2014-LTR-1014

Attachment 15

[Permit Attachment OO]

Process Engineering Description for the MW Thermal Building

SECTION D
PROCESS INFORMATION

SECTION D-12
~~GVB~~ MWTH MISCELLANEOUS UNITS

ATTACHMENT OO (PERMIT)

MIXED WASTE FACILITY
RCRA/TSCA PERMIT APPLICATION

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

TABLE OF CONTENTS

D-12. ~~GVB~~ MWTH BUILDING MISCELLANEOUS UNITS 1
D-12A DESCRIPTION OF ~~GVB~~ MISCELLANEOUS UNITS 1
D-12a-I Physical Characteristics 1
D-12a-II. Materials of construction, and dimensions of the units 6
D-12a-III. Location 6
D-12a-IV. Detailed Plan and Engineering Reports 6
D-12a-V. Closure to comply with WAC 173-303-680(2) and (3). 14
D-12a-VI Mitigative Design and Operating Standards 14
D-12B ENVIRONMENTAL PERFORMANCE STANDARDS FOR MISCELLANEOUS UNITS 18
D-12b I ~~GVB~~ Miscellaneous Unit Wastes 18
D-12b-II Containment System 18
D-12b III Site Air Conditions 19
D-12b IV Prevention of Air Emissions 19
D-12b V Topography and Seismology 20
D-12b VI Site Hydrologic Conditions 20
D-12b VII Preventing Surface and Groundwater Contamination. 21
D-12b VIII. Plants and Animals 21
D-12b IX Area Land Use 22
D-12b X Preventing Migration of Waste Constituents 22
D-12C EVALUATION OF RISK TO HUMAN HEALTH AND THE ENVIRONMENT 22
D-12D DEMONSTRATION TEST PLAN 24

TABLES

Table D-11-1 ~~GVB~~ MWTH Building Miscellaneous Units
~~Table D-11-2 Materials of Construction and Dimensions of the Units~~

SECTION D-12 GVB MISCELLANEOUS UNITS

ACRONYM LIST

AC	Alternating current
~~PEcoS~~	~~Pacific EcoSolutions, LLC~~
AWFCO	Automatic Waste Feed Cutoffs
CAA	Clean Air Act
DC	Direct current
DOE	Department of Energy
DOT	Department of Transportation
DTP	Demonstration Test Plan
~~GVB~~	~~GASVIT™ Building~~
HAZMAT	Hazardous Materials
HEPA	High-efficiency particulate air
ID	Induced draft
LDR	Land Disposal Restrictions
LLMW	Low-level mixed waste
LFL	Low flammability limit
MWF	Mixed Waste Facility
MWTH	Mixed Waste Thermal Building
NEC	National Electrical Codes
NFPA	National Fire Protection Association
OVM	Organic vapor meter
P&ID	Process and Instrumentation Diagrams
PCB	Polychlorinated biphenyls
PLC	Programmable logic controllers
~~PNNL~~	
psi	Pounds per square inch
RCRA	Resource Conservation and Recovery Act
STB	Stabilization Building
TIC	Transportable Inprocess Container
TSCA	Toxic Substances Control Act
WAC	Washington Administrative Code
WAP	Waste Analysis Plan
WSB	Waste storage building

D-12. ~~GVB~~ MWTH MISCELLANEOUS UNITS

[WAC 303-806(~~1~~4)(i), 40 CFR 264.600 through 264.603, 270.23~~:~~]

There are ~~four~~ two miscellaneous units (i.e. evaporators) addressed in this section. These units ~~are~~ will be installed in the ~~GASVIT™~~Mixed Waste Thermal building (~~GVB~~MWTH). The units, listed on Table D-12-1, are part of the MWF treatment line 500.

These units do not fit the definition of a container, tank, surface impoundment, waste pile, land treatment unit, landfill, incinerator, boiler, industrial furnace, or underground injection well. Therefore, these units are categorized as miscellaneous units under the Resource Conservation and Recovery Act (RCRA). These miscellaneous units will be used to treat ~~and stabilize wastes by gasification and vitrification (GASVIT™) method at the GVB~~incoming hazardous wastewaters by evaporation.

Section D-12a provides information on the miscellaneous units as required under WAC 173-303-80~~5~~6(4)(i)(i) including:

1. Physical characteristics
2. Materials of construction, and dimensions of the units
3. Location
4. Design, construction, operations, maintenance, monitoring, inspections
5. Closure to comply with WAC 173-303-680(2) and (3).

Section D-12b addresses the environmental performance standards for these miscellaneous units, including waste types processed, containment, land usage, precipitation, and air, groundwater, and surface water quality as required by WAC 173-303-806(4)(i)(ii).

Information on the potential pathways of exposure of humans or environmental receptors to dangerous wastes or dangerous constituents as well as information on the potential and nature of such exposures [as required by WAC 173-303-806(4)(i)(iii)] are summarized in Section D-12c ~~and discussed in more detail in the Risk Assessment Work Plan, Attachment 4~~.

Information on demonstration tests, as required by WAC 173-303-806(4)(i)(iv)], is mentioned in Section D-12d ~~and discussed in more detail in the Demonstration Test Plan (DTP), Attachment 3~~.

D-12A **DESCRIPTION OF ~~GVB~~ MWTH MISCELLANEOUS UNITS**

[WAC 173-~~805~~806(4)(i)(i), ~~805(i);~~ 40 CFR 270.23(a)(1), 270.23(a)(2)]

D-12a-I **Physical Characteristics**

[WAC 173-303-~~805~~806(4)(i)(i) (A)~~, 805(i)(A)~~]

The ~~GVB~~ miscellaneous units are described below. Additional data on the design of the equipment are included in the specifications, data sheet and vender information sheets which are provided for major items in each system. These can be found by referring to equipment lists in Attachment 9 and then to equipment technical specification package in Attachment 12, Technical Specifications of ~~GASVIT™~~ MWTH Building Processes. ~~All equipment specified in this section will be new and will be purchased after the RCRA/TSCA Permit is issued.~~

(a) ~~FEED Prep System (GV-01)~~EVAPORATION SYSTEM (TP-16)

Formatted

Two identical evaporators (Model N33V2-260 manufacture by ENCON) with a design evaporation rate of 260 gallons per hour will be installed in the MWTH Building. Each evaporator is equipped with a natural gas-fired burner rated at 2,950,000 Btu per hour and a PLC control panel.

Formatted

Wastewater is pumped into the evaporation system from one of four storage tanks. As the wastewater flows into the evaporator and reaches the low level, the burner will light. Wastewater will continue to flow into the evaporators until it reaches the auto-run level when feed pump or the actuated ball valve will be de-energized or closed. As the wastewater comes to a boil and begins to evaporate, the liquid level will drop below the auto-run level and the feed pump or actuated ball valve will be energized and more wastewater will be fed into the evaporators based ona a timed cycle controlled by the PLC and the auto-run probe until liquid lelve reaches the auto-rum level. The evaporation process will continue until either the liquid temperature reaches the high set point or the optional cycle timer counts down to zero.

The gases from the natural gas combustion travel around the vertical tubes insode the heat exchanger until they reach the insulated chimney outside the evaporator tank(s). The hot gases are pulled back into the evaporator above the liquid level and drawn across the water surface by the exhaust blower. The exhaust blower pulls the combined water vapor and flue gases through the mist eliminator and then pushes them to the exhaust stack

~~The feed prep system has an inspection station (Z-0110) a sorting box (Z-0107), a sorting table (Z-0105), a shredder feed conveyor (CV-0103) a shredder (SHR-0101), and a weighing station. Physical description of each item is described below.~~

~~**Inspection Station (Z-0110).** The inspection station consists of a hooded area which is used for staging containers during inspection. An incoming solid waste container is placed under this hood, its cap removed to allow visual inspection and, if necessary, sampling. Any fugitive emissions released from an open container is collected by the hood which vents to the GVB process vent system. After inspection, the container is sent to one of the two sorting stations, as described below.~~

~~**Sorting Box.** The sorting box (Z-0107) is a totally enclosed housing equipped with a confinement system that maintains a slight negative air pressure inside the box with respect to the GVB environment. The vent from the box is connected to the GVB process vent system. The unit has gloveports allowing operators to manually segregate material inside the box. The box has an inlet and outlet door. Solid waste containers, (such as 55 gallon drums) are rotated 90 degrees and horizontally connected to the sorting box inlet door. An air-lock door is used to maintain air space confinement. Once the container is positioned next to the sort box inlet port, the container lid is removed and dropped inside a bag. The sorting box inlet port is then opened and the solid waste is emptied into the sorting box. Large RCRA-contaminated metals are removed and placed in a metal collection drum located under the sorting box. When the metal collection drum is full, it is capped, weighed, labeled and forwarded to treatment line 300 in the STB. PCB contaminated metal pieces are placed into cardboard batch feed canisters. The remaining waste objects are also placed into separate batch feed canisters. All filled canisters are capped and removed from the sort box through the outlet door. The filled containers are concurrently weighed and labeled with a bar-code system.~~

Formatted

~~**Sorting Table.** The sorting table is a turntable with a vary-speed gear drive. A vented hood (Z-0104) is provided above the table. Any fugitive emissions and dust generated during waste sorting operations are vented to the process vent system (see subsystem system GV-09). Sorting table operation is similar to the box sorting. First, metal pieces not suitable for processing by the GASVIT™ system are removed and placed in a metal collection drum (C-0109). When the metal collection drum is full, it is capped, weighed, labeled, and sent to line 300 in STB for treatment. Solid waste objects that cannot be shredded, are packaged in batch feed canisters (C-0106). Solid waste objects suitable of shredding and feed as~~

Formatted: Tab stops: Not at 0.25"

~~continuous solid feed are placed on an enclosed conveyor (CV-0103) and routed to the shredder (SHR-0101).~~

~~**Shredder Feed Conveyor (CV-0103).** The shredder feed conveyor is an inclined belt conveyor designed to carry solid waste debris to the shredder inlet housing. The conveyor is enclosed in a metal housing which is kept under negative pressure by a vent line connected to the GVB process vent system (GV-09). The conveyor inlet hopper can receive granulated waste, such as soil, directly from a drum dumper.~~

~~**Shredder (SHR-0101).** A low speed shredder is provided for size reduced debris wastes for processing by the GASVIT™ system continuous solids feeder. A screen mounted under the shredder ensures that solid waste debris is reduced the pre-selected size of approximately 2-in. The shredded material falls into a chute which leads to a bagging station. A hopper is provided under the shredder to collect the shredded solids. The hopper has a discharge gate valve (FV-0101) which feeds shredded solids to a bagging chute. A plastic bag is placed under the chute and the hopper discharge valve is opened to allow shredded material to fill the bag. When the bag is full to approximately 25 lb, the chute discharge gate (FV-0101) is closed. The bag is then tied and sealed twice, two inches apart, cut between the seals, and horsetail wrapped at each stub end. The bag is then weighed, bar-code labeled, and staged for continuous solid feed.~~

~~**Weighing station (Z-0114).** The weight stations is an integrated unit equipped with a weight scale (WE-0114), and a computer terminal, and a label printer. At this station, the weight of the batch feed canisters, bags and metal drums produced during the sorting operations will be measured. The computer terminal will record the weight of each packaged material, retrieve waste profile data from the main plant waste inventory control system, and generate a bar-code strip for affixing to the new package. From the weighing station (Z-0114), the bags (C-0102) and batch feed canisters (C-0106) will be placed in a surge feed storage area (GVB room 3).~~

~~**(2) GASVIT™ System**~~

A1

~~The GASVIT™ system encompasses all of the subsystems needed to ensure safe and reliable treatment of organic wastes by a gasification/vitrification process. The system will be installed in the GASVIT™ building. The GASVIT™ system consists of 11 subsystems including: a liquid feeder (GV-02-1); a continuous feeder, (GV-02-2); two batch feeders (GV-02-3); a flux feeder (GV-02-4); a process chamber~~

~~(GV-03); a product handling (GV-04); a first stage syngas processing (GV-05); a second stage syngas processing (GV-06); a third stage syngas processing (GV-07); a syngas sampling (GV-08); and main process controls (GV-10). An overall description of the GASVIT™ system is included in Section D-5b(2)(b)(i) of the DTP, Attachment 3.~~

~~Each of the GASVIT™ subsystems has several components which are described in Section 3 of Attachment 6. The GASVIT™ system liquid feeder subsystem (GV-02-1) consisting of a tank (TK-0205), mixer (MX-0206), container pump (PMP-0203) and feed pumps (PMP-0209 & 0210) is classified as a tank system and is described in Section D-2.~~

~~A brief description of the various subsystems is presented below.~~

~~**Feed Subsystem (GV-02).** Feed subsystem introduces feedstock and additives into the process chamber at a pre-determined feed rate. The following four different types of feeder are used: 1) a feed tank/pump assembly is used to feed liquid/sludge waste; 2) a continuous screw feeder equipped with an airlock hopper assembly is used to introduce solids 3) a redundant set of batch feeder mechanisms are used to feed pre-packaged waste canisters and, 4) glass former additives are metered into the continuous solids feeder by a gravimetric feeder which introduces the material into the process chamber.~~

~~**Process Chamber Subsystem (GV-03).** The process chamber subsystem is the heart of the GASVIT™ system, where feed materials are processed producing a synthesis gas (syngas) stream, a ceramic/glass product stream, and metal stream. Two sources of energy are utilized to process the feed: the DC (direct current) arc plasma zone, and the AC (alternating current) joule-heated zone. The DC arc plasma is created by applying a DC potential across the three graphite arcing electrodes with a single electrode at one polarity and the other two electrodes at the opposite polarity. A stable plasma arc is then formed between the molten bath and arcing electrodes. The second source of energy to the process chamber is supplied directly to the molten glass via three graphite joule-heating electrodes submerged in the melt. A three phase AC potential is placed across the joule-heating electrodes which results in current flow through the glass. The molten glass acts as a resistor such that power is supplied directly to the molten glass. Organic constituents which are subjected to the DC plasma arc and joule heating are pyrolized producing syngas (CO, H_2) and acid gases such as HCl. Inorganic constituents decompose as oxides and dissolve into the glass phase.~~

~~**Product Handling Subsystem (GV-04).** GASVIT™ system product handling subsystem consists of a bottom freeze valve and an overflow drain valve attached to the process chamber. These two discharge points are used to remove molten product out of the chamber. The molten product is poured into disposal containers and allowed to cool to a solid form. The solid form is inspected, certified for compliance with LDR and sent to a burial site for final disposal.~~

~~**Syngas Processing (GV-05, 06 and 07).** The syngas processing subsystem employs three process stages to remove metal vapor and acid gas impurities in the syngas and convert the purified syngas to a stable form (i.e., water and carbon dioxide). The first processing stage is a high temperature filter. This filter takes out solid particulate that leave the process chamber. The second stage consists of a scrubbing train, a mist eliminator, a redundant set of primary HEPA filter banks, and a redundant induced draft (ID) fans. This train removes acid gases, metal vapors and particulate and discharges the gas into the third stage syngas processing subsystem. The third stage converts the syngas into a stable form of water and carbon dioxide and filters any remaining particulate. The third stage consists of a syngas converter/quench tower and a final HEPA/charcoal filter train. The exhaust for the third stage is monitored and released to the atmosphere.~~ A1

~~**Syngas Sampling Subsystem (GV-08).** This subsystem extracts a continuous stream of syngas which is analyzed for CO and CO_2. Signals from the continuous sampler is used to maintain control of the reducing environment in the chamber with respect to feed rate of organic material.~~

~~**Main Process Control Subsystem (GV-10).** This subsystem ensures compliance with the RCRA/TSCA operating limits imposed on feed rate controls and automatic waste feed cut-off (AWFCO) requirements. Centralized computer controls and programmable logic controllers (PLC) along with local instruments are provided to implement the controls.~~

~~(3) Secondary Waste System~~

A1

Formatted

~~The secondary waste system (GV-11) treats liquid waste from the second stage syngas processing scrubbers. The system consists of a scrubber bottom waste tank (TK-1105), a waste water evaporator (EVP-1103), a distillate tank (TK-1113) and a distillate pump (PMP-1113). Only the evaporator is classified as a miscellaneous unit and is deseried in this section. The scrubber bottom waste tank (TK-1105), the distillate tank (TK-1113) and pump (PMP-1113) are classified as tank systems and are~~

~~described in section D-2. The secondary waste treatment system is designed to treat approximately 125 gallons per hour of waste water containing 5 percent by weight dissolved and suspended solids.~~

~~The evaporator is a vendor supplied package consisting of a feed pump, a concentrate pump, evaporator vat, condenser and all processing and safety instrumentation and controls. Scrubbing bottom waste discharged from the syngas scrubbers is sent to the 1200 gallon scrubber bottom waste tank. When the water level in the feed tank is sufficient, waste water is transferred to the evaporator (EVP-1103) by the evaporator feed pump. The evaporator heating device evaporates the liquids and water vapor is removed from the evaporator vat by a 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. Concentrated waste in the evaporator is periodically drained to a disposable drum. Level controls linked to the concentrates pump prevent the drum from overfilling. Disposal drums containing concentrates is sent to treatment line 200 on STB for stabilization.~~

D-12a-II. Materials of construction, and dimensions of the units

[WAC 173-303-80~~5~~6(4)(i)(i)~~, 805(i)(i)~~(A)]

The ~~M~~material of construction are as follows:

1. Tank: 316L stainless steel, 14 gauge
2. Heat Exchanger: 316L stainless steel, 11 gauge
3. Mist Eliminator Pad: 316 stainless steel
4. Skins and Lids: Polished 304 stainless steel, 18 gauge

~~and the outer dimension of the major components in each unit are listed in Table D-12-2. More detailed data in this regard is presented in design documentation contained in Attachments 7, 9 and 12.~~Each evaporator dimensions are 156 inches (length), 82 inches (width), and 110 inches (height). The evaporator tank capacities are:

1. 664 gallons at low-level
2. 819 gallons at auto-run level, and
3. 912 gallons at high level

Formatted: Numbered + Level: 1 + Numbering Style: 1, 2, 3, … + Start at: 1 + Alignment: Left + Aligned at: 0.5" + Indent at: 0.75"

Formatted: Numbered + Level: 1 + Numbering Style: 1, 2, 3, … + Start at: 1 + Alignment: Left + Aligned at: 0.5" + Indent at: 0.75"

D-12a-III. Location

[WAC 173-303-~~805~~806(4)(B)~~(i)(i), 805(i)(i)(A)~~]

.

~~GVB m~~Miscellaneous units are located in the ~~GASVIT™~~MWTH building. Drawing 31001-M-001-M004 shows the location of each unit in this building.

D-12a-IV. Detailed Plan and Engineering Reports

[WAC 173-303-80~~5~~6(4)(i)(i)~~, 805(i)(i)~~(B)]

(1) Design and Construction

[WAC 173-303-80~~5~~6(4)(i)(i)~~, 805(i)(i)~~(B)]

Design and construction of the units described in this section are included in the following ~~D~~~~document~~rawings:

1. 31001-P-071(1): This drawing provides P&ID for tanker truck/container unloading into any of the four storage tanks.

Formatted: Numbered + Level: 1 + Numbering Style: 1, 2, 3, … + Start at: 1 + Alignment: Left + Aligned at: 0.5" + Indent at: 0.75"

2. 31001-P-071(2): This drawing provides P&ID for inlet piping into and the outlet piping from the storage tanks.
3. 31001-P-071(3): This drawing provides P&ID for feed lines into the evaporators; the outlet piping from evaporators to the sludge storage tank; and the outlet piping from the sludge storage tank.
4. 31001-M-100(4): This drawing provides location information within the MWT Building for basket filters, pumps, evaporators, and all tanks associated with the evaporation process (TP-16).
5. 31001-P-505: This drawing provides a process flow diagram for the entire evaporation system (TP-16).

Each of the two evaporators is designed to evaporate 260 gallons per minute and is provided with PLC and operator interface panel which provides readouts of wastewater temperature, heated air temperature, mist pad pressure, and various alarms and operating conditions.

~~1. **Attachment 6** Process Engineering Description for Stabilization Building~~

~~2. **Attachment 7** Construction Drawings~~

~~3. **Attachment 9** Equipment/Instrument List for Stabilization Building~~

~~4. **Attachment 12** Technical Specification for Stabilization Building~~

(2) Operations

[WAC 173-303-~~805~~806(4)(i)(i)~~, 805(i)(i)~~(B)]

(a) ~~Feed Prep~~Evaporation System

~~Organic solid and liquid~~Hazardous wastewaters will be received in tanker trucks or containers in~~at~~ the MWTH~~F~~ Building for treatment. Upon arrival at the facility, the tank trucks/containers will be subject to confirmation inspection before they are accepted/rejected as described in the waste analysis plan (WAP) presented in Attachment 1. ~~RCRA wastes requiring inspection will be brought to either the STB staging areas (STB rooms 2 or 3) or the GVB staging areas (GVB rooms 1 and 4). PCB-contaminated liquids and solids, however, will be brought to the GVB staging area only. PCB-waste will not be stored or staged at the STB under any circumstances.~~

~~The GASVIT™ feed prep system (GV-01) in GVB has a hooded station where containers are opened, visually inspected and, if required, sampled for confirmation and acceptance. Upon completing~~

~~the acceptance inspection, the containers are either capped and transported to the Waste Storage Building (WSB) for storage or staged for GASVIT™ feed preparation.~~

~~The operation of the feed prep subsystem (GV-01) is based on campaign processing. This means processing will be done in a batch comprised of several containers having similar requirements with respect to: 1) worker safety protection 2) waste compatibility 3) permit compliance and 4) waste processing efficiency.~~

~~The first preparatory step for all containers entering the feed prep system is inspection. The container key physical data (e.g., weight, size, configuration) will be checked against the container profile data in the main plant inventory control computer system. Any further decision on container sampling and analysis will be based on the criteria described in the WAP. Wastes found acceptable will be staged for feed preparation while waste found not acceptable will be immediately forwarded to a predetermined area clearly marked as "Rejected Containers." Procedures and protocol for handling rejected containers are defined in the WAP.~~

Tanker truck unloading area is provided with a sampling platform or ports. Each incoming tanker truck/container will be sampled for process parameters outlined in the WAP or generators' knowledge will be used to determine of the wastewater meets acceptability criteria presented in the WAP. A compatibility test will be performed (if needed) for the contents of the storage tank and the wastewater to be pumped. Of all acceptable criteria (including compatibility) are met, the wastewater will be pumped throu basket filters (or bypassed) and into storage tanks (T-101 through T-104). Wastewaters from the storage tanks will be fed into the evaporators. Operation of the evaporators is described in Section D-12a-I.

Periodically, the sludge in the bottom of the evaporators will be pumped into the sludge storage tank (T-105). The sludge from the sludge storage tank will be pumped into containers. These containers will be processed throught further on-stie treatment (e.e. TT-02-Low Capacity Mixer, or TT-03-In-Container Mixer) or disposed of off-site. If processed on-site, the sludge will be analyzed for metals to derive appropriate recipe for the reagents for on-site treatment.

~~Liquid waste container inspection will be conducted inside a HAZMAT enclosure (GV-02-Z-0202). The HAZMAT building provides containment and confinement for the containers for the liquid feed tank. Feed tank is which are described in Section D-2. A hood, provided in the HAZMAT enclosure for liquid waste inspection, captures any organic vapors that might escape the container during the container opening and inspection process. The hood exhaust is sent to the GVB process vent system. Solid waste container inspection is conducted under a similar hood (Z-0110) but outside the HAZMAT enclosure. Fugitive emissions or dust that may be released during the container inspection are captured and forwarded to the GASVIT™ process vent system (GV-09).~~

~~After inspection, liquid wastes will be forwarded to the liquid feeder (refer to subsystem GV-02-01). Liquid wastes arriving at the GASVIT™ building in an overpack container will require opening the overpack cap, removing the liquid container from the overpack, and pouring the liquids/sludge into a funneled container (GV-02-C-0211) that is temporarily stored in the liquid feed HAZMAT enclosure (GV-02-0202). Before consolidating two or more liquids, all pre-cautionary and safety measures will be instituted to ensure waste compatibility of the liquid wastes. After removing the liquid container, the overpack, usually filled with absorbent material (e.g., vermiculite), will be sent to the feed prep area (GV-01) and staged for processing. In this area the absorbent material will be removed from the overpack, placed in bags (C-0102), placed on a weight scale (WE-0114), and labeled with weight and waste profile information. Alternatively, absorbent material or other dry material may be weighed, characterized and dumped directly into the intake conveyer leading to the GASVIT™ continuous feeder. Container labeling is discussed later in this section.~~

~~After solid waste containers are inspected and accepted for processing by the GASVIT™ system, the heterogeneous and debris are sent to one of the two sorting devices: the sorting box (Z-0107), or the sorting table (Z-0105). PCB contaminated wastes generally greater than exempt limits will be sent to the sorting box. All other wastes in heterogeneous or debris category will be sent to the sorting table.~~

Formatted

~~At the sorting box (Z-0107), the box inlet port is opened and the solid waste container is emptied into the sorting box. Large RCRA-contaminated metals are removed and forwarded to line 300 is STB for processing. The remaining waste objects are placed into separate batch feed canisters. The filled canisters (C-0106) are capped and removed from the sort box, weighed and labeled with a bar-code system containing waste profile criteria. The operations at the sorting table are the same as the sort box with the exception that the material will be either packaged into canisters or placed into the shredder~~

~~feed conveyor (CV-0103) and routed to the shredder (SHR-0101). The shredder reduces the size of the debris waste and discharges the waste into a plastic bag. When the bag is full to approximately 25 lb., the bag is sealed, weighed, bar-code labeled, and staged for continuous solid feed.~~

~~Drums not containing debris or heterogeneous solid waste are brought directly from the inspection station to the weighing station. The weighing station (Z-0114) is an integrated unit equipped with a weight scale (WE-0114), and a computer terminal, and a label printer. At this station, the weight of the batch feed canisters, bags and drums will be measured. The computer terminal will record the weight of each packaged material, retrieve waste profile data from the main plant waste inventory control system, and generate a bar-code strip for affixing to any re-packaged material. Using the bar-code as an identification number, the computer generates and maintains a record file for the re-packaged material. The file will relate the characteristics of the waste in the original package to the re-packaged containers. In addition to the bar code, the computer will generate color-coded strips which will be affixed only to the packages destined for processing by the GASVIT™ system. The color coding scheme provides a visual indication to the operator to allow selection of the feed material composition for sequencing and blending so that the metals and chlorine/chloride concentrations imposed by the GASVIT™ process permit can be met.~~

~~**(b) GASVIT™ System**~~

A1

~~GASVIT™ system operation is described in the DTP Attachment 3. Included are: new unit start-up and shake-down conditions [Section D-5b(1) in Attachment 3], system demonstration (Section D-5b(2) of Attachment 3), system start-up [Section D-5-b(2)(g)(i) of Attachment 3], waste processing mode [Section 5-b(2)(g)(i) of Attachment 3] and system shut-down [see Section 5-b(2)(g)(i) of Attachment 3].~~

~~The GASVIT™ system vitrified product and the GASVIT™ syngas processing train secondary wastes including filter residues and scrubber liquor, will be subject to the RCRA/LDR listed waste rules. When transitioning from treating a listed waste to treating a characteristic waste, a two step flush will be used to clean the system. In the first flush, molten residue in the process chamber, the solid residues in the high temperature filter and the liquids in the scrubbers will be drained to the extent practical. Next, the scrubbers will be refilled and the process chamber will be filled with one residence volume (approximately 12 ft^3) of either pure glass forming material or a mixture of glass forming material and a non-listed waste stream. When approximately 12 ft^3 of molten product is accumulated in the process~~

~~chamber, a second flush step will be initiated by draining the process chamber, the high temperature filter and the scrubber to the extent practical. All vitrified glass, high temperature filter residues and the scrubber liquids generated from the first and second flush will be subject to the RCRA/LDR waste code carry over rules for listed wastes. After completing the first and second flushing steps, the system may start processing characteristic wastes and any subsequent vitrified wastes or secondary wastes generated from treating such characteristic wastes will be subject to the RCRA/LDR waste code carryover rules applicable to characteristic waste.~~

~~**(c) Secondary Waste System**~~

A1

~~The waste evaporator is a self-contained vendor-supplied package which will operate independent of the GASVIT™ system. The scrubber bottom waste tank and distillate tank controls are discussed in Section D-2 of this permit application. Evaporator is operated, controlled and monitored from a local control panel.~~

~~Instrumentation and controls are provided for the following parameters.~~

- ~~**Evaporator vat temperature**. A temperature sensor is installed at the evaporator vat. The sensor is connected to a control system which regulates the heat supplied to the evaporator vat according to the temperature setting selected by the operator.~~

Formatted: No bullets or numbering

- ~~**Evaporator vat level.** A level controller measures and indicates the concentrates level in the vat. A high-level signal from this controller will cut-off the scrubber bottom feed pump. A low-level signal will cut off the concentrates transfer pump.~~

Formatted: No bullets or numbering

- ~~**Concentrates drum level.** A level controller measures and indicates the level in the concentrates drum. A high level signal from the drum will cutoff the concentrates pump.~~

Formatted: No bullets or numbering

- ~~**Evaporator TDS.** Evaporator total dissolved solids (TDS) is measured by a density meter. Upon reaching the set point, a stream of concentrates is transferred to the concentrates drum.~~

Formatted: No bullets or numbering

Formatted: Tab stops: 0.01", Left + Not at 6.5" + 0.01"

~~Before scrubber bottom waste is released from a scrubber bottoms tank for treatment by the evaporator package, it will be sampled and the samples analyzed for specific gravity, and pH. Sampling and analysis~~

~~is described further in Section C of this permit application. The acceptable levels of these parameters in the feed scrubber bottoms are:~~

- ~~**Specific gravity:** 1.00 to 1.25~~
- ~~**pH:** 3.0 to 11~~

Formatted: No bullets or numbering, Tab stops: 0.01", Left + 0.43", Left + Not at 6.5" + 0.01" + 0.43"

Formatted: Tab stops: 0.01", Left + Not at 6.5" + 0.01"

~~The specific gravity measurement is used to determine the concentration requirements and provides data to assess treatment effectiveness (percent volume reduction achieved). The pH measurement is used to confirm compatibility with the treatment system. The design basis for the evaporator is to produce an 18% concentrated scrubber solution. However, at the beginning of each waste processing campaign, a representative sample of the concentrated waste will be obtained and tested for stabilization. Based on this stabilization test, an exact concentration will be defined for the final waste and the evaporator controls will be set to produce the desired waste concentration. If the pressure inside the flash evaporator exceeds 15 pounds per square inch gauge, a pressure relief valve will release steam. This safety feature is provided to protect the flash evaporator from rupturing in case such an off-normal event would occur.~~

~~**Waste Transfer.** Waste transfer from the scrubber bottom tank to the evaporator is initiated by the operator and is automatically controlled by the evaporator level control system. As the level in the evaporator vat drops below the set point, the feed pump is energized to transfer scrubber bottom waste from the tank into the evaporator vat. However, if the scrubber bottoms is at a sufficient specific gravity (1.20), a manually-operated valve that allows scrubber bottom waste to bypass the evaporator will be opened, allowing evaporator bottoms to be sent directly to the concentrates drum.~~

~~**Evaporator Package Operation.** A heat exchanger will heat the evaporator vat to a temperature within the range of 210°F to 240°F. After the waste is heated, it will boil and the vapor will exit the vat through the evaporator exhaust line. A level indicator and transmitter in the evaporator vat will regulate the fresh scrubber bottom waste flow to the evaporator vat. As water vapor leaves the vat, the level in the vat decreases until a low-level switch is energized. This switch starts the evaporator feed pump and additional fresh scrubber bottom waste is allowed to enter the vat. When the vat level reaches the high-level set point, the pump is stopped. The evaporator fill cycle ensures that the vat is filled with wastes at all the time.~~

Formatted: Tab stops: 0.01", Left + Not at 0.5" + 6.5" + 0.01"

~~**Concentrates transfer.** The specific gravity of the waste in the vat is measured by a sensor. When the specific gravity of the bottoms in the evaporator vat is in the desired range (1.10 to 1.20), a small stream of the concentrates will be bled off and sent to the concentrates drum. When the drum level reaches approximately 75% of the drum height, the concentrates pump is stopped and an alarm is sounded to notify the operator. The operator removes the filled drum and places an empty drum in the filling station. The filled drum is either sent to the dryer system (TP-08) for additional concentration or to the in-container mixing system (TT-03) for stabilization.~~

~~**Evaporator exhaust.** The water vapor exits the evaporator vat and passes through a condenser and a mist eliminator, which removes particulate and excess condensation from the water vapor before it is exhausted to the GVB process vent system. The condensate will be sent to the condensate tank and will be either re-used, sent for polishing in the holding tank system (TP-06) or sent to one of the stabilization systems in STB. The criteria for reuse of the condensate as scrubber water will be established during demonstration tests.~~

(3) Maintenance

[WAC 173-303-80~~5~~6(4)(i)(i)~~, 805(i)(i)~~(B)]

~~Maintenance and inspection of the units in this section are included in the process engineering design description enclosed as Attachment 6, Process Engineering Description for GASVIT™ Building.~~

Evaporation system maintenance will be performed based on the manufacturer's recommendations. Typically the following maintenance schedule will be adhered to:

- Evaporation tank and heat exchanger rinse down by pressure spray once every 3 months
- Mist pad should be removed every 30 days for inspection and/ or pressure washing (if needed). However, it should be immediately removed and cleaned if the mist pad differential pressure alarm is activated.
- A certified burner technician should inspect and/or clean the burner once per year.
- Inspect the inside of the evaporator chimney every 6 months and clean if necessary.

Formatted: Bulleted + Level: 1 + Aligned at: 0.25" + Indent at: 0.5"

Comment [BN1]: Ask TB

(4) Monitoring

[WAC 173-~~805~~806(4)(i)(i), 805(i)(i)(B)]

The following monitoring features are included on the PLC and operator interface panel for each evaporator to monitor the status of the evaporator:

1. Evaporator tank water temperature
2. Differential air pressure across the mist pad
3. Combustion gas temperature
4. Evaporator tank wastewater level

Formatted: Numbered + Level: 1 + Numbering Style: 1, 2, 3, … + Start at: 1 + Alignment: Left + Aligned at: 0.25" + Indent at: 0.5"

Formatted: Indent: Left: 0.5"

In addition, if any setp points installed in the PLC is reached, an alarm condition will be shown on the operator interface panel. The set points are for the following parameters:

1. High wastewater level in the evaporator tank
2. Low wastewater level in the evaporator tank
3. High wastewater temperature
4. High combustion gas temperature
5. Blower shut-off temperature

Formatted: Numbered + Level: 1 + Numbering Style: 1, 2, 3, … + Start at: 1 + Alignment: Left + Aligned at: 0.25" + Indent at: 0.5"

Formatted: Indent: Left: 0.5"

~~**(a) Feed Prep System**~~

~~The following monitors are provided for personnel safety and proper operation of the system:~~

1. ~~**Inspection station hood:** A local differential pressure indicator is provided to monitor the negative air pressure in the hood vent line.~~
2. ~~**Box sort enclosure:** A local differential pressure indicator is provided to monitor the negative air pressure in the enclosure.~~
3. ~~**Shredder conveyor and shredder housing:** A local differential pressure indicator is provided to monitor the negative air pressure inside the units.~~
4. ~~**Inventory control data:** A computer terminal is provided in the feed preparation area. The terminal is connected to the inventory control system, and upon demand, waste profile data is displayed in a monitor.~~
5. ~~**Weigh station:** The weigh station includes a scale that has a local display.~~
6. ~~**Bar-code scanners/printer.** A bar scanning system is provided to label the repackaged waste in plastic bags and the canisters.~~

A1

~~**(b) GASVIT™ System**~~

~~The GASVIT™ system has monitoring and control features that ensure compliance with environmental performance and safety requirements. The feed control and the automatic waste feed cut-off (AWFCO) controls ensure compliance of the system with the environmental standards. The AWFCO logic is the overall safeguard of the GASVIT™ system for ensuring that the emissions from the process are controlled and that system is automatically shutdown in the event that a critical process parameter is outside of the operating range specified in the permit.~~

~~**Feed Control**~~

~~The GASVIT™ waste feed control is maintained using a computer/PLC to independently control the three waste feed systems. Generally, waste will be introduced to the GASVIT™ process chamber using either the liquid feeder, the two batch solid waste feeders (GV-02-CG-0230) or the continuous solids feeder (GV-02-F-0226). Key permit feed control operating limits established for each of the feeder lines are: 1) toxic metals concentration feed rates; 2) chlorine/chloride concentration feed rate; and 3) maximum total feed rate. GASVIT™ system controls on these feeders are executed by a combination of administrative controls, process instrumentation, and computer data monitoring, recording and storage system, as described below.~~

~~**Establishing Chlorine/Chloride and Metals Concentration of Feed.** The feed prep system (GV-01) receives waste containers from outside of the GASVIT™ building and prepares them for feeding into the GASVIT™ process chamber. Operations conducted by this system are receipt, inspection, unloading, sorting, size reduction, re-packaging and interim storage. The inspection operations conducted in this subsystem are administratively controlled to ensure the chlorine/chloride and toxic metals concentration of the repackaged material are tied to the original waste containers received in the GASVIT™ building. The subsystem labels the repackaged material with bar-code charts allowing tracking of the waste characteristics during the feed prep and processing steps.~~

1. ~~**Liquid Feed Control.** The feed rate of liquids will be in compliance with the permit maximum feed rate, the maximum allowable chlorine/chloride feed rate, and the maximum allowable metals concentration in the feed. The chorine/chloride and toxic metals concentrations of the feed are obtained by either sampling and analysis of the feed tank contents, or by using the known characteristics of the containers that were transferred to the~~

~~feed tank per the WAP. Once the weight of chlorine and metals concentration in the tanks are known, the feed rate is determined by dividing the total weight of the chloride/chloride and each toxic metal's content in the tank by the permitted feed rates. The lowest feed rate obtained from these calculations are used as the basis for setting the maximum feed rate of the material in the feed tank. The liquid feed rate is controlled by a flow meter (FIT-0214) and a control valve (FCV-0215). Once the desired liquid feed rate is determined, the operator sets the feed rate from the main process control panel. A control loop measures the flow rate as indicated by the flow meter (FIT-0214) and adjusts the opening of the control valve (FCV-0215).~~

2. ~~**Continuous Solids Feed Control.** As indicated above, a set of permit operating limits are imposed on the maximum total feed rate and the maximum feed rate of chlorine/chloride and toxic metals constituents introduced into the process chamber by the continuous feeder. The chlorine/chloride and toxic metals concentrations are obtained by an inventory control method as follows: As the waste containers arrive in the GVB feed preparation area, their identification number is used to retrieve their profile data from the main data base system. Alternatively, an onsite sampling and analysis may be performed to characterize a container per the WAP. In either case, data from the incoming containers along with a bar-code system is used to identify the characteristics of a series of repackaged bags that are prepared after the required sorting and size reduction operations are completed. The bags are weighed, bar coded and placed in a surge storage area. When a continuous solid waste feed campaign is desired, a series of bags are removed from the storage and are placed on a feed conveyor (CV-0103). The conveyor has an indexing drive and the activation of each indexing event is controlled by a timer. Using a scanner (BSC-0222) the ID of the bags is transmitted to the main process control computer. The computer calculates the process time for each bag. The process time is determined based on the bag characteristics data (transmitted to the computer via the scanner) and by taking into account the permit limits. When the control room operator activates the feed start command, the feed conveyor moves an index point to drop the first bag(s) into the lock-hopper leading to the screw feeder. A position switch (ZS-0224) informs the computer that the bag has been received in the lock hopper. The signal from the position switch initiates a timer for the next bag feed event. While a batch type method (i.e., a combination of bag weight and feed cycle time) is used for ensuring compliance with the~~

~~permitted feed rates, the continuous feeder which is located under the lock hopper introduces the waste into the process chamber at a continuous feed rate.~~

~~3. **Batch Feeder.** The GASVIT™ system has two batch feeders. In a normal batch feed campaign, both of the batch feeders are used in an alternating mode. The permit limitations imposed on the batch feeders are similar to the continuous feeder. First, the chorine/chloride and toxic metals concentrations of the feed are obtained by an inventory control practice as described for the continuous feeder. As the waste containers arrive in the feed preparation area, their identification numbers are used to obtain profile data from the main data base system. Alternatively, onsite sampling and analysis may be performed to characterize a container as per the WAP. In either case, characterization data from the incoming containers along with a bar-code system are used to identify characteristics of the repackaged batch feed canisters. The bar coded canisters are weighed and placed in a surge storage area. When a batch feeding campaign is desired, a series of canisters are placed on one or both of the batch feeder ramps. The feed ramps are indexed to automatically feed canisters to the batch feeder. A timer is used to control the indexing cycles. The time set point for each index cycle is initiated by a position indication switch (ZS-0234, ZS-0244) located at the inlet of the batch feeder. The process time for each canister (time cycle between canister feed events) is calculated by the process control computer. The process time calculations take into account the feed rate limitations of the permit and the canister characteristics data (transmitted to the computer by scanner (BCS-0244). The computer calculates the process time for all of the canisters placed on the ramps. When the control room operator activates the batch feed start command, the ramp automatically advances the canisters into the batch feeder at the calculated time cycles. If both batch feeders are used, the feeders will be alternated to introduce canisters into the process chamber.~~

~~**Steam Feed Control.** Steam is also metered into the process chamber (GV-03-Y-0301) to fully convert all carbonaceous waste material to syngas. The steam will be controlled using a feed back control strategy based on the composition of the syngas exiting the main GASVIT™ process chamber. The ratio of the carbon monoxide to carbon dioxide is used as an indicator for the addition of excess steam to the process.~~

~~Vitrified Product Control~~

~~To control the quality of the final product, glass formers are added during the processing of wastes. The additives will adjust the molten glass product viscosity in the GASVIT™ process chamber. The glass former additives will include lime, silica, or pre-manufactured glass frit. The glass additives will be metered into the process chamber (GV-03-Y-0301) either through the batch feeder (GV-02-CG-0230) or the continuous solid feeder (GV-02-F-0226) in combination with gravimetric additive feeder (GV-02-F-0220). To determine the quantity of additives required, a glass sample will be obtained and analyzed for every vitrified glass drum (7.5 ft^3) collected during glass discharge operations.~~

~~Emissions Control~~

~~To ensure that the GASVIT™ system operates within the performance standards established by the permit, an AWFCO is designed to automatically shutdown the GASVIT™ feeders in the event a critical process parameter drifts outside the normal operating range. The anticipated permit conducting limits are given in Table D-5b37 in Attachment 3. The AWFCO controls integrates key instrumentation from the feed subsystem, process chamber subsystem, and syngas processing subsystems to initiate a single total feed shutdown to ensure GASVIT™ system permit compliance. AWFCO is implemented by a controller (YN-0100) which is housed inside the main PLC.~~

~~The process parameters that are alarmed and used as an inputs to the AWFCO controller are shown in Table D-5b36 of the DTP, Attachment 3. Under normal conditions, these parameters are kept within the specified operating range, the AWFCO controller is not activated; and waste feeding to the process chamber is permitted. In the event one of these critical parameters reaches the specified set point, the AWFCO controller will activate interlock logic that will stop the feeding process until the parameter returns to the normal operating range. Operator action is required to re-initiate feed flow to the system.~~

~~The automatic interlock will shutdown the feeding process for each of the three feed systems as follows:~~

1. ~~The control signal to the liquid feed solenoid FV-0216 will be interrupted, closing the valve and preventing liquid feeding.~~
2. ~~The control signal to the solids feed solenoid FV-0228 will also be interrupted, closing the valve and preventing solid feeding.~~

3. The close signal to the batch feeder charge chamber feed gates motor (HS-0232, HS-0242) will be initiated, closing the gates and preventing batch feeding.

Process Chamber AWFCO Events. Events generating inputs to the AWFCO are shown in Table D-5b36 in Attachment 3.

Syngas Converter. The syngas converter failure signal initiates a bypass of the syngas converter. This signal is initiated when any of the following set points are activated.

1. Low syngas converter operating temperature (less than 750° Fahrenheit)
2. Converter dilution fan low-flow rate
3. Syngas low flow rate
4. GVB confinement fan low flow rate
5. Other equipment and process safety parameters specified by the syngas converter vendor.

(c) Secondary Waste System

A1

The following monitoring features are provided for the secondary waste system.

1. **Evaporator vat temperature:** Temperature of concentrates in the vat is indicated at a local monitoring station.
2. **Evaporator vat level:** The level of concentrates in the vat is indicated at a local station.
3. **Density of waste in evaporator vat:** The density of concentrates in the vat is indicated at a local station.
4. **Concentrates drum level:** The level of concentrates in the concentrates drum is indicated at a local station.
5. **Level alarms:** High and low level signals from the evaporator vat and concentrates drum are alarmed at the local panel.
6. **Temperature alarms:** High and low temperature alarms are monitored at the local panel.

(5) Maintenance and Inspections

[WAC 173-303-80~~5~~6(4)(i)(i)~~, 805(i)(i)~~(B)]

~~Attachment 19 of this permit application contains the inspection requirements and schedules for the miscellaneous units described in this section. Additional hardware specific maintenance program will be implemented in accordance with the instructions in the operations and maintenance manuals which will be obtained for each equipment after it is purchased.~~The evaporators and associated ancillary equipment will be inspected for leaks or excessive corrosion on each operation day. The secondary containment for the evaporation system will be inspected daily for the presence of liquid accumulation.

D-12a-V. Closure to comply with WAC 173-303-680(2) and (3).

[WAC 173-303-80~~5~~6(4)(i)(i)~~, 805(i)(i)~~(C)]

Closure of the miscellaneous units described in this section (i.e. two evaporators) are addressed in ~~Section I and~~ Attachment ~~17~~HH of th~~is~~e permit ~~application~~.

D-12a-VI. Mitigative Design and Operating Standards

[WAC 173-303-~~805~~806(4)(i)(ii); 40 CFR 270.23(b)~~a)(2)~~]

The miscellaneous units described in this section have been designed and operate in a manner to reduce the risk of waste constituents to the environment. All units will be inside the ~~GVB~~MWTH, which will have concrete floors and curbs, steel stud walls, and a roof. This building will protect the units from precipitation, thereby precluding precipitation run-on and the potential for contaminated runoff.

Special features include a concrete slab with a concrete curb that has a chemical-resistant epoxy coating to prevent waste constituents from infiltrating the slab. ~~A HAZMAT enclosure (GVB room 4) is provided for the GASVIT™ system liquid feeder system (GV-02-1). All incoming liquid waste containers will be taken to the HAZMAT enclosure. Liquid will be transferred from the containers to the liquid feed tank when the HAZMAT enclosure is closed and a negative atmosphere is established inside the enclosure by the GVB confinement system. The HAZMAT enclosure has its own secondary containment which is sized to hold the entire volume of the GASVIT™ system liquid feed tank. The HAZMAT building is designed for storing wastes having ignitable or reactive hazards and has a fire~~

~~protection system that meets the codes and standards established by the National Fire Protection Association (NFPA), the National Electrical Codes (NEC) and the local, state and federal regulations.~~ The entire evaporation system including tanker truck/container unloading area is provided with aecondary containment. All compoonents of the evaporation system (i.e. tanks, evaporators, pumps, and piping) are inside the MWTH building which is under a negative pressure. Hazardous wastes to be processed in the evaporator system are aqueous in nature and particulate emissions will be negligible from the evaporation system.

~~Solid wastes repackaged in bags and cardboard canisters are surge stored in preparation for feed to the GASVIT™ process chamber. The surge storage areas (GVB room 3) has a monolith secondary containment structure which is provided by a sheet metal pan. Although, the area is used for storing material that have no free liquid, the monolith sheet metal structure ensures that any accidental liquid leached out of the solids will be contained in the pan and that it will not leak to underneath the building slab.~~

~~Likewise, catch pans are installed under the GASVIT™ process chamber, the syngas scrubbers, the scrubber bottom waste tank, the distillate storage tank and the evaporator vat. Each catch pan is designed to hold the entire volume of the liquid contained in the largest tank ,or equipment, placed on the pan. Portable secondary containment pallets are provided undue any liquid waste container or TIC during the in-process transport and liquid loading or unloading operations.~~

~~The metal pan under the GASVIT™ process chamber will collect any accidental spillage of molten glass. Air cooling lances and water lances are provided and installed near the process chamber area to assist the operators in mitigating a glass spill incident. The curbed concrete slab will provide secondary containment to collect any other accidental leakage of liquid waste or solid waste during the waste preparation and treatment operations. Furthermore, liquid waste containers will be placed on top of a portable catch pan or pallet with secondary containment during in-process transfer operations.~~

(1) Emission Control.

Emission to the environment from waste processing operations in ~~GVB~~ MWTH are minimized by providing a state-of-the art treatment technology. Furthermore, a double confinement air handling design is provided to virtually eliminate fugitive emission discharges and airborne contaminants from the ~~GVB~~MWTH. A summary of the air emission controls are discussed below.

~~**Minimizing GASVIT™ Emissions.** The GASVIT™ system utilizes a combined plasma torch and Joule electrical heating technique that produces synthesis gas (syngas) by gasifying organic compounds. The gas generated from the GASVIT™ reaction is approximately 5-8 times less than the conventional combustion process. The system minimizes emissions by several techniques including: 1) a high temperature zone in the process chamber ensures complete destruction of the organic contaminants in the waste; 2) an oxygen starved environment that minimizes production of toxic organics such as dioxins and furans, 3) a multi-stage filtration that removes any particulates and acidic gases that is contained in the syngas; 4) a syngas converter that oxidizes the syngas to the stable form of CO2 and water, 5) a final HEPA/charcoal filtration state that filters CO2 and H_2O gases prior to monitoring and release to the GVB stack; and, 6) an AWFCO logic that maintains the process within the parameters that ensures environmental compliance and shuts-down the process whenever a process parameter or important safety device is out of the range established by the RCRA/TSCA permit.~~

Minimizing Fugitive Emissions. Fugitive emissions generated during waste feed prep and secondary waste handling operations are minimized by treating them in the ~~GVB~~ MWTH ~~process vent~~confinement system. The system collects vent lines from ~~various~~ the evaporators~~process hoods and enclosures~~ where there is a potential for generating fugitive emissions. ~~The vent lines are first filtered, if necessary, to remove dust and particulate. After initial filtration, the vent lines are sent to a carbon filter bank to remove any organic vapor constituents. The exhaust from the carbon filters~~ Fugitive emissions are treated ~~for a second time~~ by sending it to the ~~GVB~~ MWTH confinement system which has a bank of filters encompassing a pre-filter, a HEPA filter and a charcoal filter.

~~The GVB process vent system provides for continuous and reliable removal of both organic vapors and mercury by using two carbon filter beds which are installed in series. The organic vapor removal effectiveness is monitored by an organic vapor meter (OVM) installed in series. The organic vapor removal effectiveness is monitored continuously by an OVM installed at the outlet of the first bed. The~~

~~mercury vapor removal effectiveness is also monitored continuously at the same location by a mercury sensor.~~

~~When bed breakthrough occurs, the carbon is replaced as follows: 1) first the spent carbon is unloaded from the bed and placed in a TIC, 22) fresh carbon is loaded into the bed, and 3) the order of flow through the beds is reversed. After reversing the order of flow through the vessels, the vent gas first flows through the carbon that had previously been in the downstream bed and then through the new carbon.~~

~~Bed breakthrough occurs when the rolling 24-hour average concentration of organic vapors is 20 ppm above the background level and mercury vapors are more than 0.04 mg/m^3 above background readings. This background level is established by measuring a four hour average of the OVM and mercury readings at the outlet of a freshly charged carbon bed. During this period, the process vent system is operating but all activities that generate organic and mercury vapors fed to the filter system are shut-down. Between carbon changeouts, the organic vapor and mercury monitoring instruments are zeroed by drawing building air through the monitors.~~

Minimizing Release of Airborne Contaminants In GVB. Uncontrolled release of airborne contaminants to the outside environment is prevented by the ~~GVB~~ MWTH confinement system (GV-~~0~~2~~2~~5). This system maintains the ~~GVB~~ MWTH air at a slightly negative pressure, with respect to the outside air, while providing a minimum of 7 air changes per hour. Due to this negative pressure, the air flow will be from outside to the inside of the building. The confinement system (see P&ID drawing 31001-P-0~~2~~92) has two 40,000 cubic feet per minute fans that collect the area vent from various intake louvers in the building. Each fan is rated for 60% of the minimum air changes required. The collected vent passes through a bank of pre-filters, a bank of HEPA filters and a bank of activated charcoal filters. This HEPA bank filters out 99.97% of both radioactive and non-radioactive particulates and the charcoal bank filters out organics vapors before discharging through the building vent to the atmosphere.

Comment [BN2]: OR 30,000?

Emission Monitoring. The confinement system exhaust is monitored by the ~~GVB~~ MWTH exhaust monitoring system (GV-25) before discharging to the environment. The system is equipped with radiation samplers and flow meters in accordance with the requirements established by the MWF Radioactive Material License issued by the Washington Department of Health. Furthermore, an area monitoring system (GV-28), provides radiation air sampling stations at strategic locations in

~~GVB~~MWTH. Other monitors are also provided to detect and alarm the presence of combustible CO and/or H_2S gases in the work area.

The MWTH confinement system provides for continuous and reliable removal of organic vapors by using two carbon filter beds which are installed in series. The organic vapor removal effectiveness is monitored by an organic vapor meter (OVM) installed in series. The organic vapor removal effectiveness is monitored continuously by an OVM installed at the outlet of the first bed.

When bed breakthrough occurs, the carbon is replaced as follows: 1) first the spent carbon is unloaded from the bed and placed in a TIC, 22) fresh carbon is loaded into the bed, and 3) the order of flow through the beds is reversed. After reversing the order of flow through the vessels, the vent gas first flows through the carbon that had previously been in the downstream bed and then through the new carbon.

Bed breakthrough occurs when the rolling 24-hour average concentration of organic vapors is 20 ppm above the background level readings. This background level is established by measuring a four hour average of the OVM readings at the outlet of a freshly charged carbon bed. During this period, the confinement system is operating but all activities that generate organic vapors fed to the filter system are shut-down. Between carbon changeouts, the organic vapor monitoring instruments are zeroed by drawing building air through the monitors.

(2) Minimizing Risk to Environment From Fire or Explosion.

Several safety features are included in the design of the ~~GVB~~ MWTH miscellaneous units in order to prevent waste constituents from entering the environment from an accidental fire or explosion. These features are described below.

~~**Preventing Over-Pressure in GASVIT™ Process Chamber.** Over-pressurization in the GASVIT™ process chamber due to a pre-mature oxidation of syngas is minimized by designing safety features that eliminates leakage of large volumes of air into the process chamber. The chamber will be designed and constructed to be leak-tight and, although the process chamber is not a pressure vessel, the chamber housing will be designed to withstand a pressure of up to 15 PSI . A pressure relief device will be provided and installed on the process chamber to mitigate events involving a gradual increase of pressure. The process chamber solid waste charging lines will have an airlock that will be purged with nitrogen~~

~~during feed cycles. Oxygen monitors will be provided to ensure that the oxygen level in the airlock vent line is below a safe limit before the air-lock gate is allowed to be opened to feed waste to the chamber. The liquid feed tank will be inerted by nitrogen gas to eliminate accidental introduction of oxygen through the liquid feed line. Introduction of air through the steam feed line will be eliminated by monitoring steam in the line through a pressure sensing device and providing alarms for the operator to mitigate a low steam pressure event.~~

~~**Preventing Over-pressurization in Syngas Process Train**. Risk of accidental over-pressurization in the GASVIT™ syngas processing lines will be minimized by the following design features: 1) the syngas will be converted to water and carbon dioxide in a flameless oxidation reaction process accomplished by keeping the concentration of syngas concentration to below its low flammability limit (LFL); 2) if the air supply to the converter drops below a low flow set point, the control system will automatically cut-off the flow of syngas to the converter and route the syngas through a bypass line, thus, preventing a potential build-up of syngas in the converter at concentrations that could initiate burning of the syngas; 3) accidental flow of flame from converter to the scrubbers section is eliminated by designing the pipe sizes such that the velocity of syngas in the ID fan discharge line is above the fuel flame velocity; 4) to further prevent the travel of a flame front from the converter to the scrubber section, a seal pot and a flame arrestor will be installed at the syngas inlet to the converter; 5) one or more oxygen sensors will be installed in the scrubber section; 6) the scrubber section will be designed, constructed and tested to be leak tight; and 7) deflagration venting panels will be installed at the HEPA filter housing to safely relief gases generated by an over-pressurization event.~~

Preventing Over-pressurization in the Evaporator ~~Vat~~Tank. The ~~secondary waste system~~ evaporator ~~vat~~ is ~~provided with a pressure relieve valve which relives steam to the building confinement ducts if the pressure exceeds above 15 PSI.~~equipped with a readout on the operator interface panel of differential pressure measurement across the mist eliminator pad. When this differential pressure exceeds the set point entered into the PLC, the evaporation process is shut off.

Fire Detection and Prevention. Combustible solids and liquids are stored in areas away from an ignition source. ~~GVB~~ MWTH is divided into several fire protection zones including: 1) ~~GASVIT™ Unit A area~~MWTH (~~GVB~~MWT-0 ~~rooms~~ 1~~, and 3)~~, ~~GASVIT™ Unit B area (GVB room~~MWT-02~~)~~, ~~HAZMAT enclosure (GVB room~~MWT-403~~)~~, ~~electrical room (GVB room 5),~~ (ventilation room) ~~(GVB room 6) and GVB control room (GVB room 7~~MWT-04). Spread of the fire from one zone to another is minimized by

providing a fire wall between each zone. Fire extinguishers, smoke detectors, fire alarms and a central fire alarm panel are provided to effectively combat and minimize the impact of an accidental fire.

(3) Minimizing Corrosion

The construction materials for piping, pumps, filter housing, and ancillary equipment will all be compatible with the waste type to be processed. As a further protection of equipment against undue corrosion, an administrative control is established (see WAP in Attachment 1) to verify the compatibility of the equipment materials of construction with the waste stream to be processed before any such a waste stream is fed to the evaporation system process unit.

(4) Administrative Controls

Aside from the design features described above that will prevent waste constituents from entering the environment, administrative measures will be implemented to reduce the risk of exposing personnel or the environment to dangerous waste contaminants. These measures include:

1. Confirmation inspection of the waste prior to processing (~~see~~ WAP~~, Attachment 1~~).

2. Containers will be ~~capped~~ closed at all times. When needed for inspection or material transfer, the containers will be opened while located inside an enclosure or under a hood ventilated by the GVB process vent system.

Comment [BN3]: Ask Richard.

3. Piping system will be hydrostatically tested to ensure that there are no leaks (upon installation of system and after replacing piping).

4. ~~Catch pans under~~Secondary containment four the miscellaneous units will be emptied or cleaned up within 24 hours ~~when leaks occur~~of leak detection.

5. Key parameters in the ~~process units~~evaporators and trouble alarms at the operator interface panel~~GVB main process control panel~~ will be routinely monitored when evaporation process is conducted.

6. The equipment and processing areas will be visually monitored at least once ~~every shift~~per day.

7. Processing areas will be visually examined and cleaned to remove any loose solids and debris spills near the equipment at least once daily.

8. Wastewaters processed through the evaporation process will have the following limitations:
   - No TSCA-regulated PCB wastes
   - No wastewater with pH ≤ 2 or a pH ≥ 12.5
   - No reactive waste
   - No waste with ≥ 10% by weight VOCs
   - ~~7.~~ No waste with a flashpoint ≤ 100°F

Formatted: List Paragraph, Line spacing: single, No bullets or numbering

Formatted: Bulleted + Level: 1 + Aligned at: 1" + Indent at: 1.25"

During waste processing operations, operating personnel in the ~~GVB~~ MWTH are required to wear ~~at~~ a minimum Level E protective clothing. (More detailed descriptions of Level E protective clothing are provided in Attachment 14.)

Comment [BN4]: Confirm.

~~Prior to shutdown of the systems following their use, rinse solutions will be fed through the system to flush the lines, hoses, and equipment of any residual waste. This will minimize the chance of spillage of waste during shutdown.~~

D-12B ENVIRONMENTAL PERFORMANCE STANDARDS FOR MISCELLANEOUS UNITS

[WAC 173-303-80~~5~~6(i)(ii); 40 CFR 264.601, 270.23(c)]

The ~~GVB~~ MWTH miscellaneous units (i.e. two evaporators) are located, designed, and operated in a manner to preclude the release of dangerous waste constituents that may have adverse effects on human health or the environment. The following sections describe the potential pathways of waste constituent release, the potential impact of such releases, and the features that minimize potential risks. Information on the design of and operating description of these units is also given to demonstrate that there is no potential risk for a release of wastes to the environment during treatment.

Section D-12b-I addresses the wastes treated at the ~~GVB~~ miscellaneous treatment units. Section D-12b-II addresses the secondary containment systems for the ~~STB~~ miscellaneous units. Section D-12b-III describes air quality at and around the MWF site in Richland, Washington. Section D-12b-IV addresses

the prevention of air emissions. Section D-12b-V describes how the topography and seismology affects the design of the site to minimize releases to the environment. Section D-12b VI addresses the hydrologic conditions for the MWF site in Richland, WA ~~site~~. Prevention of surface and groundwater contamination is addressed in Sections D-12b VII. The impact of site operations on plant and animals are discussed in Section D-12b VIII. The land uses for the area surrounding the MWF are discussed in Section D-12b IX. The potential for waste constituents to migrate from the miscellaneous treatment units and the potential human and environmental health risks are discussed in Sections D-12b X and D-12c, respectively.

D-12b ~~1~~ I ~~STB~~MWTH Miscellaneous Unit Wastes

[WAC 173-303-80~~5~~6(4)(i)(ii); 40 CFR 264.601(a)(1), 264.601(b)(1), 264.601(c)(1)]

~~Description of waste processed by the miscellaneous units in GVB are given in the WAP, Attachment 1.~~Liquid wastes to be evaporated in the evaporation units are radioactive aquesou solutions containing dissolved inorganic salts such as potassium, sodium, aluminum nitrites, chlorides, and hydroxides. The mixed wastre for evaporation may have detectable levels of metals such as lead, chromium, and cadmium. Small quantities of organics may also be present. Waste codes potentially applicalb to these wastewaters are: D004, D005, D007 through D011, F001 through F005, F039, and U210.

D-12b-II Containment System

[WAC 173-303-80~~5~~6(4)(i)(ii); 40 CFR 264.601(b)(2), 270.23(a)(2)]

(1) General Description

~~GVB~~ MWTH secondary containment for the miscellaneous units will be provided by a base comprised of ~~the curbed and sloped~~a concrete floor with a continuous curb. ~~Additional catch pans will be provided for the HAZMAT enclosure, tanks and equipment that handle liquid wastes. The catch pans are located above the GVB base. Therefore, for many equipment and containers, a triple containment system has been provided.~~

There will be no openings in the ~~GVB~~ MWTH secondary containment curbs on any sides of the building. Where there is a personnel entrance to the ~~GVB~~MWTH, there will be either a ramp or step from the ~~GVB~~ floor to allow exit from the door or entryways. Entries and roll-up doors for material handling equipment

will have sloped ramps that allow carts and fork lift trucks to cross the curb at the given door or entryway.

The area around the building ~~will be~~is graded and paved to promote drainage away from the building (see grading drawings in Attachment ~~7~~RR). This will protect the miscellaneous units in ~~GVB~~ the MWTH building from precipitation and its associated run-on and, therefore, will not generate runoff.

The floor of the ~~GVB~~ MWTH is constructed entirely of concrete. Structural adequacy of the foundation is addressed in calculations included in Attachment 13.

Chemical-resistant water-stops made of polyvinyl chloride or rubber are used underneath all construction joints. Joints are sealed with a heat-resistant silicone sealant, and the floor will be sealed with an epoxy coating to prevent infiltration of any waste that may be released (see Attachment ~~7~~RR, Construction Drawings).

The ~~GVB~~ MWTH floor will be prepared with a chemical resistant coating as described in ~~Section D-1 of this permit application~~Attachment XX of the permit..

The ~~GVB~~ floor is divided into several rectangular section and each sections will be sloped to the center of the rectangle leading to a 2-ft by 2-ft square flat area. In the event of an accidental spill, or a floor washings, the liquids flow to this flat square area in the center of the rectangle. The operators, wearing appropriate protective clothing will use a vacuum pump to remove the liquids from this area. Any spilled solid waste will be removed by a vacuum cleaner manually by personnel wearing appropriate protective clothing.

The design and construction of the sealed concrete floor preclude the chance of hazardous wastes or chemical constituents from migrating to surface water, soil, or groundwater. A description of the design of the secondary containment system for the ~~individual~~ evaporation system~~s~~ and staging areas in the ~~GVB~~ MWTH are presented in ~~Section D-1~~Attachment RR.

~~As described in Section D-1, t~~The ~~GVB~~ MWTH secondary containment system will be able to contain more than the volume of the largest treatment unit (or tank) or 10% of the combined liquids in containers

that are in staging, storage or in-process mode and the liquids that are contained in the tanks and other treatment enclosures.

D-12b III **Site Air Conditions**

[WAC 173-303-80~~5~~6(4)(i)(i), 805(i)(ii); 40 CFR 264.601(c)(4), 264.601(c)(5), 270.23(b)]

Formatted: Tab stops: 0", Left

The atmospheric meteorological features that affect air near the MWF are presented in Section D-11b-III. Discussed here are the sources of potential contamination, including their cumulative impacts on the air quality. Note that operations at the ~~GVB~~ MWTH miscellaneous units involve: 1) feeding liquids 2) samplorting, ~~repackaging and feeding solid waste~~ 3) ~~gasification and vitrification and 4)~~ liquid waste evaporation. Fugitive particulate emissions will be negligible since wastestreams managed in the evaporation system are aqueous. Small amounts of VOC which may be present in the evaporator exhaust will be controlled ~~including particulate and low-volatile organic compounds generated from these operations are treated~~ by particulate filtration and carbon filters (GV-22). ~~The GASVIT™ system byproduct, syngas, is filtered and converted to a stable form of water and carbon dioxide.~~

D-12b IV **Prevention of Air Emissions**

[WAC 173-303-80~~5~~6(4)(i)(i), 805(i)(ii), 40 CFR 264.601(c)(2), 270.23(a)(2)~~; OAR 340-104-001, 340-105-014~~]

Emissions from ~~GVB~~ MWTH will be minimized by ~~providing: 1) a syngas processing system, 2)~~ GVB ~~process vent system, and 3) a GVB~~MWTH confinement system. The~~se~~ emission control systems are described below:

Formatted: Underline

~~The GASVIT™ byproduct, a syngas, will be cleaned by a three stage filtration system to remove metal vapor and acid gas impurities. The first processing stage is a high temperature filter. This filter takes out solid particulates leaving the process chamber. The second stage consists of a scrubbing train, a mist eliminator and primary HEPA filter banks. This train removes acid gases, metal vapors and particulates and discharges the purified gas into the third stage syngas processing subsystem. The third stage converts the syngas into a stable form of water and carbon dioxide and filters any remaining particulates. The third stage consists of a syngas converter and a final HEPA/charcoal filter train. The exhaust from the third stage is released to the atmosphere.~~

~~The process vent system is a two-stage fugitive emission and particulate treatment unit that would filter out virtually all of the particulates and fugitive organic vapors generated during GVB miscellaneous unit operations.~~ The emissions will be ~~first~~ filtered for particulates and organic vapors in the GVB process vent system (GV-09) and filtered for a second time by the HEPA and charcoal filters in the GVB confinement system (GV-22). After carbon filtration the gases would be discharged via the building stack with the building ventilation exhausts. ~~The confinement systems will remove particulates from the exhaust stream to a level less than 0.08 grains per dry standard cubic foot (or the level specified in the CAA permit, whichever is smallest). Similar systems are provided for the STB, the adjacent building, which is described in Section D-11.~~

The ~~combined~~ air pollutant emissions estimates from ~~STB and GVB~~the evaporation process were developed and preliminary air dispersion modeling was performed to analyze air quality impacts from treating ~~LLMW at the PEcoS MWF~~the wastewater.. Results of these preliminary analysis and discussions are presented in ~~Section D-11b-IV~~the air construction permit application. ~~As indicated in Section D-11b-IV, t~~The modeling results show no exceedance of Federal or State air quality standards for criteria pollutants, hazardous air pollutants, or radionuclides.

D-12b V Topography and Seismology

As described in Section D-11b-V, the MWF is designed to mitigate the impact of site topography and seismology.

D-12bVI Site Hydrologic Conditions

[40 CFR 264.601(a)(2), 264.601(a)(3), 264.601(a)(4), 264.601(b)(3), 264.601(b)(5), 270.23(b)]

(1) Surface Water

There are no natural perennial surface water bodies within 152 m (500ft) of the MWF. The principal river systems within the region surrounding the MWF Site include the Columbia and the Yakima rivers; however, the MWF Site is not within designated 100-year or 500-year floodplains of either river system

~~(PEcoS 1995)~~. A small intermittent surface stream is located about 0.8 km (0.5 mi) west of the MWF Site.

(2) Groundwater

As indicated in Section D-11b VI, the MWF Site is not over a sole source aquifer, as defined in the Safe Drinking Water Act, and is not located in a groundwater management area. No public or private domestic water supply wells are known to exist within 152 m (500 ft) of or downgradient of the MWF Site.

D-12b VII Preventing Surface and Groundwater Contamination.

Site Drainage

As described in Section D-11b VII, the MWF is designed such that little or no surface water runoff leaves the MWF Site.

Leakage and Spill Controls

All evaporation waste handling, storage, and treatment is in areas of the facility within ~~GVB~~MWTH. The ~~GVB~~ base of the building consists of a secondary spill containment system to prevent leaks and spills of waste until the accumulated materials are detected and removed, preventing releases to the environment that could potentially impact groundwater. Based on this system and the distance from the surface of the facility to the water-table, the risk of dangerous waste contaminants entering the groundwater is extremely low.

To prevent groundwater contamination during tanker truck off-loading and onsite transportation of liquid containers, administrative controls are established to limit the material handling equipment travel to the concrete passageways only. The passageways are sloped to a series of ~~interconnected collection sumps~~low points located in the center of the passageway. ~~When a liquid container off-loading or onsite transportation operation is planned, the operators isolate the sumps by closing the drainage line shut-off valve and pumping out any residual storm water remaining in the sumps.~~ The isolated sumps become a secondary containment system ~~in the yard~~. In the event of a liquid spill accident, the spilled liquids will

flow to these ~~sumps~~ low points and will be contained ~~in the sump system~~. The operators will then be able to retrieve the spilled liquids and clean the ~~sump~~the floor. This design will prevent releases to the environment that could potentially impact groundwater from an accident during truck off-loading operations.

Runoff/Run-on Controls

The MWF ~~will be~~is located on a high topographic setting and the local relief is such that the MWF will easily shed surface runoff to the west and south. The site has been designed to accommodate the 25-year, 24-hour precipitation event. In addition, there is no flood threat to the MWF from local ponding.

Contamination of surface water in the vicinity of the MWF Site is precluded by the location and design of the MWF buildings and the yard. First, MWF is not near any lakes, rivers, streams, or wetlands, and natural drainage is away from the buildings within the MWF. For these reasons, contact between the waste treated at MWF and surface water is unlikely. Secondly, the waste will be processed in an enclosed treatment system inside the buildings, and the treated wastes will be collected in containers and stored before shipment to offsite facilities for disposal, all of which precludes contact between the waste and any run-on/runoff.

D-12b VIII. Plants and Animals

As indicated in Section D-11b VIII, no threatened or endangered plant or animal species are known to exist or are suspected to be present on the MWF Site. Vegetation on the MWF Site includes shrubs and a variety of wild mustards and sagebrush plants sparsely scattered throughout the site. Site vegetation is dominated by non-native weeds, including Russian thistle. ~~Approximately 5 acres of previously disturbed land with minimal value as wildlife habitat would be disturbed during construction of the facility.~~ Because there is no surface water in the immediate vicinity of the MWF Site, there would be no impacts to aquatic species.

D-12b IX Area Land Use

[40 CFR 264.601(a)(6), 264.601(b)(9), 270.23(b)]

MWF Site is located in an industrial area in the northern portion of the City of Richland. Most developed land in the surrounding area is used for agriculture, light industry, or residences. The area to the north of the site is the DOE Hanford site.

The nearest neighbors to the MWF is PFNW-R~~EcoS~~' Low-Level Waste Processing Facility ~~which is~~ adjacent to the MWF and the ~~Siemens Power Corporation Facility~~Areva which is approximately 0.64 km (0.4 ~~ml~~mi.) to the north~~west~~; Central Washington Corn Processing, Inc. ~~farm~~ is located on the south ~~and west sides~~ of the site; Ferguson Distribution Center ~~the Richland Industrial Park~~ is to the ~~north~~west; the WCH – Sample Storage/Shipping Facility is located directly to the each; the Richland Disposal Site and Horn Rapids ~~Off~~ R~~oad~~ V~~ehicle~~ Park is approximately 3.86 km (2.4 mi~~l~~.) to the northwest; and the PNNL complex is located 1.6 km (1 ml.) to the northeast of the site. The nearest residential dwellings are located in North Richland and are approximately 2.7 km (1.7 mi) to the southeast and there is a child care center located 2 km (1.25 mi) to the east-south east.

Comment [BN5]: Craig has map.

D-12b X Preventing Migration of Waste Constituents
[40 CFR 264.601(a)(7), 270.23(c)]

The potential for release of waste constituents from ~~GVB~~ the MWTH miscellaneous units into subsurface physical structures, the environment, or the root zone of food chain crops or other vegetation is minimal. All waste treatment operations will be performed inside ~~GVB~~ the MWTH and ~~will be confined by enclosures, tanks and treatment chambers~~are performed in closed systems. The waste will be inspected and sampled, if needed, to confirm that it will be compatible with these miscellaneous systems. This will mitigate the potential for a waste release to inside the building caused by deterioration of the primary containment system. The ~~GVB~~ MWTH will have features to minimize fire and explosion in the building.

Should a spill or leak occur from the miscellaneous unit equipment, the released waste would be contained inside the ~~GVB~~MWTH secondary containment system. The containment system will provide adequate containment volume, as described in ~~Section D-1~~Attachment QQ. Operations personnel will regularly inspect the secondary containment during normal operations and storage containers, so if a spill were to occur, they would readily detected and mitigated in accordance with the Contingency Plan as described in Attachment ~~15~~GG.

Since spills that may occur in the ~~GVB~~ MWTH will be contained within an enclosed structure, the released waste will be prevented from coming into contact with soil, thus precluding migration of contaminants in to the subsurface or groundwater.

The ~~GVB~~ MWTH will be an enclosed building that ~~will~~ prevents run-on and precipitation from contacting the equipment and generating contaminated runoff.

D-12C EVALUATION OF RISK TO HUMAN HEALTH AND THE ENVIRONMENT

[WAC-173-303-~~805~~ 806(4) (i)(iii); 40 CFR 264.601(a)(8), 264.601(a)(9), 264.601(b)(10), 264.601(b)(11),264.601(c)(6), 264.601(c)(7), 270.23(c)]

The following paragraphs present a general evaluation of risks to human health and the environment associated with release of waste constituents from the ~~GVB~~ MWTH miscellaneous units. The focus of this assessment is potential risks to human health, domestic animals, wildlife, and crops and vegetation surrounding MWF as well as physical structures of the facility itself. A ~~more detailed~~ health risk assessment ~~i~~was ~~being~~ prepared ~~by~~for PFNW-R~~EcoS~~ that ~~will~~ addresses the STB and MWTH (formerly GVB) miscellaneous units (See Attachment 4 - Risk Assessment Plan).

In general terms, a risk assessment examines the potential for adverse or unwanted effects. Adverse effects can only occur following exposure to inherently toxic or hazardous materials. Previous sections have examined the potential for release of waste constituents from the ~~GVB~~ MWTH miscellaneous units and its associated confinement systems. This section evaluates this information and the potential for exposure of human and non-human receptors to hazardous materials.

As discussed in Section D-12b IX, the region surrounding the MWF consists primarily industrial and agricultural lands and is sparsely populated. The facility is more that 500 ft of any residential or public gathering place. The City of Richland residential community is within 1.7 miles of the facility. A day care center is located within 1.25 mile of the facility. The facility is more than 200 ft away from any public road (Battelle Blvd.).

Section D-12b X evaluated the potential for release of waste constituents from the ~~GVB~~ MWTH to environmental media surrounding the MWF. Based on analyses presented, no release of solid or liquid waste constituents to the environment is anticipated. As noted in that section:

- The miscellaneous units will be located within ~~GVB~~MWTH, a fully enclosed, contained and confined structure. The structure will be constructed to ensure containment of any unanticipated solid or liquid waste release. Any leaks that might occur will be contained within ~~GVB~~ MWTH building and adjacent secondary containmetn~~and catch pans~~. There will be no discharge or release of waste constituents to soil, surface water, or groundwater.

- Incoming and outgoing wastes will be in DOT approved containers. During off-loading and loading by fork-lift, the containers will be transported above concrete pads which are sloped to collection sumps. Any spills during loading and unloading will be collected by these sumps. There will be no discharge or release of waste constituents to soil, surface water, or groundwater.

Given this information, no exposure of human or non-human receptors to liquid and solid waste from the normal operation of the ~~GVB~~ MWTH miscellaneous units is anticipated. Therefore, there would be no risk of adverse effects to offset receptors associated with generation or handling of the wastes. Physical damage to the structural components of the MWTH~~GVB~~ is very unlikely.

No wastes that pose an inherent physical threat to the MWTH~~GVB~~ or a safety hazard for the operators are processed through the MWF.

Wastes that are incompatible with the MWTH~~GVB~~ miscellaneous units, containers, or piping are not be accepted.

Fugitive and particulate emissions from normal operation of the MWTH~~GVB~~ miscellaneous units are collected and treated by ~~a two-step filtration process: GVB process vent system and~~the MWTH~~GVB~~ confinement system. The ~~two~~ system is ~~are~~ designed to remove particulate matter and organic vapors from the vent streams. After the particulate matter and organic vapors are removed, the vent stream will be released to the atmosphere.

~~The gasification and vitrification byproduct, syngas, is treated to remove particulate and acid gases. The purified gas is converted to the stable form of water and oxygen. The exhaust from the converter is filtered in the GVB confinement system by the building HEPA and carbon filter banks and is released to the atmosphere.~~

The resultant effluent gases from the evaporators will contain some residual particulate matter along with small quantities of organic vapors and metals ~~(see Attachment 4). The STB miscellaneous units have been designed to ensure compliance with the requirements of the RCRA regulations and the CAA permit. No adverse impacts to human health or the environment are projected to be associated with release of waste constituents to the atmosphere from the MWF~~.

D-12D DEMONSTRATION TEST PLAN

[WAC-173-303-~~805~~ 806(4) (i)(iv)]

~~The commercial operation of the GASVIT™ system is subject to demonstration of its performance effectiveness according to the Demonstration Test Plan, Attachment 3.~~ A demonstration test plan will be provided to the agency before the evaporation of mixed wastewater is processed in the evaporation system (TP-16).

Table D-12-1 ~~GVB~~ MWTH Miscellaneous Units

System Name	Equipment Classified as Miscellaneous Unit Under *WAC 303-680, Miscellaneous Units*
Systems in Treatment Line 500	
~~Feed Prep~~Evaporation System (TP~~GV-~~016)	~~Shredder, sorting box, sorting table~~Two identical evaporators and accessories See PFD drawing 31001-P-050
~~GASVIT™ System Unit A (GV-02 to GV-08 and GV-10)~~	~~Continuous feeders, (GV-02-2), batch feeders (GV-02-3), flux feeder (GV-02-4), process chamber (GV-03), product handling (GV-04), First stage syngas processing (GV-05), Second stage syngas processing (GV-06), third stage syngas processing (GV-07) Syngas sampling for process control (GV-08), GASVIT™ main process controls (GV-10). See PFD drawings 31001-P-051 to 053~~
~~GASVIT™ System Unit B (GV-02B to GV-08B and GV-10B)~~	~~Same as Unit A~~
~~Secondary Waste System (GV-11)~~	~~Evaporator~~ ~~See PFD drawing 31001-P-054~~

A1

TABLE D-12-2 Materials of Construction and Dimensions of the Units

STB Misc Unit Description	Material of Construction	Dimension
~~Feed Prep~~Evaporation System ~~(GV~~TP-~~0~~16) (PFD: 31001-P-050)		
~~Shredder feed conveyor~~Two evaporators	Carbon steel	~~3'~~ 82' W x 14~~5~~6' L x 11~~07~~' H
~~Shredder~~Four storage tanks	~~Carbon steel~~HDPE	~~4' W x 6' L x 7' H~~TBD
~~Sorting table~~Sludge/Residue storage tank	~~Carbon~~ Stainless steel	~~8'~~ 7' ~~Ø~~ D x ~~5'~~ 11' H
~~sorting box~~	~~Carbon steel~~	~~3' W x 10' L x 7' H~~
~~**GASVIT™ System (GV-02 to GV-08 & GV-10) (PFD 31001-P-051 to 053)**~~		
~~Liquid feeder tank, pump and piping~~	~~Stainless steel~~	~~8' W x 17" L: x 10' H~~
~~Continuous feeders, (GV-02-2)~~	~~Carbon steel~~	~~4' W x 7' L x 8' H~~
~~Batch feeders (GV-02-3),~~	~~Stainless steel~~	~~2" Diam. x 4' H~~
~~Flux feeder (GV-02-4),~~	~~Carbon steel~~	~~1.5' W x 3' L x 3' H~~
~~Process chamber (GV-03) Housing~~	~~Stainless steel~~	~~8' Diam. x 16' H~~
~~Product handling (GV-04),~~	~~Carbon steel/stainless steel~~	~~5' Diam. x 7' H~~
~~Thermal residence chamber Housing~~		~~4.5' Diam. x 10' H~~
~~Ducting from process chamber to high temperature filter~~	~~Stainless steel/refractory lined~~	~~6" and 4" Diam.~~
~~1st stage syngas handling (GV-05) filter (high temperature filter)~~	~~Note 1~~	~~Note 1~~
~~2nd stage syngas handling scrubbers~~	~~Note 1~~	~~Note 1~~
~~2nd stage scrubber piping system & pumps~~	~~Note 1~~	~~Note 1~~
~~Scrubber gas outlet ducts~~	~~Stainless steel~~	~~6' Diam.~~
~~High efficiency mist eliminator~~	~~Stainless steel~~	~~Note 1~~
~~HEPA filters~~	~~Stainless steel~~	~~2.5' W x 4' L x 2.5' H~~
~~ID fans~~	~~Note 1~~	~~Note 1~~
~~Third stage syngas processing~~	~~Carbon steel~~	~~8' WS x 25' L x 12' H~~
~~Syngas converter air fan~~	~~Carbon steel~~	~~2.5' W x 5' L x 4' H~~

Comment [BN6]: Will be completed w/ Class I PM

~~TABLE D-12-2 Materials of Construction and Dimensions of the Units~~
~~(continued)~~

~~STB Misc Unit Description~~	~~Material of Construction~~	~~Dimension~~
~~Secondary Waste Ssytem (GV-11) (PFD 31001-P-054)~~		
~~Evaporator~~	~~Stainless steel~~	~~5' W x 20' L x 6'H~~

A1

Formatted: Normal, Space Before: 0 pt

~~Note 1. Material of construction will be selected after purchasing the equipment and will be suitable for the acid gases and the corrosion environment of the process. Size will also be available after equipment is purchased.~~