Closure Plan

City of Harrisonburg Resource Recovery Facility

1630 Driver Drive
Harrisonburg, Virginia 22801

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1. Introduction and Background

1.1 Introduction

The Harrisonburg Resource Recovery Facility (hereinafter referred to as the “RRF” or “Facility” or “Site”) is owned and operated by the City of Harrisonburg (the “City”), Department of Public Works. The RRF, located at 1630 Driver Drive, is a waste-to-energy plant that previously combusted municipal solid waste (MSW) in order to create steam for heating and cooling of the nearby James Madison University (JMU) campus. In addition to providing steam, the RRF served to reduce the volume of solid waste requiring disposal in the local municipal landfill. The RRF opened in1982 and has been in nearly continuous use, receiving up to 200 tons per day of MSW produced by the City, Rockingham County and other municipalities in the Shenandoah Valley of Virginia. In May 2014, the RRF shut down one of its two municipal waste combustion units (MWCUs), referred to as MWCU-2. On June 7, 2014, the RRF started diverting refuse from the facility and on June 15, 2014, the RRF processed the final quantity of MSW accumulated on site and officially shut down combustion operations of MWCU-1.

1.2 Purpose

The Facility is currently permitted under Permit-By-Rule (PBR) No. 513. This permit, issued on August 31, 2004, superseded and replaced in whole the original PBR No. 507 which was issued on March 29, 2004, and the former Solid Waste Permit No. 390 issued on October 29, 1982. A Facility Closure Plan (the “Plan”) was submitted to the Virginia Department of Environmental Quality (VDEQ) on June 25, 2004 pursuant to the requirements of PBR No. 507 and the Virginia regulatory closure requirements as set forth in 9 VAC 20-81-360. The Plan was written under the assumption that the RRF would be closed in place for future use by another tenant; however, the City is now planning on decommissioning and partial demolition of the RRF, and selling the Site to James Madison University (JMU). As a result, the Plan is herein amended to reflect this change in end-use of the facility and to fully document procedures necessary to remove or decontaminate waste residues from equipment and structures.

In addition, while the City no longer intends to operate the Facility as a waste-to-energy plant, it has future plans to potentially use the waste receiving portion of the Facility (i.e. the tipping floor area) as a transfer station for the temporary storage of MSW. An application was submitted to the VDEQ on April 15, 2015 requesting a solid waste transfer station permit for the affected portions of the Facility. Therefore, the schedule for closure activities in the waste receiving area, including the truck scales, has been amended to reflect its continued use as a solid waste transfer station. Final closure of the waste receiving area and truck scales will be completed following closure of the solid waste transfer station using the procedures outlined in this Plan. A two-phased approach (i.e. closure of the waste-to-energy plant first, followed by the waste receiving area and truck scales at a later date) eliminates redundant cleaning efforts.

The provisions in this Plan are designed to meet the objectives of “clean closure”, whereby the following are achieved:

- Control, minimization, or elimination, to the extent necessary to protect human health and the environment; the post-closure escape of uncontrolled leachate, surface runoff, or waste decomposition products to the groundwater, surface water, or to the atmosphere;
- Minimization or elimination of post closure care and/or maintenance; and
- Full regulatory closure in accordance with VDEQ closure requirements (9 VAC 20-81-360).

Final closure of the RRF will be accomplished by (1) removing remaining waste inventory (MSW and waste ash); (2) characterizing waste residues to determine proper handling and disposal methods; (3) removing and/or decontaminating equipment, ductwork, building structures, or other materials containing or contaminated with waste residues; (4) review and certification by a registered professional engineer that the closure was completed in accordance with the approved Plan, and (5) obtaining VDEQ final approval of closure.

Note that final closure of the Facility will take place in two phases. The first phase will include closure of the waste-to-energy plant, excluding the waste receiving area/truck scales. Closure of the waste receiving area, which the City intends to temporarily use as a solid waste transfer station, and closure of the truck scales will occur at a later date, thereby constituting the second and final phase of closure. The City will seek final approval from VDEQ for each phase of the closure by submitting a separate certification letter at the completion of each phase. Details are presented in the following sections.

2. Facility Description

2.1 Location

The RFF is located adjacent to the eastern campus of JMU and is accessed via Driver Drive off of University Boulevard in the City of Harrisonburg, Virginia. The general location of the Facility and the physiographic features of the surrounding area are shown in Figure 1, developed from the United States Geological Survey (USGS) 7.5-minute quadrangle for Harrisonburg, Virginia, dated 2002.

2.2 Topography and Hydrology

The Facility is located at approximately 1,368 feet above mean sea level (AMSL) and generally slopes to the north and northwest. Based on visual observations and topographic map review, the closest surface water bodies to the Facility are two stormwater retention ponds, which are located to the northeast of the Site. There is also an intermittent stream located just north of the Facility's property boundary.

2.3 Geology and Hydrogeology

The geology beneath the Site is typically of the Paleozoic Era and the Ordovician Series. Bedrock is primarily composed of limestone and dolostone of the Beekmantown Formation. According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) web soil survey data, the majority of surface soils in the vicinity of the Site are generally comprised of Frederick and Timberville soils. Both soils are classified as well-drained silt loams with moderate infiltration rates.

Groundwater flow direction can be highly variable, due to the nature of karst or cavernous geology that is associated with limestone areas. Based on surface topography, groundwater is inferred to flow towards north and northwest. It is important to note that groundwater flow direction can be influenced locally and regionally by the presence of local wetland features, surface topography, recharge and discharge areas, horizontal and vertical inconsistencies in the types and location of subsurface soils, and proximity to water pumping wells.

2.4 Public Utilities

Municipal water and sewer services provide potable water and sanitary wastewater disposal for the Facility. There are no drinking water wells or on-site drain fields located at the property.

2.5 General Site Description

The Resource Recovery Facility consists of three detached buildings occupying a 3.3-acre parcel. These buildings include the Waste-to-Energy/CISAT Building, the Administration Building, and the Maintenance Shop/Fuel Oil Storage/Air Compressor Building. All of the solid waste management activities at the Facility are associated with the Waste-to-Energy Plant Building. The majority of the Facility is covered with impermeable surfaces (e.g. buildings, asphalt, and concrete slabs).

The Administration Building is the smallest building, separated from Driver Drive by a parking lot. The Maintenance

Shop/Fuel Oil Storage/Air Compressor Building is located north of the Administration Building and northwest of Waste-to-Energy/CISAT Building. A 12,000-gallon double-walled, steel above-ground storage tank, located in the Fuel Storage Building, is used to store diesel fuel. The diesel fuel is used in two (2) dual-fired boilers located in the CISAT Plant and also to fuel the Site's front-end loaders. The Waste-to Energy/CISAT Building contains the four main operational areas: the waste tipping and containment area, the control room, the Waste-to-Energy Plant, and the CISAT Plant which contain dual-fired boilers/chillers. Incoming solid waste was received and processed in the waste tipping and containment area, a fully enclosed structure that includes a waste tipping floor, a waste storage area, a waste loading pit, and associated feed hoppers. The primary control room is located between the waste containment and waste combustion areas and overlooks the tipping floor. The Waste-to-Energy Plant includes two municipal waste combustion units (MWCUs), which are the primary means of steam generation. The two identical and parallel waste combustion units, each rated at 100 tons per day, consist of waste feeding hoppers, waste combustion chambers with heat exchangers/boilers and air emissions controls, bottom ash quenchers, and waste ash load out facilities. The CISAT Plant contains two natural gas/distillate oil-fired boilers for backup steam generation, three steam-driven chillers, and one electric chiller installed in 2006. The backup boilers and chillers are proposed to remain operational by JMU and are not addressed in this Closure Plan. Figure 2 depicts the layout of the Site and its buildings.

2.6 Facility Operations

The following is a general description of the RRF combustion process (when it was in operation) from initial receipt of the MSW to final disposal of ash residues. Included is a discussion of each process unit operation, solid and gaseous waste streams, and pollution control methods. Please refer to Figure 3 for a Process Flow Diagram representing the RRF process units, flue gas flow, and waste ash conveyance and storage systems.

2.6.1 MSW Receiving and Handling

Normal operating procedures entailed the delivery of select wastes to the facility by transfer trucks. Haul vehicles were weighed by an automated scale upon entering, and were queued in the waste entrance lot. Trucks were unloaded one vehicle at a time onto the concrete tipping floor. Wastes were visually inspected by the tipping floor personnel and an overhead control room operator before waste was pushed by a rubber tired front-end loader into either the waste loading pit or the designated waste storage area of the tipping floor. The original tipping floor was modified during a previous plant renovation to provide improved waste containment and additional waste storage capacity. A ten-foot high concrete containment wall and additional aluminum sheathing were added inside the building in the designated waste storage area of the floor. The required random load inspections occurred on the tipping floor, in an area away from truck traffic. Oversized, bulky and unsuitable wastes were physically removed from the wastes on the tipping floor. Oversized wastes were shredded on the tipping floor, if practical, or loaded into roll-off boxes for shipment to an approved lined sanitary landfill. The shredder was removed from the Facility in January 2014. Waste materials unsuitable for combustion were removed from the tipping area, temporarily stored onsite in designated areas and/or roll-off containers, and disposed of as required by state law.

Waste was lifted from the waste loading pit by a crane grapple remotely operated from the overlooking control room. A total of two (2) grapples were used to pick up MSW from the refuse storage pit and place the MSW into the charging chute feed hopper of each combustor. Only one grapple was operated at any one time to place MSW in either one of the two feed chutes. At the bottom of the charging chute feed hopper, MSW fuel was fed onto the inclined grate assembly via a feed-ram assembly where controlled combustion took place.

2.6.2 Waste Combustion

The two identical and parallel waste combustion units, each rated at 100 tons per day, were used to combust the MSW. Each unit is equipped with a startup burner fired by natural gas. MSW was combusted utilizing the inclined fluidized bed (IFB) stationary grate located at the bottom of the furnaces. Combustion air was provided to each portion of the grate from a combustion air fan through slots in the grate assembly. As the MSW fuel was combusted, pulse air supplied through the grate fluidizes the bed with gravity moving the bed down the grate. Non-combustible waste solids and heavy ash accumulated as bottom ash at the base of the waste combustor units where they accumulated in bottom hoppers. The bottom ash was then discharged onto a bottom ash screw conveyor to a

quench tank.

2.6.3 Heat Recovery

The heat released from combustion of the MSW was used to convert water to steam by passing the hot flue gas stream through two waste heat boilers, one for each combustion unit. Flue gas exiting the boilers passed through economizer units which used the heat in the gas stream to pre-heat boiler make-up water.

2.6.4 Air Pollution Control

The flue gas produced by the boilers entered a flue gas cleaning system designed to remove hydrogen chloride (HCL), sulphur dioxide (SO_2), heavy metals, dioxin/furans, and particulate matter from the gases emitted from the combustion systems. A dry scrubbing system injected hydrated lime and activated carbon into the flue gas stream inside a venturi reactor to neutralize acid gas components (HCl and SO_2) and absorb air pollutants like mercury, respectively. Hydrated lime and associated injection equipment was located in a silo at the bottom of the stack. The activated carbon and associated injection equipment was stored separately in a small, corrugated metal building located adjacent to the lime silo. Exhaust gases then passed through a baghouse for removal of particulate matter, activated carbon and lime before exiting through the stack. Two flues, one from each of the parallel waste combustion units, are housed inside an approximately 150-ft high stack. Gases were drawn from the baghouses to their respective flue inside the stack with an induced draft (ID) fan.

2.6.5 Ash Handling, Storage, and Disposal

The fly ash collected inside the waste heat boilers, economizers, and baghouses was mechanically transported with screw conveyors to the quench tank for co-mingling with the bottom ash. As the bottom ash and fly ash residues passed through the quench tank via a wet drag chain conveyor, the ash residues then proceeded up an incline for dewatering and into an ash roll-off container for disposal at the Rockingham County Sanitary Landfill. In 2005, the metal recovery magnet system was physically removed from the RRF. The system was designed for a magnet to be located at the end of the ash conveyor for the collection of ferrous materials from the ash for recycling as scrap metal. The combustion ash and scrap metal were collected separately into roll-off containers.

Samples of the combustion ash were collected quarterly for analysis of Toxic Characteristic Leaching Procedure (TCLP) as required by VDEQ. Once results indicated the ash was below associated TCLP levels, the roll-off containers were covered with tarps and transported to the Rockingham County Sanitary Landfill for final disposal. Historical laboratory analysis of the fly ash has demonstrated that it was consistently below the TCLP levels (see Section 3.2).

The facility did have the capability to transport the fly ash to a storage silo should the facility find a beneficial reuse market for the fly ash. However, the fly ash silo was never placed in operation on a regular basis and has only held a small quantity of ash over the course of the Facility operations.

3. Waste Stream Characterization

3.1 Waste Streams

3.1.1 Municipal Solid Waste (MSW)

MSW received by the Facility consisted of typical residential refuse from the surrounding communities. Prior to combustion, the MSW was sorted by the Facility to remove oversized or other unsuitable materials. While the daily composition of the waste stream was variable, components typical of MSW are as follows:

Material	Composition (%)
Paper	50%
Food Wastes	10%
Yard Wastes	15%
Plastic	2%
Glass	8%
Metal	7%
Miscellaneous	8%
Total	100%

Source: Environmental Protection Agency, *Decision-Makers' Guide To Solid Waste Management, Volume II*, EPA 530-R-95-023, August 1995

On June 7, 2014, the RRF started diverting MSW from the facility and on June 15, 2014, the RRF processed the final quantity of MSW accumulated on site and officially shut down all MSW combustion operations. The surfaces of the waste receiving area (i.e. tipping floor/push walls and refuse pit) and combustor feed chutes have been cleaned of bulk accumulations of MSW and only a residual layer of material currently remains on those surfaces.

3.1.2 Fly Ash and Bottom Ash

Generally, the RRF combustion process generates two types of waste materials: fine-particle fly ash entrained in the flue gas stream and heavier bottom ash formed in the firing chamber. Bottom ash is the most significant, accounting for 80-90 wt% of the total ash and is often a mixture of combustion ash with various fractions of unburnt matter, glass, and metallic debris. RRF ash residues can be further divided into the following groups:

- Bottom ash as discharged from the bottom of the combustion chamber below the furnace grates;
- Heat recovery ash (HRA) as collected in the heat recovery system including boiler and economizer. This fly ash is carried over from the combustor and removed before sorbents are injected to clean the fuel gases;

- Air pollution control (APC) residues as collected in the APC equipment (i.e. dry scrubber reactor and baghouse) including fly ash, activated carbon, hydrated lime, condensates and reaction products; and
- Combined ash as a mixture of the above categories (i.e. fly ash and bottom ash that are co-mingled prior to landfill disposal)

Since the cessation of operations in June 2014, the Facility removed and properly disposed of accumulated waste ash materials from the quench tank and roll-off containers. Ash currently present at the Facility consists of residual accumulation on the interior surfaces of processing equipment (e.g. boiler, reactor, baghouse, etc.) and on the building surfaces (e.g. walls, structural supports, floors, etc.) in the ash load-out stall. The physical characteristics of the ash vary from a fine-textured, light gray particulate matter to a hardened ash cake adhered to equipment surfaces.

3.1.3 Refractory

The walls of the furnace above the grates are lined with heat insulating refractory. The upper section of the furnace consists of a refractory-lined duct system connecting the combustor unit to the heat recovery boiler. While the refractory itself is not a waste stream generated directly from the operation of the RRF, it will be removed during closure activities due to the build-up of slag material on the surface of the refractory. The slag material consists of a hard layer of vitrified combustion residues.

3.1.4 Activated Carbon and Hydrated Lime

The flue gases produced by the combustors enter the APC system at the venturi reactor where they come into contact with injected reagents. These reagents are hydrated lime and activated carbon. Un-reacted excess reagents are expected in the reactor and process equipment downstream of the reactor. Bulk quantities of hydrated lime and activated carbon have been removed from their respective storage areas (i.e. the lime silo and activated carbon building) and only residues of unused, raw materials remain on the surface of equipment and interior building structures of those storage areas.

3.1.5 Structural Debris

Portions of the Facility structures will be decontaminated and left in place while others will be removed and characterized for proper disposal or recycling. Demolition debris will include the following materials, as more fully described in Section 4 of this Plan. These materials will be either disposed in a landfill, recycled, or reused offsite

- Steel processing vessels (i.e. economizers and reactors)
- Flue gas ductwork and associated insulation material
- Induced draft (ID) fan
- Corrugated sheet metal from ash load-out stall
- Filter fabric and supporting wire mesh cage from interior of baghouses
- Ash conveyors
- Quench tank, recirculation pumps, and drag chain
- Ash roll-off containers (quantity of 20 containers)
- Air compressor

At the conclusion of the closure activities, the following structures will be decontaminated, as appropriate, and remain at the Facility:

- All building structures, except the lower portion of the ash load-out corrugated metal wall

- Truck scales
- Tipping area and refuse pit
- Combustor feed chutes and rams
- Primary/secondary combustors and crossover ductwork to boilers
- Waste heat boiler inlets and waste heat boilers
- Baghouses, except interior filter bags and bag supports
- Fly ash silo
- Stack
- Hydrated lime silo
- Activated carbon equipment

3.2 Historical Data

Historically, the RRF handled waste bottom and fly ash by combining the two waste streams in the quench tank and loading the material into 20 yard roll-off containers pending characterization for disposal in the local municipal landfill. Per the Facility Operation Plan, and in accordance with VDEQ requirements, the waste ash contained in the roll-off containers was sampled and analyzed quarterly and reported to the VDEQ. The ash samples were analyzed using the TCLP EPA SW-846 Method 1311 for eight metals. If TCLP metal concentrations were above regulatory thresholds, the ash held in the roll-off containers was treated with lime and then resampled for a second TCLP metals analysis. Either the initial data collected or the resampled data (after lime treatment) were used to determine proper disposal methods. These data consistently demonstrated that the untreated and lime-treated ash was below the TCLP metal levels that are used to define a solid waste as “non-hazardous” or “hazardous”, per regulatory thresholds set forth in 40 CFR 261.24, Table 1. Since the co-mingled bottom and fly ash (untreated and lime-treated) TCLP metal concentrations were below regulatory TCLP thresholds for metals, the waste ash was deemed suitable for disposal at a facility licensed to accept “non-hazardous” wastes, the Rockingham County Sanitary Landfill.

Analytical data collected during the last ten quarterly reporting periods of the Facility’s operation (from First Quarter 2012 until Second Quarter 2014), exhibited detectable concentrations (but below the TCLP levels) of barium, lead, and selenium. The other five TCLP metals analyzed (i.e. arsenic, cadmium, chromium, mercury, and silver) were reported below the quantitation level.

3.3 Grouping of Operational Units for Waste Characterization

To facilitate waste characterization and closure planning, the various operational elements of the RRF have been grouped into eighteen (18) waste streams/operational units. These delineations were based on the units’ respective identical/similar waste characteristics and logistical process interactions and connections. The Process Flow Diagram in Figure 3 is color-coded to represent the grouping of waste streams/operational units. Likewise, Table 1 in Appendix A is an identically color-coded summary table which includes a list of each component, potential waste residues, and methods for waste characterization, closure, and performance verification.

3.4 Waste Sampling and Analysis

The identification and characterization of waste residues will be performed through various methods, from visual inspection to laboratory analysis of representative samples. Visual inspection will be utilized to identify area of gross accumulation of waste residues. This form of waste characterization is deemed adequate for waste residues that are visible to the naked eye and do not require chemical analysis to delineate the constituents of concern or the extent of

contamination. In particular, the accumulation of ordinary MSW residues on surfaces in the waste receiving area (e.g. tipping floor and refuse pit), activated carbon and lime in the reactor injection system, and oily residues on heavy equipment do not require further analysis to identify potential hazards. Knowledge of these materials and the processes generating these residues is adequate to inform the waste characterization and decision-making processes.

Process knowledge and historical laboratory data will be utilized to the maximum extent possible to minimize redundant analytical efforts. Presently, it is anticipated that historical characterization data of the co-mingled bottom and fly ash will be utilized for characterization and disposal purposes in this Plan for waste streams containing the co-mingled ash. Based on this historic data, it is anticipated that the combined bottom ash/fly ash waste streams discussed herein will be non-hazardous. In addition, samples of ash residues will be collected from distinct points along the RRF process to further define ash characteristics for each grouping of waste streams/operational units. The sampling and analysis scheme for waste characterization is presented in Table 1 in Appendix A.

3.4.1 Sample Collection Methods

3.4.1.1 Wipe Samples

Wipe samples will be collected from operational process equipment that are believed to have insufficient accumulation of waste residues available for bulk sample collection. The wipe samples will be used to characterize residual surface contamination in the stack and fly ash silo. If adequate waste ash volumes are discovered upon opening the units for sample collection, then ash samples will be collected, composited and analyzed instead of using wipe samples.

3.4.1.2 Core Samples

Core samples will be collected from the refractory present in various “heat-facing”, insulating applications such as the combustors and cross-over ductwork. The refractory will be removed due to the presence of slag material on its surface. The collection of core samples will allow for the samples to accurately represent the profile of the refractory and slag through its entire thickness. A drill bit will be advanced through the material and the cuttings will be collected for waste analysis.

3.4.1.3 Composite Samples

In order to obtain the most representative samples for a waste stream/operational unit, composite samples are frequently used. For the RRF, composite samples will range from 2-point to 8-point composite samples, depending on the physical constraints of the equipment being sampled.

3.4.2 Sample Analysis Methods

The waste characterization and sampling approach is generally based upon the requirements of 40 CFR 261.24, Toxicity Characteristic and EPA SW-846 Method 1311 (TCLP). The general approach will be to analyze for the full suite of hazardous constituents, except Volatile Organic Compounds (VOCs), in the intake side of operations up to and including the combustors using the following analytical methods:

- EPA Method 1311(TCLP) - 6010 – RCRA Metals
- EPA Method 1311 (TCLP) – 8270C – Semi-Volatile Organic Compounds (SVOCs)
- EPA Method 1311 (TCLP) – 8081 – Chlorinated Pesticides
- EPA Method 1311(TCLP) – 8151A – Chlorinated Herbicides

Since the Facility has not been in active operation since June 2014, VOCs potentially contained in the waste streams would have volatilized and are not presently believed to be constituents of concern. On the downstream side of the combustors, the primary constituents analyzed will include metals only, as the temperatures achieved in the combustor

should result in the destruction of SVOCs, and chlorinated pesticides and herbicides. According to the Facility, the combustors typically operated at temperatures in the range of 1,900 to 2,100˚F.

If chlorinated pesticides, chlorinated herbicides, or SVOCs are detected in the intake portion of the plant, as determined by measurement of constituents in samples of refractory/combustion slag collected from each combustor, this approach will be modified to include those same analyses on the post-combustor side of the operational process equipment. Wipe samples collected from the stack and fly ash silo will be analyzed for total metals using EPA Method 6010B since TCLP analysis of a bulk ash sample is not possible. The results of the total metals analysis will be used as a screening tool to determine the presence or absence of metals.

Samples to be analyzed as part of waste characterization and likewise, after decontamination/demolition to verify clean closure, will be shipped to and analyzed by an appropriately licensed commercial analytical laboratory following industry- standard quality assurance/quality control (QA/QC) and data management practices. The environmental laboratory will be certified or accredited by the Virginia Division of Consolidated Laboratory Services (DCLS) under the Virginia Environmental Laboratory Accreditation Program (VELAP).

4. Closure Procedures

4.1 Overview

The following summarizes the decontamination/demolition procedures to be used and identifies the methods of handling, temporary storage and disposal of wastes generated during closure including debris, ash residue, lime and activated carbon residue, and rinsate wastewater. All materials and/or wastes will be managed, containerized, transported, and disposed of in accordance with all prevailing laws and regulations.

4.1.1 General Closure Approach and Techniques

The general approach and decision-making process for closure is presented in Figure 4 as a flowchart and is further described in this section of the Plan.

4.1.1.1 Closure of Components in Place

For components that will remain in place at the end of closure, the overarching approach will be to triple wash facility surfaces/components after removal of loose debris. Primarily, rinsate sampling will be utilized to confirm effectiveness of cleaning efforts and to ensure that components left in place do not pose a threat to human health or the environment. Clean closure will be confirmed first by visual inspection of surfaces and then sampling of final rinsate water for toxicity characteristics per 40 CFR 261.24. Clean closure will be achieved when measured concentrations of TCLP parameters[1] in the verification samples are less than 40 CFR 261.24, Table 1 limits. Note that visual inspection alone is deemed adequate to confirm clean closure for select operational components where visual inspection was also used to characterize the waste stream residues prior to closure. These components include: the activated carbon building, hydrated lime silo, front-end loaders, and the picking crane grapple.

Wash-down water will be collected in temporary storage tanks, sampled and analyzed for waste disposal, and then discharged to the Harrisonburg POTW or to a third party vendor approved for disposal of the waste stream. The temporary storage tanks will be brought to the Site to complete the closure activities and then removed at the conclusion of the project. Waste sampling and analysis for disposal will be based upon the requirements of 40 CFR 261.24, Toxicity Characteristic and Environmental Protection Agency (EPA) SW-846 Method 1311(TCLP).

The procedures above will be modified for any hazardous ash residues found during the waste characterization phase. All hazardous waste residues removed from operation components will be handled separately from other non-hazardous waste. Any hazardous bulk ash found inside a component will be removed to the maximum extent possible and collected in separate containers for proper disposal at a licensed hazardous waste disposal facility. The goal will

[1] On the intake side of operations up to and including the combustors, TCLP parameters measured will include metals, semi-volatile organic compounds (SVOCs), chlorinated pesticides and chlorinated herbicides. On the downstream side of the combustors, TCLP parameters analyzed will include metals only. Refer to Table 1 in Appendix A for sampling and analysis plan for each waste stream/operational unit.

be to remove as much of the loose debris as possible to minimize the quantity of hazardous water generated from the triple-rinse procedure. Clean closure of the component will be confirmed first by visual inspection of surfaces and then sampling of final rinsate water for toxicity characteristics per 40 CFR 261.24. Washing will continue until the final rinsate water meets non-hazardous criteria. Wash-down water will be collected in temporary storage tanks designated for potentially hazardous wash water only. A composite sample of the wash-down water will be analyzed for TCLP metals and properly disposed in accordance with all applicable regulations.

4.1.1.2 Closure of Components by Disposal or Recycling

For components that will be removed for either disposal or recycling, the approach will be to remove loose debris to prevent discharge to the environment during transportation and handling. In the case of materials destined for recycling, additional residue removal may be necessary to meet the acceptance criteria of the recycling facility. Removal of gross accumulation of loose residues will be achieved primarily through vacuuming and collection of waste ash. The use of washing will be kept to a minimum, when possible, to reduce waste streams generated by the closure activities. Clean closure will be achieved when there is: (1) minimal gross accumulation of loose residue on components prior to transportation and (2) final removal and acceptance of the waste components at the municipal landfill or recycling facility.

It is currently anticipated that waste streams will be non-hazardous and disposal at a municipal landfill or recycling at a metal recovery facility will be acceptable. However, confirmation or rejection of this assumption will be determined through sampling and analysis of waste residues during the waste characterization phase of the closure (see Section 3.4). If waste streams are determined to be hazardous, then closure of those components by disposal or recycling will require additional measures than for non-hazardous components. The objective for components found to contain hazardous ash residues will be to either:

(i) clean the component of all hazardous residues, thus allowing the component itself to be disposed or recycled as a non-hazardous waste. The method of cleaning, sampling, and analysis will be the same as for those components left in place, as described above in Section 4.1.1.1. Likewise, waste streams will be handled separately from non-hazardous waste streams and disposed accordingly; or

(ii) dispose of the entire component, including the attached ash residues, as a hazardous waste at an appropriately-licensed disposal facility; or

(iii) recycle the entire component, including the attached ash residues, as scrap metal as allowed under the RCRA exemption provisions set forth in 40 CFR 261.6(a)(3)(ii), provided any releases from the scrap metal are minimized and properly managed.

4.1.2 Pre-Closure Activities

In preparation for closure and as part of the cessation of municipal solid waste combustion activities, the RRF completed the following:

- Combusted the remaining inventory of MSW;
- Disposed of bulk, waste ash accumulated in the quench tank and roll-off containers.

Prior to the cessation of municipal solid waste combustion in June 2014, two pieces of equipment were removed from the Facility. The Metal Recovery Magnet System, used to remove metal components from the waste ash stream as it was conveyed from the quench tank to roll-off containers, was removed from the Facility in 2005. In addition, the

Shredder used to reduce the size of bulky, oversized MSW in the tipping floor area was removed from the Site in January 2014.

4.1.3 Specific Closure Steps for Waste Streams/Operational Units

Final closure of the RRF will be accomplished by removing and/or decontaminating equipment, ductwork, building structures, or other materials containing or contaminated with waste residues that pose a risk to human health or the environment. The following narrative describes the closure and verification sampling procedures for each waste stream/operational unit. These procedures are summarized in Table 1, Appendix A.

4.1.3.1 Waste Stream/Operational Unit No. 1 - Truck Scales

This waste stream includes:

- Truck Scales

Potentially-encountered waste residues include:

- None

The truck scales are located at the entrance to the Facility and were used to weigh incoming trucks and their loads. The Facility will continue to use the truck scales during operation of a solid waste transfer station, currently pending VDEQ approval. After termination of solid waste transfer station operations, the truck scales will be permanently closed as follows.

The scales and their respective controls will remain in place. The truck scales were not exposed to MSW materials, as trucks entering the Facility were enclosed commercial vehicles. The same system of MSW truck delivery will continue during operation of the solid waste transfer station. Therefore, the truck scales are comparable to any commercial or even residential parking lot surface. As such, the asphalt surface of the scale and its immediate vicinity will be pressure washed followed by a visual inspection for closure. No samples will be collected from this area as part of the closure procedures.

4.1.3.2 Waste Stream/Operational Unit No. 2 - Tipping Floor, Push Walls & Refuse Pit

This waste stream includes:

- Tipping Floor;
- Push Walls; and
- Refuse Pit.

Potentially-encountered waste residues include:

- Refuse Residue

The MSW tipping floor and refuse pit area are enclosed by a building structure with access provided through a roll-up door. The exterior walls consist of a 4-foot high, reinforced concrete wall with metal corrugated siding above. Inside the exterior wall, a push wall was later constructed around the tipping floor extending approximately 10 feet in height.

Beginning in June 2014, wastes were no longer received by the Facility and the remaining inventory of MSW stored in the waste receiving area was combusted. The tipping floor, push walls, and refuse pit were cleaned of bulk waste materials using the operational equipment on hand at the Facility. Only minor refuse residuals remain as thin accumulations on structural surfaces. The City intends to use the tipping floor as a solid waste transfer station, pending approval by the VDEQ. The refuse pit will not be actively used during operation of the transfer station. After termination

of solid waste transfer station operations, the tipping floor, push walls and refuse pit will be cleaned and inspected using the following procedures.

Visual inspection will be used to delineate the structural components that are contaminated with waste residues. These structural components will be pressure washed to remove refuse residuals to the degree operationally feasible. The pressure washing activities will be followed by a visual inspection and the collection and analysis of one (1), 5-point composite sample of the final rinsate water to confirm the effectiveness of the cleaning effort. The sample will be composited from the following sampling locations to comprise the 5-point composite sample for analysis:

- One (1) sample collected from the tipping floor rinsate;
- Three (3) samples collected from the push wall rinsate (i.e. one (1) per wall); and
- One (1) sample collected from the refuse pit rinsate.

The collected sample will be analyzed using EPA SW-846 Method 1311 (TCLP) for metals, SVOCs, chlorinated pesticides/herbicides. Clean closure will be achieved when measured concentrations of TCLP parameters are less than 40 CFR 261.24, Table 1 limits.

4.1.3.3 Waste Stream/Operational Unit No. 3 - Corrugated Interior Walls (North, East and South)

This waste stream includes:

- Three (3) Corrugated Metal Walls (interior only)

Potentially-encountered waste residues include:

- Dust accumulations; and
- Refuse residues.

The concrete push walls detailed under Waste Stream/Operational Unit No. 2 are approximately 10 feet in height with a corrugated sheet metal wall extending over them to the facility roof. The roof covers the tipping floor and picking crane assembly. The corrugated walls (north, east, and south) currently show evidence of minor accumulations of dust and light refuse particles. The City intends to use the tipping floor area as a solid waste transfer station, pending approval by the VDEQ. After termination of the solid waste transfer station operations, the corrugated metal walls surrounding the tipping floor will be cleaned and inspected using the following procedures.

Visual inspection will be used to delineate the structural components that are contaminated with waste residues. The corrugated sheet metal walls will be pressure washed and one (1) sample of the final rinsate will be collected per wall which will then be combined into one (1) 3-point composite sample for analysis. The composited sample will be analyzed using EPA SW-846 Method 1311 (TCLP) for metals, SVOCs, and chlorinated pesticides/herbicides. Clean closure will be achieved when measured concentrations of TCLP parameters are less than 40 CFR 261.24, Table 1 limits.

4.1.3.4 Waste Stream/Operational Unit No. 4 - Front End Loaders

This waste stream includes:

- Front end loaders

Potentially-encountered waste residues include:

- Refuse residues

The Facility relied on mechanical equipment such as front end loaders for the management and transfer of incoming wastes. The Facility will continue to use front end loaders during operation of a solid waste transfer station, currently pending VDEQ approval. After termination of solid waste transfer station operations, the front-end loaders will be permanently closed.

As part of the closure activities, the front end loaders will be visually inspected to identify areas of contamination and those areas will be pressure washed. Verification of clean closure will be through visual inspection. No samples will be collected as part of the closure.

4.1.3.5 Waste Stream/Operational Unit No. 5 - Picking Crane

This waste stream includes:

- Two (2) Picking Crane Grapples

Potentially-encountered waste residues include:

- Refuse Residue;
- Hydraulic Oil; and
- Hydraulic Grease Packing.

The picking crane grapples formerly used to charge the refuse pit will be lowered to the ground inside the tipping building. Once lowered to the ground, they will be cleaned using a combination of a biodegradable degreaser and pressure washing. Only external accumulations of hydrocarbon-based materials will be removed. The grease packing for moveable joints and bearings will be left in place as to not compromise the functionality of these units. Following the cleaning, the grapple will be visually inspected for closure and subsequently stored on-site. No samples will be collected as part of the closure.

4.1.3.6 Waste Stream/Operational Unit No. 6 - Combustor Feed Ram and Chute

This waste stream includes:

- Combustor Feed Ram; and
- Feed Chute

Potentially-encountered waste residues include:

- Refuse Residue

Similar to the tipping floor, refuse pits, and push walls, the feed ram and feed chute may contain minor amounts of refuse residues. Areas of contamination will be visually identified prior to cleaning activities.

As part of the closure activities, these components will be washed in-place and one (1) 2-point composite sample of the rinsate from each, the feed ram and the feed chute. The composited sample will be analyzed using EPA SW-846 Method 1311 (TCLP) for metals, SVOCs, and chlorinated pesticides/herbicides. Clean closure will be achieved when measured concentrations of TCLP parameters are less than 40 CFR 261.24, Table 1 limits.

The closure method and verification sampling protocol will be followed for the feed ram and feed chute on each of the two (2) MWCUs.

4.1.3.7 Waste Stream/Operational Unit No. 7 – Municipal Waste Combustors (Primary and Secondary Chambers)

This waste stream includes:

- Two (2) municipal waste combustors (i.e. primary and secondary chambers)

Potentially-encountered waste residues include:

- Refractory;
- Slag from the incineration of refuse;
- Fly Ash; and
- Bottom Ash

Fly Ash Waste Characterization

MSW combustion was conducted in two stages – in the primary and secondary chambers of each MWCU. MSW was charged into the primary chamber where the combustion process began. Flue gases exited the primary chamber into the secondary chamber to ensure complete combustion by mixing the volatile gases with air. The flue gases exiting the primary chamber into the secondary chamber deposited a layer of loose ash on the surface of the refractory-lined chambers. One (1) composite sample of fly ash will be collected from each combustion chamber (primary and secondary). The composite sample from the primary combustion chamber will be combined from two (2) sampling points accessible near the top of the chamber. The composite sample from the secondary combustion chamber will be combined from two (2) sampling points accessible near the bottom of the unit. The composited samples of fly ash will be analyzed using EPA SW-846 Method 1311 (TCLP) for metals.

Bottom Ash Waste Characterization

One composite sample of bottom ash will be collected from the primary combustion chamber by combining five (5) sampling points near the bottom of the unit (i.e. bottom ash hoppers). The composited sample of bottom ash will be analyzed using EPA SW-846 Method 1311(TCLP) for metals.

Refractory /Slag Waste Characterization

As minor slag accumulation appears to be present (estimated as 2 inches in thickness or less) on the fire-facing portion of the refractory within the combustors, two (2) core samples be collected from the refractory in its entire profile (i.e. slag and refractory materials) and composited. One (1) composite sample will be collected from each combustor (i.e. primary and secondary). The composited samples of refractory/slag will be analyzed using EPA SW-846 Method 1311 (TCLP) for metals, SVOCs, and chlorinated pesticides/herbicides for waste classification and health and safety purposes.

Closure Procedures and Verification Method

The obtained waste characterization data will be used to determine the appropriate worker personal protective equipment (PPE) requirements and to characterize the ash and refractory for proper disposal. Once the appropriate PPE requirements and waste disposal facility have been identified, the surface coating of fly ash material will be removed with vacuums and the refractory will then be removed in its entirety (including slag). Ash and refractory wastes will be containerized for subsequent disposal at a facility in accordance with all pertinent laws and regulations. The cleaning operations will require entry into a permitted confined space and the erection of internal scaffolding. In addition, the combustor grates will be removed, vacuum cleaned, and sent to a recycling facility.

Upon the completion of the removal of the refractory, the bare steel walls will be rinsed and one (1) grab sample of the final rinsate will be collected from each combustion chamber and analyzed using EPA SW-846 Method 1311(TCLP) for metals, SVOCs, and chlorinated pesticides/herbicides. Clean closure will be achieved when measured concentrations of TCLP parameters are less than 40 CFR 261.24, Table 1 limits.

The closure method and verification sampling protocol will be followed for the primary and secondary combustion chambers for each of the two (2) MWCUs.

4.1.3.8 Waste Stream/Operational Unit No. 8 - Crossover Duct Work, Waste Heat Boiler Inlet & Hopper & Ash Conveyors 7A through 7D

This waste stream includes:

- Crossover Duct Work;
- Waste Heat Boiler Inlet and Hopper Assembly; and
- Ash Conveyors (Nos. 7A through 7D).

Potentially-encountered waste residues include:

- Refractory;
- Slag from the incineration of refuse; and
- Fly Ash.

Fly Ash Waste Characterization

This waste stream/operational units have been combined as they include post-combustion components with similar characteristics. One (1), 4-point composite fly ash sample from the crossover duct and boiler inlet will be collected and analyzed using EPA SW-846 Method 1311(TCLP) for metals.

Refractory /Slag Waste Characterization

Minor slag accumulation inside the crossover duct is anticipated on the hot, fire-facing portion of the refractory. Therefore, two (2) representative grab samples will be collected from the refractory in its entire profile (i.e. slag and refractory materials) from each of the two (2) existing access points, composited, and then analyzed using EPA SW 846 Method 1311(TCLP) for metals.

Closure Procedures and Verification Method

The obtained waste characterization data will be used to determine appropriate worker protection/PPE and to characterize the ash and refractory for proper disposal. As with the combustion chambers, the surface coating of fly ash material will be removed with vacuums and the refractory will be removed in its entirety (including slag) from the cross-over duct. Upon completion of the refractory removal, the bare steel walls will be rinsed and a final rinsate sample will be collected and analyzed using EPA SW-846 Method 1311(TCLP) for metals.

The waste heat boiler inlet unit will be vacuumed to remove loose accumulation of ash and then pressure washed. The effectiveness of the cleaning operations will be confirmed with the collection of one (1) rinsate grab sample from the final rinsate water and analyzed using EPA SW-846 Method 1311(TCLP) for metals.

Clean closure of the cross-over duct and waste heat boiler inlet will be achieved when measured concentrations of TCLP metals in the rinsate water are less than 40 CFR 261.24, Table 1 limits.

The ash conveyors will be vacuumed and pressure washed, if necessary, to remove gross accumulation of waste ash residue. Since the conveyors will be disposed or recycled, the goal will be to remove loose debris as necessary to prevent discharge to the environment during transportation and handling of the conveyors and to meet acceptance criteria of the recycling facility, if applicable. Adhered residues may be left on the equipment if they do not pose a risk of discharge to the environment. Furthermore, based on the assumption that analytical results will confirm that the ash residues are non-hazardous, the conveyors can be disposed or recycled with the residue in place. Conveyors No. 7A through 7D waste solids will be characterized from analytical results obtained from the composite sample of waste heat boiler inlet and cross-over duct ash. If these data confirm the waste ash residues are non-hazardous, then clean closure will be achieved when there is: (1) minimal gross accumulation of loose residue on the conveyors prior to transportation and (2) final removal and acceptance of the waste components at the municipal landfill or recycling facility. If waste characterization determines that ash residues are hazardous, then the conveyors and their respective attached remnant residues will be either: (i) properly handled and disposed of as hazardous wastes at an appropriately-licensed disposal facility or (ii) recycled as allowed under the RCRA exemption provisions set forth in 40 CFR 261.6(a)(3)(ii), provided any releases from the scrap metal are minimized and properly managed.

The closure methods and verification sampling protocol for these components will be followed for each of the two (2) MWCUs.

4.1.3.9 Waste Stream/Operational Unit No. 9 – Waste Heat Boiler, Hoppers B1 through B-4 & Ash Conveyor No. 3

This waste stream includes:

- Waste Heat Boiler and Hopper Assembly B1 through B-4; and
- Ash Conveyor (No. 3).

Potentially-encountered waste residues include:

- Fly Ash combined with
- Hydrated Lime Residues; and
- Activated Carbon Residues.

Fly Ash Waste Characterization

One (1), 8-point composite sample will be obtained by collecting one (1) sample from each of the eight (8) access points to the waste heat boiler and hoppers, namely:

- One (1) sample from the inlet;
- One (1) sample from the outlet;
- One (1) sample each from each of the bottoms of the hoppers (B1 through B4); and
- One (1) sample from each of the two (2) side doors.

These samples will be composited and analyzed using EPA SW-846 Method 1311 (TCLP) for metals. The composite sample results will be used to characterize the residues inside the waste heat boiler and ash conveyor No. 3.

Closure Procedures and Verification Method

The waste heat boiler and hoppers will be cleaned by vacuum removal of waste ash residue and by washing with water followed by the collection of one (1) rinsate sample from the final rinsate water to confirm adequate cleaning of the units. The rinsate sample will be analyzed using EPA SW-846 Method 1311(TCLP) for metals. Clean closure of the

waste heat boiler inlet will be achieved when measured concentrations of TCLP metals in the rinsate water are less than 40 CFR 261.24, Table 1 limits. The waste heat boiler will be left in place following the cleaning procedure.

The ash conveyor No. 3 will be cleaned and disposed or recycled in a similar fashion to conveyors No. 7A through 7D, as described above in Section 4.1.3.8, Waste Stream/Operational Unit No. 8, with the exception that the conveyor No. 3 waste solids will be characterized from analytical results obtained from the composite sample collected from the waste heat boiler and hopper ash residues.

The closure methods and verification sampling protocol for these components will be followed for each of the two (2) MWCUs.

4.1.3.10 Waste Stream/Operational Unit No. 10 - Economizer, Hoppers (E3 and E4), Ash Conveyors & Flue Gas Duct

This waste stream includes:

- Economizer and Hoppers Assemblies E-3 and E-4;
- Ash Conveyor (No. 8); and
- Flue Gas Duct (Economizer to Reactor).

Potentially-encountered waste residues include:

- Fly Ash

Fly Ash Waste Characterization

Given the identical characteristics of the fly ash throughout these operational components, one (1) 4-point composite sample will be collected from the following locations:

- One (1) sample from the economizer inlet;
- One (1) sample from the economizer outlet;
- One (1) sample from the bottom of each of the two (2) economizer hoppers; and
- One (1) sample from the access point on the flue gas duct.

The composite sample will be analyzed using EPA SW-846 Method 1311(TCLP) for metals. These data will be used to characterize the waste for disposal or recycling.

Closure Procedures and Verification Method

The economizer and flue gas duct connecting the economizer to the reactor will be removed from the site following the procedures outlined in 4.1.1.2. If hazardous ash residues are present, the economizer and flue gas duct will be either:

(i) cleaned by applying a vacuum and washing with water to remove gross accumulation of residual fly ash prior to disposal or recycling. The washing procedure will be followed by the collection of one (1) rinsate sample from the final rinsate water to confirm adequate cleaning of the units. The rinsate sample will be analyzed using EPA SW-846 Method 1311(TCLP) for metals. Clean closure of the economizer and flue gas duct will be achieved when measured concentrations of TCLP metals in the rinsate water are less than 40 CFR 261.24, Table 1 limits. The economizer unit and flue gas duct will then be disposed or recycled as a nonhazardous waste; or

(ii) recycled as scrap metal, including the attached ash residues, as allowed under the RCRA exemption provisions set forth in 40 CFR 261.6(a)(3)(ii), provided any releases from the scrap metal are minimized and properly managed.

The ash conveyor No. 8 will be cleaned and disposed or recycled in a similar fashion to conveyors No. 7A through 7D, as described in Section 4.1.3.8, Waste Stream/Operational Unit No. 8, with the exception that the conveyor No. 8 waste solids will be characterized from analytical results obtained from the composite sample collected from the economizer and the flue gas duct.

The closure methods and verification sampling protocol for these components will be followed for each of the two (2) MWCUs.

4.1.3.11 Waste Stream/Operational Unit No. 11 - Reactor

This waste stream includes:

- Reactor

Potentially-encountered waste residues include:

- Fly Ash combined with
- Hydrated Lime Residues; and
- Activated Carbon Residues.

Fly Ash Waste Characterization

One (1) 3-point composite sample will be obtained by collecting three (3) samples of fly ash residues from the bottom of the reactor, the location of the only access point. The composite sample will be analyzed using EPA SW-846 Method 1311(TCLP) for metals. These data will be used to characterize the waste solids for disposal or recycling.

Closure Procedures and Verification Method

The reactor will be removed from the site following the procedures outlined in 4.1.1.2. If hazardous ash residues are present, the reactor will be either:

(i) cleaned by applying a vacuum and washing with water, to remove gross accumulation of residual fly ash prior to disposal or recycling. The washing procedure will be followed by the collection of one (1) rinsate sample from the final rinsate water to confirm adequate cleaning of the units. The rinsate sample will be analyzed using EPA SW-846 Method 1311(TCLP) for metals. Clean closure of the reactor will be achieved when measured concentrations of TCLP metals in the rinsate water are less than 40 CFR 261.24, Table 1 limits. The reactor unit will then be disposed or recycled off-site following the cleaning procedure, as a non-hazardous waste; or

(ii) recycled as scrap metal, including the attached ash residues, as allowed under the RCRA exemption provisions set forth in 40 CFR 261.6(a)(3)(ii), provided any releases from the scrap metal are minimized and properly managed.

The closure methods and verification sampling protocol for these components will be followed for each of the two (2) MWCUs.

4.1.3.12 Waste Stream/Operational Unit No. 12 - Baghouses, Hoppers, Ash Conveyors, Flue Gas Duct, Flue Gas Duct Return Duct, Flue Gas Duct & ID Fan

This waste stream includes:

- Baghouses and Hoppers (B-5 and B-6);
- Baghouse Ash Conveyors (Nos. 2, 4, 7; Rotary No. 8; and vertical ash conveyor);
- Flue Gas Duct (from Reactor to Baghouse)
- Flue Gas Duct Return Duct (from Baghouse to Combustor);
- Flue Gas Duct (from Baghouse to Stack); and
- ID Fan.

The flue gas ducts, ash conveyors, and ID fan are slated for removal and disposal or recycling. The filter fabric bags and interior support cages will be removed from the baghouse and disposed. The shell of the baghouse will remain in place.

Potentially-encountered waste residues include:

- Fly Ash combined with;
- Hydrated Lime Residues; and
- Activated Carbon Residues.

Fly Ash Waste Characterization

One (1) 5-point composite sample will be collected from the baghouse to classify the waste for disposal/recycling and worker protection/PPE purposes. The sample will be composited from ash residuals collected from the following locations:

- One (1) sample of the solid residual from each of the two (2) bottom hoppers.

The composite sample will be analyzed for TCLP metals following EPA SW 846 protocols using Methods 1311(TCLP) for metals and will represent all the listed operational process equipment in this group.

Closure Procedures and Verification Method

Once the appropriate PPE requirements and disposal facility have been determined, the bags present in the baghouses will be dislodged with their respective cages and dropped into the lower portions of each baghouse where they will be collected and containerized for transportation and disposal.

Following the removal of the bags, the interior of the baghouse will be pressure washed and a grab sample will be collected from the final rinsate water to verify clean conditions. The final rinsate will be analyzed using EPA SW-846 Method 1311(TCLP) for metals. Clean closure will be achieved when measured concentrations of TCLP parameters are less than 40 CFR 261.24, Table 1 limits.

The flue gas ducts, ash conveyors, and ID fan will be removed from the Facility. These components will be vacuumed and pressure washed, if necessary, to remove gross accumulation of waste ash residue. Since these components will be disposed or recycled, the goal will be to remove loose debris as necessary to prevent discharge to the environment during transportation and handling of the conveyors and to meet acceptance criteria of the recycling facility, if applicable. Adhered residues may be left on the equipment if they do not pose a risk of discharge to the environment. Furthermore, based on the assumption that analytical results will confirm that the ash residues are non-hazardous, the flue gas ducts, ash conveyors, and ID fan can be disposed or recycled with the residue in place. The composite ash sample collected from the baghouse will be used to characterize these solid waste components for proper disposal or recycling. If these data confirm the waste ash residues are non-hazardous, then clean closure will be achieved when

there is: (1) minimal gross accumulation of loose residue on the conveyors prior to transportation and (2) final removal and acceptance of the waste components at the municipal landfill or recycling facility.

The closure methods and verification sampling protocol for these components will be followed for each of the two (2) MWCUs.

4.1.3.13 Waste Stream/Operational Unit No. 13 - Stack

This waste stream includes:

- Stack

Potentially-encountered waste residues include:

- Fly Ash combined with
- Hydrated Lime Residues, and
- Activated Carbon Residues;
- Refractory.

Fly Ash Waste Characterization

Two flues, one from each of the parallel waste combustion units, are housed inside a single stack. Two (2) wipe samples, one from each flue, will be collected and analyzed using EPA SW-846 Method 6010B for total metals.

Closure Procedures and Verification Method

The stack will remain in place. The interior of the two flues will be washed to remove fly ash to the degree operationally feasible. Three (3) rinses will be performed to remove residuals. The rinsate will be collected and conveyed to a temporary aboveground storage tank, sampled and then analyzed using EPA SW-846-Method 1311 (TCLP) metals to determine proper disposal method. At the conclusion of the final rinse, two (2) representative samples of the rinsate will be collected (one from each flue) and analyzed using EPA SW-846 Method 1311(TCLP) for metals to confirm the effectiveness of the cleaning effort. Clean closure will be achieved when measured concentrations of TCLP parameters are less than 40 CFR 261.24, Table 1 limits.

4.1.3.14 Waste Stream/Operational Unit No. 14 - Quench Tank, Recirculation Pumps, Ash Conveyor (No. 5), Ash Load-out Stall (Waste-to-Energy Building), and Ash Roll-off Containers

This waste stream includes:

- Quench Tank;
- Recirculating Pumps;
- Ash Conveyor System;
- Ash load-out stall (interior only); and
- Mobile Ash Roll-off Containers.

Potentially-encountered waste residues include:

- Fly Ash;
- Bottom Ash;
- Hydrated Lime Residues; and

- Activated Carbon Residues.

Fly Ash and Bottom Ash Waste Characterization

The ash material collected and co-mingled in this area of the Facility were historically sampled and analyzed prior to disposal in the local, municipal landfill. These data have historically indicated that the ash waste is non-hazardous based on TCLP analysis using EPA SW-846 Method 1311 (TCLP) for metals. These data will be utilized for characterization of the ash load-out area components and will be augmented with one (1) current, 3-point composite sample combined from the following sampling locations:

- One (1) sample from the quench tank;
- One (1) sample from the ash conveyor/drag line; and
- One (1) sample from one (1) of the mobile roll-off containers.

Closure Procedures and Verification Method

The operational equipment associated with the management of ash (including the quench tank, recirculating pumps, ash conveyor No. 5, and roll-off containers) are in a reasonably cleaned state with only minor solid residues remaining. These components will be removed and sent to a metal reclamation facility for recycling or to a landfill for disposal. The above-referenced historical laboratory data and proposed composite sample of co-mingled bottom and fly ash will be used to characterize the solids wastes disposed or recycled. As with the other equipment to be removed from the Facility, the goal will be to remove loose debris as necessary to prevent discharge to the environment during transportation and handling of the ash management equipment and to meet acceptance criteria of the recycling facility, if applicable. Adhered residues may be left on the equipment if they do not pose a risk of discharge to the environment. Furthermore, based on knowledge from historical ash analysis and the assumption that current analytical results will confirm that the ash residues are non-hazardous, the quench tank, pumps, conveyors, and roll-offs can be disposed or recycled with the residue in place. If these data confirm the waste ash residues are non-hazardous, then clean closure will be achieved when there is: (1) minimal gross accumulation of loose residue on the equipment prior to transportation and (2) final removal and acceptance of the waste components at the municipal landfill or recycling facility.

The accumulation of ash on the corrugated steel metal walls of the ash load-out stall will be managed by removing the sheet metal to the height of visual accumulation of ash residues (approximately the height of the first beam). The sheet metal will be cleaned of loose debris in preparation for disposal or recycling in a manner similar to the ash management equipment located in the load-out stall and as described above. The remaining interior structural components will be pressure washed to remove ash residuals. The pressure washing activities will be followed by a visual inspection for gross accumulation and the collection and analysis of one (1), 2-point composite sample of the final rinsate water to confirm the effectiveness of the cleaning effort. The sample will be composited from the following sampling locations:

- One (1) sample collected from the ash load-out stall floor rinsate; and
- One (1) sample collected from other interior structure rinsate (i.e. beams, utility conduits, roll up door, etc.).

The collected sample will be analyzed using EPA SW-846 Method 1311 (TCLP) for metals. Clean closure will be achieved when measured concentrations of TCLP parameters are less than 40 CFR 261.24, Table 1 limits.

The closure methods and verification sampling protocol for these components will be followed for each of the ash load-out stall components associated with the two (2) MWCUs.

4.1.3.15 Waste Stream/Operational Unit No. 15 - Fly Ash Silo

This waste stream includes:

- Fly Ash Silo

Potentially-encountered waste residues include:

- None/de minimis quantities of fly ash, hydrated lime residues; and activated carbon residues.

Fly Ash Waste Characterization

The fly ash silo was only used during a trial run in 2004. The trial run did not yield favorable results thereby rendering the use of this silo obsolete. The silo has remained empty and non-operational since. The interior of the fly ash silo will be visually inspected for the presence of fly ash residues. If visual residues are present, then one (1) wipe sample will be collected from the interior walls and analyzed using EPA SW-846 Method 6010B for total metals.

Closure Procedures and Verification Method

4.1.3.16 This unit will remain in place as part of the closure. The unit will be pressure washed until residues are visually absent. Then, one (1), grab sample of the final rinsate water will be collected to confirm the effectiveness of the cleaning effort and analyzed using EPA SW-846 Method 1311 (TCLP) for metals. Clean closure will be achieved when measured concentrations of TCLP parameters are less than 40 CFR 261.24, Table 1 limits.

4.1.3.16 Waste Stream/Operational Unit No. 16 - Hydrated Lime Silo

This waste stream includes:

- Hydrated lime silo

Potentially-encountered waste residues include:

- Hydrated lime

Given the inherent characteristics of hydrated lime, this unit will be cleaned using the application of a vacuum followed by a visual inspection for gross accumulations which will suffice for closure. This unit will remain in place as part of the closure.

4.1.3.17 Waste Stream/Operational Unit No. 17 - Activated Carbon Shack

This waste stream includes:

- Carbon shack

Potentially-encountered waste residues include:

- Activated carbon

Given the inherent characteristics of activated carbon, this unit will be cleaned using the application of a vacuum or washed down followed by a visual inspection for gross accumulations which will suffice for closure. This unit will remain in place as part of the closure.

4.1.3.18 Waste Stream/Operational Unit No. 18 - Air Compressors

This waste stream includes:

- Two (2) air compressors

Potentially-encountered waste residues include:

- Hydraulic oil

The two (2) air compressor units will be removed from the Site and either sold or reused at another location. The concrete floor of the building which housed the compressors will be cleaned using a biodegradable degreaser in combination with pressure washing. A visual inspection following cleaning will suffice for closure.

4.1.4 Previously Removed Waste Processing Equipment

A shredder and a metal magnet recovery system were removed from the facility in 2014 and 2005, respectively.

4.2 Closure Verification Sampling and Analysis

4.2.1 Closure Performance Standards

Final closure will be achieved when closure performance standards are met for each waste stream/operational unit identified in this Plan, as discussed in Section 4.1.3 and summarized in Table 1, Appendix A. In addition to attaining protective levels for human health and the environment, current and reasonably-anticipated future land uses at the Facility were considerations in determining the appropriate closure performance standards.

4.2.2 Sampling and Analysis

The verification sampling approach for each waste stream/operational unit is presented in detail in Section 4.1.3 above, and is summarized in Table 1 in Appendix A. Samples will be shipped to and analyzed by an appropriately licensed commercial analytical laboratory following industry-standard quality assurance/quality control (QA/QC) and data management practices. Sampling and analyses will be performed in accordance with prevailing laws, rules, regulations, and protocols promulgated by pertinent regulatory agencies (i.e. VDEQ and EPA). The environmental laboratory will be certified or accredited by the Virginia Division of Consolidated Laboratory Services (DCLS) under the Virginia Environmental Laboratory Accreditation Program (VELAP).
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4.2.3 Procedures if Closure Performance Standards are exceeded

It is the goal of the activities outlined in the Plan to decontaminate, manage, and close the facility within the respective regulatory framework while being protective of exposures to human health and the environment.

In the event that closure performance standards cannot be achieved using the methods and approaches outlined herein and by following industry standards, additional decontamination methods may have to be applied and/or the respective units/operational component may have to be removed, managed, and disposed of as a waste in its entirety.

4.3 Waste Handling, Storage, and Disposal

4.3.1 Ash Residue

This section describes the methods, equipment, and structures necessary to prevent the uncontrolled dispersion of ash residue, considering potential pathways of human or environmental exposure, including but not limited to inhalation, direct contact, and potential for groundwater and surface water contamination.

The ash handling systems will be designed, constructed, operated, and maintained to ensure ash residue (whether bottom ash, fly ash or combined ash) is properly wetted or contained to ensure that dust emissions are controlled during on-site storage, loading, transport, and unloading.

Ash residue will be drained of free liquid before transport. The drained liquid will be combined with other wash water generated during closure activities. Ash residue transportation containers or vehicles will be watertight and leak resistant, and must be designed and constructed such that any closures at or near the bottom are sealed to prevent leakage under normal transportation conditions. Closures must be fitted with gaskets or materials that will not be deteriorated by the ash. The transport vehicle will be enclosed or covered to prevent the top surface of the load from becoming dried, resulting in fugitive emissions during transport.

Ash residues will be characterized during waste characterization sampling and will be managed according to the results of those analyses. Based on historical data, the combined waste bottom/fly ash is expected to be non-hazardous and acceptable for disposed in the municipal landfill. Additional analysis of fly ash residues at various points in the RRF process will be used to further characterize the ash residues for proper disposal. If criteria for municipal landfill disposal are not met, the hazardous ash waste will be temporarily stored onsite, separately from non-hazardous waste, and then disposed in a permitted facility licensed to handle the waste. The City will notify VDEQ of the temporary storage location for hazardous ash residues prior to commencing on-site closure activities.

4.3.2 Refractory

It is the intent to minimize the retention time for wastes or intermediates stored on-site during the decontamination and closure activities outlined herein. Any wastes or intermediaries will be stored in appropriate containers, vessels, tanks protected from the elements and nuisance. Larger quantities of wastes (such as refractories) will be placed into covered roll-off boxes until they are filled and transported off-site to the respective receiving disposal facility.

Refractory materials will be characterized during waste characterization sampling and will be managed according to the results of those analyses. If criteria for municipal landfill disposal are not met, the refractory waste will be disposed in a permitted facility licensed to handle the waste.

4.3.3 Wastewater and Solids Generated During Closure Activities

Rinsate will be collected in a temporary storage tank (such as a frac tank) staged outside of the Maintenance/Fuel Oil Storage/Air Compressor Building in the roll-off container yard. This tank will provide accumulated water/rinsate with a residence time that will allow for the settling of solids. Upon the completion of the decontamination activities, representative distinct phase samples will be collected from the water and solids contained within the tank. Analytical results of these waste characterization samples will be used to determine the ultimate management and disposal of the water and solids.

In the event that the analytical results for the containerized water are compliant with the acceptance criteria of the local POTW, the water will be discharged to the POTW after coordination with the proper authorities.

In the event that the containerized water is not compliant with the acceptance criteria by the POTW, the water will be transported to and disposed of at an appropriately-permitted treatment or disposal facility.

The soils settled in the bottom of the frac tank will be managed and disposed of based on their waste characterization at an appropriately-permitted facility. In the event that the waste characterization analyses render the solids acceptable to the currently-used municipal landfill, these solids will be transported to and disposed of at that facility. In the event that the solids cannot be disposed of at the currently-utilized municipal waste landfill, they will be transported to and disposed of at an appropriately-permitted disposal facility.

Wastewater generated by washing down components known to contain hazardous ash residue (based on waste characterization laboratory results) will be containerized, sampled, analyzed, and managed separately from wastewater generated by washing down non-hazardous residues in order to ensure proper disposal methods are used. Prior to commencing on-site closure activities, the City will notify VDEQ of the temporary storage location for wastewater generated by washing down components known to contain hazardous ash residues.

Should closure activities generate quantities of hazardous wastes (ash residue and wastewater combined) that exceed the action levels of a RCRA Conditionally Exempt Small Quantity Generator (SQG) limit of 220 pounds per month, the City will notify VDEQ as soon as it is aware of this condition.

4.4 Closure Report

At the conclusion of all closure activities, a letter report will be submitted to the VDEQ summarizing the activities performed during the RRF closure process. The letter will include a certification from a registered, professional engineer that the facility has been closed in accordance with the closure plan.

5. Closure Schedule and Cost

5.1 Objectives

In accordance with 9 VAC 20-81-360, the closure plan "*shall identify the steps necessary to completely close the facility/unit at its full operation under the permit conditions. The closure plan shall include, at least a schedule for final closure including, as a minimum, the anticipated date when wastes will no longer be received, the date when completion of final closure is anticipated, and intervening milestone dates that will allow tracking of the progress of closure."*

In addition, in accordance with 9 VAC 20-70-111, the Facility *"shall also submit to the department a revised cost estimate in current dollars when requesting a permit modification that changes the closure cost estimate….The closure cost estimate shall be based on the costs to the owner or operator of hiring a third party to close the facility. A third party may not be either a parent or a subsidiary of the owner or operator. The closure cost estimate may not incorporate any salvage value that may be realized by the sale of wastes, facility structures or equipment, land or other facility assets at the time of partial or final closures."*

5.2 Timeline of Closure Activities

The anticipated schedule for the RRF closure is attached in Appendix B.

5.3 Cost Estimate

The cost to close the Harrisonburg RRF is estimated to range from $1,500,000 to $2,000,000, in current dollars. After this Plan is approved by the VDEQ and a closure scope of work is clearly defined, a more detailed cost estimate will be obtained by the Facility through a process of soliciting bid proposals from qualified, third-party demolition contractors.

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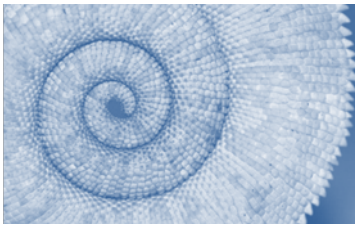
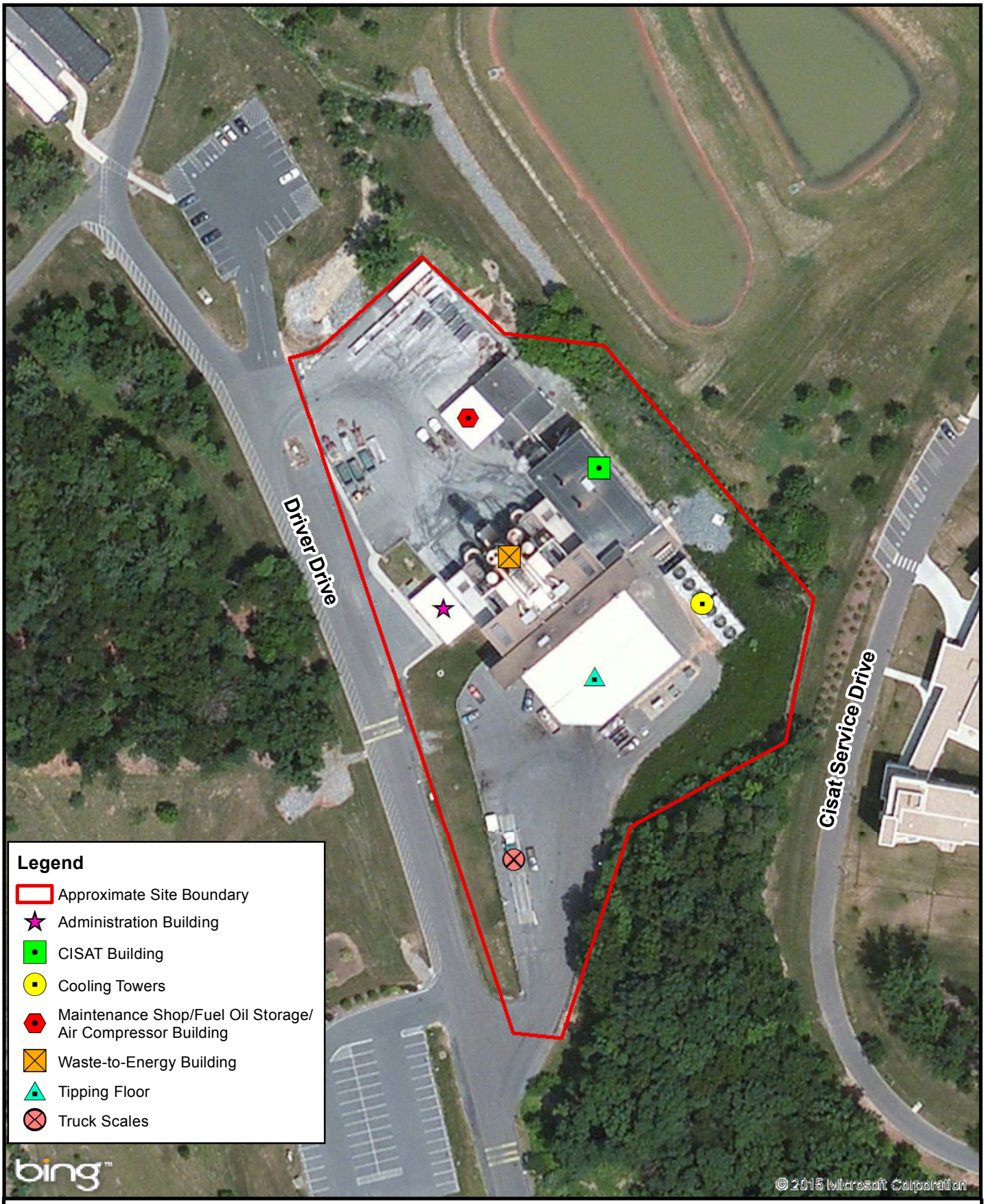
Figures





N

0 100 200 Feet

Figure 2: Site Layout Map

City of Harrisonburg
Resource Recovery Facility
1630 Driver Drive
Harrisonburg, Virginia

ERM

Figure 1: Site Location Map

USGS Harrisonburg Quad

N

0 1,000 2,000 Feet

City of Harrisonburg
Resource Recovery Facility
1630 Driver Drive
Harrisonburg, Virginia

ERM

Figure 3
City of Harrisonburg
Resource Recovery Facility
Process Flow Diagram

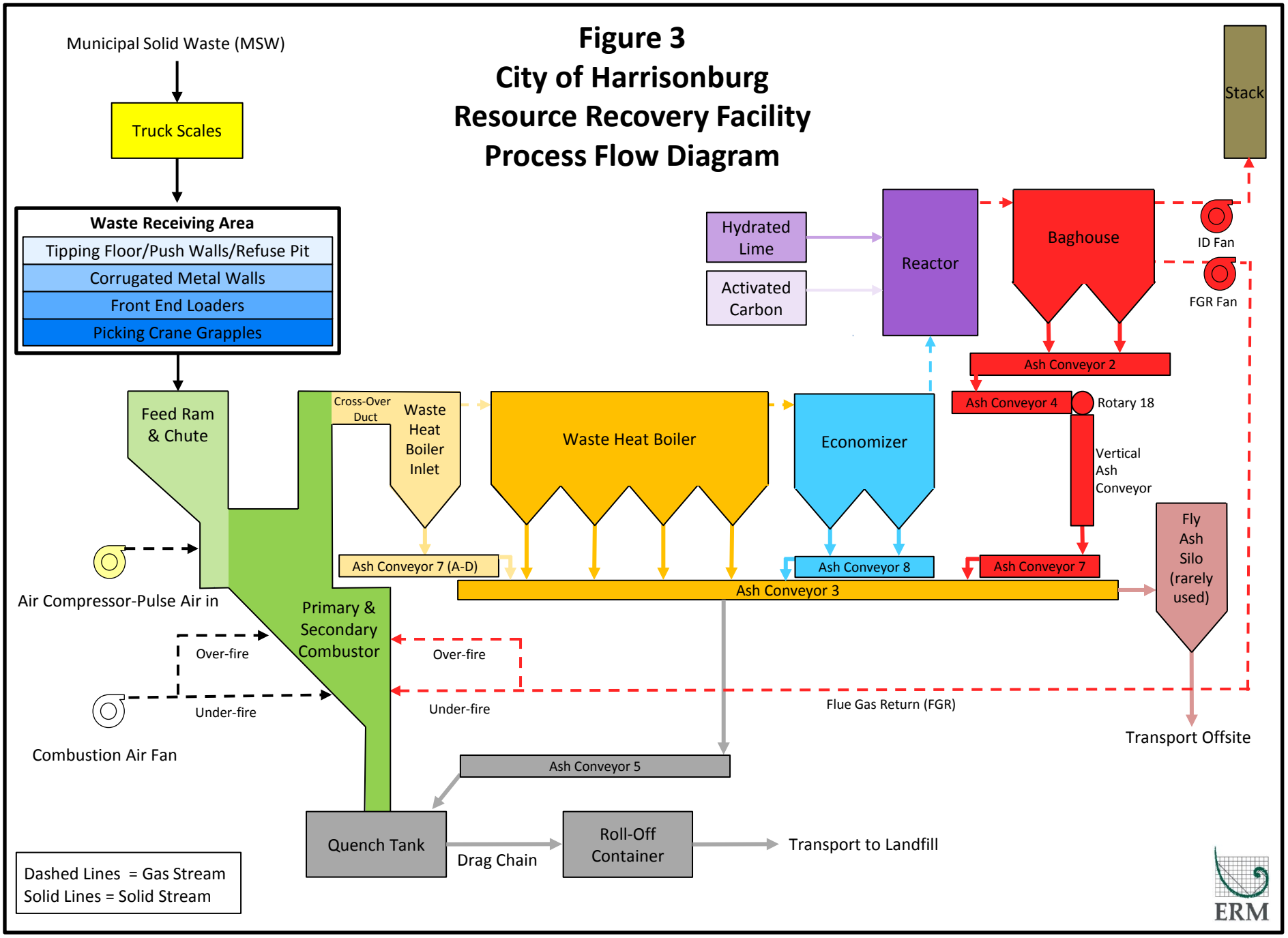
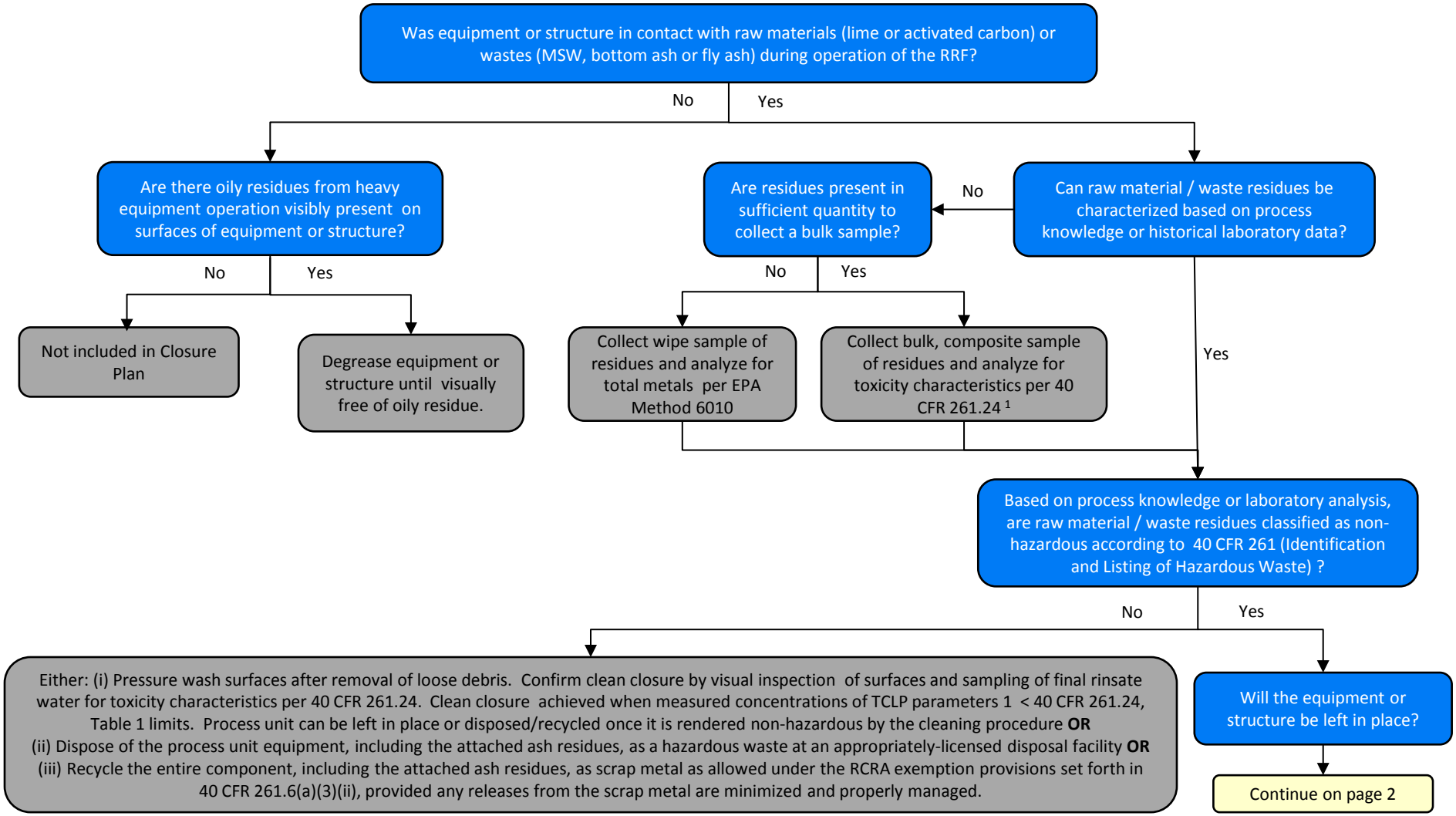
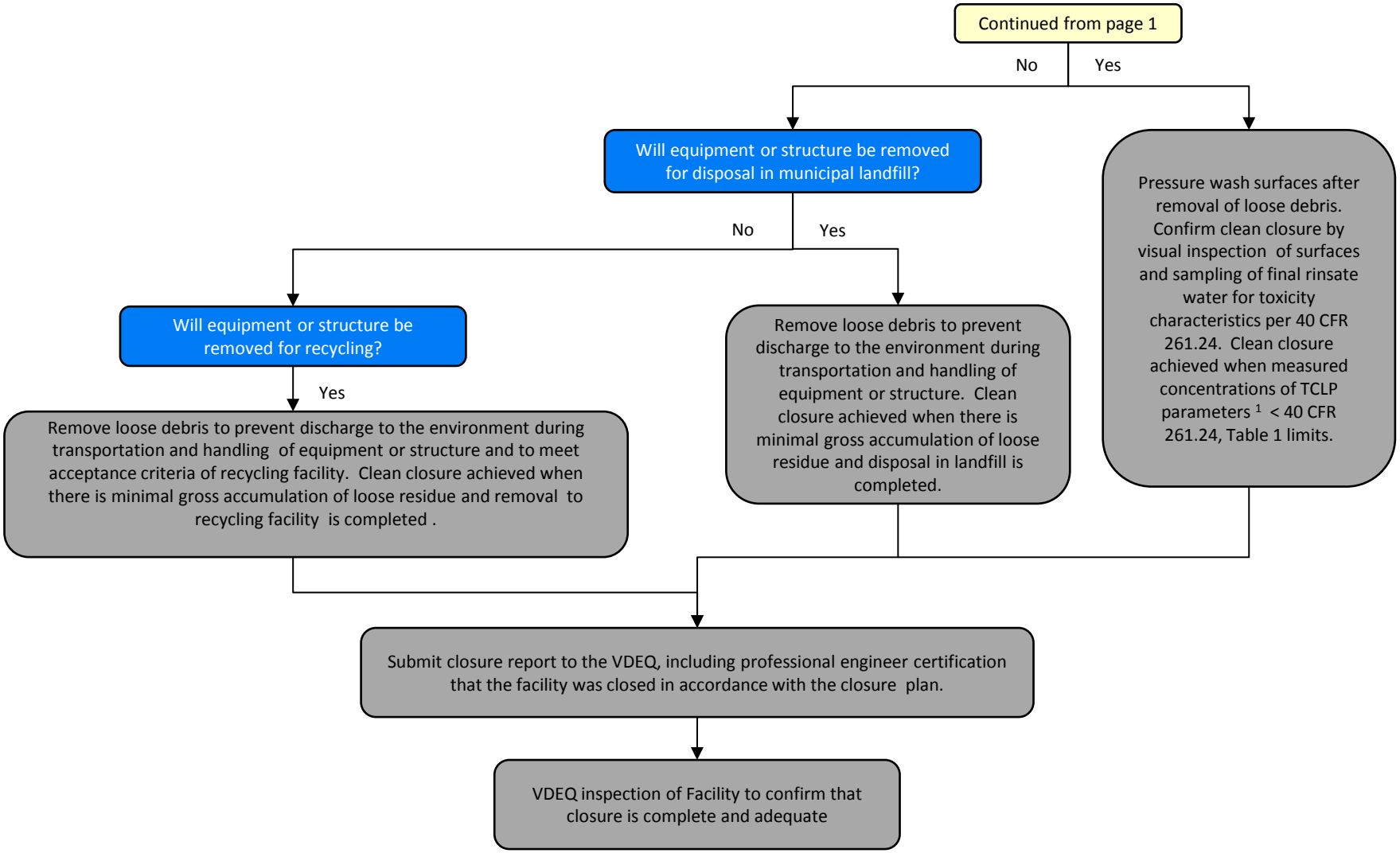


Figure 4
City of Harrisonburg Resource Recovery Facility
Closure Plan Flowchart



[1] On the intake side of operations up to and including the combustors, TCLP parameters measured will include metals , semi-volatile organic compounds (SVOCs), chlorinated pesticides and chlorinated herbicides. On the downstream side of the combustors, TCLP parameters analyzed will include metals only. Refer to Table 1 for sampling and analysis plan for each waste stream/operational unit.

Figure 4
City of Harrisonburg Resource Recovery Facility
Closure Plan Flowchart



[1] On the intake side of operations up to and including the combustors, TCLP parameters measured will include metals , semi-volatile organic compounds (SVOCs), chlorinated pesticides and chlorinated herbicides. On the downstream side of the combustors, TCLP parameters analyzed will include metals only. Refer to Table 1 for sampling and analysis plan for each waste stream/operational unit.

Appendix A

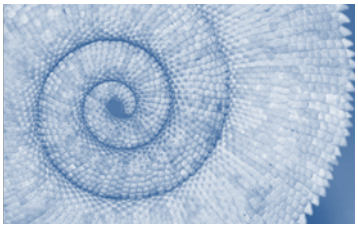


Table 1

City of Harrisonburg Resource Recovery Facility
Closure Procedures Summary Table

Waste Stream/ Operational Unit No.	Component	Potential Waste Residues	Waste Characterization						Closure Method	Post-Closure Verification						Performance Standard
			Sample Collection Method	No. of Samples Collected	Sample Locations	No. of Samples Analyzed	Parameters	Analytical Methods		Sample Collection Method	No. of Samples Collected	Sample Location	No. of Samples Analyzed	Parameters	Analytical Methods	
1	**Truck Scales**	a) None	Visual inspection for gross accumulation	NA	NA	NA	NA	NA	These components will be washed down and left in place. To be completed during a second closure phase after the tipping area is no longer used as a transfer station	Visual inspection for gross accumulation	NA	NA	NA	NA	NA	NA
2	**Tipping Floor, Push Walls, & Refuse Pit**	a) Refuse Residue	Visual inspection for gross accumulation	NA	NA	NA	NA	NA	These components will be washed down and left in place. To be completed during a second closure phase after the tipping area is no longer used as a transfer station	Visual inspection for gross accumulation; 5 grab samples of final rinsate composited to represent these components	5	Tipping Floor rinsate- 1 Push Walls rinsate - 3 Refuse Pit rinsate - 1	1 Composite Sample	TCLP Metals,SVOCs, and Chorinated Pesticides/Herbicides	EPA SW-846 Method 1311 (TCLP) 6010, 8270C, 8081 and 8151A	40 CFR 261.24 - Table 1 Limits
3	**Corrugated Metal Interior Walls (North, South, & East)**	a) Refuse Residue	Visual inspection for gross accumulation	NA	NA	NA	NA	NA	These components will be washed down and left in place. To be completed during a second closure phase after the tipping area is no longer used as a transfer station	Visual inspection for gross accumulation; 3 grab samples of final rinsate composited to represent these components	3	Corrugated Walls rinsate - 3	1 Composite Sample	TCLP Metals,SVOCs, and Chorinated Pesticides/Herbicides	EPA SW-846 Method 1311 (TCLP) 6010, 8270C, 8081 and 8151A	40 CFR 261.24 - Table 1 Limits
4	**Front End Loaders** CAT 924, CAT 908, & Back Hoe	a) Refuse residue	Visual inspection for gross accumulation	NA	NA	NA	NA	NA	These components will be washed down and left in place. To be completed during a second closure phase after the tipping area is no longer used as a transfer station	Visual inspection for gross accumulation	NA	NA	NA	NA	NA	Minimal gross accumulation
5	**Picking Crane Grapple No. 1 & 2**	a) Refuse residue b) Hydraulic Pack c) Hydraulic oil	Visual inspection for gross accumulation	NA	NA	NA	NA	NA	Both grapples will be taken down to the tipping floor, degreased and washed down. Grapples will be stored on site.	Visual inspection for gross accumulation;	NA	NA	NA	NA	NA	Minimal gross accumulation
6	**Combustor Feed Ram & Chute[1]**	a) Refuse Residue	Visual inspection for gross accumulation	NA	NA	NA	NA	NA	Wash down and leave in place	Visual inspection for gross accumulation; 2 grab samples of final rinsate from feed chute and ram and composited to represent these components	2	Feed Chute rinsate - 1 Ram rinsate- 1	1 Composite Sample	TCLP Metals,SVOCs, and Chorinated Pesticides/Herbicides	EPA SW-846 Method 1311 (TCLP) 6010, 8270C, 8081 and 8151A	40 CFR 261.24 - Table 1 Limits

Table 1

City of Harrisonburg Resource Recovery Facility
Closure Procedures Summary Table

Waste Stream/ Operational Unit No.	Component	Potential Waste Residues	Waste Characterization						Closure Method	Post-Closure Verification						Performance Standard
			Sample Collection Method	No. of Samples Collected	Sample Locations	No. of Samples Analyzed	Parameters	Analytical Methods		Sample Collection Method	No. of Samples Collected	Sample Location	No. of Samples Analyzed	Parameters	Analytical Methods	
7	**Primary Combustor[1]**	a) Refractory b) Slag from combustion of refuse c) Fly and Bottom Ash	2 ash samples will be collected from the top of the primary combusor and composited; 5 ash samples will be collected from each bottom ash hopper and composited; 2 core samples of refractory/slag will be collected and composited	Ash - 7 Refractory - 2	Top - 2 Bottom Ash Hoppers - 5	1 Composite sample of fly ash (top) 1 Composite sample of bottom ash 1 Composite sample of refractory/slag cores	TCLP Metals (ash and refractory) TCLP SVOCs, and Chorinated Pesticides/Herbicides (refractory only)	EPA SW-846 Method 1311 (TCLP) 6010, 8270C, 8081 and 8151A	Remove and dispose of refractory; Remove the combustion grates to allow access to the bottom ash hoppers and FGR ductwork. Recycle combustion grates.	Visual inspection for gross accumulation; 1 grab sample of final rinsate from primary combustor	1	Primary Combustor rinsate - 1	1 Grab Sample	TCLP Metals,SVOCs, and Chorinated Pesticides/Herbicides	EPA SW-846 Method 1311 (TCLP) 6010, 8270C, 8081 and 8151A	40 CFR 261.24 - Table 1 Limits
	Secondary Combustor[1]	a) Refractory b) Slag from combustion of refuse c) Fly and Bottom Ash	2 ash samples will be collected from the bottom of the secondary combustor and composited. 2 core samples of refractory/slag will be collected and composited	Ash - 2 Refractory - 2	Bottom - 2	1 Composite sample of fly ash 1 Composite sample of refractory/slag cores	TCLP Metals (ash and refractory) TCLP SVOCs and Chorinated Pesticides/Herbicides (refractory only)	EPA SW-846 Method 1311 (TCLP) 6010, 8270C, 8081 and 8151A		Visual inspection for gross accumulation; 1 grab sample of final rinsate from secondary combustor	1	Secondary Combustor rinsate - 1	1 Grab Sample	TCLP Metals,SVOCs, and Chorinated Pesticides/Herbicides	EPA SW-846 Method 1311 (TCLP) 6010, 8270C, 8081 and 8151A	40 CFR 261.24 - Table 1 Limits

Table 1

City of Harrisonburg Resource Recovery Facility
Closure Procedures Summary Table

Waste Stream/ Operational Unit No.	Component	Potential Waste Residues	Waste Characterization						Closure Method	Post-Closure Verification						Performance Standard
			Sample Collection Method	No. of Samples Collected	Sample Locations	No. of Samples Analyzed	Parameters	Analytical Methods		Sample Collection Method	No. of Samples Collected	Sample Location	No. of Samples Analyzed	Parameters	Analytical Methods	
8	**Crossover Duct Work**[1]	a) Refractory b) Slag from combustion of refuse c) Fly Ash	4 ash samples will be collected from the boiler inlet unit and crossover duct and composited to represent these components. 2 core samples of the refractory/slag will be collected and composited	Ash-2 Refractory - 2	Access Ports - 2	1 Composite sample of ash 1 Composite sample of refractory/slag cores	TCLP Metals	EPA SW-846 Method 1311 (TCLP) - 6010	Vacuum interior of crossover duct work and remove refractory lining; leave metal skin of duct in place	Visual inspection for gross accumulation; 1 grab sample of final rinsate from cross-over duct	1	Cross-over duct rinsate - 1	1 Grab sample	TCLP Metals	EPA SW-846 Method 1311 (TCLP) - 6010	40 CFR 261.24 - Table 1 Limits
	Waste Heat Boiler Inlet & Hopper B-5[1]	a) Fly Ash		2	Inlet-1 Hopper -1				Vacuum and wash down interior of boiler inlet unit and leave in place	Visual inspection for gross accumulation 1 grab sample of final rinsate water from boiler inlet	1	Boiler Inlet rinsate- 1	1 Grab sample	TCLP Metals	EPA SW-846 Method 1311 (TCLP) - 6010	40 CFR 261.24 - Table 1 Limits
	Ash Conveyors[1] (Boiler Inlet) No. 7 (A-D)	a) Fly Ash		0	NA				Remove ash conveyor and dispose/recycle. If hazardous ash is present, dispose of conveyors and attached ash residue in appropriately-licenced facility or recycle as scrap metal as allowed under the RCRA exemption provided in 40 CFR 261.6(a)(3)(ii)	Visual inspection for gross accumulation unless hazardous. If hazardous, closure verified through proper hazardous waste disposal or recycling under the RCRA exemption provision.	NA	NA	NA	NA	NA	Minimum gross accumulation and proper disposal
9	**Waste Heat Boiler & Hopper(s) B-1, B-2, B-3, & B-4**[1]	a) Fly Ash	8 samples will be collected from the boiler and composited to represent these components	8	Inlet-1 Outlet-1 Bottom Hoppers-4 Side Door-2	1 Composite Sample	TCLP Metals	EPA SW-846 Method 1311 (TCLP) - 6010	Vacuum and wash down interior of boiler and leave in place.	Visual inspection for gross accumulation 1 grab sample of final rinsate water from boiler	1	Boiler rinsate -1	1 Grab Sample	TCLP Metals	EPA SW-846 Method 1311 (TCLP) - 6010	40 CFR 261.24 - Table 1 Limits
	Ash Conveyors[1] (Boiler Hoppers) No. 3	a) Fly Ash combined with, b) Hydrated Lime, and c) Activated Carbon		0	NA				Remove ash conveyor and dispose/recycle. If hazardous ash is present, dispose of conveyors and attached ash residue in appropriately-licenced facility or recycle as scrap metal as allowed under the RCRA exemption provided in 40 CFR 261.6(a)(3)(ii)	Visual inspection for gross accumulation unless hazardous. If hazardous, closure verified through proper hazardous waste disposal or recycling under the RCRA exemption provision.	NA	NA	NA	NA	NA	Minimum gross accumulation and proper disposal
10	**Economizer & Hopper(s) E-3, E-4**[1]	a) Fly Ash	5 samples will be collected from the economizer and downstream flue gas duct and composited to represent these components.	4	Inlet-1 Outlet-1 Bottom Hoppers-2	1 Composite Sample	TCLP Metals	EPA SW-846 Method 1311 (TCLP) - 6010	Vacuum and wash down interior of economizer and downstream flue gas duct and dispose/recycle. If hazardous , either clean as stated above prior to disposal/recycle as a nonhazardous waste; or recycle the entire component, including attached ash residues, as allowed under the RCRA exemption provided in 40 CFR 261.6(a)(3)(ii)	Visual inspection for gross accumulation unless hazardous. If hazardous, 1 grab sample of final rinsate water to verify adequate cleaning prior to disposal/recycling as non-hazardous waste; or visual inspection prior to recycling under the RCRA exemption provision.	1	Economizer rinsate -1	1 Grab Sample	TCLP Metals	EPA SW-846 Method 1311 (TCLP) - 6010	40 CFR 261.24 - Table 1 Limits
	Flue Gas Duct[1] Economizer to Reactor	a) Fly Ash		1	Access port - 1											
	Ash Conveyor[1] (Economizer) No. 8	a) Fly Ash		0	NA				Remove ash conveyor and dispose/recycle. If hazardous ash is present, dispose of conveyors and attached ash residue in appropriately-licenced facility or recycle as scrap metal as allowed under the RCRA exemption provided in 40 CFR 261.6(a)(3)(ii)	Visual inspection for gross accumulation unless hazardous. If hazardous, closure verified through proper hazardous waste disposal or recycling under the RCRA exemption provision.	NA	NA	NA	NA	NA	Minimum gross accumulation and proper disposal

Table 1

City of Harrisonburg Resource Recovery Facility
Closure Procedures Summary Table

Waste Stream/ Operational Unit No.	Component	Potential Waste Residues	Waste Characterization						Closure Method	Post-Closure Verification						Performance Standard
			Sample Collection Method	No. of Samples Collected	Sample Locations	No. of Samples Analyzed	Parameters	Analytical Methods		Sample Collection Method	No. of Samples Collected	Sample Location	No. of Samples Analyzed	Parameters	Analytical Methods	
11	**Reactor[1]**	a) Fly Ash combined with, b) Hydrated Lime, and c) Activated Carbon	3 samples will be collected from the bottom of the Reactor and composited.	3	Inlet-3	1 Composite Sample	TCLP Metals	EPA SW-846 Method 1311 (TCLP) - 6010	Vacuum and wash down interior of economizer and downstream flue gas duct and dispose/recycle. If hazardous , either clean as stated above prior to disposal/recycle as a nonhazardous waste; or recycle the entire component, including attached ash residues, as allowed under the RCRA exemption provided in 40 CFR 261.6(a)(3)(ii)	Visual inspection for gross accumulation unless hazardous. If hazardous, 1 grab sample of final rinsate water to verify adequate cleaning prior to disposal/recycling as non-hazardous waste; or visual inspection prior to recycling under the RCRA exemption provision.	1	Reactor rinsate - 1	1 Grab Sample	TCLP Metals	EPA SW-846 Method 1311 (TCLP) - 6010	40 CFR 261.24 - Table 1 Limits
12	**Baghouse & Hopper(s) B-5, B-6[1]**	a) Fly Ash combined with, b) Hydrated Lime, and c) Activated Carbon	2 samples will be collected from the baghouse and composited to represent these components.	2	Bottom Hoppers-2	1 Composite Sample	TCLP Metals	EPA SW-846 Method 1311 (TCLP) - 6010	*Baghouse:* Remove bags from baghouse and dispose; vacuum and wash down interior of baghouse and leave in place.	Visual inspection for gross accumulation; 1 grab sample of final rinsate water from baghouse	1	Baghouse rinsate- 1	1 Grab sample	TCLP Metals	EPA SW-846 Method 1311 (TCLP) - 6010	40 CFR 261.24 - Table 1 Limits
	Ash Conveyors (Baghouse)[1] No. 2, 4, 7, Rotary 18, and Vertical Ash Conveyor	a) Fly Ash combined with, b) Hydrated Lime, and c) Activated Carbon		0	NA				*Ash Conveyors, Flue Gas Ducts, and ID Fan* : remove and dispose/recycle	Visual inspection for gross accumulation	NA	NA	NA	NA	NA	Minimal gross accumulation
	Flue Gas Duct[1] Reactor to Baghouse	a) Fly Ash combined with, b) Hydrated Lime, and c) Activated Carbon		0	NA											
	Flue Gas Return Duct[1] Baghouse to Combustor	a) Fly Ash combined with, b) Hydrated Lime, and c) Activated Carbon		0	NA											
	Flue Gas Duct[1] Baghouse to Stack	a) Fly Ash combined with, b) Hydrated Lime, and c) Activated Carbon		0	NA											
	ID Fan[1]	a) Fly Ash combined with, b) Hydrated Lime, and c) Activated Carbon		0	NA											
13	**Stack**	a) Fly Ash combined with, b) Hydrated Lime, and c) Activated Carbon; d) Refractory	Wipe sample of interior of stack	2	Stack interior wall	2 wipe sample, one from each of the two internal flue stacks	Total Metals	EPA SW-846 Method 6010	Wash down stack interior and leave in place	Grab sample of final rinsate water	2	Stack rinsate - 2	2 Grab Samples	TCLP Metals	EPA SW-846 Method 1311 (TCLP) - 6010	40 CFR 261.24 - Table 1 Limits

Table 1

City of Harrisonburg Resource Recovery Facility
Closure Procedures Summary Table

Waste Stream/ Operational Unit No.	Component	Potential Waste Residues	Waste Characterization						Closure Method	Post-Closure Verification						Performance Standard
			Sample Collection Method	No. of Samples Collected	Sample Locations	No. of Samples Analyzed	Parameters	Analytical Methods		Sample Collection Method	No. of Samples Collected	Sample Location	No. of Samples Analyzed	Parameters	Analytical Methods	
14	**Quench Tank, Recirculation Pumps[1]**	a) Bottom Ash b) Fly Ash combined with, c) Hydrated Lime, and d) Activated Carbon	Historical quarterly ash sample results will be used to characterize the demolition debris for disposal; 3 samples will be collected from the quench tank, ash conveyor and roll-off container and composited	1	Side door - 1	1 Composite Sample	TCLP Metals	EPA SW-846 Method 1311 (TCLP) - 6010	Remove and dispose/recycle quench tank, recirculation pumps, drag chain, conveyors, and roll-off containers; Wash down interior of ash loadout stall and leave in place, except remove and dispose of corrugated metal wall containing gross accumulation of ash (to height of first beam)	Visual inspection for gross accumulation on equipment to be disposed/recycled; 2 grab samples of final rinsate from ash load-out floor and ash load-out interior and composited to represent these components	2	Ash load-out floor rinsate - 1; Ash Load-out Interior rinsate - 1	1 Composite Sample	TCLP Metals	EPA SW-846 Method 1311 (TCLP) - 6010	Minimal gross accumulation on quench tank, recirculation pumps, drag chain, conveyors, and roll-off containers; 40 CFR 261.24 - Table 1 Limits for ash load-out stall
	Ash Conveyors[1] (To Ash Container) No. 5	a) Bottom Ash b) Fly Ash combined with, c) Hydrated Lime, and d) Activated Carbon		1	Conveyor -1											
	Ash Load-out Stall (WTE Building)[1]	a) Bottom Ash b) Fly Ash combined with, c) Hydrated Lime, and d) Activated Carbon		NA	NA											
	Ash Roll-off Containers	a) Bottom Ash b) Fly Ash combined with, c) Hydrated Lime, and d) Activated Carbon		1	Roll-off - 1											
15	**Fly Ash Silo**	a) Fly Ash combined with, b) Hydrated Lime, and c) Activated Carbon	Wipe Sample	1	Walls/bottom	1 Wipe Sample	Total Metals	EPA SW-846 Method 6010	Wash down and leave in place	Visual inspection for gross accumulation; Grab sample of final rinsate water	1	Silo rinsate - 1	1 Grab Samples	TCLP Metals	EPA SW-846 Method 1311 (TCLP) - 6010	40 CFR 261.24 - Table 1 Limits
16	**Hydrated Lime Silo**	a) Hydrated lime	Visual inspection for gross accumulation	NA	NA	NA	NA	NA	This component will be vacuumed at the bottom of the distribution system and left in place	Visual inspection for gross accumulation	NA	NA	NA	NA	NA	Minimal gross accumulation
17	**Activated Carbon Building**	a) Activated Carbon	Visual inspection for gross accumulation	NA	NA	NA	NA	NA	This component will be vacuumed at the bottom of the distribution system and left in place	Visual inspection for gross accumulation	NA	NA	NA	NA	NA	Minimal gross accumulation
18	**Air Compressors**	a) Hydraulic oil	Visual inspection for gross accumulation	NA	NA	NA	NA	NA	Floor will be degreased from oil residue. Air compressors will be removed from the Site	Visual inspection for gross accumulation	NA	NA	NA	NA	NA	Minimal gross accumulation

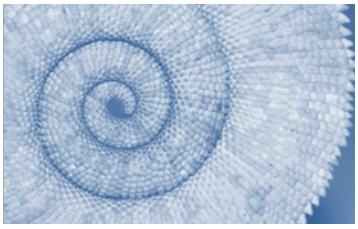
Table 1

City of Harrisonburg Resource Recovery Facility
Closure Procedures Summary Table

Waste Stream/ Operational Unit No.	Component	Potential Waste Residues	Waste Characterization						Closure Method	Post-Closure Verification						Performance Standard
			Sample Collection Method	No. of Samples Collected	Sample Locations	No. of Samples Analyzed	Parameters	Analytical Methods		Sample Collection Method	No. of Samples Collected	Sample Location	No. of Samples Analyzed	Parameters	Analytical Methods	
NA	**Shredder**	In January 2014, the shredder was removed from Facility (No longer permitted)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	**Metal Recovery Magnet System**	In 2005, the equipment was physically removed from Facility	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

[1] Sampling and analysis for waste characterization and closure verification represents one of the two identical, parallel Municipal Waste Combustion Units (MWCUs). The same sampling frequency, analytical parameters/ methods, and performance standards will be used for both MWCUs.

Appendix B

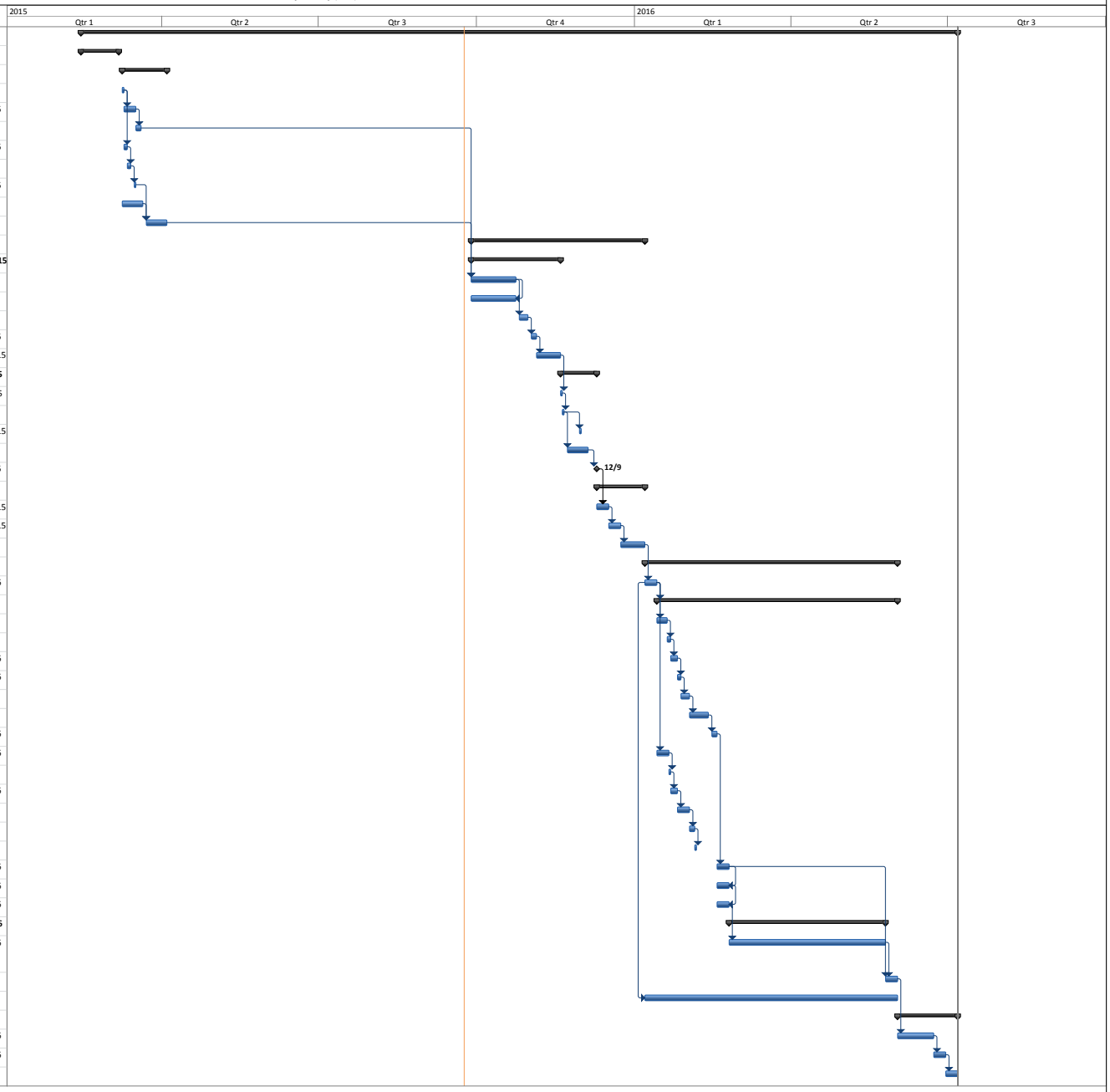


Preliminary Schedule

CITY OF HARRISONBURG
Harrisonburg, VA
Resource Recovery Facility (RRF) Closure

ERM

ID	Task Mode	Task Name	Duration	Start	Finish
1		**Project Activities**	**364 days**	**Fri 2/13/15**	**Wed 7/6/16**
2		**Initial Planning Activities**	**16 days**	**Fri 2/13/15**	**Fri 3/6/15**
6		**Phase I - Regulatory Review**	**20 days**	**Mon 3/9/15**	**Fri 4/3/15**
7		Site Visit & Interview Process	1 day	Mon 3/9/15	Mon 3/9/15
8		Review Regulations & Matrix	5 days	Tue 3/10/15	Mon 3/16/15
9		Finalize Regulatory Matrix	3 days	Tue 3/17/15	Thu 3/19/15
10		Develop Waste Stream Characterization Plan	2 days	Tue 3/10/15	Wed 3/11/15
11		Perform Waste Stream Characterization of facility	2 days	Thu 3/12/15	Fri 3/13/15
12		Submit Waste Stream Characterization Summary	1 day	Mon 3/16/15	Mon 3/16/15
13		Re-Write Closure Plan	10 days	Mon 3/9/15	Fri 3/20/15
14		Project Team and VDEQ Meetings	10 days	Mon 3/23/15	Fri 4/3/15
15		**Phase II - Project Manual & Bid Process**	**73 days**	**Mon 9/28/15**	**Wed 1/6/16**
16		**Develop Project Manual**	**38 days**	**Mon 9/28/15**	**Wed 11/18/15**
17		Develop Project Manual	20 days	Mon 9/28/15	Fri 10/23/15
18		Qualify Contractors	20 days	Mon 9/28/15	Fri 10/23/15
19		City of Harrisonburg Review of Project Manual	5 days	Mon 10/26/15	Fri 10/30/15
20		Revise Project Manual	3 days	Mon 11/2/15	Wed 11/4/15
21		City of Harrisonburg Approval of Project Manual	10 days	Thu 11/5/15	Wed 11/18/15
22		**Complete Bid Process**	**15 days**	**Thu 11/19/15**	**Wed 12/9/15**
23		Disseminate Bids	1 day	Thu 11/19/15	Thu 11/19/15
24		Bid Walk	1 day	Fri 11/20/15	Fri 11/20/15
25		Second Bid Walk	1 day	Mon 11/30/15	Mon 11/30/15
26		Bid Question & Answer Period	10 days	Mon 11/23/15	Fri 12/4/15
27		Bid Due Date	0 days	Wed 12/9/15	Wed 12/9/15
28		**Complete Contract Award**	**20 days**	**Thu 12/10/15**	**Wed 1/6/16**
29		Bid Evaluation Period	5 days	Thu 12/10/15	Wed 12/16/15
30		Contract Award	5 days	Thu 12/17/15	Wed 12/23/15
31		Contractor Submissions	10 days	Thu 12/24/15	Wed 1/6/16
32		**Phase III - Onsite DDD Activities**	**105 days**	**Thu 1/7/16**	**Wed 6/1/16**
33		Mobilization	5 days	Thu 1/7/16	Wed 1/13/16
34		**Decontamination Work**	**100 days**	**Thu 1/14/16**	**Wed 6/1/16**
35		Baghouse	4 days	Thu 1/14/16	Tue 1/19/16
36		Tipping Floor	2 days	Wed 1/20/16	Thu 1/21/16
37		Pit	2 days	Fri 1/22/16	Mon 1/25/16
38		Crane/Rail/Chute	2 days	Tue 1/26/16	Wed 1/27/16
39		Build Scaffold	3 days	Thu 1/28/16	Mon 2/1/16
40		Chamber/Econimizer	9 days	Tue 2/2/16	Fri 2/12/16
41		Bottom Ash Area	3 days	Mon 2/15/16	Wed 2/17/16
42		Reactor	5 days	Thu 1/14/16	Wed 1/20/16
43		Stack	1 day	Thu 1/21/16	Thu 1/21/16
44		Quench Tank	2 days	Fri 1/22/16	Mon 1/25/16
45		Waste-to-Energy Building	5 days	Tue 1/26/16	Mon 2/1/16
46		Lime Silo	3 days	Tue 2/2/16	Thu 2/4/16
47		Activated Carbon Building	1 day	Fri 2/5/16	Fri 2/5/16
48		Ductwork	5 days	Thu 2/18/16	Wed 2/24/16
49		Waste Disposal	5 days	Thu 2/18/16	Wed 2/24/16
50		SAP Implementation	5 days	Thu 2/18/16	Wed 2/24/16
51		**Demolition**	**65 days**	**Thu 2/25/16**	**Wed 5/25/16**
52		Demolition of Equipment, Stack, Associated ESP, Piping and Structures	65 days	Thu 2/25/16	Wed 5/25/16
53		Demobilization	5 days	Thu 5/26/16	Wed 6/1/16
54		ERM Oversight	105 days	Thu 1/7/16	Wed 6/1/16
55		**Phase IV - Final Report**	**25 days**	**Thu 6/2/16**	**Wed 7/6/16**
56		Develop Final Report Draft	15 days	Thu 6/2/16	Wed 6/22/16
57		City of Harrisonburg Review of Final Report Draft	5 days	Thu 6/23/16	Wed 6/29/16
58		Revise & Submit Final Report	5 days	Thu 6/30/16	Wed 7/6/16



Project: 20150218_COH_VA_Sche
Date: Thu 9/24/15

Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | Deadline | Progress