PERMIT ATTACHMENT
SECTION D

This document was not altered from the April 2016 Application.

PROCESS INFORMATION

September 2018

SECTION
D

PROCESS INFORMATION

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D.1 INTRODUCTION

This section presents a description of the design and operation of the Siemens Industry, Inc. (SII) carbon reactivation facility. In the November 1995 RCRA Part B permit application, SII discussed an existing carbon reactivation furnace (RF-1) and a future second carbon reactivation furnace (RF-2) that SII expected to install at the facility. Currently, the second carbon reactivation furnace (RF-2) is now operational and the original carbon reactivation furnace (RF-1) was shut down in June 1996, and will not be returned to service. RF-1 will undergo RCRA closure upon final approval of a closure plan submitted to EPA. With the exception of a RCRA Closure Plan prepared specifically for the old RF-1 unit, the RCRA Part A and Part B Permit Applications will only discuss the second carbon reactivation furnace that will continue to be abbreviated in the permit applications as RF-2.

The facility reactivates spent carbon, which, in some cases, may be classified as a RCRA hazardous waste. The facility's container storage area is currently regulated under the provisions found in 40 CFR 264 Subpart I (Use and Management of Containers). The facility's five spent carbon storage tanks are currently regulated under the 40 CFR 264 Subpart J (Tank Systems) requirements. The facility's reactivation unit and its associated air pollution control equipment are currently regulated under the 40 CFR 264 Subpart X (Miscellaneous Units) requirements. The Subpart X classification for carbon reactivation units is consistent with the discussion concerning carbon reactivation units found on page 7200 of the February 21, 1991 Federal Register.

As per the regulations specified in 40 CFR 264.601 and discussions with EPA Region IX, RF-2 underwent a Performance Demonstration Test in March of 2006 that incorporated emission standard requirements from the Hazardous Waste Combustor Maximum Achievable Control Technology (HWC MACT) regulations in 40 CFR 63 Subpart EEE. A copy of the Performance Demonstration Test Plan and the Test Report for RF-2 can be found in Appendix V.

Some of the tank systems referenced in this permit application (including without limitation T-9, T-19, T-11, and wastewater treatment equipment) are not subject to the provisions of 40 CFR Part 264 or 40 CFR Part 270 because they are part of exempt units, including wastewater treatment units and elementary neutralization units. In addition, some of the processes referenced in this permit application (including without limitation the facility's recycle water storage and transport system) are not subject to the provisions of 40 CFR Part 264 or 40 CFR Part 270 because they do not involve the management of a hazardous or solid waste. These tank systems and processes are described in this permit application in order to provide a complete description of the carbon reactivation process and are not intended to be incorporated into the facility's RCRA permit.

D.1.1 FACILITY OVERVIEW

Process flow diagrams of the carbon reactivation process are shown in Drawings PC-1466-

PR-003 and 004 located in Appendix VI. It is important to note that drawings referenced in this permit application include many components of the facility that are exempt from permitting under various provisions of RCRA. These components are provided for informational purposes and ease of review only, and they are not intended to become regulated components of the facility. Spent carbon slurry is fed from the Furnace Feed Tank T-18 into a dewatering screw where the carbon is dewatered prior to introduction into the Carbon Reactivation Furnace (RF-2). Water from the dewatering screw is returned to the recycle water storage tank. RF-2 is a multiple hearth furnace consisting of five hearths. The spent carbon is introduced into the top hearth and flows downward through the remaining four hearths. Reactivated carbon exits the bottom hearth through a cooling screw. RF-2 is equipped with a primary combustion air fan and two shaft cooling fans. Natural gas burners are provided to ensure adequate heat input to the reactivation unit for all of the spent carbons that are reactivated at the facility. The hot gases generated in RF-2 are routed to an afterburner to ensure the thermal oxidation of organic matter that is not oxidized in the reactivation unit. The afterburner is equipped with two burners that utilize natural gas as the fuel source. From the afterburner, the gases are quenched by direct water contact and routed through a variable throat venturi scrubber for particulate matter control. From the venturi scrubber, the gases are routed to a packed bed scrubber for acid gas control. From the packed bed scrubber, the gases flow through a wet electrostatic precipitator, used for fine particulate matter and metals control. From the wet electrostatic precipitator, the gases are routed through a stack to the atmosphere. The motive force for moving the gases through the air pollution control system is supplied by an induced draft fan.

A pH-controlled scrubbing medium (water and caustic solution) is supplied to the air pollution control system from the scrubber water system. The pH is continuously monitored to ensure efficient acid gas removal in both the gas cooler/venturi scrubber and the packed bed scrubber. Caustic is added based on the pH of the scrubber water.

The air pollution control equipment uses a recycle water system. A portion of the scrubber water in the system is continuously discharged (blowdown).

Scrubber blowdown from RF-2 air pollution control equipment is treated in an exempt wastewater treatment unit, or discharged directly to the POTW. The discharge to the POTW is continuously monitored for pH, total dissolved solids, flow and temperature to ensure compliance with the discharge limitations found in the facility's industrial wastewater discharge permit.

D.1.2 CARBON REACTIVATION PROCESS

The carbon reactivation process involves various thermal mechanisms that are discussed in the following section:

Following dewatering the spent granular carbon is fed to the top section of the multiple-hearth furnace. In the pre-drying and drying zones (the top hearths) the water retained in the pores and the surface of the carbon is evaporated by the counter-current flow of hot combustion gases coming from the lower hearths. The temperature of the carbon is raised in the top hearths to approximately 210°F. Upon application of heat, water will evaporate freely when the carbon particle temperature goes over 200°F. The adsorbed water is freed at temperatures of approximately 212°F to 230°F.

Upon the application of heat to the carbon particles at temperatures over 600°F, the high molecular weight organic impurities adsorbed in the carbon will crack to produce gaseous hydrocarbons, hydrogen, and water vapor which escape the pores of the granular carbon while some fixed carbon is retained in the pores of the carbon particles. In these pre-heating and decomposition zones (middle hearths) the temperature of the carbon is increased to about 750°F in a virtually oxygen-free atmosphere. Under these conditions the adsorbed organic impurities in the pores of the carbon are pyrolyzed and all volatile materials are driven off.

By the time the carbon reaches 1200°F, there is little or none of the original adsorbed organic impurities remaining. However, the carbon is not fully regenerated at this point. Carbonaceous residue remaining within the pores of the carbon particles restricts the adsorption capacity and must be removed. The carbonaceous residue is treated in the final heat up and gasification zones (lower hearths) in a way which avoids damage to the original pore structure of the carbon. Gas-phase temperatures from 1350°F to 1650°F are typical for this final step of the thermal regeneration process.

D.1.3 FACILITY CONTAINER STORAGE CAPACITY

The container storage capacity designated in the facility's Part A application is 100,000 gallons. The location of this container storage area (S01) is shown on Drawing No. D14789-02 which can be found in Appendix III. Drawing No. D14789-02 depicts the layout of the facility.

D.2 PROCESS SUMMARY

The following sections, along with the piping and instrumentation diagrams and flow diagrams found in Appendix VI, present an overview of the equipment used at the facility and the flow of carbon through the facility. Detailed descriptions of the RCRA-regulated components can be found in specific sections of Section D.

DRAWING NO.	REV. NO.	TITLE	LOCATION PART B
PC-1466-PR-003	P4	Liquid Phase Carbon Process Flow Diagram -- Balance for RF-2	Appendix VI
PC-1466-PR-004	P4	Vapor Phase Carbon Process Flow Diagram -- Balance for RF-2	Appendix VI
D11135-200	3	Legend and Specialty Items	Appendix VI
D11135-201	3	Spent Carbon Storage/H-1	Appendix VI
D11135-202	3	Spent Carbon Storage/H-2	Appendix VI
D11135-203	3	Recycle Water	Appendix VI
D11135-205	3	Process Water Discharge to POTW	Appendix VI
D11135-211	3	Utilities -Natural Gas, Plant Water, Steam	Appendix VI
D11135-213	3	Reactivation Unit No. 2 Feed System	Appendix VI
D11135-214	3	Reactivation Unit No. 2	Appendix VI
D11135-215	3	Reactivation Unit No. 2 Product Handling	Appendix VI
D11135-216	3	Reactivation Unit No. 2 Off Gas Scrubber	Appendix VI
D11135-217	3	Reactivation Unit No. 2 Process Water	Appendix VI

D.2.1 SPENT CARBON RECEIPT AND STORAGE

Spent carbon is received by truck in containers (i.e., drums, vessels, supersacks, roll-off bins, etc.) or in tank trucks. Following inspection and acceptance at the facility, containerized spent carbon is unloaded in the unloading and receiving area where it is inspected and sampled. If the load is accepted for treatment, the containerized spent carbon is transferred into one of the four spent carbon storage tanks (T-1, T-2, T-5, T-6) via a feed hopper or moved to the Container Storage Area.

Spent carbon received in large containers, such as roll-offs, is typically transferred directly to the spent carbon storage tanks via feed hopper H-1. Spent carbon received in smaller containers, such as drums, is typically moved to the container storage area in the containers in which it was received and subsequently transferred to the spent carbon storage tanks via feed hopper H-2. The containerized spent carbon is transferred to the storage tanks via a hopper because it cannot be pumped directly from the container to the storage tank. Water is added as the carbon passes through the hopper to facilitate removal of the spent carbon from the hopper via an eductor. The carbon is transferred to the storage tanks as a water-carbon slurry. Both H-1 and H-2 are part of the feed system, and are equipped with covers and with a dust collection system. The hoppers and other components of the feed system are constructed of mild steel.

The trucks carrying the bulk loads are retained in the unloading and receiving area and the spent carbon is inspected and sampled. If the shipment is accepted for treatment, the spent carbon is transferred in slurry form to one of the four spent carbon storage tanks, directly or via feed hopper H-1. From the spent carbon storage tanks, the carbon is transferred in slurry form to the Furnace Feed Tank (T-18). Water used in the transfer process is supplied from the recycle water system which consists of a recycle water storage tank (T-9) and associated valves and piping.

D.2.2 CARBON REACTIVATION UNIT (RF-2)

From Furnace Feed Tank (T-18), the spent carbon slurry is fed into a dewatering screw (C-5) where the carbon is dewatered prior to introduction into RF-2. Water from the dewatering screw is returned to the recycle water storage tank. The reactivation unit is a multiple hearth furnace consisting of five hearths. The spent carbon is introduced into the top hearth and flows downward through the remaining four hearths. Reactivated carbon exits the bottom hearth through a cooling screw. RF-2 is equipped with a primary combustion air fan (B-7) and two shaft cooling fans (B-8A and B-8B). For some of the spent carbons reactivated at the facility, the volatile organic matter desorbed from the spent carbon is the primary source of fuel to provide the heat required to reactivate the spent carbon. Natural gas burners are provided to ensure adequate heat input to the reactivation unit for all of the spent carbons that are reactivated at the facility.

D.2.3 REACTIVATED CARBON PACKAGING AND SHIPPING PROCESS

Currently, reactivated carbon product from the cooling screw enters a transporter and is transferred to product storage tanks S-2, S-3 and S-4. The product is transported from a product storage tank to the screening and packaging facilities which are located within the product packaging building.

D.2.4 REACTIVATION UNIT AIR POLLUTION CONTROL PROCESS

RF-2 is equipped with dedicated air pollution control equipment. The hot gases generated in RF-2 are routed to an afterburner (AB-2) to ensure the thermal oxidation of organic matter that is not oxidized in the reactivation unit. The afterburner is designed to provide a minimum destruction and removal efficiency (DRE) of 99.99 percent. The afterburner is equipped with two burners that utilize natural gas as the fuel source. From the afterburner, the gases are routed through a rapid quench system and variable throat venturi scrubber (SC-11) for particulate matter control.

From the venturi scrubber, the gases are routed to a packed bed scrubber (SC-12) for acid gas control. The design efficiency of the packed bed scrubber is 99 percent for HCl removal. The pH-controlled scrubbing medium is supplied from the scrubber water system which is described below.

From the packed bed scrubber, the gases are routed through a wet electrostatic precipitator (W-11). The design criteria of the wet electrostatic precipitator combined with the venturi scrubber is 0.015 grains per dry standard cubic foot corrected to 7% oxygen. From the wet electrostatic precipitator, the gases are routed by an induced draft fan (B-15) through a stack to the atmosphere.

D.2.5 SCRUBBER WATER PROCESS

The air pollution control equipment for the reactivation unit requires a scrubbing medium for acid gas control. The scrubbing medium is supplied via a recycle system. A portion of the scrubber water in the system is continuously discharged (blowdown) in order to prevent the excessive build-up of total dissolved solids in the scrubber water system.

RF-2 is equipped with a dual loop scrubber water system. Scrubber water for the gas cooler/venturi scrubber (SC-11) is supplied from a tank incorporated in the bottom section of SC-12. Pump P-22 is used to route the scrubber water, from the tank in SC-12, to the gas cooler/venturi scrubber and, periodically, to treatment. Scrubber water for the packed bed scrubber (SC-12) is supplied from tank T-19. A pump is used to route the scrubber water from tank T-19 to the upper section of SC-12.

The pH of the dual loop system is continuously monitored to ensure efficient acid gas removal in both the gas cooler/venturi scrubber and the packed bed scrubber. A metering pump delivers caustic to the gas cooler/venturi scrubber and a pump delivers caustic to the packed bed scrubber. Caustic is added independently to each loop based on the pH of the scrubber water.

D.2.6 WASTEWATER TREATMENT PROCESS

Scrubber blowdown from RF-2 air pollution control equipment is treated in an exempt wastewater treatment unit (as per 40 CFR 264.1(a)(6) and 270.1(c)(2)(v)), prior to discharge to the POTW. The discharge to the POTW is continuously monitored for pH, total dissolved solids, flow, and temperature to ensure compliance with the discharge limitations found in the facility's current industrial wastewater discharge permit.

D.3 CONTAINER MANAGEMENT

D.3.1 CONTAINER STORAGE AREA

The RCRA hazardous spent carbon container storage area is located in the north end of the warehouse building. Containers are off-loaded in the unloading area just outside the container storage area and are transported by forklift into the storage area. Containers are stored no more than three containers high, and sufficient aisle space is provided to allow access to the containers for movement and for inspections. The containment system for the container storage area consists of the floor of the warehouse building. The floor slopes towards concrete drainage trenches which flow into a concrete sump. The periphery of the storage area is bermed to contain any spills which may occur. Spilled materials contain mainly solid materials which are readily cleaned up using a shovel or broom. Residual materials may be hosed to the sump using water. The sump is equipped with a pump that can remove accumulation in the sump to the recycle water storage tank. Spent carbon stored in drums may be placed on pallets and can be stacked three high. Larger containers (2000 pounds or greater), such as adsorber vessels, are not stacked. The container storage area is illustrated on the drawings that can be found in Appendix III.

Since neither corrosive nor reactive spent carbon is accepted at the facility, the concrete surface is impervious to chemical attack from the spent carbon. The concrete surface is inspected daily to ensure the absence of any cracks or gaps. An engineering evaluation of the structural integrity of the container storage area concrete pad can be found in Appendix VII. It is possible that ignitable wastes could be brought into the container storage area. Containers are stored more than 50 feet from the nearest property boundary. The scale drawings in Appendix III show that the nearest location of container storage to the property boundary is approximately 84 feet.

The container storage area is designed to hold up to 100,000 gallons of RCRA spent carbon. The containment system is designed to hold a minimum of 10,000 gallons. Because the container storage area is inside, run-on is not a consideration. If a container leaks, any liquids leaking from the container will drain into the sump via the trench system, where it will be transferred to recycle water tank T-9. Details of the container storage area floor, slope, sump, etc. can be found on the drawings contained in Appendix VII.

Facility history indicates that more than half of the containers received do not contain free liquids. All containers however are managed in the same manner, consistent with practices for containers with free liquids.

Identification of Container Storage Areas

Description	Location	Capacity	Status
Spent Carbon Container Storage	Warehouse	100,000 gal	Permitted

D.3.2 CONTAINERS

Spent carbon is received in several different types of containers. Spent carbon can be received in drums, adsorber vessel, supersacks, slurry (tank) trucks, or roll-off bins. Specifications of the types of containers in which spent carbon is typically received can be found in Appendix VIII. The specifications include typical materials of construction and dimensions, but are not all-inclusive.

Drum-type containers are generally moved by placing them on pallets using a forklift in a manner that will not rupture the container or cause it to leak. The containers are always closed except during inspection and sampling and when the spent carbon is being removed from the containers into the reactivation process. No reactive or incompatible spent carbons are received at the facility. The container storage area is more than 50 feet from the closest property boundary, therefore, no special areas are required for the storage of ignitable spent carbon.

After spent carbon is removed from a container it is rinsed to remove residual material. Spent carbon containers may be reused after they are emptied and rinsed, and a visual inspection ensures that the container is in good physical condition. Since no incompatible wastes are accepted into the facility, there is no concern for contact with the small amount of material which may remain in a container after rinsing.

The container storage area is inspected at least weekly (See inspection schedule in Section F). During this inspection, containers are inspected for leaks and for deterioration of containers. Should a container be found to be leaking or in a deteriorated condition, the materials will be promptly removed to a container that is in good condition, placed in an overpack, or transferred to a spent carbon storage tank. Sufficient aisle space is provided for inspection. Containers are managed in accordance with the requirements of 40 CFR 264 Subpart FF and CC (see Section O and Appendix XX) where applicable.

D.4 TANK SYSTEMS

There are five above ground tanks (T-1, T-2, T-5, T-6, and T-18) at the SII facility that are regulated under 40 CFR 264 Subpart J. Specific information about these tanks can be found in Table D-1. The location of each of these tanks is shown on Drawing No. D14789-02 that can be found in Appendix III of this document. P&IDs for tanks and the ancillary equipment area provided in Appendix VI. Tank design drawings are provided in Appendix IX.

TABLE D-1 -- HAZARDOUS WASTE TANK INFORMATION

TANK NUMBER	MATERIALS OF CONSTRUCTION	DIMENSIONS	DESIGN CAPACITY(1) (GALLONS)
T-1	300 Series Stainless Steel	16'-0" Straight Side 10'-0" Diameter 8'-0" 62° Bottom Cone	8,319
T-2	300 Series Stainless Steel	16'-0" Straight Side 10'-0" Diameter 8'-0" 62° Bottom Cone	8,319
T-5	300 Series Stainless Steel	16'-0" Straight Side 10'-0" Diameter 8'-0" 62° Bottom Cone	8,319
T-6	300 Series Stainless Steel	16'-0" Straight Side 10'-0" Diameter 8'-0" 62° Bottom Cone	8,319
T-18	300 Series Stainless Steel	7'-6" Straight Side 10'-4.5" Diameter 9'-4.75" 60° Bottom Cone	6,500

Note:
(1) Design capacity is determined based on a tank height as defined by the level at which a high level alarm and automatic interlock is initiated to discontinue spent carbon transfer.

Any spent carbon received at the facility is eventually routed through one or more of the five spent carbon storage tanks. Placing incompatible or reactive materials in these tanks is not a concern because different spent carbons by their physical nature are not incompatible with each other and reactive wastes are not received at the facility. Spent carbon on a rare occasion may exhibit the characteristic of ignitability, however, because the spent carbon is placed in the tanks in a carbon/water slurry, the resultant mixture is not ignitable. The tanks are operated at atmospheric pressure and ambient temperature.

The tanks are operated under the provisions of Subpart FF and Subpart CC. The Subpart CC compliance plan, the entirety of which can be found in Appendix XX for the SII facility identifies two types of waste management units:

- Waste management units that are exempt from Subpart CC requirements because they are otherwise regulated under the Benzene Waste Operation NESHAP; and

- Waste management units that have a volatile organic (VO) concentration less than 500 ppmw, and are therefore exempt from the Subpart CC air emissions control requirements ((§§265.1085-1087). However, record keeping and monitoring requirements under Subpart CC apply to these units §§265.1082(c)(1 and 1090(f)).

Under the final Subpart CC regulations, tanks and containers that are equipped with and comply with the Benzene Waste Operations NESHAP (Subpart FF) are exempt from all Subpart CC requirements (see 40 CFR §265.1080(b)(7)). Therefore, the facility will demonstrate compliance with Subpart CC regulations by assuring that all tanks and containers at the facility used to manage hazardous waste are equipped with and operate in compliance with Subpart FF. (See Section O and Appendix XX of the Permit Application).

Subpart BB is not applicable for the tank systems as SII conducts periodic tests to show the facility waste stream contains an organic content of less than 10% by weight. Subpart BB information is contained in Section N, and in Appendix XIX of the Permit Application.

Identification of Tank Systems

Description	**Location**	**Capacity**	**Status**
T-1	Tank Storage Area	8,319 gal	Permitted
T-2	Tank Storage Area	8,319 gal	Permitted
T-5	Tank Storage Area	8,319 gal	Permitted
T-6	Tank Storage Area	8,319 gal	Permitted
T-18	Top of RF-2 steel structure	6,500 gal	Permitted
T-9	South of T-1, 2, 5 and 6	10,300 gal	Exempt
T-11	Southeast of RF-2 furnace structure	12,400 gal	Exempt
T-19	Adjacent to packed bed scrubber	660 gal	Exempt
S-1	Outside East wall of main warehouse	44,000 lb	Exempt Product Storage
S-2	Outside East wall of main warehouse	44,000 lb	Exempt Product Storage
S-3	Outside East wall of main warehouse	44,000 lb	Exempt Product Storage

D.4.1 ASSESSMENT OF EXISTING TANK SYSTEMS' INTEGRITY

Appendix IX contains the assessment report for the five hazardous waste tank systems located at the SII facility.

D.4.2 CONTAINMENT AND DETECTION OF RELEASES

The area in which four (T-1, T-2, T-5, and T-6) hazardous waste tanks are located at the SII facility is surrounded by a curbed concrete pad which is an external liner providing secondary containment. The fifth tank, T-18, is a double-walled tank which does not require external secondary containment. The concrete pad is impervious to chemical attack from any spent carbon spills from the tank systems.

All components of the regulated tank systems are elevated above the concrete pad that allows for visual inspection of all components. The tank systems and containment area are visually inspected each day to ensure that no leaks from the tank systems have occurred. The containment area is sloped so that any spilled material will flow into a sump. This sump is equipped with a pump that will remove any accumulated water to the recycle water tank. Any solid material removed from the sump is placed in drums and placed in an appropriate storage location. Any precipitation that falls within the containment area is collected in a sump and is either placed in the recycle water tank or discharged (either with or without pre-treatment) to the POTW.

Ancillary equipment consists of 300 series stainless steel pipe with either Victaulic couplings, welded joints or flanged couplings. The ancillary equipment for the hazardous waste storage tanks is inspected once per day. A P&ID of the ancillary equipment can be found in Appendix VI.

The concrete containment pad has a volume of 12,265 gallons which exceeds by 2,415 gallons the volume of the largest tank system (8,319 gallons) within its boundary plus the precipitation from a 25-year, 24-hour rainfall (2.45 inches = 1,531 gallons). The secondary containment volume calculations can be found in Appendix IX. The containment area is inspected daily to ensure that the concrete pad remains free of cracks or gaps.

D.4.3 CONTROLS AND PRACTICES TO PREVENT SPILLS AND OVERFLOWS

All the hazardous waste storage tanks (T-1, T-2, T-5, T-6, and T-18) are equipped with water and carbon high level alarms to alert operators that the tanks are approaching capacity. The hopper discharge valves are interlocked with the spent carbon storage tanks' high carbon level alarms to ensure overfilling of the tanks does not occur. In the event of a high water level alarm, the operator will discontinue introduction of material into the affected tank. Overflow lines are provided from the hazardous waste storage tanks to the recycle water tank (T-9) to prevent spills. Tank system inspections are conducted in accordance with the inspection schedule and checklists provided in Section F and Appendix XII.

D.5 MISCELLANEOUS UNITS

The spent carbon reactivation unit at the Siemens Industry, Inc. facility is a hazardous waste treatment unit and does not fit the current definition of container, tank, surface impoundment, waste pile, land treatment unit, landfill, incinerator, boiler, industrial furnace ,underground injection well, containment building, corrective action management unit, or a staging pile and therefore, is classified as a miscellaneous unit as per 40 CFR 260.10.

The reactivation furnace is not a hazardous waste incinerator. "Hazardous waste incinerator" is defined in 40 CFR Part 63, Subpart EEE as a "device defined as an incinerator in § 260.10 of this chapter and that burns hazardous waste at any time." (40 CFR 63.1201). "Incinerator" is defined in 40 CFR 260.10 as "any enclosed device that: (1) Uses controlled flame combustion and neither meets the criteria for classification as a boiler, sludge dryer or carbon regeneration unit, nor is listed as an industrial furnace; or (2) Meets the definition of infrared incinerator or plasma arc incinerator. (emphasis supplied)" The RF does not qualify as an incinerator and instead is designated by Subpart X of the RCRA regulations as a Miscellaneous Unit. According to 40 CFR 264.601 of the Subpart X regulations, permit terms and provisions for a Miscellaneous Unit must include appropriate requirements of 40 CFR Subparts I through O and Subparts AA through CC, 40 CFR 270, 40 CFR 63 Subpart EEE, and 40 CFR 146. Other portions of this permit application discuss provisions for management of hazardous waste in tanks and containers. Specific to the carbon reactivation furnace and associated equipment, Siemens Industry, Inc. believes that it is appropriate to regulate emissions in accordance with the provisions of 40 CFR 63 Subpart EEE applicable to existing hazardous waste incinerators (although this unit is not an incinerator). Associated equipment such as the dewatering screw, weigh belt, emission control components, pumps, piping, etc. will be managed similarly to equipment associated with a hazardous waste incinerator as provided in Subpart O (Specifically 40 CFR 264.347(b), (c), and (d)). Please refer to Sections F and G, as well as Appendices XII and XIII.

The spent carbon reactivation unit is used to thermally desorb and destroy organic contaminants adsorbed on the carbon. The process reactivates the carbon which allows for its reuse in air and water pollution control equipment. The presence of these organic contaminants on the spent carbon is the reason that some of the spent carbon is a listed and/or characteristic hazardous waste when it arrives at the facility. Removal of these contaminants in the reactivation process renders the reactivated product non-hazardous. Because of the high temperature environment of the reactivation unit and the associated afterburner, the reactivation unit will thermally oxidize in excess of 99.99 percent of the organic contaminants adsorbed on the spent carbon feed.

Descriptions of the RF-2 process and equipment are provided in the PDT Plan in Appendix V, and are summarized in the sections below. Process Flow Diagrams (PFDs) as well as Piping and Instrumentation Diagrams (P&IDs) for the reactivation process are presented in

Appendix VI. A list of available operating and maintenance procedures for the RF-2 system components is provided for informational purposes in Table D-2.

Table D-2. Operating and Maintenance Manuals

Equipment *	**Manufacturer/ Supplier ****	**Purpose**
Spent Carbon GAC Probes	Dynatrol	Spent Tank Level Control
Eductors	Penberthy	Transferring Spent Carbon
Spent Carbon Storage Tanks	Unknown	Storing Spent Carbon
Carbon Vessels	Siemens	Vapor Control for Spent Tanks
T-Tank PRV	Tyco	Spent Tanks Pressure Relief Valve
T-18 Furnace Feed Tank	Modern	Storing Spent Carbon
Furnace Feed Valve	Linatex	Feed Valve
Dewater Screw	B.W. Sinclair	Dewater Spent Carbon
Weigh Belt	Merrick	Measuring Spent Carbon Feed Rate
Rotary Air Lock	Wm. Meyer	Transfer Spent Carbon
LMI Chemical Pumps	LMI	Off Gas pH control
Magnetic Flow Meters	Rosemount	Off Gas Liquid Flow
Scrubber Pumps	Goulds	Venturi/Packed Bed Pumps
Quench/Venturi Scrubber	Clean Gas Inc.	Air Pollution Control
Packed Bed Scrubber	Clean Gas Inc.	Air Pollution Control
WESP	Clean Gas Inc.	Air Pollution Control
ID Fan	Barron	Gas
Stack	Warren Environmental	Gas Dispersion
CEMS Carbon Monoxide	TECO/Siemens	Measure Carbon Monoxide
CEMS Oxygen Analyzers	Ametek	Measure Oxygen
Stack Flow Meter	Cemtek	Measure Stack Flow Rate
Reactivation Furnace (RF-2)	Hankin Environmental	Reactivate Spent Carbon
Afterburner (AB-2)	Hankin Environmental	Destruction of Organics
Natural Gas Burners	North American	Temperature Control
Thermocouples	Pyco	Temperature Monitoring

***** Note - This table includes components of the facility that are exempt from permitting. Data related to these components is provided for informational purposes and ease of review only and they are not intended to become regulated components of the hazardous waste facility. .

****** Note – Manufactures are listed for informational purposes only. Facility may elect to use other vendors with comparable products.

D.5.1 REACTIVATION UNIT (RF-2)

RF-2 is a multiple hearth furnace consisting of five hearths and an afterburner manufactured by Hankin Environmental Systems, Inc. A venturi scrubber, packed bed scrubber, and wet electrostatic precipitator are used to meet applicable emissions regulations. The furnace and afterburner are equipped with a combustion air system. An induced draft fan is used to exhaust combustion gases from the furnace, afterburner, and air pollution control system. The clean gas stream is exhausted to the atmosphere via a stack. Parameters used to ensure good combustion in the furnace and afterburner (carbon monoxide and oxygen) are monitored in the exhaust gases using a continuous emission monitoring system. Materials of construction are listed in Appendix X for all of the major reactivation furnace and air pollution control equipment. SII may occasionally change materials of constructions that are listed in Appendix X with other materials of construction that are equivalent.

D.5.1.1 MULTIPLE HEARTH FURNACE

The furnace has an outside diameter of 12 feet 10 inches and is 19 feet 8 inches in height. The furnace is raised approximately ten feet off the ground. The furnace shell is manufactured of carbon steel plate. The furnace is continuously seal welded internally to assure an air tight assembly. The furnace is internally lined with block firebrick and block insulation. The hearths and furnace roof are constructed of firebrick. The furnace roof is composed of firebrick backed with block insulation and castable insulation to fill voids under the roof cover plates. The bottom hearth is insulated with block insulation and castable refractory. High strength castable refractory is used to insulate the center shaft and to insulate the rabble arms. Extra strength castable refractory is used for backing of skewbacks. Extreme temperature castable refractory is used for burner settings and insulating castable is used for door linings. Cross-sectional drawings of the furnace and afterburner and materials of construction are located in Appendix X.

Spent carbon is introduced into the top hearth of the reactivation unit and flows downward through the remaining four hearths. The top two hearths are unfired hearths. Hot combustion gases generated in the bottom three hearths are used to complete the dewatering of the spent carbon. The bottom three hearths are fired hearths where the pyrolysis and reaction steps of the reactivation process will occur. Rabble arms, with teeth, each connected to a rotating center shaft, are located above each hearth. The center shaft is air cooled. The rabble teeth will plow the carbon material across the hearth surface and towards drop holes. The carbon will fall through the drop holes to the next lower hearth, and eventually to the outlet of the reactivation unit. Reactivated carbon will exit the bottom hearth through a cooling screw. RF-2 is equipped with a primary combustion air fan (B-7), and two center shaft cooling fans (B-8A and B-8B). Natural gas burners are provided to ensure adequate heat input to the reactivation unit for all carbons that are reactivated at the facility.

D.5.1.2 AFTERBURNER (AB-2)

The afterburner is a self supporting vertical cylindrical chamber approximately 33 feet high with an inside refractory diameter of 5 feet. The design incorporates a mixing zone, choke ring, and a minimum residence time at temperature of greater than one second. The afterburner shell is constructed of steel plate and is internally lined with firebrick and castable insulation. The afterburner is equipped with two low NO_x burners, which utilize heated combustion air. The afterburner chamber is fitted with a total of six air injection nozzles which are placed to provide combustion air and turbulence to promote the oxidation of organic materials in the flue gas.

The afterburner is designed to thermally oxidize greater than 99.99 percent of all organic matter entering the afterburner in the furnace off gas. A cross-section of the afterburner and a list of materials of construction can be found in Appendix X.

D.5.1.3 NOZZLES AND BURNERS

Six North American Manufacturing Company burners (NA 6422-6) are installed in RF-2, two per hearth on hearths 3, 4, and 5. Two North American Manufacturing Company burners (NA 6514-8-B) are installed in the afterburner. Literature describing these burners can be found in Appendix X. Materials of construction of these burners are those listed in the manufacturer's literature or their functional equivalent.

D.5.1.4 QUENCH/VENTURI SCRUBBER (SC-11)

The Quench/Venturi Scrubber is a dual-purpose device used to rapidly quench the hot combustion gases exiting the afterburner and to remove particulate matter. The quench section uses water sprays to cool the afterburner exit gas to the point of adiabatic saturation (approximately 170 to 190°F). The venturi scrubber has an adjustable throat, and is a low energy, vertical down flow type. The throat area is adjusted by a pneumatic cylinder actuator and an electro/pneumatic positioner. The remotely adjustable throat is automatically controlled to maintain a constant pressure differential. The venturi scrubber is located directly below the quench section and is connected by a flooded elbow to the packed bed scrubber. The elbow incorporates a water-filled gas impact section directly beneath the throat to prevent erosion of the shell. The water supply for quench and venturi irrigation is recirculated scrubber water at a total flow of approximately 7.5 gpm/1000 ACFM.

The design drawing for the venturi scrubber as well as a description of the physical dimensions and materials of construction of the venturi scrubber can be found in Appendix X.

D.5.1.5 PACKED BED SCRUBBER (SC-12)

The packed bed scrubber consists of a vertical upflow and cylindrical disengaging section followed by a packed bed section and mist eliminator. The bottom portion of the scrubber is used to remove entrained water droplets from the gas prior to entering the packed section of the scrubber. The packed bed scrubber is designed to remove a minimum of 99 percent of the incoming hydrogen chloride.

The design drawing for the packed bed scrubber as well as a description of the physical dimensions and materials of construction of the packed bed scrubber can be found in Appendix X.

D.5.1.6 WET ELECTROSTATIC PRECIPITATOR (W-11)

The wet electrostatic precipitator (WESP) is a vertical hexagonal tube design with self-irrigating tubes. The WESP consists of inlet gas distribution to promote even distribution of the process gas flow entering the WESP, inlet and outlet plenums and a collecting electrode tube bundle. The WESP is equipped with outboard high voltage insulator compartments which include a purge air system, high voltage distribution-support grids, high intensity rigid tube type charging/precipitating discharge electrodes, high voltage power supply (transformer/rectifier and controller) system, ground sticks, safety key interlocks, warning labels, and electronic control logic equipment and valving.

The WESP, in conjunction with the venturi scrubber, is designed to achieve a maximum outlet particulate matter grain loading of 0.015 grains/dscf adjusted to 7 percent oxygen.

The design drawing for the WESP as well as a description of the physical dimensions and the materials of construction of the WESP can be found in Appendix X.

D.5.1.7 FEED SYSTEM

The spent carbon feed system to RF-2 consists of a furnace feed tank (T-18), a dewatering screw (C-5), and a weigh belt conveyor (C-16). The spent carbon/recycle water slurry is discharged from T-18 to C-5 via a control valve. The dewatered spent carbon is discharged from C-5 on to the weigh belt conveyor which is used to measure the feed rate to RF-2. Feed to RF-2 is stopped by stopping the weigh belt. Equipment design information is provided in Appendix X. Instrumentation and controls are depicted on the P&IDs in Appendix VI.

D.5.1.8 INDUCED DRAFT FAN AND STACK

A variable speed induced draft fan is provided to exhaust combustion gases from the furnace and afterburner and through the air pollution control system. Design information and materials of construction for the fan can be found in Appendix X. The clean gas stream is exhausted to the atmosphere via a 110 foot high stack with an inside diameter of 19.75 inches. Design information and a stack layout drawing are provided in Appendix X.

D.5.1.9 CONTINUOUS EMISSION MONITORING SYSTEM

A continuous emission monitoring system (CEMS) is installed in the stack to monitor the carbon monoxide and oxygen concentrations in the exhaust gas. Dual carbon monoxide analyzer are installed. The CO monitors are a Thermo Environmental Model 48 (or equivalent) and an Ultramat 23 (or equivalent). Dual oxygen analyzers are also installed. The oxygen analyzers are an Ameteck FCA-Control unit (or equivalent) and a Thermox unit (or equivalent). Performance specifications for the CEMS as well as a drawing of the sampling system can be found in Appendix X.

D.5.2 CONTROL SYSTEMS

The facility is equipped with a programmable logic control (PLC) system which monitors process variables to ensure proper facility operation. The instrumentation associated with Automatic Waste Feed Cutoffs and other regulatory compliance is summarized in Table D-3, below. Information related to these instruments is summarized in Appendix X. Operating manuals for each instrument are maintained at the facility.

Table D-3. REGULATORY COMPLIANCE INSTRUMENTATION.

Parameter	Identification Number of Sensor/Transmitter (a)	Instrument Type	Units	Range	Expected Operating Point or Range	Calibration frequency	Averaging	AWFCO (Y/N)
Feed rate of spent activated carbon	WE/WT-427	Weigh cell	lb/h	0-6000	< 2760	Semi-annually	1-hr Block	Y
Total feed rate of mercury	Computer	Calculated	lb/h	NA	0 – 1.9E-03	NA	12-hr RA	N
Total feed rate of SVM	Computer	Calculated	lb/h	NA	0 – 1.0	NA	12-hr RA	N
Total feed rate of LVM	Computer	Calculated	lb/h	NA	0 – 1.2	NA	12-hr RA	N
Afterburner gas temperature	TE-464A/B	T/C	F	0-2400	>1750	Semi-annually	1-hr RA	Y
Venturi scrubber pressure differential	PDIT-556	Pressure sensor	in w.c.	0-50	>15	Annually	1-hr RA	Y
Venturi/Quench scrubber recycle liquid flow rate (Total Flow)	FI-562 (Total of FE/FIT-553, 554, & 555)	Sum of Magnetic flow meters (Dynac Function)	gpm	0-656	>75	Annually	1-hr RA	Y
Packed bed scrubber pH	AE/AIT-590	pH probe	pH	0-14	5	Quarterly	1-hr RA	Y
Packed bed scrubber recycle liquid flow rate	FE/FIT-552	Magnetic flow meter	gpm	0-200	>60	Annually	1-hr RA	Y
Packed bed scrubber pressure differential	PDIT-560	Pressure sensors	in w.c.	0-10	>0.1	Annually	1-hr RA	N
Scrubber blowdown flow rate	FE/FIT-605	Magnetic flow meter	gpm	0-691	>30	Annually	1-hr RA	Y
WESP secondary DC voltage	EI-558	Voltmeter	kVDC	0-80	14-22	NA	1-hr RA	Y
Stack gas flow rate	FE/FIT-700	Ultrasonic meter	acfm	Not available	<10,000	Semi-annually	1-hr RA	Y
Stack gas carbon monoxide (b)	AE-575	Nondispersive infrared CEMS	ppmvd @7% O_2	0-100 0-1000	< 100	Daily/ Quarterly/ Annually	1-hr RA	Y
Stack gas oxygen (b)	AE-576	Paramagnetic CEMS	vol%, dry	0-25	7	Daily/ Quarterly/ Annually	None	N

RA = Rolling average.

(a) Instrument identification from P&IDs.

(b) CEMS calibrations include daily zero and span check, quarterly cylinder gas audit, and annual performance specification test.

D.5.3 MISCELLANEOUS UNIT WASTES

The waste introduced into the reactivation furnaces is spent carbon. This spent carbon is contaminated with various compounds. Refer to Section C for a discussion of the types of wastes accepted for treatment at the facility.

D.5.4 TREATMENT EFFECTIVENESS

The purpose of the facility process is to treat spent carbon by reactivation so that the carbon can be reused. The treatment process consists solely of reactivation, consequently, reactivated carbon exiting the unit is not subject to hazardous waste regulation. The reactivated carbon is screened to separate sizes for various use applications and to remove oversized material, and subjected to quality assurance testing to confirm that it is suitable for reuse.

The quality assurance testing that is conducted depends upon the type of reactivated carbon and the anticipated use of the carbon. On reactivated carbons to be used in vapor applications, a Butane test may be performed. On reactivated carbons used in liquid applications, an iodine number may be calculated. These tests are used to measure the surface area of the reactivated carbon and demonstrate the adsorptive capacity of the product. The facility may also perform tests for size distribution. This testing confirms that the reactivated carbon is suitable for reuse.

D.5.5 ENVIRONMENTAL PERFORMANCE STANDARDS

As per 40 CFR 264.601 and discussions with EPA Region IX, RF-2 underwent a Performance Demonstration Test that incorporated emission standards from the Hazardous Waste Combustor Maximum Achievable Control Technology (HWC MACT) regulations in 40 CFR 63 Subpart EEE. A copy of the approved Performance Demonstration Test Plan, and the Performance Demonstration Test Report for RF-2 can be found in Appendix V. Table D-4 is a listing of the performance standards that RF-2 will be required to meet.

TABLE D-4. PERFORMANCE STANDARDS FOR RF-2

Parameter	Purpose	Standard (1)
Destruction and Removal Efficiency	To limit organic emissions	99.99%
Particulate matter	To limit particulate matter emissions	0.015 gr/dscf (2)
HCl/Chlorine	To limit HCl/chlorine emissions	77 ppmv (3)
Mercury	To limit mercury emissions	130 μg/dscm (4)
Semi volatile metals (5)	To limit Pb and Cd emissions	240 μg/dscm
Low volatile metals (6)	To limit As, Be and Cr emissions	97 μg/dscm
Dioxin and furans	To limit dioxin and furan emissions	0.4 ηg/dscm (7)
Carbon monoxide (8)	To ensure good combustion	100 ppmv
Total hydrocarbons (9)	To limit organic emissions	10 ppmv

Note: Siemens and EPA agreed that although the RF-2 unit is not a hazardous waste combustor, but is a RCRA Subpart X Miscellaneous Treatment Unit, the performance standards applicable to existing hazardous waste incinerators in 40 CFR 63 Subpart EEE would be used as guidance. At the time of the PDT, the appropriate standards were found in 40 CFR 63.1203, and are reflected in the table above. Since completion of the PDT, the regulations at Subpart EEE have been changed, and revised standards have been added at 40 CFR 63.1219. A review of the RF-2 PDT results indicate that the unit meets the new standards at 40 CFR 63.1219.

(1) All values except DRE are corrected to 7% oxygen in the stack gas
(2) gr/dscf is grains per dry standard cubic foot of stack gas
(3) ppmdv is parts per million on a dry volumetric basis in the stack gas
(4) μg/dscm is micrograms per dry standard cubic meter of stack gas
(5) Semi-volatile metals are lead and cadmium
(6) Low volatile metals are arsenic, beryllium and chromium
(7) ηg/dscm is nanograms 2,3,7,8-TCDD toxicity equivalents per dry standard cubic meter
(8) 100 ppm by volume on a dry gas basis using a one hour rolling average
(9) Measured only during the Performance Demonstration Test

D.5.6 DEVELOPMENT OF OPERATING LIMITS

The Siemens Industry, Inc. Carbon Reactivation Furnace RF-2 system demonstrated compliance with all applicable regulatory requirements during a Performance Demonstration Test (PDT) program conducted during 2006, in conformance with the approved PDT Plan (See Appendix V for a copy of the PDT Plan). Operating parameter limits and associated automatic waste feed cutoff setpoints (as applicable) have been established as described in the approved PDT Plan and in the appropriate regulations of 40 CFR 63 Subpart EEE. Most operating parameter limits are based on demonstrations made during the PDT. For some parameters, such as maximum stack gas CO concentration, and minimum packed bed scrubber pressure differential, the limits are based either on regulation, guidance, or equipment manufacturer's recommendations (rather than the PDT demonstrated values).

Limits on a number of operational control parameters must be maintained as an indication that the RF-2 system continues to operate in compliance with the applicable emission standards. Table D-5 summarizes the discussion of the operational parameter limits for the RF-2 unit. To facilitate review, the operating parameters are grouped into the following categories:

- Group A1 parameters are continuously monitored and recorded, and are interlocked with the automatic waste feed cutoff system. Group A1 parameter limits are established from test operating data, and are used to ensure that system operating conditions are equal to or are more rigorous than those demonstrated during the test.
- Group A2 parameters are continuously monitored and recorded, and are interlocked with the automatic waste feed cutoff system. Group A2 parameter limits are established based on regulatory requirements rather than on the test operating conditions, e.g., the maximum stack CO concentration.
- Group B parameters are continuously monitored and recorded, but are not required to be interlocked with the automatic waste feed cutoff system. Operating records are required to ensure that established limits for these parameters are not exceeded. The Group B parameter limits are established based on the operation of the system during the test.
- Group C parameters are continuously monitored and recorded, but are not required to be interlocked with the automatic waste feed cutoff system. Group C parameter limits are based on manufacturer's recommendations, operational safety, and good operating practice considerations rather than on the test operating conditions, e.g., the minimum packed bed scrubber pressure differential.

Table D-5. Operating Parameter Limits

Control Parameters[a]	Anticipated Permit Limit	Comments[b]
GROUP A1 PARAMETERS		
Maximum spent carbon feed rate (lb/hr)	3049	Block hour AWFCO
Minimum afterburner temperature (^{o}F)	1760	Hourly rolling average AWFCO
Minimum hearth #5 temperature (^{o}F)	1350	Hourly rolling average AWFCO
Minimum venturi scrubber pressure differential (in. w.c.)	18	Hourly rolling average AWFCO
Minimum quench/venturi scrubber total liquid flow rate (gpm)	75	Hourly rolling average AWFCO
Minimum packed bed scrubber pH	4.4	Hourly rolling average AWFCO
Minimum packed bed scrubber liquid flow rate (gpm)	63	Hourly rolling average AWFCO
Minimum wet scrubber blowdown flow rate (gpm)	58	Hourly rolling average AWFCO
Minimum WESP secondary voltage (kVDC)	22	Hourly rolling average AWFCO
Maximum stack gas flow rate acfm	9,550	Hourly rolling average AWFCO
GROUP A2 PARAMETERS		
Maximum stack gas carbon monoxide (ppmvd, @7% oxygen)[c]	100	Hourly rolling average AWFCO
GROUP B PARAMETERS		
Allowable hazardous constituents	All except dioxin wastes and TSCA PCBs	Class 1 POHC demonstrated
Maximum total chlorine and chloride feed rate (lb/hr)	60	12-hour rolling average
Maximum mercury feed rate (lb/hr)	1.8E-03	12-hour rolling average
Maximum semivolatile metal (Cd + Pb) feed rate (lb/hr)	1.0E-01	12-hour rolling average
Maximum low volatility metal (As + Be + Cr) feed rate (lb/hr)	1.5E+00	12-hour rolling average
GROUP C PARAMETERS		
Minimum packed bed scrubber pressure differential (in. w.c.)	0.1	Hourly rolling average

(a) Group A1 parameters are continuously monitored and recorded, and are interlocked with the automatic waste feed cutoff system. The values for the Group A1 parameters are based on the performance demonstration test operating conditions.

Group A2 parameters are continuously monitored and recorded, and are interlocked with the automatic waste feed cutoff system. The values for the Group A2 parameters are based on regulatory standards or good operating practice rather than performance demonstration test operating conditions.

Group B parameters are continuously monitored and recorded, but are not interlocked with the automatic waste feed cutoff system. Values for the group B parameters are based on the performance demonstration test operating conditions.

Group C parameters are continuously monitoring and recording, but are not interlocked with the automatic waste feed cutoff system. The values for the Group C parameters are based on manufacturer's specifications and/or operational and safety considerations rather than performance demonstration test operating conditions.

(b) AWFCO = Automatic waste feed cutoff.

(c) AWFCO interlock will not be active during the daily CEM calibration period.

D.5.6.1 Specific Operating Parameters

Operating parameter limits for each of the control parameters have been established as specified in the HWC MACT regulations given in 40 CFR 63.1209 and the approved PDT plan. The following sections describe how each operating parameter limit has been established.

In addition to establishing specific operating limits, SII has limits on the types of waste that can be treated in RF-2. Since SII has demonstrated greater than 99.99% DRE during the PDT while treating chlorobenzene, a Class 1 (most thermally stable) compound, SII will be permitted to treat all of the materials represented by the waste codes in the facility's most recent RCRA Part A permit application. Specific prohibitions are in place for feed materials containing greater than 50 ppm of PCBs and those listed with the waste codes F020, F021, F022, F023, F026 or F027.

D.5.6.2 Parameters Demonstrated During the Test (Group A1 Limits)

Group A1 parameter limits are based on the results of the testing. The following operating parameters have been established as Group A1 parameters for the RF-2 system.

Maximum Spent Carbon Feed Rate [40 CFR 63.1209(j)(3), and 63.1209(k)(4)]
The PDT was conducted in order to demonstrate the maximum feed rate of spent carbon. The spent carbon feed rate is monitored on a continuous basis. The maximum allowable spent carbon feed rate has been established as a block hour average limit from the average of feed rates demonstrated during each of the three runs of the PDT.

Minimum Afterburner Temperature [40 CFR 63.1209(j)(1), and 63.1209(k)(2)]
The PDT was conducted at the minimum afterburner temperature with maximized combustion gas flow rate (minimum residence time), since these are the conditions least favorable for DRE. Organic emissions were also measured under these conditions for risk assessment purposes. Based on successful demonstration of DRE during the PDT, the minimum temperature limit has been established as an hourly rolling average equal to the average of the demonstrated test run average values.

Minimum and Maximum Hearth #5 Temperature
As part of EPA's approval of the PDT Plan, SII was required to establish both a minimum and maximum temperature limit for Hearth #5 of the reactivation furnace. Since both a minimum and maximum temperature could not be demonstrated in the single test condition approved for the test, SII operated Hearth #5 at a maximum temperature during the PDT and has established a minimum temperature limit based on a study of the boiling points of the organic constituents found in the spent activated carbon received at the facility.

Since completion of the PDT, SII has provided documentation from EPA that was developed as part of the HWC MACT regulations, demonstrating that establishing a maximum temperature limit is no longer deemed necessary for thermal treatment systems. Accordingly, no maximum temperature limit is included in Table D-5.

The minimum Hearth #5 temperature limit has been established as an hourly rolling average based on the results of SII's study of organic constituent boiling points.

Minimum Venturi Scrubber Differential Pressure [40 CFR 63.1209(m)(1)(i)(A), 63.1209(o)(3)(i), and 63.1209(n)(3)]
The performance test was conducted to demonstrate the minimum venturi scrubber differential pressure. Venturi scrubber differential pressure is monitored on a continuous basis. Based on successful demonstration of particulate and metals control during the performance test, the minimum venturi scrubber differential pressure limit has been established as the average of the hourly rolling average values demonstrated during each run of the performance test. This limit is implemented as an hourly rolling average value.

Minimum Quench/Venturi Scrubber Recycle Liquid Flow Rate [40 CFR 63.1209 (m)(1)(C), 63.1209(o)(3)(v), and 63.1209(n)(3)]
The performance test was conducted to demonstrate the minimum quench/venturi scrubber recycle flow and maximum stack gas flow, thus establishing a *de facto* minimum liquid to gas ratio. Quench/Venturi scrubber flow and stack gas flow are both monitored on a continuous basis. Based on successful demonstration during the performance test, the minimum quench/venturi scrubber recycle liquid flow rate limit has been established based on the average of the hourly rolling average values demonstrated during each run of the performance test. This limit is implemented as an hourly rolling average.

Minimum Packed Bed Scrubber pH [40 CFR 63.1209(o)(3)(iv)]
The performance test was conducted to demonstrate the minimum packed bed scrubber pH at maximum total chlorine/chloride feed rate. Scrubber pH is monitored on a continuous basis. Based on successful demonstration of HCl and Cl_2 control during the performance test, the minimum packed bed scrubber pH limit has been established as the average of the hourly rolling average pH values demonstrated during each run of the performance test. The permit limit is implemented as an hourly rolling average.

Minimum Packed Bed Scrubber Recycle Liquid Flow Rate [40 CFR 63.1209 (m)(1)(C), 63.1209(o)(3)(v), and 63.1209(n)(3)]
The performance test was conducted to demonstrate the minimum packed bed scrubber recycle flow rate and maximum stack gas flow, thus establishing a *de facto* minimum liquid to gas ratio. Packed bed scrubber recycle flow and stack gas flow are both monitored on a continuous basis. Based on successful demonstration of HCl and Cl_2 control during the performance test, the minimum packed bed scrubber recycle liquid flow rate limit has been established as the average of the hourly rolling average values demonstrated during each run of the performance test. This limit is implemented as an hourly rolling average.

Minimum Scrubber Blowdown Flow Rate [40 CFR 63.1209(m)(1)(i)(B), and 63.1209(n)(3)]
The performance test demonstrated a minimum scrubber blowdown flow rate, in order to demonstrate worst case conditions for solids buildup in the scrubbing system. In order to

conserve water, SII recycles most of the liquid from the air pollution control system. However, in order to prevent the buildup of dissolved solids in the recycled water, a certain amount of the water must be purged (or blown down) from the system. As water is purged from the system, fresh makeup water is added. The minimum scrubber blowdown flow rate limit has been based on the average of the hourly rolling average values demonstrated during each run of the performance test. This limit is implemented as an hourly rolling average.

Minimum WESP Secondary Voltage [40 CFR 63.1209(m)(1)(iv), and 63.1209(n)(3)]

Although the HWC MACT regulations do not require any indicator of performance in an electrically enhanced emissions control device, SII believes that it is appropriate to establish a performance indicator. Accordingly, WESP secondary voltage (expressed as KVDC) is used as the indicator of continuing WESP performance. The minimum value has been established as the average of the minimum hourly rolling average secondary voltage values demonstrated during each run of the performance test. The secondary voltage limit is implemented as an hourly rolling average.

Maximum Combustion Gas Velocity (Stack Gas Flow Rate) [40 CFR 63.1209(j)(2), 63.1209(k)(3), 63.1209(m)(2), 63.1209(n)(5), and 63.1209(o)(2)]

The stack gas flow rate (expressed as actual cubic feet per minute) is used as the indicator of combustion gas velocity. The maximum stack gas flow rate was planned to be established from the mean of the maximum hourly rolling average stack gas flow rates measured by SII's stack gas flow rate monitor during each run of the performance test. As stated in the PDT Report (contained in Appendix V), the stack gas flow rate monitor experienced difficulties during the PDT such that the measurements were not reliable. Each isokinetic sampling system used for stack gas emissions measurements during the PDT also included the measurement of stack gas flow rate. Thus, the average stack gas flow rate determinations for each run, derived from the stack gas sampling systems, has been used to establish a maximum stack gas flow rate limit. The maximum stack gas flow rate limit is implemented as an hourly rolling average.

D.5.6.3 Group A2 Parameters

Maximum Stack Gas CO Concentration [40 CFR 63.1203(a)(5)(i)]

The maximum hourly rolling average stack gas CO concentration was maintained at or below 100 ppmv corrected to 7% oxygen (dry basis) during the test. An operating parameter limit for maximum stack gas carbon monoxide concentration of 100 ppmv hourly rolling average corrected to 7% oxygen has been established in according to the applicable regulations.

Fugitive Emissions Control [40 CFR 63.1206(c)(5)(i)(A)]

The HWC MACT regulations require controlling combustion system leaks. By design (no open feed systems), the combustion chamber constitutes a sealed system. There are no locations for combustion system leaks to occur. Therefore, the RF-2 system is in compliance with 40 CFR 63.1206(c)(5)(i)(A).

D.5.6.4 Group B Parameters

Maximum Total Chlorine/Chloride Feed Rate [40 CFR 63.1209(n)(4), and 63.1209(o)(1)]

During the PDT, SII maximized the feed rate of total chlorine/chloride through the spiking of tetrachloroethene and other chlorinated organic compounds. Since the HCl and Cl_2 emissions measured during the PDT were less than the applicable standard, the limit for total chlorine/chloride feed rate has been set as a 12-hour rolling average, equal to the average of the average total chlorine/chloride feed rate during the three runs of the PDT. Total chlorine/chloride includes the native chlorine/chloride in the spent activated carbon feed plus the spiked chlorine/chloride. Records of feed analyses, and the calculated 12-hour rolling average total chlorine/chloride feed rate values will be maintained to demonstrate compliance with the chlorine/chloride feed rate limit.

Maximum Mercury Feed Rate [40 CFR 63.1209(l)(1)(iii)(D)]

Due to the low amounts of mercury expected in the spent activated carbon, SII has elected to comply with the mercury standard by calculating and complying with a 12-hour rolling average Maximum Theoretical Emission Concentration (MTEC), conservatively assuming no mercury removal across the APC system. The MTEC is complied with as a maximum mercury feed rate limit. This limit has been calculated from the performance test data by using the stack gas flow rate and oxygen concentration, and the maximum allowable stack gas mercury concentration based on the HWC MACT regulations. The feed rate limit is determined assuming that all mercury is emitted, and is complied with as a maximum 12-hour rolling average mercury feed rate limit.

Maximum Semivolatile Metals Feed Rate [40 CFR 63.1209(n)(2)]

SII demonstrated compliance with the semivolatile metal emission standard while spiking lead during the test. Therefore, the permitted feed rate limit for semivolatile metals (total cadmium plus lead) has been set as a 12-hour rolling average value equal to the average semivolatile metal feed rate demonstrated during the three runs of the PDT. Records of feed analyses, and the calculated 12-hour rolling average semivolatile metal feed rate values will be maintained to demonstrate compliance with the semivolatile metal feed rate limit.

Maximum Low Volatility Metals Feed Rate [40 CFR 63.1209(n)(2)]

SII demonstrated compliance with the low volatility metal emission standard while spiking chromium during the test. The emissions measured during the test were significantly lower than the allowable limit. Therefore, the feed rate limit for low volatility metals (total arsenic, plus beryllium, plus chromium) has been set as a 12-hour rolling average extrapolated upward to the HWC MACT standard based on the average low volatility metal feed rate and the average low volatility metal System Removal Efficiency (SRE) during the three runs of the CPT. Extrapolation has been conducted as described in the approved PDT Plan.

Records of feed analyses, and the calculated 12-hour rolling average low volatility metal feed rate values will be maintained to demonstrate compliance with the low volatility metal feed rate limit.

D.5.6.5 Group C3 Parameters

Group C parameter limits are based on manufacturer's recommendations, operational safety and good operating practice considerations. The following parameters are proposed as Group C parameters.

Minimum Packed Bed Scrubber Pressure Differential [40 CFR 63.1209(o)(3)(ii)]
The minimum packed bed scrubber pressure differential is based on past operating experience. This limit has been established as an hourly rolling average limit.

D.5.7 PROTECTION OF GROUNDWATER AND SUBSURFACE ENVIRONMENT

The facility is designed with a containment system that contains any spills of hazardous materials and precipitation that falls on the process areas of the facility. Process wastewater generated at the facility is permitted to be discharged to the local publicly-owned treatment works.

D.5.7.1 GROUNDWATER

Because of the physical properties of activated carbon and the location and design of the facility, the risk of contamination of groundwater and/or the subsurface environment in the areas surrounding the facility is very low.

The primary source of potential contamination from the facility would be the contaminants adsorbed on the spent carbon received and reactivated at the facility. However, because of the physical properties of the carbon (the contaminants are held in the pore structure of the carbon by strong intermolecular forces), these contaminants do not desorb from the carbon until the carbon is introduced into a high temperature environment such as the reactivation unit located at the facility. At these high temperatures, the contaminants are in a gaseous state and are thermally destroyed in the high temperature environment of the reactivation unit and, therefore, do not pose a risk to the groundwater and/or subsurface environment. The facility is designed to contain (see Sections D.3 and D.4) the potential releases that could impact groundwater and/or the subsurface environment. In addition, the potential impacts associated with a release would be minimal at this site because of the depth to the groundwater table and the absence of any drinking water wells, either public or private, in proximity to the facility. The closest potential exposure point is an irrigation supply well which is located more than 2,500 feet away from the facility boundary.

An exposure pathway is not complete for exposure through the groundwater and/or subsurface environment for the reasons stated above (physical characteristics of spent carbon, facility location, and design). Because the exposure pathway is not complete, the facility poses negligible risk to human health or the environment from contamination of groundwater and/or the subsurface environment.

D.5.8 PROTECTION OF SURFACE WATER, WETLANDS, AND SOIL SURFACE

There are no springs, drinking water wells, surface water bodies, or wetlands within one quarter mile of the facility. Outside operating areas of the hazardous waste management facility are paved and are provided with run-on and run-off protection. Container storage is indoors and the floor is sloped and trenched to capture any spills. All containment is free of gaps or cracks which would allow waste materials or contaminated rainwater to leak into the underlying or surrounding soil.

D.5.9 PROTECTION OF THE ATMOSPHERE

Air pollution control equipment has been installed on the reactivation units to limit the potential emissions from the facility. Emissions testing has been conducted and a health risk assessment ahs been approved to assess the potential risks associated with facility emissions.

D.5.9.1 RISK ASSESSMENT

EPA Region IX has approved a Risk Assessment Work Plan (RAW) for a Human Health and Ecological Risk Assessment of the facility. Using this work plan and the PDT results, a risk assessment was conducted and subsequently accepted by EPA. A copy of the Risk Assessment Report is included in this application in Appendix XI.