SIEMENS Industry

August 30, 2012

Via UPS Overnight

Gerardo Rios
Manager, Permits Office
US Environmental Protection Agency
Air Division, Air-3
75 Hawthorne Street
San Francisco, CA 94105

Re: Minor New Source Review Program
Registration of Existing Source Under 40 CFR Part 49

Dear Mr. Rios

In accordance with 40 C.F.R. 49.151(c)(iii), please find enclosed registration materials for the registration of the Siemens Industry, Inc. activated carbon regeneration facility in Parker, Arizona, as a true minor source of air emissions. The facility is located on Colorado River Indian Tribes land, and is therefore subject to the federal rule governing minor new source review in Indian Country.

Please do not hesitate to contact me if you have any questions about the registration materials.

Sincerely yours,

Monte McCue
Director of Plant Operations

Enclosures

Siemens Industry, Inc.

2523 Mutahar Street
Parker, AZ 85344
USA

Tel: +1 928-669-5758
Fax: +1 928-669-5775
www.siemens.com/water

REGISTRATION FOR EXISTING SOURCES

FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY

OMB Control No. 2060-0003
Approval expires 04/30/2012

United States Environmental Protection Agency Program Address Phone Fax Web address	Reviewing Authority Program Address Phone Fax Web address

FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY

Registration for Existing Sources
(FORM REG)

Please submit information to:

[Reviewing Authority
Address
Phone]

Gerardo Rios, Manager Permits Office
US Environmental Protection Agency
Region 9
Air Division, Air-3
75 Hawthorne Street
San Francisco, CA 94105

A. GENERAL SOURCE INFORMATION

1. Company Name Siemens Industry, Inc.		**2. Source Name** Siemens Industry, Inc. Parker AZ	
3. Type of Operation Activated Carbon Regeneration Plant		**4. Portable Source?** ☐ Yes ☒ No **5. Temporary Source?** ☐ Yes ☒ No	
6. NAICS Code 562211 Hazardous Waste Treatment Facilities		**7. SIC Code** 4953 (Refuse Systems)	
8. Physical Address (home base for portable sources) 2523 Mutahar Street P.O. Box 3308 Parker, AZ 85344			
9. Reservation* Colorado River Indian Tribes (CRIT)	**10. County*** La Paz	**11a. Latitude*** 34.131357	**11b. Longitude*** -114.273581
12a. Quarter-Quarter Section*	**12b. Section***	**12c. Township***	**12d. Range***

* Provide all locations of operation for portable sources

B. CONTACT INFORMATION

1. Owner Name Siemens Industry, Inc.	Title N/A
Mailing Address 2523 Mutahar Street, P.O. Box 3308, Parker, AZ 85344	
Email Address monte.mccue@siemens.com	
Telephone Number 928.669.5758	Facsimile Number 928.669.5775
2. Operator Name (if different from owner)	Title
Mailing Address	
Email Address	
Telephone Number	Facsimile Number
3. Source Contact Monte McCue	Title Director of Operations
Mailing Address 2523 Mutahar Street, P.O. Box 3308, Parker, AZ 85344	
Email Address monte.mccue@siemens.com	
Telephone Number 928.669.5758 Ext 17	Facsimile Number 928.669.5775
4. Compliance Contact Roy Provins	Title EH&S Manager
Mailing Address 2523 Mutahar Street, P.O. Box 3308, Parker, AZ 85344	
Email Address james.r.provins@siemens.com	
Telephone Number 928.669.5758 Ext 12	Facsimile Number 928.669.5775

C. ATTACHMENTS

Include all of the following information as attachments to this form

☒ Narrative description of the operations See attached - Process Description

☒ Identification and description of all emission units and air pollution generating activities (with the exception of the exempt emissions units and activities listed in §49.153(c) See attached - Process Description

☒ Identification and description of any existing air pollution control equipment and compliance monitoring devices or activities See attached - Process Description

☒ Type and amount of each fuel used See attached - Actual and Potential Emissions Calculations

☒ Type raw materials used See attached - Actual and Potential Emissions Calculations

☒ Production Rates See attached - Actual and Potential Emissions Calculations

☒ Operating Schedules See attached - Actual and Potential Emissions Calculations

☒ Any existing limitations on source operations affecting emissions or any work practice standards, where applicable, for all regulated NSR pollutants at your source.

☒ Total allowable (potential to emit if there are no legally and practically enforceable restrictions) emissions from the air pollution source for the following air pollutants: particulate matter, PM_{10}, $PM_{2.5}$, sulfur oxides (SO_x), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates. See attached - Potential Emissions Calculations

☒ Estimates of the total actual emissions from the air pollution source for the following air pollutants: particulate matter, PM_{10}, $PM_{2.5}$, sulfur oxides (SO_x), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, ammonia (NH_3), fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates. See attached - Actual Emissions Calculations

☐ Other

D. TABLE OF ESTIMATED EMISSIONS

The following estimates of the total emissions in tons/year for all pollutants contained in your worksheet stated above should be provided.

Pollutant	Total Actual Emissions (tpy)	Total Allowable or Potential Emissions (TPY)
PM	3.93	5.75
PM_{10}	3.69	5.01
$PM_{2.5}$	3.63	4.81
SO_x	7.29	30.01
NO_x	16.83	22.22
CO	13.78	18.20
VOC	1.48	1.95
Pb	1.30E-05	1.72E-05
NH_3	0	0
Fluorides	0	0
H_2SO_4	0.40	1.65
H_2S	0	0
TRS	0	0
RSC	0	0

Emissions calculations must include fugitive emissions if the source is one the following listed sources, pursuant to CAA Section 302(j):

(a) Coal cleaning plants (with thermal dryers);
(b) Kraft pulp mills;
(c) Portland cement plants;
(d) Primary zinc smelters;
(e) Iron and steel mills;
(f) Primary aluminum ore reduction plants;
(g) Primary copper smelters;
(h) Municipal incinerators capable of charging more than 250 tons of refuse per day;
(i) Hydrofluoric, sulfuric, or nitric acid plants;
(j) Petroleum refineries;
(k) Lime plants;
(l) Phosphate rock processing plants;
(m) Coke oven batteries;
(n) Sulfur recovery plants;
(o) Carbon black plants (furnace process);
(p) Primary lead smelters;
(q) Fuel conversion plants;
(r) Sintering plants;
(s) Secondary metal production plants;
(t) Chemical process plants
(u) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input;
(v) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;
(w) Taconite ore processing plants;
(x) Glass fiber processing plants;
(y) Charcoal production plants;
(z) Fossil fuel-fired steam electric plants of more that 250 million British thermal units per hour heat input, and
(aa) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act.

Instructions

Please answer all questions. If the item does not apply to the source and its operations write "n/a". If the answer is not known write "unknown".

A. General Source Information

1. Company Name: Provide the complete company name. For corporations, include divisions or subsidiary name, if any.

2. Source Name: Provide the source name. Please note that a source is a site, place, location, etc… that may contain one or more air pollution emitting units.

3. Type of Operation: Indicate the generally accepted name for the operation (i.e., asphalt plant, gas station, dry cleaner, sand & gravel mining, oil and gas well site, tank battery, etc.).

4. Portable Source: Does the source operate in more than one location? Some examples of portable sources include asphalt batch plants and concrete batch plants.

5. Temporary Source: A temporary source, in general, would have emissions that are expected last less than 2 years. Do you expect to cease operations within the next 2 years?

6. NAICS Code: North American Industry Classification System. The NAICS Code for your source can be found at the following link → North American Industry Classification System (http://www.census.gov/epcd/naics/nsic2ndx.htm#S1).

7. SIC Code: Standard Industrial Classification Code. Although the new North American Industry Classification System (NAICS) has replaced the SIC codes, much of the Clean Air Act permitting processes continue to use these codes. The SIC Code for your source can be found at the following link → Standard Industrial Classification Code (http://www.osha.gov/pls/imis/sic_manual.html).

8. Physical Address: Provide the actual address of where the source is operating, not the mailing address. Include the State and the ZIP Code.

9. Reservation: Provide the name of the Indian reservation within which the source is operating.

10. County: Provide the County within which the source is operating.

11a & 11b. Latitude & Longitude: These are GPS (global positioning system) coordinates. This information can be provided in decimal format or degree-minute-second format.

12a – 12d. Section-Township-Range: Please provide these coordinates in Quarter-Quarter Section/Section/Township/Range. (e.g., SW ¼, NE ¼ /S36/T10N/R21E).

B. Contact Information

Please provide the information requested in full.

1. Owners: List the full name (last, middle initial, first) of all owners of the source.

2. Operator: Provide the name of the operator of the source if it is different from the owner(s).

3. Source Contact: The source contact must be the local contact authorized to receive requests for data and information.

4. Compliance Contact: The compliance contact must be the local contact responsible for the source's compliance with this rule. If this is the same as the Source Contact please note this on the form.

C. Attachments

The information requested in the attachments will enable EPA to understand the type of source being registered and the nature and extent of the air pollutants being emitted.

D. Total Emissions

1. Allowable Emissions (See also, Potential to Emit): Emissions rate of a source calculated using the maximum rated capacity of the source (unless the source is subject to practically and legally enforceable limits which restrict the operating rate, or hours of operation, or both) and the most stringent of the following:

   a) Any applicable standards as set forth in 40 CFR parts 60 and 61;

   b) Any applicable Tribal or Federal Implementation Plan emissions limitation, including those with a future compliance date; or

   c) Any emissions rate specified as a federally enforceable permit condition, including those with a future compliance date.

2. Potential to Emit: The maximum capacity of a source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is enforceable as a practical matter. See Allowable Emissions.

Actual Emissions: Estimates of actual emissions must take into account equipment, operating conditions, and air pollution control measures. For a source that operated during the entire calendar year preceding the initial registration submittal, the reported actual emissions typically should be the annual emissions for the preceding calendar year, calculated using the actual operating hours, production rates, in-place control equipment, and types of materials processed, stored, or combusted during the preceding calendar year. However, if you believe that the actual emissions in the preceding calendar year are not representative of the emissions that your source will actually emit in coming years, you may submit an estimate of projected actual emissions along with the actual emissions from the preceding calendar year and the rationale for the projected actual emissions. For a source that has not operated for an entire year, the actual emissions are the estimated annual emissions for the current calendar year.

3. The emission estimates can be based upon actual test data or, in the absence of such data, upon procedures acceptable to the Reviewing Authority. The following procedures are generally acceptable for estimating emissions from air pollution sources:

   (i) Source-specific emission tests;
   (ii) Mass balance calculations;
   (iii) Published, verifiable emission factors that are applicable to the source. (i.e., manufacturer specifications).
   (iv) Other engineering calculations; or
   (v) Other procedures to estimate emissions specifically approved by the Reviewing Authority.

4. Guidance for estimating emissions can be found at http://www.epa.gov/ttn/chief/efpac/index.html.

PROCESS DESCRIPTION

SIEMENS INDUSTRY, INC. PROCESS DESCRIPTION

PARKER, ARIZONA FACILITY

Siemens Industry, Inc. (SII) operates a carbon reactivation facility located in the Colorado River Indian Tribes (CRIT) Industrial Park near Parker, Arizona. The facility treats spent activated carbon that has been used by industry, state and federal government agencies, and municipalities for the removal of organic compounds from liquid and vapor phase process waste streams. Once the carbon has been used and is spent, it must be either disposed of or reactivated at a facility such as SII. A Carbon Reactivation Furnace (RF-2) is used by SII to reactivate the spent carbon. Some of the carbon received at the Parker facility is designated as a hazardous waste under the Resource Conservation and Recovery Act (RCRA) regulations. Much of the spent activated carbon received at the facility is not a RCRA hazardous waste, as it is neither a characteristic nor a listed waste as defined by 40 CFR 261.

The carbon reactivation process thermally treats spent activated carbon in 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. 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 the reactivation furnace are routed to an afterburner to ensure the thermal oxidation of any 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. The air pollution control equipment uses a closed loop recycle water system. Scrubber blowdown from reactivation furnace air pollution control equipment is treated in an exempt wastewater treatment unit, or discharged directly to a Publicly Owned Treatment Works (POTW).

The multiple hearth furnace is designated by Subpart X of the RCRA regulations as a Miscellaneous Unit.

The following paragraphs provide a description of the various areas/units at the facility. A detailed flow diagram of the process is also attached.

1. SPENT CARBON 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.

The container storage area is designed to hold up to 100,000 gallons of RCRA spent carbon.

2. SPENT CARBON HANDLING SYSTEM

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.

Carbon absorbers are used to control vapor emissions from H-1 and H-2 hopper (WS-2), spent carbon storage and recycle water tanks (WS-1) and T-18 furnace feed tank (WS-3).

3. REACTIVATION FURNACE

The spent carbon reactivation unit (RF-2) 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.

RF-2 is a multiple hearth furnace consisting of five hearths and an afterburner and has a potential reactivation capacity of 4,661 lb/hr. 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.

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.

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.

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.

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 NOx 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.

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 facility is required to operate this scrubber pursuant to the RCRA interim status regulations, 40 CFR Parts 265 and 270.

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 facility is required to operate this scrubber pursuant to the RCRA interim status regulations, 40 CFR Parts 265 and 270.

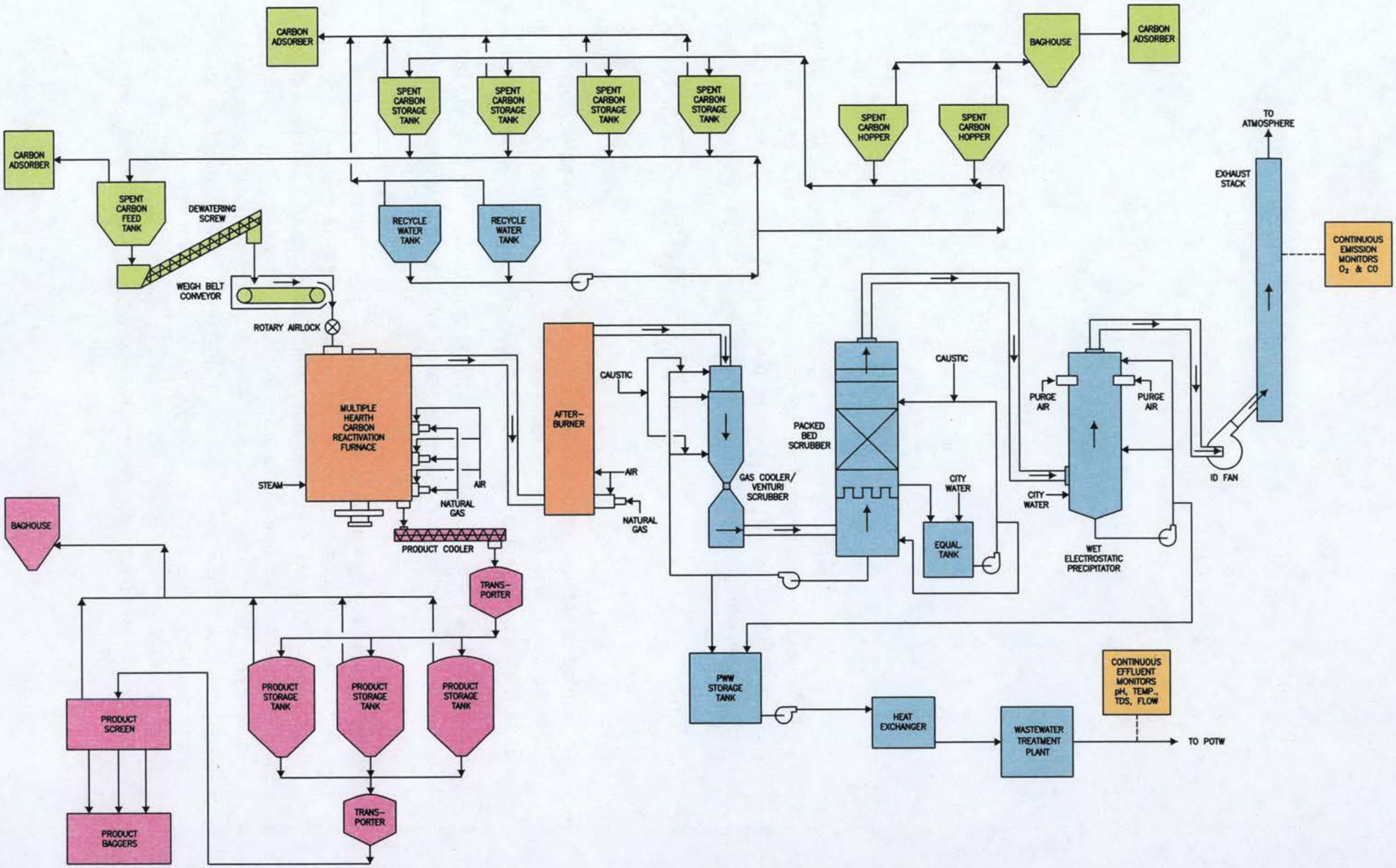
The wet electrostatic precipitator (WESP) is a vertical hexagonal tube design with self-irrigating tubes. The WESP consists of inlet gas distribution to promote even distribution of the process gas flow entering the WESP, inlet and outlet plenums and a collecting electrode tube bundle. The WESP is equipped 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 facility is required to operate this WESP pursuant to the RCRA interim status regulations, 40 CFR Parts 265 and 270.

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.

A variable speed induced draft fan is provided to exhaust combustion gases from the furnace and afterburner and through the air pollution control system. The clean gas stream is exhausted to the atmosphere via a 110 foot high stack with an inside diameter of 19.75 inches.

4. PRODUCT SCREENING AND PACKAGING

Product Screening and Packaging – The activated carbon product packaging building consists of piping, transporters, valves, and screeners. The screening process is enclosed and vented to a baghouse designated as the product side baghouse (BH-1). The screened product is bagged, weighed, tested and sold for reuse.


CARBON ADSORBER
SPENT CARBON STORAGE TANK
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SPENT CARBON HOPPER
SPENT CARBON HOPPER
BAGHOUSE
CARBON ADSORBER
CARBON ADSORBER
SPENT CARBON FEED TANK
DEWATERING SCREW
RECYCLE WATER TANK
RECYCLE WATER TANK
WEIGH BELT CONVEYOR
ROTARY AIRLOCK
TO ATMOSPHERE
EXHAUST STACK
CONTINUOUS EMISSION MONITORS O_2 & CO
MULTIPLE HEARTH CARBON REACTIVATION FURNACE
STEAM
AIR
NATURAL GAS
AFTER-BURNER
AIR
NATURAL GAS
CAUSTIC
GAS COOLER/ VENTURI SCRUBBER
PACKED BED SCRUBBER
CAUSTIC
CITY WATER
EQUAL. TANK
PURGE AIR
PURGE AIR
CITY WATER
WET ELECTROSTATIC PRECIPITATOR
ID FAN
BAGHOUSE
PRODUCT COOLER
TRANS-PORTER
PRODUCT STORAGE TANK
PRODUCT STORAGE TANK
PRODUCT STORAGE TANK
PRODUCT SCREEN
PRODUCT BAGGERS
TRANS-PORTER
PWW STORAGE TANK
HEAT EXCHANGER
WASTEWATER TREATMENT PLANT
CONTINUOUS EFFLUENT MONITORS pH, TEMP., TDS, FLOW
TO POTW

POTENTIAL EMISSIONS CALCULATIONS

Siemens Water Technologies Corp. Parker, Arizona

Potential Emissions Calculations - SUMMARY

Pollutant	Product Baghouse	Spent Carbon Hopper 1	Spent Carbon Hopper 2	Reactivation Furnace 2	Carbon Adsorber 1	Carbon Adsorber 2	Carbon Adsorber 3	Facility Total Emissions	Minor NSR Thresholds [a]	Major Source Threshold [b]	True Minor? [c]
	BH-1	H-1	H-2	RF-2	WS-1	WS-2	WS-3				
	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	
NO_x				22.22				22.22	10	250	Yes
CO				18.20				18.20	10	250	Yes
SO_2				30.01				30.01	10	250	Yes
TSP	0.97	0.00	0.00	4.78				5.75	10	250	Yes
PM_{10}	0.23	0.00	0.00	4.78				5.01	5	250	Yes
$PM_{2.5}$	0.03	0.00	0.00	4.78				4.81	3	250	Yes
VOC				1.94	1.26E-02	2.73E-03	6.44E-06	1.95	5	250	Yes
H_2SO_4				1.65				1.65	2	250	Yes
Lead (Pb)				1.72E-05				1.72E-05	0.1	250	Yes
Fluorides								0.00E+00	1	250	Yes
GHG CO_2e				4,100.18				4,100.18	-	100,000	Yes

[a] Minor NSR thresholds listed in Table 1 of 40 CFR 49.153 for sources located in attainment areas.

[b] Major source thresholds at 40 CFR 52.21. The Siemens Water facility is not one of the 28 listed 100 tons/yr source categories; the major source threshold for this facility is 250 tons/year.

[c] A true minor source is defined by 40 CFR 49.153 as one whose potential emissions are <u>less</u> than the major source thresholds listed in 40 CFR 52.21 but <u>equal to or greater</u> than the minor NSR thresholds listed in Table 1 of the rule.

Siemens Water Technologies Corp. Parker, Arizona

Potential Emissions Calculations - Product Side Baghouse

Parameter	Value	Units	Notes
Total Product Discharged from Furnace (lb/hr)	4,661	lb/hr	Email from Monte Mccue dated Feb 1, 2012 2:50 pm.
Percentage of Material that is Over- or Under-Sized	4.04%		Part 70 Application, Nov 1998 states that 82.7% of the incorrectly sized material is undersized and 17.3% is oversized.
Percentage of Material that is Under-Sized	3.34%		Provided by Siemens in the spreadsheet "Parker Overs and Unders - PPB.xls"
Percentage of Material that is Over-Sized	0.70%		Incorrectly sized minus undersized = oversized
Hourly Product Generated that is Under-Sized	155.65	lb/hr	
Percentage of Under-Sized Material Collected as Product	86%		The material passes through various mesh screens and is collected in a container as product.
Percentage of Under-Sized Material Collected and sent to a Baghouse	14%		Whatever is not collected as product, is collected by the vacuum system and and sent to a BH for capture and control. Provided by Siemens in the spreadsheet "Parker Overs and Unders - PPB.xls"
TSP - Hourly Mass Rate of Under-Sized Material sent to the baghouse (lb/hr)	22.07	lb/hr	
PM_{10} - Hourly Mass Rate of Under-Sized Material sent to the baghouse (lb/hr)	10.44	lb/hr	Particle size multiplier for PM10 = 0.35 and that for TSP = 0.74. Therefore, portion of TSP that is PM10 = 0.35/0.74. [AP-42 Section 13.2.4.1]
$PM_{2.5}$ - Hourly Mass Rate of Under-Sized Material sent to the baghouse (lb/hr)	1.58	lb/hr	Particle size multiplier for PM2.5 = 0.053 and that for TSP = 0.74. Therefore, portion of TSP that is PM2.5 = 0.053/0.74. [AP-42 Section 13.2.4.1]
Baghouse Control Efficiency **(TSP)**	99.0%		AP-42 Table B.2-3. AIRS Code 018 Low Temp BH
Baghouse Control Efficiency **(PM_{10})**	99.5%		AP-42 Table B.2-3. AIRS Code 018 Low Temp BH
Baghouse Control Efficiency **($PM_{2.5}$)**	99.5%		AP-42 Table B.2-3. AIRS Code 018 Low Temp BH
TSP - Hourly Mass Rate of Under-Sized Material Emitted to the Ambient Air (lb/hr)	0.22	lb/hr	
PM_{10} - Hourly Mass Rate of Under-Sized Material Emitted to the Ambient Air (lb/hr)	0.05	lb/hr	
$PM_{2.5}$ - Hourly Mass Rate of Under-Sized Material Emitted to the Ambient Air (lb/hr)	0.01	lb/hr	
Annual Hours of Operation of Product Handling System	8,760	hours/year	No annual operational restrictions
Annual TSP Emissions from the Product Handling System	**0.967**	**tons/year**	tons/year = (lb/hr)*(8,760 hr/yr)*(ton/2000 lb)
Annual PM10 Emissions from the Product Handling System	**0.229**	**tons/year**	tons/year = (lb/hr)*(8,760 hr/yr)*(ton/2000 lb)
Annual PM2.5 Emissions from the Product Handling System	**0.035**	**tons/year**	tons/year = (lb/hr)*(8,760 hr/yr)*(ton/2000 lb)

Siemens Water Technologies Corp. Parker, Arizona

Potential Emissions Calculations - Spent Carbon Hoppers 1 and 2 (H-1 & H-2)

Spent Carbon Hopper 1 (H-1)

Parameter	Value	Units	Notes
Particle Size Multiplier for TSP (k1)	0.74	dimensionless	TSP are particles are < 30 μm. Particle size multiplier for TSP = 0.74. [AP-42 Section 13.2.4.1]
Particle Size Multiplier for PM10 (k2)	0.35	dimensionless	PM10 are particles are < 10 μm. Particle size multiplier for PM10 = 0.35. [AP-42 Section 13.2.4.1]
Particle Size Multiplier for PM2.5 (k3)	0.053	dimensionless	PM2.5 are particles are < 2.5 μm. Particle size multiplier for PM2.5 = 0.053. [AP-42 Section 13.2.4.1]
Mean Wind Speed (U)	2.38	miles/hour	Long term average value based on Parker AZ data (data provided by M. McCue, Director of Plant Operations, May 2007)
Moisture Content (M)	10	%	Value for vapor carbon. (data provided by M. McCue, Director of Plant Operations, May 2007)
Half the Maximum Potential Spent Carbon Throughput Rate	4,367.5	lb/hr	Conference call with Siemens Water on 6-27-2012 : The process loses about 7-8% mass of inlet carbon in RF-2. For conservatism, assume that 8% is lost in RF-2. Therefore, based on a potential of 4,661 lb/hr product rate, inlet material (or potential material in the hopper) = 4,661 lb/hr product + 7% lost in RF-2 + 42% moisture in incoming carbon. The carbon typically contians 0.5% organic loading. Assume that the loading is negligible or zero. The total material is split evenly between the two hoppers.

Siemens Water Technologies Corp. Parker, Arizona

Potential Emissions Calculations - Spent Carbon Hoppers 1 and 2 (H-1 & H-2)

E (lb TSP per ton material handled) =	k1 * (0.0032) [(U/5)^1.3 / [(M/2)^1.4]	AP-42 Section 13.2.4, Equation 1
E (lb PM_{10} per ton material handled) =	k2 * (0.0032) [(U/5)^1.3 / [(M/2)^1.4]	
E (lb $PM_{2.5}$ per ton material handled) =	k3 * (0.0032) [(U/5)^1.3 / [(M/2)^1.4]	

Parameter	Value	Units
E_{TSP} =	9.48E-05	lb TSP per ton material handled
E_{PM10} =	4.48E-05	lb PM10 per ton material handled
$E_{PM2.5}$ =	6.79E-06	lb PM2.5 per ton material handled

Parameter	Value	Units	Notes
Maximum Potential Spent Carbon Feed Rate	4,367.5	lb/hr	4,661 lb/hr dry product (potential) with 0.5% organics loading and 10 % moisture
Maximum Potential Spent Carbon Feed Rate	2.2	ton/hr	
Potential Annual Hours of Operation	8,760	Hours/year	No annual operational restrictions

Hourly and Annual Emissions from Spent Carbon Hopper 1 (H-1)

Maximum Hourly Emissions	Value	Units
Maximum Hourly Emissions $_{TSP}$ =	2.07E-04	lb/hr
Maximum Hourly Emissions $_{PM10}$ =	9.79E-05	lb/hr
Maximum Hourly Emissions $_{PM2.5}$ =	1.48E-05	lb/hr

Potential Annual Emissions	Value	Units
Potential Annual Emissions $_{TSP}$ =	9.07E-04	tons/year
Potential Annual Emissions $_{PM10}$ =	4.29E-04	tons/year
Potential Annual Emissions $_{PM2.5}$ =	6.49E-05	tons/year

Siemens Water Technologies Corp. Parker, Arizona

Potential Emissions Calculations - Spent Carbon Hoppers 1 and 2 (H-1 & H-2)

Spent Carbon Hopper 2 (H-2)

Parameter	Value	Units	Notes
Particle Size Multiplier for TSP (k1)	0.74	dimensionless	TSP are particles are < 30 μm. Particle size multiplier for TSP = 0.74. [AP-42 Section 13.2.4.1]
Particle Size Multiplier for PM10 (k2)	0.35	dimensionless	PM10 are particles are < 10 μm. Particle size multiplier for PM10 = 0.35. [AP-42 Section 13.2.4.1]
Particle Size Multiplier for PM2.5 (k3)	0.053	dimensionless	PM2.5 are particles are < 2.5 μm. Particle size multiplier for PM2.5 = 0.053. [AP-42 Section 13.2.4.1]
Mean Wind Speed (U)	2.38	miles/hour	Long term average value based on Parker AZ data
Moisture Content (M)	10	%	Value for vapor carbon. May 2007 value
Half the Maximum Potential Spent Carbon Throughput Rate	4,368	lb/hr	Conference call with Siemens Water on 6-27-2012 : The process loses about 7-8% mass of inlet carbon in RF-2. For conservatism, assume that 8% is lost in RF-2. Therefore, based on a potential of 4,661 lb/hr product rate, inlet material (or potential material in the hopper) = 4,661 lb/hr product + 7% lost in RF-2 + 42% moisture in incoming carbon. The carbon typically contians 0.5% organic loading. Assume that the loading is negligible or zero. The total material is split evenly between the two hoppers.

E (lb TSP per ton material handled) =	k1 * (0.0032) [(U/5)^1.3 / [(M/2)^1.4]	AP-42 Section 13.2.4, Equation 1
E (lb PM_{10} per ton material handled) =	k2 * (0.0032) [(U/5)^1.3 / [(M/2)^1.4]	
E (lb $PM_{2.5}$ per ton material handled) =	k3 * (0.0032) [(U/5)^1.3 / [(M/2)^1.4]	

Siemens Water Technologies Corp. Parker, Arizona

Potential Emissions Calculations - Spent Carbon Hoppers 1 and 2 (H-1 & H-2)

Parameter	Value	Units
E_{TSP} =	9.48E-05	lb TSP per ton material handled
E_{PM10} =	4.48E-05	lb PM10 per ton material handled
$E_{PM2.5}$ =	6.79E-06	lb PM2.5 per ton material handled

Parameter	Value	Units	Notes
Maximum Potential Spent Carbon Feed Rate	4,367.5	lb/hr	4,661 lb/hr dry product (potential) with 0.5% organics loading and 10 % moisture
Maximum Potential Spent Carbon Feed Rate	2.2	ton/hr	
Potential Annual Hours of Operation	8,760	Hours/year	No annual operational restrictions

Hourly and Annual Emissions from Spent Carbon Hopper 2 (H-2)

Maximum Hourly Emissions	Value	Units
Maximum Hourly Emissions $_{TSP}$ =	2.07E-04	lb/hr
Maximum Hourly Emissions $_{PM10}$ =	9.79E-05	lb/hr
Maximum Hourly Emissions $_{PM2.5}$ =	1.48E-05	lb/hr

Potential Annual Emissions	Value	Units
Potential Annual Emissions $_{TSP}$ =	9.07E-04	tons/year
Potential Annual Emissions $_{PM10}$ =	4.29E-04	tons/year
Potential Annual Emissions $_{PM2.5}$ =	6.49E-05	tons/year

Siemens Water Technologies Corp. Parker, Arizona

Potential Emissions Calculations - Reactivation Furnace 2 (RF-2)

Parameter (Units)	Value	Notes
Higher Heating Value of Natural Gas (Btu/scf)	1,020	Footnote a of AP-42 Table 1.4-1
RF-2 Potential Hourly Carbon Regeneration Rate (lb/hr)	4,661	Email from Monte Mccue dated Feb 1, 2012 2:50 pm.
RF 2 - Maximum Heat Input Rate (MMBtu/hr)	8.0	RF 2 Design Information; from Nov. 1998 Part 70 Application
RF 2 - Maximum Natural Gas Usage (MMscf/hr)	7.84E-03	Natural Gas Usage (MMscf) = Heat Input (MMBtu/hr) / HHV (Btu/scf)
RF 2 - Design Exhaust Gas Flow Rate (dscfm @ 7% O2)	8,022.9	Max possible flow rate = 15,280 acfm (email from Monte McCue dated 7-3-2012). See the calculations in the "Fan Calc" tab.
Potential Annual Hours of Operation	8,760	Potential annual hours without restriction

2005 Mini-Burn Stack Test Results for RF-2 ---- NOx

Condition 1	ppmdv	%O2	ppmdv @ 7% O2
Run 1	64	7	64.0
Run 2	79	7	79.0
Run 3	81	7	81.0
		Average (ppmdv @ 7% O2)	**74.7**

Boiler and Industrial Furnace Standard (RF-2) ---- VOC

VOC (ppmdv @ 7% O2)	**20.0**

USEPA Regulatory Performance Standards (HWC MACT Standards) ---- CO

CO (ppmdv @ 7% O_2)	**100.0**

Chavond-Berry Engineering's 1/24/94 Calculations (Attachment I of the 1998 Part 70 Application) --- SO2

Maximum Sulfur in Adsorbate	6.61	% S Liquid (Gibson Oil)	Based on July stack test data, Confirmed by Siemens Water
Maximum Sulfur in Vapor-phase Carbon	1.28	% S Liquid (Mobil Torrance)	Based on Nov stack test data, Confirmed by Siemens Water
Liquid Phase Carbon Maximum Loading	11.11	% dry regen basis	1998 TV application
Vapor Phase Carbon Maximum Loading	30	%	1998 TV application
Potential Hourly Carbon Regeneration Rate for RF-2	4,661	lb/hr	Email from Monte Mccue dated Feb 1, 2012 2:50 pm.
RF-2 Maximum Hourly SO2 Emissions (pre-control)	**68.46**	**lb/hr**	Max hourly SO2 emissions = maximum of [(vapor phase carbon * Sulfur in vapor phase carbon *potential hourly carbon regeneration rate) , (liquid phase carbon * sulfur in adsorbate * potential hourly carbon regeneration rate)]
RF-2 Potential Annual SO2 Emissions (pre-control)	**299.85**	**Tons/year**	Hourly emissions x 8760 hours/year
Control efficiency of the Packed Bed Scrubber	**90.0%**		Engineering judgment, scrubber uses NaOH as the scrubbing agent
RF-2 Maximum Hourly SO2 Emissions (post-control)	**6.85**	**lb/hr**	
RF-2 Potential Annual SO2 Emissions (post-control)	**29.98**	**Tons/year**	

USEPA Regulatory Performance Standards (HWC MACT Standards) --- TSP/PM10/PM2.5

Particulate in Furnace Exhaust (Post Scrubber and ESP)	0.015	gr/dscf @ 7% O2	RCRA Limit
RF 2 - Design Exhaust Gas Flow Rate (dscfm @ 7% O2)	8,022.9	dscfm @ 7% O2	
RF-2 Maximum Hourly TSP/PM10/PM2.5 Emissions	**1.03**	**lb/hr**	
RF-2 Potential Annual TSP/PM10/PM2.5 Emissions	**4.52**	**Tons/year**	

Reactivation Furnace 2 (RF 2) Calculations

Spent Carbon Feed Only

Unit	Pollutant	Emission Factor (ppmdv @7% O_2)	Emission Rate lb/hr	Emission Rate tons/year	Notes
Reactivation Furnace 2	Nitrogen Oxides	74.7	4.289	18.79	2005 Mini-burn test on RF-2. Flow obtained from the fan rating.
	Carbon Monoxide	100.0	3.496	15.31	Based on RCRA limit of 100 ppm. Flow obtained from the fan rating.
	VOC	20.0	0.400	1.75	Boiler and Industrial Furnace Standard (RCRA). Flow obtained from the fan rating.
	Sulfur Dioxide		6.85	29.98	Chavond-Berry Engineering's 1/24/94 Calculations (Attachment I of the 1998 Part 70 Application)
	H_2SO_4		0.07	1.65	EPRI 2010. 1 % of SO_2 converted to SO3 and 100% SO3 converted to H2SO4
	Filterable PM		1.03	4.52	HWC MACT standard 0.015 gr/dscf. No information available on condensables.
	Condensable PM				
	TOTAL PM		1.03	4.52	
	TOTAL PM10		1.03	4.52	
	TOTAL PM2.5		1.03	4.52	

Reactivation Furnace 2 (RF 2) Calculations

Natural Gas Firing Only

Unit	Pollutant	Emission Factor (lb/MMscf)	Emission Rate lb/hr	Emission Rate tons/year	Notes
Reactivation Furnace 2	Filterable PM	1.9	0.0149	0.065	AP-42 Table 1.4-2
	Condensable PM	5.7	0.0447	0.196	AP-42 Table 1.4-2
	TOTAL PM	7.6	0.0596	0.261	AP-42 Table 1.4-2
	TOTAL PM10	7.6	0.0596	0.261	According to Footnote c of AP-42 Table 1.4-2, all PM is
	TOTAL PM2.5	7.6	0.0596	0.261	According to Footnote c of AP-42 Table 1.4-2, all PM is
	Sulfur Dioxide	0.6	0.0047	0.021	AP-42 Table 1.4-2
	Nitrogen Oxides	100	0.7843	3.435	AP-42 Table 1.4-1
	Carbon Monoxide	84	0.6588	2.886	AP-42 Table 1.4-1
	VOC	5.5	0.0431	0.189	AP-42 Table 1.4-2
	Lead (Pb)	0.0005	3.92E-06	1.72E-05	AP-42 Table 1.4-3
	H_2SO_4	0.006	4.71E-05	2.06E-04	EPRI 2010. 1 % of SO2 converted to SO3 and 100% SO3 converted to H2SO4
	Pollutant	**Emission Factor (lb/MMBtu)**	**Emission Rate lb/hr**	**Emission Rate tons/year**	**Notes**
	CO2	116.900	935.200	4,096.18	Emission factors are based on the EPA rule "Mandatory Reporting of Greenhouse Gases", Federal Register Vol. 74, No. 209, October 2009.
	CH4	2.20E-03	0.018	0.08	
	N2O	2.20E-04	0.002	0.01	
	Total GHG Mass	-	935.219	4,096.26	
	GHG CO2e	-	936.115	4,100.18	GWP: CO2 = 1, CH4 = 21, N2O = 310

Siemens Water Technologies Corp. Parker, Arizona
Potential Annual Emissions - Carbon Adsorbers WS-1, WS-2 and WS-3

Parameter	Value	Units	Notes
WS-1 VOC Loading (inlet)	201	ppmv	Max. inlet loading using Flame Ionization Detector calibrated for CH4
WS-2 VOC Loading (inlet)	2	ppmv	Max. inlet loading using Flame Ionization Detector calibrated for CH4
WS-3 VOC Loading (inlet)	2	ppmv	Max. inlet loading using Flame Ionization Detector calibrated for CH4
Control Efficiency (typical)	95%		Although the adsorbers can achieve 100% control of certain compounds, 95% is typical
WS-1 VOC Loading (outlet)	10.05	ppmv	applying 95% control efficiency
WS-2 VOC Loading (outlet)	0.1	ppmv	applying 95% control efficiency
WS-3 VOC Loading (outlet)	0.1	ppmv	applying 95% control efficiency
Potential Annual Hours of Operation	8,760	hours/year	no operational restrictions

Parameter	Value	Units	Notes
WS-1 Design Exhaust Rate	115	acfm	From the document entitled "Appendix D Enfineering Calculations Supporting Control Device Performance", Rev 7 - June 2011
WS-2 Design Exhaust Rate	2,500	acfm	
WS-3 Design Exhaust Rate	5.90	acfm	
WS-1 Design Exhaust Rate	6,900	ft^3/hr	
WS-2 Design Exhaust Rate	150,000	ft^3/hr	
WS-3 Design Exhaust Rate	354	ft^3/hr	
WS-1 VOC Emission Rate (hourly)	6.93E-02	ft^3/hr	
WS-2 VOC Emission Rate (hourly)	1.50E-02	ft^3/hr	
WS-3 VOC Emission Rate (hourly)	3.54E-05	ft^3/hr	
Molar Volume of Vapor	385.5	ft^3/lb-mol	Assuming ideal gas behavoir
WS-1 VOC Emission Rate (hourly)	1.80E-04	lb-mol/hr	Applying the ideal gas volume per mol
WS-2 VOC Emission Rate (hourly)	3.89E-05	lb-mol/hr	
WS-3 VOC Emission Rate (hourly)	9.18E-08	lb-mol/hr	
Molecular Weight of Vapor	16	lb/lb-mol	Assuming the vapor is all methane as detected on the FID

Parameter	Value	Units	Notes
WS-1 VOC Emission Rate (hourly)	2.88E-03	lb/hr	
WS-2 VOC Emission Rate (hourly)	6.23E-04	lb/hr	
WS-3 VOC Emission Rate (hourly)	1.47E-06	lb/hr	
WS-1 VOC Emission Rate (annual)	1.26E-02	tons/year	assuming 8,760 hours/year
WS-2 VOC Emission Rate (annual)	2.73E-03	tons/year	assuming 8,760 hours/year
WS-3 VOC Emission Rate (annual)	6.44E-06	tons/year	assuming 8,760 hours/year

Maximum hourly VOC Emission Rate (WS-1, WS-2 and WS-3)		
WS-1 Maximum Hourly VOC Emission Rate =	6.93E-02	lb/hr
WS-2 Maximum Hourly VOC Emission Rate =	1.50E-02	lb/hr
WS-3 Maximum Hourly VOC Emission Rate =	3.54E-05	lb/hr
Potential Annual VOC Emission Rate (WS-1, WS-2 and WS-3)		
WS-1 Potential Annual VOC Emission Rate =	1.26E-02	tons/year
WS-2 Potential Annual VOC Emission Rate =	2.73E-03	tons/year
WS-3 Potential Annual VOC Emission Rate =	6.44E-06	tons/year

ACTUAL EMISSIONS CALCULATIONS

Siemens Water Technologies Corp. Parker, Arizona

2011 Actual Emissions Calculations - SUMMARY

Pollutant	Product Baghouse	Spent Carbon Hopper 1	Spent Carbon Hopper 2	Reactivation Furnace 2	Carbon Adsorber 1	Carbon Adsorber 2	Carbon Adsorber 3	Facility Total Emissions	Minor NSR Thresholds [a]	Major Source Threshold [b]	True Minor? [c]
	BH-1	H-1	H-2	RF-2	WS-1	WS-2	WS-3				
	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	
NO_x				16.83				16.83	10	250	Yes
CO				13.78				13.78	10	250	Yes
SO_2				7.29				7.29	10	250	Yes
TSP	0.31	0.00	0.00	3.62				3.93	10	250	Yes
PM_{10}	0.07	0.00	0.00	3.62				3.69	5	250	Yes
$PM_{2.5}$	0.01	0.00	0.00	3.62				3.63	3	250	Yes
VOC				1.47	9.55E-03	2.07E-03	4.87E-06	1.48	5	250	Yes
H_2SO_4				0.40				0.40	2	250	Yes
Lead (Pb)				1.30E-05				1.30E-05	0.1	250	Yes
Fluorides								0.00E+00	1	250	Yes
GHG CO_2e				3,105.56				3,105.56	-	100,000	Yes

[a] Minor NSR thresholds listed in Table 1 of 40 CFR 49.153 for sources located in attainment areas.

[b] Major source thresholds at 40 CFR 52.21. The Siemens Water facility is not one of the 28 listed 100 tons/yr source categories; the major source threshold for this facility is 250 tons/year.

[c] A true minor source is defined by 40 CFR 49.153 as one whose potential emissions are <u>less</u> than the major source thresholds listed in 40 CFR 52.21 but <u>equal to or greater</u> than the minor NSR thresholds listed in Table 1 of the rule.

Siemens Water Technologies Corp. Parker, Arizona

2011 Actual Emissions Calculations - Product Side Baghouse

Parameter	Value	Units	Notes
Total Product Discharged from Furnace; 2011 Actual (lb/hr)	1,492	lb/hr	Transition Policy Report 2011.xls
Percentage of Material that is Over- or Under-Sized	4.04%		Part 70 Application, Nov 1998 states that 82.7% of the incorrectly sized material is undersized and 17.3% is oversized.
Percentage of Material that is Under-Sized	3.34%		Provided by Siemens in the spreadsheet "Parker Overs and Unders - PPB.xls"
Percentage of Material that is Over-Sized	0.70%		Incorrectly sized minus undersized = oversized
Hourly Product Generated that is Under-Sized	49.82	lb/hr	
Percentage of Under-Sized Material Collected as Product	86%		The material passes through various mesh screens and is collected in a container as product.
Percentage of Under-Sized Material Collected and sent to a Baghouse	14%		Whatever is not collected as product, is collected by the vacuum system and and sent to a BH for capture and control. Provided by Siemens in the spreadsheet "Parker Overs and Unders - PPB.xls"
TSP - Hourly Mass Rate of Under-Sized Material sent to the baghouse (lb/hr)	7.06	lb/hr	
PM_{10} - Hourly Mass Rate of Under-Sized Material sent to the baghouse (lb/hr)	3.34	lb/hr	Particle size multiplier for PM10 = 0.35 and that for TSP = 0.74. Therefore, portion of TSP that is PM10 = 0.35/0.74. [AP-42 Section 13.2.4.1]
$PM_{2.5}$ - Hourly Mass Rate of Under-Sized Material sent to the baghouse (lb/hr)	0.51	lb/hr	Particle size multiplier for PM2.5 = 0.053 and that for TSP = 0.74. Therefore, portion of TSP that is PM2.5 = 0.053/0.74. [AP-42 Section 13.2.4.1]
Baghouse Control Efficiency **(TSP)**	99.0%		AP-42 Table B.2-3. AIRS Code 018 Low Temp BH
Baghouse Control Efficiency **(PM_{10})**	99.5%		AP-42 Table B.2-3. AIRS Code 018 Low Temp BH
Baghouse Control Efficiency **($PM_{2.5}$)**	99.5%		AP-42 Table B.2-3. AIRS Code 018 Low Temp BH
TSP - Hourly Mass Rate of Under-Sized Material Emitted to the Ambient Air (lb/hr)	0.07	lb/hr	
PM_{10} - Hourly Mass Rate of Under-Sized Material Emitted to the Ambient Air (lb/hr)	0.02	lb/hr	
$PM_{2.5}$ - Hourly Mass Rate of Under-Sized Material Emitted to the Ambient Air (lb/hr)	0.003	lb/hr	
Annual Hours of Operation of Product Handling System	8,760	hours/year	No annual operational restrictions
Annual TSP Emissions from the Product Handling System	**0.309**	**tons/year**	tons/year = (lb/hr)*(8,760 hr/yr)*(ton/2000 lb)
Annual PM10 Emissions from the Product Handling System	**0.073**	**tons/year**	tons/year = (lb/hr)*(8,760 hr/yr)*(ton/2000 lb)
Annual PM2.5 Emissions from the Product Handling System	**0.011**	**tons/year**	tons/year = (lb/hr)*(8,760 hr/yr)*(ton/2000 lb)

Siemens Water Technologies Corp. Parker, Arizona

2011 Actual Emissions Calculations - Spent Carbon Hoppers 1 and 2 (H-1 & H-2)

Spent Carbon Hopper 1 (H-1)

Parameter	Value	Units	Notes
Particle Size Multiplier for TSP (k1)	0.74	dimensionless	TSP are particles are < 30 μm. Particle size multiplier for TSP = 0.74. [AP-42 Section 13.2.4.1]
Particle Size Multiplier for PM10 (k2)	0.35	dimensionless	PM10 are particles are < 10 μm. Particle size multiplier for PM10 = 0.35. [AP-42 Section 13.2.4.1]
Particle Size Multiplier for PM2.5 (k3)	0.053	dimensionless	PM2.5 are particles are < 2.5 μm. Particle size multiplier for PM2.5 = 0.053. [AP-42 Section 13.2.4.1]
Mean Wind Speed (U)	2.38	miles/hour	Long term average value based on Parker AZ data (data provided by M. McCue, Director of Plant Operations, May 2007)
Moisture Content (M)	10	%	Value for vapor carbon. (data provided by M. McCue, Director of Plant Operations, May 2007)
Half the 2011 Actual Spent Carbon Throughput Rate	1,398.1	lb/hr	Conference call with Siemens Water on 6-27-2012 : The process loses about 7-8% mass of inlet carbon in RF-2. For conservatism, assume that 8% is lost in RF-2. Therefore, based on 2011 actual throughput rate of 1,492 lb/hr product rate, inlet material (or potential material in the hopper) = 1,492 lb/hr product + 7% lost in RF-2 + 42% moisture in incoming carbon. The carbon typically contians 0.5% organic loading. Assume that the loading is negligible or zero. The total material is split evenly between the two hoppers.

Siemens Water Technologies Corp. Parker, Arizona

2011 Actual Emissions Calculations - Spent Carbon Hoppers 1 and 2 (H-1 & H-2)

E (lb TSP per ton material handled) =	k1 * (0.0032) [(U/5)^1.3 / [(M/2)^1.4]	AP-42 Section 13.2.4, Equation 1
E (lb PM_{10} per ton material handled) =	k2 * (0.0032) [(U/5)^1.3 / [(M/2)^1.4]	
E (lb $PM_{2.5}$ per ton material handled) =	k3 * (0.0032) [(U/5)^1.3 / [(M/2)^1.4]	

Parameter	Value	Units
E_{TSP} =	9.48E-05	lb TSP per ton material handled
E_{PM10} =	4.48E-05	lb PM10 per ton material handled
$E_{PM2.5}$ =	6.79E-06	lb PM2.5 per ton material handled

Parameter	Value	Units	Notes
2011 Actual Annual Spent Carbon Feed Rate	1,398.1	lb/hr	1,492 lb/hr dry product (2011 actual) with 0.5% organics loading and 10 % moisture
2011 Actual Annual Spent Carbon Feed Rate	0.699	tons/hr	
2011 Annual Hours of Operation	6,635	Hours/year	Transition Policy Report 2011.xls

Hourly and Annual Emissions from Spent Carbon Hopper 1 (H-1)

Maximum Hourly Emissions	Value	Units
Maximum Hourly Emissions $_{TSP}$ =	6.63E-05	lb/hr
Maximum Hourly Emissions $_{PM10}$ =	3.13E-05	lb/hr
Maximum Hourly Emissions $_{PM2.5}$ =	4.75E-06	lb/hr

Potential Annual Emissions	Value	Units
Potential Annual Emissions $_{TSP}$ =	2.20E-04	tons/year
Potential Annual Emissions $_{PM10}$ =	1.04E-04	tons/year
Potential Annual Emissions $_{PM2.5}$ =	1.57E-05	tons/year

Siemens Water Technologies Corp. Parker, Arizona

2011 Actual Emissions Calculations - Spent Carbon Hoppers 1 and 2 (H-1 & H-2)

Spent Carbon Hopper 2 (H-2)

Parameter	Value	Units	Notes
Particle Size Multiplier for TSP (k1)	0.74	dimensionless	TSP are particles are < 30 μm. Particle size multiplier for TSP = 0.74. [AP-42 Section 13.2.4.1]
Particle Size Multiplier for PM10 (k2)	0.35	dimensionless	PM10 are particles are < 10 μm. Particle size multiplier for PM10 = 0.35. [AP-42 Section 13.2.4.1]
Particle Size Multiplier for PM2.5 (k3)	0.053	dimensionless	PM2.5 are particles are < 2.5 μm. Particle size multiplier for PM2.5 = 0.053. [AP-42 Section 13.2.4.1]
Mean Wind Speed (U)	2.38	miles/hour	Long term average value based on Parker AZ data
Moisture Content (M)	10	%	Value for vapor carbon. May 2007 value
Half the 2011 Actual Spent Carbon Throughput Rate	1,398.1	lb/hr	Conference call with Siemens Water on 6-27-2012 : The process loses about 7-8% mass of inlet carbon in RF-2. For conservatism, assume that 8% is lost in RF-2. Therefore, based on a potential of 4,661 lb/hr product rate, inlet material (or potential material in the hopper) = 4,661 lb/hr product + 7% lost in RF-2 + 42% moisture in incoming carbon. The carbon typically contians 0.5% organic loading. Assume that the loading is negligible or zero. The total material is split evenly between the two hoppers.

E (lb TSP per ton material handled) =	k1 * (0.0032) [(U/5)^1.3 / [(M/2)^1.4]	AP-42 Section 13.2.4, Equation 1
E (lb PM_{10} per ton material handled) =	k2 * (0.0032) [(U/5)^1.3 / [(M/2)^1.4]	
E (lb $PM_{2.5}$ per ton material handled) =	k3 * (0.0032) [(U/5)^1.3 / [(M/2)^1.4]	

Siemens Water Technologies Corp. Parker, Arizona

2011 Actual Emissions Calculations - Spent Carbon Hoppers 1 and 2 (H-1 & H-2)

Parameter	Value	Units
E_{TSP} =	9.48E-05	lb TSP per ton material handled
E_{PM10} =	4.48E-05	lb PM10 per ton material handled
$E_{PM2.5}$ =	6.79E-06	lb PM2.5 per ton material handled

Parameter	Value	Units	Notes
2011 Actual Spent Carbon Feed Rate	1,398.1	lb/hr	1,492 lb/hr dry product (2011 actual) with 0.5% organics loading and 10 % moisture
2011 Actual Spent Carbon Feed Rate	0.699	tons/hr	
2011 Actual Annual Hours of Operation	6,635	Hours/year	Transition Policy Report 2011.xls

Hourly and Annual Emissions from Spent Carbon Hopper 2 (H-2)

Maximum Hourly Emissions	Value	Units
Maximum Hourly Emissions $_{TSP}$ =	6.63E-05	lb/hr
Maximum Hourly Emissions $_{PM10}$ =	3.13E-05	lb/hr
Maximum Hourly Emissions $_{PM2.5}$ =	4.75E-06	lb/hr

Potential Annual Emissions	Value	Units
Potential Annual Emissions $_{TSP}$ =	2.20E-04	tons/year
Potential Annual Emissions $_{PM10}$ =	1.04E-04	tons/year
Potential Annual Emissions $_{PM2.5}$ =	1.57E-05	tons/year

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2011 Actual Emissions Calculations - Reactivation Furnace 2 (RF-2)

Parameter (Units)	Value	Notes
Higher Heating Value of Natural Gas (Btu/scf)	1,020	Footnote a of AP-42 Table 1.4-1
RF-2 2011 Actual Hourly Carbon Regeneration Rate (lb/hr)	1,492	Transition Policy Report 2011.xls
RF 2 - Maximum Heat Input Rate (MMBtu/hr)	8.0	RF 2 Design Information; from Nov. 1998 Part 70 Application
RF 2 - Maximum Natural Gas Usage (MMscf/hr)	7.84E-03	Natural Gas Usage (MMscf) = Heat Input (MMBtu/hr) / HHV (Btu/scf)
RF 2 - Design Exhaust Gas Flow Rate (dscfm @ 7% O2)	8,022.9	Max possible flow rate = 15,280 acfm (email from Monte McCue dated 7-3-2012). See the calculations in the "Fan Calc" tab.
2011 Actual Annual Hours of Operation	6,635	Transition Policy Report 2011.xls

2005 Mini-Burn Stack Test Results for RF-2 ---- NOx

Condition 1	ppmdv	%O2	ppmdv @ 7% O2
Run 1	64	7	64.0
Run 2	79	7	79.0
Run 3	81	7	81.0
		Average (ppmdv @ 7% O2)	**74.7**

Boiler and Industrial Furnace Standard (RF-2) ---- VOC

VOC (ppmdv @ 7% O2)	**20.0**

USEPA Regulatory Performance Standards (HWC MACT Standards) ---- CO

CO (ppmdv @ 7% O_2)	**100.0**

Chavond-Berry Engineering's 1/24/94 Calculations (Attachment I of the 1998 Part 70 Application) --- SO2

Maximum Sulfur in Adsorbate	6.61	% S Liquid (Gibson Oil)	Based on July stack test data, Confirmed by Siemens Water
Maximum Sulfur in Vapor-phase Carbon	1.28	% S Liquid (Mobil Torrance)	Based on Nov stack test data, Confirmed by Siemens Water
Liquid Phase Carbon Maximum Loading	11.11	% dry regen basis	1998 TV application
Vapor Phase Carbon Maximum Loading	30	%	1998 TV application
Potential Hourly Carbon Regeneration Rate for RF-2	1,492	lb/hr	Transition Policy Report 2011.xls
RF-2 Maximum Hourly SO2 Emissions (pre-control)	**21.91**	**lb/hr**	Max hourly SO2 emissions = maximum of [(vapor phase carbon * Sulfur in vapor phase carbon *potential hourly carbon regeneration rate) , (liquid phase carbon * sulfur in adsorbate * potential hourly carbon regeneration rate)]
RF-2 Potential Annual SO2 Emissions (pre-control)	**72.70**	**Tons/year**	Hourly emissions x 8760 hours/year
Control efficiency of the Packed Bed Scrubber	**90.0%**		Engineering judgment, scrubber uses NaOH as the scrubbing agent
RF-2 Maximum Hourly SO2 Emissions (post-control)	**2.19**	**lb/hr**	
RF-2 Potential Annual SO2 Emissions (post-control)	**7.27**	**Tons/year**	

USEPA Regulatory Performance Standards (HWC MACT Standards) --- TSP/PM10/PM2.5

Particulate in Furnace Exhaust (Post Scrubber and ESP)	0.015	gr/dscf @ 7% O2	RCRA Limit
RF 2 - Design Exhaust Gas Flow Rate (dscfm @ 7% O2)	8,022.9	dscfm @ 7% O2	
RF-2 Maximum Hourly TSP/PM10/PM2.5 Emissions	**1.03**	**lb/hr**	
RF-2 Potential Annual TSP/PM10/PM2.5 Emissions	**3.42**	**Tons/year**	

Reactivation Furnace 2 (RF 2) Calculations Spent Carbon Feed Only					
Unit	Pollutant	Emission Factor (ppmdv @7% O_2)	Emission Rate lb/hr	Emission Rate tons/year	Notes
Reactivation Furnace 2	Nitrogen Oxides	74.7	4.289	14.23	2005 Mini-burn test on RF-2. Flow obtained from the fan rating.
	Carbon Monoxide	100.0	3.496	11.60	Based on RCRA limit of 100 ppm. Flow obtained from the fan rating.
	VOC	20.0	0.400	1.33	Boiler and Industrial Furnace Standard (RCRA). Flow obtained from the fan rating.
	Sulfur Dioxide		2.19	7.27	Chavond-Berry Engineering's 1/24/94 Calculations (Attachment I of the 1998 Part 70 Application)
	H_2SO_4		0.02	0.40	EPRI 2010. 1 % of SO_2 converted to SO3 and 100% SO3 converted to H2SO4
	Filterable PM		1.03	3.42	HWC MACT standard 0.015 gr/dscf. No information available on condensables.
	Condensable PM				
	TOTAL PM		1.03	3.42	
	TOTAL PM10		1.03	3.42	
	TOTAL PM2.5		1.03	3.42	

Reactivation Furnace 2 (RF 2) Calculations

Natural Gas Firing Only

Unit	Pollutant	Emission Factor (lb/MMscf)	Emission Rate		Notes
			lb/hr	tons/year	
Reactivation Furnace 2	Filterable PM	1.9	0.0149	0.049	AP-42 Table 1.4-2
	Condensable PM	5.7	0.0447	0.148	AP-42 Table 1.4-2
	TOTAL PM	7.6	0.0596	0.198	AP-42 Table 1.4-2
	TOTAL PM10	7.6	0.0596	0.198	According to Footnote c of AP-42 Table 1.4-2, all PM is
	TOTAL PM2.5	7.6	0.0596	0.198	According to Footnote c of AP-42 Table 1.4-2, all PM is
	Sulfur Dioxide	0.6	0.0047	0.016	AP-42 Table 1.4-2
	Nitrogen Oxides	100	0.7843	2.602	AP-42 Table 1.4-1
	Carbon Monoxide	84	0.6588	2.186	AP-42 Table 1.4-1
	VOC	5.5	0.0431	0.143	AP-42 Table 1.4-2
	Lead (Pb)	0.0005	3.92E-06	1.30E-05	AP-42 Table 1.4-3
	H_2SO_4	0.006	4.71E-05	1.56E-04	EPRI 2010. 1 % of SO2 converted to SO3 and 100% SO3 converted to H2SO4
	Pollutant	**Emission Factor (lb/MMBtu)**	**Emission Rate**		**Notes**
			lb/hr	**tons/year**	
	CO2	116.900	935.200	3,102.53	Emission factors are based on the EPA rule "Mandatory Reporting of Greenhouse Gases", Federal Register Vol. 74, No. 209, October 2009.
	CH4	2.20E-03	0.018	0.06	
	N2O	2.20E-04	0.002	0.01	
	Total GHG Mass	-	935.219	3,102.59	
	GHG CO2e	-	936.115	3,105.56	GWP: CO2 = 1, CH4 = 21, N2O = 310

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2011 Actual Annual Emissions - Carbon Adsorbers WS-1, WS-2 and WS-3

Parameter	Value	Units	Notes
WS-1 VOC Loading (inlet)	201	ppmv	Max. inlet loading using Flame Ionization Detector calibrated for CH4
WS-2 VOC Loading (inlet)	2	ppmv	Max. inlet loading using Flame Ionization Detector calibrated for CH4
WS-3 VOC Loading (inlet)	2	ppmv	Max. inlet loading using Flame Ionization Detector calibrated for CH4
Control Efficiency (typical)	95%		Although the adsorbers can achieve 100% control of certain compounds, 95% is typical
WS-1 VOC Loading (outlet)	10.05	ppmv	applying 95% control efficiency
WS-2 VOC Loading (outlet)	0.1	ppmv	applying 95% control efficiency
WS-3 VOC Loading (outlet)	0.1	ppmv	applying 95% control efficiency
2011 Actual Annual Hours of Operation	6,635	hours/year	2011 annual hours of operation

Parameter	Value	Units	Notes
WS-1 Design Exhaust Rate	115	acfm	From the document entitled "Appendix D Enfineering Calculations Supporting Control Device Performance", Rev 7 - June 2011
WS-2 Design Exhaust Rate	2,500	acfm	
WS-3 Design Exhaust Rate	5.90	acfm	
WS-1 Design Exhaust Rate	6,900	ft^3/hr	
WS-2 Design Exhaust Rate	150,000	ft^3/hr	
WS-3 Design Exhaust Rate	354	ft^3/hr	
WS-1 VOC Emission Rate (hourly)	6.93E-02	ft^3/hr	
WS-2 VOC Emission Rate (hourly)	1.50E-02	ft^3/hr	
WS-3 VOC Emission Rate (hourly)	3.54E-05	ft^3/hr	
Molar Volume of Vapor	385.5	$ft^3/lb\text{-}mol$	Assuming ideal gas behavoir
WS-1 VOC Emission Rate (hourly)	1.80E-04	lb-mol/hr	
WS-2 VOC Emission Rate (hourly)	3.89E-05	lb-mol/hr	Applying the ideal gas volume per mol
WS-3 VOC Emission Rate (hourly)	9.18E-08	lb-mol/hr	
Molecular Weight of Vapor	16	lb/lb-mol	Assuming the vapor is all methane as detected on the FID

Parameter	Value	Units	Notes
WS-1 VOC Emission Rate (hourly)	2.88E-03	lb/hr	
WS-2 VOC Emission Rate (hourly)	6.23E-04	lb/hr	
WS-3 VOC Emission Rate (hourly)	1.47E-06	lb/hr	
WS-1 VOC Emission Rate (annual)	9.55E-03	tons/year	2011 annual hours of operation
WS-2 VOC Emission Rate (annual)	2.07E-03	tons/year	2011 annual hours of operation
WS-3 VOC Emission Rate (annual)	4.87E-06	tons/year	2011 annual hours of operation

Maximum hourly VOC Emission Rate (WS-1, WS-2 and WS-3)		
WS-1 Maximum Hourly VOC Emission Rate =	6.93E-02	lb/hr
WS-2 Maximum Hourly VOC Emission Rate =	1.50E-02	lb/hr
WS-3 Maximum Hourly VOC Emission Rate =	3.54E-05	lb/hr
Potential Annual VOC Emission Rate (WS-1, WS-2 and WS-3)		
WS-1 Potential Annual VOC Emission Rate =	9.55E-03	tons/year
WS-2 Potential Annual VOC Emission Rate =	2.07E-03	tons/year
WS-3 Potential Annual VOC Emission Rate =	4.87E-06	tons/year