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Attachment 14

[Permit Attachment MM]

Tank Management

SECTION D (APPLICATION)
PROCESS INFORMATION

SECTION D-2
TANK SYSTEMS

ATTACHMENT MM (PERMIT)

MIXED WASTE FACILITY
RCRA/TSCA PERMIT APPLICATION

~~Pacific EcoSolutions, LLC~~PFNW-R
RICHLAND, WASHINGTON

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~~SECTION D-2 TANK SYSTEMS~~

ACRONYM LIST

ASME	American Society of Mechanical Engineers
~~PEcoS~~	~~Pacific EcoSolutions, LLC~~
CAM	Continuous air monitor
CARBN	Carbon filtration
CHOXD	Chemical oxidation
DOT	Department of Transportation
~~GVB~~	~~GASVIT™ Building~~
HAZMAT	Hazardous Materials
HEPA	High efficiency particulate air
HMIS	Hazardous Materials Identification System
IBC	Intermediate bulk containers
LDR	Land Disposal Restrictions
MWF	Mixed Waste Facility
MWTH	Mixed Waste Thermal Building
NEUTR	Neutralization
NFPA	National Fire Protection Association
P&ID	Piping and instrument diagrams
PFD	Process flow diagrams
PFNW-R	Perma-Fix Northwest Richland, Inc.
PVC	Polyvinyl Chloride
PVDF	Polyvinylidene Fluoride
RCRA	Resource Conservation and Recovery Act
STB	Stabilization Building
TIC	Transportable In-process Containers
UBC	Uniform Building Code
UST	Underground storage tanks
UV	Ultraviolet
WAC	Washington Administrative Code
WAP	Waste Analysis Plan

1.0 INTRODUCTION

This section provides all necessary tank design, construction, and operational information to adequately assess the suitability of each tank system for its designated use within the Mixed Waste Facility (MWF). Tank systems designed into the MWF include:

- System TP-04, Liquid Treatment (two 1200 gallon tanks)
- System TP-06, Liquid Holding (two 1200 gallon tanks)
- System TP-16~~GV-02~~, ~~Liquid Feed~~Storage Tanks (~~one~~four ~~375~~10,950 gallon tanks)
- System ~~GV-1~~TP-16, ~~Secondary Waste Treatment~~Residue/Sludge Storage Tank (~~two~~one 12~~00~~075 gallon tank~~s~~)

These systems are defined in the process engineering descriptions for the Stabilization building (STB) and ~~GASVIT™~~-Mixed Waste Thermal building (MWTH~~GVB~~), Attachments ~~5~~-PP and ~~6~~QQ, respectively. Waste acceptance criteria and limitations for these tank systems are described in Attachment 1, Waste Analysis Plan (WAP).

2.0 LIQUID TREATMENT (SYSTEM TP-04)

Overview - The function of the liquid treatment system (TP-04) is to receive liquid waste for treatment by filtration, neutralization, or deactivation. Deactivation also includes neutralization. Liquid waste includes off-site generated waste and waste received from other onsite treatment systems.

The pretreatment processes provided by system TP-04 will comply with the Resource Conservation and Recovery Act (RCRA) Land Disposal Restrictions (LDR) treatment standards of neutralization (NEUTR) as described in federal regulations 40 CFR 268.42 and 268.45 and incorporated by reference in Washington Administrative Code (WAC) 173-303-140(2)(a). Other purposes of pretreatment are to provide ease of waste handling, reducing hazards to the worker, reducing corrosion and damage to equipment, protect corrosion-resistant floor coatings, and facilitating the next step of the treatment.

The Liquid treatment system (TP-04) will have a container pump (PMP-0401), two 1,200 gallon stainless steel tanks (TK-0403 and TK-0406) three liquid filters (FLT-0404, FLT-0410, and FLT-0414), two tank mixers (MX-0402 and MX-0405), two pumps (PMP-0409 and PMP-0411), associated piping, instrumentation, and controls.

The system is operated from a local control panel. For a campaign having numerous containers of similar compatible waste, one of the liquid treatment tanks may serve to hold the incoming waste while the other provides treatment. In this manner, the combined waste can be blended and an integrated sample can be extracted for analysis and treatment planning. Treated liquids from this tank system are pumped to local transportable in-process containers (TICs).

Neutralization is accomplished by adding waste and either acidic or alkaline chemicals in the tank to adjust the pH of the waste. The second method (deactivation) is also accomplished by neutralization.

D-2A Design, Installation And Assessment Of Tank System

D-2a(1) Design Requirements

Tanks and ancillary equipment will be designed and fabricated to ensure that the equipment will not collapse or rupture under design loads. A summary of the tank design loads and calculations are presented in the technical specifications for stabilization building processes, Attachment 11, Section 15176, Shop Fabricated Stainless Steel Tanks, and Attachment 13, Calculations. Tank designs and operating specifications are also provided in attachment 11, section 15179D, liquid treatment and liquid holding tank data sheet. The tank data sheet details the materials of construction; tank dimensions; tank capacity; shell thickness; allowable corrosion; connections; structural supports; and seam requirements for the liquid treatment tank. Attachment 7, Construction Drawings, details the design and materials of construction for the tank foundation.

All tank system components are prefabricated and are commercially available. Vendor-supplied design data and certifications are used to evaluate the adequacy of the components of each tank system design with respect to the applicable design standards. This will ensure that components of the tank systems will not collapse, rupture, or fail during installation or operation. Evaluations will be performed by ~~PEcoS~~ PFNW-R and the manufacturers to design appropriate anchors for tank system components.

Tanks within the liquid treatment system will be structurally supported by steel legs, reinforced and secured to a level concrete pad. All tanks are designed with base anchorage to resist sliding or overturning due to seismic loads. Tank anchorage is designed to withstand the Uniform Building Code, Zone 3 seismic loading.

Tank anchorage for the liquid treatment tank will consist of anchor bolts bonded, mechanically or via epoxy, to the concrete pad. The anchors bolts protruded up through the stainless steel secondary containment pan and are seal welded at the base of the bolt. The anchor bolts then directly fasten the tank structural support frame to the concrete pad. Tank foundations and supports are designed in accordance with the American Concrete Institute and American Institute of Steel Construction. Foundation designs are shown in Attachment 7, Construction Drawings.

None of the waste tank systems to be used in the MWF will contact soil. The components of each tank system (e.g., tanks, filters, pumps, etc.) are provided with~~e~~ primary containment of the waste. ~~Each component is contained within the GASVIT™ Building (GVB) or Stabilization Building (STB). The stainless steel pans, individually mounted for each of the tank systems, serve as the secondary containment for that tank system.~~

Since the individual components of each tank systems are provided ~~primary~~ with containment, these components will be inspected in accordance with the Inspection Plan included as Attachment 19. If observed during inspections, equipment corrosion and/or other observable material stress will be addressed as required to maintain safe operation of the MWF treatment processes and prevent releases to the environment.

Installation procedures, based on manufacturer specifications, are developed and followed to ensure the safe installation of each tank. Where applicable, tightness testing procedures are developed and followed to confirm integrity of new waste tank systems after installation. An independent, qualified, registered professional engineer, familiar with the appropriate installation procedures for tanks, will ensure that the

installation of the waste tank systems follows proper procedures with no resultant damage to the system. Ancillary piping is designed to meet ANSI standards for process piping.

Records of tank installations are maintained at the PFNW-R~~EcoS~~ facility. A certification statement, of the independent inspection~~,~~ as required by WAC 173-303-640(3)(a) and certified~~will be included with the records~~ in accordance with WAC 173-303-810(13)(a) will be kept in the operating record.

~~All s~~Stainless steel tanks are designed in accordance with the American Society of Mechanical Engineers (ASME) and other organizations listed in Table D-2-1. A minimum of 15 psi will be specified, however, since tanks are for atmospheric use, pressure vessel certification stamps will not be needed. Welding on tank shells will be full penetration welds. Weld joint efficiency will be 85 % or greater, in accordance with applicable standards.

Piping and instrument diagrams (P&IDs) and process flow diagrams (PFDs) for the liquid treatment system are presented in Attachment ~~7~~RR.

D-2a(2) Integrity Assessment

Design basis used for design, installation, and minimum shell thickness are presented in Attachment 13, Calculations (Tank Certifications). Tank certifications provide an independent registered professional engineers' certification that tank support structures, foundation, and ancillary equipment design will be structurally sound and be sufficiently compatible with wastes stored therein, to ensure that specified tanks will not fail or collapse over the intended life of the tank.

Tank systems will be subsequently assessed throughout the life of the system to verify that the tank system will be fit for its intended use. This assessment program is described in Attachment 19, Inspection Plan. Copies of tank assessments will be kept on file at the MWF facility.

D-2a(3) Additional Requirements for Existing Tanks ~~—N/A.~~

~~No existing tank systems are included as part of the MWF design.~~WAC 173-303-040 defines existing tank systems as a tank system used for storage or treatment of dangerous waste which is in operation, or for which installation has commenced on or prior to February 3, 1989. Based on this definition, the MWF does not have any existing tanks.

D-2a(4) Additional Requirements for New Tanks

Tanks will be installed in compliance with WAC 173-303-640 (3). Tanks, components and ancillary equipment will be carefully handled, by a subcontractor who is specialized in tank installation, to prevent damage to tank systems during installation. No underground tanks will be installed at the MWF. After tank systems have been installed, and before being placed in service, tanks systems will be inspected by an independent, qualified, installation inspector or ~~licensed~~ registered professional engineer for the following items:

- Weld breaks
- Punctures
- Scrapes of protective coatings, where applicable
- Cracks
- Corrosion
- Other structural damage or inadequate construction or installation.

Discrepancies will be remedied before tank systems are placed in service. New tanks and ancillary equipment will be tested for tightness (i.e., leak tested) prior to being placed in service. If a leak is found, the tank system or ancillary equipment will be repaired and re-inspected before being placed in service. A copy of the installation report, signed by the independent inspector, stating that the tank system was installed in accordance with the applicable designs, and that acceptable repairs were made as required, will be kept on file at the MWF facility.

Ancillary equipment, such as piping, will be supported and protected to prevent excessive stresses due to physical hazards, settlement, vibration, expansion, or contraction. Ancillary equipment installation will use, as a reference, ANSI Standard B31.3, "Chemical Plant And Refinery Piping", or an equivalent standard reference.

Based on tank design and material of construction, no active corrosion protection systems, either of commercial origin or in-house shop fabricated, are part of the liquid treatment tank system. Corrosion protection for this tank is provided as an administrative control, limiting the waste pH range between 2 and 12.5. No portion of the tank system is in contact with the soil.

Tank design and corrosion certification requirements, verifying adequacy of tank system design and corrosion protection, are defined in Attachments 11 and 12, Section 15176. A Certification of conformance will be provided by each manufacturer. Tank and support calculation are presented in Attachment 13, Calculations.

D-2a(5) Additional Requirements for New On-ground or Underground Tanks – N/A.

All waste tank systems associated with the MWF, will not be installed or operated in direct contact with the soil environment (e.g., as would be the case for underground storage tanks (USTs) or outdoor tanks). Therefore design failures due to soil corrosion, dome loading, etc. need not be evaluated for this tank system.

D-2B Secondary Containment And Release Detection For Tank Systems

D-2b(1) Requirements for All Tank Systems

This section describes the secondary containment system for above ground tanks at the MWF. Tank secondary containment systems are designed, installed, and operated to prevent any waste migration or cross-contamination with other waste being stored or processed within the MWF. For the liquid treatment tank and ancillary equipment, the secondary containment consists of a flat stainless steel pan that is secured directly beneath the tank system. The pan free volume is designed to contain 1,320 gallons (110% of the volume capacity of one tank), and is sized to provide a combined secondary containment for the ~~following~~ tank equipment and interconnecting piping. The free volume in the secondary containment space takes into account the space occupied (e.g., displaced volume) by the tank support structure and any equipment that is placed inside the containment area during the normal operation of the system.

Piping - All waste bearing piping extending outside of the secondary containment pan effective boundary will be constructed of double encased pipe (e.g., pipe-in-pipe). The carrier pipe is specified as Polyvinylidene Fluoride (PVDF) for maximum resistance to postulated waste types. The outer pipe, used as secondary containment, is specified as Polyvinyl Chloride (PVC). The annular space, between the inner and outer pipe, is lined with conductivity tape to serve as early leak detection from a failure of the carrier pipe.

(i) Foundation – The secondary containment pan will be placed directly on the stabilization building concrete foundation. The foundation is designed to support the tank system and all equipment operating within the tank system; resist pressure gradients above and below the system; and prevent failure due to settlement, compression and uplift. Foundation preparation, design, and construction procedures to control cracking due to uneven settlement are presented in Attachment 7, Construction Drawings, and Attachment 13, Calculations.

To further ensure the structural integrity of the tank system, the tank structural supports (e.g., legs) will be high enough to maintain the tank above the secondary containment's maximum potential liquid level. Additionally, the tank system ancillary components, as listed in Table D-2-2, will be mounted on support frames, above the maximum height of the secondary containment pan. The pumps themselves will be directly mounted on frames attached to tank structural supports (above the maximum height of the pan).

(ii) Material Compatibility – The secondary containment for the tank system, as well as tank and ancillary equipment structural supports, will be constructed of stainless steel, with a material compatibility consistent with the material used for the tank system components. Based on the waste types postulated for this system and a pH range limit between 2 and 12.5, the stainless steel material specified in Attachment 7, Construction Drawings, should be adequate.

(iii) Strength and Thickness – The tank system secondary containment will be constructed of 1/8-inch stainless steel plate with reinforcing ribs. This design is determined to have sufficient strength, thickness and resistance to prevent failure f~~e~~rom pressure gradients (including static head and external hydrological forces), physical contact with the waste, climactic conditions, and stresses of daily operations. Structural design information for the tank containment system is presented in Attachment 7, Construction Drawings.

(iv) Leak Detection – The stainless steel pan providing secondary containment is slightly sloped to facilitate both liquid detection and removal. A conductivity probe, with a respective alarm, will be placed at the low point of the secondary containment pan, and will serve as continuous leak detection of the primary tank and tank system components listed in Table D-2-2. Additionally, visual checks of the secondary containment systems will be performed daily. These checks will consist of visually

inspecting for signs of primary containment leaks; run-on or run-off of liquids to and from the secondary containment pan; and immediately apparent signs of corrosion, cracking, or other material stress. A more extensive examination of the equipment and material integrity will be routinely performed as discussed in Attachment 19.

(v) Drainage and Spill Removal – The secondary containment pan for the tank system is slightly sloped to a low point at one corner of the pan. This approach facilitates collection of liquids and removal. The degree of sloping for the secondary containment structure is specified in the structural designs presented in Attachment 7, Construction Drawings. Visual inspections for contamination from leaks or spills are discussed in the section above. If liquids are present in the secondary containment, the material will be removed via a portable vacuum pump or by absorbents, within a twenty-four (24) hour period from the time of discovery. The material will be collected in a transportable in-process container (TIC); transported to container staging area, TS-01; and evaluated for required treatment and stabilization procedures.

(vi) Run On – The tank system is housed within the completely enclosed ~~Stabilization building~~STB. The secondary containment system is constructed and operated, as well as sheltered from the outdoor environment, so that run-on from a 25-year, 24-hour will be excluded from the system. The exterior wall of the combined ~~GASVIT™~~-MWTH and ~~Stabilization~~ STB~~building~~ is designed with a solid concrete berm. The height of the berm will be a minimum of 8-inches. The exterior entrances to the Stabilization building are also a minimum of 8-inches higher than the exterior yard grade. This containment is sufficient to prevent run-on form a 100-year, 24-hour storm. Therefore, secondary containment capacity for run-on need not be provided. Construction details are presented in Attachment 7, Construction Drawings.

D-2b(1)(b)

(i) Concrete Secondary Containment – ~~N/A.~~ The tank system will not rely upon the concrete secondary containment system. The Stabilization building concrete foundation, with an 8-inch berm, will serve a tertiary containment function. Foundation design features including materials of construction, provisions for expansion, and impermeable sealants, are detailed in Attachment ~~7~~RR, Construction Drawings.

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(ii) Secondary Containment Capacity - For the liquid treatment tank and ancillary equipment, the secondary containment consists of a flat stainless steel pan that is secured directly beneath the tank system. The secondary containment system is designed to contain 200 percent (200%) of the volume of the largest tank. Therefore, the pan free volume is designed to contain 1,320 gallons, and is sized to provide a combined secondary containment for the tank system equipment and interconnecting piping listed in Table D-2-2. The free volume in the secondary containment space takes into account the space occupied (e.g., displaced volume) by the tank support structure and any equipment that is placed inside the containment area during the normal operation of the system. Material specifications, design drawings, and calculations are presented in Attachment ~~7~~RR, Construction Drawings, and Attachment 13, Calculations.

(iii) Automatic Sprinkler Systems Capacity – N/A. The MWF will be equipped with dry fire suppression systems only. Therefore, secondary containment capacity to contain 20 minutes of fire water, per Uniform Building Code, 80.301(1)(4), need not be provided.

Comment [BN1]: Only hazmat cabinets right?

D-2b(2) Additional Requirements for Specific Types of Systems

The following sections define the provisions for compliance to applicable requirements for vault systems, double wall tanks, and ancillary equipment.

D-2b(2)(a) Vault Systems

The secondary containment system is not a vault, by a conventional definition. The secondary containment system is comprised of a shallow stainless steel pan; with the bottom of the pan at floor level; and the top of the pan completely open to the room environment. Although the definition of "vault" is not applicable to this secondary containment system the requirements for this section are satisfied, and include:

(i) Ignitable or Reactive Vapors – As a fundamental administrative control, no ignitable waste (D001) will be processed through this tank system. As a precaution, the process ventilation system and building ventilation system are the primary design means to protect against the potential formation and accumulation, of unforeseen ignitable concentration of flammable vapors. The tanks in the system are completely sealed and vented by the process ventilation system. Any fumes originating from

waste accumulating in the secondary containment system are defused, diluted, and captured in the building ventilation system.

Waste treated and stored within the boundary of the secondary containment system for this tank system will be compatible. Waste compatibility will be determined by the procedures discussed in the WAP.

(ii) Exterior Moisture Barrier – The tank system and secondary containment are installed inside the fully enclosed Stabilization building, sheltered from the outdoor environment. An exterior moisture barrier, as described in Section D-2b(1)(a)(vi), prevents the migration (e.g., run-on) of moisture or infiltration into the secondary containment system. Therefore, secondary containment capacity for run-on need not be provided. Construction details are presented in Attachment 7, Construction Drawings.

D-2b(2)(b) Double-walled Tanks – N/A.

The tanks within this system are not a double-wall tank design, but instead, are a single-shell design. Therefore, all provisions for corrosion protection and continuous leak detection are defined in the applicable sections for the secondary containment pan.

D-2b(2)(c) Ancillary Equipment

Secondary containment for the ancillary equipment of this tank system (listed in Table D-2-2) is provided by the same stainless steel pan for the entire tank system; as described in Section D-2b(1). Piping extending outside the physical boundary of the secondary containment pan, will be constructed of double-encased pipe, as described in section D-2b(1). Containers being transported within the facility (e.g., transportable in-process containers (TICs)) shall be equipped with their respective secondary containment (refer to Section D-1, Containers). Inspections for leaks, spills, corrosion, and/or other material stress are described in Sections D-2a(2), (4), and (5).

D-2C VARIANCES FROM SECONDARY CONTAINMENT REQUIREMENTS

~~N/A.~~ No variances are requested for the tank systems specified in the MWF.

D-2D TANK MANAGEMENT PRACTICES

Each tank system is designed to manage a subset of the wastes that will be accepted for treatment. Standard procedures for each treatment process, developed prior to receipt of any waste at the MWF, provide operational controls to ensure that any waste or treatment reagent that could cause a tank to rupture, leak, corrode, or otherwise fail is not placed in such tanks.

The following practices are employed to ensure tank failure does not occur.

D-2d(1) Compatibility of Wastes or Treatment Agents

As part of waste acceptance, all wastes and proposed treatment agents are assessed for compatibility with materials of construction in the tank systems selected for holding and treatment. This assessment is routine and is based on process knowledge, treatability test results and equipment and reagent vendor information. Before processing waste, a process data sheet is used to evaluate the compatibility of the tank material of construction with the planned chemical adjustment process as defined in Attachment 1, Waste Analysis Plan.

D-2d(2) Operational Practices and Controls to Prevent Overfilling

The following operational practices and controls prevent overfilling of tanks.

D-2d(2)(a) Feed Cut-Off Systems, Pressure Controls, or Bypass Systems

All liquid storage tanks are fitted with level sensors, level switches and automatic shut-offs. The level sensor provides tank volume data and has a high and high-high level alarm set point. The high alarm set point is designed to provide a warning signal to halt tank filling operations. The high-high set point activates the automatic shut-off to stop the filling operation automatically.

D-2d(2)(b) Maintenance of Freeboard

Maintenance of freeboard is not required since ~~no~~ tanks are ~~open to the environment.~~located inside an enclosed building.

D-2d(2)(c) Diagrams of Piping, Control Instrumentation, and Process Flow

Process flow diagrams for the tank systems are included in Attachment 7, Construction Drawings. All processes within the MWF are batch processes. Tank systems have independent control mechanisms. Control requirements for each tank system are discussed in Attachments 5, Process Engineering Description for Stabilization Building, and Attachment 6, Process Engineering.

Description for ~~GASVIT™~~-MWTH Building. Additionally, tank system vendors provide P&ID for the components of the tank systems they supply no later than at the time of purchase. The control instrumentation identified will include:

- level sensors
- level switches
- level alarms
- flow measurement and controls
- automatic shut-off valves
- motor control devices
- weight sensor
- temperature monitoring regulation and controls

D-2d(2)(d) Descriptions of Procedures for Treating Dangerous Waste

Descriptions of procedures for treatment of dangerous wastes in tank systems are included in Section~~s~~ D-2b ~~and D-2e~~.

D-2E Labels And Signs

The tanks, referenced in Table D-2-2, will be labeled on two sides in black letters identifying the type of waste contained, the tank number, and tank name. The tank label area will be painted a light color, as necessary, to provide a contrast for the black lettering and enhance visibility. Tank identification labels will be lettered and numbered using a minimum of 3-inch high characters and will be located approximately at eye level. These labels will be visible from a minimum distance of 50 feet.

In accordance with WAC 173-303-640(5)(d), ~~The~~ tanks will be labeled to identify the waste contained and the major risks associated with the waste being treated and stored. At all times, tanks containing dangerous wastes, extremely hazardous wastes, or hazardous materials will be appropriately labeled to identify the major risks associated with the tank contents for employees, emergency personnel, and the public. Labels will be inspected per WAC 173-303-395(6) to insure they are not obscured, removed, or unreadable. Hazardous Materials Identification System (HMIS) and National Fire Protection Association (NFPA) labeling system will be used.

HMIS labels provide information on waste characteristics which identify the major risk associated with the waste being stored. The HMIS system includes information on health hazard, flammability, reactivity, and personnel protection. Hazards are rated from 0 to 4 (e.g., minimal hazard to severe hazard) indicating the degree of severity associated with the hazard. HMIS labels are color coded as follows:

- Blue — Health characteristics
- Red — Flammability
- Yellow — Reactivity
- White — Personnel Protection

The HMIS labels are 10.5-inches by 13.5-inches and are located at approximately eye level. These labels can be seen from a minimum distance of 50 feet. ~~Legend signs explaining the HMIS labeling system will be located throughout the plant.~~

Tanks will also be labeled with NFPA labels in addition to the tank number and material contained. Similar to the HMIS labeling system, the NFPA labels provide information on waste characteristics such as reactivity, flammability, and health hazard. Additional information such as reactivity with water and other special fire fighting information is also provided on this label. The color scheme for this label is as follows:

- Blue — Health characteristics
- Red — Flammability
- Yellow — Reactivity

Each characteristic is rated from 0 to 4 indicating the degree of hazard ranging from 0 as no special hazard, to 4 as a severe hazard. The NFPA labels are typically 12-inches-square, with each character approximately 3-inches high. These labels can be seen from a minimum distance of 50 feet. ~~Legend signs explaining the NFPA labeling system will be located throughout the plant.~~

D-2F AIR EMISSIONS

Process Ventilation - Process ventilation to this system is established and confirmed prior to conducting liquid treatment operations. The process ventilation system provides airspace confinement of waste-bearing equipment and maintains that equipment and/or area at a negative air pressure relative to the immediate room environment. The control of fugitive emissions is provided by venting the airspace above the incoming waste containers (e.g., TICs) and tank system. Local differential pressure indicators provide the operator with a positive indication that the process ventilation system is operating.

The process vent system collects fugitive emissions from the waste handling preparation areas where dust, vapors, or fumes may be released. The system uses activated carbon filters to treat organic vapor. A second filter type is used to treat acid and alkaline fumes, where applicable. A third filter type is a high efficiency particulate air (HEPA) filter and is used to remove particles of ≥ 0.3 micron at 99.97% efficiency. The process ventilation system design is detailed in Attachments 5, 6, and 7.

Building Confinement Exhaust – The exhaust from the process ventilation system is discharged to the building confinement system. This system provides for general stabilization building exhaust and ventilation and zone pressure control. The system consists of one supply air units two main exhaust filter trains, associated pressure control sensors, controllers, and damper actuators.

The system is designed to provide a minimum of seven air changes per hour in the operating process areas. Each filter bank consists of a pre-filter, HEPA filter, and carbon adsorption filter stage. Process ventilation exhaust discharges directly into the building exhaust system ahead of the building confinement filter banks. Building exhaust is then discharged through ~~two~~ an exhaust stack~~s~~ located ~~on the roof of the building~~behind the MWTH building. The building confinement system design is detailed in Attachments 5, 6, and 7.

Exhaust Emissions Monitoring – The building confinement exhaust monitors consist of a continuous air monitor (CAM) and a record sample filter, both of which collect representative samples of the radioactive particles in the discharge stream. A local alarm will sound if a high radiation level is detected. In addition, the building confinement exhaust monitors provide a continuous readout for the gas flow to the atmosphere. A process engineering description for this system is described in Attachments 5 and 6. Piping and instrument diagrams (P&IDs) for this system are found in Attachment 7, Construction Drawings.

D-2G MANAGEMENT OF IGNITABLE OR REACTIVE WASTE IN TANK SYSTEMS

No ignitable waste will be stored, processed, or treated within this tank system. Conversely, some reactive waste may be forwarded to this tank system for treatment and temporary storage. Tanks potentially containing reactive waste will be located away from: (1) a property line which is or can be built upon, and (2) the nearest side of any public way or from the nearest public building or property line, as required by the NFPA and 1988 Uniform Building Code's (UBC) buffer zone requirements for reactive wastes. The minimum required distance from reactive storage tanks to a property line is 50 feet. Section F-5, Prevention of Reaction of Ignitable, Reactive and Incompatible Wastes, describes in more detail the safe management practices used when handling or storing the waste types.

Reactive wastes identified in WAC 173-303-0907(7) (a) (vii) and (viii) will be specifically restricted form this tank system as specified in the WAP. Other wastes defined as reactive, such as sulfide

bearing wastes, will be accepted at the MWF. Compatibility testing as described, also described in the WAP will be used to determine what reactive wastes can be consolidated. Also, tanks previously containing reactive wastes will not be used to store incompatible wastes until at least one waste, compatible with both wastes is stored in the tank, or the tank has been cleaned.

D-2H MANAGEMENT OF INCOMPATIBLE WASTE IN TANK SYSTEMS

This tank system is designed to provide segregated storage, with primary and secondary containment, for waste treated, processed, and stored therein. This waste, by design, is preempted from commingling with potentially incompatible waste staged for or stored in neighboring tank systems. The administrative controls and inherent design features (e.g., material of construction, structural integrity, secondary containment, continuous leak detection, routine inspections, etc.), as described earlier in this section, attest to the tank system's ability to effectively segregate incompatible wastes and materials.

Wastes which are incompatible with the previous contents of the tank will not be placed in that same tank until the tank has been cleaned, or the tank has stored a waste compatible to both the waste streams in question. Compatibility determinations will be based on compatibility testing as described in the WAP, Department of Transportation (DOT) hazard classification, or an equivalent recognized compatibility reference.

3.0 LIQUID HOLDING (SYSTEM TP-06)

Overview - The function of the liquid holding tank system (TP-06) is to receive and treat liquid wastes containing low concentrations (less than 1%) of dissolved metals and organic. The system also provides capability for organic and metal contaminants removal including final polishing of liquid wastes treated by other systems. Other purposes of the treatment are to provide opportunities for re-use of the treated liquid waste when such a re-use is practical, cost effective, and allowed by the MWF part B permit.

The pretreatment processes will comply with the RCRA LDR treatment standards of chemical oxidation (CHOXD) by UV oxidation and carbon filtration (CARBN) as described in federal regulations 40 CFR 268.42 and 268.45 and incorporated by reference in WAC 173-303-140(2)(a).

The liquid holding system (TP-06) has two 1,200 gallon tanks, two tank mixers, two pumps, a carbon filter, an ion exchange unit, and a UV oxidation unit including all of the related piping, valve, instrumentation and controls, and instrumentation needed to perform the specified treatment. The carbon filter, ion exchange unit and UV oxidation unit are classified as miscellaneous units and are described in Section D-11. A summary description of these units is presented here.

Wastes are brought to this system by a TIC or in their original containers. The liquid holding system employs a granular activated carbon absorber, an ion exchange unit, and UV oxidation for removal and/or destruction of small amounts of organic material (e.g., hydrocarbons, alcohol, ketones, volatile organic compounds, and aromatics) followed by the removal of dissolved metals and ionic compounds in the incoming liquid waste. Treatment by the different processing methods is optional and is selected based on the input waste characteristics and the ultimate waste treatment objectives which are as follows:

- Removal of organic or inorganic contaminants to allow the waste to meet the LDR treatment standards of CARBN or CHOXD
- Removal of organic or inorganic contaminants so that the waste meets the leachability requirements after it is stabilized.
- Removal of contaminants to a cleanliness level that allows for the re-use of the waste.

Carbon Adsorption. The activated carbon filter is provided to remove chlorine and some organics in the feed water. The removal is an absorption process. There are two carbon beds with each bed having one layer of filter media and several layers with the least dense carbon layer on top and the most dense quartz layer at the bottom. The carbons will be used in regeneration or non-regenerative modes, which ever is most effective for the given waste stream.

Ultraviolet (UV) Oxidation. UV oxidation is used as a polishing step to reduce total organic carbon. Low pressure mercury discharge lamps are used to generate the UV energy in the powerful of 185 nm) range. The UV light rays produced by each lamp efficiently pass through the lamp housing and into the surrounding light flowing through the UV treatment chamber. This UV energy is sufficient for effective reduction of the oxidizable carbon in the waste. The UV energy promotes free radicals in varying degrees of photo-chemical excitation. The hydroxyl (OH-) free radicals break various chemical bonds of organic matter which in turn produce chain reactions, oxidizing most organic matter into CO_2 and H_2O.

Ion Exchange. A double-bed ion-exchange, one anion and one cation, will be provided for removal of metals in the waste. The cation resin at the initial operation will be in sodium form and the anion will be in chlorine form. The beds will be used in series.

D-2A DESIGN, INSTALLATION AND ASSESSMENT OF TANK SYSTEM

D-2a(1) Design Requirements

Tanks and ancillary equipment will be designed and fabricated to ensure that the equipment will not collapse or rupture under design loads. A summary of the tank design loads and calculations are presented in the technical specifications for stabilization building processes, Attachment 11, Section 15176, Shop Fabricated Stainless Steel Tanks, and Attachment 13, Calculations. Tank designs and operating specifications are also provided in Attachment 11, Section 15179D, liquid treatment and Liquid holding tank data sheet. The tank data sheet details the materials of construction; tank dimensions; tank capacity; shell thickness; allowable corrosion; connections; structural supports; and seam requirements for the liquid holding tank. Attachment 7, Construction Drawings, details the design and materials of construction for the tank foundation.

All tank system components are prefabricated and are commercially available. Vendor-supplied design data and certifications are used to evaluate the adequacy of the components of each tank system design with respect to the applicable design standards. This will ensure that components of the tank systems will not collapse, rupture, or fail during installation or operation. Evaluations will be performed by PFNW-R~~EcoS~~ and the manufacturers to design appropriate anchors for tank system components.

Tanks within the liquid holding system will be structurally supported by steel legs, reinforced and secured to a level concrete pad. All tanks are designed with base anchorage to resist sliding or overturning due to seismic loads. Tank anchorage is designed to withstand the Uniform Building Code, Zone 3 seismic loading.

Tank anchorage for the liquid holding tank will consist of anchor bolts bonded, mechanically or via epoxy, to the concrete pad. The anchors bolts protruded up through the stainless steel secondary containment pan and are seal welded at the base of the bolt. The anchor bolts then directly fasten the tank structural support frame to the concrete pad. Tank foundations and supports are designed in accordance with the American Concrete Institute and American Institute of Steel Construction. Foundation designs are shown in Attachment 7, Construction Drawings.

None of the waste tank systems to be used in the MWF will contact soil. The components of each tank system (e.g., tanks, filters, pumps, etc.) provide the primary containment of the waste. Each component is contained within the ~~GASVIT™~~-MWTH Building ~~(GVB)~~ or ~~Stabilization Building (~~STB~~)~~. The stainless steel pans, individually mounted for each of the tank systems, serve as the secondary containment for that tank system.

Since the individual components of each tank systems provide primary containment, these components will be inspected in accordance with the Inspection Plan included Attachment 19. If observed during inspections, equipment corrosion and/or other observable material stress will be addressed as required to maintain safe operation of the MWF treatment processes and prevent releases to the environment.

Installation procedures, based on manufacturer specifications, are developed and followed to ensure the safe installation of each tank. Where applicable, tightness testing procedures are developed and followed to confirm integrity of new waste tank systems after installation. An independent, qualified, registered professional engineer, familiar with the appropriate installation procedures for tanks, will ensure that the

installation of the waste tank systems follows proper procedures with no resultant damage to the system. Ancillary piping is designed to meet ANSI standards for process piping.

Records of tank installations are maintained at the PFNW-R~~EcoS~~ facility. A certification statement, of the independent inspection, will be included with the records in accordance with WAC 173-303-810(13)(a).

~~All s~~Stainless steel tanks are designed in accordance with the ASME and other organizations listed in Table D-2-1. A minimum of 15 psi will be specified, however, since tanks are for atmospheric use, pressure vessel certification stamps will not be needed. Welding on tank shells will be full penetration welds. Weld joint efficiency will be 85% or greater, in accordance with applicable standards.

P&IDs and PFDs for the liquid holding system are presented in Attachment 7.

D-2a(2) Integrity Assessment

Design basis used for design, installation, and minimum shell thickness are presented in Attachment 13, Calculations (Tank Certifications). Tank certifications provide an independent registered professional engineers' certification that tank support structures, foundation, and ancillary equipment design will be structurally sound and be sufficiently compatible with wastes stored therein, to ensure that specified tanks will not fail or collapse over the intended life of the tank.

Tank systems will be subsequently assessed throughout the life of the system to verify that the tank system will be fit for its intended use. This assessment program is described in Attachment 19, Inspection Plan. Copies of tank assessments will be kept on file at the PFNW-R~~EcoS~~ ~~MWF~~ facility.

D-2a(3) Additional Requirements for Existing Tanks ~~—N/A.~~

WAC 173-303-040 defines existing tank systems as a tank system used for storage or treatment of dangerous waste which is in operation, or for which installation has commenced on or prior to February 3, 1989. Based on this definition, the MWF does not have any existing tanks.
~~No existing tank systems are included as part of the MWF design.~~

D-2a(4) Additional Requirements for New Tanks

Tanks will be installed in compliance with WAC 173-3-03-640 (3). Tanks, components and ancillary equipment will be carefully handled, by a subcontractor who is specialized in tank installation, to prevent damage to tank systems during installation. No underground tanks will be installed at the MWF. After tank systems have been installed, and before being placed in service, tanks systems will be inspected by an independent, qualified, installation inspector or ~~licens~~registered professional engineer for the following items:

- Weld breaks
- Punctures
- Scrapes of protective coatings, where applicable
- Cracks
- Corrosion
- Other structural damage or inadequate construction or installation.

Discrepancies will be remedied before tank systems are placed in service. New tanks and ancillary equipment will be tested for tightness (i.e., leak tested) prior to being placed in service. If a leak is found, the tank system or ancillary equipment will be repaired and re-inspected before being placed in service. A copy of the installation report, signed by the independent inspector, stating that the tank system was installed in accordance with the applicable designs, and that acceptable repairs were made as required, will be kept on file at the MWF facility.

Ancillary equipment, such as piping, will be supported and protected to prevent excessive stresses due to physical hazards, settlement, vibration, expansion, or contraction. Ancillary equipment installation will use, as a reference, ANSI Standard B31.3, "Chemical Plant And Refinery Piping", or an equivalent standard reference.

Based on tank design and material of construction, no active corrosion protection systems, either of commercial origin or in-house shop fabricated, are part of the liquid holding tank system. Corrosion protection for this tank is provided as an administrative control, limiting the waste pH range between 2 and 12.5. No portion of the tank system is in contact with the soil.

Tank design and corrosion certification requirements, verifying adequacy of tank system design and corrosion protection, are defined in Attachments 11 and 12, Section 15176. A Certification of conformance will be provided by each manufacturer. Tank and support calculation are presented in

Attachment 13, Calculations.

D-2a(5) Additional Requirements for New On-ground or Underground Tanks – N/A.

All waste tank systems associated with the MWF, will not be installed or operated in direct contact with the soil environment (e.g., as would be the case for underground storage tanks (USTs) or outdoor tanks). Therefore, design failures due to soil corrosion, dome loading, etc. need not be evaluated for this tank system.

D-2B SECONDARY CONTAINMENT & RELEASE DETECTION FOR TANK SYSTEMS

D-2b(1) Requirements for All Tank Systems

This section describes the secondary containment system for above ground tanks at the MWF. Tank secondary containment systems are designed, installed, and operated to prevent any waste migration or cross-contamination with other waste being stored or processed within the MWF. For the liquid holding tank and ancillary equipment, the secondary containment consists of a flat stainless steel pan that is secured directly beneath the tank system. The pan free volume is designed to contain 1,320 gallons (110% of the volume capacity of one tank), and is sized to provide a combined secondary containment for the ~~following~~ tank equipment and interconnecting piping.

The free volume in the secondary containment space takes into account the space occupied (e.g., displaced volume) by the tank support structure and any equipment that is placed inside the containment area during the normal operation of the system.

Piping - All waste bearing piping extending outside of the secondary containment pan effective boundary will be constructed of double encased pipe (e.g., pipe-in-pipe). The carrier pipe is specified as Polyvinylidene Fluoride (PVDF) for maximum resistance to postulated waste types. The outer pipe, used as secondary containment, is specified as Polyvinyl Chloride (PVC). The annular space, between the inner and outer pipe, is lined with conductivity tape to serve as early leak detection from a failure of the carrier pipe.

D-2b(1)(a)

(i) Foundation – The secondary containment pan will be placed directly on the stabilization building concrete foundation. The foundation is designed to support the tank system and all equipment operating within the tank system; resist pressure gradients above and below the system; and prevent failure due to settlement, compression and uplift. Foundation preparation, design, and construction procedures to control cracking due to uneven settlement are presented in Attachment 7, Construction Drawings, and Attachment 13, Calculations.

To further ensure the structural integrity of the tank system, the tank structural supports (e.g., legs) will be high enough to maintain the tank above the secondary containment's maximum potential liquid level. Additionally, the tank system ancillary components, as listed in Table D-2-4, will be mounted on support frames, above the maximum height of the secondary containment pan. The pumps themselves will be directly mounted on frames attached to tank structural supports (above the maximum height of the pan).

(ii) Material Compatibility – The secondary containment for the tank system, as well as tank and ancillary equipment structural supports, will be constructed of stainless steel, with a material compatibility consistent with the material used for the tank system components. Based on the waste types postulated for this system and a pH range limit between 2 and 12.5, the stainless steel material specified in Attachment 7, Construction Drawings, should be adequate.

(iii) Strength and Thickness – The tank system secondary containment will be constructed of 1/8-inch stainless steel plate with reinforcing ribs. This design is determined to have sufficient strength, thickness and resistance to prevent failure from pressure gradients (including static head and external hydrological forces), physical contact with the waste, climactic conditions, and stresses of daily operations. Structural design information for the tank containment system is presented in Attachment 7, Construction Drawings.

(iv) Leak Detection – The stainless steel pan providing secondary containment is slightly sloped to facilitate both liquid detection and removal. A conductivity probe, with a respective alarm, will be placed at the low point of the secondary containment pan, and will serve as continuous leak detection of the primary tank and tank system components listed in Table D-2-4. Additionally, visual checks of the secondary containment systems will be performed daily. These checks will consist of visually inspecting for signs of primary containment leaks; run-on or run-off of liquids to and from the

secondary containment pan; and immediately apparent signs of corrosion, cracking, or other material stress. A more extensive examination of the equipment and material integrity will be routinely performed as discussed in Section F-2.

(v) Drainage and Spill Removal – The secondary containment pan for the tank system is slightly sloped to a low point at one corner of the pan. This approach facilitates collection of liquids and removal. The degree of sloping for the secondary containment structure is specified in the structural designs presented in Attachment 7, Construction Drawings. Visual inspections for contamination from leaks or spills are discussed in the section above. If liquids are present in the secondary containment, the material will be removed via a portable vacuum pump or by absorbents, within a twenty-four (24) hour period from the time of discovery. The material will be collected in a TIC; transported to container staging area, TS-01; and evaluated for required treatment and stabilization procedures.

(vi) Run On – The tank system is housed within the completely enclosed Stabilization building. The secondary containment system is constructed and operated, as well as sheltered from the outdoor environment, so that run-on from a 25-year, 24-hour will be excluded from the system. The exterior wall of the combined ~~GASVIT™~~-MWTH and STB~~tabilization building~~ is designed with a solid concrete berm. The height of the berm ~~will be~~is a minimum of 8-inches. The exterior entrances to the Stabilization building are also a minimum of 8-inches higher than the exterior yard grade. This containment is sufficient to prevent run-on form a 100-year, 24-hour storm. Therefore, secondary containment capacity for run-on need not be provided. Construction details are presented in Attachment 7, Construction Drawings.

D-2b(1)(b)

(i) Concrete Secondary Containment – N/A. The tank system will not rely upon the concrete secondary containment system. The STB concrete foundation, with an 8-inch berm, will serve a tertiary containment function. Foundation design features including materials of construction, provisions for expansion, and impermeable sealants, are detailed in Attachment 7, Construction Drawings.

(ii) Secondary Containment Capacity - For the liquid holding tank and ancillary equipment, the secondary containment consists of a flat stainless steel pan that is secured directly beneath the tank

system. The secondary containment system is designed to contain 110 percent (110%) of the volume of the largest tank. Therefore, the pan free volume is designed to contain 1,320 gallons, and is sized to provide a combined secondary containment for the tank system equipment and interconnecting piping listed in Table D-2-4. The free volume in the secondary containment space takes into account the space occupied (e.g., displaced volume) by the tank support structure and any equipment that is placed inside the containment area during the normal operation of the system. Material specifications, design drawings, and calculations are presented in Attachment 7, Construction Drawings, and Attachment 13, Calculations.

(iii) Automatic Sprinkler Systems Capacity – N/A. The MWF will be equipped with dry fire suppression systems only. Therefore, secondary containment capacity to contain 20 minutes of fire water, per UBC, 80.301(1)(4), need not be provided.

D-2b(2) Additional Requirements for Specific Types of Systems

The following sections define the provisions for compliance to applicable requirements for vault systems, double wall tanks, and ancillary equipment.

D-2b(2)(a) Vault Systems

The secondary containment system is not a vault, by a conventional definition. The secondary containment system is comprised of a shallow stainless steel pan; with the bottom of the pan at floor level; and the top of the pan completely open to the room environment. Although the definition of "vault" is not applicable to this secondary containment system the requirements for this section are satisfied, and include:

(i) Ignitable or Reactive Vapors – As a fundamental administrative control, no ignitable waste (D001) will be processed through this tank system. As a precaution, the process ventilation system and building ventilation system are the primary design means to protect against the potential formation and accumulation, of unforeseen ignitable concentration of flammable vapors. The tanks in the system are completely sealed and vented by the process ventilation system. Any fumes originating from waste accumulating in the secondary containment system are defused, diluted, and captured in the building ventilation system.

Waste treated and stored within the boundary of the secondary containment system for this tank system will be compatible. Waste compatibility will be determined by the procedures discussed in the WAP.

(ii) Exterior Moisture Barrier – The tank system and secondary containment are installed inside the fully enclosed Stabilization building, sheltered from the outdoor environment. An exterior moisture barrier, as described in Section D-2b(1)(a)(vi), prevents the migration (e.g., run-on) of moisture or infiltration into the secondary containment system. Therefore, secondary containment capacity for run-on need not be provided. Construction details are presented in Attachment 7, Construction Drawings.

D-2b(2)(b) Double-walled Tanks

The tanks within this system are not a double-wall tank design, but instead, are a single-shell design. Therefore, all provisions for corrosion protection and continuous leak detection are defined in the applicable sections for the secondary containment pan.

D-2b(2)(c) Ancillary Equipment

Secondary containment for the ancillary equipment of this tank system (listed in Table D-2-2) is provided by the same stainless steel pan for the entire tank system; as described in Section D-2b(1). Piping extending outside the physical boundary of the secondary containment pan, will be constructed of double-encased pipe, as described in section D-2b(1). Containers being transported within the facility (e.g., TICs) shall be equipped with their respective secondary containment (Section D-1, Containers). Inspections for leaks, spills, corrosion, and/or other material stress are described in Sections D-2a(2), (4), and (5).

D-2C VARIANCES FROM SECONDARY CONTAINMENT REQUIREMENTS

N/A. No variances are requested for the tank systems specified in the MWF.

D-2D TANK MANAGEMENT PRACTICES

Each tank system is designed to manage a subset of the wastes that will be accepted for treatment.

Standard procedures for each treatment process, developed prior to receipt of any waste at the MWF, provide operational controls to ensure that any waste or treatment reagent that could cause a tank to rupture, leak, corrode, or otherwise fail is not placed in such tanks. The following practices are employed to ensure tank failure does not occur.

D-2d(1) Compatibility of Wastes or Treatment Agents

As part of waste acceptance, all wastes and proposed treatment agents are assessed for compatibility with materials of construction in the tank systems selected for holding and treatment. This assessment is routine and is based on process knowledge, treatability test results and equipment and reagent vendor information. Before processing waste, a process data sheet is used to evaluate the compatibility of the tank material of construction with the planned chemical adjustment process as defined in the WAP.

D-2d(2) Operational Practices and Controls to Prevent Overfilling

The following operational practices and controls prevent overfilling of tanks.

D-2d(2)(a) Feed Cut-Off Systems, Pressure Controls, or Bypass Systems

All liquid storage tanks are fitted with level sensors, level switches and automatic shut-offs. The level sensor provides tank volume data and has a high and high-high level alarm set point. The high alarm set point is designed to provide a warning signal to halt tank filling operations. The high-high set point activates the automatic shut-off to stop the filling operation automatically. The high-high alarm annunciates at the operator control panel.

D-2d(2)(b) Maintenance of Freeboard

Maintenance of freeboard is not required since ~~no~~ all tanks are ~~open to the environment~~located inside an enclosed building..

D-2d(2)(c) Diagrams of Piping, Control Instrumentation, and Process Flow

Process flow diagrams for the tank systems are included in Attachment 7. All processes within the MWF are batch processes. Tank systems have independent control mechanisms. Control requirements for each tank system are discussed in Attachments 5, Process Engineering Description for Stabilization Building, and Attachment 6, Process Engineering Description for ~~GASVIT™~~ MWTH Building. Additionally, tank system vendors provide P & ID for the components of the tank systems they supply no later than at the time of purchase. The control instrumentation identified will include:

- level sensors
- level switches
- level alarms
- flow measurement and controls
- automatic shut-off valves
- motor control devices
- weight sensor
- temperature monitoring regulation and controls

D-2d(2)(d) Descriptions of Procedures for Treating Dangerous Waste

Descriptions of procedures for treatment of dangerous wastes in tank systems are included in Section~~s~~ D-2b ~~and D-2e~~.

D-2E LABELS AND SIGNS

The tanks, referenced in Table D-2-4, will be labeled on two sides in black letters identifying the type of waste contained, the tank number, and tank name. The tank label area will be painted a light color, as necessary, to provide a contrast for the black lettering and enhance visibility. Tank identification labels will be lettered and numbered using a minimum of 3-inch high characters and will be located approximately at eye level. These labels will be visible from a minimum distance of 50 feet.

In accordance with WAC 173-303-640(5)(d), ~~The~~ tanks will be labeled to identify the waste contents and the major risks associated with the waste being treated and stored. At all times, tanks containing dangerous wastes, extremely hazardous wastes, or hazardous materials will be appropriately labeled to identify the major risks associated with the tank contents for employees, emergency personnel, and the public. Labels will be inspected per WAC 173-303-395(6) to insure they are not obscured, removed,

or unreadable. HMIS and NFPA labeling system will be used.

HMIS labels provide information on waste characteristics which identify the major risk associated with the waste being stored. The HMIS system includes information on health hazard, flammability, reactivity, and personnel protection. Hazards are rated from 0 to 4 (e.g., minimal hazard to severe hazard) indicating the degree of severity associated with the hazard. HMIS labels are color coded as follows:

- Blue Health characteristics
- Red Flammability
- Yellow Reactivity
- White Personnel Protection

The HMIS labels are 10.5-inches by 13.5-inches and are located at approximately eye level. These labels can be seen from a minimum distance of 50 feet. ~~Legend signs explaining the HMIS labeling system will be located throughout the plant.~~

Tanks will also be labeled with NFPA labels in addition to the tank number and material contained. Similar to the HMIS labeling system, the NFPA labels provide information on waste characteristics such as reactivity, flammability, and health hazard. Additional information such as reactivity with water and other special fire fighting information is also provided on this label. The color scheme for this label is as follows:

- Blue Health characteristics
- Red Flammability
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Each characteristic is rated from 0 to 4 indicating the degree of hazard ranging from 0 as no special hazard, to 4 as a severe hazard. The NFPA labels are typically 12-inches-square, with each character approximately 3-inches high. These labels can be seen from a minimum distance of 50 feet. ~~Legend signs explaining the NFPA labeling system will be located throughout the plant.~~

D-2F AIR EMISSIONS

Process Ventilation - Process ventilation to this system is established and confirmed prior to conducting liquid holding operations. The process ventilation system provides airspace confinement of waste-bearing equipment and maintains that equipment and/or area at a negative air pressure relative to the immediate room environment. The control of fugitive emissions is provided by venting the airspace above the incoming waste containers (e.g., TICs) and tank system. Local differential pressure indicators provide the operator with a positive indication that the process ventilation system is operating.

The process vent system collects fugitive emissions from the waste handling preparation areas where dust, vapors, or fumes may be released. The system uses activated carbon filters to treat organic vapor. A second filter type is used to treat acid and alkaline fumes, where applicable. A third filter type is a HEPA filter and is used to remove particles of ≥ 0.3 micron at 99.97% efficiency. The process ventilation system design is detailed in Attachments 5, 6, and 7.

Building Confinement Exhaust – The exhaust from the process ventilation system is discharged to the building confinement system. This system provides for general stabilization building exhaust and ventilation and zone pressure control. The system consists of one supply air units two main exhaust filter trains, associated pressure control sensors, controllers, and damper actuators.

The system is designed to provide a minimum of seven air changes per hour in the operating process areas. Each filter bank consists of a pre-filter, HEPA filter, and carbon adsorption filter stage. Process ventilation exhaust discharges directly into the building exhaust system ahead of the building confinement filter banks. Building exhaust is then discharged through two exhaust stacks located on the roof of the building. The building confinement system design is detailed in Attachments 5, 6, and 7.

Exhaust Emissions Monitoring – The building confinement exhaust monitors consist of a CAM and a record sample filter, both of which collect representative samples of the radioactive particles in the discharge stream. A local alarm will sound if a high radiation level is detected. In addition, the building confinement exhaust monitors provide a continuous readout for the gas flow to the atmosphere. A process engineering description for this system is described in Attachments 5 and 6. P&IDs and for this system are found in Attachment 7, Construction Drawings.

D-2G Management Of Ignitable Or Reactive Waste In Tank Systems

No ignitable waste will be stored, processed, or treated within this tank system. Conversely, some reactive waste may be forwarded to this tank system for treatment and temporary storage. Tanks potentially containing reactive waste will be located away from: (1) a property line which is or can be built upon, and (2) the nearest side of any public way or from the nearest public building or property line, as required by the NFPA and 1988 UBC buffer zone requirements for reactive wastes. The minimum required distance from reactive storage tanks to a property line is 50 feet. Section F-5, Prevention of Reaction of Ignitable, Reactive and Incompatible Wastes, describes in more detail the safe management practices used when handling or storing the waste types.

Table 2-3, Ignitable, Corrosive, and Reactive Waste by Tank System, tabulates the types of waste accepted in each of the four tank systems.

Reactive wastes identified in WAC 173-303-0907(7) (a) (vii) and (viii) will be specifically restricted form this tank system as specified in ~~Attachment 1,~~the WAP. Other wastes defined as reactive, such as sulfide bearing wastes, will be accepted at the MWF. Compatibility testing as described, also described in ~~Attachment 1 (~~ the WAP~~)~~ will be used to determine what reactive wastes can be consolidated. Also, tanks previously containing reactive wastes will not be used to store incompatible wastes until at least one waste, compatible with both wastes is stored in the tank, or the tank has been cleaned.

D-2H Management Of Incompatible Waste In Tank Systems

This tank system is designed to provide segregated storage, with primary and secondary containment, for waste treated, processed, and stored therein. This waste, by design, is preempted from commingling with potentially incompatible waste staged for or stored in neighboring tank systems. The administrative controls and inherent design features (e.g., material of construction, structural integrity, secondary containment, continuous leak detection, routine inspections, etc.), as described earlier in this section, attest to the tank system's ability to effectively segregate incompatible wastes and materials.

Wastes which are incompatible with the previous contents of the tank will not be placed in that same tank until the tank has been cleaned, or the tank has stored a waste compatible to both the waste streams in question. Compatibility determinations will be based on compatibility testing as described in ~~Attachment 1,~~ the WAP, DOT hazard classification, or an equivalent recognized compatibility reference.

4.0 ~~LIQUID FEED~~EVAPORATION ~~(~~SYSTEM ~~(GV-02~~TP-16)

Overview – The function of the evaporation system is to remove most of the water from incoming hazardous wastewaters using four storage tanks and two evaporators; storing the sludge/residue from the evaporation process in one sludge storage tank, and further treatment of these sludges using other permitted treatment processes at the MWF or shipment to an off-site facility for further treatment and/or disposal. Tanker trucks will bring the hazardous wastewater to the MWF and they will be unloaded into one or more of the four storage tanks. Some hazardous wastewater may also come to the evaporation system in containers.

Containers or tankers will be unloaded using an unloading pump that may pass hazardous wastewater through bag filters (BF-101 and/or BF-102) and into one of the four storage tanks (T-101, T-102, T-103, or T-104). Two diaphragm pumps (P-300 and P-400) will be used to transfer hazardous wastewaters from any of the four storage tanks to the two evaporators (WWe-01 and WWE-02). The gaseous stream (steam) from the evaporators will be passed through a duct heater, HEPA system, and then into the MWTH building exhaust stack. The sludge from the evaporators will be transferred to a storage tank (T-105) using the diaphragm pumps (P-500 and P-700). Sludge from the sludge/residue storage tank will be pumped into containers using diaphragm pumps for further on-site treatment or shipment off-site.

~~The liquid feeder is one of three feed units used to introduce liquid and sludge waste at a controlled feed rate into the GASVIT™ process chamber (see subsystem GV-02) for treatment. The two remaining feed units are: continuous solids and batch solids, and are described in subsystems GV-02-2 and GV-02-3, respectively.~~

~~The liquid feeder consists of a feed tank and a set of redundant feed pumps installed inside a HAZMAT enclosure. A portable, top mounted, pump is used for transferring liquid from incoming containers to a feed tank.~~

~~The process flow is based on receiving the incoming liquid and sludge wastes in 55 gallon drums or intermediate bulk containers (IBC). The containers are placed in carts and are moved either manually or by a fork-lift truck into a secondary containment ventilated HAZMAT enclosure (Z-202). Once in the HAZMAT enclosure, each container is fitted with a suction pipe and a container pump (PMP-0203). Next, the liquid is pumped into the feed tank (TK-0205) and the feed tank mixer is turned on to blend the liquid into a uniform consistency. A strainer (ST-0204) is mounted at the discharge of the container pump to remove solids from the liquid waste to avoid clogging the nozzles and small piping downstream of the liquid feed pumps. Spent sludge filters are removed from the filter housing, placed in a one cubic foot canister, and staged as feed for the solids batch feeder.~~

~~Before feeding liquid to the process chamber, the feed pump discharge valves are lined up in a recirculation mode and the feed pump (either PMP-0209 or PMP-0210) is turned on to recirculate the liquid through the discharge piping and back into the feed tank. At this time, a grab sample may be taken from a sample port (V-02036) and analyzed to confirm the waste falls within the given process guidelines. When all feed conditions meet the required specifications and when the process chamber conditions are within the specified limits, the waste feed cut-off valve (FV-0216) is opened to revert the flow from the recirculation to the feed mode. When feeding operation is to be stopped, the feed cut-off (FV-0216) is placed in closed position and the liquid is allowed to recirculate. At this time, the feed pump (either PMP-0209 or PMP-0210) can be turned off, if needed.~~

~~The HAZMAT enclosure (Z-0202) provides for both liquid containment and air space confinement. All operations where waste feed may be exposed to the environment will be conducted inside the ventilated HAZMAT enclosure. Additionally, safety interlocks are designed into the system to both mitigate an environmental release and to ensure worker safety in the event of a leak, spill, or ventilation failure.~~

D-2A Design, Installation, And Assessment Of Tank System

D-2a(1) Design Requirements

Tanks and ancillary equipment will be designed and fabricated to ensure that the equipment will not collapse or rupture under design loads. A summary of the sludge storage tank design loads and calculations are presented in the technical specifications for ~~GASVIT™~~-MWTH building processes,

Attachment ~~12~~WW, Section 15176, Shop Fabricated Stainless Steel Tanks, and Attachment 13, Calculations. Tank designs and operating specifications are also provided in Attachment ~~12~~WW, section 15179E, ~~liquid feed~~sludge storage tank data sheet. Hazardous wastewater storage tank design loads, calculations, and tank data sheet are also provided in Attachment WW. The tank data sheet details the materials of construction; tank dimensions; tank capacity; shell thickness; allowable corrosion; connections; structural supports; and seam requirements for the liquid feed tank. Attachment ~~7~~RR, Construction Drawings, details the design and materials of construction for the tank foundation.

All tank system components are prefabricated and are commercially available. Vendor-supplied design data and certifications, are used to evaluate the adequacy of the components of each tank system design with respect to the applicable design standards. This will ensure that components of the tank systems will not collapse, rupture, or fail during installation or operation. Evaluations will be performed by PFNW-R~~EcoS~~ and the manufacturers to design appropriate anchors for tank system components.

The storage tanks for the evaporation system will be rotationally-molded, vertical, high density cross-linked polyethylene one-piece seamless construction with cylindrical cross-section and cone-bottom. ~~A HAZMAT enclosure is provided is provided for the liquid feed system. All incoming liquid waste containers are taken inside the HAZMAT enclosure. The HAZMAT enclosure has its own secondary containment which is essentially a stainless steel sub-pan below a grated floor. The bottom of the secondary containment is at floor level, therefor incoming containers are ramped up into the HAZMAT enclosure (e.g., the grated floor level).~~

Tanks ~~within the liquid feed~~for the evaporation system will be structurally supported by steel legs, reinforced and secured to a level grated floor within the ~~HAZMAT enclosure~~MWTH building. All tanks are designed with base anchorage to resist sliding or overturning due to seismic loads. Tank anchorage is designed to withstand the UCB, Zone 3 seismic loading.

Tank anchorage for the ~~liquid feed~~ tanks will consist of anchor bolts bonded mechanically to the floor of the ~~HAZMAT enclosure~~MWTH building. ~~The HAZMAT enclosure is also secured to the concrete pad. The tank anchor bolts do not protrude up through or impact the stainless steel secondary containment pan.~~ Tank foundations and supports are designed in accordance with the American Concrete Institute and American Institute of Steel Construction. Foundation designs are shown in Attachment ~~7~~RR, Construction Drawings for the sludge storage tank and in Attachment WW for the

high density cross-linked polyethylene storage tanks.

None of the waste tank systems to be used in the MWF will contact soil. The components of each tank system (e.g., tanks, filters, pumps, etc.) provide the primary containment of the waste. Each component is contained within the secondary containment for the evaporation system ~~GVB or the STB~~. ~~The stainless steel pans (e.g., the HAZMAT enclosure secondary containment), individually mounted for each of the tank systems, serve as the secondary containment for that tank system.~~

Since the individual components of each tank systems provide primary containment, these components will be inspected in accordance with the Inspection Plan, Attachment ~~19~~EE. If observed during inspections, equipment corrosion and/or other observable material stress will be addressed as required to maintain safe operation of the MWF treatment processes and prevent releases to the environment.

Installation procedures, based on manufacturer specifications, ~~are~~ will be developed and followed to ensure the safe installation of each tank. Where applicable, tightness testing procedures ~~are~~ will be developed and followed to confirm integrity of new waste tank systems after installation. An independent, qualified, registered professional engineer, familiar with the appropriate installation procedures for tanks, will ensure that the installation of the waste tank systems follows proper procedures with no resultant damage to the system. Ancillary piping is designed to meet ANSI standard~~s~~ B31.3 for process piping for the sludge storage tank. Ancillary piping is designed to meet ANSI standard B16.5.

Records of tank installations ~~are~~ will be maintained at the ~~P~~MWF~~EcoS~~ facility. A certification statements, of the independent inspection will be included with the records in accordance with WAC 173-303-810(13)(a).

~~All~~ One sludge/residue stainless steel storage tank~~s~~ ~~are~~ is designed in accordance with the ASME and other organizations listed in Table D-2-1. A minimum of 15 psi will be specified however, since tanks are for atmospheric use, pressure vessel certification stamps will not be needed. Welding on tank shells will be full penetration welds. Weld joint efficiency will be 85% or greater, in accordance with applicable standards.

Four hazardous wastewater tanks will be cone-bottomed high density cross-linked polyethylene tanks and designed per ASTM standards (including D638, D883, D1505, D1525, and D1693). P&IDs and PFDs for the ~~liquid feed~~evaporation system are presented in Attachment ~~7~~RR.

D-2a(2) Integrity Assessment

Design basis used for design, installation, and minimum shell thickness are presented in Attachment 13, Calculations (Tank Certifications). Tank certifications provide an independent registered professional engineer's certification that tank support structures, foundation, and ancillary equipment design are structurally sound and sufficiently compatible with wastes stored therein, to ensure that specified tanks will not fail or collapse over the intended life of the tank.

Tank systems will be subsequently assessed throughout the life of the system to verify that the tank system will be fit for its intended use. This assessment program is described in Attachment ~~19~~EE, Inspection Plan. Copies of tank assessments will be kept on file at the ~~MWF~~ PFNW-R facility.

D-2a(3) Additional Requirements for Existing Tanks

~~No existing tank systems are included as part of the MWF design.~~WAC 173-303-040 defines "Existing Tank System" as a tank system used for storage or treatment of dangerous waste which is in operation or for which installation has commenced on or prior to February 3, 1989. Based on this definition, evaporation system tanks are not existing tanks.

D-2a(4) Additional Requirements for New Tanks

Tanks will be installed in compliance with WAC 173-303-640 (3). Tanks, components and ancillary equipment will be carefully handled, by a subcontractor who is specialized in tank installation, to prevent damage to tank systems during installation. No underground tanks will be installed at the MWF. After tank systems have been installed, and before being placed in service, tanks systems will be inspected by an independent, qualified, installation inspector or ~~licens~~registered professional engineer for the following items:

- Weld breaks (if applicable)
- Punctures
- Scrapes of protective coatings, where applicable
- Cracks
- Corrosion

- Other structural damage or inadequate construction or installation.

Discrepancies will be remedied before tank systems are placed in service. New tanks and ancillary equipment will be tested for tightness (i.e., leak tested) prior to being placed in service. If a leak is found, the tank system or ancillary equipment will be repaired and re-inspected before being placed in service. A copy of the installation report, signed by the independent inspector, stating that the tank system was installed in accordance with the applicable designs, and that acceptable repairs were made as required, will be kept on file at the ~~MWF~~ PFNW-R facility.

Ancillary equipment, such as piping, will be supported and protected to prevent excessive stresses due to physical hazards, settlement, vibration, expansion, or contraction. Ancillary equipment installation will use, as a reference, ANSI Standard B31.3, "Chemical Plant And Refinery Piping" or an equivalent standard reference for the sludge storage tank. Ancillary equipment for the four storage tanks is designed per ANSI standard B16.5 or equivalent.

Based on tank design and material of construction, no active corrosion protection systems, either of commercial origin or in-house shop fabricated, are part of the ~~liquid feed~~evaporation process tanks system. Corrosion protection ~~for this tank~~ is provided as an administrative control, limiting the waste pH range between 2 and 12.5.

Tank design and corrosion certification requirements, verifying adequacy of tank system design and corrosion protection, are defined in Attachments ~~11~~ VV and ~~12~~WW, Section 15176. A certification of conformance will be provided by each manufacturer. Tank and support calculation are presented in Attachment 13, Calculations.

D-2a(5) Additional Requirements for New On-ground or Underground Tanks – N/A.

All waste tank systems associated with the MWF will not be installed or operated in direct contact with the soil environment (e.g., as would be the case for USTs or outdoor tanks). Therefore, design failures due to soil corrosion, dome loading, etc. need not be evaluated for this tank system.

D-2B Secondary Containment And Release Detection For Tank Systems

D-2b(1) Requirements for All Tank Systems

This section describes the secondary containment system for above ground tanks at the MWF. Tank secondary containment systems are designed, installed, and operated to prevent any waste migration or cross-contamination with other waste being stored or processed within the MWF. For the ~~liquid feed~~ evaporation system tanks and ancillary equipment, the secondary containment consists of ~~a flat stainless steel pan that is secured directly beneath the tank system, within the HAZMAT enclosure. The pan free volume is designed to contain 825 gallons (110% of the volume capacity of the liquid feed tank), and is sized to provide a combined secondary containment for the following tank equipment and interconnecting piping.~~a concrete foundation and concrete berm with a height of at least 8 inches. FIND AND ADD VERBAGE ON COATING HERE!!!!!. The secondary containment capacity is greater than 10,950 gallons (i.e. the largest tank within the containment).

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The free volume in the secondary containment space takes into account the space occupied (e.g., displaced volume) by the tank support structure and any equipment that is placed inside the containment area during the normal operation of the system.

Piping for Evaporation System (TP-16)

All piping for the evaporation system (i.e. from tanker truck to each of the four storage tanks, feed tanks to the evaporators and evaporators to the sludge holding tank) will be inside the secondary containment for the evaporation system. Materials of construction for piping will be as follows:

Piping from tanker truck to the four storage tanks: PVC
Piping from storage tanks to evaporators: PVC
Piping from evaporators to sludge tank: Carbon or stainless steel
~~- All waste bearing piping extending outside of the secondary containment pan effective boundary will be constructed of double encased pipe (e.g., pipe-in-pipe). The carrier pipe is specified as PVDF for maximum resistance to anticipated waste types. The outer pipe, used as secondary containment, is specified as PVC. The annular space, between the inner and outer pipe, is lined with conductivity tape to serve as early leak detection from a failure of the carrier pipe.~~

D-2b(1)(a)

(i) Foundation - ~~The secondary containment pan will be placed directly on the GVB concrete foundation.~~ The concrete foundation is designed to support the tank system and all equipment operating within the tank system; resist pressure gradients above and below the system; and prevent failure due to settlement, compression and uplift. Foundation preparation, design, and construction procedures to control cracking due to uneven settlement are presented in Attachment 7, Construction Drawings, and Attachment 13, Calculations.

To further ensure the structural integrity of the tank system, the tank structural supports (e.g., legs) will be high enough to maintain the tank above the secondary containment's maximum potential liquid level. Additionally, the tank system ancillary components, as listed in Table D-2-5, will be mounted on support frames, above the maximum height of the secondary containment ~~pan~~. The pumps themselves will be directly mounted on frames attached to tank structural supports (above the maximum height of the ~~pan~~secondary containment).

A secondary containment will be provided inside the MWTH building for the entire evaporation system which includes tanker truck unloading station, four hazardous wastewater storage tanks, two evaporators, a sludge storage tank, and all of the ancillary components (i.e. piping, pumps, valves, etc.). The secondary containment capacity is at least 13, 781 gallons which is greater than 10,950 gallon largest tank inside the containment. Incoming tanker truck size will be up to 8,000 gallons.

(ii) Material Compatibility – The secondary containment for the tank system~~, as well as tank and ancillary equipment structural supports,~~ will be constructed of ~~stainless steel~~concrete~~, with a material compatibility consistent with the material used for the tank system components.~~ -The concrete floor and berm of the secondary containment will be coated with an epoxy coating. All ancillary equipment and structural supports will be constructed with materials that are compatible with the materials used for the secondary containment and dangerous wastes. Based on the waste types postulated for this system and a pH range limit between 2 and 12.5, the ~~stainless steel~~concrete material specified in Attachment 7, Construction Drawings, should be adequate for material compatibility.

(iii) Strength and Thickness – The tank system secondary containment will be constructed of ~~1/8-inch stainless steel plate with reinforcing ribs~~concrete. This design is determined to have sufficient strength, thickness and resistance to prevent failure form pressure gradients (including static

head and external hydrological forces), physical contact with the waste, climactic conditions, and stresses of daily operations. Structural design information for the tank containment system is presented in Attachment ~~7~~RR, Construction Drawings.

(iv) Leak Detection – ~~The stainless steel pan providing secondary containment is slightly sloped to facilitate both liquid detection and removal. A conductivity probe, with a respective alarm, will be placed at the low point of the secondary containment pan, and will serve as continuous leak detection of the primary tank and tank system components listed in Table D-2-5. Additionally, v~~Visual checks of the secondary containment systems will be performed daily. These checks will consist of visually inspecting for signs of primary containment leaks; run-on or run-off of liquids to and from the secondary containment ~~pan~~; and immediately apparent signs of corrosion, cracking, or other material stress. A more extensive examination of the equipment and material integrity will be routinely performed as discussed in Attachment ~~19~~EE.

(v) Drainage and Spill Removal – ~~The secondary containment pan for the tank system is slightly sloped to a low point at one corner of the pan. This approach facilitates collection of liquids and removal. The degree of sloping for the secondary containment structure is specified in the structural designs presented in Attachment 7, Construction Drawings.~~ Visual inspections for contamination from leaks or spills are discussed in the section above. If liquids are present in the secondary containment, the material will be removed via a portable vacuum pump or by absorbents, within a twenty-four (24) hour period from the time of discovery. The material will be collected in a TIC; transported to container staging area, TS-01; and evaluated for required treatment and stabilization procedures.

(vi) Run On – The tank system is housed within the completely enclosed ~~GASVIT™~~-MWTH building. The secondary containment system is constructed and operated, as well as sheltered from the outdoor environment, so that run-on from a 25-year, 24-hour storm will be excluded from the system. The exterior wall of the combined ~~GVB~~ MWTH and STB is designed with a solid concrete berm. The height of the berm will be a minimum of 8-inches. The exterior entrances to the ~~GASVIT™~~-MWTH building are also a minimum of 8-inches higher than the exterior yard grade. This containment is sufficient to prevent run-on form a 100-year, 24-hour storm. Therefore, secondary containment capacity for run-on need not be provided. Construction details are presented in Attachment ~~7~~RR, Construction Drawings.

D-2b(1)(b)

(i) Concrete Secondary Containment ~~– N/A.~~ The tank system will ~~not~~ rely upon the concrete secondary containment system. The ~~GVB~~ MWTH building concrete foundation, with an 8-inch berm, will serve a tertiary containment function. Foundation design features including materials of construction, provisions for expansion, and impermeable sealants, are detailed in Attachment ~~7~~RR, Construction Drawings. Concrete secondary containment system will have a berm with a height of at least 8 inches.

(ii) Secondary Containment Capacity - ~~For the liquid feed tank and ancillary equipment, the secondary containment consists of a flat stainless steel pan that is secured directly beneath the tank system, within the HAZMAT enclosure. The secondary containment system is designed to contain 200 percent of the volume of the largest tank. The HAZMAT Building secondary containment site is approximately 8ft. wide by 16ft. long by 1ft. high. Therefore, the pan free volume is designed to contain more than 825 gallons, and is sized to provide a combined secondary containment for the tank system equipment and interconnecting piping listed in Table D-2-5. Therefore, a grating is provided above the containment system and all equipment are on the grating. The free volume in the secondary containment space takes into account the space occupied (e.g., displaced volume) by the tank support structure and no equipment that is placed inside the containment area during the normal operation of the system.~~The concrete secondary containment will have the capacity of at least 13,781 gallons which is greater than the largest tank capacity of 10,950 gallons within the containment. Material specifications are presented in Attachment ~~12~~WW, technical specifications of ~~GASVIT™~~-MWTH Building.

(iii) Automatic Sprinkler Systems Capacity – N/A. The MWF will be equipped with dry fire suppression systems only. Therefore, secondary containment capacity to contain 20 minutes of fire water, per UBC, 80.301(1)(4), need not be provided.

D-2b(2) Additional Requirements for Specific Types of Systems

The following sections define the provisions for compliance to applicable requirements for vault systems, double wall tanks, and ancillary equipment.

D-2b(2)(a) Vault Systems

The secondary containment system is not a vault by a conventional definition. The secondary containment system is comprised of a ~~shallow stainless steel pan; with the bottom of the pan at floor level; and the top of the pan completely open to the HAZMAT enclosure environment~~concrete foundation and berm.. Although the definition of "vault" is not applicable to this secondary containment system the requirements for this section are satisfied, and include:

(i) Ignitable or Reactive Vapors – N/A. ~~Some i~~Ignitable and reactive wastes will not be processed through th~~is~~e evaporation process tank system. ~~The process ventilation system and building ventilation system are the primary design means to protect against the potential formation and accumulation of potential ignitable concentration of flammable vapors. The tanks in the system are completely sealed and vented by the process ventilation system. Additional, the liquid feed tank is continuously purged with nitrogen. Any fumes originating from waste accumulating in the secondary containment system are defused, diluted, and captured in the building ventilation system.~~

~~Waste treated and stored within the boundary of the secondary containment system for this tank system will be compatible. Waste compatibility will be determined by the procedures discussed in the WAP.~~

(ii) Exterior Moisture Barrier – The tank system and secondary containment are installed inside the fully enclosed ~~GVB~~MWTH building, sheltered from the outdoor environment. An exterior moisture barrier, as described in Section D-2b(1)(a)(vi), prevents the migration (e.g., run-on) of moisture or infiltration into the secondary containment system. Therefore, secondary containment capacity for run-on need not be provided. Construction details are presented in Attachment ~~7~~RR, Construction Drawings.

D-2b(2)(b) Double-walled Tanks – N/A.

The tanks within this system are not a double-wall tank design, but instead, are a single-shell design. Therefore, all provisions for corrosion protection and continuous leak detection are defined in the applicable sections for the secondary containment ~~pan~~.

D-2b(2)(c) Ancillary Equipment

Secondary containment for the ancillary equipment of this tank system (listed in Table D-2-5) is provided by the same ~~steel pan for the entire tank system; as described in Section D-2b(1). Piping extending outside the physical boundary of the secondary containment pan, will be constructed of double-encased pipe, as described in section D-2b(1)~~secondary containment designed for the storage tanks.. Containers being transported within the facility (e.g., TICs) and the incoming hazardous wastgewater tankers (i.e. tanker truck unloading) share a common secondary containment~~shall be equipped with their respective secondary containment (refer to Section D-1, Containers)~~. Inspections for leaks, spills, corrosion, and/or other material stress are described in Sections D-2a(2), (4), and (5).

D-2C VARIANCES FROM SECONDARY CONTAINMENT REQUIREMENTS

N/A. No variances are requested for the tank systems specified in the MWF.

D-2D TANK MANAGEMENT PRACTICES

Each tank system is designed to manage a subset of the wastes that will be accepted for treatment. Standard procedures for each treatment process, developed prior to receipt of any waste at the MWF, provide operational controls to ensure that any wastewater or treatment reagent that could cause a tank to rupture, leak, corrode, or otherwise fail is not placed in such tanks.

The following practices are employed to ensure tank failure does not occur.

D-2d(1) Compatibility of Wastes or Treatment Agents

As part of waste acceptance, all wastes ~~and proposed treatment agents~~ are assessed for compatibility with materials of construction in the tank systems selected for holding and treatment. This assessment is routine and is based on process knowledge~~, treatability test results~~ and equipment vendor information. Before processing waste, the compatibility of the tank construction of material with the planned incoming waste is checked.

D-2d(2) Operational Practices and Controls to Prevent Overfilling

The following operational practices and controls prevent overfilling of tanks.

D-2d(2)(a) Feed Cut-Off Systems, Pressure Controls, or Bypass Systems

The tank is fitted with a level sensor, level switches and automatic shut-offs. The level sensor provides tank volume data and has a high and high-high level alarm set point. The high alarm set point is designed to provide a warning signal to halt tank filling operations. The high-high set point activates the automatic shut-off to stop the filling operation automatically. High-high alarms are annunciated at the operator control room panel.

D-2d(2)(b) Maintenance of Freeboard

Maintenance of freeboard is not required since no tanks are open to the environment.

D-2d(2)(c) Diagrams of Piping, Control Instrumentation, and Process Flow

Process flow diagrams for the tank systems are included in Attachment ~~7~~RR. All processes within the MWF are batch processes. Tank systems have independent control mechanisms. Control requirements for each tank system are discussed in Attachment ~~6~~QQ, Process Engineering Description for ~~GASVIT™~~-MWTH Building. Additionally, tank system vendors provide P&ID for the components of the tank systems they supply no later than at the time of purchase. The control instrumentation identified will include:

- level sensors
- level switches
- level alarms
- flow measurement and controls
- automatic shut-off valves
- motor control devices
- ~~weight sensor~~
- temperature monitoring regulation and controls

D-2d(2)(d) Descriptions of Procedures for Treating Dangerous Waste

Descriptions of procedures for treatment of dangerous wastes in tank systems are included in Sections D-2b~~ and D-2e~~. ~~Further information for treating the waste by GASVIT™ system is given in Section D-12.~~

D-2E LABELS AND SIGNS

~~The tanks, referenced in Table D-2-5, will be labeled on two sides in black letters identifying the type of waste contained, the tank number, and tank name. The tank label area will be painted a light color, as necessary, to provide a contrast for the black lettering and enhance visibility. Tank identification labels will be lettered and numbered using a minimum of 3-inch high characters and will be located approximately at eye level.~~

~~T~~in accordance with WAC 173-303-640(5)(d)~~he~~ tanks will be labeled to identify the waste and the major risks associated with the waste being treated and stored. At all times, tanks containing dangerous wastes, extremely hazardous wastes, or hazardous materials will be appropriately labeled to identify the major risks associated with the tank contents for employees, emergency personnel, and the public. Labels will be inspected per WAC 173-303-395(6) to insure they are not obscured, removed, or unreadable. HMIS and NFPA labeling systems will be used. These labels will be visible from a minimum distance of 50 feet.

HMIS labels provide information on waste characteristics which identify the major risk associated with the waste being stored. The HMIS system includes information on health hazard, flammability, reactivity, and personnel protection. Hazards are rated from 0 to 4 (minimal hazard to severe hazard) indicating the degree of severity associated with the hazard. HMIS labels are color coded as follows:

- Blue Health characteristics
- Red Flammability
- Yellow Reactivity
- White Personnel Protection

The HMIS labels are 10.5-inches by 13.5-inches and are located at approximate eye level. These labels can be seen from a minimum distance of 50 feet. ~~Legend signs explaining the HMIS labeling system will be located throughout the plant.~~

Tanks will also be labeled with NFPA labels in addition to the tank number and material contained. Similar to the HMIS labeling system, the NFPA labels provide information on waste characteristics such as reactivity, flammability, and health hazard. Additional information such as reactivity with water and other special fire fighting information is also provided on this label. The color scheme for this label is as follows:

- Blue Health characteristics
- Red Flammability
- Yellow Reactivity

Each characteristic is rated from 0 to 4 indicating the degree of hazard ranging from 0 as no special hazard, to 4 as a severe hazard. The NFPA labels are typically 12-inches-square, with each character approximately 3-inches high. These labels can be seen from a minimum distance of 50 ft. ~~Legend signs explaining the NFPA labeling system will be located throughout the plant.~~

D-2F AIR EMISSIONS

Process Ventilation ~~–~~ N/A. The ~~P~~process ventilation ~~to this~~ system (GV-09) is ~~established and confirmed prior to conducting liquid feed operations. The process ventilation system provides airspace confinement of waste-bearing equipment and maintains that equipment and/or area at a negative air pressure relative to the immediate room environment. The control of fugitive emissions is provided by venting the airspace above the incoming waste containers (e.g., TICs) and tank system. Local differential pressure indicators provide the operator with a positive indication that the process ventilation system is operating.~~

~~The process vent system collects fugitive emissions from the waste handling preparation areas where dust, vapors, or fumes may be released. The system uses activated carbon filters to treat organic vapor. A second filter type is used to treat acid and alkaline fumes, where applicable. A third filter type is a HEPA filter and is used to remove particles of ≥ 0.3 micron at 99.97% efficiency. The process ventilation system design is detailed in Attachments 5, 6, and 7.~~currently not in use. All treatment

operations (i.e. Evaporation System) in the MWTH building will be vented to the Building Confinement Exhaust system (GV-22)

Building Confinement Exhaust – The exhaust from the process ventilation system is discharged to the building confinement system. This system provides for general stabilization building exhaust and ventilation and zone pressure control. The system consists of one supply air units two main exhaust filter trains, associated pressure control sensors, controllers, and damper actuators.

The system is designed to provide a minimum of seven (7) air changes per hour in the operating process areas. Each filter bank consists of a pre-filter, HEPA filter, and carbon adsorption filter stage. Process ventilation exhaust discharges directly into the building exhaust system ahead of the building confinement filter banks. Building exhaust is then discharged through ~~two~~ an exhaust stack~~s~~ located ~~on the roof of the building~~behind MWTH. The building confinement system design is detailed in Attachments 5, 6, and 7.

Exhaust Emissions Monitoring – The building confinement exhaust monitors consist of a CAM and a record sample filter, both of which collect representative samples of the radioactive particles in the discharge stream. A local alarm will sound if a high radiation level is detected. In addition, the building confinement exhaust monitors provide a continuous readout for the gas flow to the atmosphere. A process engineering description for this system is described in Attachment~~s 5 and 6~~QQ. P&IDs for this system are found in Attachment ~~7~~RR.

D-2G Management Of Ignitable Or Reactive Waste In Tank Systems

Ignitable Waste - ~~Ignitable~~ No ignitable wastes will be stored ~~and~~ or processed through the evaporation system. ~~with compatible material (usually designated as "flammable" by DOT standards). Ignitable storage will be protected from any material or conditions which may cause the waste to ignite in compliance with WAC 173-303-640(6)(a)(ii). The waste will be stored away from ignition sources when in any open area. "Danger-No Smoking, No Open Flames" signs will be posed prominently in the unloading areas, sampling areas, and around the liquid treatment system HAZMAT enclosure. Smoking will not be permitted within the GVB. The liquid treatment tank will also be continuously purged with a nitrogen blanket to inert the atmosphere within the tank. The tank will be grounded to protect against sparking during maintenance operations.~~

Reactive Waste - Reactive waste will not be stored or processed through the evaporation system. ~~forwarded to this tank system for treatment and temporary storage. The tank is located away from: (1) a property line which is or can be built upon, and (2) the nearest side of any public way or from the nearest public building or property line, as required by the NFPA and 1988 UBC buffer zone requirements for reactive wastes. The tank location meets the minimum required distance from reactive storage tanks to a property line which is 50 feet. Attachment 14, Prevention of Reaction of Ignitable, Reactive and Incompatible Wastes, describes in more detail the safe management practices used when handling or storing the waste types.~~

~~Table D-2-3, Ignitable, Corrosive, and Reactive Waste by Tank System, tabulates the types of waste accepted in each of the four tank systems.~~

~~Reactive wastes identified in WAC 173-303-0907(7) (a) (vii) and (viii) will be specifically restricted form this tank system as specified in the WAP. Other wastes defined as reactive, such as sulfide bearing wastes, will be accepted at the MWF. Compatibility testing, also described in the WAP will be used to determine what reactive wastes can be consolidated. Also, tanks previously containing reactive wastes will not be used to store incompatible wastes until at least one waste, compatible with both wastes is stored in the tank, or the tank has been cleaned.~~

D-2H Management Of Incompatible Waste In Tank Systems

This tank system is designed to provide segregated storage, with primary and secondary containment, for waste treated, processed, and stored therein. This waste, by design, is preempted from commingling with potentially incompatible waste staged for or stored in neighboring tank systems. The administrative controls and inherent design features (e.g., material of construction, structural integrity, secondary containment, ~~continuous leak detection,~~ routine inspections, etc.), as described earlier in this section, attest to the tank system's ability to effectively segregate incompatible wastes and materials.

Wastes which are incompatible with the previous contents of the tank will not be placed in that same tank until the tank has been cleaned, or the tank has stored a waste compatible to both the waste streams in question. Compatibility determinations will be based on compatibility testing as described in the WAP, DOT hazard classification, or an equivalent recognized compatibility reference.

~~5.0 Secondary Waste Tanks (System Gv-11)~~

~~**Overview** - The secondary waste treatment system (GV-11) treats liquid waste from the syngas scrubbers. Water rejected from the filters in the syngas scrubber spray loops (referred to as scrubber bottom waste) is transferred to the scrubber bottoms waste tank (TK-1105). Waste water from this tank is transferred to the evaporator unit (EVP-1103) for treatment. Steam heat is used to evaporate the waste water. The distillate is collected in distillate tank (TK-115) and reused by the syngas scrubbers while the concentrate is sent to waste drums for off-site recycle or disposal.~~

~~The secondary waste treatment system is designed to treat approximately 125 gallons per hour of waste water contaminated with oil, solids, and sludge.~~

~~Scrubber bottom waste feed tank for interim storage. When the water level in the tank is sufficient, scrubber bottom waste is automatically transferred to the evaporator (EVP-1103) by the air-operated transfer pump. The evaporator, transfer pump, concentrate pump, and all operating and safety controls are provided with the vendor furnished packaged unit. The evaporator is described in Section D-12.~~

~~Steam heat is used to evaporate the waste. Water vapor is removed from the evaporator by a 500 sefm blower and then condensed. The condenser unit (CD-1108) is cooled by process cooling water (system GV-19). The condensed distillate drains to the distillate tank (TK-1115) where it is stored for reuse in the scrubbers.~~

~~**D-2A Design, Installation And Assessment Of Tank System**~~

~~**D-2a(1) Design Requirements**~~

~~Tanks and ancillary equipment will be designed and fabricated to ensure that the equipment will not collapse or rupture under design loads. A summary of the tank design loads and calculations are presented in the technical specifications for stabilization building processes, Attachment 11, Section 15176, Shop Fabricated Stainless Steel Tanks, and Attachment 13, Calculations. Tank designs and operating specifications are also provided in attachment 11, section 15179A, secondary waste treatment tanks data sheet. The tank data sheet details the materials of construction; tank dimensions; tank capacity; shell thickness; allowable corrosion; connections; structural supports; and seam requirements for the~~

~~secondary waste treatment tank. Attachment 7, Construction Drawings, details the design and materials of construction for the tank foundation.~~

~~All tank system components are prefabricated and are commercially available. Vendor-supplied design data and certifications, are used to evaluate the adequacy of the components of each tank system design with respect to the applicable design standards. This will ensure that components of the tank systems will not collapse, rupture, or fail during installation or operation. Evaluations will be performed by PEcoS and the manufacturers to design appropriate anchors for tank system components.~~

~~Tanks within the secondary waste treatment system will be structurally supported by steel legs, reinforced and secured to a level concrete pad. All tanks are designed with base anchorage to resist sliding or overturning due to seismic loads. Tank anchorage is designed to withstand the UBC, Zone 3 seismic loading.~~

~~Tank anchorage for the secondary waste treatment tank will consist of anchor bolts bonded, mechanically or via epoxy, to the concrete pad. The anchors bolts protruded up through the stainless steel secondary containment pan and are seal welded at the base of the bolt. The anchor bolts then directly fasten the tank structural support frame to the concrete pad. Tank foundations and supports are designed in accordance with the American Concrete Institute and American Institute of Steel Construction. Foundation designs are shown in Attachment 7, Construction Drawings.~~

~~None of the waste tank systems to be used in the MWF will contact soil. The components of each tank system (e.g., tanks, filters, pumps, etc.) provide the primary containment of the waste. Each component is contained within the GASVIT™ Building (GVB) or Stabilization Building (STB). The stainless steel pans, individually mounted for each of the tank systems, serve as the secondary containment for that tank system. Since the individual components of each tank system provides primary containment, these components will be inspected in accordance with the Inspection Plan included Attachment 19. If observed during inspections, equipment corrosion and/or other observable material stress will be addressed as required to maintain safe operation of the MWF treatment processes and prevent releases to the environment.~~

~~Installation procedures, based on manufacturer specifications, are developed and followed to ensure the safe installation of each tank. Tightness testing procedures are developed and followed to confirm integrity of new waste tank systems after installation. An independent, qualified, registered professional engineer, familiar with the appropriate installation procedures for tanks, will ensure that the installation of the waste tank~~

~~systems follows proper procedures with no resultant damage to the system. Ancillary piping is designed to meet ANSI standards for process piping.~~

~~Records of tank installations are maintained at the PEcoS facility. A certification statement for the independent inspection, will be included with the records in accordance with WAC 173-303-810(13)(a).~~

~~All stainless steel tanks are designed in accordance with the ASME and other organizations listed in Table D-2-1. A minimum of 15 psi will be specified, however, since tanks are for atmospheric use, pressure vessel certification stamps will not be needed. Welding on tank shells will be full penetration welds. Weld joint efficiency will be 85 % or greater, in accordance with applicable standards.~~

~~P&IDs and PFDs for the secondary waste treatment system are presented in Attachment 7.~~

~~D-2a(2) Integrity Assessment~~

~~Design basis used for design, installation, and minimum shell thickness are presented in Attachment 13, Calculations (Tank Certifications). Tank certifications provide an independent registered professional engineers' certification that tank support structures, foundation, and ancillary equipment design are structurally sound and sufficiently compatible with wastes stored therein, to ensure that specified tanks will not fail or collapse over the intended life of the tank.~~
~~Tank systems will be subsequently assessed throughout the life of the system to verify that the tank system will be fit for its intended use. This assessment program is described in Section F-2, Inspection Plan. Copies of tank assessments will be kept on file at the MWF facility.~~

~~D-2a(3) Additional Requirements for Existing Tanks – N/A.~~

~~No existing tank systems are included as part of the MWF design.~~

~~D-2a(4) Additional Requirements for New Tanks~~

~~Tanks will be installed in compliance with WAC 173-3-3-640 (3). Tanks, components and ancillary equipment will be carefully handled, by a subcontractor who is specialized in tank installation, to prevent damage to tank systems during installation. No underground tanks will be installed at the MWF. After~~

~~tank systems have been installed, and before being placed in service, tanks systems will be inspected by an independent, qualified, installation inspector or licensed professional engineer for the following items:~~

- ~~Weld breaks~~
- ~~Punctures~~
- ~~Scrapes of protective coatings, where applicable~~
- ~~Cracks~~
- ~~Corrosion~~
- ~~Other structural damage or inadequate construction or installation.~~

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~~Discrepancies will be remedied before tank systems are placed in service. New tanks and ancillary equipment will be tested for tightness (i.e., leak tested) prior to being placed in service. If a leak is found, the tank system or ancillary equipment will be repaired and re-inspected before being placed in service. A copy of the installation report, signed by the independent inspector, stating that the tank system was installed in accordance with the applicable designs, and that acceptable repairs were made as required, will be kept on file at the MWF facility.~~

~~Ancillary equipment, such as piping, will be supported and protected to prevent excessive stresses due to physical hazards, settlement, vibration, expansion, or contraction. Ancillary equipment installation will use, as a reference, ANSI Standard B31.3, "Chemical Plant And Refinery Piping," or an equivalent standard reference.~~

~~Based on tank design and material of construction, no active corrosion protection systems, either of commercial origin or in-house shop fabricated, are part of the secondary waste treatment tank system. Corrosion protection for this tank is provided as an administrative control, limiting the waste pH range between 2 and 12.5.~~

~~Tank design and corrosion certification requirements, verifying adequacy of tank system design and corrosion protection, are defined in Attachments 11 and 12, Section 15176. A certification of conformance will be provided by each manufacturer. Tank and support calculation are presented in Attachment 13, Calculations.~~

~~D-2a(5) Additional Requirements for New On-ground or Underground Tanks – N/A.~~

~~All waste tank systems associated with the MWF will not be installed or operated in direct contact with the soil environment (e.g., as would be the case for underground storage tanks (USTs) or outdoor tanks). Therefore design failures due to soil corrosion, dome loading, etc. need not be evaluated for this tank~~

~~system.~~

~~D-2B SECONDARY CONTAINMENT AND RELEASE DETECTION FOR TANK SYSTEMS~~

~~D-2b(1) Requirements for All Tank Systems~~

~~This section describes the secondary containment system for above ground tanks at the MWF. Tank secondary containment systems are designed, installed, and operated to prevent any waste migration or cross-contamination with other waste being stored or processed within the MWF. For the secondary waste treatment tanks and ancillary equipment, the secondary containment consists of a flat stainless steel pan that is secured directly beneath the tank system. The pan free volume is designed to contain 1,320 gallons (110% of the volume capacity of one tank), and is sized to provide a combined secondary containment for the following tank equipment and interconnecting piping.~~

~~The free volume in the secondary containment space takes into account the space occupied (e.g., displaced volume) by the tank support structure and any equipment that is placed inside the containment area during the normal operation of the system.~~

~~**Piping** - All waste bearing piping extending outside of the secondary containment pan effective boundary will be constructed of double encased pipe (e.g., pipe-in-pipe). The carrier pipe is specified as PVDF for maximum resistance to postulated waste types. The outer pipe, used as secondary containment, is specified as PVC. The annular space, between the inner and outer pipe, is lined with conductivity tape to serve as early leak detection from a failure of the carrier pipe.~~

~~D-2b(1)(a)~~

~~(i) **Foundation** - The secondary containment pan will be placed directly on the GVB concrete foundation. The foundation is designed to support the tank system and all equipment operating within the tank system; resist pressure gradients above and below the system; and prevent failure due to settlement, compression and uplift. Foundation preparation, design, and construction procedures to control cracking due to uneven settlement are presented in Attachment 7, Construction Drawings, and Attachment 13, Calculations.~~

~~To further ensure the structural integrity of the tank system, the tank structural supports (e.g., legs) will be high enough to maintain the tank above the secondary containment's maximum potential liquid level. Additionally, the tank system ancillary components, as listed in Table D-2-6, will be mounted on support frames, above the maximum height of the secondary containment pan. The pumps themselves will be directly mounted on frames attached to tank structural supports (above the maximum height of the pan).~~

~~**(ii) Material Compatibility** – The secondary containment for the tank system, as well as tank and ancillary equipment structural supports, will be constructed of stainless steel, with a material compatibility consistent with the material used for the tank system components. Based on the waste types postulated for this system and a pH range limit between 2 and 12.5, the stainless steel material specified in Attachment 7, Construction Drawings, should be adequate.~~

~~**(iii) Strength and Thickness** – The tank system secondary containment will be constructed of 1/8-inch stainless steel plate with reinforcing ribs. This design is determined to have sufficient strength, thickness and resistance to prevent failure form pressure gradients (including static head and external hydrological forces), physical contact with the waste, climactic conditions, and stresses of daily operations. Structural design information for the tank containment system is presented in Attachment 7, Construction Drawings.~~

~~**(iv) Leak Detection** – The stainless steel pan providing secondary containment is slightly sloped to facilitate both liquid detection and removal. A conductivity probe, with a respective alarm, will be placed at the low point of the secondary containment pan, and will serve as continuous leak detection of the primary tank and tank system components listed in Table D-2-6. Additionally, visual checks of the secondary containment systems will be performed daily. These checks will consist of visually inspecting for signs of primary containment leaks; run-on or run-off of liquids to and from the secondary containment pan; and immediately apparent signs of corrosion, cracking, or other material stress. A more extensive examination of the equipment and material integrity will be routinely performed as discussed in Attachment 19.~~

~~**(v) Drainage and Spill Removal** – The secondary containment pan for the tank system is slightly sloped to a low point at one corner of the pan. This approach facilitates collection of liquids and removal. The degree of sloping for the secondary containment structure is specified in the structural designs presented in Attachment 7, Construction Drawings. Visual inspections for contamination from leaks or spills are discussed in the section above. If liquids are present in the secondary containment, the material will be removed via a portable vacuum pump or by absorbents, within a twenty-four (24) hour~~

~~period from the time of discovery. The material will be collected in a TIC; transported to container staging area, TS-01; and evaluated for required treatment and stabilization procedures.~~

~~(vi) **Run On** – The tank system is housed within the completely enclosed STB. The secondary containment system is constructed and operated, as well as sheltered from the outdoor environment, so that run-on from a 25-year, 24-hour storm will be excluded from the system. The exterior wall of the combined GASVIT™ and STB is designed with a solid concrete berm. The height of the berm will be a minimum of 8-inches. The exterior entrances to the STB are also a minimum of 8-inches higher than the exterior yard grade. This containment is sufficient to prevent run-on form a 100-year, 24-hour storm. Therefore, secondary containment capacity for run-on need not be provided. Construction details are presented in Attachment 7, Construction Drawings.~~

~~**D-2b(1)(b)**~~

~~(i) **Concrete Secondary Containment** – N/A. The tank system will not rely upon the concrete secondary containment system. The STB concrete foundation, with an 8-inch berm, will serve a tertiary containment function. Foundation design features including materials of construction, provisions for expansion, and impermeable sealants, are detailed in Attachment 7, Construction Drawings.~~

~~(ii) **Secondary Containment Capacity** – For the secondary waste treatment tank and ancillary equipment, the secondary containment consists of a flat stainless steel pan that is secured directly beneath the tank system. The secondary containment system is designed to contain 110 percent (110%) of the volume of the largest tank. The secondary containment pan is 7.5ft. by 16.5ft. long and 1.5ft. high. Therefore, the pan free volume is designed to contain 1,320 gallons, and is sized to provide a combined secondary containment for the tank system equipment and interconnecting piping listed in Table D-2-6. The free volume in the secondary containment space takes into account the space occupied (e.g., displaced volume) by the tank support structure and any equipment that is placed inside the containment area during the normal operation of the system. Material specifications, design drawings, and calculations are presented in Attachment 7, Construction Drawings, and Attachment 13, Calculations.~~

~~(iii) **Automatic Sprinkler Systems Capacity** – N/A. The MWF will be equipped with dry fire suppression systems only. Therefore, secondary containment capacity to contain 20 minutes of fire water, per UBC, 80.301(1)(4), need not be provided.~~

~~D-2b(2) Additional Requirements for Specific Types of Systems~~

~~The following sections define the provisions for compliance to applicable requirements for vault systems, double wall tanks, and ancillary equipment.~~

~~D-2b(2)(a) Vault Systems~~

~~The secondary containment system is not a vault, by a conventional definition. The secondary containment system is comprised of a shallow stainless steel pan; with the bottom of the pan at floor level; and the top of the pan completely open to the room environment. Although the definition of "vault" is not applicable to this secondary containment system the requirements for this section are satisfied, and include:~~

~~**(i) Ignitable or Reactive Vapors** As a fundamental administrative control, no ignitable waste (code D001) will be processed through this tank system. As a precaution, the process ventilation system and building ventilation system are the primary design means to protect against the potential formation and accumulation, of unforeseen ignitable concentration of flammable vapors. The tanks in the system are completely sealed and vented by the process ventilation system. Any fumes originating from waste accumulating in the secondary containment system are defused, diluted, and captured in the building ventilation system.Waste treated and stored within the boundary of the secondary containment system for this tank system will be compatible. Waste compatibility will be determined by the procedures discussed in Attachment 1, Waste Analysis Plan.~~

~~**(ii) Exterior Moisture Barrier** The tank system and secondary containment are installed inside the fully enclosed Stabilization building, sheltered from the outdoor environment. An exterior moisture barrier, as described in Section D-2b(1)(a)(vi), prevents the migration (e.g., run-on) of moisture or infiltration into the secondary containment system. Therefore, secondary containment capacity for run-on need not be provided. Construction details are presented in Attachment 7, Construction Drawings.~~

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~~D-2b(2)(b) Double-walled Tanks N/A.~~

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~~The tanks within this system are not a double-wall tank design, but instead, are a single-shell design. Therefore, all provisions for corrosion protection and continuous leak detection are defined in the applicable sections for the secondary containment pan.~~

~~D-2b(2)(c) Ancillary Equipment~~

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~~Secondary containment for the ancillary equipment of this tank system (listed in Table D-2-6) is provided by the same stainless steel pan for the entire tank system; as described in Section D-2b(1). Piping extending outside the physical boundary of the secondary containment pan, will be constructed of double-encased pipe, as described in section D-2b(1). Containers being transported within the facility (e.g., transportable in-process containers (TICs)) shall be equipped with their respective secondary containment (refer to Section D-1, Containers). Inspections for leaks, spills, corrosion, and/or other material stress are described in Sections D-2a(2), (4), and (5).~~

~~D-2C Variances From Secondary Containment Requirements~~

~~No variances are requested for the tank systems specified in the MWF.~~

~~D-2D Tank Management Practices~~

~~Each tank system is designed to manage a subset of the wastes that will be accepted for treatment. Standard procedures for each treatment process, developed prior to receipt of any waste at the MWF, provide operational controls to ensure that any waste or treatment reagent that could cause a tank to rupture, leak, corrode, or otherwise fail is not placed in such tanks.~~

~~The following practices are employed to ensure tank failure does not occur.~~

~~D-2d(1) Compatibility of Wastes or Treatment Agents~~

~~As part of waste acceptance, all wastes and proposed treatment agents are assessed for compatibility with materials of construction in the tank systems selected for holding and treatment. This assessment is routine and is based on process knowledge, treatability test results and equipment and reagent vendor information. Before processing waste, a process data sheet is used to evaluate the compatibility of the tank material of construction with the planned chemical adjustment process as defined in Attachment 1, WAP.~~

~~**D-2d(2) Operational Practices and Controls to Prevent Overfilling**~~

~~The following operational practices and controls prevent overfilling of tanks.~~

~~**D-2d(2)(a) Feed Cut-Off Systems, Pressure Controls, or Bypass Systems**~~

~~The tank is fitted with level a sensor, level switches and automatic shut-offs. The level sensor provides tank volume data and has a high and high-high level alarm set point. The high alarm set point is designed to provide a warning signal to halt tank filling operations. The high-high set point activates the automatic shut-off to stop the filling operation automatically. The high-high alarm annunciates at the operator control panel.~~

~~D-2d(2)(b) Maintenance of Freeboard~~

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~~Maintenance of freeboard is not required since no tanks are open to the environment.~~

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~~D-2d(2)(c) Diagrams of Piping, Control Instrumentation, and Process Flow~~

~~Process flow diagrams for the tank systems are included in Attachment 7. All processes within the MWF are batch processes. Tank systems have independent control mechanisms. Control requirements for each tank system are discussed in Attachments 5, Process Engineering Description for Stabilization Building, and Attachment 6, Process Engineering Description for GASVIT™ Building. Additionally, tank system vendors provide P & ID for the components of the tank systems they supply no later than at the time of purchase. The control instrumentation identified will include:~~

- ~~level sensors~~
- ~~level switches~~
  - ~~level alarms~~
  - ~~flow measurement and controls~~
  - ~~automatic shut-off valves~~
  - ~~motor control devices~~
  - ~~weight sensor~~
  - ~~temperature monitoring regulation and controls~~

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~~D-2d(2)(d) Descriptions of Procedures for Treating Dangerous Waste~~

~~Descriptions of procedures for treatment of dangerous wastes in tank systems are included in Sections D-2b and D-2e.~~

~~D-2E Labels And Signs~~

~~The tanks, referenced in Table D-2-6, will be labeled on two sides in black letters identifying the type of waste contained, the tank number, and tank name. The tank label area will be painted a light color, as necessary, to provide a contrast for the black lettering and enhance visibility. Tank identification labels will be lettered and numbered using a minimum of 3-inch high characters and will be located approximately at eye level. These labels will be visible from a minimum distance of 50 feet.~~

~~The tanks will be labeled to identify the major risks associated with the waste being treated and stored. At all times, tanks containing dangerous wastes, extremely hazardous wastes, or hazardous materials will be appropriately labeled to identify the major risks associated with the tank contents for employees, emergency personnel, and the public. Labels will be inspected per WAC 173-303-395(6) to insure they are not obscured, removed, or unreadable. HMIS and NFPA labeling systems will be used.~~

~~HMIS labels provide information on waste characteristics which identify the major risk associated with the waste being stored. The HMIS system includes information on health hazard, flammability, reactivity, and personnel protection. Hazards are rated from 0 to 4 (minimal hazard to severe hazard) indicating the degree of severity associated with the hazard. HMIS labels are color coded as follows:~~

- ~~Blue Health characteristics~~
- ~~Red Flammability~~
- ~~Yellow Reactivity~~
- ~~White Personnel Protection~~

~~The HMIS labels are 10.5-inches by 13.5-inches and are located at approximate eye level. These labels can be seen from a minimum distance of 50 feet. Legend signs explaining the HMIS labeling system will be located throughout the plant.~~

~~Tanks will also be labeled with NFPA labels in addition to the tank number and material contained. Similar to the HMIS labeling system, the NFPA labels provide information on waste characteristics such as reactivity, flammability, and health hazard. Additional information such as reactivity with water and other special fire fighting information is also provided on this label. The color scheme for this label is as follows:~~

- ~~Blue Health characteristics~~
- ~~Red Flammability~~
- ~~Yellow Reactivity~~

~~Each characteristic is rated from 0 to 4 indicating the degree of hazard ranging from 0 as no special hazard, to 4 as a severe hazard. The NFPA labels re typically 12-inches-square, with each character approximately 3-inches high. These labels can be seen from a minimum distance of 50 feet. Legend signs explaining the NFPA labeling system will be located throughout the plant.~~

~~D-2F AIR EMISSIONS~~

~~**Process Ventilation** - Process ventilation to this system is established and confirmed prior to conducting secondary waste treatment operations. The process ventilation system provides airspace confinement of waste-bearing equipment and maintains that equipment and/or area at a negative air pressure relative to the immediate room environment. The control of fugitive emissions is provided by venting the airspace above the incoming waste containers (e.g., TICs) and tank system. Local differential pressure indicators provide the operator with a positive indication that the process ventilation system is operating.~~

~~The process vent system collects fugitive emissions from the waste handling preparation areas where dust, vapors, or fumes may be released. The system uses activated carbon filters to treat organic vapor. A second filter type is used to treat acid and alkaline fumes, where applicable. A third filter type is a HEPA filter and is used to remove particles of $\geq$ 0.3 micron at 99.97% efficiency. The process ventilation system design is detailed in Attachments 5, 6, and 7.~~

~~**Building Confinement Exhaust** - The exhaust from the process ventilation system is discharged to the building confinement system. This system provides for general stabilization building exhaust and ventilation and zone pressure control. The system consists of one supply air units two main exhaust filter trains, associated pressure control sensors, controllers, and damper actuators.~~

~~The system is designed to provide a minimum of seven air changes per hour in the operating process areas. Each filter bank consists of a pre-filter, HEPA filter, and carbon adsorption filter stage. Process ventilation exhaust discharges directly into the building exhaust system ahead of the building confinement filter banks. Building exhaust is then discharged through two exhaust stacks located on the roof of the building. The building confinement system design is detailed in Attachments 5, 6, and 7.~~

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~~**Exhaust Emissions Monitoring**—The building confinement exhaust monitors consist of a CAM and a record sample filter, both of which collect representative samples of the radioactive particles in the discharge stream. A local alarm will sound if a high radiation level is detected. In addition, the building confinement exhaust monitors provide a continuous readout for the gas flow to the atmosphere. A process engineering description for this system is described in Attachments 5 and 6. P&IDs for this system are found in Attachment 7.~~

~~D-2g MANAGEMENT OF IGNITABLE OR REACTIVE WASTE IN TANK SYSTEMS~~

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~~No ignitable or reactive waste will be stored, processed, or treated within this tank system.~~

~~D-2h MANAGEMENT OF INCOMPATIBLE WASTE IN TANK SYSTEMS~~

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~~This tank system is designed to provide segregated storage, with primary and secondary containment, for waste treated, processed, and stored therein. This waste, by design, is preempted from commingling with potentially incompatible waste staged for or stored in neighboring tank systems. The administrative controls and inherent design features (e.g., material of construction, structural integrity, secondary containment, continuous leak detection, routine inspections, etc.), as described earlier in this section, attest to the tank system's ability to effectively segregate incompatible wastes and materials.~~

~~Wastes which are incompatible with the previous contents of the tank will not be placed in that same tank until the tank has been cleaned, or the tank has stored a waste compatible to both the waste steams in question. Compatibility determinations will be based on compatibility testing as described in the WAP, DOT hazard classification, or an equivalent recognized compatibility reference.~~

Table D-2-1, Applicable Codes for Tank Construction		
Organization	**Section**	**Application / Title**
ASME	B&PV Code	Tanks
ASHRAE	Industrial	Industrial ventilation and vapor control
NFPA	Part 30	Fire protection, vents, drains
OSHA	29 CFR 1910	General industrial safety and health
ANSI	B31.3	Chemical plant and refinery piping
ANSI	B16.5	Flanges
ANSI 4BC	1988 Edition	Seismic and wind loads
FM	7-88	Flammable/combustible liquid

Table D-2-2, Liquid Treatment Tank System Components		
Equipment	**Tag ID**	**Volume (Gallons)**
Liquid treatment tank #1	TK-0403	1200
Liquid treatment tank #2	TK-0406	1200
Liquid bag filter #1	FLT-0404	< 6
Liquid bag filter #2	FLT-0414	< 6
Liquid bag filter #3	FLT-0410	< 6
Liquid treatment pump #1	PMP-0409	< 1
Liquid treatment pump #2	PMP-0411	< 1
Interconnecting Piping	-	< 15

Table D-2-3, Ignitable, Corrosive, and Reactive Waste by Tank System (A = Accepted N = Not Accepted)				
Tank System		**Ignitable (D001)**	**Corrosive (D002)**	**Reactive (D003)**
Liquid Treatment Tanks	TP-04	N	N	A
Liquid Holding Tanks	TP-06	N	N	N
~~GASVIT™~~-Liquid ~~Feed~~ Storage Tanks	~~GV-02-01~~TP-16	~~A~~N	N	~~A~~N
~~Secondary Waste~~Sludge Storage Tanks	~~GV-11~~TP-16	N	N	N

Table D-2-4, Liquid Holding Tank System Components		
Equipment	Tag ID#	Volume (Gallons)
Liquid holding tank #1	TK-0603	1200
Liquid holding tank #2	TK-0606	1200
Carbon filter	FLT-0612	< 6
Ion-Exchange filter	FLT-0613	< 6
UV Oxidation	Z-0610	< 6
Liquid holding pump #1	PMP-0609	< 1
Liquid holding pump #2	PMP-0611	< 1
Interconnecting Piping	-	< 20

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Table D-2-5, ~~Liquid Feed~~Evaporation Tank System Components		
Equipment	**Tag ID#**	**Volume (Gallons)**
~~Liquid feed~~Wastewater storage tanks	T~~K~~-101~~205~~, T-102, T-103, T-104	~~375~~10,950 each
Sludge storage tank	T-105	1,270
Tanker/container unloading pumps	P-100, P-200	< 1 each
Evaporator feed pumps	P-300, P-400	< 1 each
Evaporators	WWE-01, WWE-02	835 each
~~Liquid feed~~Evaporator to sludge tank pumps ~~#1~~	P~~MP~~-50~~21~~0, P-700	< 1
Sludge tank unloading pump	P-600	< 1
~~Liquid feed pump #2~~	~~PMP-0209~~	~~< 1~~
~~Container pump~~	~~PMP-0203~~	~~< 1~~
~~Interconnecting piping~~	-	~~< 15~~
~~HAZMAT enclosure~~	~~Z-0202~~	~~N/A~~

~~Table D-2-6, Secondary Waste Treatment Tank System Components~~		
~~Equipment~~	~~Tag ID#~~	~~Volume (Gallons)~~
~~Scrubber bottom waste tank~~	~~TK-1105~~	~~1200~~
~~Distillate Tank~~	~~TK-1113~~	~~1200~~
~~Waste water evaporator unit~~	~~EVP-1103~~	~~< 6~~
~~Condenser~~	~~CD-1108~~	~~< 6~~
~~Distillate pump~~	~~PMP-1115~~	~~< 1~~
~~Interconnecting Piping~~	-	~~< 20~~