accumulations. In addition to fire and toxic hazard, epoxy coatings can cause allergic reactions when allowed to come in contact with the skin. Prompt skin cleanup after contact using soap and water, not solvents, is recommended. Solvents will thin and spread paint over the skin, permitting deeper penetration and increasing the hazard of a delayed allergic reaction.

SECTION 09875

INTERIOR COATING SYSTEM FOR WELDED STEEL STORAGE TANKS

PART 1 GENERAL

1.1 REFERENCES

The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.134	Respiratory Protection
29 CFR 1910.1000	Air Contaminants
29 CFR 1910.1018	Inorganic Arsenic
29 CFR 1910.1025	Lead
29 CFR 1910.1200	Hazard Communication
40 CFR 260	Hazardous Waste Management Systems: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Generators of Hazardous Waste
40 CFR 263	Transporters of Hazardous Waste
40 CFR 264	Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Management of Specific Hazardous Waste Treatment, Storage, and Disposal Facilities

MILITARY SPECIFICATIONS (MIL)

MIL-B-131	(Rev. H) Barrier Materials, Watervaporproof, Greaseproof, Flexible, Heat-Sealable
MIL-P-3420	(Rev. F) Packaging Materials, Volatile Corrosion Inhibitor Treated, Opaque
MIL-S-22262	(Rev A) (Am. 2) Abrasive Blasting Media Ship Hull Blast Cleaning

MIL-P-24441	(Rev. B) Paint, Epoxy-Polyamide

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC VIS 1	1989 Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs)
SSPC SP 5	1991 White Metal Blast Cleaning
SSPC SP 7	1991 Brush-Off Blast Cleaning
SSPC PA 2	1991 Measurement of Dry Paint Thickness with Magnetic Gages

1.2 SUBMITTALS

Submit the following in accordance with Section 01300, “Submittals.”

1.2.1 SD-06, Instructions

a. Coating systems

Before application, submit three copies of formulator’s printed instructions to include brand names, catalog numbers, and names of manufacturers. The instructions shall include detailed mixing and application procedures, number and types of coats required, minimum and maximum application temperatures, curing procedures, pot life, and shelf life.

1.2.2 SD-08, Statements

a. Operation procedures

b. Material safety data sheets

1.2.2.1 Statement Requirements

Submit four copies of the industrial hygienist certification of the operation procedures and personal protection equipment the Contractor is proposing to use. Provide six copies of material safety data sheets for materials to be used at the job site in accordance with CFR 29 CFR 1910.1200.

1.2.3 SD-10, Test Reports

a. Blasting abrasive

Provide laboratory test results of blasting abrasive and certify conformance to contract requirements. Provide six copies of results of tests required by MIL-S-22262 and certifications.

1.2.4 SD-13, Certificates

a. Coating system

Before delivery of the coating system, submit four copies of certificates.

1.3 DELIVERY AND STORAGE

Epoxy materials should be shipped and stored out of the sun and weather, preferably in air conditioned spaces.

1.4 SAFETY

The Contractor shall ensure that employees are trained in the requirements of CFR 29 CFR 1910.1200 and understand the information contained in the MSDS for their protection against toxic and hazardous chemical effects.

1.5 GOVERNMENT-FURNISHED MATERIALS AND SERVICES

The Government will furnish, without cost; all test fuel products for leakproof testing of coated tank as specified in the paragraph titled “Final Inspection.”

1.6 JOB SITE REFERENCES

The contractor shall have at least one copy of each of SSPC SP 5, SSPC OA 2, and SSPC VIS 1 at the job site and made available to the Contracting Officer.

PART 2 PRODUCTS

2.1 COATING SYSTEM

Shall conform to the respective specifications and to the requirements specified herein.

2.1.1 Primer

Epoxy-Polyamide, Green Primer, Formula 150 of IL-P-24441.

2.1.2 Intermediate Coat

Epoxy-Polyamide, Haze Gray Intermediate Coat, Formula 151 of MIL-P-24441.

2.1.3 Top Coat

Epoxy-Polyamide, White Top Coat, Formula 152 of MIL-P-24441.

2.2 BLASTING ABRASIVE

Abrasive shall be sharp, washed, salt-free, angular, crushed wet bottom boiler slag or nickel slag, free from feldspar or other constituents that tend to break down and remain on the surface. Abrasive shall not contain magnetic materials and shall conform to MIL-S-22262, Type I (Inorganic).

Rouda Point

June 3, 1994

Mr.Oavic:IS.ier
Com,gs Un&!i!ted
182!i0 tl8U'I Ave S
l<e<1t WA 9803:2

SUBJECT: Hmtdcus W- TSO
REF: P Coamg 9fsta,n

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Prvntir.	I-P-24441, Formula 151 (Haze Gray)	@ 210 4 ma.c:uy
lntemlediate;	I-P-24441, Formula 152 (White)	@2to4mlldly
TOI)c:Olt		@2to• mill dry

Primer:		
Intermediate:	Mil-P-24441, Formula 159 (Zlhc Aic:11)	@ 2 10 4 milsd!y
Topcoat:	-24441, FQ,mva 157 (Glay)	@ 2 ID 4 mils *dry*
	Mil-C-811:185 (Whn>	@210 • mas dlV

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SPREAD SHEET

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[redacted]

December 1992

DF8CBIPnOH

Fis... a 2ioe Pnm.t"riaat'trocoa:.po.a!:!1.tpo\v&m14tl:vn.d iiiac pi:ic-.

PIIJNQp.u,

- Designed as a system primer for various paint systems.
- Good corrosion prevention properties.
- Quick drying, can be overcoated after a short interval. Can also serve as a holding primer for various maintenance systems when a short overcoating interval is required.
  The superimposed system must be unsaponifiable.
- Can be applied up to 3 mils (75 microns) d.f.t. depending on amount of thinner.

COLOBANDG!D.18

Green - Flat

:8ASICDAl'ANr.-,!lll'O) [redacted]

s.w.-e,,-
VOC[redacted]cl
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Approx. 15.4 lbs/gal (2.2 kg/ltr)
Approx. 55%
3.8 lbs/gal (456 gms/ltr)
1.5-2.0 mils (35-50 microns) depending on use. D.F.T.'s of more than 2.0 mils (50 microns) are not advised under thick, rigid epoxy systems.
882 ft²/gal (22 m²/ltr)
15 Minutes at 68°F (20°C), 40 min. at 50°F (10°C)
8 Hours at 68°F (20°C), 8 Hours at 50°F (10°C)
Zinc rich primers can form zinc salts on the surface. They should not be exposed to weathering for long periods before overcoating. An interval of several months can be allowed, however, under clean interior exposure conditions. In clean exterior conditions a maximum interval of 14 days can be tolerated, but in industrial or marine conditions this interval should be reduced to the practical minimum. At all times visible contamination must be removed before overcoating by sandwashing, sweepblasting, or mechanical cleaning.

0/()

P.O. BOX 816, HARVEY, LA 70059 (504) 347-4321 - (FAX) 341-9120

;EOaW...TESTING I..AaORAIO 29½ Dravus • Seattle, WA 98109 • 283-4202 • FAX 284-4549

Ap il B. 1991

R<>dd• Paint
505e <tth Avenue South
Seattle. Washln9tan 98t3<t

Test Report: #91-1150

Pc-oc : t'ct.l'nt An• I/JO 37337
SPeclflc:4tlo1'1 Ill l P42<t4-4I
Cate Testea! April 1 - 5, 19?!

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Sample: SI ,;gia 7402 A
Form: Color Red Q ev Date of M nu, c 1990
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Sao,ple: Sl a 7'102 .9
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11>, eh: 127-090
Ou«nt: 125 9"41100!1

!!ca.erct rueI Tank:,
DllC.l\-67-9D-C-Ot54

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9. Adhe!9lon••• ·-- ·- ·· ··· -no dsl.llllnatlon

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'ffll!/'!H! LABORATORIES

SIGMJ\STA-TUF GRE,EN PRIMER

3252

itudt,L"a

DESCRIPTION

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CQl,OKAlfDCLOS& **Green - Flat**

llAStCDATA Nr 98'1'0!U"C)

Mass density	lo.tllwp]0,, ¥17)
Solids by volume	Al>-.59'
VOC (Before Thinning)	2.11bw'cal (;36pwlb-j
Theoretical spreading rate @ 1 MDFT	-1\"lplll(2Unr'/lb-}
Recommended dry film thickness	d,,.,.. m1...,,.,
Touch dry after	>Roun
Min. interval before overcoating	6 1r.,,,.
Max. interval before overcoating	70.,,.
Full cure after	7,loy•
Temperature resistance (dry)	CM'(1111'0>
Ordering Information	s;--T.l"Cn.mPrimorf32511'"1n)&IOpl. • l<ita. 'Tl>• 2 pl. ldl i. pl. _,_ 32$t • t pl. t bareod lpl ,rbm f:ner2218 lA•'- pl. t I '-• 'l'l,e10 pl. l<;tio$pl .ra.- !a o5 p1,.-..i..... ""45 pl..,_-.,.lioa -- . 1 •.•
Shelf life (cool and dry place)	&lj..,.,... _,. ....., ol\c,-U"""11s
Flashpoint (T.C.C.)	- Bon!o!oLT„Tl0C8l6"fC(!·O'O

P.O. BOX 816, HARVEY, LA 70059 (504) 347-4321 - (FAX) 341-9120

SIGMA
COATINCiS

SIGMA STA-TUF EPOXY SERIES 3200

11'O-NA)jEJ STI.TUF uon Sl!JUES)

February 1993

DESCRIPTION

Sigma Sta-Tuf Epoxy Series products are polyamide cured epoxy tank coatings. Listed on navy QPL for MIL-P-24441, Type I.

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COLOll AND GLOSS

#3250/3296	Dark Gray	Ffffflu,t. U$4
#3251/3297	Haze Gray	ISi
#3253/3297	White	!".,,. Jo ua
#3254/3296	Red	P""""1alli6
#3255/3297	Black	F.-mal•l
#3256/3297	Dark Gray	f" ta1.55

BASICDltJ.AJJ.X 88't(JO'C)

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INSTRUCTIONS FOR USE

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Mixing Instructions

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QUALIFIED PRODUCTS LIST

OF

FSC 8010

Paonac;o.s QUALIFIED UNDER MILITARY SPECIFICATION

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Formula 150.	3252/3298	MARE ISLAND NAVSHIPYD Rpt. 24441-108	Sigma Coatings U.S.A. Inc. P. O. Box 825 Harvey, LA 70059 Plant: 3300 River Rd. Harvey, LA 70059
Formula 151	3251/3297	HUE ULAI<D UYSIIII'TI> Ipt. i\n1-1oa	Sigma Co1titt ..S.A. tr,c:.. P. O. Se lar••Y• LA 70059 Plant: 3300 Uur d. R■rY•t• tA TD09
Formula 152	3253/3297	MARE ISLAND NAVSHIPYD Rpt. 24441-108	Sigma Coatings U.S.A. Inc. P. O. Box 825 Harvey, LA 70059 Plant: 3300 River Rd. Harvey, LA 70059

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October 1993

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COLQJl!I'AND GLOSS

Available in white and colors. - High-gloss finish.

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asffll2l,:)

Temperature Resistance (Dry)
Ordering Information

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In case of roller application order 5523C available in half pint cans for addition to a one-gallon kit.

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P.O. BOX 816, HARVEY, LA 70059 (504) 347-4321 - (FAX) 341-9120

SIGMA
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FEDERM. Tl:.STINGLABORA'ltlf!IES 2no.-i. • son111.-»u111 • 2S3-4202 • ,u-

!lay l2. 1994

Rodda l!'alnt
P.O. llo>< 801
Seattle, oklngton 98124
Attn• Ro!>ort t-af

Test Report:	s94-192!
.Procoss:	Paint Anal/JO 47S63
Specl f1catlon:.	I'll t-r.-"852858<"5>
D t:e Tasted::	rel> ?3 - May 10. 19'14

PO: t'l0949

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/ 1!11l·C-8S:21lsa<AS).

,/ Sample: Polyurethane <u>56213-7000a</u> nd 552138

?C"OPflc-tles	Test · Results	Limits
Fineness of grind	>8	7 minimum
Coar-se pJ>ct i c\as on• 325 sle-ve	<O.1% oy ...,t	<O,-6% by wt
Qdqr, res1dUal 48 krs	no ocior	no O<lor
Vlscoeity, 11-4 Ford Cup	23 sec	30 sec max
Pot Lifc., e, Fot"d Cup ,after 4 ho-..c•	-49 :t1'e	bo s.tc max.
Pot t.lf..oefoC'e 8' h •	na ge-l	oo 1
DC'Ytn9 Tlmo, Touch	2-S hovrs	3.0 hou s ma
D ytnc:t "Tl o, Ha.ect	6.,.0 .t,ovrS	8.C hout"S m,s,c
Glo9e. 60°	92.	90 mintm1.1
Hiding Power	0.9	0.9 minimum
Adhesion	no removal	no removal

TE5TlNG l,.4IIOIIATDR1£S 2975 Ofanus • Seattle, WA 98108 • 283-4202 • FAX 284-4480

Ro Paint
•at Repoct tt -l'nl C'OJ'It.
t!ay 12. 199-,
pago 2

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V•c•,tltv th•t thes test result5 et *tn*• rec;uirem.nts of Kll-C-8'15285,\<AS)

FEDERAL TESTING t.AllORATOl!l1!3

Patrick P. Raney

CHAPTER 6

STOR.AGE ANO l14111DLING ASliORE

6,1, SCOPE.

6·2, Tht" Clll.!t,1e·r l)(Q\ltdes. guid lnes Jor me s.s,fe .i;tC'ai.s Md h:i:idllsis uhore ot Oo:10 Fve11f, lr+Cluding- ma:tc.ri31s, ct;u'ipn'lt"nt f-a,<;i!ltl,\s, -a.id s-oeoul1nitr.,>,r;110 tor uansfer, cjeanu,:i, decontamination,-anddi:soos,al. The heJlth.1104 .saff!tV oree.auikm.s preser,u oind,a n:e,4 .st,all -also,be -Q. t\l . fl:egulatioe,1reguiremems wnic.h she!! l.le. t.eftr.r4tO (0-ln.r-hMdling ,nd .$t0f11Q'il or Otto Pu U a>h r• are.,_,ovio.ct "'OPS, tM·1e guidt-Mn1tra •lto appdcab to usedand conr.,mt'nated Ono Fuld11.whfch mutt tie k lo staannaldentffiio!t1ui;.ers-W1Wfl;ctt an bo hand:ed and sfo, :o.tmll;uly,

fr3. HANDLING.

6-4, RovtmtcbttJtdl!ng o! 01to Fu'1J tt uhoN!.-!,,clug !oad!ng and llflloadl,,g of .shipping arid, o ge contAin• eJ'S pteparalib ao_d rruintepance of TorpedoEjS A(lk 46 ir-A Mk 48. ano ih.e co4'd\,C1 cf , song operctions,

6-S, MATERIAlS.

8>6, The recommttnded matcri,als f6r u,;a wlth Otto Fu U Me listed in mble 6•1. Rafe, tc -af)9ertdia E fo,-a IO'O(f;'tXltnsiv• ll:sti:ny. Otto Fvtf,II l$eornr,ati •- w!1h tno,,t common meutls, -aiit1ou9t, !ong erm cont.let with coo r-6 ,ed altoy!i: is not ,ecQmmended. Mos.t el.istOfl'lers.swell-and abso,bme I\;el opooCO/'ltaCt. Those t'!Commended a riol aH u!d orsHow mi"!maJeffects: E,h.,l prop')'fene, borytNbl>t1, and SiJlecw,e ttJbber are rtcommerided materlal (arge'als an.tO ri:rig':i,MatSfQ(s. wiiic..41are not apo roved for.use a, sea>s or 0-Mgs with OqoFuelJI,n,c-Ju e V/;on, 81,11\Ji-N, ancfnecprffle W'1 swell uci,on COf.ll:.lCt bu(p,esen\ r,o tiarsrd, nd polysut, Jldtt\.lbt>tt wtlict'i i$ c: cm alt'l fnco•Tlo.i(!blt, fet • bawd lubricants are not J@C;0fflrM1'!dl'<IOtto Fuel H does not Chemlcel)y react with11am;ish, ena,met, and Wl!:te'r latex p,a!m.i, tx111t vi1ll ·remove 11\&.palm ri,11:Sh, f:PO•V oalnu •?Pear toofter,the 9rrattttprotection agail,st Ot\o F\l'.e.l 11. ta 11t-nwic s.,tisfi.ctory-w!'VIQJ, any pnJviov&lv unts.st¢ painl should be w.b.tec1ed to-1est1" withOtto Fu:e) II p,1ior lo ur.e, A minimum' of three coats of folly cu,4Hi f POXY parn1has bnn touf\d i..oprovc.'i ttdeou3ui, orotfetiOn lor <Q £$. •-surf.aets, Poro'-CS absOfb nt ma'ierial wtiic: can c-: ali 'a wick -af\d emli me ftl!!i V8'pc,ts shooki tle n'lini zerl wt H$ on, cr th the fuel ls-lik-e.ly. Poro.us iftms vvh!G.h e1nno1 oe adet1oatt!IY decontl!n'llf'!;iU:e-d al er e powtes."laijoe discarded ahe,useandre::,1;.ceo, WoodIs if\ \1(:C;!ptab(e oroduct fo1 rl:i!r.d!h <aotopis aoo '!11-Voptrtg oafets frx Uno h.,el II anti i;s • ·s-ce,, Orte 1WOd is COl"!Jafl'li-nated v.-(tn O o FvalII 01its w,ute1. ,,,., t.v0od oroouus 1MI e Olspo3 d of ilS iii!'\Cno fu@+ U solidWa$t-e. R1!-Corr.met1$d'm31erials su1ta'J:la for vs.e:.n iloorln_g w'.o,k tea,fteMte.dia r.lbteS·1, Foridchiorie1 lnform.at!On conecm,ng n'i3t l'lal5 fo; uie w,m Ot,tO uet II, ,:on.tact lite Naval. Ouina.n s Stabon, I rt Head. Maryland !Coda52331. Materi;al Satety Oata sheers on ,Wsolve·nts, arH;i haurdcus chemic.a/s- used oµd Ot;9 fu&jlLoo·e--etr.or'\$ V.-&11Ot- r'h ,avAllaote !O pe,-10,n c:1,

Table._6'.t, R@C!;if'l".fTll!'ftd M&t lati fot US:ij \1¥1tl'\ Ono ,:uel II

Material	
Metals	Most common metals except copper
Nonmetals	Euw1c. o-,...,(,..n1t; '!'<t11°""""°"9"!"'ct UTIHtQS•:ocarbotu wenH,KtM "" l Jlo.,: ..oofy•ttwl• ·: 914U, ha"C#J! 1,;l;i!)ltrt p.,m t\lb buNf A11n..,. ,rt:t1ed ,vbbt,
l,U9ri !'l1¥	Mo,i;1siliw,,l!< -a,r,o,f\u_o,oeatt.oi.bue,ei 1ubrC u
Paint	Any epoxy paint conforming to MIL-P-24441
flC()oot'l') ro,wol\ fo!.t• or,r,,	! /1,'<Cjtttof#l"! p1 - n,(/r,9" .....,.', lt!cffffl t• t,t-lM J.e1!&r!nl'de b• No,,l>e'm lrY-!Urim! M•t111ei"1flmr, '!•rl>el Par,, ,. 2, li1111tnt n 1 1 1 r-.,l>f'i ""r" 61.r:•"1 10 rf.Jtt ••lii, !Nde,bV 1,W. --dll'$, O h.'11'1. P( ). Sl0!\1;1.d•l:Cl St O11T, n01l'l a I -ti S..ipet.S_toraer,:s:.WlJde 1'¥ S k;lfq, I tnc., !'-i091""SN •. k..1

[1] Asbestos shall not be used if substitute is available.

6•7. rnll!PMENT

'6-8,. Thu gpfNttltlg praaduct1and loelfl plii)ln9!Je:llgl"f\c -11 defermine lhe eqU1pment ,eauire.men.ts; t,owovt",r.111 val1;e$, purrips. a.r,ti switr.nes ;,/\a8 M:i if d.

,6-9. VA.1,.VES. Valvtssl\.ill lieptOY' as "ec ssarv for-,afe OP!.1:aiJon V4,fvc-S-·!ilaU alw.av, perform o oos;.. tive ciOSQre. Sall, plu!J, a;r b;lJanciHl jOp,pet designsa:& tecom,r,ene: d' Vahl"s;,hall ti::8!1. tr t:. "II weOW pitJs aF tlie- vch•e !l'! 0 be.of approv d l"\aieri,aJ, Ot'ce. Jse-o, v.,!ye., sl'alJ not be used fer 1f"3.M,1 1 or >'Ot"ge -ol o,o,Qqt,.$.

SECTION D

APPENDIX D11

SUBPART BB EQUIPMENT DETAILS

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Bulk Storage Waste (Oily Wastewater)

EXTERIOR TANK PIPE RACK	system	101	102
fill pipe end cap	PID-1		
fill pipe check valve	PIV-1		
fill pipe valve	PIV-2		
drain pipe end cap	POD-3		
drain pipe valve	POV-3		
TANK TOP EQUIPMENT			
fill pipe valves		PIV-3	PIV-4
tank overflow flange		POF-2	POF-5
top hatch cover seal perimeter		PIF-1	PIF-4
mechanical level sensor flange		PIF-2	PIF-5
tank vent flange		POF-1	POF-4
electronic level sensor		PIF-3	PIF-6
TANK BOTTOM EQUIPMENT			
tank overflow open end		POD-1	POD-2
bottom access cover seal		POF-3	POF-6
tank drain valve		POV-1	POV-2

HW TANK RECIRCULATION	system	101	102
recirc drain valve	PRV-1		
recirc drain sample port valve	PRV-2		
recirc drain sample port	PRD-1		
first recirc strainer	PRF-1		
second recirc strainer	PRF-2		
recirc drain valve	PRV-3		
recirc drain flex hose flanges	PRF-3		
ten air pump clamp fittings	PRF-4		
recirc fill flex hose flanges	PRF-5		
recirc fill valve	PRV-4		
three accumulator flanges	PRF-6		
recirc fill valve	PRV-5		
recirc fill sample port valve	PRV-6		
recirc fill sample port	PRD-2		
pressure gauge valve	PRV-7		
pressure gauge	PRF-7		
recirc fill valve	PRV-8		
recirc tank fill valve		PRV-9	PRV-11
recirc tank fill flange		PRF-8	PRF-9
recirc fill valve	PRV-10		
recirc drain valve	PRV-12		
recirc tank drain valve		PRV-13	PRV-15
recirc drain valve	PRV-14		

MISC OTHER EQUIPMENT	Int. vent	Exh. vent
Paint Can Crusher Carbon Filter	PCCV-I	PCCV-E

first letter P = oily (petroleum) wastewater system

second letter:
I = input system
O = output system
R = recirculation system

third letter:
V = valve
F = fitting (flange, threads, etc)
D = drain (any device openable to atmosphere)

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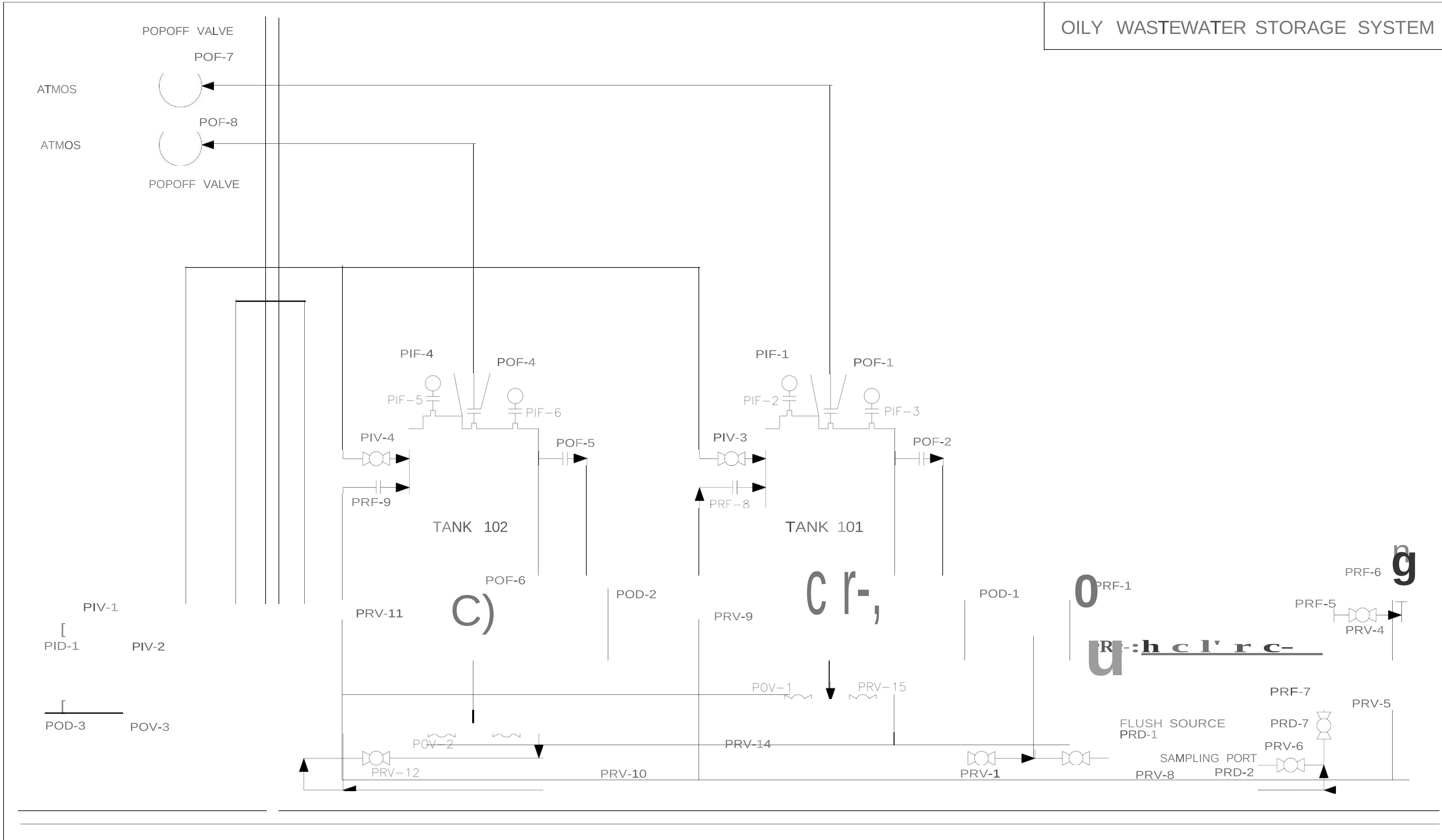
OILY WASTEWATER STORAGE SYSTEM
POPOFF VALVE
POF-7
ATMOS
POF-8
ATMOS
POPOFF VALVE
PIF-4
POF-4
PIF-5
PIF-6
PIV-4
POF-5
PRF-9
TANK 102
PIF-1
POF-1
PIF-2
PIF-3
PIV-3
POF-2
PRF-8
TANK 101
POF-6
POD-2
POD-1
PRF-1
PRF-6
PRF-5
PRV-4
PIV-1
PID-1
PIV-2
PRV-11
PRV-9
POV-1
PRV-15
PRF-7
PRV-5
POD-3
POV-3
POV-2
PRV-14
FLUSH SOURCE
PRD-1
PRD-7
PRV-6
SAMPLING PORT
PRD-2
PRV-12
PRV-10
PRV-1
PRV-8

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Bulk Storage Waste (Cyanide)

EXTERIOR TANK PIPE RACK	system	103	106
fill pipe end cap		CID-1	CID-2
fill pipe valve	CIV-1	CIV-2	CIV-3
drain pipe end cap	COD-4		
drain pipe valve	COV-4		
TANK TOP EQUIPMENT			
fill pipe valves		CIV-4	CIV-5
fill pipe flange		CIF-1	CIF-2
tank overflow flange		COF-2	COF-5
top hatch cover seal perimeter		CIF-3	CIF-6
mechanical level sensor flange		CIF-4	CIF-7
tank vent flange		COF-1	COF-4
electronic level sensor		CIF-5	CIF-8
TANK BOTTOM EQUIPMENT			
main drain pipe end cap	COD-1		
main drain pipe valve	COV-1		
tank overflow open end		COD-2	COD-3
bottom access cover seal		COF-3	COF-6
tank drain valve		COV-3	COV-2

HW TANK RECIRCULATION	system	103	106
recirc drain valve	CRV-1		
recirc drain sample port valve	CRV-2		
recirc drain sample port	CRD-1		
first recirc strainer	CRF-1		
second recirc strainer	CRF-2		
recirc drain valve	CRV-3		
recirc drain flex hose flanges	CRF-3		
ten air pump clamp fittings	CRF-4		
recirc fill flex hose flanges	CRF-5		
recirc fill valve	CRV-4		
three accumulator flanges	CRF-6		
recirc fill valve	CRV-5		
recirc fill sample port valve	CRV-6		
recirc fill sample port	CRD-2		
pressure gauge valve	CRV-7		
pressure gauge	CRF-7		
recirc fill valve	CRV-8		
recirc tank fill valve		CRV-11	CRV-9
recirc tank fill flange		CRF-9	CRF-8
recirc fill valve	CRV-10		
recirc drain valve	CRV-12		
recirc tank drain valve		CRV-13	CRV-15
recirc drain valve	CRV-14		

first letter C = Cyanide wastewater system

second letter:
I = input system
O = output system
R = recirculation system

third letter:
V = valve
F = fitting (flange, threads, etc)
D = drain (any device openable to atmosphere)

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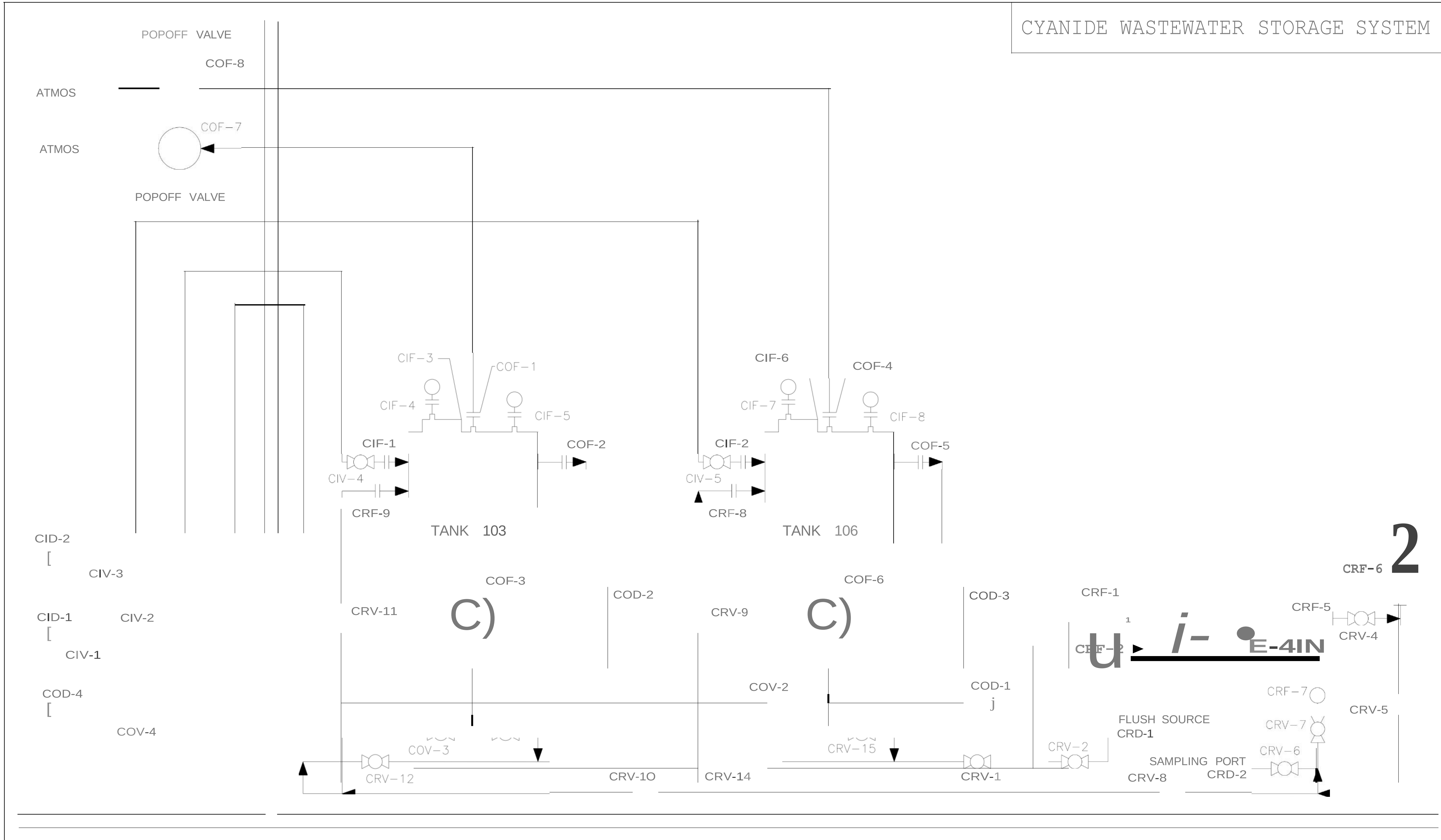
CYANIDE WASTEWATER STORAGE SYSTEM
POPOFF VALVE
COF-8
ATMOS
COF-7
ATMOS
POPOFF VALVE
CIF-3
COF-1
CIF-4
CIF-5
CIF-1
COF-2
CIV-4
CRF-9
TANK 103
CIF-6
COF-4
CIF-7
CIF-8
CIF-2
COF-5
CIV-5
CRF-8
TANK 106
CID-2
CIV-3
CID-1
CIV-2
CIV-1
COD-4
COV-4
COF-3
COD-2
CRV-11
COF-6
COD-3
CRV-9
COV-2
COD-1
CRF-1
CRF-6
2
CRF-5
CRV-4
CRF-2
E-4IN
CRF-7
CRV-7
CRV-5
FLUSH SOURCE
CRD-1
CRV-2
CRV-6
SAMPLING PORT
CRD-2
COV-3
CRV-15
CRV-12
CRV-10
CRV-14
CRV-1
CRV-8

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Bulk Storage Waste (Otto Fuel)

EXTERIOR TANK PIPE RACK	system	104	105	HW TANK RECIRCULATION	system	104	105
fill pipe end cap	AID-1			recirc drain valve	ARV-1		
fill pipe valve	AIV-1			recirc drain sample port valve	ARV-2		
drain pipe end cap	AOD-8			recirc drain sample port	ARD-1		
drain pipe valve	AOV-10			first recirc strainer	ARF-1		
TANK TOP EQUIPMENT				second recirc strainer	ARF-2		
fill pipe valves		AIV-2	AIV-3	recirc drain flex hose flanges	ARF-3		
tank overflow flange		AOF-2	AOF-5	ten air pump clamp fittings	ARF-4		
top hatch cover seal perimeter		AIF-1	AIF-4	recirc fill flex hose flanges	ARF-5		
mechanical level sensor flange		AIF-2	AIF-5	three accumulator flanges	ARF-6		
tank vent flange		AOF-1	AOF-4	recirc fill sample port valve	ARV-3		
electronic level sensor		AIF-3	AIF-6	recirc fill sample port	ARD-2		
TANK BOTTOM EQUIPMENT				recirc fill valve	ARV-4		
main drain pipe end cap	AOD-1			recirc fill sample port valve	ARV-5		
main drain pipe valve	AOV-1			recirc fill sample port	ARD-3		
tank overflow open end		AOD-2	AOD-5	pressure gauge valve	ARV-6		
bottom access cover seal		AOF-3	AOF-6	pressure gauge	ARF-7		
first tank sample port valve		AOV-2	AOV-6	recirc tank fill valve		ARV-7	ARV-9
first tank sample port		AOD-3	AOD-6	recirc tank fill flange		ARF-8	ARF-9
second tank sample port valve		AOV-3	AOV-7	recirc fill valve	ARV-8		
second tank sample port		AOD-4	AOD-7	recirc drain valve	ARV-10		
tank drain valve		AOV-4	AOV-8	recirc tank drain valve		ARV-11	ARV-13
main drain pipe valve	AOV-5			recirc drain valve	ARV-12		
main drain pipe valve	AOV-9						
main drain flange	AOF-7						

first letter A = OF/Alcohol tank system

second letter:

I = input system

O = output system

R = recirculation system

third letter:

V = valve

F = fitting (flange, threads, etc)

D = drain (any device openable to atmosphere)

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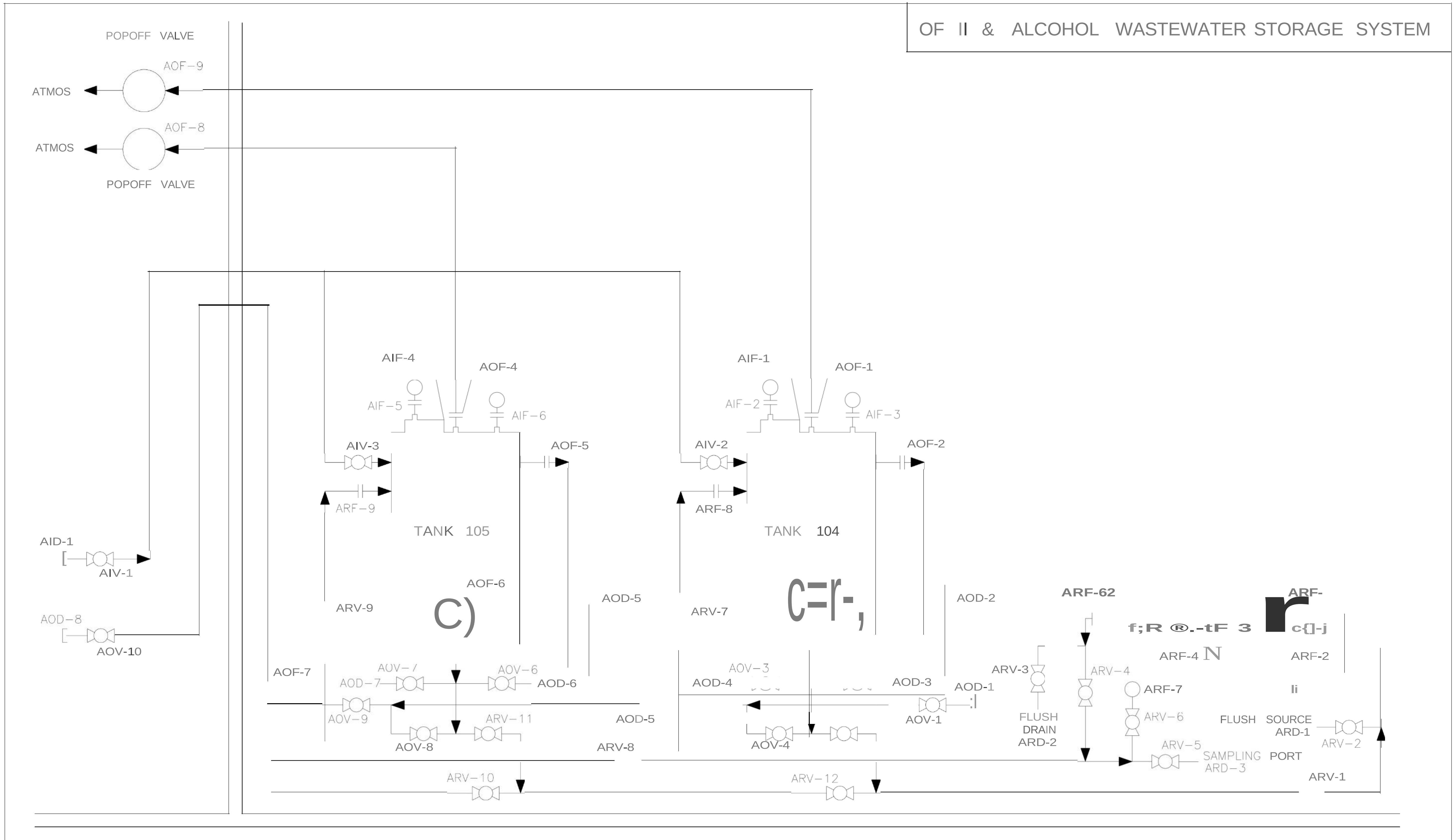

OF II & ALCOHOL WASTEWATER STORAGE SYSTEM
POPOFF VALVE
AOF-9
ATMOS
AOF-8
ATMOS
POPOFF VALVE
AIF-4
AOF-4
AIF-5
AIF-6
AIV-3
AOF-5
ARF-9
TANK 105
AIF-1
AOF-1
AIF-2
AIF-3
AIV-2
AOF-2
ARF-8
TANK 104
AID-1
AIV-1
AOD-8
AOV-10
AOF-6
ARV-9
AOD-5
ARV-7
AOD-2
ARF-62
ARF-
ARF-4
ARF-2
AOF-7
AOV-7
AOD-7
AOV-6
AOD-6
AOV-9
ARV-11
AOV-8
AOD-5
ARV-8
AOV-3
AOD-4
AOD-3
AOD-1
AOV-1
AOV-4
ARV-3
ARV-4
ARF-7
ARV-6
FLUSH
DRAIN
ARD-2
FLUSH SOURCE
ARD-1
ARV-2
ARV-5
SAMPLING PORT
ARD-3
ARV-1
ARV-10
ARV-12

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Figure 1. Outside waste tank fill pipe rack valves AIV-1, CIV-3 and end caps AID-1 and CID-2.

Two center pipes labeled ‘Cyanide Waste Water’ and ‘Otto Fuel II Wastewater’ are active.

Test perimeter of end caps, perimeter of flanges at either end of valve, valve center flange, and valve stem seal.

Figure 2. Outside waste tank drain pipe rack valve AOV-10 and end cap AOD-8.

Left pipe with black arrows on orange tape is active.

Test perimeter of end cap, perimeter of flanges at either end of valve, valve center flange, and valve stem seal.

Figure 3. Tank 104 fill pipe valve AIV-2.

Test perimeter of flanges at either end of valve, valve center flange, and valve stem seal.

Figure 4. Tank 104 overflow pipe flange AOF-2.

Test perimeter of overflow pipe flange.

Figure 5. Tank 104 vent flange AOF-1. Test perimeter of vent flange.

Figure 6. Tank 104 electronic level sensor AIF-3. Test perimeter of flange and two threaded fittings at base of sensor.

Figure 7. Tank 104 upper access hatch cover AIF-1. Test underside of entire hatch perimeter.

Figure 8. Tank 104 mechanical level sensor AIF-2. Test perimeter of flange.

Figure 9. Tank 105 fill pipe valve AIV-3.

Test perimeter of flanges at either end of valve, valve center flange, and valve stem seal.

Figure 10. Tank 105 overflow pipe flange AOF-5.

Test perimeter of overflow pipe flange.

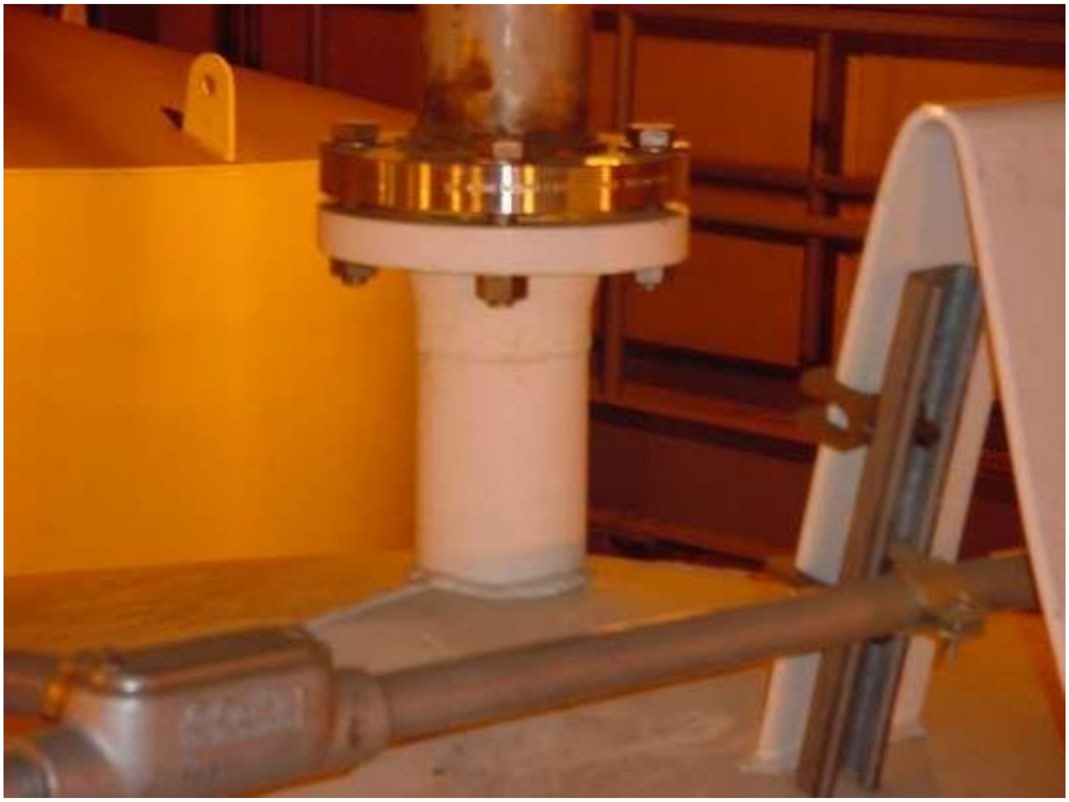

Figure 11. Tank 105 vent flange AOF-4. Test perimeter of vent flange.

Figure 12. Tank 105 electronic level sensor AIF-6. Test perimeter of flange and two threaded fittings at base of sensor.

Figure 13. Tank 105 upper access hatch cover AIF-4. Test underside of entire hatch perimeter.

Figure 14. Tank 105 mechanical level sensor AIF-5. Test perimeter of flange.

Figure 15. Tank 106 fill pipe valve CIV-5 and flange CIF-2.

Test perimeter of flanges at either end of valve, valve center flange, valve stem seal, and perimeter of tank flange

Figure 16. Tank 106 overflow pipe flange COF-5.

Test perimeter of overflow pipe flange.

Figure 17. Tank 106 vent flange COF-4. Test perimeter of vent flange.

Figure 18. Tank 106 electronic level sensor CIF-8. Test perimeter of flange and two threaded fittings at base of sensor.

Figure 19. Tank 106 upper access hatch cover CIF-6. Test underside of entire hatch perimeter.

Figure 20. Tank 106 mechanical level sensor CIF-7. Test perimeter of flange.

Figure 21. Main drain pipe valve AOV-1 and end cap AOD-1. Test perimeter of cap, perimeter of flanges at either end of valve, valve stem seal, and perimeter of end cap.

Figure 22. Tank 104 drain valve AOD-2. Test perimeter of flanges at either end of valve and valve stem seal.

Figure 23. Tank 104 sample port valve AOV-3 and drain AOD-4. Test three threaded fittings and valve stem seal.

Figure 24. Tank 104 sample port valve AOV-2 and drain AOD-3. Test four threaded fittings and valve stem seal.

Figure 25. Tank 104 overflow end cap AOD-2.

Test perimeter of end cap.

Figure 26. Tank 105 overflow end cap AOD-5.

Test perimeter of end cap.

Figure 27. Tank 105 sample port valve AOV-7 and drain AOD-7. Test three threaded fittings and valve stem seal.

Figure 28. Tank 105 sample port valve AOV-6 and drain AOD-6. Test four threaded fittings and valve stem seal.

Figure 29. Tank 105 drain valve AOV-8. Test perimeter of flanges at either end of valve and valve stem seal.

Figure 30. Main drain pipe valve AOD-5. Test perimeter of flanges at either end of valve, valve center flange, and valve stem seal.

Figure 31. Main drain pipe valve AOV-9. Test perimeter of flanges at either end of valve, valve center flange, and valve stem seal.

Figure 32. Tank 106 drain valve COV-2. Test perimeter of flanges at either end of valve, valve center flange, and valve stem seal.

Figure 33. Tank 106 overflow cap COD-3.

Test perimeter of end cap.

Figure 34. Tank 104 bottom access cover AOF-3.

Test perimeter of seal.

Figure 35. Tank 105 bottom access cover AOF-6.

Test perimeter of seal.

Figure 36. Tank 106 bottom access cover COF-6.

Test perimeter of seal.

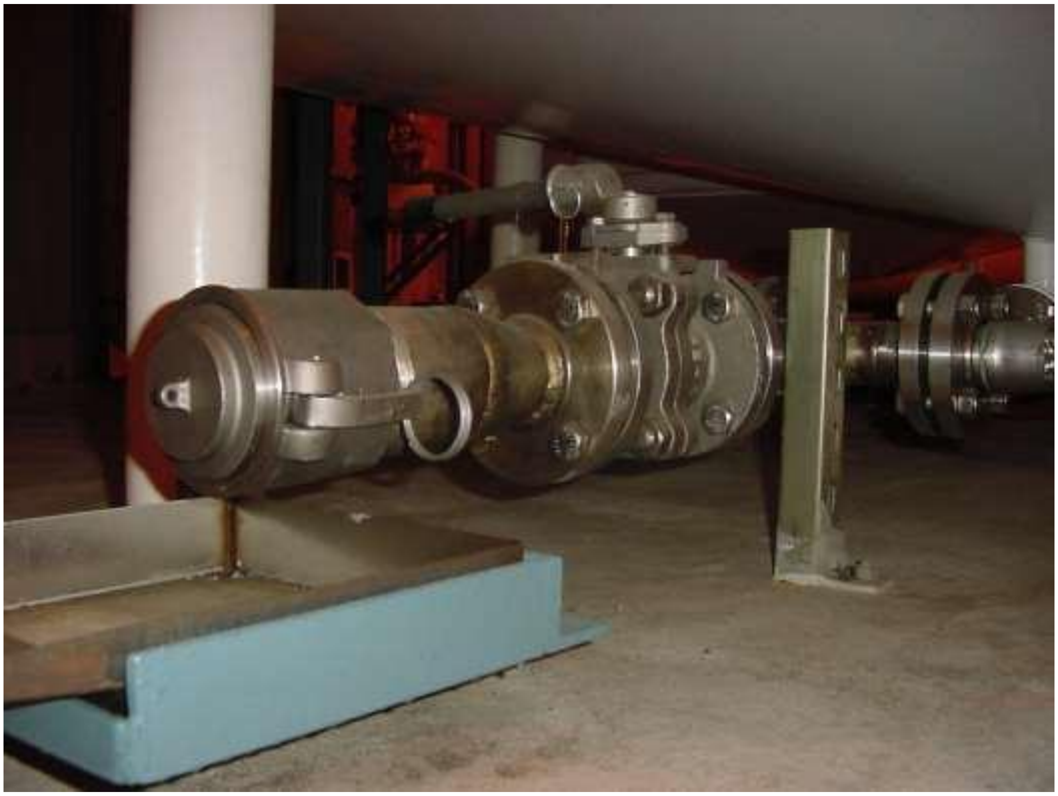

Figure 37. Backflush drain valve COV-1 and drain cap COD-1. Test perimeter of flanges at either end of valve, valve center flange, valve stem seal, and perimeter of end cap.

Figure 38. Tank 106 drain pipe flange (to be deleted in upgrade). Test perimeter of flange.

Figure 39. Backflush pipe flange (to be deleted in upgrade). Test perimeter of flange.

Figure 40. Backflush valve (to be deleted in upgrade). Test perimeter of flanges at either end of valve, valve center flange, and valve stem seal.

Figure 41. Backflush flex hose flange (to be deleted in upgrade). Test perimeter of flange.

Figure 42. Recirculation drain flex hose flange (to be deleted in upgrade). Test perimeter of flange.

Figure 43. Recirculation drain flex hose flange (to be deleted in upgrade). Test perimeter of flange.

Figure 44. Recirculation drain valve ARV-10. Test perimeter of flanges at either end of valve, valve center flange, and valve stem seal.

Figure 45. Tank 105 recirculation drain valve ARV-11. Test perimeter of flanges at either end of valve, valve center flange, and valve stem seal.

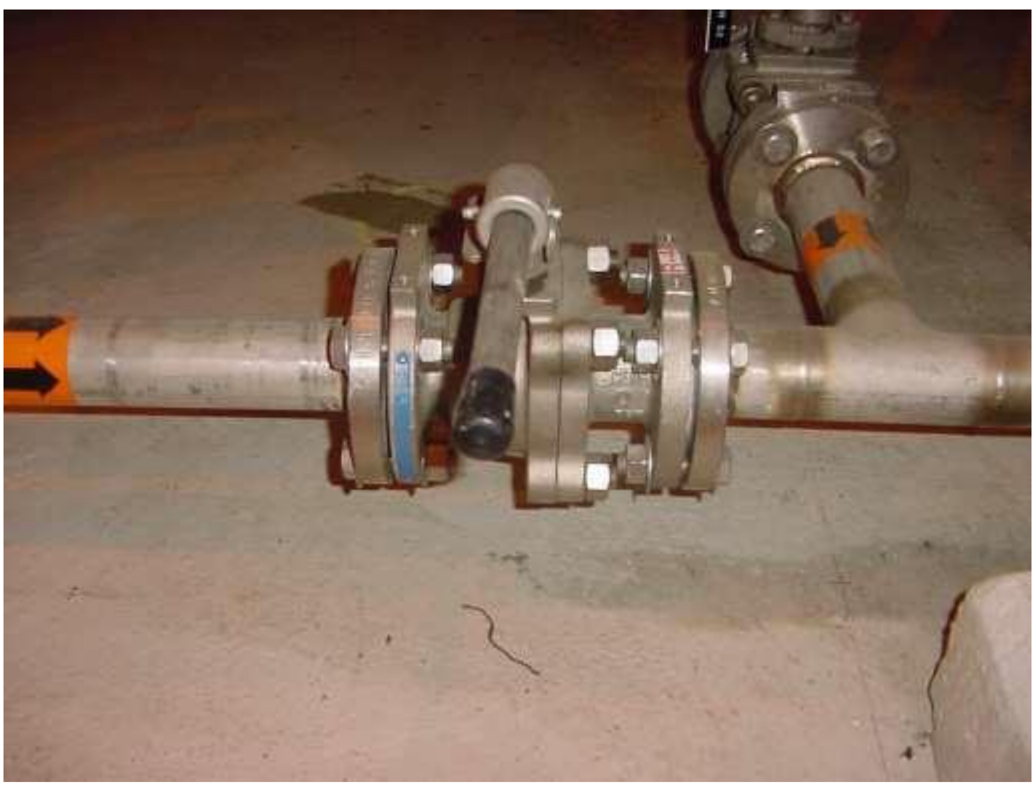

Figure 46. Recirculation drain valve ARV-12. Test perimeter of flanges at either end of valve, valve center flange, and valve stem seal.

Figure 47. Tank 104 recirculation drain valve ARV-13.

Test perimeter of flanges at either end of valve, valve center flange, and valve stem seal.

Figure 48. Recirculation drain valves ARV-1, sample port valve ARV-2 and drain sample port ARD-1.

Test perimeter of both ARV-1 flanges and threaded fittings, three ARV-2 threaded fittings, both valve stem seals, and sample port.

Figure 49. Strainers ARF-1 AND ARF-2, input.

Test perimeter of two unions and two threaded fittings.

.

Figure 50. Strainers ARF-1 AND ARF-2, output.

Test perimeter of two unions and two threaded fittings

Figure 51. Strainers ARF-1 AND ARF-2, caps.

Test perimeter of caps shown and threaded drains at the bottom of each canister (not shown).

Figure 52. Recirculation drainpipe flex fitting ARF-3.

Test perimeter of two flanges.

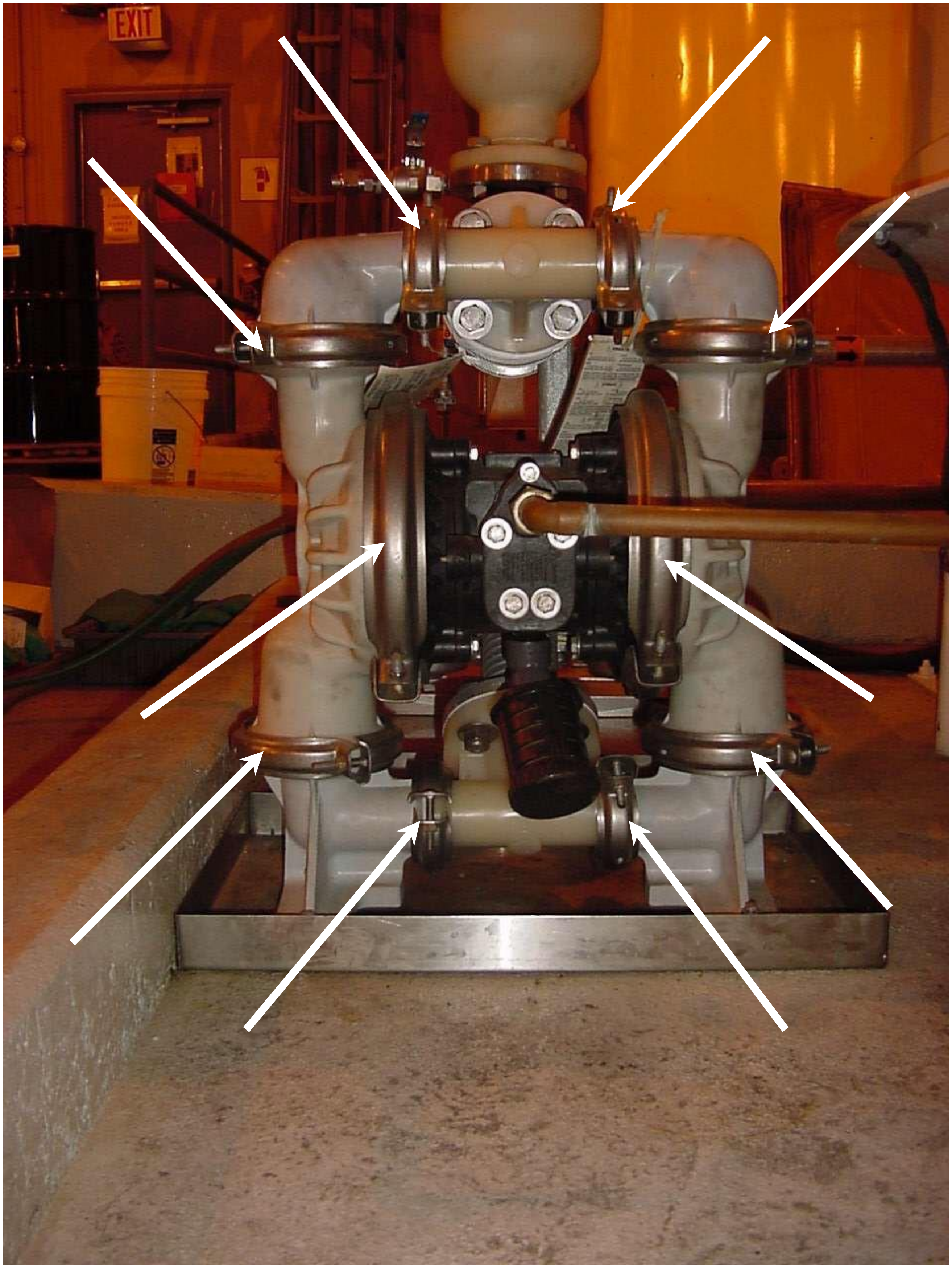

Figure 53. Recirculation pump ARF-4. Test perimeter of ten clamp fittings (see arrows).

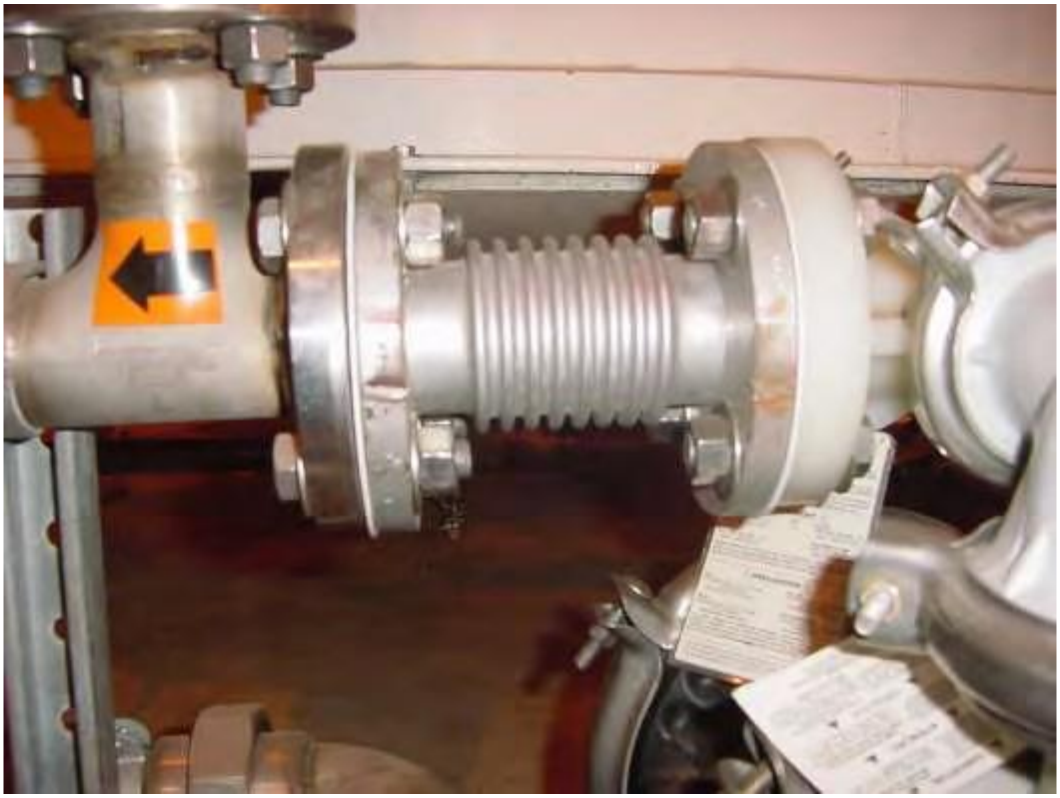

Figure 54. Recirculation fill pipe flex fitting ARF-5. Test perimeter of two flanges.

Figure 55. Recirculation fill valve ARV-4, fill sample port valve ARV-3, and sample port ARD-2. Test perimeter of both ARV-4 flanges and threaded fittings, four ARV-3 threaded fittings, both valve stem seals and sample port.

Figure 56. Accumulator ARF-6.

Test perimeter of three flanges (see arrows).

Figure 57. Recirculation fill pipe sampling port valve ARV-5, sample port ARD-3, pressure gage valve ARV-6, and pressure gauge ARF-7.

Test perimeter of three threaded fittings and valve stem seal of sampling port valve and end of sampling port.

Test perimeter of three threaded fittings for pressure gauge valve and pressure gauge, and valve stem seal.

Figure 58. Tank 104 recirculation fill valve ARV-7

Test perimeter of flanges at either end of valve, valve center flange, and valve stem seal.

Figure 59. Tank 104 recirculation fill pipe flange ARF-8.

Test perimeter of flange.

Figure 60. Recirculation fill valve ARV-8. Test perimeter of flanges at either end of valve, valve center flange, and valve stem seal.

Figure 61. Tank 105 recirculation fill valve ARV-9.

Test perimeter of flanges at either end of valve, valve center flange, and valve stem seal.

Figure 62. Tank 105 recirculation fill pipe flange ARF-9.

Test perimeter of flange.

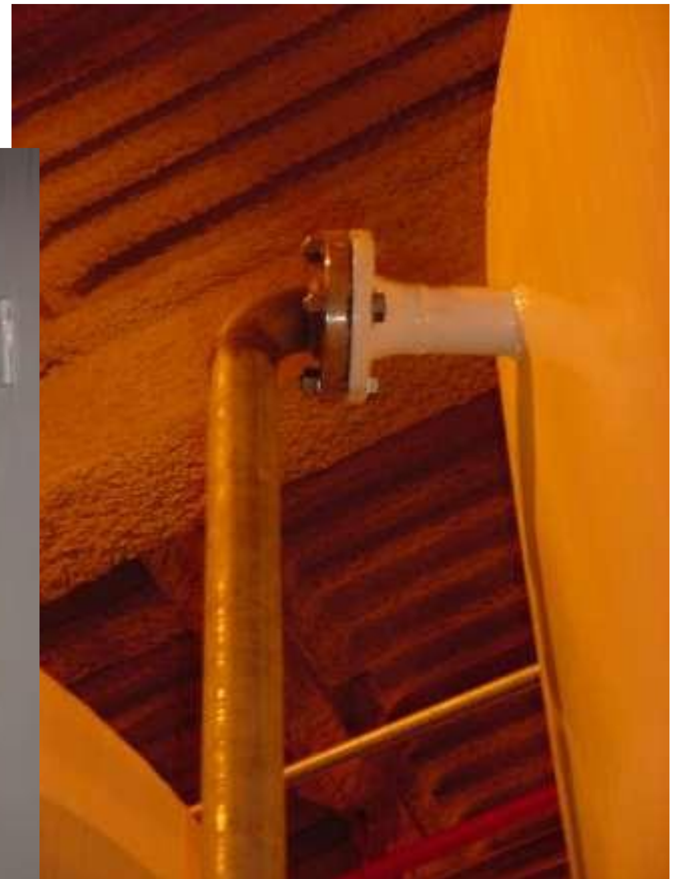

Figure 63. Tank 106 recirculation fill valve CRV-9.

Test perimeter of flanges at either end of valve, valve center flange, and valve stem seal.

Figure 64. Tank 106 recirculation fill pipe flange CRF-8.

Test perimeter of flange.

SECTION D

APPENDIX D12

SUBPART CC EQUIPMENT DETAILS

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Ensure that no wastes are introduced into or removed from the tanks during this operation.

Prior to disassembling and after reassembling the vents, sample the area under the pressure hood assembly and the suction port with the VOC meter as set forth in the VOC meter user's manual ,and method 21 in 40 CFR 60.

Figure 1. From left to right, vents POF7 (101), POF8 (102) and COF7 (103) located in the far northeast corner of the BLDG 1051 roof.

Figure 2. From left to right, vents AOF9 (105), COF8 (106) and AOF8 (104) located about 4 meters to the right of the Figure 1 vents on the BLDG 1051 roof. The pressure hood assembly is shown at the bottom right, the pressure screen is shown at the bottom left.

Figure 3. The pressure vent (right side in picture) cover and screen have been removed by detaching 4 wing nuts from the top. The suction vent (left side in picture) cover has been removed by releasing the hold-down wing nuts on both sides.

Ensure that the flat portions of the pistons are not warped causing a gap between the sealing surfaces and that there are no cracks in the flat portions of the pistons.

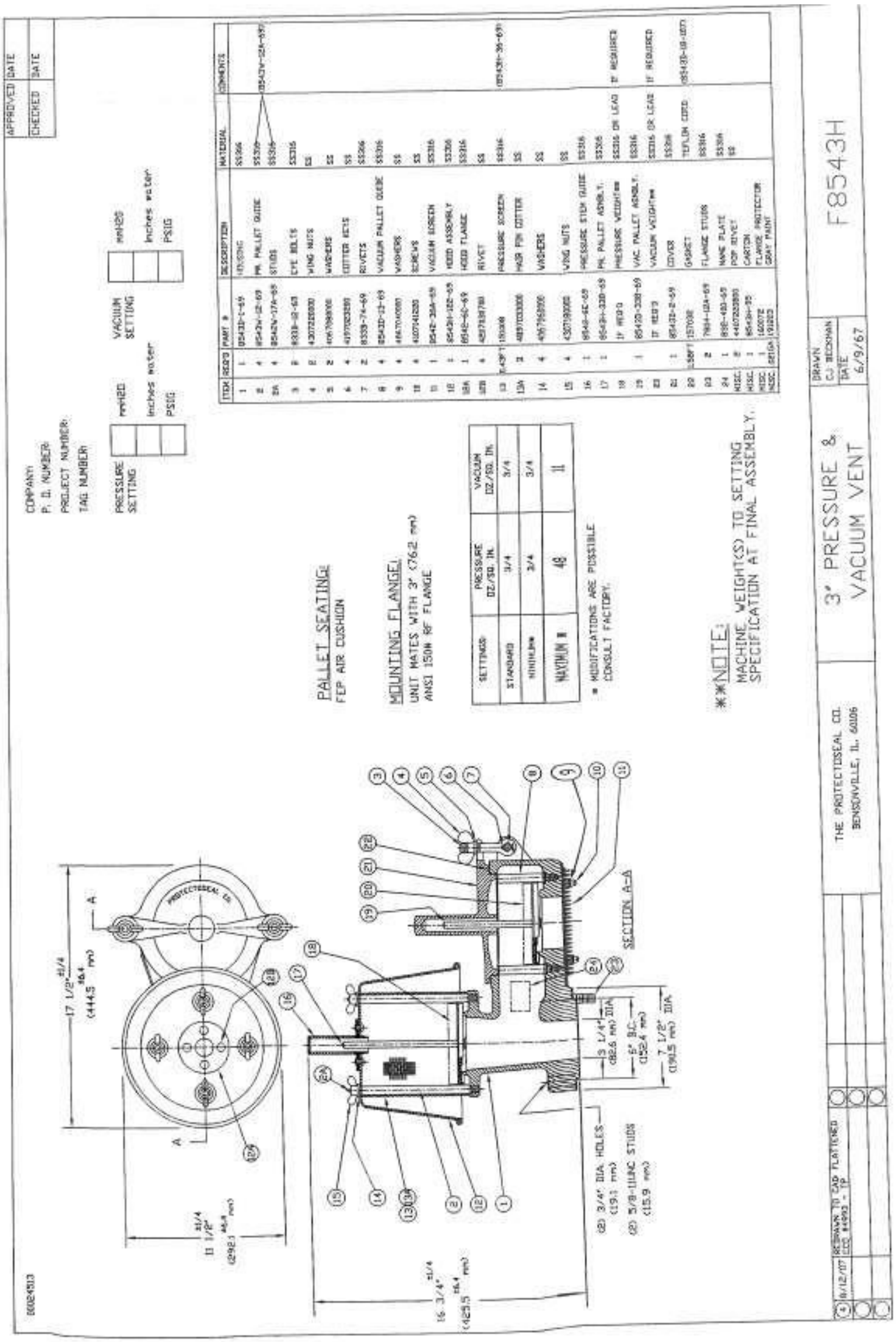

Figure 6. Pressure and vacuum vent parts diagram.

SECTION E

RELEASES FROM SOLID WASTE MANAGEMENT UNITS

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TABLE OF CONTENTS

Section **Page**

LIST OF TABLES

Table **Page**

APPENDICES

Appendix

E1. SOLID WASTE MANAGEMENT UNITS AND KNOWN OR SUSPECTED RELEASES OF DANGEROUS WASTES OR CONSTITUENTS

WAC 173-303-646; -646(2); -806(4)(a)(xxiv)

E1.1 SOLID WASTE MANAGEMENT UNITS

Table E1-1 is a summary of all Solid Waste Management Units (SWMUs) at the TSD Facility along with those not associated with the facility as defined by WAC 173-303-040, but have the same EPA ID number. SWMUs identified in these reports are included in the table whether they are closed or currently active. Data from current Facility Maintained Database (FMD) is also included if the SWMU has been closed or is scheduled to be closed. Data from current Naval Undersea Warfare Center (NUWC) Division Keyport records for SWMUs that are currently active is further detailed in Section B. The table includes the following information in concise, summarized form:

- Column 1, SWMU #: The various numbers by which the location is known in the FMD (the K- numbers), the RFA (the S- and A- numbers in this column), and in the SWMU records (the remaining numbers).
- Column 2, Building description: The title by which the building is known on the NUWC facility records. Usually associated with the process conducted in the building at the time it was designated.
- Column 3, Location: The location of the SWMU with respect to the building with which it is associated.
- Column 4, Type & description: A short description of the management unit, or 'how it was used to manage solid waste'.
- Column 5, Wastes managed: A list of dangerous wastes managed at the unit, extracted from FMD.
- Column 6: Period of Operation: The best available data of when the SWMU was first placed in operation until the closure date (if the unit has been closed)
- Column 7: Status: The status of the unit, including closure information if the unit was closed or reclassification information if the unit was reclassified. Reports noted as completed have been submitted to Department of Ecology Northwest Regional Office.

Locations of closed and active SWMU locations at the TSD Facility are provided on the topographic map in appendix E1, SWMU locations within the facility are identified in appendix E2. Additionally, SWMU locations not affiliated with the facility but have the same EPA ID number are identified on a map located in Part A, attachment A and in a table located in Section B, appendix B3.

A more detailed description of each building and its associated SWMUs and AOCs follows the table.

Table E1-1. TSD Facility Solid Waste Management Units

SWMU #	Building description	Location	Type & description	Wastes managed	Period of Ops	Status
Container Storage/Fabric Structures	Previous TSD Facility	Entire site	Container Storage Areas	Acids, bases, Oil/Oily wastes, Flammable and Combustible, solids and sludge, Reactive, Oxidizer, Industrial wastewater, PGDN wastes, PCBs, Toxic and carcinogenic	12/89 – 1997	RCRA removed, Report: HW Container Storage/Fabric Structures Closure Plan & Certificate of Closure on 10/2000
884	Previous TSD Facility	Entire site	Bulk Storage & Alodine Pretreatment	Mineral spirits, PGDN wastes, cyanide wastes, cutting oil, waste oil, oily water, alodine waste	12/89 – 03/00	RCRA removed, Report: HW Storage Facility Building 884/1032 Closure Plan & Certificate of Closure on 10/2000
1032	Previous TSD Facility	Entire site	Bulk Storage and Paint Consolidation	Oily wastewater, waste oils, paints	12/89 – 03/00	RCRA removed, Report: HW Storage Facility Building 884/1032 Closure Plan & Certificate of Closure on 10/2000
K1051-110 & 111	TSD Facility	Room 124	Bulk Waste Storage	Oily wastewater	12/89 – 2006	Moved from Bldg. 884 (Previous TSD Facility); tanks were cleaned and processed through DLA for disposal
K1051-04	TSD Facility	Room 129	Oxidizer Storage Cell	Oxidizing solid, toxic, n.o.s.	1996 - present	Active – Part B Permit
K1051-05	TSD Facility	Room 130	Acid Storage Cell	Corrosive solid, acidic, inorganic, n.o.s.	1996 - present	Active – Part B Permit
K1051-06	TSD Facility	Room 138	Caustic Storage Cell	Batteries, dry, containing Potassium hydroxide Solid	1996 - present	Active – Part B Permit
K1051-07	TSD Facility	Room 132	Poison Storage Cell	Toxic solid, inorganic, n.o.s.	1996 - present	Active – Part B Permit
K1051-08	TSD Facility	Room 133	Organic Peroxide Storage Cell	Organic peroxide type D, solid	1996 - present	Active – Part B Permit
K1051-09	TSD Facility	Room 134	Flammable Storage Cell	Solids containing flammable liquid, n.o.s.	1996 - present	Active – Part B Permit
K1051-10	TSD Facility	Room 136	Flammable, Class 1A Storage Cell	Solids containing flammable liquid, n.o.s.	1996 - present	Active – Part B Permit
K1051-20	TSD Facility	Room 131	Reactive When Wet Storage Cell	Lithium	1996 - present	Active – Part B Permit
K1051-21	TSD Facility	Room 123 South end Room 140/19	Class 9 Storage Racks Class 9 Storage	Environmentally hazardous substance, liquid & solid, n.o.s.	1996 - present	Active – Part B Permit
K1051-24	TSD Facility	North Loading Area, Outside NE corner of Bldg.	Flammable Debris	Solids containing flammable liquid, n.o.s.	1996 - present	Active – SAA
K1051-101	TSD Facility	Room 124	Bulk Waste Storage	Oily Water	1996 - present	Active – Part B Permit
K1051-102	TSD Facility	Room 124	Bulk Waste Storage	Oily Water	1996 - present	Active – Part B Permit
K1051-103	TSD Facility	Room 124	Bulk Waste Storage	Wastewater	1996 - present	Active – Part B Permit
K1051-104	TSD Facility	Room 124	Bulk Waste Storage	Flammable liquid, n.o.s.	1996 - present	Active – Part B Permit

SWMU #	Building description	Location	Type & description	Wastes managed	Period of Ops	Status
K1051-105	TSD Facility	Room 124	Bulk Waste Storage	Flammable liquid, n.o.s.	1996 - present	Active – Part B Permit
K1051-106	TSD Facility	Room 124	Bulk Waste Storage	Wastewater	1996 - present	Active – Part B Permit
K1051-603	TSD Facility	Room 126	Acid Pretreatment	Wastewater, Hexavalent Chrome Pretreatment	1996 - 2010	Process Suspended – RCRA cleaned but not removed.

Table E1-2. Solid Waste Management Units not affiliated with the TSD Facility identified in the RCRA Facility Assessment

SWMU #	Building description	Location	Type & description	Wastes managed	Period of Ops	Status
K0011-02 (S-1)	Freight shop	Outside bldg on Pier 1	Covered, secured cage w/ 2nd cont	Petroleum wastes, cleaners, solvents, lubricants, paints, epoxies, adhesives, barium peroxide, ethylene glycol, waxes	12/89 – 05/99	Removed, no report
K0021-03 (S-2)	Oil storehouse	Northeast trench	Lined concrete trench	Waste fluids from machining scrap	12/91 – 08/99	CERCLA removed
K0021-103	Oil storehouse	North sump	Concrete sump	Spill containment for Bldg 21 materials	12/91 – 08/99	CERCLA removed
K0021-104 (S-3)	Oil storehouse	WW tank in 21-106	2000 G Steel AST	Waste cutting oil	12/91 – 08/99	CERCLA removed
K0021-105 (S-3)	Oil storehouse	WW tank in 21-106	2000 G Steel AST	Wastewater with cutting oil	12/91 – 08/99	CERCLA removed
K0021-106 (S-3)	Oil storehouse	Containment/ washdown area	Concrete sump	2nd containment & equipment washdown	12/91 – 08/99	CERCLA removed
K0024-01 (S-4 & S-5)	Weapons quality testing	Outside storage cage N of Bldg 24	Covered cages w/ 2nd cont	Petroleum wastes, sulfurous acid wastes, batteries, OF II wastes, sealers, solvents, paints, adhesives, silicones	10/91 – 11/98	Removed, no report
K0033-01	Boat repair shop	Outside Bldg 33, north side	Secured drum storage	Bilge water, MEK, adhesives, paint, epoxy, ethylene glycol, glass beads, petroleum debris, water w/ paint chips, asphalt varnish	1/95 – 7/02	Removed, no report
K0038-101	Container shop	Sump inside NE corner of Bldg 38	10 G DW plastic, monitored PBR tank	Industrial wastewaters from deburring machines and water jet cutter	1976 – present	Active Permit-by-Rule tank
K0038-102	Container shop	Sump inside NW corner of Bldg 38	10 G DW plastic, monitored PBR tank	Spills & overflow from tanks 38 3 through 8	1976 – 02/04	Closed, no report
K0038-103 (S-6)	Container shop	Tank between Bldgs 12 & 233	DW plastic, monitored PBR tank in concrete tank	Photo lab waste, metal prep wastes	1976 – present	Active Permit-by-Rule tank
K0038-104	Container shop	Tank 6 – hot detergent	Steel AST	Hot Oakite 166 detergent	1961 – 12/01	RCRA removed, no report
K0038-105	Container shop	Tank 5 – caustic cleaner	Steel AST	Sodium Hydroxide Caustic	1961 – 12/01	RCRA removed, no report
K0038-106	Container shop	Tank 4 – rinse water tank	Steel AST	Rinse water	1961 – 12/01	RCRA removed, no report
K0038-107	Container shop	Tank 3 – rinse water tank	Steel AST	Rinse water	1961 – 12/01	RCRA removed, no report
K0038-108	Container shop	Tank 2 – Isoprep 184 tank	Steel AST	Isoprep 184	1961 – 12/01	RCRA removed, no report
K0038-109	Container shop	Tank 1 – hot water rinse tank	Steel AST	Hot rinse water	1961 – 12/01	RCRA removed, no report
K0040-101 & 102 (A-1)	Soldering school	Underground tanks south of Bldg 40	Two 1500 G Concrete tanks	Paint stripping, steam cleaning wastes, battery acid, oily water, metal chips	12/89 – 12/85	RCRA removed, with report
K0040-02	Soldering school	Outside Bldg 40, SE end	Covered, secured drum storage	Adhesives, ethylene glycol, machining debris, aerosols, paints, rosin flux, propane	05/92 – 08/02	Removed, no report

SWMU #	Building description	Location	Type & description	Wastes managed	Period of Ops	Status
K0047-01 (S-7)	Technical operations	Storage area inside NE corner of Bldg 47	Covered storage area	Used oil, spray cans, NiCad batteries, solvents, cleaners, paints, empty propane cylinders	08/92 – 11/97	Removed, no report
K0048-01 (S-8), (A-2)	Boat machine shop	Outside Bldg 48, W end of Pier 2	Enclosed building	Cutting oil, thinners, solvents, paints, aerosol cans	03/91 – 08/02	Removed, no report
K0072-101	Plating shop	Outside NE corner of bldg 72	300G steel raised PBR tank	trichloroethane	12/89 – 12/98	CERCLA removed
K0072-102	Plating shop	Outside NE corner of bldg 72	250G steel PBR tank in concrete 2nd cont	Cyanide wastes	12/89 – 12/98	CERCLA removed
K0072-105	Plating shop	Outside SE corner of bldg 72	2000G PBR concrete underground sump	Acid wastes	12/89 – 12/98	CERCLA removed
K0072-106	Plating shop	Outside, center of N wall of bldg 72	250G PBR Concrete underground sump	Cyanide wastes	12/89 – 12/98	CERCLA removed
K0072-108	Plating shop	Entire W portion of bldg 72	45,000G grated concrete PBR sump	Acid wastes	12/89 – 12/98	CERCLA removed
K0072-109	Plating shop	NE corner of 72-108	50G pump-out PBR sump for 72-108	Acid wastes	12/89 – 12/98	CERCLA removed
K0072-111	Plating shop	Outside, E of bldg 72	5000G aboveground plastic PBR tank	Acid wastes	12/89 – 12/98	CERCLA removed
K0072-112	Plating shop	Outside NE corner of bldg 72	2000G underground concrete/plastic PBR tank	Cyanide wastes	12/89 – 12/98	CERCLA removed
K0073-01 (S-9)	Machine shop	NW of Bldg 73	enclosed steel cabinet w/ 2nd cont	Oil-contaminated machine shop debris, solvents, oil, paints, metal scraps, cleaners	09/90 – 04/03	Removed, no report
73 (S-10)	Machine shop	Tank next to Bldg 73 (in SWMU referenced to Bldg 21)	5000 G Steel AST	Cutting oil & machine coolant	12/89 – 11/91	Removed, no report
K0081-01 (S-11 & 12)	Reload Bldg	W of Bldg 81, next to Bldg 105	Two covered cages w/ 2nd cont	Solvents, coatings, inks, oil, adhesives, paints, batteries, sealers, plastic compounds & resin, foam rubber	12/89 – 12/03	South cage removed, no report, N cage active CAA SWMU
K0081-07	Reload Bldg	North end of Bldg 81, riggers loft	Designated storage area	Adhesives, paints ,thinners, solvents, MEK, alodine, hydraulic oil, epoxies, waxes, mold release, curing agents, acetone, fiberglass, retarders, accelerators, aerosols, resins	05/95 – 11/95	Removed, no report
K0081-08	Reload Bldg	Inside Bldg 81, topside, southside, S wall	Designated storage area	Adhesives, paints, epoxies, resins, MEK	01/00 – 12/03	Removed, no report
K0082-01 (S-13)	Target shop	Outside SE corner of Bldg 82	Covered cage w/ 2nd cont	Hydrochloric acid, parts cleaner wastes	12/89 - present	Active CAA SWMU
K0083-02 (S-14)	Metals Forming Shop	Inside Bldg 83, NE corner	Plastic 2-drum clamshell storage w/ 2nd cont	Paints, thinners, filters, spray cans, adhesives, solvents, resin, paints, oil, dyes, plastic sands, silicone sealants, contaminated rags	09/90 – 08/02	RCRA removed, with report
K0083-10	Metals Forming Shop	Inside Bldg 83, north end	Covered, designated storage area	Adhesives, paints, inks, epoxies, used oil, lubricants	05/03 – 03/04	RCRA removed, with report
K0084-07	Paint stripping & painting shops, lead room	Inside NW corner of lead room	Secured drum storage	Blasting booth filters, soda blasting sludge, paints, solvents, epoxies, aerosols, inks	02/93 – 07/98	Removed, no report
K0084-12 (S-16)	Paint stripping & painting shops, lead room	Outside N end of Bldg 84	Covered, 3-sided structure	Paint, thinners, filters, blast media, spray cans, solvents, fluo tubes, wastes contaminated with lead	12/89 – present	Active CAA SWMU
K0084-14	Paint stripping & painting shops	Outside NE corner of Bldg 84	Designated drum storage area w/ 2nd cont	Lubricants, used oil, cleaners, alodine	10/96 – 11/02	Removed, no report

SWMU #	Building description	Location	Type & description	Wastes managed	Period of Ops	Status
K0084-101 (S-15)	Paint stripping & painting shops, lead room	Paint stripping sump inside N end of Bldg 84	6000 G Concrete sump	Steam cleaning and paint stripping wastes, paints and solvents, contaminated sand, soap, paint chips, dust,	1944 – 03/94	RCRA closed in place, with report
K0084-104	Heat treatment shop	Inside Bldg 84, heat treat area, NE corner	1500G concrete aqua quench tank with contaminated liquid	Metal-contaminated quench fluid	12/89 – 02/97	Removed, no report
K0085-01	Battery shop	East of building 85, north of door 1	Designated, covered storage site	Batteries, asbestos	12/89 – 08/03	RCRA removed, with report
K0085-102 (A-3)	Battery shop	Sump & trenches E of Bldg 85	SS lined concrete trenches & plastic tank w/ 2nd cont	electrolyte, potassium hydroxide, sulfuric acid	12/89 – 10/03	RCRA removed, with report
K0085-103	Battery shop	East of building 85, north of door 1	Plastic tank w/ 2nd cont	electrolyte, potassium hydroxide, sulfuric acid	9/92 – 08/03	RCRA removed, with report
K0098-01 (S-17)	Torpedo shop, electronic assembly	N of Bldg 98, SW of Bldg 825	Covered cage w/ 2nd cont	Spray cans, paints, thinners, solvents, sealers, adhesives, alodine, fluo tubes, waxes, epoxies, plastic compounds & resin, solder, flux, oil	12/89 - present	Active CAA SWMU
105N & 105S (S-18 & 19)	Torpedo shop, electronic assembly	Outside storage cages W of Bldg 105, moved to E side of Bldg	Roofed steel cages w/ 2nd cont	OF II-contaminated wastes, spray cans, adhesives, sealers, cleaners, alodine, Freon, batteries, fluo tubes, agitene, epoxies, paints, lacquers, oil, paints, solder, flux, photo wastes	12/89 – 6/90	Removed, no report
K0106-05	Torpedo engine test	Outside Bldg 106, west side, adjacent to Bldg 499	Covered, bermed, secured storage building	Waste actryl, tectyl, ethylene glycol	12/89 – 03/99	Removed, no report
K0106-101	Torpedo engine test	Outside SW corner of Bldg 106, E of Bldg 499	1000G concrete underground tank	OF II, cyanide wastes	12/89 – 10/99	CERCLA removed
K0106-102 (S-20)	Torpedo engine test	Outside E of Bldg 106	1500 G steel tank	Waste OF II, cyanide wastes	12/89 – 03/04	To be RCRA closed
K0106-103	Torpedo engine test	Outside E of Bldg 499	600 G plastic tank	Waste OF II	12/89 – 03/04	To be RCRA closed
K0106-104	Torpedo engine test	Outside E of Bldg 499	660 G concrete 2nd cont sump for 103-103	OF II spills	12/89 – 03/04	To be RCRA closed
K0106-105	Torpedo engine test	Outside NW corner of 106	25 G spill containment sump	OF II spills	12/89 – 10/99	To be RCRA closed
K0106-108	Torpedo engine test	Outside NW corner of 106	25 G spill containment sump	OF II spills	12/89 – 03/04	To be RCRA closed
110 (S-21)	Paint shop (bunker)	Storage cage SW of Bldg 110	Roofed steel cage w/ 2nd cont	Spray cans, paints, thinners, solvents, MEK, paint filters	Site predated FMD	Removed, no report
115 (S-22)	Lithium storage bunker	Entire building	Soil-covered concrete building w/ steel doors	Expended lithium boilers	12/89 – 05/99	RCRA closed, with report
K0134-101 (S-23)	Photo Lab	Underground tank north of Bldg 134	1250 G Concrete PBR tank	Photo lab wastes	1980 – 05/01	RCRA closed in place, with report
K0181-101	Storehouse	Outside Bldg 181, next to 804, at head of Pier 1	50,000 G concrete 2nd cont for AST 804-101 & 102	Oily wastewater	12/89 – 07/98	CERCLA removed
K0205-01	BOSC office	Outside NE corner of Bldg 205	Covered, secured storage area	Fluorescent bulbs, ballasts, paints, petroleum wastes, lead acid gel batteries,	04/92 – 04/04	Removed, no report
205	Exchange service station	Steel UST W Bldg 205, no tank #s	Steel used oil UST	Used oil	1961 – 06/90	UST removed, with reports

SWMU #	Building description	Location	Type & description	Wastes managed	Period of Ops	Status
K0206-01 (S-24)	Weapons quality engineering center	Outside storage cage NE of Bldg 206	Roofed steel cage w/ 2nd cont	Batteries, fluo tubes, paints, thinners, solvents, cleaners, adhesives, waste oils, ethylene glycol, OF II waste, lithium wastes, magnesium shavings, barium carbonate, lab wastes	12/89 - present	Active CAA SWMU
K0233-02 (S-25)	Machine shop	Outside, S of Bldg 233	Steel pallets in paved, roofed structure	Spray cans, cleaners, solvents, waste oils	12/89 - present	Active CAA SWMU
478 (S-26)	Special projects	Caged area SW of Bldg 478	Roofed area enclosed by Bldg 478 & fence	Batteries, adhesives, paints, solder, flux, sealants	3/90 – 2/92	Removed, no report
478-101 (A-4)	Special projects	Underground tank SW of Bldg 478	1350 G Concrete tank	Waste OF II	1966 – 02/98	RCRA removed, with report
478-102 (A-4)	Special projects	Underground tank W of Bldg 478	1350 G Concrete tank	Waste OF II	1966 – 02/98	RCRA removed, with report
478-103 (A-4)	Special projects	Underground tank NW of Bldg 478	1350 G Concrete tank	Waste OF II	1966 – 02/98	RCRA removed, with report
478 (A-5)	Special projects	Caged area SW of Bldg 478	2 steel tanks in 2nd cont	A and B grade OF II (material, not waste as indicated in the RFA)	1968 – 2/98	Removed, no report
K0489-03 (S-27)	Torpedo shop	Outside storage cage E of Bldg 489	Roofed steel cage for 4 drums w/ 2nd containment	OF II wastes, spray cans, agitene, alodine, adhesives, oil, solvents, paints, thinners, resins	12/89 - present	Active CAA SWMU
K0489-101 (S-28)	Torpedo shop	Underground tank outside E of Bldg 489	1200 G concrete tank with SS liner	Waste OF II, alcohol, cyanide contaminated wastewater	1975 – 11/92	Converted to 2nd containment for K0489-102, no report
K0489-102	Torpedo shop	Underground tank outside E of Bldg 489	50 G SS tank in 1200 G concrete secondary containment (K0489-101)	Waste OF II, alcohol, cyanide contaminated wastewater	11/92 – 11/97	RCRA cleaned with report
K0489-103	Torpedo shop	Tank outside E of Bldg 489	1500 G SS DW tank	Waste OF II, alcohol, cyanide contaminated wastewater	11/92 – 11/97	RCRA cleaned & changed to HM with report
K0489-104	Torpedo shop	Tank outside E of Bldg 489	1500 G SS DW tank	Waste OF II, alcohol, cyanide contaminated wastewater	11/92 – 08/99	RCRA cleaned & changed to HM with report
K0514-01 (S-33)	Torpedo shop	Outside storage cage NW of Bldg 514	Roofed steel cage w/ concrete containment	OF II - contaminated wastes, spray cans, paints, thinners, solvents, oil, grease, fluo tubes, adhesives, sealants, Freon, batteries	1985 – present	Active CAA SWMU
K0514-14	Torpedo shop	Post range flush area of Bldg 514	Covered designated storage area	OF II - contaminated wastes, spray cans, paints, thinners, solvents, oil, grease, fluo tubes, adhesives, sealants, Freon, batteries	12/91 – 10/95	Removed, no report
K0514-104 (S-29)	Torpedo shop	Sump NW of Bldg 514	4750 G steel lined concrete sump	Waste OF II, cyanide, water	1973 – 08/92	Converted to 2nd containment for K0514-105, no report
K0514-105 (S-30)	Torpedo shop	Steel tank inside caged area NW of Bldg 514	1500 G SS DW tank w/ alarms	Cyanide contaminated wastewater	1984 - present	Active CAA SWMU
K0514-106 (S-31)	Torpedo shop	Underground tank W of Bldg 514	625 G SS lined concrete tank	Wastewater from carbon columns (which remove residual OF II)	1980 – present	Active Permit-by-Rule tank
514 (S-32)	Torpedo shop	Plastic tanks inside NW corner of Bldg 514	Plastic tanks inside building	Carbon columns that remove residual OF II from OF II recycling system wastewater	1976 – present	Active Permit-by-Rule tanks
K0514-107 (S-34)	Torpedo shop	Outside NW corner of Bldg 514, in 514-01, replaced with K0514-108	350 G portable steel bongo in concrete 2nd cont	Alcohol contaminated with Otto Fuel II	11/85 – 04/98	Replaced, no report
K0726-01 (S-35)	Paint shop	Outside storage cage S of Bldg 726	Roofed steel cage w/ concrete containment	Paint & thinners	12/89 – 10/02	Removed, no report

SWMU #	Building description	Location	Type & description	Wastes managed	Period of Ops	Status
K0790-01	Otto Fuel II recycling	Inside Bldg 790 compound, west bay area	Designated storage area	Otto fuel II contaminated drums and liners	1974 – 12/93	Removed, no report
790-102 (A-6)	Otto Fuel II recycling	Outside, S of Bldg 790	Steel underground storage tank	Recycled OF II until 1987, spilled OF II & OF II wastewater until 1993	1974 – 12/93	RCRA removed, with report
804-101 & 102 (A-7)	Fuel storage	Concrete sump S of Bldg 72	Steel tanks in concrete sump (Bldg 181)	Oily water	1947 – 12/98	CERCLA removed
820-101 (A-8)	Container refurb, decontamination	UST W of Bldg 820	2000 G Steel UST	Oily wastewater	1976 – 12/96	UST removed, with report
820 (S-36)	Container refurb, decontamination	Trench system inside S end of Bldg 820	Concrete trenches that lead to 820-106 & 107	Decon spill wastes	1990 – 9/03	To be RCRA closed, with report
K0820-109 (S-37)	Container refurb, decontamination	Trench system & sump outside S end of Bldg 820	Concrete trenches and secondary containment sump	Decon spill wastes	1990 – 9/03	To be RCRA closed, with report
K00820-106 (S-38)	Container refurb, decontamination	Under roofed, fenced area S end of Bldg 820	3000 G steel tank in concrete secondary containment	Lithium decontamination wastes	1990 – 9/03	To be RCRA closed, with report
K00820-107 (S-38)	Container refurb, decontamination	Under roofed, fenced area S end of Bldg 820	3000 G steel tank in concrete secondary containment	Lithium decontamination wastes	1990 – 9/03	To be RCRA closed, with report
K0820-103 (S-39)	Container refurb, decontamination	Outside plastic tank K0820-103, E of Bldg 820	Covered Poly tank on 2nd containment	Waste alodine	1988 – 11/95	Removed, no report
K0820-104 (S-39)	Container refurb, decontamination	Outside plastic tank K0820-104, E of Bldg 820	Covered Poly tank on 2nd containment	Waste alodine	1988 – 11/95	Moved to Bldg 82, active CAA SWMU
K0820-105 (S-39)	Container refurb, decontamination	Outside plastic tank K0820-105, E of Bldg 820	Covered Poly tank on 2nd containment	Waste alodine	1988 – 11/95	Moved to Bldg 84, active CAA SWMU
K0820-01 (S-40)	Container refurb, decontamination	Outside storage cage NE of Bldg 820	Roofed steel cage w/ 2nd containment	Alodine & blast booth wastes, spray cans, oily water, adhesives, cleaners	12/90 – 11/95	Removed, no report
K0820-02 (S-41)	Container refurb, decontamination	Outside storage cage S of Bldg 820	Roofed steel cage w/ concrete containment	lithium-contaminated debris, equipment & sludges, solvents	12/90 – 11/95	Removed, no report
K0824-01 (S-42)	Facilities Support	Outside storage cage NW of Bldg 824	Roofed steel cage w/ concrete containment	Asbestos fiberboard, waste oil, solvents	03/90 - present	Active CAA SWMU
K0825-101 (T-1) (S-43)	IWTP	Tank E of Bldg 825in the caustic containment area	6000G fiberglass caustic WW receiving tank	Cyanide plating wastes & OF II wastes	1982 - present	Active Permit-by-Rule tank
K0825-107 (T-7) (S-44)	IWTP	Tank E of Bldg 825 in the caustic containment area	6000G fiberglass caustic WW reactor tank	Cyanide treatment tank	1982 - present	Active Permit-by-Rule tank
K0825-105 (T-5) (S-45)	IWTP	Tank E of Bldg 825 in the acid containment area	40,000G polyester lined steel acid WW receiving tank	Acid plating, photo lab & metal prep wastes	1982 - present	Active Permit-by-Rule tank
K0825-108 (T-8) (S-46)	IWTP	Tank E of Bldg 825 in the acid containment area	40,000G polyester lined steel acid WW reactor tank	Acid treatment tank	1982 - present	Active Permit-by-Rule tank
K0825-110 T-10) (S-47)	IWTP	Tank E of Bldg 825 in the neutral containment area	50,000G coal tar epoxy lined steel intermediate storage tank	Treated wastewater during pH adjustment	1982 - present	Active Permit-by-Rule tank
K0825-112 T-12 A-D) (S-48)	IWTP	Four tanks inside N end of Bldg 825	1200G (ea) plastic sandfilter tanks	anthracite coal & silica sand filter material, treated wastewater	1982 - present	Active Permit-by-Rule tank
K0825-113 (T-13) (S-49)	IWTP	Tank E of Bldg 825 in neutral containment area	1500G coal tar epoxy lined steel sludge tank	Sludge storage	1982 - present	Active Permit-by-Rule tank
K0825-114 (T-14 A-B)(S-50)	IWTP	Tanks E of Bldg 825 in neutral containment area	Two 17,000G coal tar epoxy lined steel clearwater tanks	Treated water awaiting test results	1982 - present	Active Permit-by-Rule tank

SWMU #	Building description	Location	Type & description	Wastes managed	Period of Ops	Status
825 (S-51)	IWTP	Secondary containment E of Bldg 825	Epoxy-coated concrete secondary containment	acid wastewater spills	1982 - present	Active Permit-by-Rule site
825 (S-52)	IWTP	Secondary containment E of Bldg 825	Epoxy-coated concrete secondary containment	caustic wastewater spills	1982 - present	Active Permit-by-Rule site
825 (S-53)	IWTP	Secondary containment E of Bldg 825	Epoxy-coated concrete secondary containment	neutral wastewater spills	1982 - present	Active Permit-by-Rule site
K0825-01 (S-54)	IWTP	Inside south-central part of Bldg	designated drum area on epoxy-coated concrete floor	Dewatered wastewater treatment sludge, sludge-contaminated debris	1982 - present	Active CAA SWMU
K0893-01 (S-55)	Supply Traffic	Fenced storage inside E bay of Bldg 893	Roofed steel cage w/ concrete containment	Spray cans, adhesives, batteries, greases, solvents, paint & thinners, oil, grease, inks, solvents, adhesives, plastics & plastic resins	12/89 – present	Active CAA SWMU
K0894-01 (S-56)	Raytheon (KTR) Mk 46 Torpedo refurbishment	Storage area N of Bldg 894	Steel cage w/ 2nd cont, was replaced with dedicated room inside	Adhesives, benzene, toluene, paints, solvents, detergents, lithium wastes, cleaners, batteries, office supplies, paint cans, plastics & resins	02/92 – 12/20	Removed, no report
894 (S-57)	Mk 50 Torpedo shop	Outside storage area N of Bldg 894	Plastic clam shell w/ 2nd containment	Adhesives, adhesives, spray cans, paints, solvents, detergents, lithium wastes, sealers, plastics & resins	12/89 – 09/02	Removed, no report
K0894-101 (A-9)	Mk 50 Torpedo shop	Underground tank outside under canopy N of Bldg 894	Plastic tank inside epoxy-coated concrete	Tank was replaced with 894-102 before wastewater was generated	02/92 – 09/02	Never used, closed-in-place, no report
K0894-102 (S-58)	Raytheon (KTR) Mk 46 Torpedo refurbishment	Aboveground tank located outside, N of Bldg 894	Portable plastic tank w/ 2nd containment	BSS wash water (halogenated). Tank was incorrectly designated K0894-107 in FMD, now used by Raytheon for Indus wastewater	10/91 – present	Active CAA SWMU
K0940-02 (S-59)	Propulsion test facility	Storage area E of Bldg 940	Steel pallets w/o roof or 2nd containment	Spray cans, paints, solvents, waste oils, cleaners, contaminated OF II	12/89 – 12/98	Removed, no report
K1013-01 (S-60)	Auto hobby shop	Storage cabinet outside S of Bldg 1013	Enclosed cabinet w/ 2nd containment	Waste oils, grease, antifreeze	10/90 – 08/00	Removed, no report
K1013-101	Auto hobby shop	UST E of Bldg 1013	125 G steel UST	Used oil	10/92 – 08/98	UST removed, with report
K1019-101	Precious metal plating shop	Entire SW corner of bldg 1019 interior floor	30,000G grated sump	Acid wastes	12/89 – 12/98	CERCLA removed
K1019-102	Precious metal plating shop	NE corner of bldg 1019 floor	300G plastic tank in concrete	Cyanide wastes	12/89 – 12/98	CERCLA removed
K1058-06	Metal finishing facility	Inside Bldg 1058, along east wall of dark room	Designated storage area	Alodine, acids, caustics, dyes, aerosols, anodize stripping solution, profiler wastes	10/01 – 02/03	Removed, no report

E1.1.1 TSD Facility Building Descriptions

Container Storage/Fabric Structures was a component of the previous TSD Facility. These structures have been RCRA clean-closed and demolished.

Building 884 is the previous TSD Facility. All facilities have been RCRA clean-closed and demolished. Soils and groundwater are managed under the CERCLA program.

Building 1032 was part of the original TSD Facility. The building was used for the paint consolidation and used oil storage tanks. RCRA clean-closure of the building was completed in October 2000.

Building 1051 is the current TSD Facility. Two 5000-gallon horizontal oily wastewater tanks were moved from the old TSD Facility site (Building 884) to room 124 of this building during construction, identified as tanks K1051-110 and K1051-111. During the integrity assessment completed in July 2006, it was determined that the tanks were out of compliance because wall thicknesses could not be measured (double walled tanks), the tanks were un-enterable (hatches sealed) for inspection, the wastes could not be sampled prior to shipping (no sample ports), and no destratification system was installed to ensure samples for shipping manifesting were representative of the entire contents of the tank. Tanks K1051-110 and K1051-111 were cleaned and processed through the DLA contract for disposal. Two unused 5000-gallon vertical tanks (K1051-101 and K1051-102) were upgraded to replace these tanks and store the oily wastewater wastes at the TSD Facility.

Acid pretreatment was conducted in room 126 using tank K1051-603 as the mixing tank to pretreat hexavalent chromium. The wastewater from this process was transferred to the Industrial Waste Treatment Plant located in Building 825 for final treatment. Process was stopped in 2010 and the tank was RCRA cleaned and left in place in a “suspended” status.

E1.1.2 Non-Facility Building Descriptions

Building 11 was used to stage loading and unloading materials for use onboard range craft at the end of Pier 1. A CAA SWMU was located outside near the building, identified in the RFA as S-1 and in the Facility Maintained Database (FMD) as K0011-02. The unit consisted of a 6’ X 6’ X 8’ high prefabricated enclosure manufactured for the storage of hazardous materials and dangerous wastes. The enclosure was constructed entirely of steel with locking doors, and a secondary containment pan >60 gallons with locking drain valve. The start date of dangerous waste management operations in Building 11 is undetermined. Operations ceased in October 1997, and the building was removed in August 2002.

Building 21 was divided into four parts. The north part of the wooden structure was used for the storage of oils, solvents, and cleaners. A 45-gallon blind sump, identified in FMD as K0021-103, was located in the center of this portion of the building to collect spills from these materials. The south part of the wooden structure was also used for the storage of dangerous materials. In 1990, a steel enclosure was added east of the wooden structure to house two machine cutting/cooling fluid waste collection tanks and a secondary containment wash rack, identified in the RFA as S-3 and in FMD as K0021-106. This site was used to clean machining equipment, and to transfer wastes from the tanks to tank trucks. At the same time, a canopy was installed north of the wooden structure to house the machining cutting solid/liquid separation and draining operations. This canopy was surrounded by stormwater and metal cutting/coolant oil collection trenches, identified in the RFA as S-2 and in FMD as K0021-03. The trenches were designed to drain into the wash rack. Drained cutting and cooling fluids were collected from a trench at the bottom (north end) of the wash rack and pumped into two 2,000-gallon tanks, also identified in the RFA as S-3, and in FMD as K0021-104 and K0021-105, in preparation for shipping off base for further recycling. The start date of dangerous waste management operations in Building 21 is undetermined, though the wash rack installation was finished in 1991. Operations ceased in August 1999 and the building was removed in September 1999. The site was remediated under the CERCLA program.

Building 24 was used to perform periodic environmental testing on components. A CAA SWMU, identified in the RFA as S-4 and in FMD as K0024-01, was located outside the building. The SWMU consisted of a 5' X 5' X 8' high, roofed, steel cage that incorporated a >60-gallon steel secondary containment pan. A satellite site, identified in the RFA as S-5, was located between the building and the seawall, consisting of a fenced area approximately 20' X 160'. This area was used to stage hazardous materials pre- and post-testing, and miscellaneous hazardous materials and wastes associated with testing during the process. Those areas used to store hazardous materials and wastes were roofed but did not have secondary containment. Dangerous waste management operations were initiated in October 1991 at this site. Operations ceased in August 1998 and the building was demolished in November 1998.

Buildings 33 and 48 constituted the waterfront boat repair shop. A woodwork shop was located in building 33, and a machine shop and marine railway were located in Building 48 in support of various vessels. A CAA SWMU was located outside, northwest of Building 33, and a CAA SWMU was located on Pier 2, northeast of building 48. Both SWMUs consisted of a 6' X 6' X 8' high, prefabricated enclosed all-steel structure manufactured for the storage of hazardous materials and dangerous wastes, had locking doors, a steel grate floor over a secondary containment, with a normally locked closed valve to drain accumulated liquids from the pan. The Building 33 SWMU was identified in FMD as K0033-01. The Building 48 SWMU was identified in the RFA as S-8 and in FMD as K0048-01. A dangerous material storage shed was also located on the pier adjacent to K0048-01 in support of these operations, identified in the RFA as A-2. The shed did not have any release controls such as secondary containment. The start date of dangerous waste management operations in Building 48 is undetermined. Operations ceased in August of 2002, at which time the SWMU and dangerous material locker were removed.

Building 38 was used to clean and prep metals prior to manufacturing processes and to construct and refurbish aluminum shipping containers. Six 2,000-gallon open-top process baths used in this process were located in the northwest corner of the building, identified in FMD as tanks 1 through 6, and K0038-104 through 109. Three of these tanks contained the following cleaning solutions: Oakite 166 detergent, Isoprep 184 acid solution, and a sodium hydroxide caustic solution. Wastes from these prep tanks were periodically pumped out and shipped off base through the Treatment, Storage and Disposal Facility (TSDF). The other three tanks were rinse tanks that were continuously supplied with fresh water. The overflows from these tanks were collected in a sump in the northwest corner of the building, identified in FMD as K0038-102. A water jet cutter and several deburring machines are located in the northeast corner of the building. Wastewater from these machines is gravity drained to a sump in that corner of the building, identified in FMD as K0038-101. Both 10-gallon sumps are constructed of concrete with a fiberglass liner and interstitial monitoring. The sumps gravity drain into an underground tank located between Buildings 233 and 12 through a secondarily contained fiberglass pipe with interstitial monitoring. This 1600-gallon tank was installed in 1976, and has a concrete secondary containment and a fiberglass liner with interstitial monitoring. It is identified in the

RFA as S-6, and in FMD as K0038-103. The secondary containment was installed in April 1994. Originally, photo processing wastes from Building 134 were also collected in this tank, but this connection was removed in 2001 (see Building 134 description below). Currently, only the deburring machines and water jet cutter in Building 38, and metal plating wastes from Building 1058 are collected in this tank. Wastewater is pumped from this tank through a secondarily contained, interstitially monitored fiberglass pipe to Building 825, the Industrial Wastewater Pretreatment Plant (IWTP). All interstitial spaces in the sumps, tanks and pipes are monitored in Building 825 for leakage. The start date of these dangerous waste management operations in Building 38 is estimated to be in 1961. The metal prep process was discontinued in 2001, at which time tanks K0038-104 though K0038-109 (the metal prep dip tanks) were decontaminated, removed, and disposed of through the TSDF. Only two of the deburring machines and the water jet cutter remain at this time. Currently Building 38 is used for sheet metal cutting and forming processes.

Building 40 was used for multiple varied processes over the years. Research indicates a machine shop and chemical treatment facility were located there at one time. In the eighties, the building was renovated for office space, and subsequently served as the Keyport Housing office, the soldering school, the safety office, and the security office, in that order. A CAA SWMU, identified in FMD as K0040-02, was located under a canopy southeast of the building. The SWMU consisted of a 5' X 5' X 8' high, roofed, steel cage that incorporated a >60-gallon steel secondary containment pan. Two 1500-gallon, precast concrete underground tanks associated with Building 40 received wastes from the industrial activities in Building 40 as well as the steam-cleaning operations, paint stripping operations, and battery cleaning, charging, repairing, and recycling operations in Building 85. These tanks are identified in the RFA as A-1, and in FMD as K0040-101 and K0040-102. The start date of dangerous waste management operations in Building 40 is undetermined. Waste producing processes that discharged to these tanks ceased around 1985. The tanks were removed in December 1996.

Building 47 was used for a wide variety of processes. Though some processes generated dangerous wastes, in general very few of the processes carried out in this building produced any. The CAA SWMU in Building 47 was a designated, covered storage area on the northeast side of the building, identified in the RFA as S-7 and in FMD as K0047-01. The storage area had a concrete floor with no berm, and was used to store up to two 55-gallon drums. The start date of dangerous waste management operations in Building 47 is undetermined. Operations ceased in 1997 and the building was removed in August 2000.

Building 72 was the plating plant. The entire Building 72/1019 complex was removed and the site was remediated under the CERCLA program. Site remediation was completed in March 1999.

Building 73 was a machine shop used for component manufacture and repair. The CAA SWMU at Building 73 is a 6' deep, 6' wide, 8' high steel structure with a steel roof located outside the northwest corner of the building, identified in the RFA as S-9 and in FMD as K0073-01. Flooring is a steel grate over a 130-gallon secondary containment reservoir. The SWMU has a capacity of six 55-gallon drums. A 5000-gallon waste oil tank was located outside the northwest corner of the building, identified in the RFA as S-10. The start date of dangerous waste management operations in Building 73 is September 1990. Machine shop operations ceased in 1995. The 5000-gallon waste oil tank was removed and disposed of in November 1991, and replaced with K0021-104 and 105 (see Building 21 description). An active CAA-day SWMU identified in FMD as K0073-02 remains in this location to service the other machine shop operations in the industrial area. Treatment by generator occurs in CAA

K0073-15, where metal fines from a 3D printing machine are treated with quartz sand and silicone oil to reduce flammability.

Building 81 is a manufacturing shop. Various plastics forming and machining processes have taken place in the center portion of the building over the years. A liquid nitrogen heat treatment and an alodine treatment process are located at the north end of the building. Two CAA SWMUs were located west of the building, next to Building 105, identified in the RFA as S-11 and S-12. The component refurbishment processes located in Building 105 also contributed to the Building 81 SWMUs. Both SWMUs consisted of prefabricated steel cages, one measuring 5' X 5' X 8' high (south cage), and the other measuring 10' X 5' X 8' high (north cage). Both units were constructed of galvanized steel with metal roofs, chain-link fence sides, and a steel grate floor over a containment reservoir. The north cage had a capacity of eight 55-gallon drums and a secondary containment capacity of 220 gallons, and the south cage could store four 55-gallon drums and had a secondary containment capacity of 115 gallons. The south cage was removed in 2003, and the north cage is a currently active CAA SWMU, identified in FMD as K0081-01. The start date of dangerous waste management operations in Building 81 is undetermined.

Building 82 is a repair/refurbishment shop. A currently active 500-gallon, double walled plastic tank with a high level alarm and interstitial monitoring is located in the southwest corner of the patio east of the building. This tank receives washwater from post-range component cleaning. This tank is identified in FMD as K0082-104. An active CAA SWMU that has a storage capacity of four 55-gallon drums is located outside under a large canopy at the southeast corner of the building. The unit is identified in the RFA as S-13 and in FMD as K0082-01. It consists of a single galvanized steel cage, 5' X 5' X 8' tall, with chain-link fencing for walls, a metal roof, and a steel grate floor over a 115 gallon secondary containment pan. The start date of dangerous waste management operations in Building 82 is undetermined, and the CAA SWMU and plastic storage tank remain in this location to service the current operations in the building.

Building 83 was the Metals Forming Shop. A welding shop was located at the north end, a sheet metal shop in the middle and south ends, a machine shop in the middle, and a paint shop in the west side. A CAA SWMU was located in the northeast corner of the building, and was identified in the RFA as S-14 and in FMD as K0083-02. The unit consisted of a secured clamshell polyethylene container that can store two 55-gallon drums, and incorporated a 55-gallon secondary containment. A covered, designated CAA SWMU was located in the welding area at the north end of the building. This storage area is identified as K0083-10 in FMD, and was closed in March 2004. The start date of dangerous waste management operations in Building 83 is 1990. All industrial shop operations ceased in 2003, and the building was removed in 2004. The area under the building floor and the perimeter of the building were sampled in 2003 as part of plans for the demolition of Building 83.

Building 84 was used for various paint stripping and painting processes, and at one time contained a lead foundry and heat treatment process. The lead foundry and heat treatment processes were discontinued and removed in 1997. Initially, paint stripping took place in the north end of the building over a large grated sump that collected the stripping wastes. Stripping wastes included Turco 5555B, Turco 5469, MEK, alcohol and toluene. This sump is identified as S-15 in the RFA, and as K0084-101 in FMD. In 1988, these paint-stripping processes were discontinued and replaced with a bead blasting process. Soil samples were taken under and around the sump in June 1992. Test results of these samples indicate the soil around the sump is contaminated. A copy of the report of the test results titled 'The Paint Shop Waste Sump Building 84, Keyport, Washington', prepared by Seacor dated July 12 1992, was submitted to

Ecology Northwest Regional Office. Due to the proximity of the building foundations to the edge of the sump, it was determined that the contamination could not be removed without removing the concrete roof, brick walls and concrete foundation of the building. Because the risk of contaminants reaching receptors was low, it was decided to leave the contamination in place, clean the interior of the sump, and fill it with CDF. The contamination will be removed at some time in the future when the building will be demolished. A designated CAA SWMU identified in FMD as K0084-07 was located in the northwest corner of the lead room. This CAA SWMU was closed and removed in July 1998. A designated CAA SWMU with secondary containment, identified in FMD as K0084-14, was located outside the northeast corner of Building 84. This CAA SWMU was closed and removed in November of 2002. A three-sided, roofed structure is built against the north wall of Building 84. Inside this structure, along the north wall, a currently active CAA SWMU, identified on the RFA as S-16, and in FMD as K0084-12, is located. This SWMU was originally created to accumulate lead wastes from the lead foundry, and remains as a smaller footprint CAA SWMU for paint process waste accumulation. A 1500-gallon aqua quench tank was located in the heat treatment area in the northeast corner of Building 84. Quenching solutions included curing oil, detergent, Quench G, Dow Temp 225, and Aqua Quench 251. Because the quenching solution in this tank was contaminated with metals, it was designated as a SWMU, identified as K0084-104 in FMD. At the time the heat treatment processes were discontinued in 1997, the waste quench solution was disposed of through the TSDF, and the tank was decontaminated and disposed of as solid waste. The start date of dangerous waste management operations in Building 84 appears to be 1944.

Building 85 was used for steam-cleaning operations, paint stripping operations, and battery cleaning, charging, repairing, and recycling operations. Wastes from these processes were originally drained to the two tanks located southwest of Building 40 (see Building 40 description). The steam cleaning and paint stripping processes were discontinued in 1985. The battery cleaning, charging, repairing, and recycling wastes were originally collected in a sump inside the building that drained through a trench to the two tanks located southwest of Building 40 (see Building 40 description). The system of trenches, sump and tank were identified in the RFA as A-3, and in FMD as K0085-102. When the use of these tanks was discontinued in 1985, the trenches were lined with stainless steel and routed to an underground concrete sump with a stainless steel liner, and monitored interstitial space. This sump in turn drained to the Building 72 acid sump located north of Building 72. When plating operations in Building 72 were discontinued, the wastewater collected in this sump was rerouted into a 300-gallon portable plastic tank equipped with a secondary containment and high-level alarms. This CAA accumulation tank was located east of Building 85, north of door 1, and is identified in FMD as K0085-103. This tank was transported with a forklift to the IWTP where the wastes were treated prior to disposal to the sanitary sewer. In 1998, the use of the interior sump was also discontinued, and the process was modified to take place on top of grate-covered portable basins that collected the liquid battery wastes as they were drained. Wastes from these basins was pumped directly to the K0083-103 tank. Subsequent to this change, the sump and trenches were used only as spill containment. The area under the interior sump, the trenches, and the general patio area were sampled in 2003 as part of plans for the demolition of Building 85. A copy of the report of the test results of these samples was submitted to Ecology Northwest Regional Office. A designated CAA storage area, located east of the building under a canopy, and identified in FMD as K0085-01, was used to collect and store waste batteries. This CAA SWMU was closed and removed in 2003.

Building 98 was used for various mechanical component repair processes, as well as the technical documentation storage center, and various small laboratories in self-contained structures installed inside on the ground floor. The second floor of the building is used for electronics repair. A currently active, CAA SWMU is located north of the building. This SWMU is identified in the RFA as S-17, and in FMD as K0098-01. The SWMU consists of a 5' X 10' X 8' high, roofed, steel cage that incorporates a 115-gallon steel secondary containment pan. The start date of dangerous waste management operations in Building 98 is December 1989. The SWMU is currently active.

Building 105 is divided into three sections. The south section consists of two floors, the upper floor has always been used for office space. The lower floor of the south section and part of the middle section were used for mechanical component refurbishment until 1992. The north end of the building, and the middle section after 1998, were used to store supplies for shop processes throughout Keyport. Two roofed, 5' X 10' X 8' high steel cages with grated floors were located over a concrete 440-gallon secondary containment west of the middle portion of the building. These two CAA SWMUs are identified as S-18 and S-19 in the RFA, as 105N and 105S in the SWMU data sheets. The start date of dangerous waste management operations in Building 105 is December 1989. In June of 1990, the dangerous wastes stored at this location were consolidated with S-11 and S-12, and the S-18 and S-19 cages were removed.

Building 106 was a Mechanical Test Facility. A CAA SWMU was located southwest of Building 106. The SWMU is identified in FMD as K0106-05. The SWMU was closed and removed in March of 1999. The south portion of Building 106 contained a pressure vessel used to perform operational (at-depth) tests on functional components. Several mechanical component test stands were also located throughout the rest of the building. Otto Fuel II spills that occurred during component testing were collected on the concrete, epoxy-sealed floor, and washed into trenches that directed the contaminated wastewater into two sumps located outside the northwest corner of the building, identified in FMD as K0106-105, and southeast corner of the building, identified in FMD as K0106-108. Whenever an engine test was completed, water from the pressure vessel, contaminated with Otto-Fuel II and combustion by-products generated during the engine testing, was washed into these trenches and sumps. Wastewater from the sumps was pumped to a 1000-gallon concrete underground tank, identified in FMD as K0106-101, where it was stored until shipped off-site. In November 1989, the use of the 1000-gallon concrete tank was discontinued, and it was replaced with a 600-gallon plastic tank, identified in FMD as K0106-103, located in a roofed, epoxy-sealed, 660-gallon concrete secondary containment, identified in FMD as K0106-104. The plastic tank was provided with a high level alarm. At this same time, most of the component test stands were provided with dedicated secondary containment. Because providing secondary containment in the test stand was not possible, the practice of draining the contaminated pressure vessel water to a trench and sump continued, but spill cleanups took place immediately after each engine test. This waste water was pumped from the K0106-108 sump to the K0106-103 tank, using secondarily contained, aboveground piping. At the same time a new, 1500-gallon steel tank, identified the RFA as S-20, and in FMD as K106-102, was installed in a concrete secondary containment to collect cyanide-contaminated wastewaters from the engine test afterburner and the pressure vessel. In 1991, the site was sampled extensively as part of the RI/FS study (Area 3 of Operable Unit 2), and was found to be uncontaminated (ROD of September 1994, paragraph 8.3, page 79). In December 1996, the 1000-gallon underground tank (K0106-101) was removed along with several aboveground product tanks and unused underground tanks as part of the Building 40 and 820 tank removals. Because the site was proven clean during the CERCLA RI/FS process, a closure report was not produced. The remaining tanks and sumps (K0106-102, K0106-103, K0106-104, K0106-105 and K0106-108) have been cleaned in preparation for final closure and removal.

Building 110 was constructed as a soil-covered concrete munitions storage bunker. After NUWC stopped storing munitions, the building was converted to a carpenters paint shop. A CAA SWMU was located inside the southwest portion of the building, identified in the RFA as S-21. This SWMU consisted of a 5' X 5' X 8' high galvanized cage with chain link sides, a metal roof, and a grate floor over steel 115-gallon secondary containment. Because the SWMU was removed before FMD was created, there is no start or end date associated with this location.

Building 115 was also constructed as a soil-covered concrete munitions bunker. Beginning in 1989, the building was used to store spent lithium boilers. The entire building was identified in the RFA as SWMU S-22. When Building 115 was filled to capacity, spent lithium boilers were also stored in Buildings 116 and 117. These two buildings were also soil-covered concrete munitions bunkers. Dangerous waste storage in the bunkers was discontinued in 1996. All three buildings were RCRA clean-closed by May 1998, and a copy of the report was submitted to Ecology Northwest Regional Office.

Building 134 was the photo shop since 1967. Photolab wastes including developers, hypo solutions, stop baths and the associated silver salts were discharged directly from dedicated sinks to a 1250-gallon single walled concrete wastewater collection tank north of the building. This tank is identified in the RFA as S-23, and in FMD as K0134-101. All floor drains were also connected to this tank through single walled piping. Wastewater from this tank was pumped through single walled piping to a concrete wastewater collection tank between the north end of buildings 38 and 233, identified in the RFA as S-6 and in FMD as K0038-103, and from there to the IWTP. In April 1994, all piping from the Building 38 sumps to the K0038-103 tank and from there to the IWTP was replaced with double walled, interstitially monitored piping, and a plastic liner with monitored interstitial space was installed in the K0038-103 tank. The single walled pipe from K0134-101 was connected to the double wall pipe at the northwest corner of Building 38. Use of the tank was discontinued in May 2001, and the tank was closed and filled with CDF. Some contamination discovered during closure sampling was left in place in the soil adjacent to the tank because removal would endanger nearby building foundations due to the depth and proximity of the contamination. A closure report was submitted to Ecology Northwest Regional Office.

Building 181 was used to store hazardous materials for the plating facility in Building 72, the Plating Plant. From 1936 to 1982 the NUWC Keyport steam plant used Bunker C oil for station steam generation. The Bunker C oil was stored in two adjoining concrete underground storage tanks. In 1982, the steam plant was converted from bunker C to natural gas, and fuel oil was used for a backup source. After the Bunker C fuel was removed from the north and south portions of the underground concrete tank, the north portion of the concrete underground storage tank was converted to secondary containment for the hazardous materials stored in Building 181. At this same time, the south portion of the concrete underground storage tank was converted to secondary containment for two 50,000-gallon steel aboveground fuel oil reserve tanks. Both of these secondary containments are identified in FMD as K0181-101. In 1998, both fuel oil reserve tanks, Building 181, and both concrete underground storage tanks were removed as part of a CERCLA remedial action.

Building 205 was the Navy Exchange Gas and Service Station. The building was constructed for that purpose in 1961. Three underground gasoline storage tanks were located west of the building, one 10,000-gallon capacity and two 6,000-gallon capacity. A 500-gallon underground waste oil tank was located southwest of the building. In October 1989 the three product tanks were tightness tested. Because all three tanks failed tightness testing, the decision was made to close and remediate the site. Because Service Station operations ceased prior to the implementation of FMD, there are no tank or waste sites associated with the Service Station operations at site in FMD. The site was not addressed in the RFA. All three gasoline tanks and the waste oil tank were removed in November 1990, and the site was over-excavated and sampled until all samples tested below MTCA levels. A copy of the final report on the soil excavation including sample results was submitted to Ecology Northwest Regional Office. Subsequent to Service Station Operations, the building was used for an onsite office by the Base Operations Services Contractor (BOSC). A CAA SWMU, identified in FMD as K0205-01, was set up to store dangerous wastes generated by the BOSC during building maintenance processes. The site was closed in April 2004 when the BOSC consolidated operations at Bangor.

Building 206 has housed the Weapons Quality Evaluation Center, the Failure Analysis Laboratory, the Chemical Testing Laboratory, the Metrology Laboratory, and a Model Shop. An active CAA SWMU, identified in the RFA as S-24, and in FMD as K0206-01, is located outside the northeast corner of the building. The SWMU consists of a 10' X 5' X 8' high, roofed, steel cage that incorporates a 220-gallon steel secondary containment pan. The start date of dangerous waste management operations in Building 206 is December 1989.

Building 233 is a production machine shop. Originally, two metal 4' X 4' X 4" pallets were located on a concrete base with no secondary containment or berm under a large patio roof at the south end of the building. This SWMU is identified in the RFA as S-25, and in FMD as K0233-02. The start date of dangerous waste management operations in Building 233 is December 1989. The SWMU was moved inside Building 233 and provided with secondary containment in October 2002, and is currently active in that location.

Building 478 was originally used to perform maintenance activities. Those functions were moved to Buildings 489 and 514 in 1968 and 1973 respectively. Since then, the building has been used as office space, Maintenance Training Center, and many special projects. A 10' X 5' X 8' high, steel roofed cage was located on a concrete slab outside the southwest corner of Building 478. There was no secondary containment or berm for this unit. This CAA SWMU was identified in the RFA as S-26, and was removed in February 1992. Three 1350-gallon concrete dangerous waste collection tanks were installed outside the southwest and northwest corners of Building 478, and just outside the west wall halfway between the northwest and southwest tanks. These tanks are identified in the RFA as A-4, and in FMD as K0478-101, K0478-103, and K0478-102, respectively. A trench system throughout the first floor of the building collected wastewaters generated during maintenance and drained it to the nearest tank. In the early seventies, the tanks and trenches were cleaned and coated with epoxy paint. Some of the trenches were filled in at this time and replaced with underground pipes. The tanks were also lined with steel plate, and covers were installed on the tanks to keep stormwater out. The tanks were cleaned and deactivated in the eighties. The northwest tank was temporarily reinstated in 1989 to receive halogenated washwater from the maintenance process. The tank was cleaned again in 1990. All three tanks were RCRA-closed and removed in 1998, and a copy of the report was submitted to Ecology Northwest Regional Office. Two steel, 550-gallon aboveground Otto Fuel II product tanks were installed in 1968 southwest of Building 478. These tanks are identified in the RFA as A-5, where they were incorrectly described as waste storage tanks instead of material storage tanks. Both tanks were removed in 1998. The start date of dangerous waste management operations in Building 478 is December 1966.

Building 489 is used for maintenance processes. A 6' X 8' X 14' high roofed steel cage is located outside the Building 489 east wall. This CAA SWMU is identified in the RFA as S-27, in FMD as K0489-03, and is currently active. A 1200-gallon underground concrete tank was installed east of Building 489 in support of maintenance processes. This tank collected Otto Fuel II wastewater generated inside Building 489 immediately adjacent to the tank, and is identified in the RFA as S-28, and in FMD as K0489-101. In 1988, the 1200-gallon concrete tank was cleaned and converted to secondary containment for a stainless steel 50-gallon transfer tank with interstitial monitoring. This smaller transfer tank is identified in FMD as K0489-102. Otto Fuel II wastewater was transferred from this tank to two 1500-gallon stainless steel, double walled, interstitially monitored aboveground tanks equipped with level indicators, high-level alarms and interstitial monitoring. These two wastewater tanks are identified in FMD as K0489-103 and K0489-104. In October 1999, all Otto Fuel II operations were consolidated in Building 514. As a result, the Otto Fuel II wastewater piping was removed from Building 489, and the 50-gallon tank and both 1500-gallon tanks were cleaned and triple rinsed. Final rinsewater was sampled and tested for contaminants of concern. A report with test results and a request to reclassify these tanks as hazardous material (Otto Fuel II) storage tanks was submitted to Ecology Northwest Regional Office. The start date of dangerous waste management operations in Building 489 is December 1968.

Building 514 is used for maintenance processes. A CAA SWMU is located northwest of Building 514. This currently active, roofed, fenced, secondarily contained SWMU is identified in the RFA as S-33 and in FMD as K0514-01. A second CAA SWMU was located in the post range flush room in the northwest corner of Building 514, identified in FMD as K0514-14. In October 1995, this SWMU was combined with K0514-01. A concrete underground tank was installed in fenced area northwest of the building in support of maintenance processes. This tank was first used to collect all Otto Fuel II-contaminated wastewaters, and was identified in the RFA as S-29, and in FMD as K0514-104. From 1989 to 1992, a series of upgrades were installed that provided for Otto Fuel II recycling and waste water separation. The seawater and Otto Fuel II mixture from the Defueling process is now directed to a coalescing plate separator and a series of three double wall, stainless steel gravity separation tanks (K0514-101 and K0514-102 and K0514-103). Two of these tanks were installed in the concrete tank after it was decontaminated. Wastewater from the final separation tank at Building 514 is processed through two tanks that contain carbon to remove residual Otto Fuel II down to trace levels. These two tanks were identified in the RFA as S-32. Wastewater from these carbon columns is transferred to an underground concrete tank with a fiberglass liner identified in the RFA as S-31 and in FMD as K0514-106, and from there to the IWTP for final processing and testing before discharge to the sanitary sewer. Two other tanks store dangerous wastes at this location. One tank stores cyanide-contaminated wastewater, and is identified in the RFA as S-30, and in FMD as K0514-105. This is a double-walled stainless steel tank with interstitial monitoring and high level alarms, and is currently active. The other tank stored alcohol contaminated with Otto Fuel II, and is identified in the RFA as S-34, and in FMD as K0514-107. In 1998 this tank was RCRA cleaned and disposed of through the TSDF, and was replaced with a currently active, stainless steel, double walled tank with interstitial monitoring and high level alarms, identified in FMD as K0514-108. The start date of dangerous waste management operations in Building 514 is December 1973.

Building 726 was used as a paint shop. A roofed, fenced cage with bermed concrete secondary containment was located south of the building to store waste paints, thinners and filters. This CAA SWMU was identified in the RFA as S-35, and in FMD as K0726-01. The start date of dangerous waste management operations in Building 726 is December 1989. The SWMU was removed in October 2002 when painting operations were consolidated in Building 84. The start date of dangerous waste management operations in Building 726 is March 1991.

Building 790 was used to process Otto Fuel II before the upgraded system was constructed in Building 514 from 1989 to1992. Otto Fuel II and seawater from the defueling process was offloaded into a series of aboveground process tanks for separating the Otto Fuel from the seawater. Reusable Otto fuel II was drained to an underground tank, from which it was pumped and transported to Building 514 to be used as 'B' grade fuel. Seawater was siphoned off the top and transported to the IWTP for further treatment and testing prior to disposal to the sanitary sewer. After the Otto Fuel II reclamation process was moved to Building 514, the aboveground tanks were removed and the underground tank was used to store Otto Fuel II wastewater prior to shipment offsite. This underground tank was identified in the RFA as A-6, and was removed in December 1993. A copy of this report was submitted to Ecology Northwest Regional Office. A CAA SWMU was located under the canopy roof in the west bay to store Otto Fuel II-contaminated drum liners, rags and PPE. This SWMU was identified in FMD as K0790-01, and it was also removed in December 1993. The start date of dangerous waste management operations in Building 790 is December 1974.

Building 804 was used to store the reserve fuel oil for the Station steam plant. From 1936 to 1982 Bunker C oil, used for station steam generation, was stored in two adjoining concrete underground storage tanks. In 1982, the steam plant was converted from bunker C to natural gas, and fuel oil was used for a backup source. After the Bunker C oil was removed from the north and south portions of the concrete underground storage tank, the south portion was cleaned and converted to secondary containment for two new 50,000 gallon steel aboveground fuel oil storage tanks. These two tanks are identified in the RFA as A-7. In 1998, both fuel oil reserve tanks, and both concrete underground secondary containments were removed as part of a CERCLA remedial action.

Building 820 has been used for container refurbishment, the Station Decontamination Facility, and many special projects. A CAA SWMU, identified in the RFA as S-40 and in FMD as K0820-01, is located outside the northeast corner of the building. The SWMU consists of a 10' X 5' X 8' high, roofed, steel cage that incorporates a 220-gallon steel secondary containment pan, and was used to store wastes generated by the container refurbishment process. The SWMU was removed in November 1995 when the container refurbishment process was relocated to Building 38. A 2000 gallon underground storage tank was used to store waste oil from the container refurbishment process. This tank was identified in the RFA as A-8, and was removed in December 1996. Copies of the Buildings 40 and 820 Soil and Groundwater Investigation Report, and the Building 40 and Building 820 UST Decommissioning and Site Assessment Report was submitted to Ecology Northwest Regional Office. The south end of Building 820 was used as the Station Decontamination Facility. A system of epoxy-coated trenches were installed inside the building for collecting contaminated wastewater generated during decontamination. These interior trenches were identified in the RFA as S-36. The trenches drained to an epoxy-coated concrete sump located in a fenced area under a canopy roof outside the southeast corner of Building 820. This sump is identified in the RFA as S-37 and in FMD as K0820-109. Wastewater collected in the sump was transferred to two steel 3000 gallon aboveground storage tanks located on a steel grate above the sump. These tanks were identified in the RFA as S-38 and in FMD as K0820-106 and K0820-107. The trenches inside the building and the sump were never contaminated because decontamination processes were always carried out on counters and in sinks that drained directly to the tanks outside. The floor was only used as spill containment, and was cleaned after each decontamination process was completed. The tanks were used as CAA dangerous waste SWMUs. Both tanks were cleaned in September 2006 in preparation for an integrity inspection. The access hatches at the bottom of the tanks were left off after the tank integrity inspection, and the pumps to the tanks were secured. The site is presently under consideration for closure. If the decision is made to close the tanks, a decommissioning report and site assessment will be filed upon completion of the closure action. The fenced, roofed area over the raised grated floor of the sump was also used to store drums of wastes generated as part of the decontamination process (contaminated rags, wipes, PPE, debris). This CAA SWMU was identified in the RFA as S-41 and in FMD as K0820-02, and was removed in November 1995. Three tanks were installed along the east wall of Building 820 to store chromic acid wastewater generated as part of the container refurbishment process. The tanks were 300 gallon, steel cage-enclosed plastic portable 'Tuff' tanks (see appendix D9) that were set on 330-gallon aluminum secondary containments, and were equipped with high level and leak alarms. These tanks were identified in the RFA as S-39 and in FMD as K0820-01, K0820-02, and K0820-03. Chromic acid wastewater collected in the tanks was transported with a forklift to the TSDF for pretreatment (chrome reduction), and subsequent to that to the IWTP for final treatment, testing and disposal to the sanitary sewer. All three tanks were removed in November 1995. One of the tanks has been relocated to Building 82 where it is an active CAA SWMU, identified in FMD as K0082-105, another of the tanks has been relocated to Building 84, where it is an active CAA SWMU, identified in FMD as K0084-105. The third tank has been cleaned and incorporated into the TSDF portable tank inventory. The start date of dangerous waste management operations in Building 820 is December 1976.

Building 824 was used for facilities maintenance support functions (staging, machining, welding, metal forming, etc). A currently active CAA SWMU, identified in the RFA as S-42, and in FMD as K0824-01, is located outside the west end of the building. The SWMU consists of a 6' X 8' X 10' high steel fenced, roofed cage with a curbed, epoxied concrete floor. The start date of dangerous waste management operations in Building 824 is March 1990.

Building 825 is the IWTP, a currently active permit-by-rule facility. The facility is laid out with four separated secondary containment areas. Two 6000 gallon caustic receiving and reactor tanks, identified in the RFA as S-43 and S-44, and in FMD as K0825-101 and K0825-107 respectively, are located in the caustic secondary containment area, identified in the RFA as S-52. Two 40,000 gallon acid receiving and reactor tanks, identified in the RFA as S-45 and S-46, and in FMD as K0825-105 and K0825-108 respectively, are located in the acid secondary containment area identified in the RFA as S-51. A 50,000 gallon intermediate storage tank, identified in the RFA as S-47 and in FMD as K0825-110, a 1500 gallon sludge storage tank, identified in the RFA as S-49 and in FMD as K0825-113, and two 17,000 gallon clearwater storage tanks, identified in the RFA as S-50 and in FMD as K0825-114 are located in the neutral secondary containment area identified in the RFA as S-53. Four 1200 gallon sandfilter tanks, identified in the RFA as S-48 and in FMD as K08252-112 are located inside the building. An active CAA SWMU, identified in the RFA as S-54 and in FMD as K0825-01, is located inside the south-central part of the building and consists of several pallets used to store drums of dewatered sludge. The start date of dangerous waste management operations in Building 825 is December 1982.

Building 893 is used as the Supply Receiving building. A currently active, CAA SWMU, identified in the RFA as S-55, and in FMD as K0893-01, is located inside the east bay of the building. The SWMU consists of a steel fenced cage on a concrete floor. The start date of dangerous waste management operations in Building 893 is December 1989.

Building 894 was used as the Maintenance building. A CAA SWMU, identified in the RFA as S-56 and in FMD as K0894-01, was located outside the northwest corner of the building, within the fenced general storage yard. This SWMU consisted of a 5' X 5' X 8' high prefabricated, roofed, fenced steel cage with grated floor and a secondary containment pan. This site was removed in September 2002 when the refurbishment process was consolidated into Buildings 489 and 514, and the building was leased by Raytheon to facilitate the refurbishment of components. A new, currently active site was opened up inside the northwest corner of the building by Raytheon upon occupancy. This new site retained the original K0894-01 SWMU number in FMD. Another CAA SWMU, identified in the RFA as S-57, was located north of the building, also in the fenced general storage yard. This unit consisted of a plastic clamshell with built-in secondary containment. This SWMU was removed in September 2002 upon turnover of the building to Raytheon. An underground, steel 55 gallon storage tank in an epoxy-coated concrete secondary containment, identified in the RFA as A-9 and in FMD as K0894-101, was located under a canopy on the north side of the building within the fenced general storage yard. The tank was originally installed to receive halogenated washwater, but was never used because the wastewater was pumped to K0894-102 instead, as discussed below. In September 2002 the steel tank was removed and the secondary containment was filled with CDF. Because the tank was never used, the site was not sampled and a report was not generated. A CAA portable 330 gallon plastic tank in a steel wire frame was placed on a secondary containment pan north of Building 894 in the fenced general storage yard, identified in the RFA as S-58, and in FMD as K0894-102. This tank received the halogenated washwater. In September 2002 this tank was removed and replaced with a double wall 300 gallon plastic tank in the same location as part of the turnover of the facility to Raytheon. This currently active CAA tank retained the same K0894-102 number in FMD. The tank receives wastewater from a circuit board washer. The tank contents are sampled and transported to the IWTP for further treatment and disposal to the sanitary sewer after testing. The start date of dangerous waste management operations in Building 894 is December 1989.

Building 940 was one of the component acceptance test facilities. A CAA SWMU was located east of the building, identified in the RFA as S-59, and in FMD as K0940-02. The SWMU consisted of two 4’ X 4’ steel pallets placed on a concrete slab. There was no cover, fencing or secondary containment associated with the unit. The SWMU was removed in December 1998 as part of the consolidation of component acceptance test facilities. Current processes in the building do no require a CAA SWMU. The start date of dangerous waste management operations in Building 940 is March 1989.

Building 1013 was the Auto Hobby Shop. A CAA SWMU was located outside the south end of the building, identified in the RFA as S-60, and in FMD as K1013-01. The unit consisted of a locked, fully enclosed steel cabinet with a built-in secondary containment pan. The SWMU was removed in August 2000 when the Keyport Auto Hobby Shop was consolidated with the auto hobby shop located at Bangor Subase. A CAA 125 gallon steel UST was located east of the building, identified in FMD as K1013-101. The tank received used oil. The tank was removed under the UST program in August 1998. A copy of the UST decommissioning report and site assessment was submitted to Ecology Northwest Regional Office. The start date of dangerous waste management operations in Building 1013 is March 1989.

Building 1019 was the precious metals plating plant. The entire Building 72/1019 complex was removed and the site was remediated under the CERCLA program. Site remediation was completed in March 1999.

Building 1058 is the Plating Plant. A CAA SWMU, identified in FMD as K1058-06, was located inside along the east wall of the dark room. The site was a designated storage area inside the building without secondary containment. The site was removed in February 2003. The start date of dangerous waste management operations in Building 1058 is 1998. Currently, the Plating Plant is scheduled to be shut down. The only active SWMU, K1058-05 will be ‘clean closed' as part of this action, and a report submitted to Ecology Northwest Regional Office. All process tanks, wastewater collection tanks and associated piping will be cleaned and triple rinsed prior to disposal.

E1.2 Releases

No known or suspected significant releases of dangerous waste and/or dangerous constituents at or from solid waste management units at the TSD Facility.

Non-TSD Facility documented locations where contamination greater than MTCA method A-allowable levels was left behind as part of a RCRA site 'clean closure' are the Building 84 Paint Stripping wastewater sump, identified in the RFA as S-15 and in FMD as K0084-101 and the Building 134 Photo Lab wastewater sump, identified in the RFA as S-23 and in FMD as K0134-101. See descriptions under E1.1 Solid Waste Management Units above for descriptions of the locations and wastes managed at these locations. Documentation of the contaminants and concentrations have been submitted to Ecology Northwest Regional Office.

Any contamination treated or managed under the CERCLA program is not addressed in this document.

E2. Corrective Actions Implemented

No corrective actions have been required or implemented at the TSD Facility.

Non-TSD Facility corrective actions implemented to date are described under Section E1.1 Solid Waste Management Units, above.

The following actions remain to be implemented:

1. Building 106 (Torpedo Mechanical Test Facility) clean closure of tanks K0106-102, K0106-103, K0106-104, K0106-105 and K0106-108.

2. Building 820 (Decontamination Facility) clean closure of tanks K0820-106 and K0820-107, should NUWC elect to close those tanks.

APPENDIX E1

TOPOGRAPHIC MAP
AND
SWMU LOCATIONS

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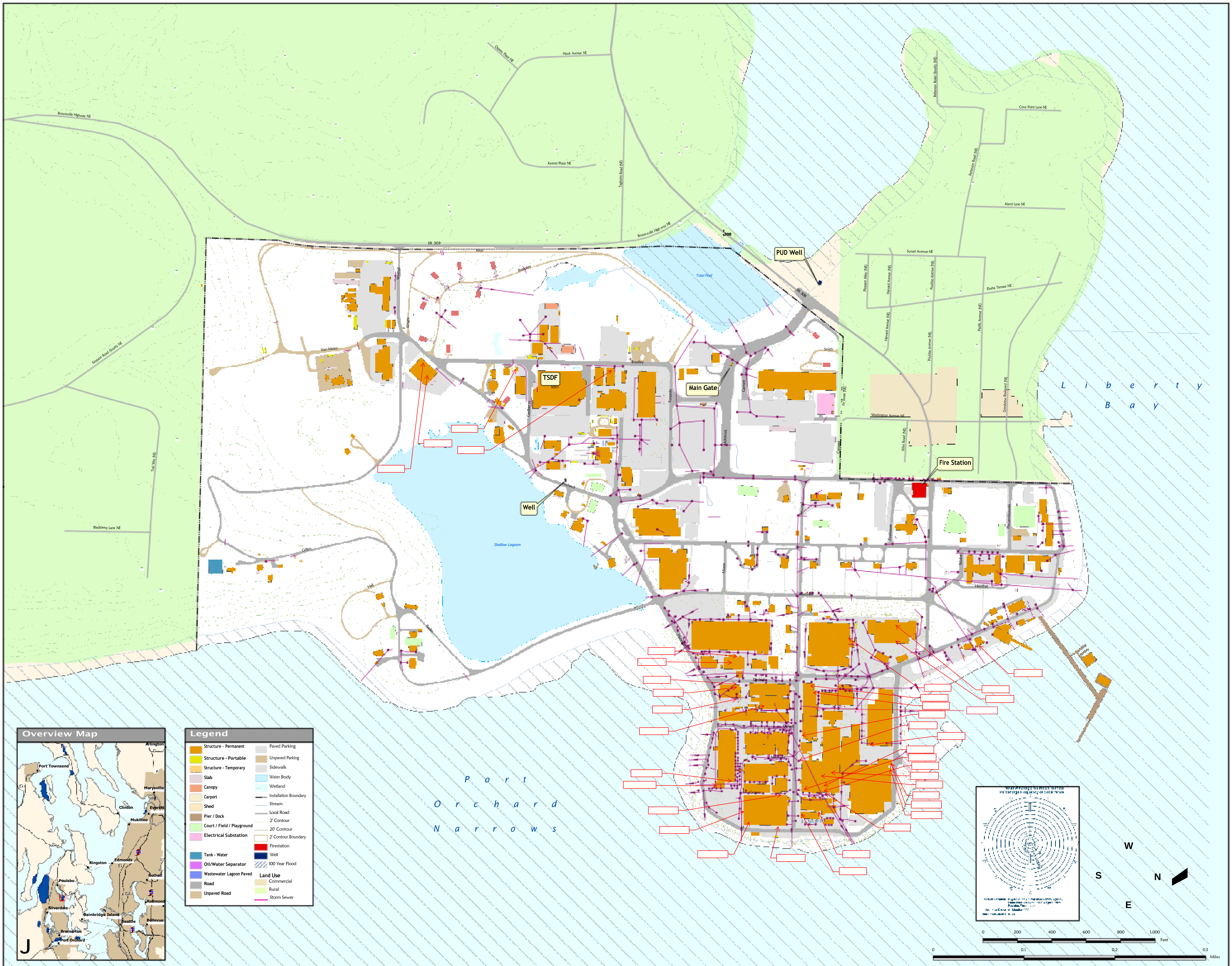

Pacific NW

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SCALE
1 in = 200 ft

SIZE
37 in x 32 in

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DEPARTMENT OF THE NAVY

NAVY REGION NORTHWEST

TITLE

NBK KEYPORT INSTALLATION TOPOGRAPHIC MAP

RSIMS DOCUMENT NUMBER
09 - KP - xxxxx

PRINT DATE
15 FEB 2017

PROJECTION
STATE PLANE, WA NORTH ZONE, DATUM NAD 83, FEET

Naval Undersea Warfare Center Division, Keyport

APPENDIX E2

FACILITY SWMU LOCATIONS

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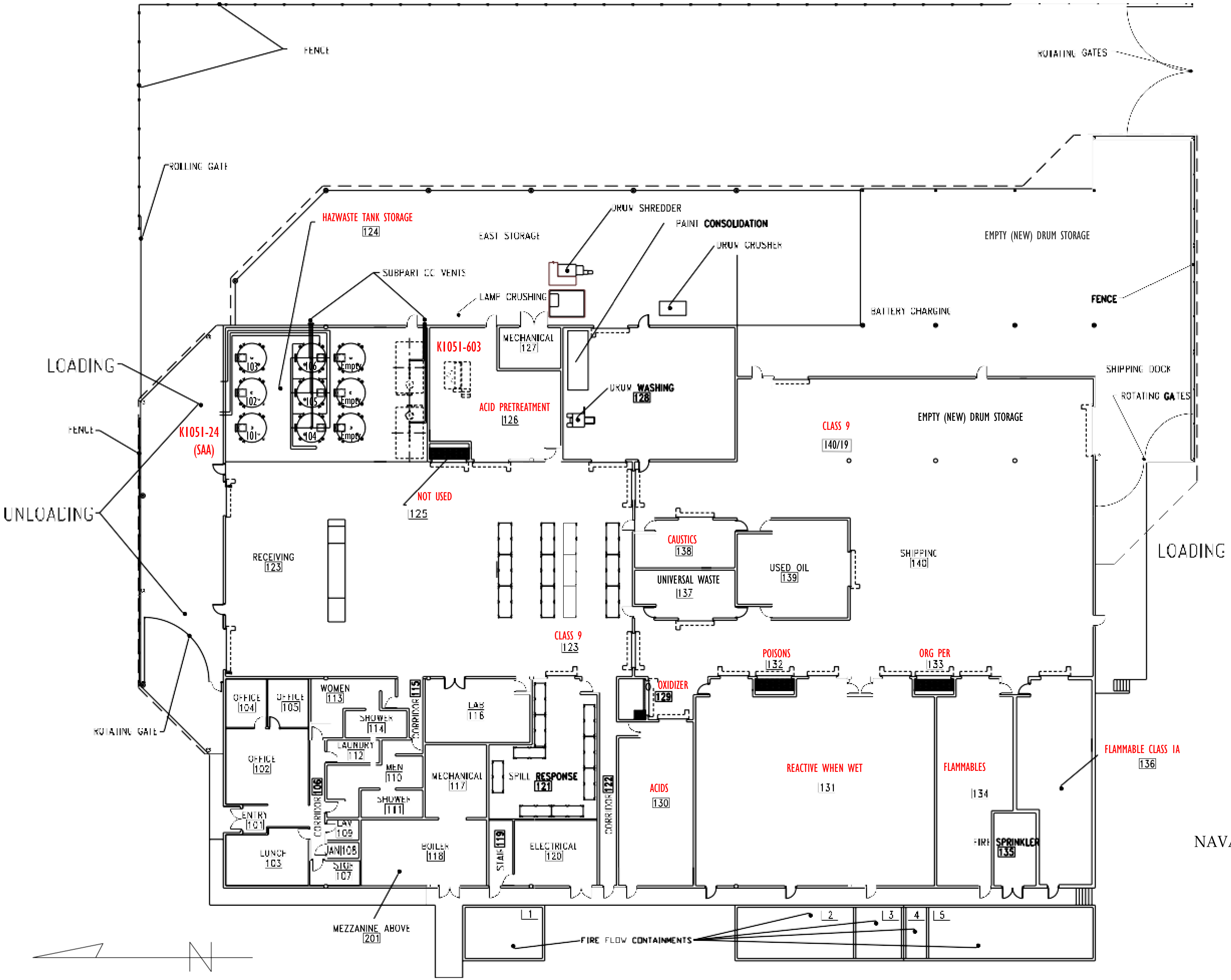

NAVAL UNDERSEA WARFARE CENTER DIVISION
KEYPORT, WA

BUILDING 1051

TSD FACILITY

SWMU LOCATIONS

SECTION F

PROCEDURES TO PREVENT HAZARDS

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APPENDICES

F1. SECURITY
WAC 173-303-310; -806(4)(a)(iv)

F1.1 SECURITY PROCEDURES AND EQUIPMENT
WAC 173-303-310(2); -806(4)(a)(iv)

F1.1.1 WARNING SIGNS

‘DANGER-UNAUTHORIZED PERSONNEL KEEP OUT” signs are posted where an immediate hazard exists, every 100 feet along the fence, and at all entrances to the TSD Facility. These signs are of sufficient size to be readable at 25 feet. Caution signs are also used to warn against potential hazards. Sign colors are chosen for the particular lighting type.

F1.1.2 24-HOUR SURVEILLANCE SYSTEM

NBK Keyport is a secure military installation, where access is restricted to authorized personnel only. Security is maintained by a military force which patrols the installation 24/7 and routinely inspects the perimeter fence as well as the Treatment and Storage and Disposal Facility (TSD) Facility site. NBK Keyport is surrounded by an eight-foot high chain link fence topped with razor wire. Perimeter lighting surrounds the installation and the TSD Facility site during hours of darkness.

The TSD Facility is located within the NBK Keyport fence line and is not related to any civilian structure or property outside the installation boundary. The TSD Facility itself has an eight-foot high chain link security fence on the east side of the asphalt truck area. From the north end of the parking lot, the fence is extended to the west edge of the truck loading/unloading area. From the south end of the parking lot, the fencing is extended to the truck dock on the south side of the building. Truck gates are provided at the south end of the parking lot and at the north concrete apron. See Part A, Attachment B (TSD Facility General Layout Drawing) for a drawing showing all TSD Facility fences and gates. Doors on the south and west side of the TSD Facility (not within the TSD Facility fence line) that access the waste storage areas remain locked at all times. Additionally, during non-operational hours, the TSD Facility gates and access doors are closed and locked.

All traffic enters NBK Keyport through guarded security gates. No individual is allowed to enter the installation without first obtaining a clearance pass. Color-coded badges are worn by all personnel for quick identification. Upon arrival at the TSD Facility, visitors are required to log in, and log out when departing.

F1.2 WAIVER
WAC-173-303-310(1); -806(4)(a)(iv)

The TSD Facility does not operate under a security waiver.

F2. INSPECTION PLAN

WAC 173-303-320; -340; -806(4)(a)(v)

A qualified Waste Handler or the Dangerous Waste Program Manager will inspect the TSD Facility to ensure that releases do not occur or cause a threat to human health or the environment. This section identifies all monitoring equipment, safety and emergency equipment, security devices, and operating and structural portions of the TSD Facility to be inspected and the periodicity of these inspections. Results of the inspections and associated dates of remedy implementation will be recorded on the inspection checklists and discrepancy logs kept in the operating record at the TSD Facility.

F2.1 GENERAL INSPECTION REQUIREMENTS

WAC 173-303-320(1), (2)(a), (b) and (c); -340(1)(d); -806(4)(a)(v)

Specific items inspected include containers, secondary containment systems, sumps, tanks, pumps, couplings and valves, tank monitoring equipment, level and pressure gauges, pressure relief devices, leak detectors, sampling ports, and overfill alarms or indicators.

All equipment identified in appendix D11 (Subpart BB Equipment Details) will be monitored as set forth in section F2.6.2 Equipment Leaks.

Safety equipment inspected includes personnel protective equipment such as self-contained breathing apparatus, facemasks or shields, gloves, aprons, and decontamination suits.

Emergency response equipment inspected includes spill control and decontamination equipment, fire extinguishers, and the fire alarm system.

Security devices and communications equipment inspected includes locks, perimeter fence and gates, telephones, and intercoms.

Forklifts are checked before and after each use. A Material Handling Equipment (MHE) checklist (see appendix F1, Inspection Checklists) is attached to each forklift with an inspector signoff and date block. Vac-truck pumps, hoses and fittings are also checked for damage, wear and leaks before each use.

Types of problems to be identified during these inspections will include signs of waste releases i.e., wet spots and stains from leaking valves, couplings, fittings or flanges, hose connections, pumps, pump seals, containers, drums, and tanks. In addition, the covered containment sumps are checked to ensure they are free of liquids and debris.

Accessibility, condition, suitability, and quantity of safety equipment and emergency response equipment are verified.

Example inspection checklists in appendix F1 (Inspection Checklists) provide additional details on aspects of the facility that are specifically inspected. Inspections take place on a daily, weekly, monthly, quarterly, annually, five year or fifteen year schedule as outlined in appendix F2 (Inspection Schedule). Frequency of inspection is based upon the area, system, subsystem, equipment, device, or waste handling procedure requiring inspection. Inspection results are entered on specific Inspection Checklists for each periodicity and are signed and dated by the inspector.

The Inspection Schedule, and blank and completed Inspection Checklists, are kept in the TSD Facility office. The completed checklists are retained at the TSD Facility for a minimum of five years.

TSD Facility inspections are conducted by a qualified Waste Handler or the Dangerous Waste Program Manager trained in accordance with Section H (Personnel Training).

F2.2 INSPECTION LOG

WAC 173-303-320(2)(d)

The Inspection Checklists include the printed name and signature of the inspector, date and time of inspection, and a note field for observations. The date and nature of any repairs or remedial actions taken are entered into a separate Discrepancy Log. An account of spills and discharges is maintained in the Incident Record. Inspection checklists are filed by frequency and the Discrepancy Logs are filed by date. The Incident Record is kept in the Dangerous Waste Program Manager's office. Inspection Checklists and Discrepancy Logs are reviewed and signed by the Dangerous Waste Program Manager or alternate Dangerous Waste Program Manager on the day they are conducted.

F2.3 SCHEDULE FOR REMEDIAL ACTION FOR PROBLEMS REVEALED

WAC 173-303-320(3)

Any malfunction or deterioration observed during these inspections is remedied immediately or as soon as possible, depending on the severity of the conditions or problem. Expedience of remedial actions will be based on possible deterioration of equipment, probability and severity of adverse impact on human health and the environment, and availability of supplies. Actions will be taken to bring problems that could cause harm to human health or the environment under immediate control, or the affected area will be isolated from waste management activities until the problem is resolved.

The Dangerous Waste Program Manager is responsible for taking corrective actions, scheduling repairs, and directing resources to remedial actions.

F2.4 SPECIFIC PROCESS OR WASTE TYPE INSPECTION REQUIREMENTS

WAC 173-303-320(2)(c) & (3); -630(3) & (6); -806(4)(a)(v)

F2.4.1 CONTAINER INSPECTIONS AND REMEDIAL REQUIREMENTS

F2.4.1.1 CONTAINER – INSPECTIONS

Containers or drums in waste staging and storage areas are inspected each operating day (i.e., Monday – Friday, except holidays) in all areas or rooms of the TSD Facility per the checklists in appendix F1 (Inspection Checklists). Containers and drums are checked for leaks, spills, accumulation of liquids in sumps, deterioration caused by corrosion, or other factors. The aisle spacing and maximum capacities of the areas or rooms is also checked to ensure unobstructed movement of personnel, handling equipment, and spill control or fire fighting equipment as required. The labels on the containers and drums are checked to ensure visibility, legibility, compatibility with storage area and other wastes, and storage dates as required by regulation.

All areas or rooms of the TSD Facility are inspected weekly as per the checklists in appendix F1 (Inspection Checklists). These inspections look for deterioration of the secondary containment system, cracks in the chemically-resistant coating of the floor and the foundations, or deterioration of the coating and/or sealants, and for dirt or other materials preventing inspection of protective coatings or foundations.

F2.4.1.2 CONTAINER – CORRECTIVE ACTIONS

If a container is found to be damaged, deteriorated, or leaking, it will immediately be placed in an overpack/salvage drum Any leaked or spilled waste will immediately be cleaned up as set forth in Section G (Contingency Plan). Labeling, aisle spacing and compatibility issues will be corrected immediately. Container dates more than 270 days from login date will be noted in the record to alert the TSD Facility that the 1 year storage limit is approaching.

Problems with secondary containments such as cracks or deteriorated sealers will be submitted for repair within 5 working days from entry on the inspection checklist, and repairs will be completed within 90 days from the date the problem was noted on the Inspection Checklist. Repairs not completed within 90 days will be noted in the Incident Record. However, if a problem poses an immediate threat to human health or the environment, the area will be isolated from waste activity until the repair is made. Examples of this type of problem are structural cracks in the concrete that are greater than 0.01 inches wide and a breach of secondary containment due to seismic activity.

Spilled dangerous wastes collected in blind sumps and grate-covered trenches are removed immediately upon detection.

F2.4.2 TANK SYSTEM INSPECTIONS, ASSESSMENTS, AND CORRECTIVE ACTIONS

WAC 173-303-640(6), (7); -806(4)(a)(v)

F2.4.2.1 TANK SYSTEMS – INSPECTIONS

WAC 173-303-640(6); -806(4)(a)(v)

The tank area, room 124, is inspected daily for leaks from all piping, hoses, and hose connections; and the tank level indicator panel is monitored for proper operating indications. The secondary containment system is inspected daily for evidence of deterioration and/or releases of dangerous waste. The piping and tank structures are inspected daily for corrosion, and the tank foundations are checked daily for structural integrity. In this case, daily includes weekends and holidays as long as the tank in question contains waste.

F2.4.2.2 TANK SYSTEMS – INTEGRITY ASSESSMENTS
WAC 173-303-640(2), (3); -806(4)(a)(v)

All active tanks and ancillary equipment will undergo an internal and external integrity inspection every five years. The tanks and all equipment will be evaluated for corrosion, erosion, cracks, leaks, pitting, and wall thinning. Results of the integrity assessment are reported for each individual tank and are certified by an independent, qualified, registered Professional Engineer (PE). The inspection will be performed in compliance with OSHA requirements. If the independent assessment indicates that a tank requires modifications or repair, the tank may continue to be operated if the certifying engineer grants a conditional certification until it can be upgraded as required before a full certification is issued. If the conditional certification requires special operating conditions and/or a repair schedule, the tank will be operated and repaired in compliance with the conditions and schedule. If any conditions or the repair schedule cannot be met, Ecology will be notified and the tank will be taken out of service until the conditions and repair schedule can be met. The certified assessment report and accompanying certification is maintained at the TSD Facility, see Appendix D9 for details. Tank Integrity schedule is located in Appendix F2 (Inspection Schedule).

F2.4.2.3 TANK SYSTEMS – CORRECTIVE ACTIONS
WAC 173-303-640(7); -806(4)(a)(v)

Should leakage or spillage from the tank system occur because of substandard conditions as described in WAC 173-303-640 (7), tank system operations will cease immediately and all visible releases to the environment will be contained. Removal of waste from the tank system or secondary containment system will take place within 24 hours. Notification and reporting procedures are discussed in Section G (Contingency Plan).

Problems with secondary containments such as cracks or deteriorated sealers will be submitted for repair within 5 working days from entry on the inspection checklist, and repairs will be completed within 90 days from the date the problem was noted on the Inspection Checklist. Repairs not completed within 90 days will be noted in the Incident Record. However, if a problem poses an immediate threat to human health or the environment, the area will be isolated from waste activity until the repair is made. For major repairs, certification must be submitted to the department within seven days after returning the tank system to use per –640(7). Examples of this type of problem are structural cracks in the concrete that are greater than 0.01 inches wide and a breach of secondary containment due to seismic activity.

Should the independent assessment indicate that the tank requires modifications or repair; the tanks will be upgraded as required before a certification is issued and Ecology notified.

If leakage or spillage from the tank system is due to an error or accident during tank operations such as filling, recirculating/sampling, or draining, the spill will be cleaned up as set forth in

Section G (Contingency Plan), the associated procedure will be reviewed and updated if required, and personnel training will be implemented to prevent recurrence of the incident.

F2.5 STORAGE OF IGNITABLE OR REACTIVE WASTES

WAC 173-303-395(1)(d); -806(4)(a)(v)

The Dangerous Waste Program Manager will inspect all areas where ignitable or reactive wastes are stored at least annually. The Dangerous Waste Program Manager will either be familiar with the International Fire Code or the inspection will be carried out in the presence of a professional individual who is familiar with the International Fire Code.

The TSD Facility Annual Inspection Checklist will contain the date and time of inspection, the name of the inspector and, if present, the name of the individual familiar with the Uniform Fire Code, a notation of the observations made, and any remedial actions which were taken as a result of the inspection.

Problems discovered during this inspection will be submitted for repair within 5 working days from entry on the inspection checklist, and repairs will be completed within 90 days from the date the problem was noted on the inspection checklist. Repairs not completed within 90 days will be noted in the Incident Record. However, if a problem poses an immediate threat to human health or the environment, the area will be isolated from waste activity until the repair is made. Also, repairs will meet schedules required by the inspector familiar with the Uniform Fire Code if those schedules are more aggressive than outlined above.

F2.6 AIR EMISSIONS CONTROL AND DETECTION – INSPECTIONS, MONITORING AND CORRECTIVE ACTIONS

WAC 173-303-690; -691; -692; -806(4)(a)(v)

F2.6.1 PROCESS VENTS

WAC 173-303-690; -806(4)(a)(v)

The intermediate and exhaust sample ports will be sampled for VOC using Method 21-compliant test equipment monthly to ensure the exhaust air VOC levels remain below 500 ppm.

F2.6.2 EQUIPMENT LEAKS

WAC 173-303-691; -806(4)(a)(v)

Section D, appendix D11 (Subpart BB Equipment Details) contains Subpart BB equipment descriptions, locations, details, and pictures of each component in-situ.

The method of compliance with the standards in 40 CFR 264.1052 through 1059 for all equipment at the TSD Facility is met through monthly monitoring using 40 CFR Part 60 Method 21-compliant monitoring equipment, and documented in the operating record pursuant to WAC 173-303-691(2) and 40 CFR 264.1064(b)(1)(vi).

F2.6.3 TANKS AND CONTAINERS
WAC 173-303-692; 806(4)(a)(v)

A qualified Waste Handler or the Dangerous Waste Program Manager will inspect all dangerous waste storage tanks and containers daily.

The TSD Facility Inspection Checklist will contain the date and time of inspection, the name of the inspector and, and a notation of the observations made. Any remedial actions which were taken as a result of the inspection will be entered into the Discrepancy Log.

All tank closure devices including pressure-vacuum relief devices will be inspected annually to ensure each device is free from cracks, gaps, damaged seals and gaskets, broken or missing hatches, or any other defect.

All containers required to meet container level 1 and 2 controls will meet all applicable US Department of Transportation regulations, will be managed as set forth in Section D (Process Information), and will be visually inspected at the time they are accepted at the TSD Facility. The visual inspection will consist of a check of the container and its cover and closure devices for visible cracks, holes, gaps or other open spaces into the interior of the container when the cover and closure devices are secured in the closed position.

F3. PREPAREDNESS AND PREVENTION REQUIREMENTS
WAC 173-303-340: -806(4)(a)(vi)

F3.1 EQUIPMENT REQUIREMENTS
WAC 173-303-340(1) and (2); -806(4)(a)(vi)

Details on emergency equipment locations are provided in Section G, Contingency Plan, appendix G5.

F3.1.1 INTERNAL COMMUNICATIONS

Personnel working within the TSD Facility are in direct communication with on premise supervisors, technician handlers, or leaders. The tank farm area has a leak detection monitoring system, and throughout the TSD Facility there are fire alarm boxes, an automatic sprinkler system, and automatic smoke detection that will summons the Security/Fire Department.

F3.1.2 EXTERNAL COMMUNICATIONS

A phone system is readily available in the office spaces and at key locations throughout the storage and warehouse areas. The phone system has quick access to the Security/Fire Department as well as outside emergency services.

Activation of the alarm boxes at any manual station, automatic sprinkler system, or automatic smoke detector within the TSD Facility causes an activation of the Region Fire Department fire alarm system.

F3.1.3 EMERGENCY EQUIPMENT

A fully equipped spill response storage room is located in the TSD Facility. For a listing of spill response equipment stocked at the TSD Facility, refer to Section G (Contingency Plan).

A fully equipped secondary emergency response van is located within half a mile of the TSD Facility at the Region Fire Department. Refer to Figure F3-1.

F3.1.4 WATER FOR FIRE CONTROL

The existing 10-inch diameter water main pipe along Prichard Street serves as a major water source for Building 1051. A 10-inch ductile iron wet tap was connected to the existing 10-inch main pipe near the intersection of Gadberry and Prichard Street. This maintains the loop system in the area and provides appropriate fire flows into Building 1051.

The fire flow requirement is approximately 2,000 gpm. To meet this requirement, a 10-inch line branches off from the 10-inch main line at Gadberry Street and runs through a water vault to the fire sprinkler riser in room 135 at the southwest corner of the building. A double-check valve backflow prevention assembly is provided in the water vault.

There is a 750-gpm hose allowance in the water main for outside hose streams beyond the capacity of the double-check valve assembly at the vault. The available water for fire sprinklers is 1,388 gpm. A 40-psi fire pump capable of pumping 1,500 gpm is located in room 135 and assists in meeting the sprinkler system demand if a large number of heads are activated.

Both wet and dry sprinkler systems are located throughout the TSD Facility. With the exception of the ‘Reactive When Wet’ storage area, all interior storage areas are serviced by wet pipe sprinkler systems. All exterior canopied areas are serviced by dry pipe sprinkler systems. The ‘Reactive When Wet’ storage area (room 131) is not serviced with an automatic sprinkler system. One copper powder extinguisher is located in the Shipping area (room 140) across the entrance to the ‘Reactive When Wet’ storage area next to the Used Oil area (room 137), and one copper powder fire extinguisher is located in the Receiving area (room 123) near the HW Tank storage srea. Dry chemical 10A-80BC extinguishers are strategically placed throughout the complex and are labeled with appropriate markings. All emergency equipment has easy access. See Section G (Contingency Plan) for the location of fire suppression systems.

Sprinklers are provided in the pallet storage racks in the two flammable and combustible storage rooms 134 and 136. The storage racks have sprinklers installed at each shelf level. In addition to the rack sprinklers, intermediate temperature heads are installed in the ceiling. See Part A, Attachment B (TSD Facility General Layout Drawing) for room number designations.

Fire hydrants are located north, east, and south of the TSD Facility. A fire hydrant is located approximately 90 feet north of the TSD Facility on the east side of Bradley Road between Building 950 and Building 951. A second hydrant is located on the fence line along the east side of the TSD Facility 60 feet north of Gadberry Street. The third hydrant is located on the south side of Gadberry Street, 60 feet east of Bradley Road near the corner of Building 824. All three hydrants are within 100 feet of the TSD Facility.

The fire suppression system standpipe and all valves and gauges are contained in a locked room accessible only by Region Fire Department personnel and maintenance contractor personnel. The alarm system and system pressure are tested monthly, the fire extinguishers are also inspected monthly and the entire fire suppression system is inspected, tested and flushed annually. Fire suppression system and fire extinguisher **inspections** are performed by the Region Fire Department and contractor support personnel. Inspection records are held by Keyport's Safety Department and the Base Operating Support Contractor and are available upon request. Fire system **testing and flushing** is performed by a maintenance contractor. Fire extinguishers are checked weekly by TSD Facility personnel to ensure they are unobscured and that the monthly inspection by a Region Fire Department inspector has taken place as required.

F3.2 AISLE SPACE REQUIREMENTS

WAC 173-303-340(3); -806(4)(a)(vi)

The building is designed to allow unobstructed movement of emergency vehicles, fire control, and spill response equipment with aisles at least 16 feet wide and 12-foot roll-up doors. Clearly marked walkways and forklift paths that are 16 feet wide can accommodate movement of personnel and equipment. All receiving and staging areas are clearly marked to ensure adequate aisle space is maintained throughout. A minimum of 30 inches of separation is maintained between rows of drums with rows not being more than two drums wide. All exits are marked with readily visible lighted signs. No doors are less than 3 feet in width.

Figure F3-1.
NUWC Location Map

F4. PREVENTATIVE PROCEDURES, STRUCTURES, AND EQUIPMENT

WAC 173-303-806(4)(a)(viii)

F4.1 PREVENTION OF HAZARDS & CONTAINMENT OF SPILLS DURING LOADING/UNLOADING OPERATIONS

All container movements and loading/unloading operations at the TSD Facility are accomplished by use of electric, counterbalanced, OSHA-approved forklift trucks. The lift trucks are battery powered and EE rated for use in hazardous locations. Each forklift has a safety cage for operator protection, provides a load capacity of 4,000 pounds, and is counterweighted to help reduce the possibility of spills or accidents during container handling operations.

Two truck-loading docks located at the shipping dock area at the south end of the TSD Facility are equipped with adjustable dock levelers, which allow the ramp to be adjusted to provide safe access to any truck deck height. The dock levelers provide forklifts with smoother access to the trucks, reducing the potential of accidents/spills during loading and unloading operations.

Spill containment is provided in all loading/unloading areas by means of grate-covered trench drains and blind sumps. Surfaces in these areas are sloped to provide drainage into the trenches that drain to blind sumps. The two blind sumps at the truck docks are equipped with level alarms that are activated as waste accumulates in the sump.

Truck loading/unloading areas are inspected daily for evidence of deterioration and/or releases of dangerous waste, and tank truck loading/unloading pumps, piping, manifolds, connections and hoses are checked before use. Truck loading/unloading spill containment trenches and sumps are inspected weekly for cracks or deteriorated sealers. Observations made during these inspections will be noted on the Inspection Checklist, and entered into the Discrepancy Log if needed.

Spilled dangerous wastes discovered on the sealed surface or in spill containment trenches and sumps of the truck loading/unloading area are removed immediately upon detection.

Problems with the loading/unloading areas will be submitted for repair within 5 working days from entry on the inspection checklist, and repairs will be completed within 90 days from the date the problem was noted on the Inspection Checklist. Repairs not completed within 90 days will be noted in the Incident Record. However, if a problem poses an immediate threat to human health or the environment, the area will be isolated from waste activity until the repair is made. Examples of this type of problem are leaking piping or structural cracks in the concrete that are greater than 0.01 inches wide and a breach of spill containment due to seismic activity.

F4.2 RUN-OFF PREVENTION

The prevention of run-off from dangerous waste handling areas to other areas of the TSD Facility or environment is primarily through spill containment consisting of trench drains, blind sumps, and secondary containment. The entire TSD Facility is roofed which eliminates stormwater from entering the interior trench drains. Minimal stormwater entering the drains in the north and east canopied areas flows to blind sumps that are alarmed and pumped when required. All waste handling and storage areas within the facility are equipped with secondary containment as required by the quantities handled or stored. All exits from the dangerous waste handling areas are constructed with grate-covered trenches to prevent run-off from those areas.

A second type of containment is for fire flow, which consists of five concrete basins, totaling approximately 7,000 cubic feet in volume, located along the west side of the building. Drainage is piped to the containments via area drains. The basins are, in turn, drained by automatic valve. During normal operation, the valves are open and drain stormwater to the storm systems. In the event of a fire, valves close automatically and fire flow is contained. The fire flow containment basins are sized to provide segregated fire flow containment of 20 minutes of fire flow combined with an excess internal spill.

F4.3 PREVENTION OF CONTAMINATION OF WATER SUPPLIES

The TSD Facility is over 500 feet from the nearest well head.

Contamination of ground water is prevented by providing secondary containment throughout the TSD Facility and by operational procedures. All tanks and auxiliary equipment are located above ground.

In addition, the fire flow containment has flexible membrane liners installed beneath the concrete basins. The precast concrete trench drains and sumps below both loading stations at the shipping dock also have such liners. All individual storage area containment surfaces and fire flow containment basins have water stops between concrete slabs, and an appropriate epoxy or polyester coating, or sealer. All area containment surfaces and fire flow containment surfaces are checked daily for cracks or damage.

The liner and epoxy coating add an extra level of protection against any leakage.

F4.4 MITIGATION OF EQUIPMENT FAILURE AND POWER OUTAGE

In order to mitigate the potential for equipment failure, items such as pumps, fire sprinkler and alarm systems, storage and processing equipment, communications equipment, emergency generators, and building systems are inspected and maintained by maintenance personnel on a regular schedule as specified in this inspection plan.

Emergency exit lights are checked weekly for five minutes as described in the weekly inspection log directions. Emergency lighting is tested monthly for thirty minutes as described in the monthly inspection log directions. Emergency lighting is tested monthly as required by OSHA regulations, because weekly load testing would severely shorten equipment life.

F4.5 PERSONAL PROTECTION EQUIPMENT

Employees are formally trained as outlined in Section H (Personnel Training), before they are permitted to work independently. Contractors and subcontractors attend a building walk-through directed by the Dangerous Waste Program Manager or Alternate Dangerous Waste Program Manager during which they receive site-specific training that outlines the hazards associated with the specific site they will be working in, and general building information such as where particular wastes are stored, how to report any container found leaking, an explanation of building alarms, and evacuation routes and muster points. Upon completion of the walk-through, the person signs a training log maintained at the TSD Facility.

Work practices are instituted, and the Safety Branch maintains a website that identifies PPE requirements for every process performed at the TSD Facility. Selection of the appropriate PPE is a process which must take into consideration a variety of factors. Key factors involved in this process are: identification of the hazards or suspected hazards; their routes of potential hazard to employees (inhalation, skin absorption, ingestion, and eye or skin contact); and the performance of the PPE material (any seams) in providing a barrier to these hazards. The amount of protection provided by PPE is material-hazard specific.

As detailed in Section H, all HazWaste Handlers receive an initial 40 hours of training that includes proper usage of PPE; their skills are updated annually with 8 hours of instruction including PPE utilization.

HazWaste Handlers are assigned their own respirators, coveralls, rubber boots, hard hats, chemical-resistant steel toe and shank boots, and raingear; each HazWaste Handler also has a positive pressure, air-fed hood designated for their use. All PPE is inspected and maintained according to the inspection schedule provided in appendix F2 (Inspection Schedule). In the event of a spill, the Navy On-Scene Coordinator (NOSC) specifies whether Level A, B, C, or D protection is necessary. Gloves, plastic booties, and Tyvek clothing are provided on an incident/operational basis.

On a routine basis, dangerous waste is packaged in containers, lids are tightened/secured, and labeled at the point of generation and transferred to the TSD Facility; proper PPE is worn while transferring these containers. During tank truck operations, rubber gloves, Tyvek suit, face shield, and booties/rubber boots are used.

Emergency eye washes and showers are inspected and flushed weekly, and signed/dated by the inspector on an inspection card attached to the station.

The TSD Facility does not supply first aid kits onsite. First aid kits have been found to be a risk because they encourage untrained personnel to treat their own injuries and not report them as required. By requiring personnel to use the trained emergency medical personnel and equipment available at the NBK Keyport Fire Station within ½ mile (see figure F3-1), the Navy can ensure all injuries are reported and treated properly by trained personnel in a controlled setting.

F5. PREVENTION OF REACTION OF IGNITABLE, REACTIVE, AND/OR INCOMPATIBLE WASTES

WAC 173-303-395(1)(a),(b) & (c); -630(9)(a) and (b); -640(9) & (10); -806(4)(a)(ix), (b)(v) and (c)(x)

F5.1 PRECAUTIONS TO PREVENT IGNITION OR REACTION OF IGNITABLE OR REACTIVE WASTES

WAC 173-303-395(1)(a),(b) & (c); -806(4)(a)(ix)

Dangerous waste is segregated and protected from sources of ignition or reaction. Ignitable wastes are segregated and stored in special flammable storage areas. Flammable storage areas are in compliance with National Fire Protection Association's buffer zone requirements of *The NFPA-30 "Flammable and Combustible Liquids Code" of 1990*. Facility compliance of NFPA-30 requirements are detailed in Section D (Process Information). Reactive wastes are segregated during storage and kept isolated from incompatible materials. Incompatible wastes are segregated as described in Section D (Process Information). Only compatible wastes are consolidated for storage and transportation. Section C (Waste Analysis) further describes waste identification. Section D (Process Information) describes handling, storage, and treatment procedures, and precautions to prevent ignition or reaction of ignitable or reactive waste. Documentation maintained in compliance with requirements in Sections C (Waste Analysis) and D (Process Information) of this application meet the requirements in WAC 173-303-395(1)(c).

No open flames, incineration, or smoking is permitted within the TSD Facility. "No Smoking" signs are conspicuously located at every entrance in the TSD Facility. The "No Smoking" signs are visible at a distance of 50 feet. Hazardous material warning signs identifying hazards associated with a particular material are located conspicuously at both outside and inside entrances to each segregated area. Welding, cutting, and similar spark-producing operations are not permitted within the TSD Facility unless permission is obtained from the Dangerous Waste Program Manager and the DOD Region Fire Department (burn permit). Mechanical room hot surfaces are shielded by thermal insulation. Frictional or radiant heat, if present, may be located in the mechanical room which is isolated from the warehouse area. Sparks are prevented by spark resistant equipment and tools. Forklifts are battery powered, explosive rated, and have special spark resistant features for barrel handling. Facility metallic structures are grounded through an extensive lightning protection system. All electrical equipment installed in the operations areas is rated explosion-proof. All equipment such as tanks, machinery, and piping where an ignitable mixture may be present, are connected to a ground. Precautions to prevent spontaneous ignition are further described in Section B (Facility Description and General Provisions) and Section C (Waste Analysis).

F5.2 PRECAUTIONS FOR HANDLING IGNITABLE OR REACTIVE WASTE AND MIXING OF INCOMPATIBLE WASTE

WAC 173-303-395(1)(a),(b) & (c); -630(9)(a) and (b); -640(9) & (10); -806(4)(a)(ix), (b)(v) and (c)(x)

There will not be any mixture or commingling of incompatible wastes at the TSD Facility. Only compatible wastes are consolidated for storage and transportation. Facility design, waste inspection and analysis, treatment and storage procedures, personnel training, and inspections all contribute to precautions for handling ignitable or reactive waste and the prevention of accidental mixing of incompatible waste. Some of these measures include:

- All areas of the TSD Facility are segregated by means of fire rated walls and doors.
- A continuous ventilation system for each storage compartment provides six air changes per hour.
- Fume hoods are located in areas of toxic material handling.
- Flammable 1A storage area has explosion resistant doors, blast relief wall panels and vents, in-rack sprinklers, and 4-hour-rated walls.
- All switches, motors, and equipment of the HVAC system are explosion proof.
- All waste storage areas have 4-hour-rated fire walls.
- Annual inspections by the Dangerous Waste Program Manager and/or Federal Fire Marshal is conducted where ignitable or reactive waste is stored. Refer to Section F-2 (Inspection Plan).
- Containers and tanks are labeled per local, state, and Federal regulations and adequately identify major risks associated with the contents for employees, emergency response personnel, and the police.
- Dangerous waste is not placed in an unwashed container that previously held an incompatible waste or material.

SECTION F

APPENDIX F1

INSPECTION CHECKLISTS

Includes:

- Daily
- Weekly
- Monthly
- Annual
- MHE
- Discrepancy Log

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Building 1051
Daily Inspection

Inspect	Description	Satisfactory (Initial)	Not Satisfactory (Initial) Enter on Discrepancy Log	Entered on Discrepancy Log (Date)
1. Facility Access	Unobscured access to facility for emergency vehicles.			
2. Security Fence	Fence free of damage. Gates locked or in active use.			
3. Warning Signs	Warning Signs attached to fence and main entrance.			
4. Container Storage Areas	No leaks, spills, sumps dry, containers free of damage or excessive rust, container lids secured.			
5. Container Marking and Labels	Container markers and hazard label positioned for inspection, legible and have start date.			
6. Incompatible Waste	All waste stored in appropriate storage areas.			
7. Container Storage	Containers properly stacked, with 30” of aisle space. Number of containers does not exceed maximum capacity.			

DAILY INSPECTION

1. Ensure that all doors outside the building leading into the facility are clear of obstructions (i.e. vehicles blocking entrance, stored material). Ensure all entryways inside the building are clear of obstructions (nothing blocking entry inside the building at each doorway, i.e. material storage, parked forklifts…etc).

2. Check the fence surrounding the facility to ensure that there is no damage and that all gates are unobstructed on both sides and closed and locked if not in use.

3. Ensure 'Danger – unauthorized personnel keep out' warning signs are attached to the fence from any approach to the fenced yard, on every fence gate, and on any unfenced entry into the building, are readable at 25 ft., and are unobstructed.

4. Check all drum storage areas to ensure there are no leaking containers, all containers are free from excessive rust or damage (i.e. severe dents or cracks) and lids are secured. Check sumps in each drum storage area to ensure they are dry.

5. Check all drums in storage areas to ensure each drum is marked and labeled correctly. Ensure all markings are legible and have a start date. Ensure each drum in storage is positioned so marking and label are easily viewed for inspection.

6. Ensure all drums in storage are stored in the correct storage area.

7. Ensure there is at least a 30" aisle space between all rows of stored drums. Ensure total drum storage in each storage area does not exceed the maximum storage capacity per table D1-1.

Inspect	Description	Satisfactory (Initial)	Not Satisfactory (Initial) Enter on Discrepancy Log	Entered on Discrepancy Log (Date)
8. Waste Awaiting Designation	All Waste Awaiting Designation has been logged in and is properly labeled.			
9. Interior Sumps	All sumps and secondary containment areas free of spills, leaks and accumulated liquids.			
10. Tanks	Tank and ancillary equipment free of any signs of leaks or spills, free of any signs of compromise or loss of integrity.			
11. Tank Level Gauges	Operating properly.			
12. Clutter	Area clean of clutter.			
13. Processing Equipment	Fluorescent Bulb Crusher, Paint Consolidation & Can Crusher, Drum Deheader, and Drum Washer.			
14. Monitoring Equipment	Fire Alarm, Trouble Indicator, Lighting & Alarm Panel, Beacon 200 Gas Monitor, Cyanide Alarm, Sulfide Alarm and Exhaust Fan Control Panel.			

Date Inspected: ______/______/______ MM DD YY Time of Inspection:	Inspected by: Print Name	Inspected by: Sign Name	Supervisor Signature

8. Check that all Waste Awaiting Designation has been logged in and is properly labeled.

9. Check all sumps and secondary containments inside the building to ensure they are dry.

10. Check all active waste tanks and ancillary equipment (piping, valves, pumps and connections) for any evidence of leaks or spills. Check for liquid on the floor or stains around pump and piping connections. Check integrity of active waste tanks (peeling paint, cracks, corrosion, pitting, tank supports).

11. Ensure all active waste tank gauges are in working order. Check that power is applied to the Tank Farm Level Panel. Verify each active waste tank level indicator is operational. Check each active waste tank tape measure level indicator is operational.

12. Ensure floor space throughout the building is free of clutter that restricts traffic or processes or access to equipment or storage areas.

13. Ensure equipment is free of cracks, leaks, excessive rust, corrosion, damage, or other substandard condition.

14. Ensure power light is ‘on’ to the Fire Alarm and Trouble Indicator. Verify all lights are ‘out’ on the Lighting and Alarm Panel. Ensure the Beacon 200 Gas Monitor is operating (all alarm lights and fail light are off, pilot light is on, readouts on lines 1 and 2 both 0% CH_4).

Building 1051
Daily (Before Use) Inspection

Inspect	Description	Satisfactory (Initial)	Not Satisfactory (Initial) Enter on Discrepancy Log	Entered on Discrepancy Log (Date)
15. Waste Load/ unload areas	No signs of leaks, spills, or other releases. Exterior north and south sumps only contain stormwater below maximum level line.			
16. Tank Area Pumps, Hoses and Piping	Free of leaks and operational.			
17. Forklifts	MHE inspection passed.			
18. VAC Trucks	Operational.			

Date Inspected: ________/________/________ MM DD YY Time of Inspection:	Inspected by: Print Name	Inspected by: Sign Name	Supervisor Signature

DAILY (BEFORE USE) INSPECTION

15. Check to ensure that trenches and sumps in the north tank truck shipping/receiving area, and south shipping dock contain only clean stormwater below the black maximum water level line. Check for liquid or stains on the floors, trenches and sumps. From 1 October through 31 March both sumps must be pumped down to the minimum pump suction level every thirty (30) days regardless of actual level.

16. Ensure pumps, hoses, pipes, valves, joints, and caps used to fill, drain and recirculate storage tank contents are free of excessive wear, physical damage or leaks.

17. Ensure Forklift pre-inspection has been completed pursuant to the NAVSUP Publication 538 Second Revision MHE Inspection Form in this appendix.

18. Ensure pumps, hoses, pipes, valves, joints, and caps are free of excessive wear, physical damage or leaks.

Fill in the date and time of inspection, print and sign your name.
Submit inspection sheet to supervisor to review and sign.

Building 1051
Weekly Inspection

Inspect	**Description**	**Satisfactory (Initial)**	**Not Satisfactory (Initial) Enter on Discrepancy Log**	**Entered on Discrepancy Log (Date)**
1. Emergency Response Equipment	Adequate condition and minimum supply.			
2. Emergency Communication Equipment	Working.			
3. EXIT Lights	Functioning.			
4. Emergency Showers & Eye Wash	Check if weekly inspection done.			
5. Fire Extinguishers	Unobscured and monthly inspection done.			
6. Secondary Containment	Tank and Container storage areas: Free of cracks, gaps and deterioration, and of dirt and debris.			
7. Building Systems	Air System, Water pipes and Hose Connections not leaking.			
8. Vehicles	Operational.			
9. Waste load/ unload areas	Free of cracks, gaps and deterioration.			

Date Inspected: _______/_______/_______ **MM DD YY** **Time of Inspection:**	**Inspected by: Print Name**	**Inspected by: Sign Name**	**Supervisor Signature**

WEEKLY INSPECTION

1. Check for adequate supply of absorbent pads, absorbent material, protective clothing, air fed hoods, overpack drums and spill kits.

2. Ensure that building Emergency Communications are in working order (phones located in Receiving and Drum Wash Room, Intercom system, Cyanide Sensor and Sulfide Sensor.

3. Check that all EXIT lights are 'on'.

4. Verify that all 6 eye wash stations and showers have been inspected and were flushed within the previous 7 days by checking each inspection card date. Ensure there are no obstructions blocking access to each eye wash station or shower.

5. Verify that all fire extinguishers have been inspected during the previous month by checking each inspection card date. Ensure there are no obstructions blocking access to each fire extinguisher.

6. Check that all secondary containment floor areas and side walls are free of cracks, gaps or deterioration, and that the entire area is free of dirt and debris preventing inspection of the protective coatings. Note any cracks or gaps greater than 0.01 inches in width and any other significant deterioration such as areas of damaged coating on the inspection form. Specifically inspect each sump to ensure it is in good condition.

7. Check all water pipes, air pipes and hose connections for water leaks or escaping air.

8. Verify that all vehicles start.

9. Check to ensure floor areas, trenches and sumps in the north receiving and tank truck load/unload and south shipping dock are free of cracks, gaps, and surface/seal deterioration, and that the entire areas are free of dirt and debris preventing inspection of the protective coatings. Note any cracks or gaps greater than 0.01 inches in width and any other significant deterioration such as areas of damaged coating on the inspection form. Specifically inspect each sump to ensure it is in good condition.

Fill in the date and time of inspection, print your name, sign your name.
Supervisor to review and sign inspection sheet.

Building 1051
Monthly Inspection

Inspect	Description	Satisfactory (Initial)	Not Satisfactory (Initial) Enter on Discrepancy Log	Entered on Discrepancy Log (Date)
1. Exit signs and Emergency Lights	Operational.			
2. Loading Docks	Operational.			
3. Exhaust Hoods	Operational.			
4. Roll Up Doors	Emergency Roll Up Operational.			
5. Weigh Scales	Within Calibration.			
6. Breathing Air	Operational.			
7. Forklift Batteries	Battery Water Level.			
8. Tank Equipment Air Emissions	All Equipment meets air emission requirements in Pt B Permit Section F-2d (4) (b).			

Date Inspected: ________/________/________ MM DD YY Time of Inspection:	Inspected by: Print Name	Inspected by: Sign Name	Supervisor Signature

MONTHLY INSPECTION

1. Turn power off to EXIT lights (Electrical Panel 4LP1, circuit breaker #41) and EMERGENCY lights (same Electrical Panel, circuit breaker #39) and ensure that all EXIT lights and EMERGENCY lights stay on for at least 30 seconds. Turn the power back on.

2. Check that both loading dock ramps are operational.

3. Check that all exhaust hoods are operational by starting exhaust fan and ensuring vacuum is present at intake.

4. Check each power roll up door 'emergency open' is operational.

5. Check each drum weigh scale (2 ea.) by placing the 225 lb. test drum on each scale. The scale should indicate 225 +/- 3 lbs.

6. Turn Breathing Air system on (Electrical Panel 2PP1, circuit breaker #7). Start breathing air compressor. Verify breathing air compressor and alarms are functional. Verify that there are no air leaks throughout the building. Turn Breathing Air system off and bleed all air from the system.

7. Check battery water level of both electric forklifts. Top off water level if needed.

8. Perform VOC Air Emissions check, using Method 21 test equipment and procedure, for active waste storage tanks 101 thru 106 equipment. See Pt B Permit Section D, Appendix D-11 (Subpart BB Equipment Details) for equipment listing and locations.

Fill in the date and time of inspection, print your name, sign your name.
Supervisor to review and sign inspection sheet.

Building 1051
Annual Inspection

Inspect	Description	Satisfactory (Initial)	Not Satisfactory (Initial) Enter on Discrepancy Log	Entered on Discrepancy Log (Date)
1. Exit signs and Emergency Lights	Operational.			
2. Fire Hydrants	Annual service check completed.			
3. Fire Code Building Inspection	Annual Fire Code Inspection completed.			
4. Tanks	Pop-off vents are in good working order.			
5. Tank Integrity Assessment	Tank integrity testing has been completed within the last 5 years. Next due date:______/______/_______ MM DD YY			

Date Inspected: _______/_______/________ MM DD YY Time of Inspection:	Inspected by: Print Name	Inspected by: Sign Name	Supervisor Signature

ANNUAL INSPECTION

1. Turn power off to EXIT lights (Electrical Panel 4LP1, circuit breaker #41) and EMERGENCY lights (same Electrical Panel, circuit breaker #39) and ensure that all EXIT lights and EMERGENCY lights stay on for at least 90 minutes. Turn the power back on.

2. Verify that the annual Fire Hydrant check has been completed by the Fire Department.

3. Verify that the building annual Fire Code inspection has been completed by the Fire Department.

4. Check and verify that roof top pop-off vents are free of any defects (cracks, gaps, damaged seals and gaskets, missing bolts). Perform VOC Air Emissions check, using Method 21 test equipment and procedure, for active waste storage tanks 101 thru 106 vents. See Pt B Permit Section D, Appendix D-13 (Subpart CC Equipment Details) for equipment listing and locations.

5. Verify that all active waste storage tanks have an integrity test completed within that past 5 yrs.

Fill in the date and time of inspection, print your name, sign your name.
Supervisor to review and sign inspection sheet.

NAVSUP PUBLICATION 538 SIXTH REVISION

MHE INSPECTION FORM

DATE	REGISTRATION NO. (USN)	MHE CLASS (see table 4-1)

POWERED MHE TO BE CHECKED DAILY BY OPERATOR

NOTES

1. USE THIS FORM WHEN INSPECTING MHE BEFORE AND AFTER OPERATION. MARK APPROPRIATE COLUNMS TO INDICATE SATISFACTORY OR UNSATISFACTORY CONDITIONS.
2. NOT APPLICABLE INSPECTION PROCEDURES MAY BE OBLITERATED FOR THAT PARTICULAR MHE CLASS.
3. IF DEFECTS ARE FOUND, REMOVE MHE FROM SERVICE, NOTIFY IMMEDIATE SUPERVISOR AND RETAIN FORM UNTIL REPAIRS ARE MADE.
4. IF NO DEFECTS ARE FOUND:
   (A) INITIAL OPERATOR: SIGN AND DATE FORM. ATTACH TO MHE.
   (B) LAST OPERATOR: MAINTAIN FORM IN ACCORDANCE WITH LOCAL PROCEDURES.
5. THIS FORM IS NOT AVAILABLE IN THE SUPPLY SYSTEM. REPRODUCTION OF THIS FORM FROM THIS MANUAL IS AUTHORIZED.

SHIFT HOUR-METER READING	
END	
START	
DIFF.	

		START		FINISH		
		SAT	UNSAT	SAT	UNSAT	
1	Tires and Rims					1
2	Engine Oil, Fluid Levels and Belts					2
3	Radiator Coolant Level (check when cool only)					3
4	Battery					4
5	Access Covers					5
6	Fuel System					6
7	Unusual Engine Noises					7
8	Lights					8
9	Horn					9
10	Hoist					10
11	Tilt and Side Shift					11
12	Transmission/Clutch					12
13	Directional Controls					13
14	Brake System					14
15	Gauges/Meters					15
16	Fire Extinguisher (if applicable)					16
17	Operator Restraint System (e.g., Seat Belts)					17
18	Forks					18
19	Fork Positioning Locks and Stops					19
20	Fork Safety Chains					20
21	Overhead Guard and Load Backrest					21
22	Ground Straps/Static Conductive Tires/Wheels					22
23	Structural Cracks/Broken Weldments					23
24	Mandatory Markings					24

ADDITIONAL OPTIONAL (NON-MANDATORY) INSPECTION REQUIREMENTS MAY BE INCLUDED HERE:

AREA	INITIAL OPERATOR'S SIGNATURE	LAST OPERATOR'S SIGNATURE

SEE REVERSE SIDE FOR INSPECTION CRITERIA PROCEDURES

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MHE Inspection Form - Inspection Criteria

1. Tires and Rims. Inspect tires for excessive wear and damage. Remove foreign material from tire treads. Reject tires for illegible or missing markings or labels. Reject pneumatic tires when the tire tread has worn down to the tread wear mark or if fabric is exposed through the sidewall. Inspect the rims for dents, bends, and cracks. Refer to figure 8-7 for examples of solid rubber tire defects and the probable causes.
2. Engine Oil, Fluid Levels and Belts. Check engine oil, hydraulic, transmission and brake fluid levels. If low, add oil/fluid to raise the level to the full mark. Inspect engine belts for cracks, wear, damage, nicks or cuts, and proper tension. Always inspect floor/deck under MHE for any fluid puddles.
3. Radiator Coolant Levels. CAUTION: Do not check radiator coolant level when engine is hot. Check the radiator coolant level, if low, add coolant to the full mark.
4. Battery. Inspect battery cables for damage, cuts and abrasions. Verify cables are securely fastened to connector lugs and are free of corrosion, verdigris, arcing, pitting, exposed conductor material, and loose connections. Electric trucks have color coded battery indicator power band indicating remaining charge level. Charge battery when indicator drops into yellow zone (when under load; e.g., by tilting mast back against stop and check indicator). WARNING: For internal combustion start batteries, do not jump start battery with an eye cell indicator that appears yellow or clear (low fluid level) which may result in rupture.
5. Access Covers. Inspect all access covers (e.g., battery or engine) for loose, missing, broken, or corroded covers. Ensure latches snugly secure covers when fastened.
6. Fuel System. Visually inspect the entire fuel system assembly for any leaks or any abnormal odors. Where accessible, inspect the fuel tank or gas cylinder for leakage, denting, bulging, corrosion, pitting, gouges not exposed to fire, or evidence of rough usage. Valves are protected from physical damage.
7. Unusual Engine Noises. Start engine. Should any unusual noises be noted with the engine running, turn off MHE, reject and discontinue this check.
8. Lights. Check that the headlights, brake lights, and any other installed lights are working. All lights must operate properly for night work.
9. Horn. Depress the horn push button to verify that the horn is operating properly.
10. Hoist and Lowering Control. Raise and lower the lifting assembly to verify the lifting assembly controls operate smoothly. Inspect all hoses for cracked coverings, wear, bulges or leaks. Verify all fittings are free of cracks or leaks. Inspect for loose or binding (i.e., dry/not lubricated, frozen or rusted) chains. Inspect hose and cable reel guards, as applicable, for breaks, bends or chafing.
11. Tilt and Side Shift. Tilt forward and backward to verify the tilt operates smoothly. Operate side shift to verify the carriage moves immediately and smoothly to the left and the right. Verify all hoses are serviceable and that these fittings are free of cracks or leaks. For any additional accessory controls installed on the MHE; verify proper operation with the manufacturer's recommendations.
12. Transmission/Clutch. Verify that the transmission/clutch operates smoothly with no unusual noises. Where applicable, test the neutral start switch on most fuel-powered MHE. Verify that the parking brake is set and that no one is in front of or behind the MHE. A periodic check can be made by attempting to start the engine with the directional control lever in either the forward or reverse position. If the engine starts, the MHE shall be rejected.
13. Directional Controls. Shift directional controls into forward, neutral and reverse directions to verify the MHE operates properly and smoothly. Figure 8-8 shows a typical example of the directional controls. Ensure steering operation functions smoothly.
14. Brake System Check. With the parking brake engaged, attempt to drive MHE forward by applying a moderate amount of power to the MHE and verify that it does not move. Visually inspect that no fluid is leaking from the brake system. Check the service brakes to verify they stop the MHE smoothly and evenly without pulling or binding. Where applicable, check the dead-man brake or travel control disconnect device for proper operation.
15. Gauges/Meters. Where applicable, inspect the following:
    a. Warning Indicators. With the engine running at normal operating temperature, check the oil pressure gauge (figure 8-9) for normal operating pressure. If any warning indicator lights signal a malfunction, the MHE shall be rejected until repaired.
    b. Coolant Temperature Gauge. With the engine running at normal operating temperature, check that the gauge is indicating within the proper indicating range.
    c. Fuel Gauge. Check the fuel gauge for proper reading. On types LP and CN MHE, the mechanical-type fuel gauge may be mounted directly on the gas tank. Dual-fueled MHE shall not be operated unless the gasoline fuel tank is at least 1/4 full. Electric powered types should be in "green" power range.
    d. Voltmeter/Ammeter. With the engine running, check the voltmeter/ammeter to verify that its in the green range when the engine is running at least 550 rpm.
    e. Hourmeter. Verify that the hourmeter (figure 8-10) is registering while the engine is running.
    f. Weight Scales. With forks elevated, and no load, verify that the weight scales read zero. Adjust accordingly.
16. Fire Extinguisher. When equipped, visually inspect the extinguisher cylinder for dents. Check that the gauge is registering in the green (if so equipped) and check that the wire seal has not been broken. Verify periodic checks are current. Check nozzle and hose for defects. Reject extinguisher if not serviceable. Replace rejected extinguishers.
17. Operator Restraint System. If MHE is equipped with an operator restraint system (e.g., seat belt) it shall be inspected to verify that they fully extend out, can be properly secured, and fully retract back. Additionally, they shall not exhibit any evidence of the following discrepancies: (a) nicks or cuts (figure 8-11, view A), (b) frayed webbing (figure 8-11, view B), (c) holes (figure 8-11, view C), and (d) broken or worn retractor (figure 8-11, view D).
18. Forks. Visually examine the forks for surface cracks, including under the heel of the forks. Verify that blade and shank are straight, properly installed, and fork tips are even. Verify that load ratings of forks match MHE load rating. Surface cracks appearing on the forks shall be cause for rejection until forks are repaired or replaced.
19. Fork Positioning Locks/Stops. Verify the fork positioning locks/stops secure each fork in position. Verify forks are securely engaged to the carriage.
20. Fork Safety Chains. Verify the presence and operation of fork safety chains (equipped on units with folding forks) and associated locking pins.
21. Overhead Guards and Load Backrest. Inspect all welds and hardware. Verify that overhead guard, load backrest and hardware is in place and all structural members are secured.
22. Ground Straps or Static Conductive Tires/Wheels. For EE type MHE, verify the presence of two ground straps and that they touch the floor/deck or two conductive tires/wheels. For EX type MHE, verify the presence of two conductive tires/wheels.
23. Structural Cracks/Broken Weldments. Inspect all external weldments for structural cracks or defects. Reject MHE until repaired or replaced.
24. Mandatory Markings. Verify the following is clearly and properly marked: (a) safe working load (SWL) and vehicle weight (VW) on both sides, and except for pallet trucks, in view of operator, (b) operator controls, (c) manufacturer's nameplate/label, (d) accredited laboratory (UL, FM) certification, (e) for tow tractors, the drawbar pull rating (DBP) on both sides and rear, and coupler height on rear, and (f) for ammunition and explosives handling only, the MHE Safety Certification marking (figure 5-9). Reject if the above markings are missing, illegible, expired or incorrect. All other required markings that are rejected shall be recorded on the MHE Inspection Form, but is not a cause for removal from service.

Building 1051
Discrepancy Log

1. Discrepancy from (Check Appropriate Box)	2. Discrepancy Date	3. Discrepancy	4. Action	5. Correction	6. Correction Date
Daily Inspection /_/ Weekly Inspection /_/ Monthly Inspection /_/ Quarterly Inspection /_/ Annual Inspection /_/	____/____/_____ MM DD YY				____/____/_____ MM DD YY Signature:
Daily Inspection /_/ Weekly Inspection /_/ Monthly Inspection /_/ Quarterly Inspection /_/ Annual Inspection /_/	____/____/_____ MM DD YY				____/____/_____ MM DD YY Signature:
Daily Inspection /_/ Weekly Inspection /_/ Monthly Inspection /_/ Quarterly Inspection /_/ Annual Inspection /_/	____/____/_____ MM DD YY				____/____/_____ MM DD YY Signature:
Daily Inspection /_/ Weekly Inspection /_/ Monthly Inspection /_/ Quarterly Inspection /_/ Annual Inspection /_/	____/____/_____ MM DD YY				____/____/_____ MM DD YY Signature:
Daily Inspection /_/ Weekly Inspection /_/ Monthly Inspection /_/ Quarterly Inspection /_/ Annual Inspection /_/	____/____/_____ MM DD YY				____/____/_____ MM DD YY Signature:
Daily Inspection /_/ Weekly Inspection /_/ Monthly Inspection /_/ Quarterly Inspection /_/ Annual Inspection /_/	____/____/_____ MM DD YY				____/____/_____ MM DD YY Signature:

DISCREPANCY LOG

1. Check the appropriate box to indicate from which inspection the discrepancy was found.

2. Enter the date of the discrepancy.

3. Describe the discrepancy (i.e. drum lid not secure, tank 104 recirculation line is leaking at valve R-4, EXIT light not working in drum storage site K1051-06).

4. Describe what immediate action was taken (i.e. secured drum lid, tightened bolt at R-4, requested light to be fixed by facilities).

5. Describe what was done to fix the discrepancy at the time of correction (i.e. placed shipping ring and bolt onto the drum lid, tightened 4 bolts at R-4, EXIT light bulb replaced).

6. Enter the date of the discrepancy correction. Supervisor to sign and date that discrepancy is corrected.

SECTION F

APPENDIX F2

INSPECTION SCHEDULE

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TSDF INSPECTION SCHEDULE			
Periodicity	**Inspection**	**Periodicity**	**Inspection**
Daily		**Monthly**	
	Security Fence		Emergency Lights
	Facility Access		Loading Docks
	Warning Signs		Exhaust Hoods
	Container Storage and Staging Areas (container condition and no releases)		Roll Up Doors
	Container Marking and Labels		Weigh Scales
	Incompatible Waste		Breathing Air
	Container Storage and Staging Areas (proper stacking)		Forklift Batteries
	Sumps		Tank Equipment Air Emissions
	Tanks		
	Tank Level Gauges	**Annual**	
	Clutter		Fire Hydrants
	Processing Equipment		Fire Code Building Inspection
	Monitoring Equipment		Tanks (closure devices)
	Waste Load/Unload Area		
Weekly		**Before/After Use**	
	Emergency Response Equipment		MHE
	Emergency Communication		
	EXIT Lights	**Five Years**	
	Emergency Shower and Eye Wash		Tank Integrity Assessment
	Fire Extinguishers		
	Secondary Containment		
	Hydraulic System		
	Vehicles		
	Waste Load/Unload Area		

SECTION G

CONTINGENCY PLAN

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G. CONTINGENCY PLAN

G1. GENERAL FACILITY INFORMATION

G1.1 FACILITY NAME AND LOCATION

The NUWC Division Keyport Dangerous Waste Treatment and Storage Facility (TSD Facility), Building 1051, is located on the corner of Gadbery Street and Bradley Road on the Naval Base Kitsap Keyport (NBK Keyport) Installation. NBK Keyport is located in Kitsap County, approximately 15 miles west of Seattle, see appendix G1 (NUWC Location Map) for details.

G1.2 SITE PLAN

The TSD Facility, shown in Part A, attachment B (Facility Drawing), is a one-story pre-cast concrete structure. The length of the building along Bradley Road is approximately 225 feet and its width along Gadberry Street is 165 feet. A 40-foot-wide strip between the west wall of the building and Bradley Road is used for containment sumps, transformer pads, sidewalk and a drainage ditch.

The TSD Facility site is approximately 1½ acres of flat ground located outside of the industrial area on NBK Keyport. The site is paved and controlled by a perimeter security fence. Site features include storm water control and spill and fire flow containment. See appendix G4 (TSD Facility Drainage) for site drainage patterns and appendix G3 for facility exit routes & fire flow containments. Spill containment meets the requirements of Chapter 173-303 WAC and consists of designed secondary containments within the individual waste management rooms and areas.

The TSD Facility contains 44,000 square feet of enclosed and approximately 18,000 square feet of attached exterior covered area. The enclosed structure consists of three basic functional areas:

1. The warehouse, which consists of the tank area, container handling and storage areas, and waste process/treatment areas.

2. Personnel area, comprised of office spaces, laboratory, lunch room, and toilet/shower facilities.

3. Mechanical/storage areas, comprised of a mezzanine level for heating, ventilation and air conditioning equipment, boiler rooms, electrical room, fire protection, and spill response storage.

The exterior covered area consists of truck loading/unloading areas, new drum storage, asbestos storage, metal shredding, drum compaction, battery charging station, equipment and bulk storage. To the east of the Building 1051 is a roof-covered dewatering area. The area is used to dewater uncontaminated stormwater catch basin sludge. The process is described in detail in Section B (Facility Description and General Provisions), paragraph B1.4.

The TSD Facility is constructed of non-combustible and fire-rated materials, and includes segregated, enclosed waste storage and processing areas. All waste storage and handling areas are equipped with spill containment. Mechanical systems in the TSD Facility include HVAC, fire suppression, and alarms.

G1.3 OVERVIEW DESCRIPTION OF TSD FACILITY OPERATIONS

Industrial activities and processes on NBK Keyport produce a variety of dangerous wastes which are collected at CAAs located within the NBK Keyport fence line and transferred to the TSD Facility for treatment, consolidation, and storage prior to shipment to a permanent disposal site located off-site. The TSD Facility also has the capability to receive wastes from offsite on an ‘as needed’ basis in accordance with the Dangerous Waste Management Permit. There is no disposal of wastes at or in the TSD Facility.

Dangerous waste operations include storage and treatment in tanks and containers. A list of accepted waste codes at the TSD Facility is included in Part A. The TSD Facility does not accept radioactive, infectious or explosive wastes. Common waste streams managed at the TSD Facility includes but not limited to the following:

- Corrosives (Acids and Caustics)
- Oil, Oily Debris and Oily Wastewater
- Ignitables
- Reactives
- Solids and Sludge
- Fuel Wastes
- Industrial Wastewaters
- PCB Wastes
- Contaminated Debris
- Toxics
- Universal Waste

The TSD Facility operates Monday through Friday except government holidays and during reduced operations as directed by NUWC Division Keyport. During non-operational hours, gates are kept closed and locked and facility-wide outdoor lighting illuminates the facility during low light conditions. Commander Navy Region Northwest (CNRNW or COMNAVREG NW) and Naval Base Kitsap maintain Command Duty Offices at NBK Bangor, maintaining 24 hour duty. Additionally, NUWC Keyport maintains its own duty office onsite at NBK Keyport, which also provides 24 hour monitoring. COMNAVREG NW Dispatch Center located at NBK Bangor is responsible for dispatching NRNW Fire and Emergency Services and Police when an emergency call is received from Keyport. The Regional Dispatch Center sends a group page to appropriate personnel that includes all the Emergency Coordinators at Keyport. See appendix G1 (NBK Keyport Location Map) for the vicinity/location of NBK Keyport in relation to the general Puget Sound area and appendix G2 (TSD Facility Truck Access Routes) for access routes and traffic patterns from the NBK Keyport main gate to the TSD Facility.

G2. EMERGENCY COORDINATORS

WAC 173-303-350(3)(d); -360(1); -806(4)(a)(vii)

As set forth in the Commander Navy Region Northwest Oil and Hazardous Substance Integrated Contingency Plan (COMNAVREG NW OHS ICP), Commander Navy Region Northwest Fire and Emergency Services (COMNAVREG NW F&ES), sometimes referred to as FedFire, is the first responder to all emergencies including OHS spills, and shall serve as the initial Incident Commander (IC)/Qualified Individual (QI)/Emergency Coordinator (EC), and remain on-scene until the scene is determined safe and spill response IC duties are assigned to a NUWC Division, Keyport Environmental Branch IC, or another COMNAVREG NW OHS ICP designated IC.

At NBK Keyport, the Facility Incident Commander (FIC) is the NUWC Division Keyport Commanding Officer (CO), who has designated, by letter and instruction, Qualified Individuals (QI) to act on his/her behalf as the Incident Commander/Qualified Individual/Emergency Coordinator (EC) in the event of an emergency. The EC is responsible for coordinating emergency response procedures in the event of any fires, explosions, unplanned releases, spills, or other emergency situations occurring at the TSD Facility. The CO has also designated the Environmental Manager as the person responsible for all NUWC Division Keyport environmental affairs. The Environmental Manager and CO have designated a primary Environmental Branch Emergency Coordinator and backups to respond in the event of an OHS emergency at NBK Keyport. See Table G2-1 for a list of Navy personnel emergency coordinators.

COMNAVREG NW has been designated as the Navy On-Scene Coordinator (NOSC) with overall responsibility for coordinating all Navy regional responses to OHS releases. COMNAVREG Fire and Emergency Services crew maintains emergency response capabilities for OHS emergencies at all Naval Base Kitsap installations (Bremerton, Bangor and Keyport) and serves as the first responder and primary Emergency Coordinator for all emergencies at Keyport, including OHS emergencies. COMNAVREG NW maintains an onsite duty station at NBK Keyport and in the event of an emergency, personnel onsite can quickly reach out to other local COMNAVREG NW duty stations for additional resources if needed. COMNAVREG NW maintains a Memorandum of Agreement for OHS spill response operations at NBK Keyport. See appendix G8 (Memorandum of Agreement Spill Response Areas of Responsibility at Naval Base Kitsap Keyport. COMNAVREG NW maintains a memorandum of agreement for mutual aid emergency response (for the furnishing of rescue, fire protection and suppression, handling of hazardous materials and medical services) with Kitsap County Fire and Rescue. See appendix G9 (Mutual Aid Agreement (MAA) between COMNAVREG NW and Kitsap County Fire Protection Agencies).

The FedFire Chief is the initial designated NUWC Keyport Incident Commander in the event of an OHS emergency and assumes the initial Emergency Coordinator (EC) role during OHS emergencies. In the event of an OHS emergency, Environmental EC personnel are immediately notified and will respond to the IC command post. The IC duties are described below. However, the Environmental Branch EC is responsible for ensuring these steps are accomplished according to the Contingency Plan and the dangerous waste regulations:

- Assure personnel safety.

- Assess the nature, severity, and materials involved in the situation.

- Initiate the Contingency Plan if appropriate and evacuate the TSD Facility if necessary.

- Notify neighboring facilities/personnel as necessary.

- Direct containment and control operations.

- Contact emergency agencies and authorities in Table G4-1.

- Initiate clean-up operations.

- Ensure all wastes and contaminated media are being properly managed and all emergency equipment are being cleaned and made fit for use immediately after the emergency.

- Provide a report to Ecology meeting requirements in WAC 173-303-360(2) (k) within 15 days of the emergency.

- Review and amend the Contingency Plan using a permit modification if the Plan fails in an emergency.

If during the assessment of the situation it is determined that the nature, severity, and materials involved in the situation is beyond the capability of initial responders to adequately assure personnel safety, contain and control operations, then prior arrangements will go into effect and the IC will contact the NOSC, who will coordinate the necessary arrangements with state and local authorities. NUWC Keyport Oil and Hazardous Substance Release Response Organization structure is shown in Figure G2-1. These responses do not replace other actions required by this Contingency Plan and overseen by the EC.

Because the IC/EC is also the duty Fire Chief, that person is onsite 24 hours per day, 7 days per week and therefore the first responder for all emergencies. Environmental Branch EC's will be at the TSD Facility or on call at all times during both operational and non-operational hours. The Environmental Branch Primary EC is typically at the TSD Facility from 6:00 AM to 3:30 PM weekdays. Table G2-1 lists the names, work and alternative phone numbers of all spill response coordinators in the order in which they assume responsibilities.

Table G2-1 Navy Personnel Spill Response Call Back List (Emergency Coordinators)

NAME/ROLE	PHONE #	ALT PHONE #
COMNAVREG NW Fire & Emergency Services (EC/IC/QI) (Primary)	360-396-2244 (24 hours) Use cell phone or **Non-base** phone line	911 Only from base phone line
DW Program Manager Dale Hunt Environmental Branch OHS IC/QI for Hazmat Releases (Primary)	360-396-2320	360-640-5984 (Spill)
Hazardous Material Program Manger Ryan Lewis Environmental Branch OHS IC/QI for Hazmat Releases (Backup)	360-396-5438	N/A
DW Designator Christine Stull Environmental Branch OHS IC/QI for Hazmat Releases (Backup)	360-396-7991	N/A
NUWC Keyport Environmental Manager Terry Hiatt	360-315-0946	N/A
Navy On-Scene Coordinator (NOSC) Heather Parker **Regional Response**	360-396-0222	360-340-5991 (24 hours)

G3. CIRCUMSTANCES PROMPTING IMPLEMENTATION

WAC 173-303-350(1) & (2); -360(2); -806(4)(a)(vii)

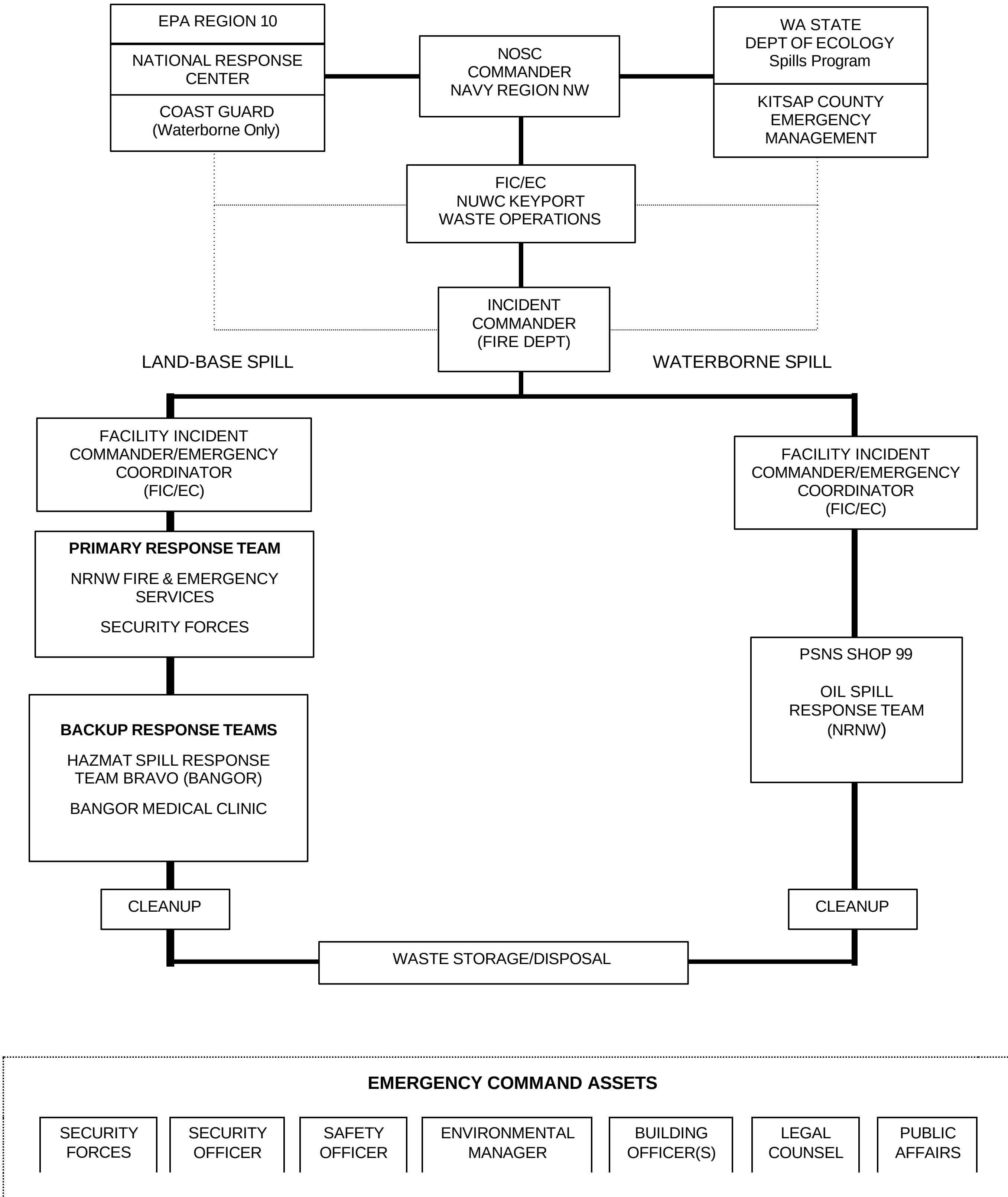
Where human health or the environment is threatened, the following emergencies would call for the implementation of the Contingency Plan:

1. Fire/explosion anywhere on premises.

2. Onsite and offsite (within the base perimeter or off base) releases of dangerous wastes or dangerous waste constituents.

3. The occurrence of natural disasters.

Figure G2-1 Oil and Hazardous Substance Release Response Organization



Examples of the emergency incidents described above:

1. Fire/Explosion
   a. Any fire or explosion in Building 1051.
   b. Any fire or explosion that could spread to or otherwise affect operations in Building 1051.

2. Release of Dangerous Waste or Hazardous Substance
   a. A sudden or non-sudden spill, release, or other discharge of a dangerous waste or hazardous substance, which poses a threat to human health or the environment, regardless of quantity.
   b. A spill, release, or other discharge, which has the potential for contamination of soil, surface water, or groundwater, regardless of size. Examples are spills or releases to soil and releases of organic solvents to asphalt.
   c. An uncontrolled spill, release, or other discharge originating from a damaged shipment, which has arrived at the TSD Facility in such a condition.
   d. A spill, release, or other discharge of a dangerous waste or hazardous substance greater than 100 pounds (12 gallons) or the “reportable quantity” established in 40 CFR Part 302 (whichever is less) when any portion of the release extends beyond secondary containment.
   e. A release of gas to the air originating from an unplanned reaction of materials.
   f. Emissions to the air from a spill, release, or other discharge (including to secondary containment) of a dangerous waste or hazardous substance when:
      i. The spill or release is greater than 100 pounds (12 gallons) or a reportable quality in 40 CFR 302 (whichever is less), and
      ii. Any constituents in the dangerous waste or hazardous substance has a Henry’s Law constant of at least 0.1 mole-fraction-in-the-gas-phase/mole-fraction-in-the-liquid-phase at 25 degrees Celsius or is a volatile organic compound detected by SW 846 Method 8260B. Note that appendix VI in 40 CFR 265 has a list of compounds known to have a Henry's law constant value less than the cutoff level.

3. A spill, release, or other discharge or potential for release of dangerous waste or hazardous substance caused by a natural disaster including but not limited to the following:
   a. Earthquake or severe flooding conditions which damage equipment, foundations, structures, or tanks.
   b. Severe storm involving high winds or lightning which damage or overturn tanks, containers or other equipment.
   c. A container(s) of dangerous waste arriving at the facility is damaged so as to present a hazard to public health and the environment.
   d. The shipment cannot be transported because the container(s) are damaged to such an extent, or the waste is in such a condition, as to present a hazard to the public health or the environment in the process of further transportation.

G4. EMERGENCY RESPONSE PROCEDURES

WAC 173-303-350(3)(a), (b); -360(2)(a) – (d); -806(4)(a)(vii)

G4.1 INCIDENT RESPONSE, ASSESSMENT AND IDENTIFICATION

WAC 173-303-350(2)(a) – (d); -806(4)(a)(vii)

NUWC Keyport TSD Facility personnel shall implement the following actions and emergency procedures to lessen the potential impact on human health and the environment in the event of an emergency:

1. Actions for Emergency Circumstances

   A. The TSD Facility has multiple building Emergency Action Plans readily available to all employees that provide standard procedures regarding the Hazardous Substance Release Bill. Individual(s) causing or discovering a release or observing a situation that may lead to a release of oil or a hazardous substance shall immediately take the following actions to lessen the potential impact on human health and the environment. The order of these actions will depend on existing conditions.

      (a) EVACUATE personnel to a safe distance upwind and upgrade from the release. Following standard Evacuation Bill procedures do the following:

         - Assess the scene.
         - Activate fire/evacuation alarms, and pass the word.
         - Provide aid and assistance to people in need, but DO NOT RISK PERSONAL SAFETY or endanger others in doing so.
         - PREVENT any further release by activating emergency shut-offs and/or closing valves, ONLY if such action does not endanger you or others.
         - Close windows, doors, and safes.
         - EXIT BUILDING using approved primary or secondary evacuation routes to muster site.
         - Conduct a full muster with Immediate Supervisor or designated person.
         - Report actions to the EC Command Post or IC.

      (b) REPORT the release immediately to:

REGIONAL DISPATCH CENTER **PHONE: 911**

      (c) WHENEVER POSSIBLE, give the following information, if known, or reasonably determined.

         - Name and telephone number.

- Location of the release (Building No.).

- Number and type of injuries if any.

- Identity or type and estimated amount of released material.
- Source of release (e.g., tank, container).

- Current estimated rate of release.

- Behavior of released material (reactions, leak, release, fire observed).

- Anticipated movement of release and actions taken.

- Time release occurred (best estimate).

(d) RESCUE injured individuals without risking safety. DO NOT ENTER the released area if an injured person appears to have been overcome by fumes.

(e) PREVENT release from entering drainage ONLY if it can be done SAFELY. Use on-site release containment equipment and materials if available

(f) DO NOT allow unauthorized persons to enter release area.

(g) EXTINGUISH OR RESTRICT all sources of ignition such as cigarettes, combustion engines, and open flames. Wait for the EC or the Fire Department to arrive and direct them to the release.

2. Detailed step-by-step actions for emergency response personnel addressing fires, spills, and other releases are provided in Appendix G7.

3. Actions for Damaged Dangerous Wastes Shipment

   A. TSD Facility personnel shall immediately take the following actions in the event that a dangerous waste shipment, which is damaged or otherwise presents a hazard to human health and the environment, arrives at the facility.

   B. The dangerous waste shipment can be received if:

      (a) It is a damaged container, perform the following actions:

         i. Over-pack the container,

         ii. Re-mark the container, and

         iii. Notify the generator of the situation.

(b) It is leaking, perform the following actions:

   i. Conduct all activities under (1)a. above, and

   ii. For minor leaks, stop or contain the spill with the approved equipment/material without endangering yourself and others, or

   iii. For leaks beyond your control, contact the spill clean up team from Naval Base Kitsap Bangor (Team Bravo). (Response time can vary, but has typically been within 20 minutes).

(c) It is an improperly labeled container(s):

   i. Accept the waste and

   ii. Contact the generator to resolve the discrepancy in accordance with procedures in subsection C of the manifest.

C. If the dangerous waste shipment is denied receipt but cannot leave the facility because transport would present a hazard to human health or the environment due to the extent of damage to the containers or the condition of the waste, perform the following actions:

(a) Overpack and re-mark the container.

(b) Deny receipt of dangerous waste shipment if it is not acceptable.

   i. Send the shipment to the alternate facility designated on the manifest.

   ii. If an alternate facility is not listed on the manifest, contact the generator and arrange for the shipment to go to an acceptable TSD Facility in a safe condition.

G4.2 NOTIFICATION

WAC 173-303-145(2); -360(2)(d), (e); -806(4)(a)(vii)

Notification will be in accordance with WAC 173-303-360(2)(a) and this Contingency Plan. The IC will be notified of any emergency. Non-emergency events, such as small spills in containment areas that can be cleaned up as 'housekeeping', will not be reported to the IC (see paragraph 3a (3) in appendix G8 (MOA). The IC will supply specific information as to the type, quantity, and location of released material to the EC. The EC along with the IC will evaluate this information. The on-call EC will immediately notify all facility personnel by activating internal facility alarms whenever there is an imminent or actual emergency situation.

Department of Ecology Northwest Regional Office: (425) 649-7000

The EC will immediately contact Ecology and other appropriate agencies when any one of the following occurs:

a. A fire or explosion in Building 1051, or any fire or explosion that could spread to or otherwise affect operations in Building 1051.
b. An incidence of noncompliance with this Permit or natural disaster at the facility that could threaten human health or the environment.
c. In accordance with WAC 173-303-145(2) and WAC 173-303-360(2) (a), a sudden or non-sudden release of a dangerous waste or hazardous substance which poses a threat to human health or the environment, regardless of quantity.
d. A spill, release, or other discharge of dangerous waste or hazardous substance greater than 10 pounds (1.2 gallons) or the "reportable quantity" established in 40 CFR Part 302 (whichever is less) outside of secondary containment.
e. A spill, release, or other discharge of dangerous waste or hazardous substance greater than 100 pounds (12 gallons) or the "reportable quantity" established in 40 CFR Part 302 (whichever is less) inside secondary containment.
f. Any incident that causes implementation of the contingency plan.

The EC will determine which agencies to notify in a given situation. A quick summary of NUWC Keyport Release Notification Procedures is provided in Table G4-1.

When response requirements exceed the resources of NUWC Keyport, Naval Base Kitsap Bangor, and the NRNW Fire and Emergency Services, the EC will notify the NOSC and coordinate outside assistance as per the MOA (Appendix G8) and MAA (Appendix G9).

Notification to the Department of Ecology will include the following:

- Name and phone number of reporter.
- Name and address of TSD Facility.
- Time and type of incident (fire, release).
- Name and the quantity of material(s) involved to the extent known.
- Extent of injuries, if any.
- Possible hazards to public health or the environment outside the base perimeters.

Pursuant to 40 CFR 355.40(b) (1), and (2), notification to Local and State Emergency Committees will further include, to the extent known:

- An indication of whether the substance is an extremely hazardous substance as defined by Appendices A and B of 40 CFR 355.
- Duration of the release.
- Medium or media into which the release occurred.
- Any known or anticipated acute or chronic health risks associated with the emergency and, where appropriate, advice regarding medical attention necessary for the exposed individuals.

- Proper precautions to take as a result of the release, including evacuation.
- Names and telephone numbers of person(s) to be contacted for further information.
- Summary of actions taken.

Table G4-1 NUWC Keyport Release Notification Procedures

AGENCY TO CONTACT	TYPE OF RELEASE						PHONE NUMBER
	OIL ON WATER	OIL ON LAND	HAZARDOUS SUBSTANCE (WATER)	HAZARDOUS SUBSTANCE (LAND)	AIR DIS-CHARGES	SEWAGE OVER-FLOWS	
NRNW NOSC	X	X	X	X	X	X	(360) 396-0222
Coast Guard	X		X				(206) 217 6002
National Response Center	X	X	X	X	X		(800) 424-8802
EPA Region 10	X	X	X	X	X		(206) 553-1263
WA State Dept. of Ecology Spills	X	X	X	X	X	X	(425) 649-7000
WA State Dept. of Ecology HWTR			X	X	X		(360) 649-7277
Kitsap County Health Dept.	X		X		X	X	(360) 337-5235
WA State Emergency Management Div	X	X	X	X	X	X	(800) 258-5990
Puget Sound Clean Air Agency					X		(800) 552-3565

G4.3 CONTAINMENT AND CONTROL OF EMERGENCIES
WAC 173-303-145; -350(3)(a),(b); -360(2)(f),(g),(i); -630(2); -640(7); -806(4)(a)(vii)

Specific types of emergencies that could occur at the TSD Facility are identified in appendix G7 (Release Containment and Control).

G4.4 IDENTIFICATION OF DANGEROUS MATERIALS
WAC 173-303-360(2)(b); -806(4)(a)(vii)

Whenever there is a release, fire, or explosion, the EC or the IC will immediately identify the character and source, and determine the amount and extent of any released materials. The specific sets of procedures to assess and handle these events are described in appendix G6 (Hazard Evaluation).

G4.5 HAZARD ASSESSMENT AND REPORT

WAC 173-303-360(2)(c), (d), (e); -806(4)(a)(vii)

The EC and/or IC will assess possible hazards to human health and to the environment that may result from the release, fire, or explosion. The suggested criteria and methods used for these assessments are described in Tables G2-B-1and G2-B-2 of appendix G7 (Release Containment and Control). If an assessment indicates that an evacuation of local areas may be required, the EC or IC will immediately notify appropriate local authorities in Table G4-1, and will be made available to help appropriate officials decide whether local areas will be evacuated. The EC or his designee will immediately notify the Naval Region Northwest (NRNW) NOSC and the National Response Center as applicable.

The assessment report will be in accordance with WAC 173-303-360(e) but as a minimum will include:

- Name and telephone number of reporter;
- Name and address of TSD Facility site;
- Time and type of incident;
- Name and quantity of materials involved to extent known;
- Extent of injuries, if any; and
- The possible hazards to human health or the environment outside the TSD Facility.

G4.6 PREVENTION OF RECURRENCE, SPREAD OF FIRES, EXPLOSIONS, OR RELEASES

WAC 173-303-360(2)(f), (g); -630(2); -640(7); -806(4)(a)(vii)

The EC will take all necessary steps to ensure that secondary release, fire, or explosion does not recur after the initial incident. The EC will ensure that no wastes that may be incompatible with the released material will be treated or stored in the affected area. During any emergency, all normal operations will be discontinued until the emergency is resolved. Emergency measures may include stopping processes and operations, collecting and containing released waste, and removing or isolating containers.

If the TSD Facility stops operations in response to a fire, explosion, or release, the EC will monitor for leaks, pressure build up, rupture, or gas generation in tanks, containers, valves, pipes, or other equipment, before normal operations can resume.

The EC, with the assistance of appropriate specialists, will evaluate the incident to understand why and how the incident occurred and what future modifications can be initiated to prevent a recurrence of the same or similar situation. Evaluations will include equipment design, operational procedures, response tactics, and personnel safety. A review of the Contingency Plan will be conducted to ensure appropriate changes are made if necessary.

G4.7 POST-EMERGENCY ACTIONS

WAC 173-303-360(2)(h), (i), (g), and (k); -640(7); -806(4)(a)(vii)

Immediately after an emergency or spill, recovered waste will be treated, stored, or disposed of in the proper manner. This may include contaminated soil, surface water, or any material that results from a release, spill, or explosion at the site.

Incompatible waste will not be treated or disposed of until all facility and emergency equipment cleanup operations are completed. Proper notification to Ecology and the local authorities that all operations are back to normal will take place prior to the treatment of incompatible waste.

If a tank or container holding a waste is not in good condition or if it begins to leak, the Dangerous Waste Program Manager will order the transfer of the dangerous waste to a tank or container that is in good condition. Upon transfer of the dangerous waste from the leaking or damaged tank or container, the Dangerous Waste Program Manager will take immediate actions to either repair, close, decontaminate, or dispose of the unit consistent with other parts of the permit and in accordance with regulatory requirements.

All emergency equipment used in an emergency will be cleaned, replaced, or returned for use prior to the resumption of operations. All equipment will go through a systematic decontamination before being returned to the emergency response room or locker. Decontamination will be done by steam cleaning and/or triple rinsing with an appropriate cleaner. Fire extinguishers will be recharged, and personnel protective equipment and absorbent materials replenished. An inventory will be conducted to ensure the minimum amount of response equipment is on hand and ready for use.

The EC will commit all necessary resources at NUWC Keyport, other Navy assets and/or may call a contract cleanup service to assist in the control, containment, and cleanup of a release. The IC through the NOSC and the Incident Command System will coordinate the activities of the emergency response agencies. The EC is responsible for ensuring all emergency equipment listed in this Contingency Plan is cleaned and fit for its intended use before operations are resumed.

Within 15 days of detection of a release to the environment, a report in the form of an After Action Report as detailed in Section G8.1 will be submitted to the state and county.

G5. EMERGENCY EQUIPMENT

WAC 173-303-340(1); -350(3)(e); -806(4)(a)(vii)

Most of the emergency equipment maintained at the TSD Facility is kept in room 121, the spill response equipment room. Besides the equipment room, spill kits are maintained at the east end and west end of the facility loading/unloading area, along the east and west walls of the receiving area, and in the staging area. Fire extinguishers are maintained throughout the facility within 75 feet of each other. There are two communication systems available at the facility to alert or evacuate personnel in the event of an emergency, a telephone and an intercom communication system. Table G5-1 lists the emergency equipment including monitoring equipment such as combustible gas meters, CO_2 meters for tanks, hydrogen cyanide/sulfide meters, oxygen sensor, and alarms located inside and in the immediate vicinity of the TSD Facility. Quantities of emergency equipment listed in Table G5-1 represent a minimum of stock quantities. The location of emergency equipment is shown in appendix G5 (TSD Facility Emergency Equipment Location)

In addition to the equipment listed in Table G5-1, the Navy Regional Northwest Battalion 2 (Keyport) HazMat Equipment Inventory is listed in Appendix G10, and containment booms are staged in the water at the end of the pier for immediate deployment along with additional booms stored under the TSD Facility roof on the southeast corner. See Appendix G2 (TSD Facility Truck Access Routes) for pier location.

Table G5-1 TSD Facility Emergency Equipment

ITEM	MINIMUM QUANTITY
Tyvek coveralls (various sizes)	20
Tyvek coveralls – (Saranex coated for Otto Fuel II) (various sizes)	12
Tyvek lab coats (various sizes)	10
Disposable booties	20
Face Shield	4
Air hoods	10
Vinyl gloves	20 pr
Rubber gloves (Sol-Vex for Otto Fuel II)	20 pr
Leather palm gloves	15 pr
Skilcraft Techwipes (90 large paper towels per box)	10 boxes
Oil absorbent pads (100 ea 17” X 19” pads per bale)	10 bales
Oil absorbent pillows (2’ X 2’)	20
Oil absorbent pillows (12” X 12”)	20
Type 100 oil absorbent rolls (38” X 144’)	2
Connectable oil absorbent booms (8” X 8’)	10
Oil absorbent socks (21” Pigs)	10
Clay absorbent (40 lb bags)	10 bags
Rubber drain covers	3
Sodium bicarbonate	1 bag
Coliwasa (glass)	20
Bailers (plastic)	20
Hand suction pumps (plastic)	6
Dust Pans	4
Push broom	5
Round-point shovel	3
Square-point shovel	2
Mop with bucket	1

Small traffic cones	4
Duct tape	10 rolls
Black plastic sheet (100' X 20')	3 rolls
Pallet bags	25
Drum liners (55 G clear plastic)	20

ITEM	**MINIMUM QUANTITY**
Nylon woven bags (empty, for sandbags)	20
Amber sample bottle (500 cc)	50
Amber sample bottle (950 cc)	25
Spare stocked spill control kits	4
Decon shower with containment	1
Drum and tank repair kit	1
Stationary eye wash stations	6
Portable eye wash station	1
Portable air-operated diaphragm pump	1
Portable hand-pump sprayer (3 G)	1
Emergency generator	1
Communication systems (Intercom and Phone)	2
Type ABC Fire extinguishers	25
Type D Fire extinguishers	4
Fire hydrant	2
Combustible gas detectors	2
Hydrogen cyanide meter/alarm	1
Hydrogen sulfide meter/alarm	1
Breathing air sensor/alarm	1
Sump level alarm	1

Table G5-1 TSD Facility Emergency Equipment (Continued)

G6. COORDINATION AGREEMENTS

WAC 173-303-340(4); -350(3)(c); -806(4)(a)(vii)

NUWC Keyport has a Memorandum of Agreement (MOA) with the Navy Region Northwest to provide support for all land and water-borne spill response at NUWC Keyport. A copy of the MOA is located in appendix G8.

NUWC Keyport no longer maintains mutual aid agreements with Kitsap County Fire Protection Agencies such as Fire, Police, and Hospitals. These agreements are negotiated at the Regional level, and are covered by the MAA in appendix G9.

The EC or IC are available to help appropriate officials with the layout of the facility, properties of dangerous waste handled at NUWC Keyport, and necessary information to effectively respond to any emergencies.

G7. EVACUATION PLAN

WAC 173-303-350(3) (f); -806(4)(a)(vii)

In the event of a fire or release of a hazardous material that could endanger the lives of persons in and outside the TSD Facility, evacuation of the TSD Facility will occur according to procedures outlined below. Appendix G3 shows exit routes to be used during evacuation. Drawings indicating the exit routes are posted throughout the TSD Facility.

The Dangerous Waste Program Manager coordinates all evacuation procedures in accordance with the Emergency Action Plan for the TSD Facility, which are posted at all exit doors.

All personnel will be notified immediately by verbal or visual instruction or by audible signal of an emergency requiring evacuation to the primary or secondary assembly area.

Neighboring facilities/personnel will be notified, if necessary, by TSD Facility personnel or by emergency personnel (e.g., police and fire).

The primary assembly area is across Bradley Road in the parking lot west of the office spaces in the TSD Facility. The secondary assembly area is across Gadberry Street on the grassy area east of Building 824. Normally the prevailing winds are from the south/southwest which in most cases puts the exit routes up wind from the TSD Facility.

The Dangerous Waste Program Manager will account for all persons by employee head count and visitor logs.

If not already done, call 911 (emergency) from Building 824 or Building 951.

The NRNW Fire and Emergency Services in conjunction with the EC will determine the need to evacuate beyond the immediate area of the TSD Facility.

No one will re-enter the TSD Facility during evacuation conditions without the permission of the EC or IC and without the proper protective clothing and equipment.

Approval of the safe re-occupancy of the TSD Facility will be determined by the EC or IC in consultation with the appropriate responding emergency personnel.

G8. REQUIRED REPORTS

WAC 173-303-360(2)(k); -640 (7)(d)(iii); -640(7)(f); -806(4)(a)(vii)

G8.1 GENERAL REQUIREMENTS

In any incident which requires the implementation of the Contingency Plan, an After Action report will be submitted within 15 days after an incident to the appropriate state and local authorities. As a minimum, the following information will be included:

- Name, address, and telephone number of the facilities operator.
- Name, address, and telephone number of the TSD Facility.
- Date, time, and type of incident.
- Name and quantity of material(s) involved.
- The extent of injuries, if any.
- An assessment of actual or potential hazards to human health or the environment.
- Likely route of migration of the release.
- Results of any monitoring or sampling in connection with a release.
- Proximity to down gradient drinking water, surface water, and populated areas.
- Estimated quantity and disposition of recovered material that resulted from the incident.
- Cause of incident, including a chronology of events for the incident.
- Description of corrective action taken to prevent reoccurrence of the incident.

G8.2 REQUIREMENTS FOR TANK SYSTEMS

Within 24 hours of a release from a tank to the environment, a report of the incident will be submitted to Ecology. At a minimum, this report will include:

- Name, address, and telephone number of the facilities operator.
- Name, address, and telephone number of the TSD Facility.
- Date, time, and type of incident, including a chronology of events for the incident.
- Name and quantity of material(s) involved.
- The extent of injuries, if any.
- An assessment of actual or potential hazards to human health or the environment.
- Likely route of migration of the release.

- Proximity to down gradient drinking water, surface water, and populated areas.

- Estimated quantity and disposition of recovered material that resulted from the incident.

If a release from a tank to the environment requires a major repair to the tank or tank piping system, the tank system will be certified by an independent professional engineer prior to placing the tank system back into service. A report of the repair and certification will be submitted to Ecology prior to placing the tank system back into service.

G9. AMENDMENT TO CONTINGENCY PLAN
WAC 173-303-350(5); -806(4)(a)(vii)

Contingency plan will be reviewed and amended for the following reasons:

- Applicable regulations or the facility permit are revised.
- The plan fails in an emergency.
- The facility changes (either by design, construction, operation, maintenance, or other circumstances) in a way that materially increases the potential for fires, explosions, or releases of dangerous waste or dangerous waste constituents, or in a way that changes the response necessary in an emergency.
- The list of emergency coordinators changes.
- The list of emergency equipment changes.

SECTION G

APPENDIX G1

NBK KEYPORT LOCATION MAP

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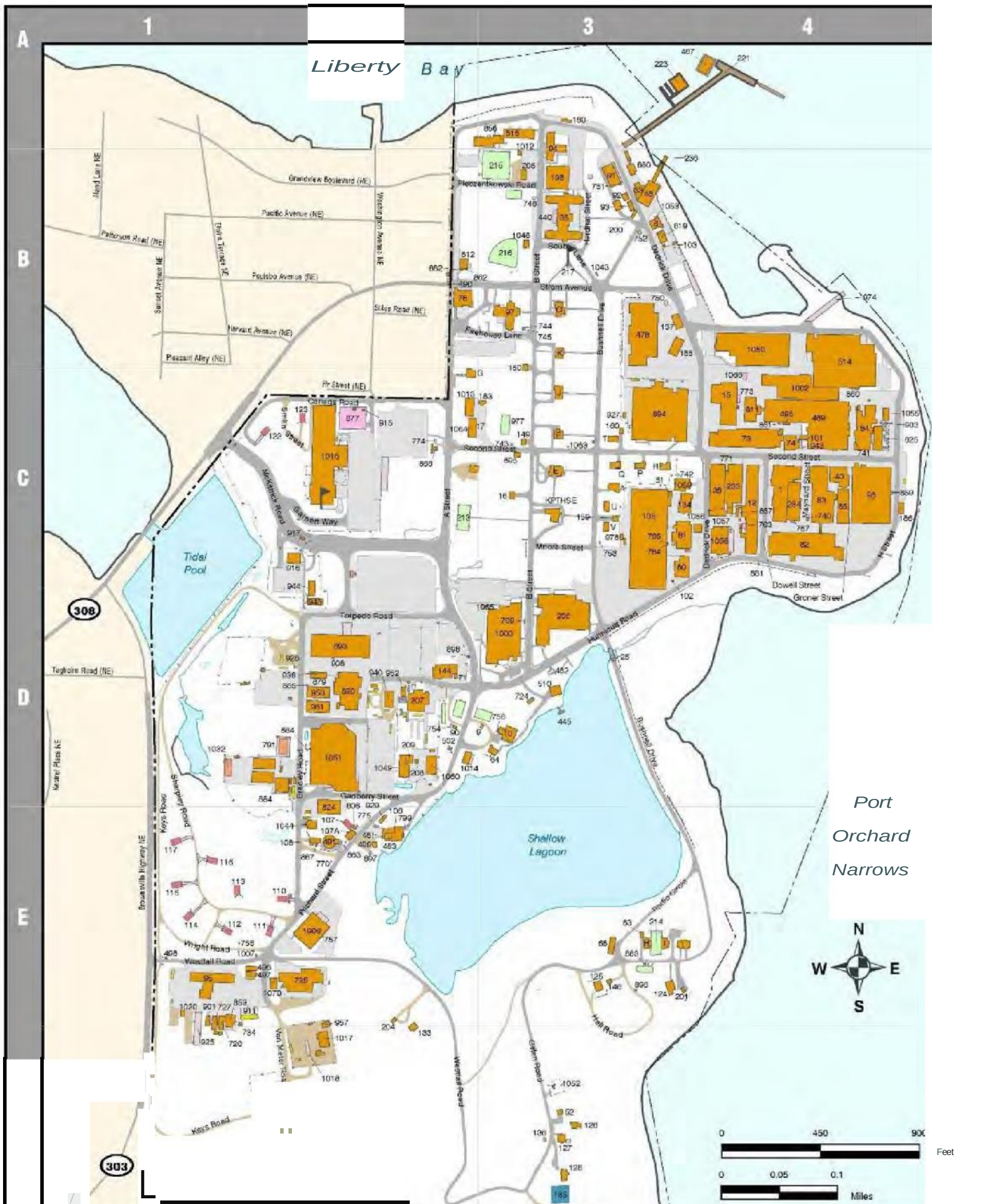

TITLE

NAVAL BASE KITSAP at KEYPORT
BASE MAP

DEPARTMENT OF THE NAVY	FIGURE 1-1	NAVY REGION NORTHWEST

RSIMS DOCUMENT NUMBER

10-KP-00000 — 30 NOV2005

PROJECTION

STATE PLANE, WA NORTH
DATUM NAD 83, FEET

1In=450ft

SIZE
B

RSIMS Center of EXCELLENCE
Supporting Navy Region NW

Submit questions, requests, or updates to the RSIMS Center of Excellence:
(360) 396-6047
http://www.rsims.navy.mil

IF SHEET IS LESS THAN 11"X 17"IT IS A REDUCED PRINT AND THE SCALE IS REDUCED ACCORDINGLY

NBK Keyport Base and Vincinity Map

SECTION G

APPENDIX G2

FACILITY TRUCK ACCESS ROUTES

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TSD FACILITY TRUCK ACCESS ROUTES

SECTION G

APPENDIX G3

FACILITY FIRE EXITS

and

FLOW CONTAINMENTS

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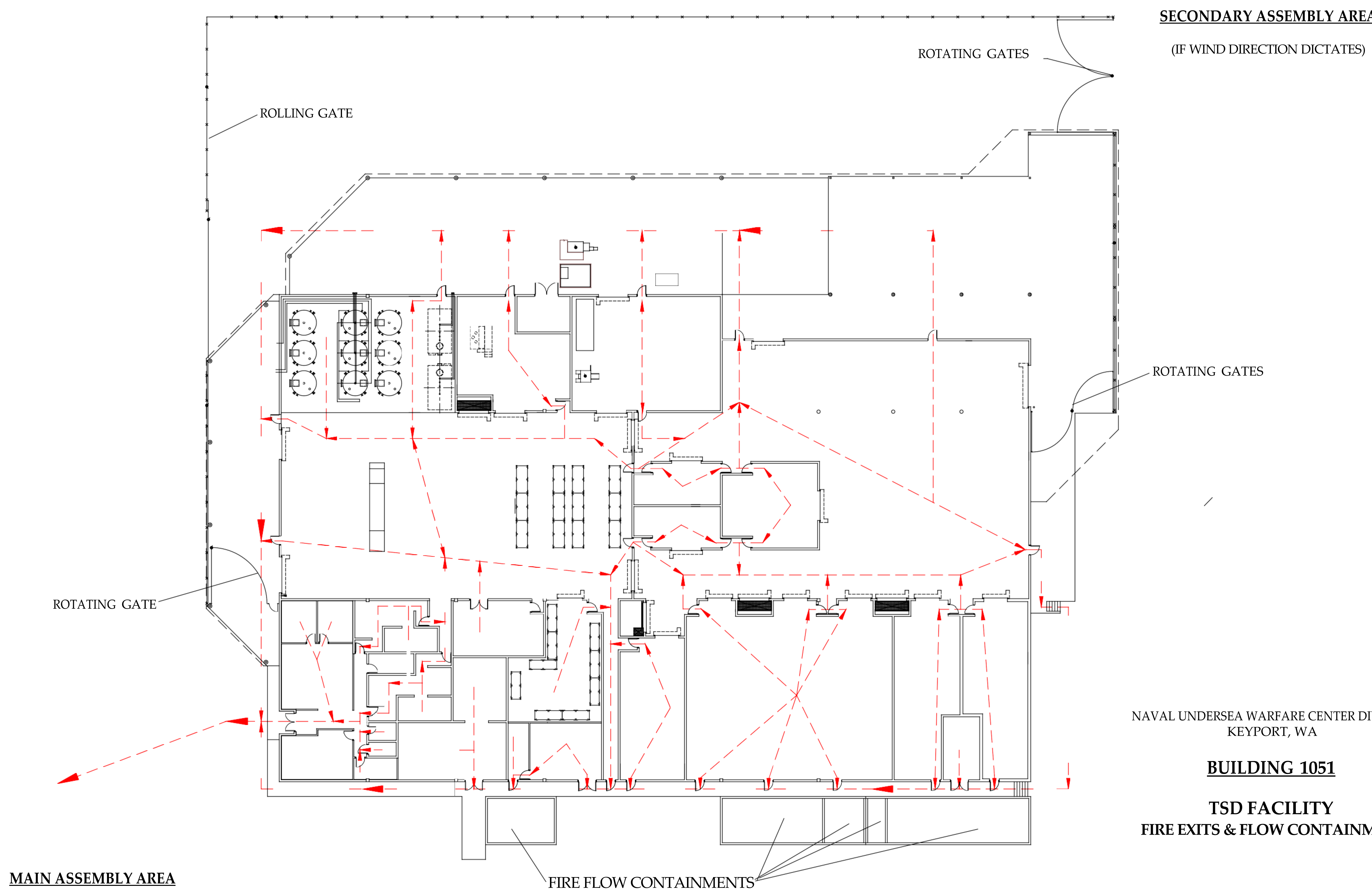

NAVAL UNDERSEA WARFARE CENTER DIVISION
KEYPORT, WA

BUILDING 1051

TSD FACILITY
FIRE EXITS & FLOW CONTAINMENTS

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SECTION G

APPENDIX G4

TSD FACILITY DRAINAGE

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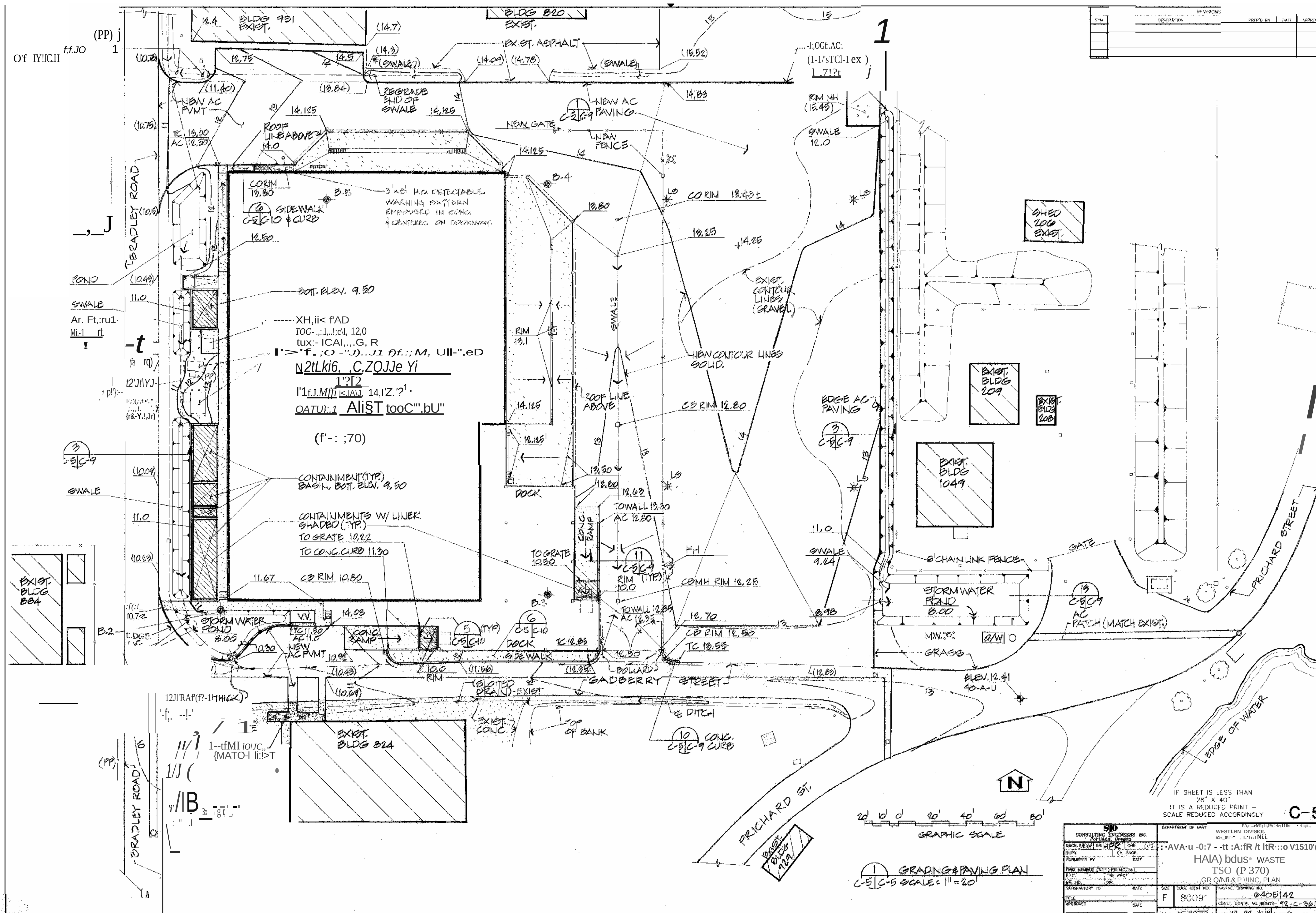
BLDG 951 EXIST.
BLDG 820 EXIST.
EXIST. ASPHALT
(SWALE)
REGRADE END OF SWALE
NEW AC PVMT
ROOF LINE ABOVE
NEW AC PAVING
NEW GATE
NEW FENCE
BRADLEY ROAD
CO RIM 13.80
SIDEWALK & CURB
3'x3' H.C. DETECTABLE WARNING PATTERN EMBOSSED IN CONC. & CENTERED ON DOORWAY.
POND
SWALE
BOTT. ELEV. 9.50
RIM 13.1
SWALE
CO RIM 13.45±
EXIST. CONTOUR LINES (GRAVEL)
NEW CONTOUR LINES SOLID.
ROOF LINE ABOVE
CB RIM 12.80
EDGE AC PAVING
CONTAINMENT (TYP.) BASIN, BOTT. ELEV. 9.50
CONTAINMENTS W/ LINER SHADED (TYP.)
TO GRATE 10.22
TO CONC. CURB 11.30
CB RIM 10.80
DOCK
CONC. RAMP
TO WALL 13.30
AC 12.80
TO GRATE 10.30
RIM 10.0
CMH RIM 12.25
TO WALL 12.85
AC 12.35
CB RIM 12.50
TC 12.55
SHED 206 EXIST.
EXIST. BLDG 209
EXIST. BLDG 208
EXIST. BLDG 1049
EXIST. BLDG 884
8' CHAIN LINK FENCE
GATE
STORM WATER POND 8.00
AC PATCH (MATCH EXIST.)
GRASS
STORM WATER POND 8.00
NEW AC PVMT
CONC. RAMP
SIDEWALK
BOLLARD
GADBERRY STREET
(SLOTTED DRAIN) - EXIST
EXIST. CONC.
TOP OF BANK
℄ DITCH
CONC. CURB
ELEV. 12.41 40-A-U
EXIST. BLDG 824
PRICHARD STREET
PRICHARD ST.
EDGE OF WATER
EXIST. BLDG 1129
N
GRAPHIC SCALE
GRADING & PAVING PLAN
SCALE: 1" = 20'
IF SHEET IS LESS THAN 28" X 40" IT IS A REDUCED PRINT — SCALE REDUCED ACCORDINGLY
C-5
REVISIONS
DEPARTMENT OF NAVY
WESTERN DIVISION
HAZARDOUS WASTE
TSO (P 370)
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SECTION G

APPENDIX G5

EMERGENCY EQUIPMENT LOCATION

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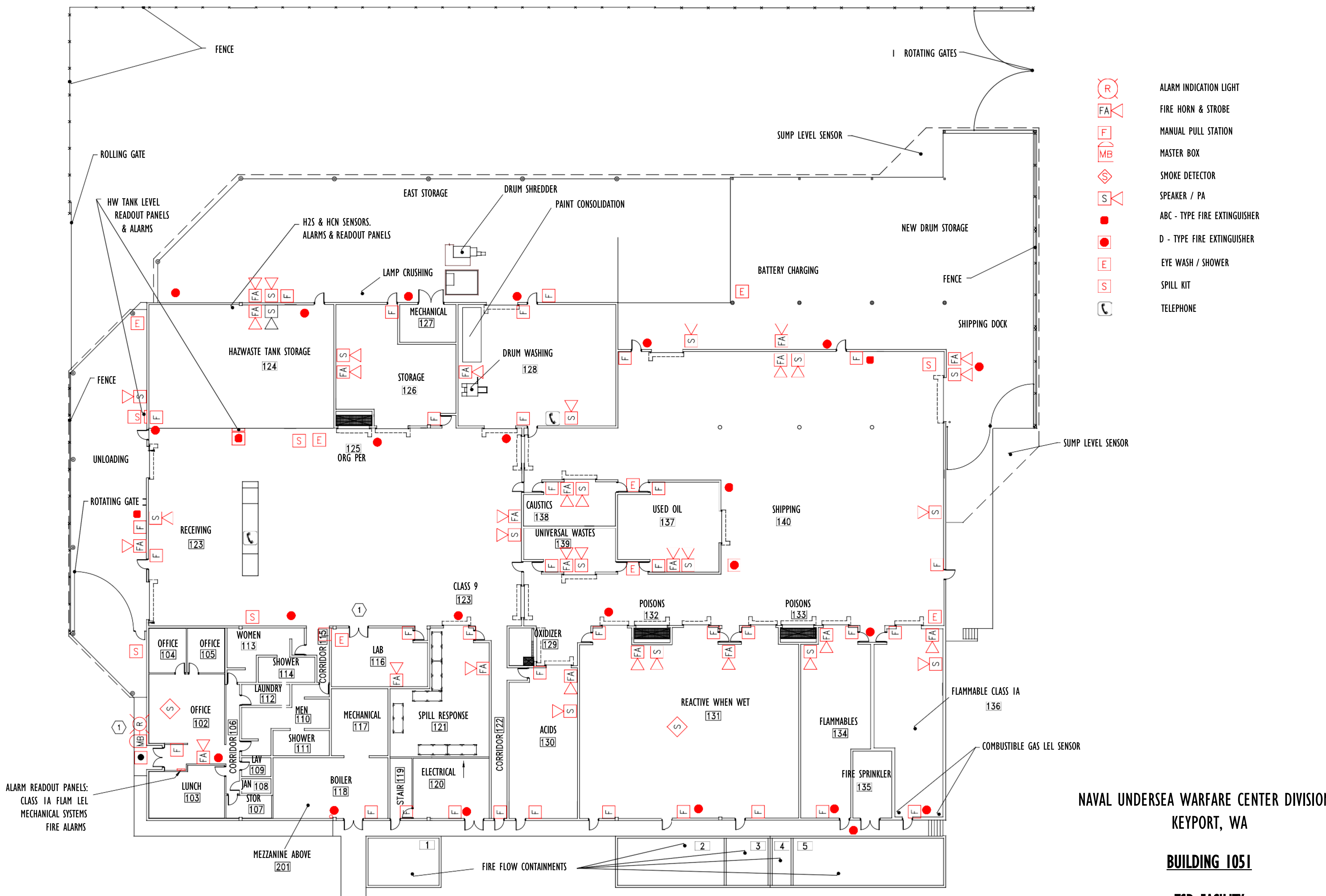

NAVAL UNDERSEA WARFARE CENTER DIVISION
KEYPORT, WA

BUILDING 1051

TSD FACILITY
EMERGENCY EQUIPMENT LOCATION

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SECTION G

APPENDIX G6

HAZARD EVALUATION

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Hazard Evaluation

While securing personnel safety and controlling the site, the EC shall define hazards involved and the severity of the release as quickly, safely, and completely as possible.

1. IDENTIFY hazardous substances involved. Be familiar with the NBK Keyport Quick Response Guide and hazards associated at the site. Look for labels, markings, and shipping papers on containers. Ask site personnel (supervisor, persons involved, and knowledgeable personnel on scene) and assess any physical symptoms being experienced by individuals who were at the location when the hazard first emerged to help identify substance(s) involved.

   Unknown Substance – If substance(s) cannot be identified, call the NBK Bangor Hazmat Spill Response Team Bravo and initiate unknown substance analysis through our DLA contract or our local Keyport Lab.

2. IDENTIFY the safety hazards associated with the substance(s) involved. Use appropriate Emergency Response Guides. However, if, after assessing the situation it is determined that the nature, severity, and materials involved in the situation is beyond the capability of initial responders to adequately assure personnel safety, contain and control operations, then call the NBK Bangor Hazmat Spill Response Team Bravo to assist.

3. INSTRUCT response personnel on proper safety procedures and the protective equipment appropriate to use in and around the release area.

4. DETERMINE relative seriousness of the situation. What is the condition of the release? Is it contained? Is it stopped? If not contained, is it safe for response personnel to control/contain release?

5. IF NECESSARY, direct the entry team to carefully evaluate conditions near the immediate release area and its surroundings, to determine actual/potential dangers:

   - Possibility of fire/explosion.
   - Oxygen deficiency – particularly in confined spaces.
   - Presence of toxic gases or vapors.
   - Presence of incompatible materials.
   - Possibility of dangerous vapors affecting surrounding area.

   WARNING: EVERY ATTEMPT shall be made to assess the situation from a safe distance. Response personnel shall wear proper breathing apparatus and protective gear to approach the release. A backup team shall stand by to provide support. The entry team shall approach a release from upwind and upgrade, assuming worst-case ambient concentration of the substance.

6. Consider the following factors that can drastically influence precautionary measures, release control methods, and necessary resources (i.e., personnel and equipment) for stabilization of an incident:

    - Substance characteristics.
    - Quantity released and physical state.
    - Actual/potential hazards.
    - Weather conditions.
    - Release movement.
    - Existing containment barriers – natural or man-made.
    - Existing drainage.
    - Distance to environmentally sensitive or highly populated areas.

SECTION G

APPENDIX G7

RELEASE CONTAINMENT AND CONTROL

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Release Containment and Control

The On-Scene Coordinator or EC shall direct actions toward controlling and containing a release by ensuring that all appropriate safety precautions are taken, the best control methods are selected, and proper release response equipment is available. Control of immediate hazards, such as fire, explosion, or toxic gas release, shall have top priority. Depending on the type and condition of a release, some or all of the following procedures may be employed.

1. If a release is burning, take the following actions:

   - DECIDE whether to extinguish the fire or to let it burn. WEIGH hazards of fighting the fire and post-fire cleanup against the benefit of possible salvage. Suggested criteria for “burn/no-burn” decisions are given in Table G7-1.

   - If a decision is made to extinguish the fire, FIGHT THE FIRE, being careful to use firefighting methods compatible with the substance(s) involved. Know exact locations, reactions to water or other chemicals, and safe distance to fight the fire. Consult the Emergency Response Guides in the DOT Emergency Response Guidebook or the NFPA HM Fire Protection Guide when necessary.

   - STAY UPWIND of the smoke. It may be TOXIC.

   - REMAIN AT A SAFE DISTANCE from burning bottles, drums, and cans. These are not vented and may rupture violently, spreading toxic chemicals.

   - COOL nearby containers and buildings to prevent fire from spreading. Use as little water as possible to minimize spreading of contaminants. Control runoff water in the smallest areas possible, away from the fire fighting activity.

   - SEEK MUTUAL AID ASSISTANCE from the local Fire Department if necessary to control fire.

   - After extinguishing the fire, institute any action required to further control the release, following the procedures described in the "Release Not on Fire" subsection. If appropriate, reevaluate the situation and take necessary precautionary measures (e.g., readjust control perimeters).

Table G7-1
Suggested Criteria for "Burn/No Burn" Decisions

CRITERIA	ALLOW TO BURN WHEN:	EXTINGUISH FIRE WHEN:
Location of release/fire/ explosion	Fire is isolated away from public and buildings	Fire is close to public and buildings
Availability of safety equipment	Equipment is limited	Protective clothing and self-contained breathing apparatus are available
Population density	People are few or have been evacuated	People are many and have not been evacuated
Presence of other combustible materials	No other combustible materials are present	Hazardous materials are present. Also petroleum or natural gas pipes or storage containers, wooded areas, or combustible structures
Substance released	Substance has a high vapor pressure High toxic vapors are detected Combustion produces non-toxic materials	Substance has a low vapor pressure Low toxic vapors and fumes are detected Combustion produces hazardous by-product(s)
Containment Status	Containment is complete	Fire/release is uncontrolled
Release from source	Release continues to be emitted	Release has been stopped
Availability of foams, dry chemicals, or powders	Availability is limited	Availability is sufficient
Wind conditions	Calm	Strong, gusty winds

Note: The OSOT library contains valuable reference materials for control of fire situations and flammable substances during releases, including the following:

a. The EPA Standard Operating Safety Guides.

b. The NFPA HM Fire Protection Guide.

c. The Bureau of Explosives: Emergency Handling of HM in Surface Transportation.

2. <u>If a release is not burning and has not entered a waterway</u>, the methods selected for containing or controlling the spread of material will depend on the materials involved, material state (liquid, vapor, etc.) and incident location. General response actions

are described below. Table G7-2 describes various techniques applicable to different scenarios and identifies the type and location of equipment required.

a. STOP SOURCE of release if it is still occurring.

    - Close valves.

    - Plug leaks in containers.

    - Put container in an upright position.

    - Replace leaking containers.

    - Empty leaking container(s) into non-leaking container(s).

    - Encapsulate leaking container(s) into larger recovery container(s).

b. STOP SOURCE of release if it is still occurring.

    - Ventilate indoor areas. Use blow-out ventilation or portable EXPLOSION-PROOF fans only. Open doors and windows.

    - <u>Be cautious of water-reactive chemicals</u>. Consult the DOT Emergency Response Guides or accessible technical references as necessary.

    - Flush corrosives to reduce vapors. Control runoff.

    - Use fog-streams to absorb vapors.

c. CONTAIN release or PREVENT release runoff from entering sewer or drainage systems, or reaching surface or ground waters.

    - Construct dams or dikes to contain the release as close to the source as possible. Use sand, dirt, or any available inert absorbent material, foams, or gels suitable to dam the flow.

    - Excavate temporary ditch, trench, or channel to direct release runoff to containment.

    - Use plastic cover for floor and storm drains.

d. DO NOT DILUTE the release unless absolutely necessary to prevent imminent danger to life. Obtain authorization from Commander, NUWC Keyport and notify NOSC.

e. MINIMIZE spreading of dust or powder releases. Cover with tarp to protect from wind and rain.

3. <u>If a release has entered, or is in danger of entering a waterway</u>, procedures applicable for controlling the spread of contamination will depend most strongly on how the material behaves in water (i.e., floats or sinks). Refer to Table G7-2 for containment measures. Proposed booming and collection strategies for oily releases into contingent waters can also be found in the Central Puget Sound Geographic Response Plan (GRP) published by the Washington State Department of Ecology (Publication 94-205).

    a. ANTICIPATE the movement of the release.

    b. INSTRUCT Response Personnel to take all necessary and possible action (close storm drains, construct dam, deploy temporary interception devices, etc.) to prevent the release runoff from exiting NUWC property.

    c. DETERMINE the facts of the release.

    d. VERBALLY NOTIFY the NOSC of the incident within 10 minutes after the NRC and State have been notified and PROVIDE the following information:

        - Hazardous substance(s) involved and quantity released
        -
        - Magnitude and severity of the threat to people, property, and the environment
        - Affected areas
        - Responsible party – Navy, non-Navy
        - Anticipated containment and cleanup actions
        - Type of ASSISTANCE required
        - Any other RELEVANT information

    e. COORDINATE activation of appropriate Government/private response organizations with the NOSC, as necessary, to control and remedy the situation.

    f. DIRECT on-base resource to take all possible action to minimize the impact and spreading of the release until additional assistance arrives at the scene.

    g. NOTIFY the Staff Public Affairs Officer of the release incident. Direct him/her to keep informed of the size and nature of the release and the response actions, and coordinate news releases with the NOSC Public Affairs Officer through the ARC.

    h. NOTIFY the Legal Counsel. Direct him/her to coordinate all legal aspects associated with the release.

i. If the party responsible for the release is other than the Navy:

- INFORM the responsible party of the release.

- If the responsible party is a contractor, NOTIFY the contracting office.

j. COOPERATE with and SUPPORT all off-base organizations directed by the NOSC to assist in the response effort.

k. MAINTAIN on-scene command until relieved by the NOSC, if necessary.

l. When the release is contained and the situation is under control, DECLARE "End of Emergency" and DEACTIVATE emergency units. Direct them to be on alert in case conditions change.

m. SUBMIT the appropriate hazardous substance release report message.

Table G7-2
Methods for Hazardous Substance Release
Control and Containment

TECHNIQUE	USE/SCENARIO	EQUIPMENT REQUIREMENTS	EQUIPMENT CHARACTERISTICS	EQUIPMENT LOCATION
Source Control • Patching • Plugging • Valve shutoff • Set upright and/or drain container	Stop release from leaking container or valve	Leak control kit Hand tools	• Spark-resistant tools, (nonferrous) • Release Site	• Building 1051 • Naval Base Kitsap Bangor HAZMAT response vehicle
Gas Vapor Reduction	Control/mitigate immediate hazard from flammable, explosive, and toxic gases/vapor	• Portable fans, blowers • Fire-fighting foams • Water sprays/mists • Absorbent pads and sheets	• Explosion-proof electrical equipment • No power tools • Inert, non-reactive absorbent (special for vapor control)	• Building 1051 • CNRNW Fire and Emergency Services
Drain Covering	Avoid liquid release runoff into floor/storm drains	Cover sheets (Plastic, Rubber)	Chemical resistant	• Building 1051 • Naval Base Kitsap Bangor HAZMAT response vehicle
Dust Covering	Prevent dispersion of powder chemical release	Cover sheets	Chemical resistant	• Building 1051 • Naval Base Kitsap Bangor HAZMAT response vehicle
Herding	Prevent expansion of liquid releases on land or insoluble, floating spills in water	Cover sheets	Chemical resistant	• Building 1051 • Naval Base Kitsap Bangor HAZMAT response vehicle
Diking or Damming	Contain liquid runoff or water stream contaminated by soluble or miscible release	• Earth-moving equipment and tools • Foams (polyurethane) • Absorbent barriers (sealed booms, pillows, sandbags)	• Inert, non-reactive absorbent material • Spark-resistant tools, (non-ferrous)	• Naval Base Kitsap Bangor HAZMAT response vehicle • Outside contractor
Ditch/Trench Excavation, Culverts	Divert liquid releases on land or water stream to containment	Earth-moving equipment and tools Prefabricated culvert	Spark-resistant tools, (non-ferrous)	• Building 1051 • Naval Base Kitsap Bangor HAZMAT response vehicle
Floating Barriers	Contain insoluble floating releases	Booms & device to deploy booms	Chemical resistant	• Port Services Piers • Oil OSOT
Absorption	Contain, collect, and remove liquid releases on land or insoluble floating releases in water	Sorbents: sheets, mops, pillows, booms, granular	• Inert, non-reactive materials • Specific absorbent for specific release substance	• Building 1051 • Naval Base Kitsap Bangor HAZMAT response vehicle

SECTION G

APPENDIX G8

MEMORANDUM OF AGREEMENT BETWEEN

COMMANDER, NAVY REGION NORTHWEST

AND

PUGET SOUND NAVAL SHIPYARD & INTERMEDIATE

MAINTENANCE FACILITY

AND

NAVAL UNDESEA WARFARE CENTER DIVISION, KEYPORT

AND

UNMANNED UNDERSEA VEHICLE SQUADRON ONE

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N68742-20180803-2747

DEPARTMENT OF THE NAVY
COMMANDER, NAVY REGION NORTHWEST
1100 HUNLEY RD., SILVERDALE, WA 98315-1100

UUVRON-1 7050 Ser I 21 JUN 2019	NUWCDIVKPT 7050 Ser 102/014 24 JUN 2019	PSNS & IMF 7050 Ser 106/033 28 JUN 2019	COMNAVREG NW 7050 Ser NS/0244 12 JUL 2019

MEMORANDUM OF AGREEMENT
BETWEEN
COMMANDER, NAVY REGION NORTHWEST
AND
PUGET SOUND NAVAL SHIPYARD & INTERMEDIATE MAINTENANCE FACILITY
AND
NAVAL UNDERSEA WARFARE CENTER DIVISION, KEYPORT
AND
UNMANNED UNDERSEA VEHICLE SQUADRON ONE

Subj: SPILL RESPONSE AREAS OF RESPONSIBILITY AT NAVAL BASE KITSAP, KEYPORT

Ref: (a) DoD Instruction 4000.19
(b) CNICINST 4000.1C
(c) COMNAVREG NW, et. al., MOA of 15 September 2009, Ser 17/169-09, Spill Response Areas of Responsibility at Naval Base Kitsap Keyport; SA# N68742-20090731-0126
(d) 31 U.S.C 1535
(e) 31 U.S.C 1341 and 1517
(f) NAVSO P-1000
(g) COMNAVREGNWINST 5090.10
(h) COMNAVREGNWINST 5450.1E

1. Purpose. To establish a Memorandum of Agreement (MOA) between Commander, Navy Region Northwest (COMNAVREG NW); Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF); Naval Undersea Warfare Center (NUWC) Division, Keyport; and Unmanned Undersea Vehicles Squadron ONE (UUVRON-1) per references (a) through (h), which define all parties' obligations and responsibilities in managing the environmental spill response program at Naval Base (NAVBASE) Kitsap, Keyport. This MOA revises and supersedes reference (c).

Subj: SPILL RESPONSE AREAS OF RESPONSIBILITY AT N VAL BASE KITSAP, KEYPORT

2. Background

a. COMNAVREG NW provides region-level management of the Oil and Hazardous Substance (OHS) spill response program per reference (g). NAVBASE Kitsap is assigned Real Property management responsibilities at NAVBASE Kitsap, Keyport per reference (h). NAVBASE Kitsap does not maintain an onsite port operations o environmental presence at NAVBASE Kitsap, Keyport. NUWC Division, Keyport maintains an environmentql department presence at NAVBASE Kitsap, Keyport and provides installation level on-site environmental department support for the OHS spill response program at NAVBASE Kitsap, Keyport.

b. NUWC Division, Keyport does not have land or water-based OHS spill cleanup response capabilities at NAVBASE Kitsap, Keyport. PSNS & IMF *is* the Navyrs waterborne spill response organization with the shortest response time to respond to in-water OHS spill events at NAVBASE Kitsap, Keyport. UUVRON-1 is a major new homeport command at NAVBASE Kitsap, Keyport, and requires over-water fueling services in support of its Unmanned Undersea Vehicles (UUVs) and support boats.

3. Scope. This MOA defines the working agreement, services, and responsibilities of each activity required to manage and operate spill response at NAVBASE Kitsap, Keyport.

4. Period of Performance. This MOA shall be in effect for nine (9) years from date of last signature, at which time the MOA shall lapse or be renewed per paragraphs.

5. Responsibilities

a. COMNAVREG NW will:

(1) Maintain overall responsibility and technical authority for the OHS Spill Prevention and Response Program at all COMNAVREG NW locations, including NAVBASE Kitsap, Keyport, through the COMNAVREG NW OHS Integrated Contingency l?lan (ICl?).

(2) Provide Navy On-Scene Coordinator (NOSC} suppo t for spills which exceed the response capabilities of the installation.

(3) Provide COMNAVREG NW Fire and Emergency Services (F&ES) support for spills at NAVBASE Kitsap, Keyport which includes:

(a) Upon report from the Regional Dispatch Center (RDC) or other appropriate authority, provide emergency esponse support for hazardous substance and oil spills.

{b) Assume initial Incident Commander (IC) duties and provide command and control response to OHS spills. For all releases, F&ES will coordinate with NUWC Division, Keyport and spill responders until the emergency phase is over. If necessary, command will be assumed by another designated IC, but not before the emergency phase is over.

(4) Upon request from the IC, the COMNAVREG NW designated NOSC will provide response and clean-up technical support units (Le., spill responders and equipment) to operate under direction of the IC for land-based and waterborne spills. Availability of technical support units will be subject to real world incidents and emergency needs of COMNAVREG NW.

(5) Upon request of the IC, will support cleanup and response operations and if necessary, mobilize the extended Spill Management Team.

(6) Participate in periodic exercises and/or equipment deployment drills at NAVBASE Kitsap, Keyport.

(7) Provide reimbursement to NUWC Division, Keyport and/or PSNS & IMF for environmental response or cleanup costs directly attributable to COMNAV EG NW activities.

(a) Any required reimbursement will be funded by use of NAVCOMPT Form 2275, Request for Work or Services; DD Form 448, Interdepartmental Purchase Request; or other acceptable form. A signed Department of Treasury FS Form 7600A (GT&C) will be required between trading partners prior to transfer of funds.

(b) Reimbursement shall be submitted to NUWC Division, Keyport (Code 01), 610 Dowell St., Keyport, WA 98345-7610 or PSNS & IMF (Code 600), 1400 Farragut Ave., Bremerton, WA 98314-5001.

b. <u>NUWC Division, Keyport will:</u>

(1) Through the direction of emergency response representatives, provide the planning, direction, and execution of the OHS spill prevention and response program at NAVBASE Kitsap, Keyport including but not limited to:

(a) Perform initial response actions, including notifications to the RDC, regulatory reporting, containing source if possible, and notifying and requesting services from COMNAVREG NW or PSNS & IMF as required.

(b) Coordinate and document investigation of root causes and corrective actions for reportable spills.

{c) Provide technical oversight of spill response operations at NAVBASE Kitsap, Keyport to include Otto Fuel spill response.

(d) Coordinate, plan and conduct periodic exercises and equipment deployment drills at NAVBASE Kitsap, Keyport, in coordination with OUVRON-1, COMNAVREG NW_1 and PSNS & IMF. Coordinate and document required training of NUWC Division, Keyport environme tal responders as appropriate.

(e) Maintain adequate space to store designated spill equipment and associated supplies assigned to Keyport, and allow PSNS & IMF, UOVRON-1, or COMNAVREG NW access for drills and response.

(f) Program £or and submit oil spill response equipment requirements for equipment under the maintenance responsibility of NUWC Division, Keyport through the Annual Allowance and Requirements Review (A2R2) program.

(2) Upon request, provide COMNAVREG NW with a copy of all pertinent NUWC Division, Keyport instructions and all related spill prevention records such as tank and pipeline testing.

(3) Provide reimbursement for spill related services provided by PSNS & IMF or COMNAVREG NW on the basis of actual costs incurred. Reimbursement will be provided on an "as-required" basis including but not limited to overtime pay, non-labor costsr and civilian labor when employed for waterborne response services (typically on major *oil* spills only).

{a) Any required reimbursement will be funded by use of NAVCOMPT Form 2275, Request of Work or Services; DD Form 448, Interdepartmental Purchase Request; or other acceptable form. A signed Department of Treasury FS Form 7600A (GT&C) will be required between trading partners prior to transfer of funds.

(b) Reimbursement shall be submitted to COMNAVREG NW (NS), 1100 Hunley Rd., Silverdale, WA 98315-1100; or PSNS & IMF (Code 600), 1400 Farragut Ave., Bremerton, WA 98314-5001.

c. PSNS & IMF will: upon request, provide on-water spill response support at NAVBASE Kitsap, Keyport in coordination with COMNAVREG NW, NUWC Division, Keyport, and/or UUVRON-1. Response to any spills, spill drills, or exercises will be on a reimbursable basis.

(1) Participate in any spill drills or exercises planned under paragraph Sb(l)(d) based on constraints of available resources.

{2} Ensure waterborne response equipment assigned to PSNS & IMF is maintained as required.

d. UUVRON-1 will:

(1) Conduct over-water fuel transfers per federal, state, and local laws and regulations, and local Navy instructions.

(2) Participate in training, drills, and exercise scenarios as required.

(3) Provide reimbursement to COMNAVREG NW, NUWC Division, Keyport, and/or PSNS & IMF for OHS program requirements and environmental response or cleanup costs attributable to UUVRON-1 activities per reference (f).

(a) Any required reimbursement will be funded by use of NAVCOMPT Form 2275, Request for Work or Services; DD Form 448, Interdepartmental Purchase Request; or other acceptable form. A signed Department of Treasury FS Form 7600A (GT&C) will be required between trading partners prior to transfer of funds. Reimbursement to PSNS & IMF will require a budget transfer because UUVRON ONE and PSNS & IMF are both commands within the same budget submitting office, COMPACFLT.

(b) Reimbursement shall be submitted to COMNAVREG NW {NS), 1100 Hunley Rd., Silverdale, WA 98315-1100; or PSNS & IMF (Code 600), 1400 Farragut Ave., Bremerton, WA 98314-5001; or NUWC Division Keyport (Code 01), 610 Dowell St., Keyport, WA 98345-7610.

6. Other Provisions

a. The parties agree that nothing herein will be construed as obligating any party to violate existing laws or regulations including reference (e).

b. The parties agree that all corrective actions and associated costs for violations of environmental laws or regulations are a responsibility of the attributable party.

c. All services provided by the parties are subject to the constraints of available resources (personnel, funds, and equipment}.

d. All support shall be provided per federal law and in compliance with the references (d) and (e).

7. Points of Contact

a. **COMNAVREG NW** Port Operations:
(360) 476-3467 {Port Operations Watch Tower)

b. RDC:
9-1-1 (Emergency from installation phones)
(360) 396-4444 (Emergency from non-installation phones)
(360} 315-4065 (Non-emergency)

c. **COMNAVREG NW NOSC:**
(360) 396-0222 (office)
(360) 340-5991 (cell)

d. NUWC Division, Keyport Environmental:
{360) 396-5682 (office)
(360) 620-5792 (cell)

e. UUVRON-1 Material Officer:
(360) 315 5663

f. l?SNS & IMF:
(360) 476-3333

8. Review, Modification, or Cancellation

a. This MOA is effective upon the affixation of all signatures and shall remain in force for nine (9) years unless modified or terminated by mutual consent of the parties concerned.

b. This MOA may be amended upon reasonable request from any party to this agreement; however, the amendment must be formally (in writing) approved by the authorized representatives from each party.

c. All parties shall conduct a triennial review of this agreement to evaluate its effectiveness and determine the need for continuation or modification per reference (a).

d, Requests for modification or termination by either party shall be provided in writing at least 120 days in advance of the proposed effective date per reference (a).

9. Approving Officials. The activities entering into this MOA, by their representatives' signatures below, agree to the responsibilities and procedures herein.

R. T. PATCHIN, CDR
Commanding Officer
Unmanned Undersea Vehicle Squadron ONE

21 JUN 19
Date

J. H. MORETTY, CAPT
Commanding Officer
Naval Undersea Warfare Center Division, Keyport

24 JUN 2019
Date

O. APT
Commander
Puget Sound Naval Shipyard & Intermediate Maintenance Facility

6/28/19
Date

ADT
Executive Director
Commander, Navy Region Northwest

12 JUL 2019
Date

N68742-20180803-2747

SECTION G

APPENDIX G9

MUTUAL AID AGREEMENT BETWEEN

COMMANDER, NAVY REGION NORTHWEST

AND

KITSAP COUNTY FIRE PROTECTION

AGENCIES

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MUTUAL AID AGREEMENT

BETWEEN

COMMANDER, NAVY REGION NORTHWEST

1100 Hunley Road, Silverdale, WA 98315

AND

CITY OF BREMERTON FIRE DEPARTMENT

NORTH KITSAP FIRE AND RESCUE

CENTRAL KITSAP FIRE AND RESCUE

SOUTH KITSAP FIRE AND RESCUE

BAINBRIDGE ISLAND FIRE DEPARTMENT

POULSBO FIRE, DISTRICT 18

KITSAP COUNTY, OFFICE OF THE FIRE MARSHAL

FOR

THE PROVISION OF FIRE PROTECTION AND EMERGENCY MEDICAL SERVICES

COMNAVREG NW
7050
Ser NS/

This agreement, entered into this 2nd day of March 2018, by and between Commander, Navy Region Northwest {COMNAVREG NW), on behalf of Commanding Officer, Naval Base Kitsap (NBK), Bremerton Fire Department, North Kitsap Fire and Rescue, Central Kitsap Fire and Rescue, South Kitsap Fire and Rescue, Bainbridge Island Fire Department, Poulsbo Fire District 18, and Kitsap County Office Of The Fire Marshal, (hereinafter, "Kitsap County Fire Protection Agencies") acting pursuant to the authority of 42 U.S.C. § 1856a, DoDI 6055.06, and OPNAVINST 11320.23G, is for the purpose of providing the benefits of mutual aid to the other entity, for the protection of life and property from wild land fires, as well as firefighting and fire suppression support. The anticipated support includes; but is not limited to; emergency services of basic medical support, basic and advanced life support, hazardous material containment and confinement, and special rescue events involving vehicular and water mishaps, and trench, building and confined space extractions.

It is the policy of the Department of the Navy and COMNAVREG NW to enter into Mutual Aid Agreements (MAA) with non-federal fire departments located in the vicinity of naval installations whenever practicable. The parties have mutually concluded that it is desirable, practicable, and beneficial for the parties to enter into this MA.A to document their willingness and ability to render assistance to one another in order to enhance the safety and security of the civilian community and naval facilities.

Hereinafter, the term "COMN"AVREG NW Fire and Emergency Services (F&ES)" refers specifically to the F&ES organization located on and servicing NBK.

It is agreed that:

1. Upon request fromKitsap County Fire Protection Agencies, firefighting equipment and personnel of COMNAVREG NW F&ES will be dispatched; subject to operational requirements and resource availability; to any location within the area for which the Kitsap County Fire Protection Agencies are responsible to provide fire protection and emergency medical services.

2. Upon request from the COMNAVREG NW F&ES, firefighting equipment and personnel of theKitsap County Fire Protection Agencies will be dispatched; subject to operational requirements and resource availability; to any location within the area for which COMNAVREG NW F&ES is responsible to provide fire protection and emergency medical services.

3. The party receiving a request for assistance shall endeavor to immediately inform the requesting party if assistance can or cannot be provided, and the type and quantity of resources available for dispatch.

4. Neither party shall hold the other party liable or at fault for being unable to respond to a request for assistance nor being able to respond in a timely manner, or responding with less than optimum equipment/personnel, as the parties understand that each is primarily and ultimately responsible for providing fire suppression and hazardous material incident response within their own jurisdictions.

S. The requesting and rendering of assistance under the terms of this MAA shall be per detailed operational plans and procedures developed by the individual parties. All parties shall work together to implement such plans and procedures in a manner compatible with their respective operational authorities. It is understood that the rendering of assistance under the terms of this MAA is not mandatory.

6. Under the authority of 15 U.S.C. § 2210 and 44 C.F.R § 151, Kitsap County Fire Protection Agencies are permitted to seek reimbursement for direct expenses and losses (defined as additional firefighting costs over normal operational costs} incurred in fighting fires on property under the jurisdiction of the United States Government.

7. Under the authority of 42 U.S.C. § 1856a, either party may seek reimbursement from the other for the costs incurred by it in providing services to the other party in response to a request for assistance. Further, all parties agree to waive all claims against every other party for compensation for any loss, damage, personal injury, or death occurring in consequence of the performance of this agreement.

8. All equipment used by any party in carrying out this agreement will; at the time of action; be owned by it. All personnel acting under this agreement will; at the time of such action; be an employee or volunteer member of the party.

9. Any dispatch of equipment and personnel pursuant to this agreement is subject to the following conditions:

a. Any request for aid shall include the amount and type of equipment and personnel requested and specify the location where the equipment and personnel are to be dispatched.

b. Upon receipt of a request for assistance, equipment and personnel will be immediately dispatched along with instructions as to their mission, use, and deployment in quantities and amounts that can be provided without jeopardizing the *mission* of the fire department providing the resources, per the judgment of the senior officer of the responding party.

c. The senior officer of the requesting fire department shall normally assume full charge of the operations at the scene of the fire or other emergency. However, under procedures agreed to by the heads of the fire departments involved, a senior officer of a fire department furnishing assistance may assume responsibility for the coordination of the overall operations at the scene of the fire or emergency.

d. A responding fire department shall be released by the requesting party when the services are no longer required or when the responding fire department is needed in its own jurisdiction.

1o. Training:

a. Whenever either party hosts fire protection training for its own personnel (host department) it may; to the maximum extent practicable and subject to its sole discretion; offer the training to personnel of the other party (guest department). Training will be provided on a space available basis only.

b. The host department will not charge the guest department for training coursework provided pursuant to this MAA unless there is a cost that cannot be covered by the host department, such as an individual student fee/tuition or cost of a certificate.

c. The guest department or its personnel will be responsible for the payment of any and all logistic costs necessary to attend training provided by the host department, including; but not limited to; lodging, meals, and travel expenses.

d. This MAA is entered into voluntarily by the parties with no obligation on their part to either provide training or to participate in any offered training.

e. The guest department is responsible for ensuring that its personnel observe all rules, regulations, and guidelines for training provided by the host department. Neither party shall hold another party liable or at fault for damage or injury incurred during joint training activities.

f. The host department reserves the right to deny training to,any guest department personnel who do not meet the prerequisites necessary to attend the offered training.

11. Execution of this Agreement:

a. This MAA shall become effective upon the date annotated above, and shall remain in full force and effect for a period not to exceed five (5) years, or until cancelled by mutual agreement of the parties, or upon the provision of at least sixty (60) days advance written notice from the party desiring to terminate this agreement to the other.

b. Following the 5 years, the agreement will either automatically terminate or be renegotiated.

12. signatures:

North Kitsap Fire & Rescue:

6-12-17
GIIJ\NGREGORY **GREGORY** | **Date**
Board Chair

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FERNANDO"ESPIN Date
Commissioner

6/12/17
EN [redacted] NEUPERT **Date**
[redacted]

6-12-17
WII,SONSTEWART **Date**
Commissioner

6/12/17
PATRICK PEARSON **Date**
Commissioner

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CINDYM°'4 7 Date
District Secretary

Central Kitsap Fire & Rescue:

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DICK WEST **Date**
Board Chair

6.26.17

BOB MUHLEMAN **Date**
Commissioner

6-26-17

NATE ANDREWS **Date**
Commissioner

(,,-z_./,,-/ 7

KEN ERICKSON **Date**
Commissioner

6/26/17

GUY EARLE **Date**
Commissioner

KENNETH BAGWELL **Date**
District Secretary .

FOR THE PROVISION OF FIRE PROTECTION AND EMERGENCY SERVICES

South Kitsap Fire & Rescue:

07/13/17
DAVE GELSLEICHTER Date
Board Chair

NOT PRESENT
MIKE ESLAVA Date
Commissioner

7-13-17
PAUL GOLNIK Date
Commissioner

7-13-17
GERALD PREUSS Date
Commissioner

-(7
DUSTY WILEY Date
Commissioner

7. 13 17
District Secretary Date

N68436-20170601-2066

Bainbridge Island Fire Department:

4: 4-27-17 d- 4/27/17

Board Chair Date **Commissioner** Date

4/27 4/27/17

BRUCE ALWARD Date FRITZ VON IBSCH Date

Commissioner **Commissioner**

Poulsbo Fire Department:

N/A-

MARTIN SULLIVAN **Date**
Commissioner

2 • ...,.,.·17

DAVID ELLINGSON **Date**
Commissioner

6/14/17

DARRYL MILTON Date
Commissioner

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CONRAD GREEN at? -
Commissioner

JAMES INGALLS **Date**
Commissioner

0/14-/1,

LISE ALKIRE **Date**
District Secretary

N68436-20170601-2066

FOR THE PROVISION OF FIRE PROTECTION AND EMERGENCY SERVICES

City Of Bremerton:

07-05-17

PATTY LENT Date
Mayor

SHANNON L. CORIN Date
City Clerk

""JULY QU>/7

ROGER A. LUBOVICH Date
City Attorney

Kitsap County:

BOARD OF COUNTY COMMISSIONERS

KITSAP COUNTY, WASEINGTON

ATTEST:

2-12-18

ROBERT GELDER, Chair

Dana Daniels, Clerk of the Board

EDWARYJf OLFE, Commissioner

l¼Ji/uxiz. -

CHARLOTTE GARRIDO, Commissioner

FOR THE PROVISION OF FIRE PROTECTION AND EMERGENCY SERVICES

Commander, Navy Region Northwest

6/1/2017

EDWARD · SCHRADER, CAPT, USN Date
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SECTION G

APPENDIX G10

NRNW Battalion 2 - HazMat Equipment Inventory

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NRNW Battalion 2 - HazMat Equipment Inventory

	DESCRIPTION	Quantity
PPE	Kappler Zytron 500 Level A Suit	20
PPE	Kappler Zytron Frontline 500 Level A Flash Suit	6
PPE	Kappler Zyton 300 Level B Suit	18
PPE	HazMax Boots	44
PPE	Butyl Rubber Gloves	5
HAZMAT	Monitoring, pH paper, etc	10
HAZMAT	Weather Pak 400	1
HAZMAT	Incident Command Vest System	1
HAZMAT	ConSpace Voice Amplifier	8
Detection	Multi RAE PRO Chemical Monitor	3
Detection	Draeger XAct5000	1
Detection	BADD Kit (Biological Field Analysis)	1
Detection	LEICA GEOVID Laser Binoculars	1
Detection	6 Foot Liguid Sampler	2
Detection	JCAD	4
Detection	Thermo Scientific First Defender RM	1
Detection	GR-135 Radioactive Isotope Identification Device	1
Detection	Inspector EXP + Radiation Meter 3 per case	1
Detection	QSA-102 Chem/Bio Sampling Kit	1
Detection	Cannon Power Shot S-500 Digital Camera	1
Detection	Water Tight Gigital Camera Case	1
Detection	Various Sample Bottles	20
Detection	Inficon Natural gas Detector	6
Detection	Trident One Decon Nozzel	1
Detection	Handheld Infrared Thermometer	1
Detection	M34A Sampling Kit	1
Decon	Stacker Cones	12
Decon	Decontamination Pools	4
Decon	USAR Decon Shelter	1
Decon	TVI 3-Line Decon Shelter System	1
Decon	Waste Water Bladder Kit	3
Decon	HMD Sked Rescue System	1
Decon	Herculite Decon Tarp 22'x44'	1
Decon	FSI Inflatable Decon Shower	2
Decon	Decon Manifold	1
Decon	EconoFlo Hose	4
Decon	Decon Brushes	4
Decon	Folding Dolly	1
Decon	IRT Decon Tent	1
Decon	Folding Chairs	16
Containment	Chlorine "A" Kit	1
Containment	Chlorine "B" Kit	1
Containment	Chlorine "C" Kit	1

NRNW Battalion 2 - HazMat Equipment Inventory (C(continued))

	DESCRIPTION	Quantity
Contaimnent	Drum and Tank Repair Kit	1
Containment	Plug and Wedge Kit	1
Containment	55 gallon Overpak Drum	3
Containment	20 gallon Overpak Drum	2
Containment	Non-Sparking Polypropylene Shovels	3
Containment	Non-Sparking Polypropylene Brushes	5
Reference	GOBOOK III	1
Reference	Haz/Mat Reference, Geniums Handbook	3
Reference	Haz/Mat Reference, SAX's Dangerous Prop.	3
Reference	Haz/Mat Reference, CHRIS Manual	3
Reference	Haz/Mat Reference, Hawley's Cond. Chem. Dict.	3
Reference	Haz/Mat Reference, NIOSH Pocket Guide	3
Reference	Haz/Mat Reference, Emergency Response Guide	25
Reference	Haz/Mat Reference, HazMat Guide for Emerg. Res	3
Reference	Haz/mat Ref., Emerg. Handling in Surface Trans.	3
Reference	Haz/Mat Reference, Janes Chem-Bio Handbook	3
Reference	Haz/Mat Reference, Handbook of Chem-Bio WF	3

SECTION H

PERSONNEL TRAINING

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H. PERSONNEL TRAINING
WAC 173-303-330; 806(4)(a)(xii)

H1. INTRODUCTION
WAC 173-303-330; -860(4)(a)(xii)

The training program managed by the TSD Facility prepares personnel to maintain and operate the TSD Facility in a safe manner and in compliance with regulatory requirements. The program also prepares personnel to respond effectively to emergency situations. All personnel at the TSD Facility undergo training according to this program. A copy of this program is kept in the TSD Facility operating record.

The TSD Facility Training Program addresses the following types of training:

- Initial Training, H2.
- Job-specific Training, H3.
- Continuing Training, H4.

Every employee directly supporting operations involving dangerous waste treatment or storage receives Initial Training (see Section H2) and Job Specific Training (see Section H3) essential for their assigned specific task prior to being allowed to work in the dangerous waste processing and storage areas unsupervised. Initial Training includes courses 101 through 116 in Table H1-1. All training is tracked and documented in the TSD Facility operating record.

Job-specific training is related to the specific duties of each job function and is uniquely tailored for the position based on the new employee's education, experience, and other qualifications. Job-specific training has been developed for the DW Handler, DW Collector, DW Designator, Dangerous Waste Program Manager, and the Environmental Manager. A matrix of which training courses apply to what positions is shown in Table H1-1.

Regional Fire Department personnel, the first responder in case of a spill or accident, attend a 24-hour spill responder training course by a certified provider. Spill cleanup is performed by Base Operation Services Contractor personnel who are required to attend 40-hour HAZWOPER training prior to performing any cleanup duties. Security personnel do not receive any training because they do not have access to the site. Their duties consist of reporting alarms visible or audible at the perimeter of the site to the Command Monitoring and Dispatch Center (CMDC). The CMDC contacts the Regional Fire Department and Emergency Coordinator in response to reported alarms.

The Primary and Secondary Emergency Coordinators (ECs) will take training for course numbers 101, 102, 103, 105 through 115, 117, 303, 304, 305, and 316 prior to being assigned to this position. The Secondary EC does not work at the TSD Facility but functions as the Base EC and had TSD Facility experience prior to being detailed as the Hazardous Material Program Manager. Both Emergency Coordinators will respond to any emergencies that occur during the training period to provide field experience for the trainee.

In addition, every employee involved in the operations of the TSD Facility will participate in continuing training on the refresher schedule shown in Table H1-1 for courses assigned to their

Table H1-1. Training Matrix

Class Title	Course Number	Initial Schedule (days)	Refresher Schedule (days)	Environmental Manager	DW Program Manager (Primary EC)	HM Program Manager (Secondary EC)	DW Designator	DW Collector	DW Handler
Initial General Orientation Training									
Facility walk-through	101	3	NA	X	X	X	X	X	X
40hr HAZWOPER	102	180	NA	X	X	X	X	X	X
Part B Permit	103	180	365	X	X	X	X		X
Housekeeping	104	180	365		X		X		X
Incident Reporting	105	180	365	X	X	X	X	X	X
Emergency Response	106	180	365	X	X	X	X	X	X
Hazard Communication	107	180	365	X	X	X	X	X	X
Accumulation Site Inspection	108	180	365		X	X		X	X
PPE	109	180	365		X	X		X	X
Respiratory Protection	110	180	365		X	X			X
CPR – First Aid	111	180	730		X	X		X	X
Confined Space Entry	112	180	365		X	X			X
Lockout-Tagout	113	180	365		X	X			X
Emergency Equipment	114	180	365		X	X		X	X
Fire Training/Fire Extinguishers	115	180	365		X	X		X	X
DOT Training & Refresher	116	180	1095		X		X		X
8-Hour HAZWOPER Refresher	117	N/A	365		X	X	X	X	X
8-Hour DOT Refresher	118	N/A	1095		X		X		X
Job Specific Training									
Waste Identification and Required Record Keeping									
Record Keeping	201	90	365		X		X		X
Incoming Manifest/Waste Tracking	202	90	365		X		X		X
Container Labeling Marking	203	90	365		X		X		X
Check In Procedures with Discrepancies	204	90	365		X		X		X
Problem Manifest Procedure	205	90	365		X		X		X
Waste Analysis Plan	206	90	365		X		X		
Waste Designation	207	90	365		X		X		
Dangerous Waste Management/Facility Operations									
Forklift Operation/Certification	300	90	1095		X			X	X
Drum Management	301	90	365		X			X	X
Portable Tank Management	302	90	365		X			X	X
PCB Recognition	303	365	365		X	X	X		X
Hazard Recognition (Reactive wastes)	304	90	365		X	X	X		X
Waste Characteristics and Compatibility	305	90	365		X	X	X		X
Chemical Segregation and Storage	306	90	365		X		X		X
Storing Product Chemical Drums	307	90	365		X		X		X
Labpacking	308	90	365		X		X		X
Sampling	309	90	365		X		X		X
Vacuum Truck Operations	310	90	365		X			X	X
Tanker Truck Loading Operations	311	90	365		X				X
Tank Operations Procedures	312	90	365		X			X	X
Paint Consolidation Procedure	313	90	365		X				X
Pressure Washer Operations	315	90	365		X				X
Required Inspections	316	90	365		X	X			X

“class title”. Employees receive continuing training to maintain proficiency, learn new techniques and procedures, and reinforce safety, quality, and compliance consciousness. The Training Program Administration is described in Section H5, and Documentation and Record Retention is described in Section H7. Job descriptions and personnel duties are provided in appendix H1 (Position Descriptions).

H2. INITIAL TRAINING

WAC 173-303-330(1)(c), 1(d), (2)(b); -806(4)(a)(xii)

All new TSD Facility employees will attend a 3-hour Facility Walk-through including a description of the TSD Facility and general operations and management organization structure presented by the TSD Facility Supervisor. In addition, all TSD Facility employees will attend Initial Training consisting of courses 101 through 116 in Table H1-1 within 180 days of assignment to the TSD Facility and before they are allowed to work in the dangerous waste processing or storage areas without direct supervision.

Emergency response training is part of the Initial Training provided to all employees at the time they are assigned to the TSD Facility, and is repeated annually (see course #106 in Figure H6-1).

As part of job-specific training all employees involved in TSD Facility operations are instructed in their specific duties and responsibilities related to emergency response. Job-specific emergency response training includes:

- Procedures for using, inspecting, verifying repairs and/or replacement of faulty emergency and monitoring equipment.
- Communications and alarm systems.
- Response to spill or groundwater contamination incidents.
- Shutdown of operations.

H3. JOB SPECIFIC TRAINING

WAC 173-303-330(1)(a) & (d), (2)(b); 806(4)(a)(xii)

After completing Initial Training, employees receive job-specific training.

The content of job specific training for DW Handler, DW Collector, and the DW Designator are outlined in Table H1-1. When a new DW Program Manager is assigned to the TSD Facility, the incoming DW Program Manager will either be a fully trained and experienced DW Program Manager or the outgoing DW Program Manager will provide the incoming Manager with all the training set forth in Table H1-1 during a two-week turnover period. The Environmental Manager receives training as set forth in Table H1-1 when these courses are offered to TSD Facility employees.

The level and quantity of training for each employee is geared to the duties and responsibilities of that employee’s position and the employee’s education, experience, and other qualifications. For example, facility management-level personnel need broad training in all aspects of dangerous waste management. This provides the necessary background and perspective for decision-making activities which can impact both the operation and condition of the TSD Facility and the health and welfare of the surrounding community. TSD Facility operations personnel need site-specific training appropriate to their individual job activities. New TSD Facility employees and current employees with new assigned job duties will receive Job Specific Training essential for a specific task before they are allowed to do that task without direct supervision.

H4. CONTINUING TRAINING
WAC 173-303-330(1)(b) & (2)(b); 805(4)(a)(xii)

Continuing training is designed to maintain proficiency in job skills, increase safety, quality, and compliance consciousness, and teach new skills. Continuing training consists of, but is not limited to, the following.

- Safety meetings with operational reviews and regulatory news (As Necessary).
- Annual refresher training – HAZWOPR (8 hrs/yr).
- Annual fire response training, including drills (~.5 hrs/yr).
- Annual emergency response and spill training, including drills (~.5 hrs/yr).
- Annual PPE – respirator reviews (~4 hrs/yr).
- Triennial DOT – labeling, manifesting, and placarding training. (8 hrs or more/3 years)
- Biennial CPR – first aid training (~8 hrs/yr).
- Periodic training to inform employees of new or revised regulatory requirements.
- Other courses identified in Figure H6-1.

At a minimum, every employee involved in operations associated with dangerous waste treatment or storage at the TSD Facility receives eight hours of annual refresher training in compliance with 29 CFR 1910.120 (p). This training updates all previous training, and includes a review of site operations and the types and characteristics of wastestreams handled at the TSD Facility. The Contingency Plan performance in emergency response is also reviewed. Changes in pertinent regulations are identified and current compliance status is reviewed.

H5. TRAINING PROGRAM ADMINISTRATION
WAC 173-303-330(1)(a), 1(c); -806(4)(a)(xii)

The Environmental Manager has overall responsibility for the development of the training program and oversees its implementation. Development and implementation of the training program has been assigned to the Dangerous Waste Program Manager, who is knowledgeable in dangerous waste management procedures, and who designates qualified instructors, approves the training program content and format, requests the necessary resources be provided, and ensures training records are maintained.

H5.1 TRAINING FORMAT

Training is conducted in meetings, small discussion groups, classroom settings, or at the employee's work site. Lectures, plant walk-throughs, and field demonstrations are also used as training methods. Much of the training is on-the-job training performed at the site, using actual equipment under actual job conditions with close supervision. Programmed instruction, i.e., videotapes, interactive video, or printed materials are available and sometimes used. For some training, courses and teaching materials developed by experts in the field are used. In addition, much of the regulation–required training is accomplished by attending seminars, and licensed, approved commercial or college courses.

H5.2 TRAINING EFFECTIVENESS EVALUATION

Qualitative evaluation techniques are used to measure a trainee's proficiency level. Examples of the evaluation techniques used include performance on written and oral exams and careful observation of on-the-job performance. The HW Program Manager determines whether the trainee has mastered the skills necessary to perform the tasks described in the job description. The HW Program Manager evaluates the training requirements and curriculum on an annual basis and incorporates new and useful instructional material to improve the quality and effectiveness of the training program.

H6. JOB TITLE/JOB DESCRIPTION

WAC 173-303-330(2)(a); -806(4)(a)(xii)

H6.1 Environmental Manager

Responsible for overall management of the Environmental Branch. The Environmental Manager provides all the required resources and is responsible for all personnel management in the Environmental Branch, including the TSD Facility.

H6.2 Dangerous Waste Program Manager

Responsible for ensuring that TSD Facility personnel have adequate facilities and training to perform their duties. Under direction of the Environmental Manager, the DW Program Manager:

1) Serves as the single point of contact for all waste issues that may require federal/state agency involvement.

2) Is responsible for keeping up with new regulatory requirements as they occur and integrating them into TSD Facility operations.

3) Provides training for all personnel involved in waste management and operations.

4) Maintains a current listing of Waste Site managers and alternates.

5) Reviews Waste Storage Site registration forms and formally authorizes the sites.

6) Is responsible for review and approval of all WGRs and profiles.

7) Is responsible for inspections/audits of all CAA and satellite waste storage sites.

8) Is responsible for all inspections at the TSD Facility as set forth in Section F (Procedures to Prevent Hazards).

9) Is part of the Hazardous Material Review Panel to ensure that waste resulting from material purchases can be handled at the TSD Facility.

10) Is part of the Change of Operations Review Panel to ensure waste stream sampling and analysis is considered for new processes.

11) Monitors and approves treatment protocols.

12) Monitors and approves selection of final disposal option.

13) Acts as the QA/QC Coordinator for the TSD Facility, which includes:

    a. Providing initial and annual training on QA/QC requirements
    b. Providing oversight to ensure documentation (both paper and electronic copies) is properly filed, secured, and available upon request,
    c. Ensuring that desk procedures or SOPs are available and up to date for each position at the TSD Facility, and
    d. Reviewing and/or auditing laboratories employed by the TSD Facility to ensure that waste analyses comply with state and federal requirements.

H6.3 DW Designator

Under direction of the Dangerous Waste Program Manager, and following desk procedures or SOPs of 13c above, the waste designator:

1) Provides initial review of MSDSs for Hazardous Material Review Panel.

2) Provides initial review of WGRs for completeness.

3) Provides research per WAC 173-303-300(2).

4) Requests and reviews results of analytical testing.

5) Designates and profiles wastes.

6) Makes initial determination of acceptability of new waste streams based on permit conditions, treatability and applicable disposal regulations.

7) Ascertains the compatibility group of new wastes for storage.

8) Maintains TSD Facility waste inventory in the on-line environmental management database.

9) Reviews and verifies test data.

10) Generates waste manifests.

11) Participates in biannual review and updating of all current WGRs and profiles.

12) Enters all data necessary to document task completion in the on-line environmental management system database.

H6.4 DW Handlers

Under direction of the Dangerous Waste Program Manager, and following desk procedures or SOPs of 13c above, the DW Handlers:

1) Sample waste streams for analytical testing.

2) Perform field screening and process testing.

3) Perform verification testing per TSD Facility Operating Manual.

4) Pick-up and log in waste from approved sites.

5) Maintain TSD Facility waste inventory in the on-line environmental management database

6) Treat waste per TSD Facility Operating Manual.

7) Package and label waste.

8) Perform waste site and TSD Facility required inspections.

H6.5 DW Collectors

Under the direction of the Dangerous Waste Program Manager, and following desk procedures or SOPs, the DW Collectors:

1) Pick up waste from approved on-station sites, verify that the waste container matches the waste description on the Hazardous Waste Pick-up Request and the Waste Disposal Request.

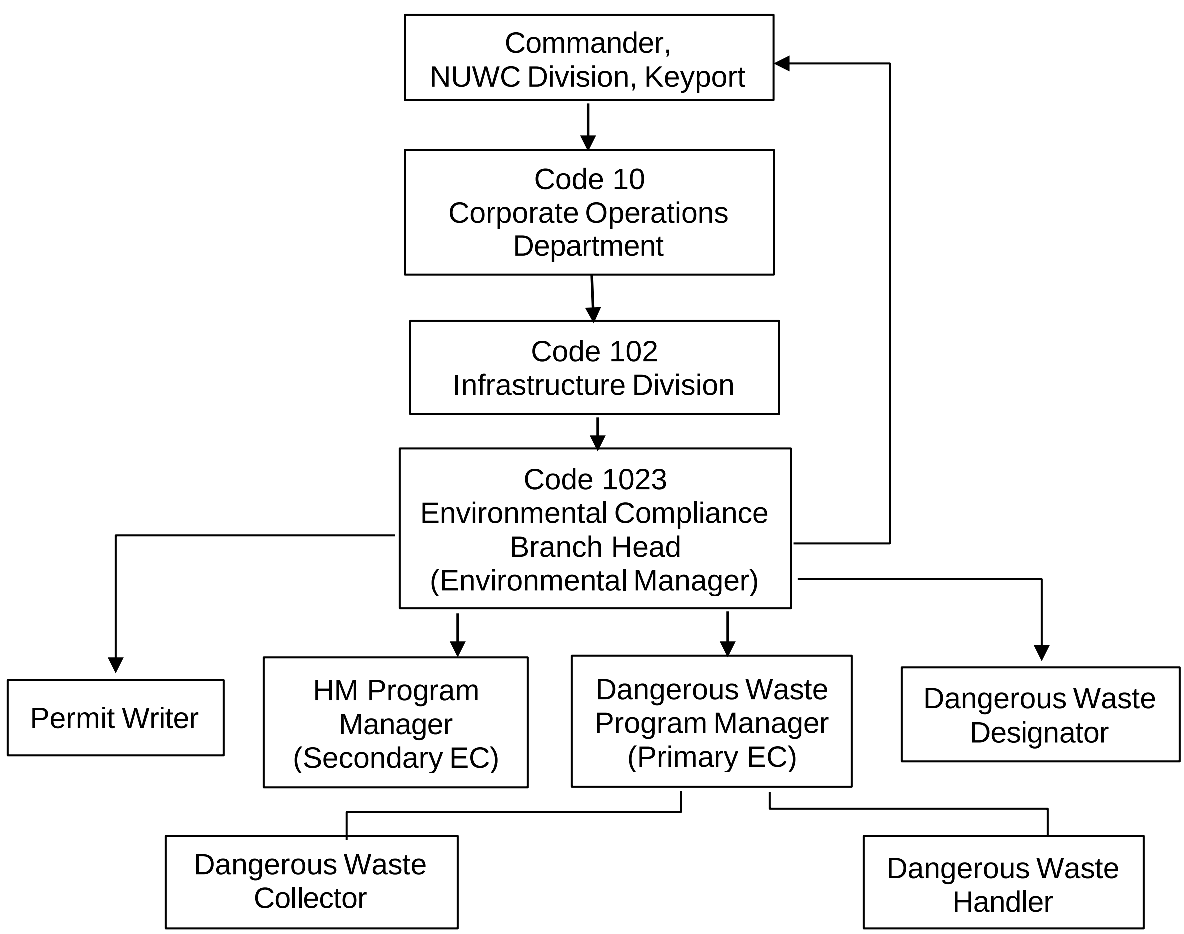
2) Deliver waste to the TSD Facility receiving area.

The position descriptions for these positions are provided in appendix H1 (Position Descriptions). These position descriptions further detail the responsibilities, duties, and requisite qualification of current positions at the TSD Facility. An Excel spreadsheet with names documenting the training is kept at the TSD Facility.

H6.6 ORGANIZATIONAL STRUCTURE

The TSD Facility organization chart shown in Figure H6-1 depicts job positions at the TSD Facility. If the organization and positions depicted in this training program change due to funding and availability of personnel, the Naval Undersea Warfare Center, Division, Keyport (NUWC) will submit a permit modification. Only the Commander of NUWC has the authority to sign the Part A form and the certification statement that accompanies the Pt B Permit Application (Section K).

Figure H6-1. NUWC Division Keyport Organizational Chart



H6.7 TRAINING PERSONNEL QUALIFICATIONS

WAC 173-303-330(1)(a)

Initial training is conducted by the Dangerous Waste Program Manager or a designated representative. Instructors for some job-specific training are experts in the specific field and have the required training and broad experience. The instructor for on-the-job training is a supervisor or operator who has the qualifications and experience necessary to demonstrate a good command of the subject matter of the courses and competent instructional skills. Training sessions related specifically to dangerous waste management are directed by a person trained in dangerous waste management procedures. In some cases, training is performed by off-site experts. The 40-hour initial and 8-hour refresher OSHA Hazardous Waste operations and Emergency Response courses that satisfy the requirements 29 CFR 1910.120 (p) (7) (i) are taught by an offsite certified provider. In addition to HAZWOPER, DOT and CPR/First Aid training are also taught by an offsite certified provider.

H7. DOCUMENTATION AND RECORD RETENTION

WAC 173-303-330(2)(c) & (3); -806(4)(a)(xii)

Training records of employees working at the TSD Facility are maintained by the DW Program Manager of the TSD Facility. Training records of support personnel from the Regional Fire Protection Branch are maintained in the training files at the Regional Fire Station. Training records of former employees are kept at least three years from the date the employee last worked at the TSD Facility. Training records of current personnel are kept at the site until closure of the TSD Facility. For at least three years after closure of the TSD Facility, personnel records will be kept by the NUWC Division, Keyport Training Division. A personal training log for each TSD Facility employee is kept at the TSD Facility. All initial, job specific, and continuing on-the-job training is maintained in the TSD Facility operating record. In addition to the personal training log, training records include copies of tests taken or certificates of attendance of all regulatory required training, documenting that the required training for each employee has been satisfactorily completed.

SECTION H

APPENDIX H1

POSITION DESCRIPTIONS

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ENVIRONMENTAL MANAGER

I. MAJOR DUTIES AND RESPONSIBILITIES

The incumbent is the Branch Head of the Environmental Compliance Branch and oversees Program Managers for the Air Quality, Cultural Resources, Drinking Water, Emergency Response, Environmental Quality Assessment, Environmental Training, Hazardous Material, Dangerous Waste (TSD Facility), Installation Restoration, ISO 14000, Natural Resources, NEPA, Pesticide, Pollution Prevention, Storage Tanks and Storm Water programs.

II QUALIFICATIONS

A. GENERAL. Ability to communicate effectively orally and in writing. Ability to plan, organize, and delegate work. Ability to lead teams of personnel with varying disciplines and grade levels. Knowledge of oral and writing techniques required to originate correspondence, write directives, instructions, reports, and inspection documents, and prepare training and briefing materials for presentation to a variety of audiences. Knowledge of related fields of environmental protection and science (e.g. biology, chemistry). Knowledge of Federal, State and County laws, statutes, regulations, rules, Presidential Executive Orders, and Chief of Navy Operations (CNO) Directives related to environmental issues.

B. TECHNICAL. Knowledge of project management principles and methods, including problem definition, solution identification, and cost/benefit analysis techniques. Knowledge of organizational techniques to manage multiple level tasks, establish time lines, and meet deadlines. Professional knowledge of environmental and natural resources concepts, principles, and practices applicable to the most complex problems associated with advanced and/or major water pollution discharge, air pollution, and dangerous waste disposal problems encountered by industry, including state-of-the-art technology and equipment development. Ability to develop plans, budgets, and strategies to ensure activity compliance with all environmental regulations. Knowledge and skill to assess discharges as they affect the environment, public safety, and attendant interests, translate technical analyses into legal, regulatory parameters, and communicate with a technical and lay community, which may be either supportive or antagonistic.

C. SPECIALTY TECHNICAL. Mastery of advanced concepts, principles, and practices of environmental protection to serve as the technical authority in industrial dangerous and toxic waste treatment and management resulting from undersea weapons industrial operations, testing and development. Knowledge and skill to apply the latest developments in environmental controls to resolve problems for which accepted methods are not applicable and to review plans, designs, and specifications (prepared by others) for the improvement or alteration of existing or the eventual construction of new facilities.

D. PHYSICAL. The work is sedentary. Typically, the employee may sit comfortably to do the work. However, there may be some physical demands to include the following: walking, standing, bending and crawling.

DANGEROUS WASTE PROGRAM MANAGER

I. MAJOR DUTIES AND RESPONSIBILITIES

The incumbent manages NUWC Division, Keyport's dangerous waste management program including direct responsibility for compliance with Federal, State, and local regulations, and the Dangerous Waste Management Permit throughout NUWC Division, Keyport.

(20%) A. Provides technical direction to the Treatment, Storage and Disposal Facility (TSD Facility) staff and NUWC Division, Keyport Waste Site Managers/Alternates in the following disciplines: dangerous waste collection, designation, tracking, storage, management, manifesting and disposal, inspections, waste sampling for analysis and testing for verification, waste consolidation, and dangerous substance spill response and cleanup.

(20%) B. Develops, implements and manages proper procedures for receiving, handling, storing, packaging, inspecting, labeling, and transporting of dangerous waste. Determines the proper waste codes and shipping names by interpreting regulations. Determines the testing requirements needed for identifying the constituents of unknown waste. Prepares dangerous waste manifests for shipping. Assists in the development of dangerous waste plans including permit requirements for treatment, storage, and disposal as applicable. Determines minimum facilities and staffing requirements for Dangerous Waste Generator activities and the TSD Facility. Evaluates the need for additional or improved facilities pursuant to applicable regulatory requirements.

(20%) C. Develops, maintains and conducts training for all TSD Facility and Site Manager/Alternate personnel. Maintains training requirements and records of TSD Facility personnel. Keeps training records updated pursuant to Navy instructions, Dangerous Waste Management Permit requirements, and other mandates.

(15%) D. Performs random, unscheduled inspections of station dangerous waste storage sites (CAA and satellite sites), and daily, weekly, monthly and annual inspections of the TSD Facility to ensure compliance with the Dangerous Waste Management Permit all other Federal, State, and local requirements. Audits disposal contractors' waste storage and disposal facilities for compliance with these requirements. Performs inspection of the waste programs of NUWC Division, Keyport tenant facilities to assure compliance with these requirements. Makes recommended changes to control or eliminate potential of existing hazards or violations.

(10%) E. Acts as Navy Emergency Coordinator for oil spills and hazardous substances spills. Determines safe evacuation distances, material hazards, proper clean-up team protection, clean up supplies needed, spill cleanup, and decontamination procedures. Makes all verbal contacts with federal, state, Navy, and local authorities when needed. Prepares and maintains spill documentation and assists in sending completed documentation to all appropriate Naval and regulatory facilities. Performs follow up investigation and recommends actions for spill prevention. Critiques spill operations with all parties. Evaluates and recommends improvements for spill response and clean-up procedures.

(3%) F. Provides interpretation of local, state, and federal regulations to NUWC Division, Keyport management, as well as implementation of Navy environmental policies and programs.

Participates in coordinating activities with municipal, state, regional, and federal environmental regulatory agencies. Provides advice, recommendations, and assistance regarding adequate environmental protection plans and their implementation. Attends meetings and joint field inspections to determine whether existing facilities comply with applicable environmental standards and, in the case of non-complying facilities, determines requirements and methods for compliance. Reviews, analyzes, and recommends modifications to existing environmental programs and practices. Determines whether such practices comply with applicable standards and determines requirements needed to meet continuously changing regulations.

(2%) G. Assists in specialized studies, surveys and designs to resolve deficiencies in dangerous waste disposal, dangerous waste minimization and dangerous materials control. Work includes: assist TSD Facility staff in identification and resolution of potential hazards to ensure compliance with regulations for dangerous waste treatment, storage, and disposal; and hazardous substance spill response and cleanup; monitoring sources for violations and providing necessary corrective actions, instructions, and guidelines to ensure compliance; providing technical environmental support related to oil, dangerous waste and solid waste disposal, and oil spill recovery programs.

(2%) H. Assists the Environmental Manager, NUWC Division, Keyport Commanding Officer, civilian management, tenant, and support activities at NUWC Division, Keyport and detachments in resolving difficult and unusual environmental, and dangerous material/waste control issues. Visits detachment facilities to determine environmental compliance and to assess operation and maintenance of equipment and facilities relating to dangerous material/waste control such as dangerous waste accumulation sites and pollution prevention equipment. The incumbent and staff provide solutions in overcoming deficiencies or potential hazards by evaluating new technology and determining the most economical and efficient procedures, methods, equipment, and facilities. Represents the command at conferences and meetings at NUWC Division, Keyport and NAVSEA level, and regulatory agencies.

(2%) I. Provides technical direction and guidance in the review and administration of assigned contracts and maintains day-to-day coordination with project contractors.

(2%) J. Determines proper procedures for conducting PCB inventories and requirements for record keeping, inspections, storage facilities, handling, marking, packaging use, transportation and disposal of PCB’s, PCB items, PCB waste, and PCB contaminated items. Obtains samples for analysis as required. Evaluates need for additional or improved facilities, record keeping, personnel training, and management policies.

(2%) K. Maintains current files of local, state, and federal dangerous waste regulations and serves as the technical authority on the requirements of various regulations. Maintains liaison with professional and technical personnel at the various regulatory agencies to ensure proper interpretation of requirements.

(2%) L. Reviews plans and specifications for pollution control features to ensure compliance with established standards. Advises management of any equipment or process changes needed to comply with federal, state, or local administrative requirements.

II. **QUALIFICATIONS**

A. KNOWLEDGE REQUIRED

1. Mastery of advanced professional environmental concepts, principles, and practices to serve as the technical authority for the full range of dangerous waste control programs and facilities and the implementation and administration of related programs at NUWC Division, Keyport.

2. Knowledge and skills sufficient to apply the latest developments in environmental protection to resolve issues for which accepted methods are not directly applicable and to review plans, designs, and specifications prepared by others for the improvement or alteration of existing or for the construction of new facilities.

3. Knowledge and skill to assess and advise on the impact of the installation's activities on public safety, ecology, and environment involving matters directly or closely related to dangerous waste operations control.

4. Knowledge and skill to store and dispose of ordnance waste, wastewater, dangerous waste and establish and implement procedures and policies in support of NUWC Division, Keyport industrial operations.

5. Knowledge and skill to establish spill prevention, control, and countermeasure methods, equipment, and procedures.

6. Knowledge of Navy and DOD environmental policies and guidelines, and local, state, and federal environmental laws and regulations.

7. Familiarity with related fields such as safety and occupational health, industrial hygiene, and operation of treatment, storage, and disposal facilities.

8. Knowledge of the organization, function, and operations to the activity-serviced, higher echelon commands and their relationship to other federal activities and private industry.

9. Knowledge and skill in applying a wide range of methods used to gather, analyze, and evaluate information concerning environmental protection/improvement management processes, draw conclusions and recommend appropriate action.

10. Knowledge of statutes, regulations, permitting requirements and precedent decisions governing environmental operations sufficient to use in planning, implementing, or monitoring environmental programs and services.

11. Ability to analyze extensive program data/interrelationships and coordinate the preparation of accurate and reasonable program plans and proposals.

12. Skill in applying complex fact finding, analytical and problem solving methods and techniques.

13. Skill in written and oral communication sufficient to prepare and present findings and recommendations, carry out specific actions regarding controversial issues and/or selling or implementing new ideas and concepts.

14. Knowledge of management information systems and office automation applications, principles, and practices.

15. Knowledge of acquisition process/procedures in order to develop statements of work, evaluate proposals, recommend awards, develop most efficient organization statements, and evaluate contractor performance.

DANGEROUS WASTE DESIGNATOR

I. MAJOR DUTIES AND RESPONSIBILIES.

(15%) A. For dangerous waste shipments, enter the Uniform Hazardous Waste Manifest (UHWM) data into the NUWC Environmental Management System (NEMS) database, assemble the UHWM packet (UHWM, Waste Disposal Requests (WDRs), DD1348, and delivery order (DO)) and file. Enter the UHWM return copy data into the NEMS database, add the return copy to the UHWM packet, and move the packet to the manifest file. Notify the Dangerous Waste Program Manager if the return copy is not received in 25 days from the receiving facility.

(15%) B. Perform designation for all new Material Identification Tracking (MIT)/Waste Identification Tracking (WIT) forms in the dangerous waste inventory, and attach the appropriate profile(s). Create a new profile for the MIT/WIT if no existing profile matches the MIT/WIT. Send a copy to the Defense Reutilization and Marketing Office (DRMO) - designated disposal company and file the Profile, the Waste Profile Questionnaire (WPQ), lab analysis, and any associated documentation.

(10%) C. Conduct a review of all active shipping profiles at least annually. Update all active profiles as required by regulatory changes, cost changes, and/or changes provided by the DRMO or other disposal companies. Create new profiles as required to support new disposal contractors. Send a copy to the DRMO - designated disposal companies and file the Profile, the WPQ, lab analysis, and any associated documentation.

(10%) D. Enter Waste Disposal Request (WDR) data for waste pick-ups into the NEMS database and file the WDRs.

(10%) E. Review waste chemical composition and physical characteristics from each Waste Generation Record (WGR) and assign an existing WIT number to that WGR. Return the WGR to the generator if incorrectly or incompletely prepared. Identify chemicals from WGRs that are not designated as a waste listed in the Dangerous Waste Management Permit and refer those chemicals to the Dangerous Waste Program Manager. If no existing WIT matches the waste, create a new WIT in the NEMS database and assign that WIT number to the WGR. When required to identify the waste, submit a waste sampling request to the Dangerous Waste Program Manager listing appropriate analytical tests to be performed, sampling method and samples to be taken to identify the waste for designation.

(10%) F. Review information on the product chemical composition and physical characteristics contained in the Safety Data Sheets (SDSs). In the NEMS database, assign a MIT number to that SDS record. Identify the correct WIT number for that product to be wasted as pure product and assign it to the SDS record in the NEMS database. Identify chemicals from SDSs that are not designated as a waste listed in the Dangerous Waste Management Permit and refer those chemicals to the Dangerous Waste Program Manager. If no existing WIT matches the SDS, create a new WIT in the NEMS database and assign that WIT to the SDS record in the NEMS database.

(5%) G. Update the NEMS database (DD1348) dangerous waste records so all containers on a DD1348 form with the same WIT have the most recent profile. Create and print DD1348s (as

PDF files) for submittal to DRMO. Update these NEMS DD1348 records with a temporary DO number and run the NEMS database ‘Staging Report’.

(5%) H. Prepare shipping papers (bills of lading) for non-DRMO shipments. Review all UHWMs for shipments of dangerous waste.

(5%) I. Review results of random sampling of dangerous waste pick-ups against the associated WGR. Update the WGR to show it has been reviewed. Void the WGR and request a new WGR from the generator if the sample results are outside the WGR/WIT ranges. Report the voided WGR to the Dangerous Waste Program Manager.

(3%) J. Upon receipt of a WGR, designate and enter the WGR data into the NEMS database and save a copy to the TSD operating record. Notify the generator of the WGR number assigned to their waste for printing of the WDR by the generator.

(3%) K. Enter or update dangerous waste sites in the NEMS database on receipt of Dangerous Waste Program Manager-approved Site Registration form or notification from the Dangerous Waste Program Manager.

(3%) L. Update the dangerous waste inventory data in the NEMS database upon receipt of Dangerous Waste Inventory Update sheet from the Dangerous Waste Program Manager.

(3%) M. Enter newly identified chemicals and chemical synonyms from SDSs or WGRs into the NEMS database Chemical Library.

II. **<u>QUALIFICATIONS</u>**.

A. KNOWLEDGE REQUIRED.

1. Mastery of advanced chemistry concepts, principles, and practices to serve as the technical authority for the designation of all hazardous materials and dangerous wastes encountered at NUWC Division, Keyport.

2. Mastery of DOT dangerous waste transportation regulations and associated manifests and other required forms and documentation.

3. Ability to research manufacturer’s information submitted, and review product chemical composition and physical characteristics to determine waste designation or specify sampling method and testing required to properly designate all new and existing dangerous wastes encountered at NUWC Division, Keyport.

4. Familiarity with related fields such as safety and occupational health, industrial hygiene, and operation of treatment, storage, and disposal facilities.

5. Knowledge of the NUWC Dangerous Waste Management Permit, and statutes, regulations, permitting requirements and precedent decisions governing environmental operations sufficient to use in planning, implementing, or monitoring the hazardous material and dangerous waste treatment, storage and disposal programs and services.

6. Skill in applying complex fact finding, analytical and problem solving methods and techniques.

7. Skill in written and oral communication sufficient to prepare and present findings and recommendations, carry out specific actions regarding controversial issues or implementing new ideas and concepts.

8. Knowledge of management information systems and office automation applications, principles, and practices, including interrelational databases.

DANGEROUS WASTE HANDLER

I. MAJOR DUTIES AND RESPONSIBILITES

A. GENERAL: The incumbent performs dangerous waste management operations, including: pre-receipt inspections, storage site inspections, and identification, collection, packaging, labeling, transportation, tracking, consolidation, storage and manifesting operations of dangerous wastes. Performs waste sampling for analysis and testing for verification. Performs fluid pumping operations, transferring dangerous liquids for proper disposal.

B. SPECIFIC: The duties and responsibilities identified below are specific in work type, but are not limited to the "line item" description provided. As new dangerous waste requirements are established, the functions listed below will be adjusted to maintain compliance within the broad framework outlined under federal laws and regulations.

(35%) 1. OPERATION OF FACILITIES

a. Inspects all waste material received from dangerous waste generators and accepts or rejects the material in accordance with NUWC procedures. Inspects for proper labeling, container type, segregation, proper use of pallets, drum identification number, material nomenclature, and verifies that material is properly secured. Performs verification sampling and testing of all wastes. Loads and transports all material that meets the accepted criteria to designated storage facilities. When rejection occurs, the incumbent provides the generator written instructions on the specific deficiency to be corrected.

b. Performs daily, weekly, monthly and annual inspections of dangerous waste storage areas as assigned to assure that waste material is accurately accounted for, identified, and stored, and that any necessary measures (e.g. over-packing) are performed to compensate for deteriorated containers.

c. Performs daily, weekly, monthly and annual inspections of dangerous waste storage equipment as assigned.

d. Makes arrangements and moves portable tanks and pumping equipment to production shops for pumping various chemicals used in metal preparation and treatment.

e. Performs routine maintenance and repair of pumps, tanks, and other waste handling equipment.

f. Operates specialized equipment: paint consolidation, drum washer, compactor and shredder.

g. Stages waste for pre-inspection and load-outs of both solid and liquid wastes.

h. Interfaces with private contractors to manifest and ship dangerous waste.

i. Operates pumps, mixing tanks, and sampling devices used in the storage of wastes.

j. When in-house treatment is not available, incumbent re-packs, consolidates, and/or blends wastes into proper containers for shipping.

k. When materials are lab packed, the incumbent places, arranges, and cushions individual containers inside shipping drums, seals and labels drums for shipment.

(20%) 2. INSPECTION AND IDENTIFICATION

a. Performs on site pre-receipt inspections of dangerous waste at the generation point and assures that the receipt documentation is in order, that containers are not leaking and are safe to handle, and that appropriate labels, placards, or other markings are affixed to the containers for transportation to the Treatment, Storage and Disposal Facility (TSD Facility).

b. Reviews/determines whether containers are Department of Transportation (DOT) approved and rejects items not meeting this requirement.

c. Determines the nature (e.g. flammable, toxic, acid) and the degree (e.g. repercussions of long term storage) of the particular hazard involved. May receive technical input from other environmental engineering and technical staff.

d. Collects test samples of unknown hazardous substances for laboratory analysis to identify materials.

(20%) 3. PACKAGING, LABELING, AND TRANSPORTING

a. Properly segregates, packages, and labels wastes such as heavy metals, asbestos, PCBs, waste oils, paints, etc., for shipment.

b. Provides (DOT) dangerous waste identification and labeling for shipment.

c. Ensures that all wastes removed from CAAs are properly containerized, labeled, and documented in compliance with all federal, state, and local regulations.

d. Operates trucks, vans, tanker trucks and flatbeds (up to 5-ton capacity) for transporting dangerous waste to the handling facility. Operates forklift trucks for loading, unloading, staging, and storing material.

(20%) 4. RECORDS AND DOCUMENTATION

a. Completes inventory and inspection forms and logs for stored dangerous waste.

b. Prepares documentation (i.e. Waste Generation Record (WGR)) required to evaluate and classify the type of waste.

c. Provides assistance to the other environmental engineering and technical staff in assuring that all records, reports, and documentation required for the processing of dangerous waste are complete, accurate, and available for review, including those necessary for Resource Conservation and Recovery Act (RCRA) record keeping and reporting.

e. Cleans and decontaminates transportation and handling equipment used to move hazardous materials and dangerous wastes.

(5%) 5. INDEFINITE REQUIREMENTS

The laws by which dangerous waste regulatory programs are established are under constant review and can change quickly and frequently. In some cases, past practices, which were within the framework of existing laws, may be superseded and can even be considered a violation of current law, for which NUWC could be held liable. The incumbent will likely be assigned a number of tasks in the future, which are as yet unknown. Workers will, however, be adequately trained in the proper execution of these new requirements.

II. **QUALIFICATIONS**

A. KNOWLEDGE REQUIRED: The incumbent must be able to read and interpret a wide variety of Federal, State, and local statutes as well as applicable regulatory requirements in order to carry out the duties and responsibilities outlined herein. The incumbent must possess specific knowledge of the NUWC Division, Keyport Dangerous Waste Management Permit, Navy directives and policy statements; NUWC instructions; local, state, and federal regulations; standard operation procedures; manufacturer's catalogs and handbooks; files of previous projects; contract specifications, and such guidelines as: the Clean Water Act, the Toxic Substance and Control Act, the Code of Federal Regulations (CFR); Department of Transportation (DOT) Regulations; Resource Conservation and Recovery Act (RCRA); National Fire Protection Association (NFPA) Label Guide; the Washington Administrative Code (WAC 173-303). Additionally, the incumbent must possess the following knowledge, skills, and abilities:

1. Knowledge of and documented training in proper dangerous waste identification procedures.

2. Ability to identify a broad variety of dangerous waste materials by visual observation, and/or consulting applicable supply lists, catalogs, manuals, and technical publications.

3. Must have a basic knowledge of a variety of chemicals and be knowledgeable with the nomenclature and properties of various hazardous properties (incompatibility, reactivity, use in production processes, etc.).

4. Must be able to collect samples for basic test procedures on wastes for pH, heavy metals, sulfates, nitrates, nitrites, phosphates, cyanide, ammonia, chloride, phenols, and sodium hydroxide.

5. Must have working knowledge with pertinent governing directives issued by Navy, Environmental Protection Agency (EPA), Department of Transportation (DOT), Resource Conservation and Recovery Act (RCRA), and state and local agencies.

6. Must have a thorough knowledge of and documented training in proper handling, consolidating, manifesting, placarding, labeling, and emergency spill procedures.

7. Must have the ability to interpret and follow technical reference manuals.

8. Must be licensed to operate trucks, vans, or flatbeds with a capacity up to five tons and ten-ton forklift, with various attachments. Must have HAZMAT commercial endorsement.

9. Must have ability to successfully complete a variety of training classes in dangerous waste compliance as well as on-the-job training.

10. Must have effective verbal and written communication skills.

11. Must be able to properly fill out DOT manifests and other required forms and documentation.

12. Must have knowledge of NUWC environmental instructions.

13. Must have knowledge of NUWC organization, facilities, and production operations.

14. Must have knowledge of basic mathematics to compute weights, volumes, mass, and percentages.

15. The incumbent is required to be certified to wear respiratory protection such as: self-contained breathing apparatus and full-face cartridge respirators. Fully encapsulated suits are to be worn in some emergency spill response situations. A variety of chemical protective suits are used for daily operations and some spill containment and cleanup. Incumbent must have a basic knowledge of chemical and toxicological hazards of chemical substances. Incumbent must be able to determine hazards and select appropriate Personal Protective Equipment (PPE).

B. RESPONSIBILITY:

1. The dangerous waste management facilities for which the incumbent has substantial responsibility comprise a large and complex operation.

   a. The incumbent is responsible for the physical and documentary control of more than 7,000 types of dangerous wastes that have been identified at Naval Undersea Warfare Center.

   b. There are numerous different locations in NUWC that require frequent (several times a week) removal, treatment, storage, and disposal services on a continuing basis.

   c. A significant amount of the dangerous waste consists of mixed or unidentified hazardous substances or liquids in the same container. These must be sampled for technical laboratory analysis.

   d. A significant portion of the waste that is received must be removed from the containers and consolidated with other like waste using special handling procedures.

2. The incumbent makes independent technical decisions to determine the proper identification, treatment, packaging, storage, labeling, and shipment of waste materials. Critical technical decisions are typically subject to review by supervision or environmental engineering personnel.

3. The handling and treatment of the majority of the dangerous wastes are subject to and controlled by compliance with a wide variety of laws and regulations, some of which are conflicting or contradictory.

4. The incumbent performs under general supervision. A high degree of resourcefulness, initiative, and sound judgment is required to apply training and work experience to a variety of dangerous waste management problems, devise new or improved techniques for complying with environmental protection regulations, and overcome difficult or unique problems where guidelines and precedents may be lacking. Critical or highly unusual situations may be referred by the incumbent to his or her supervisor or to the environmental engineering and technical staff.

5. Incumbent must be able to select proper sampling equipment for the type of waste to be identified as determined by the Waste Analysis Plan. He/she assures proper usage and care of associated equipment and materials. The incumbent will insure that the samples are collected and preserved in accordance with prescribed EPA test methods outlined in the Waste Analysis Plan.

DANGEROUS WASTE COLLECTOR

I. MAJOR DUTIES AND RESPONSIBILITIES

A. GENERAL: The incumbent performs dangerous waste management operations, including: on-station storage site inspections; and identification, collection, inspection of packaging and labeling, and transportation of dangerous wastes. Performs fluid pumping operations to transfer dangerous liquids at waste storage sites and the TSD Facility for proper storage.

B. SPECIFIC: The duties and responsibilities identified below are specific in work type, but are not limited to the “line item” description provided. As new dangerous waste requirements are established, the functions listed below will be adjusted to maintain compliance within the broad framework outlined under federal laws and regulations.

(60%) 1. INSPECTION AND IDENTIFICATION

a. Performs a documentation inspection of dangerous waste at the generation point or nearby storage site and ensures that the waste matches the waste documentation (Hazardous Waste Pickup Request, Waste Disposal Request), that containers are the correct type, are not leaking and are safe to handle, and that appropriate labels, placards, or other markings are affixed to the containers. When rejection occurs, the incumbent notifies the Dangerous Waste Program Manager with the specific deficiency to be corrected.

(40%) 2. TRANSPORTATION OPERATIONS

a. Upon inspecting and ensuring dangerous wastes are safe to transport, loads and transports all dangerous wastes to the TSD Facility receiving area.

b. Moves portable tanks and pumping equipment to production shops for pumping various chemicals used in metal preparation and treatment.

c. Operates trucks, vans, tanker trucks and flatbeds (up to 5-ton capacity) for transporting dangerous waste to the handling facility. Operates forklift trucks for loading, unloading, staging, and storing material.

II. QUALIFICATIONS

A. KNOWLEDGE REQUIRED: The incumbent must be able to read and interpret Federal, State, and local statutes as well as applicable regulatory requirements in order to carry out the duties and responsibilities outlined herein. Additionally, the incumbent must possess the following knowledge, skills, and abilities:

1. Ability to identify a broad variety of dangerous wastes by visual observation, and/or consulting applicable documentation.

2. Must have a thorough knowledge of and documented training in proper handling, and emergency spill procedures.

3. Must have the ability to interpret and follow technical reference manuals.

4. Must be licensed to operate trucks, vans, vacuum trucks, and flatbeds (up to 5-ton capacity), and forklift with various attachments.

5. Must have ability to successfully complete a variety of training classes in dangerous waste compliance as well as on-the-job training.

6. Must have effective verbal and written communication skills.

7. Must have knowledge of NUWC environmental instructions.

8. Must have knowledge of NUWC organization, facilities, and production operations.

B. RESPONSIBILITY:

1. The incumbent is responsible for the physical and documentary control of more than 7,000 types of dangerous wastes that have been identified at Naval Undersea Warfare Center.

2. The handling of the majority of the dangerous wastes are subject to and controlled by compliance with a wide variety of laws and regulations, some of which are conflicting or contradictory.

3. The incumbent performs under general supervision. A high degree of resourcefulness, initiative, and sound judgment is required to apply training and work experience to a variety of dangerous waste transport problems, devise new or improved techniques for complying with environmental protection regulations, and overcome difficult or unique problems where guidelines and precedents may be lacking. Critical or highly unusual situations may be referred by the incumbent to his or her supervisor or to the environmental engineering and technical staff.

SECTION I

CLOSURE AND FINANCIAL ASSURANCE

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I CLOSURE AND FINANCIAL ASSURANCE

WAC 173-303-610; -620; -630(10); - 640(8); -806(4)(a)(xiii) – (xviii)

I1. CLOSURE PLAN

WAC 173-303-610(2) – (6); -806(4)(a)(xiii)

I1.1 INTRODUCTION AND FACILITY DESCRIPTION

WAC 173-303-610(3)

The TSD Facility, Building 1051, is a 44,000 square foot one-story enclosed structure with approximately 18,000 square feet of attached exterior covered area. A diagram of the TSD Facility floor plan is shown in Part A, Attachment B (TSD Facility General Layout). The enclosed structure consists of three basic functional areas: (1) the warehouse which consists of the tank area, container handling and storage areas, and waste process/treatment areas; (2) personnel areas comprised of office spaces, laboratory, lunch room, and toilet/shower facilities; and (3) mechanical/storage areas comprised of a mezzanine level for heating, ventilation and air conditioning equipment, boiler rooms, electrical room, fire protection, and spill response storage. The exterior covered area consists of the truck loading/unloading dock, the new drum storage, the drum shredder, the fluorescent lamp crusher, the asbestos storage bin, the battery charging station, and the soil dewatering areas.

TSD Facility location is detailed in Section B (Facility Description and General Provisions) along with container and tank storage capacities which can also be found in Section I1.3.1.

Section I describes the details of clean closure which can be summarized by the following actions:

- Notification of Closure
- Receive Last Known Volume of Waste
- Begin Closure
- Monitoring by PE
- Inventory Elimination
- Tank/Equipment Decontamination
- Containment Decontamination
- Soil Sampling and Analysis

I1.1.1 MAXIMUM WASTE INVENTORY

The maximum waste inventory is shown be Tables I1-1 and I1-2 in subsections I1.3.1.

I1.1.2 MAXIMUM EXTENT OF OPERATION

For the purpose of closure, the extent of operation is defined as the area encompassed by Bradley Road to the west, Gadberry Street to the south, and the 8’ high chain-link fences east and north of the TSD Facility (see Part A, Attachment B, TSD Facility Layout).

I1.2 CLOSURE PERFORMANCE STANDARDS

WAC 173-303-610(2)

NUWC Division, Keyport will meet Washington Department of Ecology (Ecology) clean closure performance standards for dangerous waste closure in WAC 173-303-610(2)(a) as follows:

a. Minimize the need for further maintenance.

b. Control, minimize, or eliminate, to the extent necessary to protect human health and the environment from post-closure escape of dangerous waste, dangerous waste constituents, leachate, contaminated runoff, or dangerous waste decomposition products to the ground, surface water, ground water, or the atmosphere.

c. Return the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous dangerous waste activity.

Where clean closure requires the removal and decontamination of all dangerous waste, waste residues, equipment and bases, liners, soils and subsoils, or other material containing or contaminated with dangerous waste or waste residue, the removal or decontamination must ensure that the levels of dangerous waste or dangerous waste residuals do not exceed:

(1) For soils, groundwater, surface water, and air in the area of the closing unit or affected by releases, the numeric cleanup levels calculated using unrestricted site use exposure assumptions according to the Model Toxics Control Act (MTCA) Cleanup Regulation, WAC 173-340. Primarily, these will be numeric cleanup levels calculated according to MTCA Method B, although MTCA Method A may be used as appropriate.

(2) For structures, equipment, bases, liners, and other materials containing or contaminated with dangerous wastes, constituents, or residues, clean closure standards will be by removal or decontamination to a “clean debris surface” using an appropriate treatment method in 40 CFR 268.45 Table 1 (Alternative Treatment Standards for Hazardous Debris, Section A, Extraction technologies, subsection 1, Physical extraction), or other methods specifically described in subsection I-1b(3) (Decontaminating Structures, Equipment, and Soil).

I1.3 CLOSURE ACTIVITIES

WAC 173-303-610(3)(a)(i) – (vi), (5); -620(3); -630(10); 640(8)

The following procedures will be implemented during closure:

a. Provide notification to Ecology of partial or final closure pursuant to WAC 173-303-610(3)(c).

b. All daily, weekly, and monthly inspections will be performed and checklists maintained as stated in the Inspection Schedule in Section F (Procedures to Prevent Hazards) until the final closure certification is submitted and accepted by Ecology.

c. At all times during closure activities, the TSD Facility will be secured and the prevention procedures, structures, and equipment identified in Section F (Procedures to Prevent Hazards) will be followed.

d. At all times during closure activities, the required and applicable Standard Operating Procedures (SOP) for proper waste management and worker health and safety will be followed. The precautions outlined in Section F (Procedures to Prevent Hazards) and the standards in the Site Safety and Health Plan, Building 1051 (SSHP) will be observed.

e. During closure, dangerous wastes and process residues will continue to be segregated and stored according to their compatibility in the storage tanks and the containers as stated in Section D (Process Information).

f. All wastes within the TSD Facility and waste management units will be processed in the same manner, as they would be under normal operating circumstances as presented in Section D (Process Information).

g. The requirements of the Department of Transportation (DOT) 49 CFR will be followed for transporting any wastes or other equipment or materials off site.

h. Sequential closure of the dangerous waste management units will follow for closing the entire TSD Facility. Refer to Section I-1b(2), Removing Dangerous Waste, for a description of the closure procedures for individual waste management units and Section I-1f, Schedule for Closure, for the timing of these activities.

i. All dangerous waste storage and treatment tanks and associated equipment, piping and instrumentation will be decontaminated and either salvaged, dismantled or if necessary, disposed of off-site at an authorized TSD Facility.

j. All mobile or fixed equipment that has been used to process or handle dangerous wastes will be cleaned, decontaminated, and re-used, salvaged, or, if necessary, disposed of off-site at an authorized TSD Facility.

k. Decontamination residues and contaminated soil generated from closure activities will be handled as required by WAC 173-303-170 through 230.

l. An independent, registered, Professional Engineer will monitor all closure activities to ensure they are conducted in accordance with the approved Closure Plan. In particular, the engineer's documentation will include, but not be limited to, field observation and review of records of the following:

   1. Sampling procedures;

   2. Locations of soil, concrete, and asphalt sampling to ensure locations were as specified in the sampling and analysis plan;

   3. Sample labeling and handling including chain of custody procedures;

   4. Tank, equipment and concrete decontamination procedures to ensure that closure plan requirements for decontamination and rinsate management were followed and that structures and equipment were adequately cleaned.

m. Pursuant to WAC 173-303-610(b), NUWC Division, Keyport will submit a written notification of, or request for, a permit modification to authorize a change in operating plans, facility design, or the approved Closure Plan in accordance with the applicable procedures in WAC

173-303-800 through 173-303-840. The written notification or request will include a copy of the amended closure plan

n. NUWC Division, Keyport will submit a written notification or request to Ecology for a permit modification to amend the Closure Plan at any time prior to the notification of partial or final closure of the TSD Facility.

o. NUWC Division, Keyport will submit a written notification of or request for a permit modification to authorize a change in the approved Closure Plan whenever the following occurs:

    1. Changes in operating plans or TSD Facility design that affect the Closure Plan, or

    2. There is a change in the expected year of closure, or

    3. In conducting partial or final closure activities, unexpected events require a modification of the approved Closure Plan.

p. Within 60 days of completion of final closure NUWC Division, Keyport will submit to Ecology a certification statement that the final closure of the facility was conducted in accordance with this closure plan. The certification will be signed by Keyport personnel and by the independent, registered, Professional Engineer who will monitor closure activities.

I1.3.1 REMOVING DANGEROUS WASTE

WAC 173-303-610(3)(a)(iii) - (iv); 620(3)

The inventory elimination activities involve removal of all dangerous waste inventory at the TSD Facility at the start of closure. Dangerous wastes processed during closure will be processed in the same manner as they would be processed under normal TSD Facility operations. Wastes will be removed from each segregated storage area and staged in the shipping area in preparation for shipping. Only compatible wastes will be staged in the shipping area. Staging will take place as set forth in Section D (Process Information). Upon clearing of each individual storage area, all racks and equipment located therein will be decontaminated, sampled and tested to ensure decontamination was successful, and moved to offsite storage. After ensuring all floors, walls and secondary containment have not been compromised (or repaired as required), the storage area will be decontaminated, and sampled and tested to ensure the decontamination was successful. Decontamination wastes will be moved to the staging area and shipped out with the compatible wastes staged there. The shipping area will be decontaminated last.

The maximum waste inventory includes the maximum capacity of the TSD Facility to store dangerous waste in tanks and containers at the NUWC Division, Keyport TSD Facility. The total inside container capacity is 67,925 gallons and the total tank capacity is 45,000 gallons.

Container storage information is included in Table I1-1. The waste type, storage location, and drum and liquid capacities for each container storage area are presented in this table.

Table I1-1. Inside Container Storage Area Designations and Storage Capacity

Waste Type Designation	Room Number	Container Size (Gal)	Drum Quantity*	Total Liquid Capacity (Gal)
Receiving	123N	Up to 550	62	3,410
DOT Class 9 (Other Regulated Materials)	123S	Up to 550	192	10,560
WAD	123M	Up to 550	40	2,200
Organic Peroxides DOT Class 5.2	125	Up to 55	6	330
Oxidizers DOT Class 5.1	129	Up to 55	9	495
Acids DOT Class 8 (a)	130	Up to 550	36	1,980
Reactive when wet and compatible materials DOT Class 4.3	131	Up to 55	340	18,700
Toxic DOT Class 6.1 (or by subsidiary hazard class)	132	Up to 55	6	330
Toxic DOT Class 6.1 (or by subsidiary hazard class)	133	Up to 55	4	220
Flammable/Combustibles DOT Classes 3 and 4.1	134	Up to 550	144	7,920
Flammables 1A DOT Class 2/Compressed Gases (all hazard classes)	136	Up to 55	60	3,300
Universal Waste	137	150	12	660
Caustics, DOT Class 8 (b)	138	Up to 150	24	1,320
Used Oil Class 3 (a)	139	Up to 55	54	1,650
DOT Class 9 (Other Regulated Materials)	140/19	Up to 55	120	5,500
Shipping	140S	Up to 55	220	9,350
Total Gallons Storage				**67,925**

***** "Container Size" and "Drum Quantity" are provided to derive equivalency. Different container sizes and quantity may be placed in these container management areas, but the "Total Liquid Capacity" for the area will not be exceeded.

Containers that are stored outside in the bulk storage area under the roofline within the East Storage location will be a new storage location that will add to our overall storage capacity. This area will be able to store construction debris in 40 yd roll-offs and/or portable containers with secondary containment with a maximum storage capacity of 17,035 gallons. In addition, there is a WAD isolated accumulation area used for contingency purposes with a storage capacity of 220 gallons. Therefore, the total container storage capacity for the facility has increased to 85,180 gallons (17,255 outside + 67,925 inside). This value increases our storage capacity to less than 25% of the original capacity.

Room 124 is the only permitted tank storage area. There are 11 dangerous waste storage tanks in that location. Table I1-2 provides information on waste type, storage container number, function, and capacity of each tank. Each pair of tanks containing the same waste streams will be pumped out using existing equipment and shipped out in tank trucks as set forth in Section D (Process Information). Waste streams stored in the tanks and generated during decontamination will not be mixed for shipment. Decontamination wastes will be shipped out with the waste from each pair of pair of tanks.

Table I1-2. Tank Storage Waste Types and Tank Identification

Tank Number	Waste Type	Function	Total Capacity (Gal)
K1051-101	Oily Wastewater	Storage	5,000
K1051-102	Oily Wastewater	Storage	5,000
K1051-103	Water, Otto Fuel, Cyanide, Oil	Storage	5,000
K1051-104	Water, Alcohol, Mineral Spirits, Otto Fuel	Storage	5,000
K1051-105	Water, Alcohol, Mineral Spirits, Otto Fuel	Storage	5,000
K1051-106	Water, Otto Fuel, Cyanide, Oil	Storage	5,000
K1051-107	Empty	Storage	5,000
K1051-108	Empty	Storage	5,000
K1051-109	Empty	Storage	5,000

I1.3.2 DECONTAMINATING STRUCTURES, EQUIPMENT, AND SOIL

WAC 173-303-610(3)(a)(v) and (vi); -620(3)

The decontamination procedures described in this section apply to the closure of the dangerous waste tanks, ancillary equipment, process equipment, containments, and any additional dangerous waste equipment, or other equipment, used during the closure activities.

High pressure steam and water spray is an acceptable alternative treatment standard for dangerous debris metal, glass and plastic surfaces. Previous experience with the cleanup and closure of buildings 884 and 1032 (previous TSD Facility at NUWC Division, Keyport) indicates that cleaning and decontamination of all soiled facility and equipment surfaces can be accomplished by routine mechanical and aqueous power spray methods utilizing a safe alkaline detergent, followed by triple aqueous power spray rinsing. This method will be used to decontaminate all tanks and its ancillary equipment, and the surfaces of equipment used in the management of dangerous wastes (e.g., pumps, valves, piping, storage racks, forklifts, and waste consolidation and treatment equipment) in the TSD Facility. After the power spray rinsing, external and internal surfaces of the tanks and equipment will be inspected to determine whether they meet the standard for a “clean debris surface”, as that term is defined in 40 CFR 268.45 Table 1, footnote #3. If a “clean debris surface” has been achieved, Keyport will consider the tank or equipment to be clean closed subject to certification. If that standard is not achieved, either:

- The tank or equipment will undergo additional cleaning until a “clean debris surface” is achieved,

  or

- The tank or equipment or the portion of the tank or equipment that does not meet the standard for a “clean debris surface” will be sampled to determine whether it meets “universal treatment standards” (UTS) in 40 CFR 268.48. If so, it will be disposed of in a permitted subtitle C landfill. If not, it will be further treated until it either meets the standards for a “clean debris surface” or the UTS.

Concrete structure surfaces will also be cleaned by routine mechanical and aqueous power spray methods utilizing a safe alkaline detergent, followed by triple aqueous power spray rinsing. To ensure effective decontamination, the final rinsate sample of all concrete surfaces will be analyzed for the constituents of concern. In addition, chip samples will be collected at bias and random locations to verify clean closure. Results from the chip samples will be compared to the numeric cleanup levels calculated using unrestricted site use exposure assumptions according to the Model Toxics Control Act (MTCA) Cleanup Regulation, WAC 173-340. See below for additional detail.

All wastewater generated during decontamination and cleaning processes will be analyzed, designated, treated, and/or disposed of per all Federal and State regulatory guidelines. It should be noted that the applicability of the standard and the cleaning methods are based on the fact that all substrates are in good condition based on continuing inspections, that there will be no loose and discrete debris in the building, and that loose debris located outside the building will be removed prior to final closure.

General decontamination procedures used during closure activities are listed as follows:

a. Decontamination of structures and equipment will be by routine mechanical and aqueous power spray methods utilizing a safe alkaline detergent, followed by a triple aqueous power spray rinse. The final rinsate will be sampled and tested to help ensure decontamination has been effective.

b. Equipment used in closure activities will not be removed from the site until the equipment has been decontaminated.

c. All equipment, including mobile equipment and earth moving equipment, which has come in contact with dangerous waste constituents during closure activities, will be decontaminated as outlined under “a.” above before use outside the contaminated area.

d. Residues generated during the decontamination activities will be contained and managed in accordance with applicable requirements of WAC 173-303-170 through 173-303-230. Decontamination rinsate will be treated at the NUWC Division, Keyport Industrial Wastewater Treatment Plant whenever possible.

e. Other residues which cannot be processed at the NUWC Division, Keyport Industrial Wastewater Treatment Plant will be contained, collected, analyzed for waste characteristics, and transported to an off-site TSD Facility.

f. All installed equipment such as consolidation equipment and storage racks will be decontaminated as outlined under “a.” above and disposed of as scrap metal through the Defense Reutilization Marketing Office (DRMO).

g. All mobile equipment such as lifting and moving devices will be decontaminated as outlined under “a.” above and made available other Navy facilities through the DRMO.

h. Any tank or equipment that is not decontaminated to a “clean debris surface” will be recleaned or disposed of as described above in this subsection.

I1.3.2.1 Procedures for Identifying and Repairing Cracks in Containment Structures

After all wastes and residues have been removed, all TSD Facility floors including containment structures will be inspected for cracks as set forth in Section F-2 (Inspection Plan). Cracks will be recorded in the operating record. Prior to cleaning any equipment or structure, all cracks will be repaired by enlarging crack surface area and filling with an elastomeric grout and epoxy coating compatible with the wastes stored in the area.

I1.3.2.2 Procedures for Identifying Stains in Containment Structures

All TSD Facility floors including containment structures will be inspected for stains as set forth in Section F-2 (Inspection Plan). Stained areas will be recorded in the operating record.

I1.3.2.3 Tank System and Equipment Decontamination

Dangerous waste tanks and ancillary equipment such as pipes, valves, and pumps will be decontaminated at the TSD Facility, and either reused if the tank is in adequate condition or disposed of through the DRMO.

Tanks and ancillary equipment to be reused or scrapped for reclamation will be decontaminated by routine mechanical and aqueous power spray methods utilizing a safe alkaline detergent and triple aqueous power spray rinse to achieve a "clean debris surface" as described subsection 1-1a (Closure Performance Standards) of this closure plan. This method applies to all metal, plastic and glass surfaces throughout the TSD Facility. Decontamination wastewater and residues will be collected and disposed of as per I-1b(3)(g) (Disposal of Decontamination Rinsate).

I1.3.2.4 Decontamination of Containment and Structure Surfaces

Concrete surfaces throughout the TSD Facility will be decontaminated using routine mechanical and aqueous power spray methods utilizing a safe alkaline detergent, followed by triple aqueous power spray rinsing. Decontamination wastewater and residues will be collected and disposed of as per I-1b(3)(g) (Disposal of Decontamination Rinsate). The decontamination procedure applies to all TSD Facility interior areas, and all canopy-covered receiving and storage areas east and north of the building. These procedures also apply to the dangerous waste sumps used for containment in storage areas.

Concrete chip samples will be taken and analyzed to confirm clean closure as discussed in subsection 1-1a (Closure Performance Standards). Sampling procedures are discussed in subsection 1-1b(4)(a) (Sampling to Determine Extent of Contamination).

I1.3.2.5 DISPOSAL OF ASPHALT WASTES

Ten random samples will be taken from the asphalt pavement surface east of the TSD Facility to determine extent of contamination. The samples will be tested as set forth in subsection 1-1b(4)(a) (Sampling to Determine Extent of Contamination). If the asphalt is determined to be clean as defined by the numeric cleanup levels calculated using unrestricted site use exposure assumptions according to MTCA, it will be recycled at a local asphalt recycler.

I1.3.2.6 DISPOSAL OF CONTAMINATED DEMOLITION WASTES

All concrete and asphalt demolition wastes that cannot be decontaminated to the stated standards may be transported to a Subtitle C landfill. If this option is used, the material will be tested to ensure it meets LDR requirements.

Soils, groundwater, surface water, or sediments that are determined to be contaminated will be either treated onsite or offsite prior to disposal, or will be disposed of at a Subtitle C landfill, based on available technology and economics at the time of closure.

I1.3.2.7 DISPOSAL OF DECONTAMINATION RINSATE

All decontamination wastewaters or residues generated will be contained and processed as dangerous waste. Characterization of the rinsate and/or residue will be based on the wastes managed within the area undergoing decontamination. All rinsate will be collected in secondarily contained plastic tanks. Rinsate and residues from incompatible containment areas will be separated. The final rinsate(s) will be sampled and tested to ensure effective decontamination. If feasible, the rinsate may be treated at the NUWC Division, Keyport Industrial Wastewater Treatment Plant, or the rinsate and residues will be sent off-site for treatment and/or disposal at a RCRA permitted TSD Facility through the DRMO.

I1.3.3 SAMPLING AND ANALYSIS TO IDENTIFY EXTENT OF DECONTAMINATION/ REMOVAL AND TO VERIFY ACHIEVEMENT OF CLOSURE STANDARD

A Sampling and Analysis Plan will be submitted to Ecology prior to the notification for beginning final closure. At a minimum, the plan will include the number and type of samples listed in 1-1b (4) (a). This plan will include:

- Statement of purpose and objectives
- Organization and responsibility for sampling and analysis activities
- Project schedule
- Detailed procedures for sample collection and handling
- Identity of chemical constituents that will be analyzed
- Analytical techniques and procedures consistent with this closure plan and Chapter 173-303 WAC to be conducted at an Ecology accredited laboratory, modified, if necessary, to meet data quality objectives
- Specific sampling location and a unique identification number for all random and bias concrete, asphalt and soil samples that were selected in accordance with this closure plan

- Procedures for decontamination of sampling equipment
- Procedures for management of waste materials generated by sampling activities
- Protocols for sample labeling and chain of custody
- Practical quantification limits (PQLs) sufficiently low to determine compliance with clean closure standards
- Description and number of quality assurance and quality control samples including blanks, matrix spikes, surrogate samples, laboratory control samples, and duplicates, as appropriate
- Provisions for splitting samples with Ecology, when appropriate
- Procedures for reporting results

I1.3.3.1 SAMPLING TO DETERMINE EXTENT OF CONTAMINATION

Confirmation sampling and analysis will be conducted on soil, concrete secondary containment, and asphalt at the time of closure. Each sample will be analyzed separately for volatile organic constituents, semivolatile organic constituents, total petroleum hydrocarbons, total metals, PCBs and cyanide. Keyport will use approved analytical methods capable of achieving quantification limits low enough to demonstrate whether the sample is in compliance with clean closure standards as defined by this closure plan. For example, the following methods or approved methods that replace them will be used:

- SW-846 Method 8260 for volatile organic constituents
- SW-846 Method 8270 for semivolatile organic constituents
- SW-846 Method 6000 for metal constituents
- SW-846 Method 8082 for PCB constituents

The closure plan will be reviewed and modified if different waste chemicals not presently identified in the permit are managed at the facility.

If results are above clean closure standards, the area represented by the sample does not meet clean closure standards. Samples will be taken at random and bias locations as outlined below.

Following the decontamination of the containment, the underlying soil will be sampled and analyzed to confirm that no residual contamination is present. Soil samples will be taken at biased and random sampling locations. A random sampling procedure consistent with EPA document SW-846 will be used to select a minimum of 10 random sampling locations. Bias samples will be taken in areas of repaired cracks and major spills identified in the record of operations as outlined below.
Samples will be collected at the interface between the concrete and the soil, and at a depth of two feet below the first sample through holes bored in the overlying concrete containment. Samples will be collected, documented, and handled in accordance with the standard procedures described in SW-846. Sample locations will be identified in a sampling plan prepared by NUWC Division, Keyport at the time of TSD Facility or unit closure.

Random samples will be located using a grid pattern superimposed over all dangerous waste containment including the loading and unloading areas. Random sampling locations in close proximity to biased sampling locations will be excluded.

Locations for biased samples include areas below sumps, cracks in the containment, visual stains in concrete, and spill areas. Repair records maintained as part of the TSD Facility operating record will be used to determine selective locations for soil sampling.

A minimum of 10 concrete chip samples will be taken at bias and random locations within the container and tank secondary containment areas. A minimum of five of these will be at randomly selected locations. In addition, bias samples will be taken in areas of major stains and spills identified in the record of operations. At least three bias samples will be below different sumps.

A minimum of 10 random samples will be taken from the asphalt pavement surface east of the TSD Facility to determine extent of any potential contamination.

I1.3.3.2 SAMPLING TO CONFIRM DECONTAMINATION SOILS

Areas where contamination is found will be over-excavated to remove contaminated soils. Samples will be collected from the exposed surface of each of the four walls, and one sample will be collected from the bottom of the resulting excavation. These samples will be tested for the contaminants found in the first round of sampling to ensure all contamination was removed with the over excavation.

Results of concrete, asphalt, and soils sample analysis will be compared to numeric cleanup levels calculated using unrestricted site use exposure assumptions according to MTCA. If results are at or below these levels, clean closure standards will be satisfied for the materials. For concrete and asphalt, clean closure standards for individual constituents may be adjusted to background concentrations in the construction material. This is only relevant when background for that constituent can be demonstrated to be above the clean closure standards and when the concentration of that constituent in the sample is not above the established background level.

I1.4 SCHEDULE FOR CLOSURE

WAC 173-303-610(3)(a)(vii), (4)

Dangerous waste treatment and storage operations at NUWC Division, Keyport will be closed when proofing, engineering, support, and services for Undersea Warfare projects are finished. The Navy does not have any foreseeable plans for ending current operations, and consequently, cannot now determine an exact date for closure of any presently permitted storage site. If the operation would close at some point in the future, the building would be utilized as a non-hazardous storage facility. When operations cease or the use of any presently permitted site or portion thereof is not required, closure will be instituted following procedures as outlined below.

The NUWC Division, Keyport TSD Facility is not expected to close prior to the expiration date of the permit. Therefore, an expected year of closure is not given. The closure of individual dangerous waste units will be phased out on a progressive schedule to allow for use of units during waste inventory elimination.

The proposed schedule for closure of the facility is presented in Figure I1-1, Facility Final Closure Schedule. Section I-1b (4) (Sampling and Analysis to Identify Extent of

Decontamination/Removal and to Verify Achievement of Closure Standard) describes methods for evaluating whether soil underneath the containment is contaminated. NUWC Division, Keyport will notify Ecology in writing at least 45 days prior to the date final closure is expected to begin.

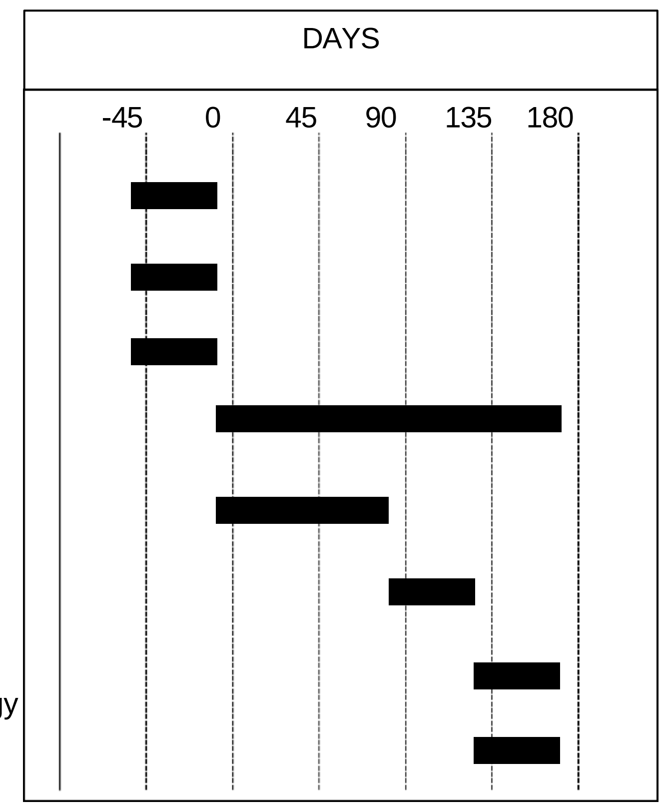
The proposed schedule for inventory elimination and tank and containment decontamination is as follows:

Inventory Elimination	90 days
Tank and Equipment Decontamination	45 days
Containment Decontamination	45 days
Total	180 days

Note: If sampling and analysis indicate that containment or soil removal or treatment is required, the closure schedule will require a permit modification conducted in accordance with WAC 173-303-610(3)(b)(ii).

Figure I1-1. Facility Final Closure Schedule

Notification of Closure..................................
Receive Last Known Volume of Waste ....
Begin Closure ....
Monitoring by PE ....
Inventory Elimination ....
Tank/Equipment Decontamination................
Containment Decontamination.....................
Soil Sampling and Analysis* ....



* Soil sampling data will be submitted to Ecology
measures will be based on data submitted.

I1.4.1 EXTENSION OF CLOSURE TIME

The planned closure is not expected to exceed 90 days for treatment, removal or disposal of wastes, and all closure activities are expected to be complete within 180 days. Therefore an application for a longer closure schedule is not required.

I2. CLOSURE COST ESTIMATE

WAC 173-303-620(3); -806(4)(a)(xv)

The NUWC Division, Keyport TSD Facility is owned and operated by the Federal government and is exempt from the Financial Requirements of WAC 173-303-620 as per WAC 173-303-620(1)(c).

I2.1 FINANCIAL ASSURANCE MECHANISM FOR CLOSURE

WAC 173-303-620(4) and (10); -806(4)(a)(xv)

The NUWC Division, Keyport TSD Facility is owned and operated by the Federal government and is exempt from the Financial Requirements of WAC 173-303-620 as per WAC 173-303-620(1)(c).

I3. NOTICE IN DEED OF ALREADY CLOSED DISPOSAL UNITS

WAC 173-303-610(10); 806(4)(a)(xiii)

NUWC Division, Keyport has closed one dangerous waste disposal unit under the CERCLA program. Details of the history, steps taken to close the unit, and institutional controls implemented as a result of the cleanup action are recorded in the 'Record of Decision for Operable Unit 1, Naval Undersea Warfare Center Division Keyport, Washington' dated September 1998, prepared by URS Greiner, Inc of Seattle, WA and Science Applications International Corp of Bothell, WA for Engineering Field Activity, Northwest, Southwest Division, Naval Facilities Engineering Command, Poulsbo, WA.

I4. POST-CLOSURE PLAN

WAC 173-303-610(8); -806(4)(a)(xiii)

A Post-Closure Plan has not been provided for the NUWC Division, Keyport TSD Facility since no dangerous waste, dangerous waste residues, or contaminated materials is expected to remain after closure. Additionally, all tank systems are provided with secondary containment, which meets the requirements of WAC 173-303-640(4)(b) through (f). Although soil and groundwater contamination may be identified at the facility during closure activities, this contamination could be addressed under RCRA Corrective Action. Should corrective action measures not fully address soil or groundwater contamination, a post-closure permit could be required.

I5. LIABILITY REQUIREMENTS

WAC 173-303-620(8), (10); -806(4)(a)(xvii)

The NUWC Division, Keyport TSD Facility is owned and operated by the Federal government and is exempt from the Financial Requirements of WAC 173-303-620 as per WAC 173-303-620(1)(c).

SECTION J

OTHER FEDERAL AND STATE LAWS

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A. BACKGROUND

1. Name of proposed project, if applicable:

    Naval Undersea Warfare Center (NUWC) Division, Keyport – Dangerous Waste Treatment and Storage Facility.

2. Name of applicant:

    Naval Undersea Warfare Center (NUWC) Division, Keyport.

3. Address and phone number of applicant and contact person:

    NUWC Division, Keyport
    Attn: Dangerous Waste Manager
    Building 1051, Code 1023
    610 Dowell Street
    Keyport, WA 98345
    Phone: 360-396-2320

4. Date checklist prepared:

    April 2020.

5. Agency requesting checklist:

    Washington State Department of Ecology.

6. Proposed timing or schedule (including phasing, if applicable):

    Construction is complete; the facility has been operational since 1995.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

    No.

8. List any environmental information you know that has been prepared, or will be prepared, directly related to this proposal.

    Environmental Assessment for MILCON P-370, April 1991
    Revised Pt A Permit application for relocation of the Hazardous Waste TSDF, April 1994
    Draft RCRA Pt B Permit application submitted June 1995
    Draft RCRA Pt B Permit application submitted September 2001
    Draft RCRA Pt B Permit application submitted April 2005
    Revised Pt A Permit application for treatment process modification, July 2005
    Part B Permit Application, July 2007
    Permit for the Storage and Treatment of Dangerous Waste, March 2008
    Permit Modification NUWC-01-08-1, June 2008
    Permit Modification NUWC-10-10-2, October 2010
    Permit Modification NUWC-10-13-3, October 2013

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

    None.

10. List any government approvals or permits that will be needed for your proposal, if known.

    None.

11. Give a brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

    The proposal is to renew the dangerous waste management permit for an existing operation. NUWC Division Keyport is currently operating the dangerous waste treatment and storage (TSD) Facility under a permit dated March 2008. There will be no significant changes to physical structures or the scope of waste management operations under the renew permit. The TSD Facility site is approximately 1.5 acres of flat ground. The facility includes 43,971 ft^2 of enclosed interior space and 17,576 ft^2 of awning area.

12. Location of proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide the legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps submitted with any permit applications related to the checklist.

    NUWC Division, Keyport is located on the NBK Keyport Base on the Kitsap Peninsula approximately 15 miles west of Seattle. The proposed TSD Facility is located on the northeast corner of the intersection of Bradley Road and Gadberry Street, in the southwestern portion of NBK Keyport.

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site (circle one): Flat, rolling, hilly, steep slopes, mountainous, other . . . . . .

   Flat.

b. What is the steepest slope on the site (approximate percent slope)?

   1 percent.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

   Glacial till, clay, silt, sand, and gravel.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

   The site is adjacent to a closed landfill, which is managed under Navy's Environmental Restoration Program.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.

No backfill. Site development is complete.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

No.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

95 percent.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

None. Site development is complete.

2. Air

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

No construction emissions because site development is complete. Emissions associated with facility operation include facility ventilation system for all waste handling and storage areas and vehicle exhausts associated with normal operations.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

Air emissions originating from operations are controlled and permitted pursuant to PSCAA and RCRA requirements.

3. Water

a. Surface:

1). Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

NUWC Division Keyport is located on an arm of Puget Sound that extends from Port Orchard Reach to Liberty Bay. There is a shallow lagoon, tidal flats, seasonal stream and four delineated wetlands on the NBK Keyport property.

2). Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

Yes, a seasonal marsh/wetland is within 200 feet of the site. The wetland is southwest of the site, across from Bradley Road.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

None.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

No.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No.

b. Ground:

1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.

No.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

None.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

All waste management activities will be conducted under roofed structures. Roof runoff is generated from roof drainage and paved areas. Storm drainage for the site generates a total flow of 7 cfs based on rainfall intensity of 2.0 inches per hour, 10-minute duration for a 10-year design period. The roof drains on the east side of the facility are connected to a storm drain pipe at the new parking lot, and the westerly drains are connected to a drainage swale along Bradley Road. All paved areas have a minimum slope of 1 percent to facilitate adequate discharge. To effectively handle increased roof runoff rates, three small retention ponds are incorporated with an oil/water separator installed at the point of discharge.

2) Could waste materials enter ground or surface waters? If so, generally describe.

No.

d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

All site runoff will be directed to storm drains which will discharge to stormwater retention ponds equipped with oil/water separators.

4. Plants

a. Check or circle types of vegetation found on the site:

Deciduous tree: Alder, maple, aspen, other
Evergreen tree: Fir, cedar, pine, other
Shrubs
Grass
Pasture
Crop or grain
Wet soil plants: Cattail, buttercup, bulrush, skunk cabbage, other
Water plants: Water lily, eelgrass, milfoil, other
Other types of vegetation

Except for stormwater conveyances and retention ponds the site is capped with concrete-asphalt.

b. What kind and amount of vegetation will be removed or altered?

None. Site development is complete.

c. List threatened or endangered species known to be on or near the site.

None.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Landscaping to facilitate stormwater collection and retention has been established around the perimeter of the site.

5. Animals

a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:

Birds: Hawk, heron, eagle, songbirds, other: . . . .

Swallows, seagulls, ducks, eagles, geese

Mammals: Deer, bear, elk, beaver, other: . . . .

Deer, foxes

Fish: Bass, salmon, trout, herring, shellfish, other: . . . .

Saltwater fish and invertebrates

b. List any threatened or endangered species known to be on or near the site.

Eagles.

c. Is the site part of a migration route? If so, explain.

No.

d. Proposed measures to preserve or enhance wildlife, if any:

None.

6. Energy and natural resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Natural gas is the primary fuel for the boiler heating system and water heater. Diesel oil is used as a secondary backup fuel. Diesel oil is used for an emergency generator used in the event of electrical power outages. All other facility energy needs are met with electricity supplied through a 500 kVA transformer located west of the facility.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

Natural gas was used for all heating applications to reduce air pollution and conserve electricity. All hot water pipes and heat ducts are insulated to reduce heat loss. High pressure sodium and fluorescent light fixtures have been replaced by LED fixtures on all interior and exterior lighting. Two-inch thick expanded polystyrene foam insulation board is used in the composite roof structure resulting in a total roof insulating factor of R-11.

7. Environmental health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or dangerous waste that could occur as a result of this proposal? If so, describe.

The purpose of the TSD Facility is to treat, consolidate, and store temporarily all dangerous wastes generated at NUWC Division Keyport. Separate storage areas are provided for sulfuric acid, caustics, lithium, acids, poisons, oxy-acids, oxidizers, 1-A flammables, organic peroxides, and flammables/combustibles.

The facility is designed in compliance with all State, Federal and Navy regulations for dangerous waste management facilities and construction requirements of the NFPA. Numerous design and safety features have been incorporated into the facility to ensure the safety and protection of personnel and the environment.

1) Describe special emergency services that might be required.

The Navy Region Northwest Fire Department stationed at NBK Keyport is trained and equipped to respond to all fires, explosions, or chemical spills. The response team has been specifically trained to fight lithium fires. Emergency medical services are available at the Bangor Navy Clinic.

2) Proposed measures to reduce or control environmental health hazards, if any:

Protective design features of the TSD Facility include:

- Spill containment features in all waste handling, storage, and loading areas.
- All waste management activities will be conducted under roofed structures.
- Smoke detectors, fire alarms, and spill alarms are located in each separate area of the building.
- Automatic fire sprinkler systems for all building areas except for the lithium storage area.
- Fire flow containment vaults to prevent contaminated fire flow water from entering storm or sanitary sewers.
- Emergency showers and eye wash stations throughout the facility.
- Negative pressure exhaust and ventilation systems for all waste handling and warehouse areas.
- Respirators and breathing air apparatus for use by all personnel during operations if required or in the event of a toxic material spill.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

None.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Normal facility operations produce noise from truck and forklift operation. All waste treatment and processing equipment operation will occur inside the enclosed, roofed facility, which will minimize noise impacts to the surrounding area. Noise levels from facility operation will be consistent with other existing industrial activities in the area.

3) Proposed measures to reduce or control noise impacts, if any:

Noise levels are not significant or incompatible with activities in the industrial area, and noise reduction will not be necessary.

8. Land and shoreline use

a. What is the current use of the site and adjacent properties?

The TSD Facility is located in the Industrial/Public Works support area at NBK Keyport. Adjacent properties to NBK Keyport are primarily rural, residential and light industrial.

b. Has the site been used for agriculture? If so, describe.

No.

c. Describe any structures on the site.

Site development is complete. Facility construction was completed in 1994.

d. Will any structures be demolished? If so, what?

Site development is complete.

e. What is the current zoning classification of the site?

The Kitsap County Development Plan lists NBK Keyport as a Federal Facility, and the surrounding area is zoned rural residential.

f. What is the current comprehensive plan designation of the site?

The site is designated Military Industrial Support.

g. If applicable, what is the current shoreline master program designation of the site?

Federal Facility.

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

No.

i. Approximately how many people would reside or work in the completed project?

The TSD Facility is staffed by three waste handlers and three administrative support personnel.

j. Approximately how many people would the completed project displace?

None.

k. Proposed measures to avoid or reduce displacement impacts, if any:

None.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

The project is compatible with the NUWC Division Keyport Master Plan.

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

None.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

None.

c. Proposed measures to reduce or control housing impacts, if any:

None.

10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

The TSD Facility is a one story pre-cast concrete structure. The greatest height of any point on the structure occurs on the south side at the truck dock where the height from grade to the top of the parapet wall is 32 feet. Other building heights are approximately 28 feet. Primary building materials consist of concrete walls and floors with a steel/concrete roof structure, painted metal roofing, and EPDM elastomeric roofing.

b. What views in the immediate vicinity would be altered or obstructed?

None.

c. Proposed measures to reduce or control aesthetic impacts, if any:

None.

11. Light and glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

None.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

None.

c. What existing off-site sources of light or glare may affect your proposal?

None.

d. Proposed measures to reduce or control light and glare impacts, if any:

None.

12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?

A small County park is located on Dogfish Bay west of the NBK Keyport Main Gate approximately 1500 feet from the TSD Facility.

b. Would the proposed project displace any existing recreational uses? If so, describe.

No.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

None.

13. Historic and cultural preservation

a. Are there any places or objects located on, or proposed for, National, State or local preservation registers known to be on or next to the site? If so, generally describe.

No.

b. Generally describe any landmarks or evidence of historic, archeological, scientific, or cultural importance known to be on or next to the site.

None.

c. Proposed measures to reduce or control impacts, if any:

None.

14. Transportation

a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

State highway 308 provides access to NBK Keyport. However, NBK Keyport is not open to the public. The facility is located at the intersection of Bradley Road and Gadberry Street within the fenced, controlled boundaries of NBK Keyport.

b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

No. The nearest Kitsap County Transit bus stop is at the intersection of Highway 308 and Silverdale Way/Viking Way, three miles from NBK Keyport.

c. How many parking spaces would the completed project have? How many would the project eliminate?

Nine paved visitor parking stalls are provided at the north end of the site adjacent to Bradley Road.

d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

No.

e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No.

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

No change – same number of vehicles as prior operations.

g. Proposed measures to reduce or control transportation impacts, if any:

None.

15. Public services

a. Would the project result in an increased need for public services (for example: Fire protection, police protection, health care, schools, other)? If so, generally describe.

No.

b. Proposed measures to reduce or control direct impacts on public services, if any.

No.

16. Utilities

a. Circle utilities currently available at the site: Electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.

Electricity, natural gas, water, refuse service, telephone and sanitary sewer are available in Bradley Road and Gadberry Street.

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

Potable water is provided from a new 10” water pipe in Gadberry Street. Potable water at NBK Keyport is supplied by Kitsap Public Utilities Department.

Natural gas is supplied through a 3” pipe coming off an existing 3” pipe running along Bradley Road west of the facility. Natural gas service is provided by the Cascade Natural Gas Company.

Electrical power is fed from manhole MH 24E near the northwest corner of the building. The 15 kV circuit from MH 24E feeds a new 500 kVA transformer that supplies power to the facility. Electrical power is provided by Puget Power Company.

C. Signature

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Prepared by: Gary D. Simmons
Environmental Engineer

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Approved by: ______________________________ ______________
Terry Hiatt Date
Environmental Branch Manager

SECTION K

PART B CERTIFICATION

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TABLE OF CONTENTS

K-1 PART B CERTIFICATION

(WAC 173-303-806(4)(a), -810(12) and (13)

"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 upon 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."

Facility/Property Owner Name and Official Title (Type or print)	**Signature**	**Date**
Captain C. P. Hoskins Commanding Officer, Naval Undersea Warfare Center Division, Keyport	Digitally signed by HOSKINS.CLINTON.PATRICK.1153788401 Date: 2024.04.24 15:16:40 -07'00'	4/24/24