Westinghouse

Westinghouse Electric Company
Nuclear Fuel
Columbia Fuel Fabrication Facility
5801 Bluff Road
Hopkins, South Carolina 29061
USA

SCDHEC
Austin Goode, Permit Engineer
Bureau of Air Quality
2600 Bull Street
Columbia, SC 29201

Direct tel: 803.647.1920
Direct fax: 803.695.4152
e-mail: joynerdp@westinghouse.com

Your ref: 1900-0050-R1
Our ref: LTR-RAC-19-41

RE: Westinghouse Electric Company, LLC
Air Permit 1900-0050-R1
Updated Application for Renewal

May 30th, 2019

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BUREAU OF AIR QUALITY

Air Permit Renewal Team-

Please find enclosed the Westinghouse Columbia Fuel Fabrication Facility (CFFF) *updated* Air Permit renewal application. The original application for renewal was submitted on November 28th, 2017 within the required three month time frame prior to the expiration of the permit.

At the request of SCDHEC, CFFF is submitting the enclosed revised application to include information and data collected since the original application was submitted. The updated application includes information from the original application along with data from engineering studies and air emissions modeling performed in 2019. The updated application also includes other requests for additional information made by SCDHEC since the original application was submitted in 2017. The "Updated Air Permit Renewal Application" is attached to this cover letter, including a revised Form D-2955. Please note that for the Facility Physical Address section, Google Earth Software was used to obtain the latitude and longitude at the front door of the facility. Google Earth uses the WGS84, not NAD27 or NAD83.

The manufacturing process at Westinghouse has not changed significantly since the last renewal application in May of 2000 (and recently November 2017). There have been changes to exempted emission units as well as some changes to other permitted IDs, as identified in the summary table below. The data for this summary was obtained by reviewing the Configuration Control Forms completed for the site from 2006 to present.

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Configuration Control Changes Related to Air Emissions Units, 2006-May 2019

Date of Change	Permit ID	Event/Item	Description of Changes
2007	17	S-1008	Replace existing 1008 with new KCH 4,300 cfm system; remove old heater and replace with in-line heater; replace 14" ductwork with 18" ductwork on discharge side of scrubber CCF 07242
2008	17	S-1008	Install vacuum break for each Q-tank to prevent backflow into the scrubber CCF 08062
2008	18	S-1190	Refurbish existing, install more efficient spray nozzles, access door for packing, add extra mist eliminator CCF 08529
2008	15,16	S-1030	Relocation of scrap cage filter press from roof filter system 7A to S-1030 CCF 08551 CCF 09516
2008	18	S-1190	Install double demister CCF 08695
2009	15,16	S-1030	Removal of manual block valve and automatic control valve for addition of ammonia for pH adjustment CCF 09248
2009	Exempt	PK-7159	Connect IFBA Blue M oven hood exhaust to PK-7159
2009	14	S-2A/2B	Replacement of filter houses 1A (961) and 1B (962) with new filter houses that consist of pre-filters, intermediate filters, and HEPA filters with the same efficiency as the filter houses being replaced CCF 09817
2012	19	S-4025	Install new exhaust hood over plating room hot rinse tank that ties into the plating room scrubber, S-4025 CCF 12193
2012	Exempt	Laser Welding Scrubbers	Removal of S-4215 combined unit and replaced with individual laser welding units that filter zirc fines closer to the source, increase efficiency, and provide offline maintenance CCFs 12254, 12257, 12258, 12259, 12260
2013	14	S-2A/2B	Replacement of 3 banks of cartridge filter housings with 3 banks of bag filter housings CCF 13082
2013	Exempt	S-974	Attach exhaust from new Neptune Mass Spectrometer to the chem lab scrubber exhaust after the wet scrubber and before the filter house CCF 13204

2013	18	S-1190	Mechanical replacement of scrubber with nearly identical unit; pressure transmitter on scrubber nozzles CCF 13344 CCF 13405
2014	18	S-1190	Decrease fan rotational speed to operate in a more stable area of its performance curve; will have no effect on flow rate or scrubber ventilation performance CCF 14389
5/13/2014	Exempt	Laser X	Relocation of Laser Welding Operation from Windsor, Connecticut to Columbia, SC (Letter Attached, LTR-RAC-14-27) CCFs 14169, 14220
2/11/2016	19	S-4025	Plating Room Scrubber "Like for Like" Replacement; slight inward movement of exhaust stack 25-30 feet away from property line (Letter Attached, LTR-RAC-16-15 Rev1)) CCFs 16037, 16053, 16064
8/09/2016	Exempt	New ECG Machine	Installation of new Tridex ECG Machine and phase-out of older ECG machine (Letter Attached, LTR-RAC-16-50) CCFs 15261, 15285
9/7/2016	15,16	S-1030	Continuous bleed off, spray nozzles to inlet transition, continuous pH monitoring & future control capability, and installation of internal baskets for packing (Letter Attached, LTR-RAC-16-55) CCFs 16482, 16486, 16487, 16493, 16497, 16498, 16503, 16565
11/30/2016	15,16	S-1030	Redirect the ventilation ducts on the sifters from S-1030 to FL-150 Torit CCF 16501
11/15/2016	20	S-958	Add air gap to process water supply to S-958 CCF 16563
1/9/2017	15,16	S-1030	Change impeller on pump 1030A and 1030B from 11.625" to 13" CCFs 16659, 16667
7/17/2018	22,23	New Cleaver Brooks Boilers	Construction and installation of two new 24.5 Mbtu/hr natural gas fired boilers **Please note the boilers are still under construction
5/5/2019	15,16	S-1030	Scrubber Body Replacement for S-1030 including other minor changes to passive overflows, view ports, sensing line size for differential pressure, chevron baffles, and sump level CCF 17296

The information provided in this revised application and appendix supercedes all previously submitted information for the current permit renewal.

Please contact Diana Joyner at 803.497.7062 or joynerdp@westinghouse.com with any questions regarding this *revised* permit renewal application.

Respectfully,

Diana P. Joyner
Principal Environmental Engineer
Westinghouse Electric Company LLC
Columbia Fuel Fabrication Facility
5801 Bluff Road
Hopkins, South Carolina 29061, USA

cc: M. Annacone, Vice President of Columbia Fuel Operations
E. Wills, EH&S Manager
N. Parr, Environmental Engineering Manager
G. Couture, Licensing Manager
C. Logsdon, Principal Environmental Engineer
V. Kelmeckis, Corporate Environmental Manager
J. Pricener, Counsel for Environmental Health & Safety
ENOVIA Records

Enc.: **Attachment :** Updated Air Permit Renewal Application

Updated Air Permit Renewal Application

Westinghouse Electric Company LLC

Hopkins, South Carolina

Permit Number 1900-0050

May 30, 2019

Contents (page 1)

New Information and Documents

1) Updated DHEC Permit Renewal Application Form 2955

2) Table 1 – Facility-Wide Emissions Summary prepared by GEL Engineering, LLC, May 30, 2019.

3) Table 2 – Emisson Calculations for Industrial Incinerator prepared by GEL Engineering, LLC, May 30, 2019.

4) Table 3 – Natural Gas Combustion Emission Calculations for Calciners prepared by GEL Engineering, LLC, May 30, 2019.

5) Table 4 – Emission Calculations for Scrubbers prepared by GEL Engineering, LLC, May 30, 2019.

6) Air Dispersion Modeling Results prepared by GEL Engineering, LLC, May 30, 2019.

Previously Submitted Information and Documents

7) May 2014 correspondence – exemption for laser welder

8) February 2016 correspondence – like for like plating scrubber replacement

9) August/September 2016 correspondence – exemption for electrochemical grinding machine

10) September 2016 correspondence – minor alterations/restart of S-1030 scrubber

11) *Air Quality Construction Pemit Application* prepared by AECOM for Cleaver Brooks Boilers; AECOM Project No. 60571157, June 2018.

12) October 2018 correspondence – process equipment list for scrubbers

13) Information Regarding Uranium Volatilization in the Incinerator prepared by Leidos, Inc., December 5, 2018.

14) Inherency Documentation prepared by Westinghouse and GEL Engineering, LLC, February 25, 2019.

Contents (page 2)

Previously Submitted Information and Documents (continued)

15) *Report on Engineering Evaluation Testing* prepared by CleanAir Engineering; CleanAir Project No. 13754, March 27, 2019. Note that due to length (943 pages), this document is available for download on GEL Engineering, LLC FTP site. Please contact John McLure, jwm@gel.com, to obtain FTP link.

16) Equipment ID Descriptions (May 30, 2019 minor revision)

Updated DHEC Permit Renewal Application Form 2955

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BUREAU OF AIR QUALITY

Bureau of Air Quality
State Operating and Conditional Major Permit Renewal Application

In accordance with S.C. Regulation 61-62.1, Section II.H, any source that wishes to have its operating permit renewed must submit a written request no later than 90 days prior to the operating permit expiration to:

Air Permitting Division Director, Bureau of Air Quality
2600 Bull Street, Columbia, South Carolina, 29201

TYPE OF OPERATING PERMIT BEING REQUESTED/RENEWED:
Select the type of operating permit being requested/renewed. Eligibility criteria for general permits may be found at: http://www.scdhec.gov/Environment/AirQuality/OperatingPermits/General/. Eligibility criteria for registration permits may be found at: https://www.scdhec.gov/environment/air-quality/air-quality-permits/registration-permits
☒ State Operating Permit
☐ Conditional Major Operating Permit
☐ Registration Permit TYPE *
☐ General State Operating Permit TYPE *
☐ General Conditional Major Operating Permit TYPE *

*By checking one of the registration or general permits above, I am certifying, to the best of my knowledge and belief that this source qualifies for and agrees to the conditions and terms of the registration permit or general operating permit listed above. The source shall be subject to enforcement action for operation without a valid permit if the source is later determined not to qualify for the conditions and terms of the registration or general permit listed above.

FACILITY IDENTIFICATION	
SC Air Permit Number (8-digits only) 1900 - 0050	Application Date November 2017, Additional Information May 2019
Facility Name *(Name used to identify the facility at the physical address listed below)* Westinghouse Electric Company LLC	Facility Federal Tax Identification Number *(Established by the U.S. Internal Revenue Service to identify a business entity)* 52-2140933

FACILITY PHYSICAL ADDRESS *(Facility coordinates should be based at the front door or main entrance of the facility using NAD83 (North American Datum of 1983).*		
Physical Address: 5801 Bluff Road		County: Richland
City: Hopkins	State: SC	Zip Code: 29204
Latitude: 33° 52' 54.5"	Longitude: -80° 55' 4.0"	

FACILITY'S PRODUCTS / SERVICES	
Primary Products/Services *(List the primary product and/or service)* Industrial inorganic chemicals, not elsewhere classified. (Fabrication of nuclear fuel assemblies)	Other Products/Services *(List any other products and/or services)*
Primary SIC Code *(Standard Industrial Classification Codes)* 2819	Primary NAICS Code *(North American Industry Classification System)* 325998

AIR PERMIT FACILITY CONTACT *(Person at the facility who can answer technical questions about the facility and permit application.)*			
Title/Position: Principal Environmental Engineer	Ms.	First Name: Diana	Last Name: Joyner
Mailing Address: 5801 Bluff Road			
City: Hopkins		State: SC	Zip Code: 29061
E-mail Address: joynerdp@westinghouse.com		Phone No.: (803) 647-1920	Cell No.: (803) 497-7062

CHANGES
Complete by answering the questions below regarding your facility. Pursuant to S. C. Regulation 61-62.1, Section II.H.4.e through j any changes to the following information have to be addressed. If your answer to the question is "NO," then follow the instructions in the "NO" column. If your answer to the question is "YES," then follow the instructions in the "YES" column. When asked to provide information, submit the requested information along with this form for renewal.

Answer the following questions about your facility:	**If you answer "NO"** Initial here that this has not changed	**If you answer "YES"** Provide information listed
Has the facility's planned operating schedule changed?	**NO** MJP	Previous schedule and current schedule
Has the description of the facility's current and/or proposed processes changed? This includes the physical and chemical properties and feed rate of materials used and produced from which the facility determined actual and potential emissions.	**NO** MJP	Previous description and current and/or proposed descriptions
Have there been any changes to the process flow diagram or production process layout? (Process Flow diagram or production process layout identifies major equipment, machines, and process steps or product lines within the production process, all product streams, all exhaust streams (emission points) including fugitives within the production process, all waste streams, and all control devices including inherent process control devices used within the production process)	**NO** MJP	Updated process flow diagram or production process layout
Has any of the following changed? Mass emission data and emission calculations, including the potential uncontrolled and controlled mass emission rate of each criteria pollutant and other air contaminants such as volatile organic compounds (VOC), toxic air pollutants (TAP), and hazardous air pollutants (HAP), emitted from each source. Please provide $PM_{2.5}$ emissions, if applicable and not previously provided.	**YES** MJP Reference the last up-to-date submittal: **June 2018 construction permit application prepared by AECOM for installation of two 24.5 MMBtu/hr Cleaver Brooks boilers.** **Updated emission calculations for other existing sources are included with this submittal as Tables 1 through 4.**	Updated emission data, calculations, and supporting information as indicated in the question.

Answer the following questions about your facility:	If you answer "NO" Initial here that this has not changed	If you answer "YES" Provide information listed
Has any of the following changed? Documentation that supports the basis of the emission rates such as stack test data, AP-42 emission factors, material balance, and/or engineering estimates.	YES MJA Reference the last up-to-date submittal: **Updated emission rates are included with this submittal as Tables 1 through 4. Table 1 is a facility-wide emissions summary. Table 2 is updated emissions from Industrial Incinerator based on AP-42, Chapter 2.1. Table 3 is combustion emissions from Calciners based on AP-42, Chapter 1.4. Table 4 is emissions from process Scrubbers S-4025, S-1030, S-958, S-1190, S-2A/2B, and S-1008 derived from February 2019 engineering evaluation testing conducted by CleanAir Engineering.**	Updated emission data, calculations, and supporting information as indicated in the question.
Has any of the following changed? Assumptions used in the emission calculations.	YES MJA Reference the last up-to-date submittal: **Please refer to the footnotes on Tables 1-4 for the assumptions used in the emission calculations.**	Updated emission data, calculations, and supporting information as indicated in the question.
Has any of the following changed? Fugitive emissions (i.e. emissions from filling operations, pumps, valves, flanges, etc.) in the emission calculations.	NO MJA Reference the last up-to-date submittal:	Updated emission data, calculations, and supporting information as indicated in the question.

Answer the following questions about your facility:	If you answer "NO" Initial here that this has not changed	If you answer "YES" Provide information listed
Has any of the following changed? Summary of facility-wide potential uncontrolled and controlled emissions with a regulatory applicability determination.	**YES** MJP Reference the last up-to-date submittal: **A table showing facility-wide emissions is included as Table 1 of this submittal.**	Updated emission data, calculations, and supporting information as indicated in the question.
Are there any new emission points or has there been a change in the existing emission point information (location coordinates, release height above ground, maximum internal dimensions of the emission point/vent, discharge orientation, emission exit velocity, emission exit temperature, dimensions describing the volume or area of fugitive emissions, existence of any rain protection device or other impediment to vertical dispersion, etc.)?	**YES** MJP Reference the last up-to-date submittal: **The June 2018 construction permit application prepared by AECOM is the most recent previous air dispersion modeling submittal. An updated air dispersion modeling compliance demonstration is included with this submittal. Based on this updated demonstration, the orientation of the S-958 scrubber stack is being changed from horizontal to vertical and the height is being raised to approximately 55 feet to optimize atmospheric dispersion.**	Emission point information for any new emission point or updated information for any emission point whose parameters have changed since the last submittal.
Is there any other information that we need to know? *	**NO** MJP	Detailed explanation of the additional information

* Be aware that the Bureau may request additional information if deemed necessary.

OWNER OR OPERATOR			
Title/Position: VP/Plant Manager	Mr.	First Name: Michael	Last Name: Annacone
Mailing Address: 5801 Bluff Road			
City: Hopkins		State: SC	Zip Code: 29061
E-mail Address:		Phone No.: (803) 647-1920	Cell No.: ( ) -

OWNER OR OPERATOR SIGNATURE

I certify, to the best of my knowledge and belief, that no applicable standards and/or regulations will be contravened or violated. I certify that any application form, report, or compliance certification submitted in this permit application is true, accurate, and complete based on information and belief formed after reasonable inquiry. I understand that any statements and/or descriptions, which are found to be incorrect, may result in the immediate revocation of any permit issued for this application. I understand that all emission units at this facility must comply with all current applicable requirements and must, on a timely basis, comply with the requirements of any new applicable standards and/or regulations that become effective during the permit term.

Signature of Owner or Operator — Date: 5/30/19

Table 1 – Facility-Wide Emissions Summary

Table 1
Facility-Wide Emissions Summary
Westinghouse Electric Company LLC
Hopkins, South Carolina
prepared by GEL Engineering, LLC, May 30, 2019

Source	$PM/PM_{10}/PM_{2.5}$		SO_2		CO		NOx		VOCs		Pb		CO_2		CH_4		N_2O		CO2e		Sb		As	
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
24.5 MMBTU/HR Cleaver Brooks Boiler (1 of 2)[1]	0.555	2.43	0.034	0.15	0.458	2.01	2.683	11.75	0.088	0.39	2.12E-05	9.28E-05	3,837.6	16,809	5.40E-02	2.37E-01	0.16	0.68		17,015	-	-	-	-
24.5 MMBTU/HR Cleaver Brooks Boiler (2 of 2)[1]	0.555	2.43	0.034	0.15	0.458	2.01	2.683	11.75	0.088	0.39	2.12E-05	9.28E-05	3,837.6	16,809	5.40E-02	2.37E-01	0.16	0.68		17,015	-	-	-	-
Industrial Incinerator[2]	0.88	3.83	0.63	2.74	2.50	10.95	0.75	3.29	0.75	3.29	-	-	-	-	-	-	-	-		-	-	-	-	-
Calciner Combustion Emissions (1 of 5)[3]	4.25E-03	0.02	3.35E-04	1.47E-03	0.05	0.21	0.06	0.24	3.07E-03	1.35E-02	2.79E-07	1.22E-06	67.1	294	1.29E-03	5.63E-03	1.23E-03	5.38E-03		295.46	-	-	-	-
Calciner Combustion Emissions (2 of 5)[3]	4.25E-03	0.02	3.35E-04	1.47E-03	0.05	0.21	0.06	0.24	3.07E-03	1.35E-02	2.79E-07	1.22E-06	67.1	294	1.29E-03	5.63E-03	1.23E-03	5.38E-03		295.46	-	-	-	-
Calciner Combustion Emissions (3 of 5)[3]	4.25E-03	0.02	3.35E-04	1.47E-03	0.05	0.21	0.06	0.24	3.07E-03	1.35E-02	2.79E-07	1.22E-06	67.1	294	1.29E-03	5.63E-03	1.23E-03	5.38E-03		295.46	-	-	-	-
Calciner Combustion Emissions (4 of 5)[3]	4.25E-03	0.02	3.35E-04	1.47E-03	0.05	0.21	0.06	0.24	3.07E-03	1.35E-02	2.79E-07	1.22E-06	67.1	294	1.29E-03	5.63E-03	1.23E-03	5.38E-03		295.46	-	-	-	-
Calciner Combustion Emissions (5 of 5)[3]	4.25E-03	0.02	3.35E-04	1.47E-03	0.05	0.21	0.06	0.24	3.07E-03	1.35E-02	2.79E-07	1.22E-06	67.1	294	1.29E-03	5.63E-03	1.23E-03	5.38E-03		295.46	-	-	-	-
S-4025 Scrubber[4]	-	-	-	-	-	-	-	-	-	-	5.65E-05	2.47E-04	-	-	-	-	-	-		-	1.58E-05	6.90E-05	1.65E-05	7.21E-05
S-1030 Scrubber[4]	-	-	-	-	-	-	0.36	1.58	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-
S-958 Scrubber[4]	-	-	-	-	-	-	3.52	15.42	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-
S-1190 Scrubber[4]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-
S-2A/2B Scrubber[4]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-
S-1008 Scrubber[4]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-
	2.01	**8.79**	**0.69**	**3.04**	**3.65**	**16.00**	**10.28**	**45.00**	**0.94**	**4.13**	**0.00010**	**0.00044**	**8,010**	**35,087**	**0.114**	**0.502**	**0.326**	**1.39**		**35,507**	**1.58E-05**	**6.90E-05**	**1.65E-05**	**7.21E-05**
																				SC TAP De minimis Analysis				
																				Facility-Wide TAP Emissions (lbs/day)	0.0004		0.0004	
																				SC Standard No. 8 De minimis (lbs/day)	0.030		0.012	
																				Modeling Required?	No		No	
																					Sb		**As**	

Footnotes:

[1] Cleaver Brooks Boiler combustion emissions are based on AP-42 emission factors. See attached *Air Quality Construction Permit Application* prepared by AECOM, AECOM Project No. 60571157, June 2018, for further details.

[2] Industrial Incinerator emissions are based on AP-42 emission factors. See attached Table 2 for further details.

[3] Calciner natural gas combustion emissions are based on AP-42 emission factors. See attached Table 3 for further details.

[4] Scrubber emissions are derived from engineering testing conducted by CleanAir Engineering in February 2019 (*Report on Engineering Evaluation Testing* , CleanAir Project No. 13754, March 27, 2019). See attached Table 4 for further details.

Table 1
Facility-Wide Emissions Summary
Westinghouse Electric Company LLC
Hopkins, South Carolina
prepared by GEL Engineering, LLC, May 30, 2019

Be		Cd		Cr		Co		Mn		Ni		P		Se		HF		HNO3		HCl		H2SO4		
lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	
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3.62E-06	1.58E-05	4.67E-04	2.04E-03	5.45E-05	2.39E-04	1.49E-05	6.53E-05	9.50E-05	4.16E-04	7.15E-04	3.13E-03	2.66E-03	1.17E-02	3.13E-04	1.37E-03	0.0465	0.2037	0.3270	1.4323	0.0375	0.1643	0.1425	0.6242	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0100	0.0438	0.0500	0.2190	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0040	0.0175	0.1870	0.8191	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0045	0.0197	0.0110	0.0482	-	-	-	-	**Total HAPs tpy**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0030	0.0131	0.0070	0.0307	-	-	-	-	**3.68**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0015	0.0066	0.0045	0.0197	-	-	-	-	
3.62E-06	**1.58E-05**	**4.67E-04**	**2.04E-03**	**5.45E-05**	**2.39E-04**	**1.49E-05**	**6.53E-05**	**9.50E-05**	**4.16E-04**	**7.15E-04**	**3.13E-03**	**2.66E-03**	**1.17E-02**	**3.13E-04**	**1.37E-03**	**0.0695**	**0.3044**	**0.5865**	**2.5689**	**0.0375**	**0.1643**	**0.1425**	**0.6242**	
0.00009		0.0112		0.0013		0.0004		0.0023		0.0172		0.0638		0.0075		1.67		14.08		0.900		3.42		**SC TAP De minimis Analysis**
0.000		0.003		0.030		0.003		0.300		0.006		0.006		0.012		0.025		1.500		2.100		0.120		**Facility-Wide TAP Emissions (lbs/day)**
Yes		Yes		No		No		No		Yes		Yes		No		Yes		Yes		No		Yes		**SC Standard No. 8 De minimis (lbs/day)**
Be		**Cd**		**Cr**		**Co**		**Mn**		**Ni**		**P**		**Se**		**HF**		**HNO3**		**HCl**		**H2SO4**		**Modeling Required?**

Table 2 – Emission Calculations for Industrial Incinerator

Table 3 – Natural Gas Combustion Emission Calculations for Calciners

Table 3 - Natural Gas Combustion Emissions Calculations for Calciners

Westinghouse Electric Company LLC

Hopkins, South Carolina

prepared by GEL Engineering, LLC, May 30, 2019

Fuel:	Natural Gas	
Btu Content:	1,020	Btu/ft^3
Sulfur Content:	NA	% wt

			Natural Gas Combustion Emissions			
	A		B	C	D	
Source ID	Btu Rating (Btu/hr)	Pollutant	AP-42 Emission Factor ($lbs/10^6\ ft^3$)	Hourly Emissions (lbs/hr)	Annual Emissions (tons/yr)	
Five Calciners	570,000 (each)	$PM/PM_{10}/PM_{2.5}$	7.6	4.25E-03	0.02	
		SO_2	0.6	3.35E-04	1.47E-03	
		CO	84	0.05	0.21	
		NOx	100	0.06	0.24	**GHG Pollutants**
		VOCs	5.5	3.07E-03	1.35E-02	**CO_2 Equivalents**
		Lead	5.00E-04	2.79E-07	1.22E-06	**(tons/yr)**
		CO_2	120,000	67.1	294	294
		CH_4	2.3	1.29E-03	5.63E-03	0.14
		N_2O	2.2	1.23E-03	5.38E-03	1.60
						295.46

Notes:

1) AP-42, Section 1.4, Table 1.4-2, PM emission factor assumes all PM is less than 1.0 micrometer in diameter. Therefore, emission factors for PM, PM_{10}, and $PM_{2.5}$ are assumed to be equal.

2) SO_2, VOC, Lead, CO_2, CH_4, and N_2O (uncontrolled) emission factors taken from AP-42, Section 1.4, Table 1.4-2.

3) NOx and CO emission factors taken from AP-42, Section 1.4, Table 1.4-1 (Small Boilers, < 100 MMBtu/hr, uncontrolled)

4) CO_2 equivalents based on the following conversions -- CH_4 x 25, N_2O x 298.

5) See example emissions calculations below for natural gas combustion:

$$\boxed{A}\ \frac{Btu}{hour} \times \boxed{B}\ \frac{lbs}{10^6\ ft3} \times \frac{ft3}{1020\ Btu} = \boxed{C}\ \frac{lbs\ emissions}{hour}$$

$$\boxed{C}\ \frac{lbs\ emissions}{hour} \times \frac{8760\ hours}{year} \times \frac{1\ ton}{2000\ lbs} = \boxed{D}\ \frac{tons\ emissions}{year}$$

Table 4 – Emission Calculations for Scrubbers

Air Dispersion Modeling Results

AIR DISPERSION MODELING RESULTS

WESTINGHOUSE ELECTRIC COMPANY LLC
COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

1.0 INTRODUCTION

Westinghouse Electric Company LLC (Westinghouse) operates the Columbia Fuel Fabrication facility in Hopkins, South Carolina under Air Permit No. 1900-0050 issued by the South Carolina Department of Health and Environmental Control (DHEC) Bureau of Air Quality (BAQ). Westinghouse is submitting this air dispersion modeling compliance demonstration as part of the operating permit renewal application currently being reviewed by DHEC BAQ.

Air dispersion modeling was used to demonstrate compliance with the DHEC BAQ Standard Nos. 2 and 8. A site location map and property boundary map is included as Figure 1.

2.0 AIR DISPERSION MODELING DATA

Modeling was performed using the latest version (version 18081) of the U.S. Environmental Protection Agency (EPA)-approved AERMOD air dispersion model. No urban option was used in this demonstration. The model used Columbia meteorological data for years 2012 through 2016 obtained from DHEC BAQ's website. The ADJ_U* (UStar) files were chosen from DHEC BAQ's meteorological data as allowed by EPA's modeling guidance issued in Appendix W (2017). The AERMOD air dispersion model inputs contain the onsite building coordinates, incorporates good engineering practices, and downwash calculations. All model options were chosen in accordance with the DHEC document "Modeling Guidelines for Air Quality Permits" dated October 2018 and AERMOD guidance from the DHEC BAQ website.

A summary of the location and stack parameters for each emission point is provided in Table 1. Only the highlighted sources are included in the modeling demonstration. Criteria pollutant emission sources not included in the model were determined to have pollutant emission rates below their respective de minimis levels provided in the DHEC BAQ "Modeling Guidelines for Air Quality Permits" dated October 2018.

Facility-wide emissions were updated per the request of DHEC BAQ staff and are presented as Table 1 in the Emission Calculations section of this submittal. A determination of which toxic air pollutant emission rates exceeded their respective Standard No. 8 modeling de minimis rates was also provided in the Facility-Wide Emissions Summary Table 1. The pollutant emission rates included in the modeling compliance demonstration are included in Table 2 of the modeling results and were taken from the emission rates presented in Table 1 of the Emission Calculations Section.

The modeling analysis used one receptor grid which utilizes the AERMOD distance method. This method places discrete receptors at 50-meter intervals along the facility property boundary. Furthermore, receptors were placed in a grid outside the property boundary at no more than 100-meter spacing extending out 1,500 meters and in such a manner to ensure identification of the highest concentrations. The Richland County terrain data, in National Elevation Data 83 (NED83) format, required to run the AERMAP subprogram was obtained from DHEC's BAQ website http://www.scdhec.gov/environment/baq/Modeling/. Terrain elevations were calculated within the AERMAP subprogram.

3.0 AIR DISPERSION MODELING RESULTS

Electronic copies of the AERMOD model input and output files are provided for DHEC BAQ's Modeling Section as part of this submittal.

3.1 South Carolina Ambient Air Quality Standards (Standard No. 2)

The South Carolina Ambient Air Quality Standards (SCAAQS) (R.61-62.5, Standard No. 2) establish ambient air quality standards for criteria pollutants, including particulate matter with aerodynamic diameter of less than or equal to 10 microns (PM_{10}), particulate matter with aerodynamic diameter of less than or equal to 2.5 microns ($PM_{2.5}$), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone, and lead.

As stated in the DHEC BAQ "Modeling Guidelines for Air Quality Permits" (October 2018) sources with emissions less than de minimis modeling levels of 1.14 pounds per hour (lb/hr) for PM_{10}, $PM_{2.5}$, SO_2, NO_2, 10 lbs/hr for CO, and 0.114 lbs/hour (facility-wide) for lead, do not require modeling.

Based on DHEC de minimis criteria, the only Standard No. 2 pollutant emitted at Westinghouse requiring modeling is NO_2. To determine compliance with the SCAAQS, the estimated maximum potential ground-level concentrations of NO_2 resulting from emissions from Westinghouse were added to the corresponding background concentrations for NO_2. The 2015-2017 three-year background concentration data for NO_2 was obtained from the most recent monitoring data provided on DHEC BAQ's website. The 1-hour and annual background data of NO_2 concentrations for calendar year 2017 from the Sandhill monitoring station was added to the model results to determine the total concentrations which were then compared to the SCAAQS, as shown in Table 3. Please note that based on this modeling demonstration, the orientation of the S-958 scrubber stack is being changed from horizontal to vertical, and the stack height will increase from 42.8 to approximately 55 feet to optimize atmospheric dispersion.

3.2 South Carolina Prevention of Significant Deterioration Standard (Standard No. 7)

The South Carolina Prevention of Significant Deterioration (PSD) Standard (R.61-62.5, Standard No. 7) applies if the facility is classified as a "major" source as defined under this regulation, or if the facility is classified as a "minor" source and is located in a county for which Minor Source Baseline Dates (MSBDs) for PM_{10}, $PM_{2.5}$, NO_2, and SO_2 have been established. Westinghouse is a minor source and has not previously triggered a PSD review. The operating permit renewal project does not trigger a PSD review. Therefore, no Standard No. 7 modeling demonstration is included with this submittal.

3.3 South Carolina Toxic Air Pollutants (Standard No. 8)

The South Carolina Toxic Air Pollutant (Standard No. 8) requires facilities to identify and quantify TAP emissions from all sources at the facility and to determine compliance with established ambient air quality standards for these TAPs. The South Carolina Toxic Air Pollutant Standard establishes standards for a total of approximately 255 TAPs including most of the 187 Hazardous Air Pollutants established by Title III of the Clean Air Act Amendments.

As shown in Table 4, beryllium, cadmium, nickel, phosphorus, hydrogen fluoride, nitric acid, and sulfuric acid emissions from the Westinghouse facility comply with Standard No. 8.

Table 1
Permitted Emission Sources - Stack Parameters

Westinghouse Electric Company LLC
Columbia Fuel Fabrication Facility
Hopkins, South Carolina

Permit Unit ID	Source Description	Stack ID No.	UTM Easting	UTM Northing	Stack Height (ft)	Temperature (°F)	Stack Velocity (fps)	Modeled Velocity (fps)	Stack Diameter (ft)	Horizontal / Vertical Discharge	Rain Cap (YES/NO)
01	2.51 MMBtu/hr Industrial Incinerator	6A	507413	3749074	58	170	61	61	0.83	Vertical	NO
02	24.5 MMBtu/hr Cleaver Brooks Boiler	S22	507420.3	3748990	25	322	27.38	27.38	2.0	Vertical	NO
03	24.5 MMBtu/hr Cleaver Brooks Boiler	S23	507429.1	3748987	25	322	27.38	27.38	2.0	Vertical	NO
09	Calciner #1 - 0.57 MMBtu/hr	C1	507478	3749056	38.3	400	6.4	0.003281	1.0	Vertical	YES
10	Calciner #2 - 0.57 MMBtu/hr	C2	507485	3749054	38.3	400	6.4	0.003281	1.0	Vertical	YES
11	Calciner #3 - 0.57 MMBtu/hr	C3	507490	3749053	38.3	400	6.4	0.003281	1.0	Vertical	YES
12	Calciner #4 - 0.57 MMBtu/hr	C4	507505	3749048	38.3	400	6.4	0.003281	1.0	Vertical	YES
13	Calciner #5 - 0.57 MMBtu/hr	C5	507456	3749062	38.3	400	6.4	0.003281	1.0	Vertical	YES
14	S-1030 Process Scrubber	S-1030	507480	3749056	64	86.7	25.45	25.45	3.5	Vertical	NO
15,16	S-2A/2B Process Scrubber	S-2A/2B	507455	3749061	48	122	25.3	0.003281	2.5	Horizontal	NO
17	S-1008 Process Scrubber	S-1008	507453	3749049	51	107	31.14	0.003281	1.5	Horizontal	NO
18	S-1190 Process Scrubber	S-1190	507410	3748977	46	57.3	32.90	32.90	2.0	Vertical	NO
19	S-4025 Plating Process Scrubber	S-4025	507490	3749211	46	62.0	58.34	58.34	2.33	Vertical	NO
20	S-958 Process Scrubber	S-958	507397	3749099	55.5	119	51.05	51.05	2.0	Vertical	NO

NOTES:
1) Incinerator - temperature, velocity, and diameter taken from DHEC BAQ Modeling Summary Sheet, June 19, 2018. UTM coordinates and height provided by Westinghouse.
2) Two New Boilers - stack parameters taken from BEEST modeling file created by AECOM and submitted with construction permit application for two new boilers.
3) Calciners - stack parameters except height taken from DHEC BAQ Modeling Summary. Height taken from Westinghouse Plant Ventilation System document.
4) All Scrubber Stacks - velocity and temperature data taken from CleanAir Engineering March 2019 stack test report. Heights taken from data provided by Westinghouse Plant Ventilation System or confirmed by Westinghouse staff.
5) All Stacks - discharge direction and rain cap information provided by Westinghouse.
6) Only stacks highlighted on table are required to be modeled based on current emission estimates.
7) S-958 Scrubber exhaust parameters after modifications to optimize atmospheric dispersion.

Table 2
Modeled Pollutant Emissions Rates

Westinghouse Electric Company LLC
Columbia Fuel Fabrication Facility
Hopkins, South Carolina

Equipment Description	Stack ID No.	NO_2 (lbs/hr)	7440-41-7 Beryllium (lbs/hr)	7440-43-9 Cadmium (lbs/hr)	7440-02-0 Nickel (lbs/hr)	7723-14-0 Phosphorus (lbs/hr)	7664-39-3 HF (lbs/hr)	7697-37-2 HNO_3 (lbs/hr)	7664-93-9 H_2SO_4 (lbs/hr)
24.5 MMBtu/hr Cleaver Brooks Boiler	S22	2.683	-	-	-	-	-	-	-
24.5 MMBtu/hr Cleaver Brooks Boiler	S23	2.683	-	-	-	-	-	-	-
S-1030 Process Scrubber	S-1030	-	-	-	-	-	0.01	0.05	-
S-2A/2B Process Scrubber	S-2A/2B	-	-	-	-	-	0.003	0.007	-
S-1008 Process Scrubber	S-1008	-	-	-	-	-	0.0015	0.0045	-
S-1190 Process Scrubber	S-1190	-	-	-	-	-	0.0045	0.011	-
S-4025 Plating Process Scrubber	S-4025	-	3.62E-06	4.67E-04	7.15E-04	2.66E-03	0.0465	0.327	0.1425
S-958 Process Scrubber	S-958	3.52	-	-	-	-	0.004	0.187	-

NOTES:

1) Criteria pollutants modeling exemption rates are per source as listed on Table 2.1 in DHEC BAQ's *Modeling Guidelines for Air Quality Permits*, October 2018, and shown below:

i) PM_{10}, $PM_{2.5}$, NO_x, SO_2 < 1.14 lbs/hr/source

ii) CO < 10 lbs/hr/source

iii) Lead < 0.114 lbs/hr or 0.5 tons/year facility-wide

2) De minimis rate listed for Beryllium in DHEC BAQ Modeling Guidelines is 0.000.

Table 3
Comparison of Air Dispersion Modeling Results with
South Carolina Standard No. 2

Westinghouse Electric Company LLC
Columbia Fuel Fabrication Facility
Hopkins, South Carolina

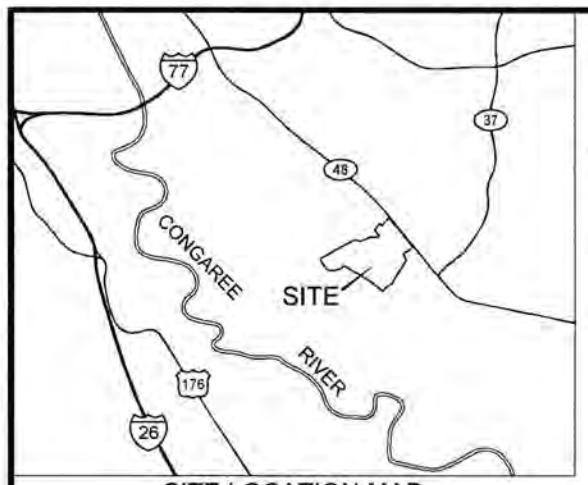
Pollutant	Averaging Period	Modeled Concentration (µg/m3)	Background Concentration (µg/m3)	Total Concentration (µg/m3)	Allowable Concentration (µg/m3)	Facility in Compliance? (YES/NO)
NO_2	1-Hour	86.8	69.6	156.4	188	YES
	Annual	2.1	7.7	9.8	100	YES

Annual and 1-hour background concentrations of NO_2 taken from 2017 data provided on DHEC BAQ website from Sandhill monitoring station in Richland County.

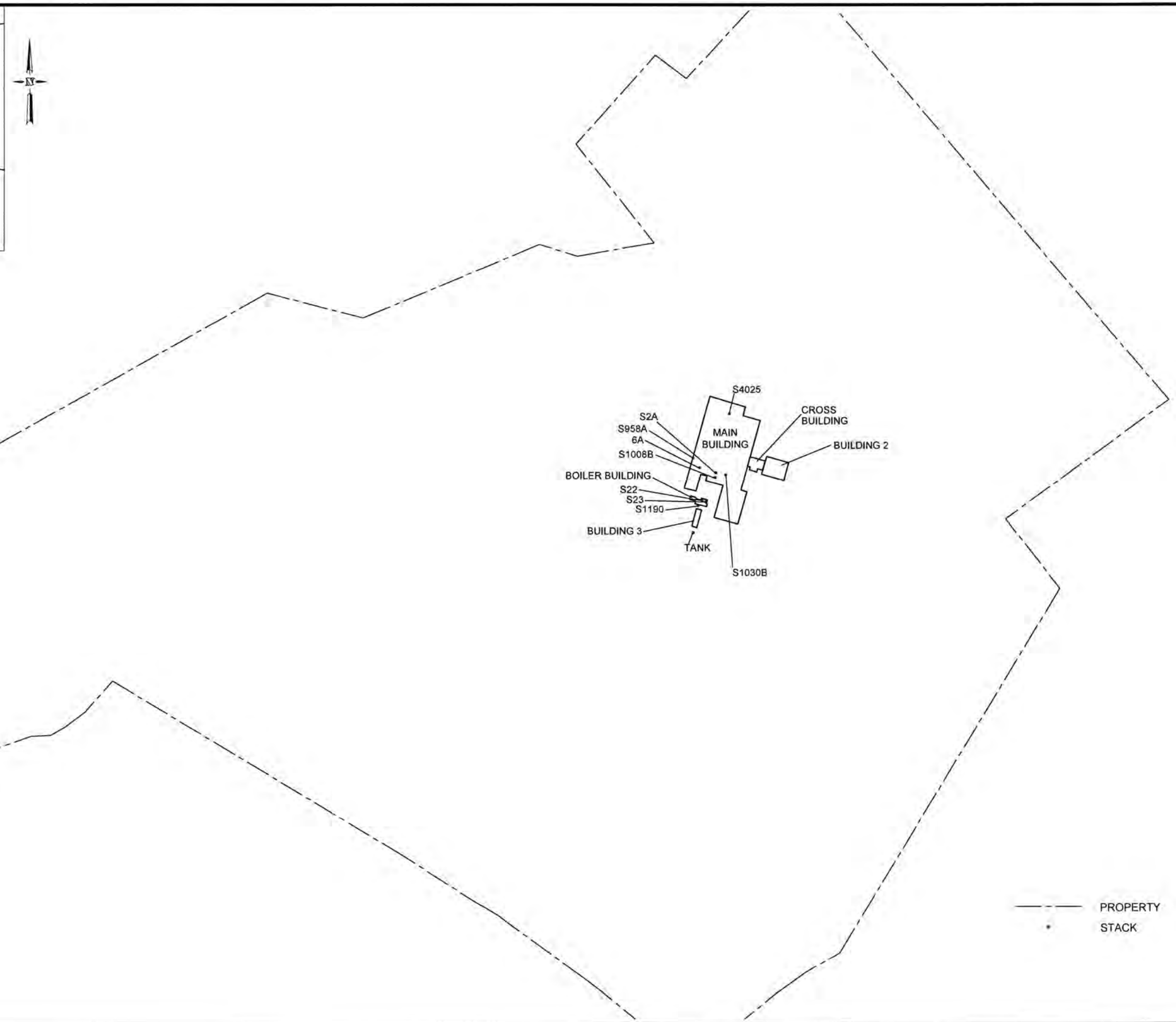
Table 4
Comparison of Air Dispersion Modeling Results with
South Carolina Standard No. 8

Westinghouse Electric Company LLC
Columbia Fuel Fabrication Facility
Hopkins, South Carolina

Pollutant	Averaging Period	Modeled Concentration (µg/m3)	Allowable Concentration (µg/m3)	Facility in Compliance? (YES/NO)
Beryllium	24-Hour	0.00001	0.01	YES
Cadmium	24-Hour	0.00154	0.25	YES
Nickel	24-Hour	0.00236	0.50	YES
Phosphorus	24-Hour	0.00879	0.50	YES
HF	24-Hour	0.184	2.05	YES
HNO3	24-Hour	1.33	125.00	YES
H_2SO_4	24-Hour	0.471	10.00	YES



SITE LOCATION MAP
(NOT TO SCALE)



APPROXIMATE SCALE: 1"= 250'

0' 125' 250' 500'

PLOTTED: 5/22/2019 5:16 PM BY: tjp LOCATION: G:\O-Z\W\welt\welt00118\welt00118_oir.dwg LAYOUT: 1

GEL Engineering LLC
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Charleston, SC 29407
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F 843.769.7397
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SITE LOCATION AND BOUNDARY MAP

WESTINGHOUSE ELECTRIC COMPANY LLC
COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

DATE	05/22/2019
DRAWN / APPROVED BY	TJP / JPF
PROJECT NUMBER	welt00118
FIGURE	1

May 2014 Correspondence – Exemption for Laser Welder

Westinghouse

Westinghouse Electric Company LLC
Nuclear Fuel
Columbia Fuel Site
5801 Bluff Road
Hopkins, South Carolina 29061
USA

South Carolina Department of Health and
Environmental Control
Attn: Hank Kirkland
Bureau of Air Quality (BAQ)
Engineering Services
2600 Bull Street
Columbia, SC 29201

Direct tel: 803-647-3171
Direct fax: 803-695-3964
e-mail: Logsdocj@westinghouse.com

Your ref: 1900-0050
Our ref: LTR-RAC-14-27

Subject: Request for laser welder stack exemption on Air Permit 1900-0050

Date: May 13, 2014

Dear Mr. Kirkland,

Westinghouse Electric Company (Westinghouse) is transferring a laser welding operation from its Windsor, Connecticut, site to the Columbia, South Carolina, site. In preparation for the transition, stack samples were taken at the Windsor site to gage regulatory impact for Columbia.

The attached laboratory results show that the laser welding operation is exemptible due to emissions less than 1 pound/hour. Toxic air pollutants have been reviewed, and no regulatory requirements will be affected by the operation.

If the BAQ is in agreement, please modify permit 1900-0050 to include the discussed exempt operation.

If you have any questions or need additional information, please contact me at 803-647-3171 or logsdocj@westinghouse.com.

Sincerely,

Cynthia J Logsdon
Principal Environmental Engineer
Environment, Health & Safety (EH&S) Engineering
Columbia Fuel Fabrication Facility
Westinghouse Electric Company

Enclosure/GEL laboratory results, March 2014.

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D H E C

PROMOTE PROTECT PROSPER

Catherine B. Templeton, Director

Promoting and protecting the health of the public and the environment

May 23, 2014

Cynthia J. Logsdon
Westinghouse Electric Company
Columbia Fuel Fabrication Facility
P.O. Box R
Columbia, SC 29250

RE: Exemption Request for a Laser Welder at Westinghouse Electric Company
Permit Number 1900-0050

Dear Ms. Logsdon:

The South Carolina Department of Health and Environmental Control (Department) has received your letter on May 15, 2014, regarding the exemption request for a Laser Welder at Westinghouse Electric Company. The Department acknowledges your request; however, written notification of exempt sources is no longer required in accordance with the revised SC Regulation 61-62.1, Section II(B). Because the Laser Welder is considered exempt, no construction permit will be issued.

The Laser Welder is exempt from construction permit requirements per SC Regulation 61-62.1, Section II(B)(3), the Department maintained Air Permitting Exemptions List (November 2013):

Exemption 5 – Others (iv) Sources with a total uncontrolled emission rate of less than one (1) lb/hr each of particulates, sulfur dioxide, nitrogen oxides, and carbon monoxide; uncontrolled emission rate of less than 1000 pounds per month (lbs/month) of any single toxic air pollutant (TAP) and a total uncontrolled emission rate of less than 1000 pounds per month (lbs/month) of VOCs will not require construction permits. However, these sources may be required to be included in any subsequent construction or operating permit review to ensure that there is no cause or contribution to an exceedance of any ambient air quality standard or limit. For toxic air pollutant exemptions, refer to Regulation 61-62.5, Standard No. 8. Emissions calculations and any other information necessary to document qualification for this exemption must be maintained onsite and provided to the Department upon request.

The facility shall maintain on-site any records necessary to determine compliance with the exemption requirements, such as the manufacturer's specifications sheets and emission calculations. This information shall be submitted to the Department as part of the State Operating Permit renewal request no later than ninety (90) days prior to the existing operating permit's expiration date. Additionally, facility-wide potential emissions for determining operating permit status should include exempt sources. Should any of the information concerning this project be found in error or obsolete, a new review shall be required. Please retain this letter for your records.

If you have any further questions or concerns, please contact me at (803) 898-0457, or by E-mail at kirklawh@dhec.sc.gov.

Sincerely,

Hank Kirkland
Engineering Services Division
Bureau of Air Quality

cc: Permit File: 1900-0050 (02X)
ec: Ben Buchanan , BEHS

February 2016 Correspondence – Like for Like Plating Scrubber Replacement

Westinghouse

Westinghouse Electric Company
Nuclear Fuel
Columbia Fuel Fabrication Facility
5801 Bluff Road
Hopkins, South Carolina 29061
USA

SCDHEC
Bureau of Air Quality
2600 Bull Street
Columbia, South Carolina 29201

Direct tel: 803.647.1920
Direct fax:
e-mail: joynerdp@westinghouse.com

Your ref:
Our ref: LTR-RAC-16-15 Rev 1

RE: Like for Like Plating Scrubber Replacement

February 11, 2016

Mr. Kirkland,

On January 17th, 2016 a fire occurred at the Westinghouse Electric Columbia Fuel Fabrication Facility (CFFF) which damaged the plating room scrubber exhaust and associated ventilation system. This letter is a follow-up to the conversation previously held with Hank Kirkland on January 21, 2016 and is intended to formally seek the department's approval of a "like for like" scrubber replacement. The permitted Heil 760 packed horizontal baffle scrubber (ID 19 in SCDHEC Air Operating Permit 1900-0050-R1) and associated ventilation system was destroyed and must be replaced for the plating process to resume operations. We are asking for the department's consideration of an expedited response.

The former Heil 760 scrubber was a fume scrubber with a capacity of 10,000 cfm designed to capture plating emissions, specifically acidic mists generated by the use of nitric acid, hydrochloric acid and sulfuric acid. The proposed custom built scrubber, also a packed bed fume horizontal scrubber, will have a capacity of 13,500 cfm and is rated to remove 99% of droplets 20 microns and above. The additional flow rate is requested so that hood velocities over individual plating tanks can be increased to improve the working environment for CFFF operators, as recommended by the latest edition of American Conference of Governmental Industrial Hygienist (ACGIH) Industrial Ventilation Manual. The total emissions from the process tanks will not increase. Please find included as Attachment A additional design information compiled for comparative purposes to demonstrate the new scrubber's ability to meet or exceed the performance of the damaged Heil 760 scrubber.

The only permitted emission rate that applies to the plating process is the one for nitric acid, for which the entire site is limited to 0.77 lbs/hr. Modeling for this process, which last occurred in 2003, identifies the maximum modeled concentration of nitric acid as 0.5 $\mu g/m^3$, well below the Standard 8 limit of 125 $\mu g/m^3$. As previously stated, the total emissions will not increase with the installation of this new scrubber and would actually be expected to decrease for this particular process.

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The exhaust stack for the former Heil 760 was 24" in diameter and extended 10 feet above the finished roof with a calculated velocity of 3,183 fpm. The proposed new exhaust stack is 28" in diameter, will extend 10 feet above the finished roof with a calculated velocity of 3,157 fpm. The increase in stack diameter is to accommodate the increase in flowrate. Lastly, the former scrubber stack location was not directly above the fan, as is good engineering design. Therefore, the CFFF would like to relocate the new stack 25-30 feet east so that it is directly over the new fan. This relocation is inward, thereby increasing the stack's distance from the property line by around fourteen inches. Because of the close proximity to the former stack, the already large distance between the stack and the property line, and the fact that the proposed new stack is the same height, there is no expected negative change to dispersion modeling.

UTM coordinates were collected for both the former and proposed new stack locations and are as follows:

Former Heil 760 Stack	17 S 507481 3749207
Proposed New Chicago Plastic Systems Stack	17 S 507489 3749211

Lastly, there are no planned changes to the plating process that would initiate compliance with new regulations, standards or requirements as a result of the scrubber replacement.

Please advise at your earliest convenience whether Westinghouse is approved to begin operations with the proposed scrubber as a "like for like" replacement of the former Heil 760.

Respectfully,

Diana P. Joyner
Senior Environmental Engineer
Westinghouse Electric, LLC
Columbia Fuel Fabrication Facility

cc: J. Howell, Environmental Health & Safety Manager
C. Snyder, NCS & Environmental Engineering Manager
N. Parr, Licensing Manager
R. Stutts, Principal Manufacturing Engineer

Westinghouse

Westinghouse Electric Company
Nuclear Fuel
Columbia Fuel Fabrication Facility
5801 Bluff Road
Hopkins, South Carolina 29061
USA

Attachment A
Comparison of Design Data for Heil 760 and Chicago Plastic Systems Cross Flow Packed Bed Scrubbers

	Manufacturer and Model	Tellerette	Volume of Packing (CuFt) in Air Stream	Pump Flow Rate (GPM)	Liquid Loading (GPM/SqFt)	Gas Flow Rate (cfm) / Volume of Packing (CuFt)	Gas Flow Rate (cfm)	Packed Bed Cross-sectional Area (SqFt)	Face Velocity (FPM)
Previous Scrubber	Heil Model 760 Cross Flow Packed Bed	Lanpac	90	144	4.80	111.00	10,000	15	667
Proposed New Scrubber	Chicago Plastic Systems Cross Flow Packed Bed	Lanpac	126	230	5.00	107.00	13,500	25.3	534

Source: Information compiled by R. Stutts, Westinghouse Principal Manufacturing Engineer

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D H E C

PROMOTE PROTECT PROSPER

Catherine E. Heigel, Director

Promoting and protecting the health of the public and the environment

February 16, 2016

Diana P. Joyner
Westinghouse Electric Company
Nuclear Fuel
Colulmbia Fuel Fabrication Facility
P.O. Box R
Hopkins, SC 29250

RE: Like-for-like replacement of existing Plating Room Scrubber (Unit ID 19) at Westinghouse Electric Company
Permit Number 1900-0050

Dear Ms. Joyner:

The South Carolina Department of Health and Environmental Control (Department) has received your letter on February 4, 2016, regarding the like-for-like replacement of the existing Plating Room Scrubber (Unit ID 19) with a Plating Room Scrubber Exhaust and custom Packed Bed Fume Horizontal Scrubber at Westinghouse Electric Company. The Department acknowledges your request and has the following response:

The Department approves the like-for-like replacement of the existing Plating Room Scrubber (Unit ID 19) per SC Regulation 61-62.1, Section II.A.1.b, The Department may grant permission to proceed with minor alterations or additions without issuance of a construction permit when the Department determines that the alteration or addition will not increase the quantity and will not alter the character of the source's emissions.

The facility shall maintain on-site any records necessary to determine compliance with the exemption requirements, such as the manufacturer's specifications sheets and emission calculations. Should any of the information concerning this project be found in error or obsolete, a new review shall be required. Please retain this letter for your records.

This information shall be submitted to the Department as part of the State Operating Permit renewal request no later than ninety (90) days prior to the existing operating permit's expiration date.

If you have any further questions or concerns, please contact me at (803) 898-0457, or by E-mail at kirklawh@dhec.sc.gov.

Sincerely,

Hank Kirkland
Engineering Services Division
Bureau of Air Quality

cc: Permit File: 1900-0050 (04X)
ec: Ben Buchanan, BEHS

August/September 2016 Correspondence – Exemption for Electrochemical Grinding Machine

Westinghouse

Westinghouse Electric Company LLC
Columbia Fuel Fabrication Facility
5801 Bluff Road
Hopkins, South Carolina 29061
USA

South Carolina Department of Health and
Environmental Control
Attn: Hank Kirkland
Bureau of Air Quality, Engineering Services
2600 Bull Street
Columbia, South Carolina 29201

Direct tel: 803.647.1920
Direct fax:
e-mail: joynerdp@westinghousecom

Your ref:
Our ref: LTR-RAC-16-50

August 9th, 2016

RE: Electrochemical Grinding Exempt Source Notification

Dear Mr. Kirkland,

Westinghouse Electric Company (Westinghouse) is installing a new Electrochemical Grinding (ECG) Machine at the Columbia Fuel Fabrication Facility (CFFF). The new Tridex ECG Machine is being installed in a different location than the existing machine, in part because both machines will be used in parallel until the new machine can be qualified for all customers.

This letter serves as notification for SCDHEC of the installation and associated exempt emissions. The emissions are estimated at 0.06 cubic inches of zirconium over an eight hour shift, which equates to 0.2275 ounces/8-hr shift and well below the exemption threshold of (5) tons per year of particulates.

Westinghouse understands that written notification for exempt sources is no longer necessary in accordance with the revised SC Regulation 61-62.1, Section II (B). The intent of this letter is to serve as part of the documentation and on-site record requirements for Westinghouse and will be included with the next operating permit renewal request sent to SCDHEC for permit 1900-0050.

Please direct any questions regarding this notification to Diana Joyner at 803.647.1920 or joynerdp@westingouse.com.

Respectfully,

Diana P. Joyner

Diana P. Joyner
Senior Environmental Engineer
Columbia Fuel Fabrication Facility
Westinghouse Electric Company, LLC

WESTINGHOUSE PROPRIETARY CLASS 2

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Ms. Diana Joyner, Senior Environmental Engineer
Westinghouse EH&S, Columbia Fuels and Fabrication Facility
Hopkins, SC 29061

22 July 2016

Ms. Joyner,

This shall serve as notice of the intent of the ventilation system serving the Tridex ECG Machine enclosure. According to our tooling engineer's best judgment and calculations, the process could discharge up to approximately .06 cubic inches of zirconium over an eight hour shift, while producing 3000 sleeves during that period.
This equates to .2275 ounce/ 8-hour shift. This is exhausted through a rooftop fan and 18" diameter, 10 foot high stack at 5600 CFM during that shift.
ECG

Jeffrey A. Search, PMP
Advanced Project Manager
Plant Systems Projects

Westinghouse Electric Company
Nuclear Fuel & Components Manufacturing
5801 Bluff Rd.
Hopkins, SC 29061 USA
Phone: +1 (803) 647-1917
Fax: +1 (803) 695-4172
Mobile: +1 (321) 750-9912
Email: searchja@westinghouse.com
Home Page: www.westinghousenuclear.com

September 1, 2016

Ms. Cynthia Logsdon
Westinghouse Electric Company, LLC
P. O. Box R
Hopkins, SC 29250

RE: Exemption Request for Electrochemical Grinding Machine at Westinghouse Electric Company, LLC
Permit Number 1900-0050-05X

Dear Ms. Logsdon:

The Bureau of Air Quality (Bureau) has received your letter on August 22, 2016, regarding the exemption request for a new Electrochemical Grinding (ECG) machine at Westinghouse Electric Company, LLC. The Bureau acknowledges your request; however, written notification of exempt sources is not required in accordance with SC Regulation 61-62.1, Section II.B. Because the Electrochemical Grinding (ECG) machine is considered exempt, no construction permit will be issued.

The Electrochemical Grinding (ECG) machine is exempt from construction permit requirements per SC Regulation 61-62.1, Section II.B.3, the Bureau maintained Air Permitting Exemptions List (February 2016):

Exemption B.6.i - Sources with a total uncontrolled PTE of less than five (5) tons per year each of particulates, sulfur dioxide, nitrogen oxides, and carbon monoxide; uncontrolled PTE of less than 1000 pounds per month (lbs/month) of any single toxic air pollutant (TAP) and a total uncontrolled emission rate of less than 1000 lbs/month of volatile organic compounds (VOCs) will not require construction permits. Unless otherwise exempt, sources may be exempted under this section at higher emission levels if there is a demonstration that there are no applicable limits or requirements. These applicable requirements include federally applicable limits or requirements. However, these sources may be required to be included in any subsequent construction or operating permit review to ensure that there is no cause or contribution to an exceedance of any ambient air quality standard or limit. For toxic air pollutant exemptions, refer to Regulation 61-62.5, Standard No. 8. emissions calculations and any other information necessary to document qualification for this exemption must be maintained on-site and provided to the department upon request.

The facility shall maintain on-site any records necessary to determine compliance with the exemption requirements, such as the manufacturer's specifications sheets and emission calculations. Should any of the information concerning this project be found in error or obsolete, a new review shall be required. Please retain this letter for your records.

This information shall be submitted to the Bureau as part of the State Operating Permit renewal request no later than ninety (90) days prior to the existing operating permit's expiration date. Additionally, facility-wide potential emissions for determining operating permit status should include exempt sources. Please retain this letter for your records.

If you have any further questions or concerns, please contact me at (803) 898-4286, or by E-mail at whitesl@dhec.sc.gov.

Sincerely,

Stephanie L. White

Stephanie L. White
Engineering Services Division
Bureau of Air Quality

cc: Permit File: 1900-0050
ec: Benjamin R. Buchanan
Diana Joyner, Westinghouse Electric Company, LLC

September 2016 Correspondence – Minor Alternations/Restart of S-1030 Scrubber

From:	Joyner, Diana P
To:	"Basil, Elizabeth"; "Hardee, Christopher"; Lindler, Breanna L.
Cc:	Smetanka, Joseph W.; Howell, John W; Pearson, Anna V.; Parr, Nancy B.; Travers, E Michael; Stutts, Roy D.; White, Joseph B.; Weathers Jr., Stephen H; Graves, Tiffany A; Culler, Sherrie L.; Pricener, Joseph J
Subject:	S-1030 Exemption Request for Restart
Date:	Wednesday, September 07, 2016 3:33:12 PM
Attachments:	2016-09-07_S-1030 Exemption Request_LTR-RAC-16-55.pdf

Liz, Chris, and Breanna-

As a follow-up to the meeting held on Monday, August 29th with Westinghouse and SCDHEC representatives, please find attached the written permit exemption request for restart. A hard copy will be placed in the mail by week's end for your files.

Thank you for your assistance and please contact me with any further questions regarding this request.

Diana

Diana P. Joyner
Principal Environmental Engineer
Westinghouse Electric Company, LLC
Columbia Fuel Fabrication Facility
joynerdp@westinghouse.com
803.647.1920 (office) | 803.497.7062 (mobile)

Westinghouse

Westinghouse Electric Company
Nuclear Fuel
Columbia Fuel Fabrication Facility
5801 Bluff Road
Hopkins, South Carolina 29061
USA

SCDHEC
Bureau of Air Quality
2600 Bull Street
Columbia, South Carolina 29201

Direct tel: 803.647.1920
Direct fax:
e-mail: joynerdp@westinghouse.com

Your ref:
Our ref: LTR-RAC-16-55

RE: S-1030 Exemption Request for Restart

September 7, 2016

Mr. Hardee,

Westinghouse Electric Company LLC ("Westinghouse") is seeking permission to proceed with minor alterations of its S-1030 scrubber pursuant to SC Regulation 61-62.1(A)(1)(b) which authorizes the Department to grant permission to proceed with minor alterations or additions without issuance of a construction permit when the Department determines that the alteration or addition will not increase the quantity and will not alter the character of the source's emissions. The scrubber is currently permitted under Operating Permit No. 1900-0050-R1, and Westinghouse's assessment is that the planned alterations meet the criteria for the permit exemption. This letter contains some background information to support the request as well as the proposed operational changes.

Function of the S-1030 Scrubber

S-1030 operates as a cross flow horizontal packed bed scrubber where a recirculating scrubbing liquid is used to absorb soluble gas molecules and knock down suspended uranium-bearing particles vented from several processes in the Conversion Area. Although it was designed to scrub acidic off-gas, many of the current feed streams to S-1030 contain ammoniated off-gas. The air flow through the scrubber system is approximately 25,000 CFM (cubic feet per minute), and the original design capacity is 30,000 CFM.

The scrubber body contains Lantec Lanpac® (also referred to as packing). The purpose of the packing is to increase the surface area of the scrubber liquid. The increase in surface area allows for more absorption of gaseous contaminants into the scrubber liquid. Water is used as make-up solution for the scrubber. The scrubber is typically operated as a closed system with no continuous bleed off.

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Westinghouse maintains a Risk Management Program (RMP) for aqueous ammonia; however the S-1030 is not a covered process unit.

Background for Alterations

Criticality Safety Evaluations are performed on all processes in the CFFF that contain significant quantities of uranium. These safety bases are established so that controls can be implemented to prevent a criticality event.

Between 2005 and 2009, CFFF created new Criticality Safety Evaluations (CSEs) and made extensive changes to the nuclear criticality safety basis plant-wide. In the case of the S-1030 scrubber, CFFF adopted highly conservative mass limit standards. CFFF began performing a clean out of the S-1030 transition on May 27th 2016 during a scheduled annual shutdown. In the middle of July additional review, inspection and cleaning activities indicated that the mass limit standards had been exceeded. Because CFFF exceeded the mass limit established in the CSE the NRC was notified and the restart of the facility was postponed. The postponement has provided an opportunity to make the performance improvements outlined below.

S-1030 Environmental Function

Although the uranium accumulation in the scrubber exceeded the CSE mass limit, during its time of operation the scrubber has continued to perform its environmental design function by knocking down both suspended particulates (primarily uranium) and ammonia gas from the associated process streams. Although not a condition of its permit, Westinghouse monitors both ammonia emissions and opacity weekly.

Proposed Alterations

Planned modifications to the scrubber operation are as follows:

a. Continuously bleed off scrubber solution. This will help maintain scrubber efficiency and aid in the removal of uranium, fluoride ions, and other dissolved solids that build up in the solution. The solution that is bled off will be processed through the Uranium Recovery processes, and fresh water will be added. This bleed off will ensure that scrubber liquid does not become saturated, enabling it to capture more particulate and fumes. A controlled, continuous bleed off would have no negative impact to the air being released to the environment and would improve ammonia absorption.
b. Add spray nozzles to the inlet transition to reduce the accumulation of uranium bearing material in this section of the scrubber. These nozzles will discourage material from precipitating in the inlet transition by directing the flow toward the drains. Once drained out of the scrubber, the material will travel through 1 micron filters, aiding in removing fluorides, uranium, and other particulates from the scrubber solution. Adding these extra spray nozzles should have no effect on the air being discharged through the stack and should aid in the reduction of gaseous ammonia emissions.
c. Continuous pH monitoring will be added to the Human Machine Interface (HMI)

Other planned modifications include the installation of baskets to hold packing for ease of removal and inspection as well as the addition of a passive overflow which is designed to improve the criticality safety basis. Given that the above modifications will not increase the quantity of the scrubber's emissions nor negatively impact the scrubber's function, Westinghouse believes they qualify for the construction permit exemption in SC Regulation 61-62.1.

Westinghouse will await the Department's response before restarting and is available to discuss at the Department's convenience any questions it may have in order to facilitate the review. Thank you for your attention to this matter.

Respectfully,

Diana P. Joyner

Diana P. Joyner
Principal Environmental Engineer
Westinghouse Electric Company, LLC
Columbia Fuel Fabrication Facility

cc: J. Smetanka, Director of Environmental Health & Safety
J. Howell, Environmental Health & Safety Manager
A. Pearson, EH&S Operations Manager
N. Parr, Licensing Manager
M. Trayers, Reliability Engineering Manager
R. Stutts, PSE Lead Engineer
B. White, Conversion Area Manager
S. Weathers, Principal Conversion Process Engineer
T. Graves, Conversion Process Engineer

September 16, 2016

Cynthia Logsdon
Westinghouse Electric Company LLC
PO Box R
Hopkins, South Carolina 29250

RE: Exemption Request for S-1030 Scrubber Alterations at Westinghouse Electric Company, LLC
Permit Number 1900-0050-06x

Dear Ms. Logsdon:

The Bureau of Air Quality (Bureau) has received your letter on September 7, 2016, regarding the construction permit exemption request for minor alterations on the S-1030 Scrubber at Westinghouse Electric Company, LLC. The Bureau acknowledges your request and approves the minor alterations construction permit exemption request per SC Regulation 61-62.1, Section II.A.1.b; the Department may grant permission to proceed with minor alterations or additions without the issuance of a construction permit when the Department determines that the alteration or addition will not increase the quantity and will not alter the character of the source's emissions.

The facility shall maintain on-site any records necessary to determine compliance with the exemption requirements, such as the manufacturer's specifications sheets and emission calculations. Should any of the information concerning this project be found in error or obsolete, a new review shall be required. Please retain this letter for your records.

This information shall be submitted to the Bureau as part of the State Operating Permit renewal request no later than ninety (90) days prior to the existing operating permit's expiration date. Please retain this letter for your records.

If you have any further questions or concerns, please contact me at (803) 898-0457, or by E-mail at lindlebl@dhec.sc.gov.

Sincerely,

Breanna Lindler

Breanna Lindler
Engineering Services Division
Bureau of Air Quality

cc: Permit File: 1900-0050
ec: Benjamin R. Buchanan, BEHS
Diana P. Joyner, Westinghouse Electric Company, LLC (joynerdp@westinghouse.com)

Air Quality Construction Permit Application for Cleaver Brooks Boilers (AECOM)

Bureau of Air Quality
Expedited Review Request Instructions
Construction Permits

APPLICATION IDENTIFICATION		
Facility Name *(This should be the name used to identify the facility)* Westinghouse Electric Company LLC	SC Air Permit Number (8-digits only) *(Leave blank if one has never been assigned)* 1900-0050	Request Date 6/11/18

PRIMARY AIR PERMIT CONTACT			
Title/Position: Principal Environmental Engineer	Salutation Ms.	First Name: Diana	Last Name: Joyner
E-mail Address: joynerdp@westinghouse.com		Phone No.: 803-647-1920	Cell No.: 803-497-7062

SECONDARY AIR PERMIT CONTACT *(If the Department is unable to contact the primary air permit contact please provided a secondary contact.)*			
Title/Position: Principal Environmental Engineer	Salutation Ms.	First Name: Cynthia	Last Name: Logsdon
E-mail Address: logsdocj@westinghouse.com		Phone No.: 803-647-3171	Cell No.: 803-312-4171

Check One	Permit Type	Expedited Review Days*	Fee**
☒	Minor Source Construction Permit	30	$3,000
☐	Synthetic Minor Construction Permit	65	$4,000
☐	Prevention of Significant Deterioration (PSD) not impacting a Class I Area (no Class I modeling required)	120	$20,000
☐	Prevention of Significant Deterioration (PSD) Modification not impacting a Class I Area (no Class I modeling required) No BACT limit change but requires Public Notice	120	$5,000
☐	Prevention of Significant Deterioration (PSD) Modification not impacting a Class I Area (no Class I modeling required) Number of BACT Pollutants ☐ X $5,000 per BACT modification	120	Total Fee $ Maximum of $20,000
☐	Prevention of Significant Deterioration (PSD) impacting a Class I Area (Class I modeling required)	150	$25,000
☐	Prevention of Significant Deterioration (PSD) Modification impacting a Class I Area (Class I modeling required) No BACT limit change but requires Public Notice	150	$5,000
☐	Prevention of Significant Deterioration (PSD) Modification impacting a Class I Area (Class I modeling required) Number of BACT Pollutants ☐ X $5,000 per BACT modification	150	Total Fee $ Maximum of $25,000
☐	**Concrete** Minor Source Construction Permit Relocation Request	10	$1,500
☐	**Asphalt** Synthetic Minor Construction Permit Relocation Request	15	$3,500

*All days above are calendar days, but exclude State holidays, and building closure dates due to severe weather or other emergencies. Expedited days for asphalt and concrete also exclude weekends.

****DO NOT SEND PAYMENT UNTIL THE APPLICATION HAS BEEN ACCEPTED INTO THE EXPEDITED PROGRAM**. <u>If chosen for expedited review, you will be notified by phone for verbal acceptance into the program. Fees must be paid within five business days of acceptance.</u>

PRIMARY AIR PERMIT CONTACT SIGNATURE
I have read the most recent version of the Expedited Review Program Standard Operating Procedures and accept all of the terms and conditions within. I understand that it is my responsibility to ensure an application of the highest quality is submitted in a timely manner, and to address any requests for additional information by the deadline specified. I understand that submittal of this request form is not a guarantee that expedited review will be granted.

Signature of Primary Air Permit Contact

6/5/2018
Date

AECOM

[illegible]
[illegible] Drive, Suite 300
Greenville, SC 29615
www.aecom.com

864-234-3000 Tel
864-234-3001 Fax

June 11, 2018

Mr. Steve McCaslin, P.E.
Bureau of Air Quality
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

RE: Construction Permit Application
Westinghouse Electric Company, LLC
Permit No. 1900-0050

Dear Mr. McCaslin:

AECOM has been retained by by Westinghouse Electric Company, LLC to assist with air permitting for the replacement of three boilers with two new boilers at their facility located in Hopkins, SC. AECOM has prepared the enclosed submittals to assist South Carolina Department of Health and Environmental Control (SCDHEC), Bureau of Air Quality (BAQ) in issuing air construction permits for the project. This submittal includes two (2) copies of the permit application package, one (1) CD containing an electronic copy of the permit application package and one (1) CD containing the air dispersion modeling files.

If you have any questions or need additional information, please do not hesitate to call me at (803) 354-0382.

Very truly yours,

AECOM Corporation

Susan Land

Susan Land, P.E.
Senior Project Engineer

Enclosures

cc: Diana Joyner, Westinghouse

AECOM

Environmental Services

Air Quality Construction Permit Application

AECOM Project No. 60571157
June 2018

Prepared for:

Westinghouse

Westinghouse Electric Company LLC
5801 Bluff Road
Columbia, South Carolina 29204

Westinghouse Electric Company LLC

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1. Application Forms
2. Process Description
3. Block Flow Diagram
4. Emission Calculations
5. Site Location
6. Facility Layout
7. Modeling Summary

APPLICATION FORMS

Bureau of Air Quality
Construction Permit Application
Facility Information

FACILITY IDENTIFICATION	
SC Air Permit Number (8-digits only) *(Leave blank if one has never been assigned)* 1900-0050	Application Date 6/11/18
Facility Name *(This should be the name used to identify the facility at the physical address listed below)* Westinghouse Electric Company LLC	Facility Federal Tax Identification Number *(Established by the U.S. Internal Revenue Service to identify a business entity)* 52-2140933

FACILITY PHYSICAL ADDRESS		
Physical Address: 5801 Bluff Road		County: Richland
City: Hopkins	State: SC	Zip Code: 29261
Facility Coordinates *(Facility coordinates should be based at the front door or main entrance of the facility.)*		
Latitude: 33.874873	Longitude: -80.897610	☐ NAD27 *(North American Datum of 1927)* Or ☒ NAD83 *(North American Datum of 1983)*

CO-LOCATION DETERMINATION
Are there other facilities in close proximity that could be considered co-located? ☒ No ☐ Yes*
List potential co-located facilities, including air permit numbers if applicable:

**If yes, please submit co-location applicability determination details in an attachment to this application.*

COMMUNITY OUTREACH
What are the potential air issues and community concerns? Please provide a brief description of potential air issues and community concerns about the entire facility and/or specific project. Include how these issues and concerns are being addressed, if the community has been informed of the proposed construction project, and if so, how they have been informed. This project involves replacing three existing boilers with two new boilers which will result in minimal emission changes.

FACILITY'S PRODUCTS / SERVICES	
Primary Products / Services *(List the primary product and/or service)* Industrial inorganic chemicals, not elsewhere classified. (Fabrication of nuclear fuel assemblies)	
Primary SIC Code *(Standard Industrial Classification Codes)* 2819	Primary NAICS Code *(North American Industry Classification System)* 325998
Other Products / Services *(List any other products and/or services)*	
Other SIC Code(s):	Other NAICS Code(s):

AIR PERMIT FACILITY CONTACT *(Person at the facility who can answer technical questions about the facility and permit application.)*			
Title/Position: Principal Environmental Engineer	Salutation: Ms.	First Name: Diana	Last Name: Joyner
Mailing Address: 5801 Bluff Road			
City: Hopkins		State: SC	Zip Code: 29061
E-mail Address: joynerdp@westinghouse.com		Phone No.: 803-647-1920	Cell No.: 803-497-7062

The signed permit will be e-mailed to the designated Air Permit Contact.
If additional individuals need copies of the permit, please provide their names and e-mail addresses.

Name	E-mail Address
Susan Land	susan.land@aecom.com

CONFIDENTIAL INFORMATION / DATA
Does this application contain confidential information or data? ☒ No ☐ Yes*

If yes, include a sanitized version of the application for public review and **ONLY ONE COPY OF CONFIDENTIAL INFORMATION SHOULD BE SUBMITTED*

LIST OF FORMS INCLUDED *(Identify all forms included in the application package)*	
Form Name	**Included (Y/N)**
Expedited Review Request (DHEC Form 2212)	☒ Yes ☐ No
Equipment/Processes (DHEC Form 2567)	☒ Yes
Emissions (DHEC Form 2569)	☒ Yes
Regulatory Review (DHEC Form 2570)	☒ Yes
Emissions Point Information (DHEC Form 2573)	☒ Yes ☐ No (If No, Explain)

OWNER OR OPERATOR			
Title/Position: VP/Plant Manager	Salutation: Mr.	First Name: Michael	Last Name: Annacone
Mailing Address: 5801 Bluff Road			
City: Hopkins		State: SC	Zip Code: 29061
E-mail Address:		Phone No.: 803-647-1000	Cell No.:

OWNER OR OPERATOR SIGNATURE

I certify, to the best of my knowledge and belief, that no applicable standards and/or regulations will be contravened or violated. I certify that any application form, report, or compliance certification submitted in this permit application is true, accurate, and complete based on information and belief formed after reasonable inquiry. I understand that any statements and/or descriptions, which are found to be incorrect, may result in the immediate revocation of any permit issued for this application.

Signature of Owner or Operator — Date: 6/5/18

PERSON AND/OR FIRM THAT PREPARED THIS APPLICATION *(If not the same person as the Professional Engineer who has reviewed and signed this application.)*			
Consulting Firm Name:			
Title/Position:	Salutation:	First Name:	Last Name:
Mailing Address:			
City:		State:	Zip Code:
E-mail Address:		Phone No.:	Cell No.:
SC Professional Engineer License/Registration No. (if applicable):			

PROFESSIONAL ENGINEER INFORMATION			
Consulting Firm Name: AECOM			
Title/Position: Sr. Project Engineer	Salutation: Mrs.	First Name: Susan	Last Name: Land
Mailing Address: 10 Patewood Drive, Building VI, Suite 500			
City: Greenville		State: SC	Zip Code: 29615
E-mail Address: susan.land@aecom.com		Phone No.: 803-354-0382	Cell No.: 803-354-0382
SC License/Registration No.: 13257			

PROFESSIONAL ENGINEER SIGNATURE
I have placed my signature and seal on the engineering documents submitted, signifying that I have reviewed this construction permit application as it pertains to the requirements of *South Carolina Regulation 61-62, Air Pollution Control Regulations and Standards.*

Susan K. Land 6/11/18
Signature of Professional Engineer Date

Bureau of Air Quality
Construction Permit Application
Equipment / Processes

APPLICATION IDENTIFICATION		
(Please ensure that the information list in this table is the same on all of the forms and required information submitted in this construction permit application package.)		
Facility Name *(This should be the name used to identify the facility)* Westinghouse Electric Company LLC	SC Air Permit Number (8-digits only) *(Leave blank if one has never been assigned)* 1900-0050	Application Date 6/11/18

PROJECT DESCRIPTION
Brief Project Description (What, why, how, etc.): Replacement of three existing boilers with two new boilers.

ATTACHMENTS	
☒ Process Flow Diagram	Location in Application: Section 3
☒ Detailed Project Description	Location in Application: Section 2

EQUIPMENT / PROCESS INFORMATION

Equipment ID Process ID	Action	Equipment / Process Description	Maximum Design Capacity (Units)	Control Device ID(s)	Pollutants Controlled (Include CAS#)	Capture System Efficiency and Description	Emission Point ID(s)
22	☒ Add ☐ Remove ☐ Modify ☐ Other	24.5 x 10^6 BTU/hr natural gas/fuel oil fired boiler (Cleaver-Brooks Model CBEX Elite)	24,497,000 btu/hr	N/A	N/A	N/A	S-22
23	☒ Add ☐ Remove ☐ Modify ☐ Other	24.5 x 10^6 BTU/hr natural gas/fuel oil fired boiler (Cleaver-Brooks Model CBEX Elite)	24,497,000 btu/hr	N/A	N/A	N/A	S-23
02	☐ Add ☒ Remove ☐ Modify ☐ Other	14.6 million Btu/hr natural gas/No. 2 fuel oil fired Boiler	14,600,000 btu/hr	N/A	N/A	N/A	Boiler #1
03	☐ Add ☒ Remove ☐ Modify ☐ Other	14.6 million Btu/hr natural gas/No. 2 fuel oil fired Boiler	14,600,000 btu/hr	N/A	N/A	N/A	Boiler #2
04	☐ Add ☒ Remove ☐ Modify ☐ Other	8.3 million Btu/hr natural gas/No. 2 fuel oil fired Boiler	8,300,000 btu/hr	N/A	N/A	N/A	Boiler #3

Bureau of Air Quality
Construction Permit Application
Equipment / Processes

CONTROL DEVICE INFORMATION					
Control Device ID	Action	Control Device Description	Maximum Design Capacity (Units)	Inherent/Required/Voluntary (Explain)	Destruction/Removal Efficiency Determination
	☐ Add ☐ Remove ☐ Modify ☐ Other				
	☐ Add ☐ Remove ☐ Modify ☐ Other				
	☐ Add ☐ Remove ☐ Modify ☐ Other				
	☐ Add ☐ Remove ☐ Modify ☐ Other				

RAW MATERIAL AND PRODUCT INFORMATION			
Equipment ID Process ID Control Device ID	Raw Material(s)	Product(s)	Fuels Combusted
07	Natural Gas	N/A	Natural gas / ULSD backup

MONITORING AND REPORTING INFORMATION					
Equipment ID Process ID Control Device ID	Pollutant(s)/Parameter(s) Monitored	Monitoring Frequency	Reporting Frequency	Monitoring/Reporting Basis	Averaging Period(s)

APPLICATION IDENTIFICATION *(Please ensure that the information list in this table is the same on all of the forms and required information submitted in this construction permit application package.)*		
Facility Name *(This should be the name used to identify the facility)* Westinghouse Electric Company LLC	SC Air Permit Number (8-digits only) *(Leave blank if one has never been assigned)* 1900-0050	Application Date 6/11/18

ATTACHMENTS *(Check all the appropriate checkboxes if included as an attachment)*	
☒ Sample Calculations, Emission Factors Used, etc.	☐ Detailed Explanation of Assumptions, Bottlenecks, etc.
☒ Supporting Information: Manufacturer's Data, etc.	☐ Source Test Information
☐ Details on Limits Being Taken for Limited Emissions	☐ NSR Analysis

SUMMARY OF PROJECTED CHANGE IN FACILITY WIDE POTENTIAL EMISSIONS
(Calculated at maximum design capacity.)

Pollutants	Emission Rates Prior to Construction / Modification (tons/year)			Emission Rates After Construction / Modification (tons/year)		
	Uncontrolled	Controlled	Limited	Uncontrolled	Controlled	Limited
Particulate Matter (PM)	4.75	N/A	N/A	5.74	N/A	N/A
Particulate Matter <10 Microns (PM_{10})	3.24	N/A	N/A	5.39	N/A	N/A
Particulate Matter <2.5 Microns ($PM_{2.5}$)	3.24	N/A	N/A	5.39	N/A	N/A
Sulfur Dioxide (SO_2)	86.04	N/A	N/A	3.04	N/A	N/A
Nitrogen Oxides (NO_x)	27.96	N/A	N/A	27.99	N/A	N/A
Carbon Monoxide (CO)	25.53	N/A	N/A	16.01	N/A	N/A
Volatile Organic Compounds (VOC)	4.22	N/A	N/A	4.11	N/A	N/A
Lead (Pb)	Unknown	N/A	N/A	2.12E-05	N/A	N/A
Highest HAP Prior to Construction (CAS #:)						
Highest HAP After Construction (CAS #: 110-54-3)				0.38	N/A	N/A
Total HAP Emissions*	Unknown			.40	N/A	N/A

Include emissions from exempt equipment and emission increases from process changes that were exempt from construction permits.
(*All HAP emitted from the various equipment or processes must be listed in the appropriate "Potential Emission Rates at Maximum Design Capacity" Table)

POTENTIAL EMISSION RATES AT MAXIMUM DESIGN CAPACITY									
Equipment ID / Process ID	Emission Point ID	Pollutants (Include CAS #)	Calculation Methods / Limits Taken / Other Comments	Uncontrolled		Controlled		Limited	
				lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
22	S-22	VOC	Manufacturer Data	0.088	0.39	N/A	N/A	N/A	N/A
		NOx		2.683	11.75				
		CO		0.458	2.01				
		SO_2		0.034	0.15				
		PM		0.555	2.43				
		PM_{10}		0.555	2.43				
		$PM_{2.5}$		0.555	2.43				
		Lead	AP-42, Section 1.3	2.12E-05	9.28E-05				
		CO_2	40 CFR 98 Tables A-1, C-1 & C-2	3,837.60	16,808.67				
		N_2O		0.16	0.68				
		CH_4		0.03	0.14				
		CO_2e		3,884.76	17,015.26				
		2-Methyl-naphthalene (91-57-6)	AP-42, Section 1.3 or 1.4	5.76E-07	2.52E-06				
		3-Methyl-Chloranthrene (56-49-5)		4.32E-08	1.89E-07				
		7,12-Dimethyl-benz(a)anthraene (57-97-6)		3.84E-07	1.68E-06				
		Acenaphthene (83-32-9)		3.60E-06	1.58E-05				
		Acenaphthylene (208-96-8)		4.31E-08	1.89E-07				
		Anthracene (120-12-7)		2.08E-07	9.11E-07				
		Benz(a) anthracene (56-55-3)		6.84E-07	3.00E-06				
		Benzene (71-43-2)		5.04E-05	2.21E-04				

POTENTIAL EMISSION RATES AT MAXIMUM DESIGN CAPACITY									
Equipment ID / Process ID	Emission Point ID	Pollutants (Include CAS #)	Calculation Methods / Limits Taken / Other Comments	Uncontrolled		Controlled		Limited	
				lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
22	S-22	Benzo(a)pyrene (50-32-8)	AP-42, Section 1.3 or 1.4	2.88E-08	1.26E-07	N/A	N/A	N/A	N/A
		Benzo(b) fluoranthene (205-99-2)		4.32E-08	1.89E-07				
		Benzo(g,h,i) perylene (191-24-2)		3.85E-07	1.69E-06				
		Benzo(k) Fluoranthene (205-82-3)		4.32E-08	1.89E-07				
		Chrysene (218-01-9)		4.06E-07	1.78E-06				
		Dibenzo(a,h) Anthracene (53-70-3)		2.85E-07	1.25E-06				
		Dichlorobenzene (25321-22-6)		2.88E-05	1.26E-04				
		Fluoranthene (206-44-0)		8.25E-07	3.62E-06				
		Fluorene (86-73-7)		6.73E-08	2.95E-07				
		Hexane (110-54-3)		4.32E-02	1.89E-01				
		Indo(1,2,3-cd)pyrene (193-39-5)		3.65E-07	1.60E-06				
		Phenanthrene (85-01-8)		1.79E-06	7.84E-06				
		Pyrene (129-00-0)		7.25E-07	3.17E-06				
		Total POMs		1.98E-03	8.67E-03				
		Ethylbenzene (100-41-4)		1.08E-05	4.75E-05				

POTENTIAL EMISSION RATES AT MAXIMUM DESIGN CAPACITY									
Equipment ID / Process ID	Emission Point ID	Pollutants (Include CAS #)	Calculation Methods / Limits Taken / Other Comments	Uncontrolled		Controlled		Limited	
				lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
22	S-22	Formaldehyde (50-00-0)	AP-42, Section 1.3 or 1.4	5.63E-03	2.47E-02	N/A	N/A	N/A	N/A
		Napthalene (91-20-3)		1.93E-04	8.44E-04				
		1,1,1-Trichloroethane (71-55-6)		4.02E-05	1.76E-04				
		Toluene (108-88-3)		1.06E-03	4.63E-03				
		o-Xylene (95-47-6)		1.86E-05	8.14E-05				
		Arsenic (7440-38-2)		9.40E-06	4.12E-05				
		Beryllium (7440-41-7)		7.05E-06	3.09E-05				
		Cadmium (7440-43-9)		2.64E-05	1.16E-04				
		Chromium Compounds		3.36E-05	1.47E-04				
		Cobalt Compounds		2.02E-06	8.84E-06				
		Manganese Compounds		1.41E-05	6.18E-05				
		Mercury (7439-97-6)		7.05E-06	3.09E-05				
		Nickel (7440-02-0)		5.04E-05	2.21E-04				
		Selenium Compounds		3.53E-05	1.54E-04				
23	S-23	VOC	Manufacturer Data	0.088	0.39	N/A	N/A	N/A	N/A
		NOx		2.683	11.75				
		CO		0.458	2.01				
		SO_2		0.034	0.15				
		PM		0.555	2.43				

POTENTIAL EMISSION RATES AT MAXIMUM DESIGN CAPACITY									
Equipment ID / Process ID	Emission Point ID	Pollutants (Include CAS #)	Calculation Methods / Limits Taken / Other Comments	Uncontrolled		Controlled		Limited	
				lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
23	S-23	PM_{10}	Manufacturer Data	0.555	2.43	N/A	N/A	N/A	N/A
		$PM_{2.5}$		0.555	2.43				
		Lead	AP-42, Section 1.3	2.12E-05	9.28E-05				
		CO_2	40 CFR 98 Tables A-1, C-1 & C-2	3,837.60	16,808.67				
		N_2O		0.16	0.68				
		CH_4		0.03	0.14				
		CO_2e		3,884.76	17,015.26				
		2-Methyl-naphthalene (91-57-6)	AP-42, Section 1.3 or 1.4	5.76E-07	2.52E-06				
		3-Methyl-Chloranthrene (56-49-5)		4.32E-08	1.89E-07				
		7,12-Dimethyl-benz(a)anthraene (57-97-6)		3.84E-07	1.68E-06				
		Acenaphthene (83-32-9)		3.60E-06	1.58E-05				
		Acenaphthylene (208-96-8)		4.31E-08	1.89E-07				
		Anthracene (120-12-7)		2.08E-07	9.11E-07				
		Benz(a) anthracene (56-55-3)		6.84E-07	3.00E-06				
		Benzene (71-43-2)		5.04E-05	2.21E-04				
		Benzo(a)pyrene (50-32-8)		2.88E-08	1.26E-07				
		Benzo(b) fluoranthene (205-99-2)		4.32E-08	1.89E-07				

POTENTIAL EMISSION RATES AT MAXIMUM DESIGN CAPACITY									
Equipment ID / Process ID	Emission Point ID	Pollutants (Include CAS #)	Calculation Methods / Limits Taken / Other Comments	Uncontrolled		Controlled		Limited	
				lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
23	S-23	Benzo(g,h,i) perylene (191-24-2)	AP-42, Section 1.3 or 1.4	3.85E-07	1.69E-06	N/A	N/A	N/A	N/A
		Benzo(k) Fluoranthene (205-82-3)		4.32E-08	1.89E-07				
		Chrysene (218-01-9)		4.06E-07	1.78E-06				
		Dibenzo(a,h) Anthracene (53-70-3)		2.85E-07	1.25E-06				
		Dichlorobenzene (25321-22-6)		2.88E-05	1.26E-04				
		Fluoranthene (206-44-0)		8.25E-07	3.62E-06				
		Fluorene (86-73-7)		6.73E-08	2.95E-07				
		Hexane (110-54-3)		4.32E-02	1.89E-01				
		Indo(1,2,3-cd)pyrene (193-39-5)		3.65E-07	1.60E-06				
		Phenanthrene (85-01-8)		1.79E-06	7.84E-06				
		Pyrene (129-00-0)		7.25E-07	3.17E-06				
		Total POMs		1.98E-03	8.67E-03				
		Ethylbenzene (100-41-4)		1.08E-05	4.75E-05				
		Formaldehyde (50-00-0)		5.63E-03	2.47E-02				
		Napthalene (91-20-3)		1.93E-04	8.44E-04				

POTENTIAL EMISSION RATES AT MAXIMUM DESIGN CAPACITY									
Equipment ID / Process ID	Emission Point ID	Pollutants (Include CAS #)	Calculation Methods / Limits Taken / Other Comments	Uncontrolled		Controlled		Limited	
				lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
23	S-23	1,1,1-Trichloroethane (71-55-6)	AP-42, Section 1.3 or 1.4	4.02E-05	1.76E-04	N/A	N/A	N/A	N/A
		Toluene (108-88-3)		1.06E-03	4.63E-03				
		o-Xylene (95-47-6)		1.86E-05	8.14E-05				
		Arsenic (7440-38-2)		9.40E-06	4.12E-05				
		Beryllium (7440-41-7)		7.05E-06	3.09E-05				
		Cadmium (7440-43-9)		2.64E-05	1.16E-04				
		Chromium Compounds		3.36E-05	1.47E-04				
		Cobalt Compounds		2.02E-06	8.84E-06				
		Manganese Compounds		1.41E-05	6.18E-05				
		Mercury (7439-97-6)		7.05E-06	3.09E-05				
		Nickel (7440-02-0)		5.04E-05	2.21E-04				
		Selenium Compounds		3.53E-05	1.54E-04				

Bureau of Air Quality
Emission Point Information

A. APPLICATION IDENTIFICATION	
1. Facility Name: Westinghouse Electric Company LLC	
2. SC Air Permit Number (if known; 8-digits only): 1900-0050	3. Application Date: 6/11/18
4. Project Description: Replace three existing boilers with two new boilers	

B. FACILITY INFORMATION	
1. Is your company a Small Business? ☐ Yes ☒ No	2. If a Small Business or small government facility, is Bureau assistance being requested? ☐ Yes ☐ No
3. Are other facilities collocated for air compliance? ☐ Yes ☒ No	4. If Yes, provide permit numbers of collocated facilities:

C. AIR CONTACT			
Consulting Firm Name (if applicable): AECOM			
Title/Position: Senior Scientist	Salutation: Mr.	First Name: Mark	Last Name: Yoder
Mailing Address: 1600 Perimeter Park Drive			
City: Morrisville		State: NC	Zip Code: 27560
E-mail Address: mark.yoder@aecom.com		Phone No.: 919-461-1441	Cell No.:

D. EMISSION POINT DISPERSION PARAMETERS
Source data requirements are based on the appropriate source classification. Each emission point is classified as a point, area, volume, or flare source. Contact the Bureau of Air Quality for clarification of data requirements. Include sources on a scaled site map. Also, a picture of area or volume sources would be helpful but is not required. A user generated document or spreadsheet may be substituted in lieu of this form provided all of the required emission point parameters are submitted in the same order, units, etc. as presented in these tables.
Abbreviations / Units of Measure: UTM = Universal Transverse Mercator; °N = Degrees North; °W = Degrees West; m = meters; AGL = Above Ground Level; ft = feet; ft/s = feet per second; ° = Degrees; °F = Degrees Fahrenheit

E. POINT SOURCE DATA

(Point sources such as stacks, chimneys, exhaust fans, and vents.)

Emission Point ID	Description/Name	Point Source Coordinates Projection:				Release Height AGL (ft)	Temp. (°F)	Exit Velocity (ft/s)	Inside Diameter (ft)	Discharge Orientation	Rain Cap? (Y/N)	Distance To Nearest Property Boundary (ft)	Building		
		UTM E (m)	UTM N (m)	Lat (°N)	Long (°W)								Height (ft)	Length (ft)	Width (ft)
S-22	Boiler	507420.3	3748990			25	322	27.38	2	V	N	See Modeling Files			
S-23	Boiler	507429.1	3748987			25	322	27.38	2	V	N				

F. AREA SOURCE DATA

(Area sources such as storage piles, and other sources that have low level or ground level releases with no plumes.)

Emission Point ID	Description/Name	Area Source Coordinates Projection:				Release Height AGL (ft)	Easterly Length (ft)	Northerly Length (ft)	Angle From North (°)	Distance To Nearest Property Boundary (ft)
		UTM E (m)	UTM N (m)	Lat (°N)	Long (° W)					

G. VOLUME SOURCE DATA

(Volume sources such as building fugitives that have initial dispersion vertical depth prior to release.)

Emission Point ID	Description/Name	Volume Source Coordinates Projection:				Release Height AGL (ft)	Initial Horizontal Dimension (ft)	Initial Vertical Dimension (ft)	Distance To Nearest Property Boundary (ft)
		UTM E (m)	UTM N (m)	Lat (°N)	Long (° W)				

H. FLARE SOURCE DATA

(Point sources where the combustion takes place at the tip of the stack.)

Emission Point ID	Description/Name	Flare Source Coordinates Projection:				Release Height AGL (ft)	Heat Release Rate (BTU/hr)	Distance To Nearest Property Boundary (ft)	Building		
		UTM E (m)	UTM N (m)	Lat (°N)	Long (° W)				Height (ft)	Length (ft)	Width (ft)

I. AREA CIRCULAR SOURCE DATA

Emission Point ID	Description/Name	Area Circular Source Coordinates Projection:				Release Height AGL (ft)	Radius of Area (ft)	Distance To Nearest Property Boundary (ft)
		UTM E (m)	UTM N (m)	Lat (°N)	Long (° W)			

J. AREA POLY SOURCE DATA

Emission Point ID	Description/Name	Area Poly Source Coordinates Projection:		Release Height AGL (ft)	Number of Vertices
		UTM E (m)	UTM N (m)		

K. OPEN PIT SOURCE DATA

Emission Point ID	Description/Name	Open Pit Source Coordinates Projection:		Release Height AGL (ft)	Easterly Length (ft)	Northerly Length (ft)	Volume (ft^3)	Angle From North (°)
		UTM E (m)	UTM N (m)					

L. EMISSION RATES						
Emission Point ID	Pollutant Name	CAS #	Emission Rate (lb/hr)	Same as Permitted (1)	Controlled or Uncontrolled	Averaging Period
S-22	NOx		2.683	☐ Yes ☐ No	Uncontrolled	1-hour, Annual
S-23	NOx		2.683	☐ Yes ☐ No	Uncontrolled	1-hour, Annual
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		

(1) Any difference between the rates used for permitting and the air compliance demonstration must be explained in the application report.

Bureau of Air Quality
Construction Permit Application
Regulatory Review

APPLICATION IDENTIFICATION *(Please ensure that the information list in this table is the same on all of the forms and required information submitted in this construction permit application package.)*		
Facility Name *(This should be the name used to identify the facility)* Westinghouse Electric Company LLC	SC Air Permit Number (8-digits only) *(Leave blank if one has never been assigned)* 1900-0050	Application Date 6/11/18

STATE AND FEDERAL AIR POLLUTION CONTROL REGULATIONS AND STANDARDS
(If not listed below add any additional regulations that are triggered.)

Regulation	Applicable		Include all limits, work practices, monitoring, record keeping, etc.		
	Yes	No	Explain Applicability Determination	List the specific limitations and/or requirements that apply.	How will compliance be demonstrated?
Regulation 61-62.1, Section II(E) Synthetic Minor Construction Permits	☐	☒	Potential uncontrolled emissions are less than 250 tpy	N/A	N/A
Regulation 61-62.1, Section II(G) Conditional Major Operating Permits	☐	☒	Potential uncontrolled emissions are less than 100 tpy	N/A	N/A
Regulation 61-62.5, Standard No. 1 Emissions from Fuel Burning Operations	☒	☐	These boilers meet the applicability requirements of this standard because they burn No. 2 fuel oil as a backup fuel and are greater than $1.5x10^6$ Btu/hr heat input.	Allowable discharge of PM 0.6 lbs/10^6 BTU Allowable discharge of SO_2 2.3 lbs/10^6 BTU Opacity of 20% or less	Based on manufacturer information, these boilers meet requirements. The facility will use ULSD for back-up fuel.
Regulation 61-62.5, Standard No. 2 Ambient Air Quality Standards	☒	☐	This facility has demonstrated compliance through modeling; see modeling	N/A	N/A
Regulation 61-62.5, Standard No. 3 Waste Combustion and Reduction	☐	☒	These boilers will burn only virgin fuels.	N/A	N/A
Regulation 61-62.5, Standard No. 4 Emissions from Process Industries	☐	☒	These boilers are not a "process industry."	N/A	N/A
Regulation 61-62.5, Standard No. 5 Volatile Organic Compounds	☐	☒	Boilers are not one of the specific type facilities nor do they have VOC emissions in excess of the listed values.	N/A	N/A

STATE AND FEDERAL AIR POLLUTION CONTROL REGULATIONS AND STANDARDS *(If not listed below add any additional regulations that are triggered.)*					
Regulation	**Applicable**		**Include all limits, work practices, monitoring, record keeping, etc.**		
	Yes	**No**	**Explain Applicability Determination**	**List the specific limitations and/or requirements that apply.**	**How will compliance be demonstrated?**
Regulation 61-62.5, Standard No. 5.2 Control of Oxides of Nitrogen	☒	☐	These boilers emit NOx and have not done a BACT analysis.	Allowable discharge of NOx 0.36 lbs/10^6 BTU (0.15 lb/MMBtu for fuel oil) Record monthly amounts and types of each fuel combusted. Perform tune-ups every twenty-four (24) months. maintain records of the occurrence and duration of any startup, shutdown, or malfunction.	Based on manufacturer information, these boilers meet requirements.
Regulation 61-62.5, Standard No. 7 Prevention of Significant Deterioration*	☐	☒	Facility emissions are below 250 tons/yr	N/A	N/A
Regulation 61-62.5, Standard No. 7.1 Nonattainment New Source Review*	☐	☒	Facility is not a major source	N/A	N/A
Regulation 61-62.5, Standard No. 8 Toxic Air Pollutants	☐	☒	HAPS from combustion of virgin fuels exempt from modeling.	N/A	N/A
Regulation 61-62.6 Control of Fugitive Particulate Matter	☒	☐	Applicable to all facilities	N/A	N/A
Regulation 61-62.68 Chemical Accident Prevention Provisions	☐	☒	No chemicals associated with this project subject to requirements.	N/A	N/A
Regulation 61-62.70 Title V Operating Permit Program	☐	☒	Potential emissions are less than 100 tons/yr	N/A	N/A
40 CFR Part 64 - Compliance Assurance Monitoring (CAM)	☐	☒	Not a major source	N/A	N/A
40 CFR 60 Subpart A - General Provisions	☒	☐			
Subpart Dc	☒	☐	Two new 24.5 x 10^6 Btu boilers	0.5% sulfur for fuel oil	Supplier certification
	☐	☐			

STATE AND FEDERAL AIR POLLUTION CONTROL REGULATIONS AND STANDARDS *(If not listed below add any additional regulations that are triggered.)*					
Regulation	**Applicable**		**Include all limits, work practices, monitoring, record keeping, etc.**		
	Yes	**No**	**Explain Applicability Determination**	**List the specific limitations and/or requirements that apply.**	**How will compliance be demonstrated?**
40 CFR 61 Subpart A - General Provisions	☒	☐		N/A	N/A
	☐	☐			
40 CFR 63 Subpart A - General Provisions	☒	☐			
Subpart JJJJ	☒	☐	These boilers meet the definition of gas-fired boilers.	N/A	N/A

* Green House Gas emissions must be quantified if these regulations are triggered.

PROJECT DESCRIPTION

WESTINGHOUSE ELECTRIC

COMPANY LLC

HOPKINS, SOUTH CAROLINA

PROJECT DESCRIPTION

Westinghouse Electric Company LLC fabricates nuclear fuel assemblies containing low-enriched (< 5% U-235) uranium oxide fuel for use in commercial light-water nuclear powered reactors. Fuel fabrication operations are conducted at the Westinghouse Electric Company LLC facility located at 5801 Bluff Road under Permit No. 1900-0050.

Project Description

Westinghouse Electric is planning to replace the three existing boilers at the facility with two new boilers. As with the existing boilers, the new boilers will utilize natural gas as a primary fuel and fuel oil as back-up fuel, in the event of natural gas curtailment.

Regulatory Analysis

Prevention of Significant Deterioration – 40 CFR 51 and Regulation 62.5: Air Pollution Control Standards - Standard 7

The PSD regulations apply to major modifications at major stationary sources, which are considered those sources belonging to any one of the 28 source categories listed in the regulations that has the potential to emit more than 100 tons per year of any PSD-regulated compound, or any other source which has the potential to emit more than 250 tons per year of any PSD compound. A major modification is defined as "any change to a major stationary source that would result in a significant emissions increase of any pollutant subject to regulation under the Act." Major modifications are subject to review under the PSD regulations and must meet certain pre-construction review and permitting requirements. Westinghouse Electric is a minor source; therefore, this regulation does not apply.

New Source Performance Standards (NSPS) – 40 CFR 60

NSPS Subpart Dc applies to each steam generating unit for which construction, modification, or reconstruction is commenced after June 9, 1989 and that has a maximum design

heat input capacity of 29 megawatts (MW) (100 million British thermal units per hour (MMBtu/h)) or less, but greater than or equal to 2.9 MW (10 MMBtu/h). The boilers proposed for Westinghouse Electric are 24.5 MMBtu/hr each, therefore, this regulation applies to the project.

National Emission Standards for Hazardous Air Pollutants (NESHAP) – 40 CFR 63

Subpart JJJJJJ applies to facilities that own or operate an industrial, commercial, or institutional boiler as defined in the regulation that is located at, or is part of, an area source of hazardous air pollutants (HAP). This regulation does not apply to "gas-fired" boilers. The proposed boilers at Westinghouse Electric meet the definition of gas-fired boilers because they will only use fuel oil during periods of natural gas curtailment; therefore, this regulation does not apply.

Compliance Assurance Monitoring (CAM) Rule – 40 CFR 64

The CAM Rule (40 CFR Part 64) applies to pollutant-specific emissions units (PSEU) that are pre-control major sources and use a control device to comply with an emissions limit. Westinghouse Electric has no emission units that are major sources with control devices; therefore, this regulation does not apply.

Regulation 62.5: Air Pollution Control Standards Standard No. 1: Emissions from Fuel Burning Operations

Standard No. 1 applies to fuel burning operations defined as "Use of furnace, boiler, device or mechanism used principally but not exclusively, to burn any fuel for the purpose of indirect heating in which the material being heated is not contacted by and adds no substance to the products of combustion." The new boilers proposed for this project are fuel burning sources, thus this standard applies.

Regulation 62.5: Air Pollution Control Standards Standard No. 2: Ambient Air Quality Standards

Standard No. 2 contains ambient air quality standards for criteria pollutants. The equipment will result in emissions of criteria pollutants. Westinghouse Electric has submitted air dispersion modeling for all criteria pollutants that are above SCDHEC air dispersion modeling exemption rates, demonstrating that pollutant concentrations are below the applicable air quality standards.

Regulation 62.5: Air Pollution Control Standards Standard No. 3: Waste Combustion and Reduction

Standard No. 3 applies to any source, regardless of type or construction date, which burns any waste other than virgin fuel for any purpose. The boilers will burn only virgin fuels; therefore, this project is not subject to this regulation.

Regulation 62.5: Air Pollution Control Standards Standard No. 3.1: Hospital/Medical/Infectious Waste Incinerators (HMIWI)

Standard No. 3.1 applies to any device that combusts hospital/medical/infectious waste. Westinghouse Electric will not combust any hospital/medical/infectious waste thus is not subject to this standard.

Regulation 62.5: Air Pollution Control Standards Standard No. 4: Emissions from Process Industries, Section VIII (Other Manufacturing) and IX (Visible Emissions)

Standard No. 4 applies to process industries. These boilers are subject to Standard No. 1 and are not a "process industry".

Regulation 62.5: Air Pollution Control Standards Standard No. 5: Volatile Organic Compounds

Standard 5 applies to specific types of facilities listed in the standard with potential VOC emissions of more than 550 pounds in any one day or more than 150 pounds in any one hour (100 tons per year). Westinghouse Electric is not one of the specific type facilities nor does it have VOC emissions in excess of the listed values therefore, this regulation does not apply.

Regulation 62.5: Air Pollution Control Standards Standard No. 5.1: Best Available Control Technology/Lowest Achievable Emission Rates

This standard requires that the best available control technology be installed on sources for which construction permits are issued after June 25, 2004 when there is a net VOC emissions increase of 100 tons per year or more since the baseline date of July 1, 1979. The total VOC emissions at Westinghouse Electric are less than 100 tons per year therefore, this standard does not apply.

Regulation 62.5: Air Pollution Control Standards Standard No. 5.2: Control of Oxides of Nitrogen

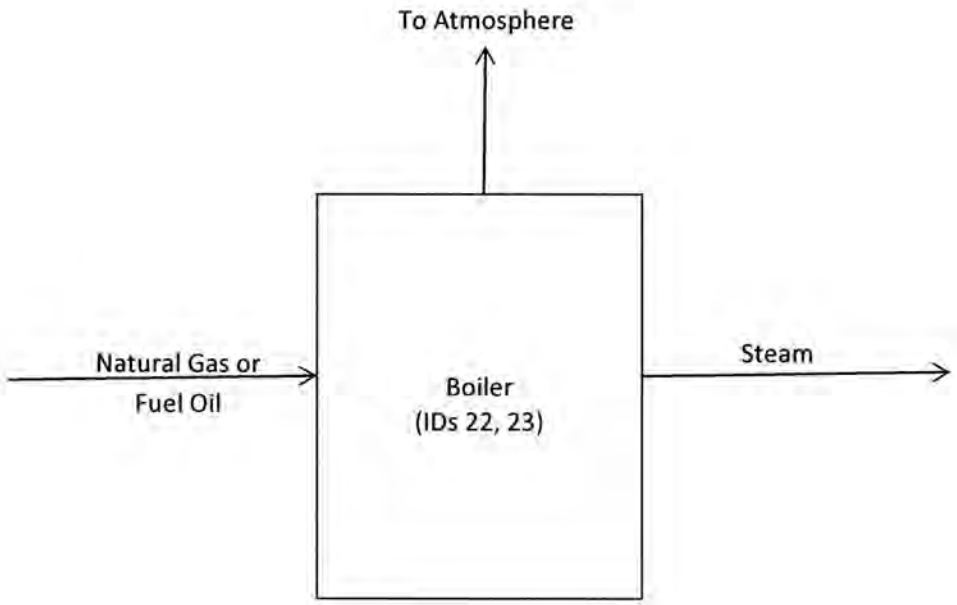
This standard applies to new combustion sources that emit NOx and have not done a BACT analysis. This project is subject to this standard. The estimated NOx emissions from these boilers meet the requirements for boilers listed in Standard 5.2, Table 1.

Regulation 62.5: Air Pollution Control Standards Standard No. 8: Toxic Air Pollutants

There are no hazardous or toxic air pollutants emissions associated with this project except those associated with the combustion of virgin fuels, which are exempt for air dispersion modeling.

BLOCK FLOW DIAGRAM

BOILER
BLOCK FLOW DIAGRAM



EMISSION CALCULATIONS

AECOM

SHEET	1 OF 4		DATE: 4/9/18
PROJECT:	Westinghouse		
SUBJECT:	Boiler Emissions - Natural Gas	CHECKED BY:	SRM
WORK BY:	SSL	PROJECT NO:	60571157

Boiler - Natural Gas

Boiler Capacity 24.5 mmBtu/hr Heating Value 1020 btu/ft^3

Max Potentional Gas Usag 2.40E-02 10^6 ft^3/hr

Max Potential Operating Hrs 8760 hrs/yr

Pollutant	*Emission Factor (lbs/mmBtu)*	*Hourly Emission Rate ea. (lbs/hr)*	*Potential Annual Emission Rate ea. (tons/yr)*	*Hourly Emission Rate 2 boilers (lbs/hr)*	*Potential Annual Emission Rate 2 boilers (tons/yr)*
VOC	0.0036	0.088	0.39	0.18	0.77
NO_x	0.035	0.857	3.76	1.71	7.51
CO	0.0187	0.458	2.01	0.92	4.01
SO_2	0.0006	0.015	0.06	0.03	0.13
PM	0.0075	0.184	0.80	0.37	1.61
PM_{10}	0.0075	0.184	0.80	0.37	1.61
$PM_{2.5}$	0.0075	0.184	0.80	0.37	1.61

Source: Manfacturer Data

	(lbs/10^6 scf)				
Lead	0.0005	1.20E-05	5.26E-05	2.40E-05	1.05E-04

Source: AP-42, Section 1.4

Pollutant	*Emission Factor kg/mmBTU)*	*Hourly Emission Rate ea. (lbs/hr)*	*Potential Annual Emission Rate ea. (tons/yr)*	*Hourly Emission Rate 2 Boilers (lbs/hr)*	*Potential Annual Emissions 2 Boilers (tons/yr)*
CO_2	53.06	2865.56	12,551.17	5,731.13	25,102.33
N_2O	1.00E-04	5.40E-03	2.37E-02	1.08E-02	4.73E-02
CH_4	1.00E-03	5.40E-02	2.37E-01	1.08E-01	4.73E-01
Total Mass			12551.43	5,731.24	25,102.85
Total CO_2e	53.11	2,868.52	12,564.13	5,737.04	25,128.26

Source 40 CFR 98 Tables A-1, C-1 & C-2

AECOM

SHEET 2 OF 4		DATE:	4/9/18
PROJECT:	Westinghouse		
SUBJECT:	Boiler Emissions - Natural Gas	CHECKED BY:	SRM
WORK BY:	SSL	PROJECT NO:	60571157

Max Potentional Gas Usage= 2.40E-02 10^6 ft^3/hr
24.5 mmBtu/hr

Max Potential Operating Hrs 8760 hrs/yr

	CAS No.	*Emission Factor ($lb/10^6 cf$)*	*Emission Rate ea. (lbs/hr)*	*Potential Emissions ea. (tons/yr)*	*Emission Rate 2 boilers (lbs/hr)*	*Potential Emissions 2 boilers (tons/yr)*
2-Methylnaphthalene	91-57-6	2.40E-05	5.76E-07	2.52E-06	1.15E-06	*5.05E-06*
3-Methylchloranthrene	56-49-5	1.80E-06	4.32E-08	1.89E-07	8.65E-08	3.79E-07
7,12-Dimethylbenz(a)anthraene	57-97-6	1.60E-05	3.84E-07	1.68E-06	7.69E-07	3.37E-06
Acenaphthene	83-32-9	1.80E-06	4.32E-08	1.89E-07	8.65E-08	3.79E-07
Acenaphthylene	208-96-8	1.80E-06	4.32E-08	1.89E-07	8.65E-08	3.79E-07
Anthracene	120-12-7	2.40E-06	5.76E-08	2.52E-07	1.15E-07	5.05E-07
Benz(a)anthracene	56-55-3	1.80E-06	4.32E-08	1.89E-07	8.65E-08	3.79E-07
Benzene	71-43-2	2.10E-03	5.04E-05	2.21E-04	1.01E-04	4.42E-04
Benzo(a)pyrene	50-32-8	1.20E-06	2.88E-08	1.26E-07	5.76E-08	2.52E-07
Benzo(b)fluoranthene	205-99-2	1.80E-06	4.32E-08	1.89E-07	8.65E-08	3.79E-07
Benzo(g,h,i)perylene	191-24-2	1.20E-06	2.88E-08	1.26E-07	5.76E-08	2.52E-07
Benzo(k)fluoranthene	205-82-3	1.80E-06	4.32E-08	1.89E-07	8.65E-08	3.79E-07
Chrysene	218-01-9	1.80E-06	4.32E-08	1.89E-07	8.65E-08	3.79E-07
Dibenzo(a,h)anthracene	53-70-3	1.20E-06	2.88E-08	1.26E-07	5.76E-08	2.52E-07
Dichlorobenzene	25321-22-6	1.20E-03	2.88E-05	1.26E-04	5.76E-05	2.52E-04
Fluoranthene	206-44-0	3.00E-06	7.21E-08	3.16E-07	1.44E-07	6.31E-07
Fluorene	86-73-7	2.80E-06	6.73E-08	2.95E-07	1.35E-07	5.89E-07
Formaldehyde	50-00-0	7.50E-02	1.80E-03	7.89E-03	3.60E-03	1.58E-02
Hexane	110-54-3	1.80E+00	4.32E-02	1.89E-01	8.65E-02	3.79E-01
Indo(1,2,3-cd)pyrene	193-39-5	1.80E-06	4.32E-08	1.89E-07	8.65E-08	3.79E-07
Napthalene	91-20-3	6.10E-04	1.47E-05	6.42E-05	2.93E-05	1.28E-04
Phenanthrene	85-01-8	1.75E-05	4.20E-07	1.84E-06	8.41E-07	3.68E-06
Pyrene	129-00-0	5.00E-06	1.20E-07	5.26E-07	2.40E-07	1.05E-06
Toluene	108-88-3	3.40E-03	8.17E-05	3.58E-04	1.63E-04	7.15E-04
Total POMs		8.24E-02	1.98E-03	8.67E-03	3.96E-03	1.73E-02
Arsenic	7440-38-2	2.00E-04	4.80E-06	2.10E-05	9.61E-06	4.21E-05
Beryllium	7440-41-7	1.20E-05	2.88E-07	1.26E-06	5.76E-07	2.52E-06
Cadmium	7440-43-9	1.10E-03	2.64E-05	1.16E-04	5.28E-05	2.31E-04
Chromium	7440-47-3	1.40E-03	3.36E-05	1.47E-04	6.73E-05	2.95E-04
Cobalt	7440-48-4	8.40E-05	2.02E-06	8.84E-06	4.04E-06	1.77E-05
Mercury	7439-97-6	2.60E-04	6.25E-06	2.74E-05	1.25E-05	5.47E-05
Manganese	7439-96-5	3.80E-04	9.13E-06	4.00E-05	1.83E-05	8.00E-05
Nickel	7440-02-0	2.10E-03	5.04E-05	2.21E-04	1.01E-04	4.42E-04
Selenium	7782-49-2	2.40E-05	5.76E-07	2.52E-06	1.15E-06	5.05E-06
Total			0.05	0.20	0.09	0.40
Max			0.04	0.19	0.09	0.38

Source: AP-42, Section 1.4

AECOM

SHEET	3 OF 4		DATE: 4/9/18
PROJECT:	Westinghouse		
SUBJECT:	Boiler Emissions - Diesel Fuel	CHECKED BY:	SRM
WORK BY:	SSL	PROJECT NO:	60571157

Boiler - Diesel Fuel

Boiler Capacity 23.5 mmBtu/hr Heating Value 138,000 btu/gal

Diesel Fuel Sulfur Content 0.0015 % 170.55 gals/hr

0.171 10^3 gals/hr

Max Potential Operating Hrs 8760 hrs/yr

Pollutant	*Emission Factor (lbs/mmBtu)*	*Hourly Emission Rate ea. (lbs/hr)*	*Potential Annual Emission Rate ea. (tons/yr)*	*Hourly Emission Rate 2 boilers (lbs/hr)*	*Potential Annual Emission Rate 2 boilers (tons/yr)*
VOC	0.0014	0.033	0.14	0.07	0.29
NO_x	0.114	2.683	11.75	5.37	23.50
CO	0.008	0.188	0.82	0.38	1.65
SO_2	0.001	0.034	0.15	0.07	0.30
PM	0.0236	0.555	2.43	1.11	4.87
PM_{10}	0.0236	0.555	2.43	1.11	4.87
$PM_{2.5}$	0.0236	0.555	2.43	1.11	4.87

Source: Manfacturer Data

	(lbs/10^{12} Btu)				
Lead	9.00	2.12E-05	9.28E-05	4.24E-05	1.86E-04

Source: AP-42, Section 1.3

Pollutant	*Emission Factor kg/mmBTU)*	*Hourly Emission Rate ea. (lbs/hr)*	*Potential Annual Emission Rate ea. (tons/yr)*	*Hourly Emission Rate 2 Boilers (lbs/hr)*	*Potential Annual Emissions 2 Boilers (tons/yr)*
CO_2	73.96	3837.60	16,808.67	7,675.19	33,617.35
N_2O	3.00E-03	0.16	0.68	0.31	1.36
CH_4	6.00E-04	0.03	0.14	0.06	0.27
Total Mass			16809.49	7,675.57	33,618.99
Total CO_2e	74.87	3,884.76	17,015.26	7,769.53	34,030.52

Source 40 CFR 98 Tables A-1, C-1 & C-2

AECOM

SHEET	4 OF 4	DATE:	4/9/18
PROJECT:	Westinghouse		
SUBJECT:	Boiler Emissions - Diesel Fuel	CHECKED BY:	SRM
WORK BY:	SSL	PROJECT NO:	60571157

Max Potentional Fuel Usage= 1.71E-01 10^3 gal/hr
23.5 mmBtu/hr

Max Potential Operating Hrs 8760 hrs/yr

	CAS No.	*Emission Factor ($lb/10^3$ gal)*	*Emission Rate ea. (lbs/hr)*	*Potential Emissions ea. (tons/yr)*	*Emission Rate 2 boilers (lbs/hr)*	*Potential Emissions 2 boilers (tons/yr)*
Benzene	71-43-2	2.14E-04	3.65E-05	1.60E-04	7.30E-05	3.20E-04
Ethylbenzene	100-41-4	6.36E-05	1.08E-05	4.75E-05	2.17E-05	9.50E-05
Formaldehyde	50-00-0	3.30E-02	5.63E-03	2.47E-02	1.13E-02	4.93E-02
Napthalene	91-20-3	1.13E-03	1.93E-04	8.44E-04	3.85E-04	1.69E-03
1,1,1-Trichloroethane	71-55-6	2.36E-04	4.02E-05	1.76E-04	8.05E-05	3.53E-04
Toluene	108-88-3	6.20E-03	1.06E-03	4.63E-03	2.11E-03	9.26E-03
o-Xylene	95-47-6	1.09E-04	1.86E-05	8.14E-05	3.72E-05	1.63E-04
Acenaphthene	83-32-9	2.11E-05	3.60E-06	1.58E-05	7.20E-06	3.15E-05
Acenaphthylene	208-96-8	2.53E-07	4.31E-08	1.89E-07	8.63E-08	3.78E-07
Anthracene	120-12-7	1.22E-06	2.08E-07	9.11E-07	4.16E-07	1.82E-06
Benz(a)anthracene	56-55-3	4.01E-06	6.84E-07	3.00E-06	1.37E-06	5.99E-06
Benzo(g,h,i)perylene	191-24-2	2.26E-06	3.85E-07	1.69E-06	7.71E-07	3.38E-06
Chrysene	218-01-9	2.38E-06	4.06E-07	1.78E-06	8.12E-07	3.56E-06
Dibenzo(a,h)anthracene	53-70-3	1.67E-06	2.85E-07	1.25E-06	5.70E-07	2.50E-06
Fluoranthene	206-44-0	4.84E-06	8.25E-07	3.62E-06	1.65E-06	7.23E-06
Indo(1,2,3-cd)pyrene	193-39-5	2.14E-06	3.65E-07	1.60E-06	7.30E-07	3.20E-06
Phenanthrene	85-01-8	1.05E-05	1.79E-06	7.84E-06	3.58E-06	1.57E-05
Pyrene	129-00-0	4.25E-06	7.25E-07	3.17E-06	1.45E-06	6.35E-06
Arsenic	7440-38-2	5.51E-05	9.40E-06	4.12E-05	1.88E-05	8.23E-05
Beryllium	7440-41-7	4.13E-05	7.05E-06	3.09E-05	1.41E-05	6.18E-05
Cadmium	7440-43-9	4.13E-05	7.05E-06	3.09E-05	1.41E-05	6.18E-05
Chromium Compounds	N/A	4.13E-05	7.05E-06	3.09E-05	1.41E-05	6.18E-05
Manganese Compounds	N/A	8.27E-05	1.41E-05	6.18E-05	2.82E-05	1.24E-04
Mercury	7439-97-6	4.13E-05	7.05E-06	3.09E-05	1.41E-05	6.18E-05
Nickel	7440-02-0	4.13E-05	7.05E-06	3.09E-05	1.41E-05	6.18E-05
Selenium Compounds	N/A	2.07E-04	3.53E-05	1.54E-04	7.05E-05	3.09E-04
Total			0.01	0.03	0.01	0.06
Max			0.01	0.02	0.01	0.05

Source: AP-42, Section 1.3

Cleaver-Brooks Boiler Expected Emission Data

Producing Steam Firing **Nat Gas**

BACKGROUND INFORMATION

Date	02/13/18	Boiler Model	CBEX Elite
Author	Stephen Wood	Altitude (feet)	700
Customer	Westinhghouse	Operating Pressure (psig)	125.00
City & State	Columbia, SC	Furnace Volume (cuft)	228.50
		Furnace Heat Release (btu/hr/cu ft)	91,408
		Heating Surface (sqft)	1905
		Nox System	30

Nat Gas		Firing Rate			
		25%	**50%**	**75%**	**100%**
Horsepower		150	300	450	600
Input , Btu/hr		6,119,000	12,144,000	18,289,000	24,497,000
CO	ppm	25	25	25	25
	lb/MMBtu	0.0187	0.0187	0.0187	0.0187
	lb/hr	0.11	0.23	0.34	0.46
	tpy	0.502	0.997	1.501	2.011
NOx	ppm	30	30	30	30
	lb/MMBtu	0.0350	0.0350	0.0350	0.0350
	lb/hr	0.21	0.43	0.64	0.86
	tpy	0.938	1.862	2.804	3.755
NO	ppm	25.5	25.5	25.5	25.5
	lb/MMBtu	0.030	0.030	0.030	0.030
	lb/hr	0.18	0.36	0.54	0.73
	tpy	0.75	1.49	2.24	3.00
NO_2	ppm	4.5	4.5	4.5	4.5
	lb/MMBtu	0.005	0.005	0.005	0.005
	lb/hr	0.03	0.06	0.10	0.13
	tpy	0.19	0.37	0.56	0.75
SOx	ppm	0.34	0.34	0.34	0.34
	lb/MMBtu	0.0006	0.0006	0.0006	0.0006
	lb/hr	0.0036	0.0071	0.0108	0.0144
	tpy	0.016	0.031	0.047	0.063
VOCs	ppm	8	8	8	8
(Non-Methane Only)	lb/MMBtu	0.0036	0.0036	0.0036	0.0036
	lb/hr	0.022	0.043	0.065	0.087
VOCs does not include any background VOC emissions.	tpy	0.095	0.189	0.285	0.382
PM10 (Filterable)	ppm	N/A	N/A	N/A	N/A
	lb/MMBtu	0.0019	0.0019	0.0019	0.0019
	lb/hr	0.011	0.023	0.034	0.046
	tpy	0.050	0.099	0.149	0.200
PM10 (Condensable)	lb/MMBtu	0.0056	0.0056	0.0056	0.0056
	lb/hr	0.034	0.068	0.102	0.137
	tpy	0.150	0.297	0.448	0.600
PM2.5 (Filterable)	lb/MMBtu	0.0019	0.0019	0.0019	0.0019
	lb/hr	0.011	0.023	0.034	0.046
	tpy	0.050	0.099	0.149	0.200
PM2.5 (Condensable)	lb/MMBtu	0.0056	0.0056	0.0056	0.0056
	lb/hr	0.034	0.068	0.102	0.137
	tpy	0.150	0.297	0.448	0.600
Exhaust Data					
Temperature, F		371	390	408	426
Flow	ACFM	2,064	3,730	5,741	7,856
	SCFM (70 Degrees Fah.)	1,348	2,382	3,588	4,805
	DSCFM	1,213	2,115	3,186	4,267
	lb/hr	6,066	10,720	16,144	21,624
Velocity	ft/sec	10.95	19.79	30.46	41.68
	ft/min	657	1,187	1,828	2,501

Notes:

1) All ppm levels are corrected to dry at 3% oxygen.
2) Emission data based on actual boiler efficiency.
3) % H2O , by volume in exhaust gas is **17.24** % O2, by volume **2.47**
4) Water vapor in exhaust gas is **98.91** lbs/MMBtu of fuel fired
5) CO2 produced is **116.31** lbs/MMBtu of fuel fired
6) Particulate is exclusive of any particulates in combustion air or other sources of residual particulates from material.
PM level indicated on this form is based on combustion air and fuel being clean and turndown up to 4:1.
7) Heat input is based on high heating value (HHV).
8.) Emission produced in tons per year (tpy) is based on 24 hours per day for 365 days = 8,760 hours per year
9.) Exhaust data is based on a clean and properly sealed boiler.
10.) Emission data is based on a burner turndown of 4 to 1.

14) Fuel High Heating Value = **1000** Btu/FT^3

Cleaver-Brooks Boiler Expected Emission Data

Producing Steam Firing **#2 Oil**

BACKGROUND INFORMATION

Date	02/19/18	Boiler Model	CBEX Elite
Author	Stephen Wood	Altitude (feet)	700
Customer	Westinhghouse	Operating Pressure (psig)	125
City & State	Columbia, SC	Furnace Volume (cuft)	228.50
		Furnace Heat Release (btu/hr/cu ft)	87,822
		Heating Surface (sqft)	1905
		Nox System	30

#2 Oil		Firing Rate			
		25%	**50%**	**75%**	**100%**
Horsepower		150	300	450	600
Input , Btu/hr		5,824,000	11,667,000	17,571,000	23,536,000
CO	ppm	10	10	10	10
	lb/MMBtu	0.008	0.008	0.008	0.008
	lb/hr	0.045	0.090	0.136	0.182
	tpy	0.197	0.394	0.594	0.795
NOx	ppm	90	90	90	90
	lb/MMBtu	0.114	0.114	0.114	0.114
	lb/hr	0.66	1.33	2.00	2.68
	tpy	2.909	5.827	8.776	11.756
NO	ppm	86	86	86	86
	lb/MMBtu	0.108	0.108	0.108	0.108
	lb/hr	0.63	1.26	1.90	2.55
	tpy	2.764	5.536	8.337	11.168
NO_2	ppm	5	5	5	5
	lb/MMBtu	0.006	0.006	0.006	0.006
	lb/hr	0.03	0.07	0.10	0.13
	tpy	0.145	0.291	0.439	0.588
SOx	ppm	1	1	1	1
	lb/MMBtu	0.001	0.001	0.001	0.001
	lb/hr	0.008	0.017	0.025	0.034
	tpy	0.036	0.073	0.110	0.147
VOCs	ppm	3	3	3	3
(Non-Methane Only)	lb/MMBtu	0.0014	0.0014	0.0014	0.0014
	lb/hr	0.008	0.017	0.025	0.034
VOCs does not include any	tpy	0.036	0.073	0.110	0.147
background VOC emissions.					
PM10(Filterable)	ppm	N/A	N/A	N/A	N/A
	lb/MMBtu	0.0143	0.0143	0.0143	0.0143
	lb/hr	0.08	0.17	0.251	0.34
	tpy	0.364	0.730	1.099	1.473
PM10(Condensable)	lb/MMBtu	0.0093	0.0093	0.0093	0.0093
	lb/hr	0.054	0.108	0.163	0.219
	tpy	0.237	0.475	0.715	0.957
PM2.5(Filtable)	lb/MMBtu	0.0143	0.0143	0.0143	0.0143
	lb/hr	0.08	0.17	0.25	0.34
	tpy	0.364	0.730	1.099	1.473
PM2.5(Condensable)	lb/MMBtu	0.0093	0.0093	0.0093	0.0093
	lb/hr	0.054	0.108	0.163	0.219
	tpy	0.237	0.475	0.715	0.957
Exhaust Data					
Temperature, F		371	390	408	426
Flow	ACFM	1,890	3,871	5,958	8,152
	SCFM (70 Degrees Fah.)	1,234	2,472	3,723	4,987
	DSCFM	1,151	2,305	3,472	4,650
	lb/hr	5,552	11,124	16,752	22,439
Velocity	ft/sec	10	21	32	43
	ft/min	602	1,232	1,896	2,595

Notes:

1) All ppm levels are corrected to dry at 3% oxygen.

Oil emission levels are based on the following fuel constituent levels:

Ash Content	**0.0100**	%, by weight
Conradson Carbon Residue	**0.0000**	%, by weight
Fuel-bound Nitrogen Content	**0.01500**	%, by weight
Sulfur Content	**0.0015**	%, by weight

2) If any of the actual fuel constituent levels are different than indicated above, the emissions will change.

3.) Boilers rated above 40 hp , emission data is based on a burner turndown of 4 to 1.

4) Emission data based on actual boiler efficiency.

5) % H2O , by volume in exhaust gas is **10.79** % O2, by volume **3.94**

6) Percent water vapor in exhaust gas is **64.31** lbs/MMBtu of fuel fired

7) CO2 produced is **157.70** lbs/MMBtu of fuel fired

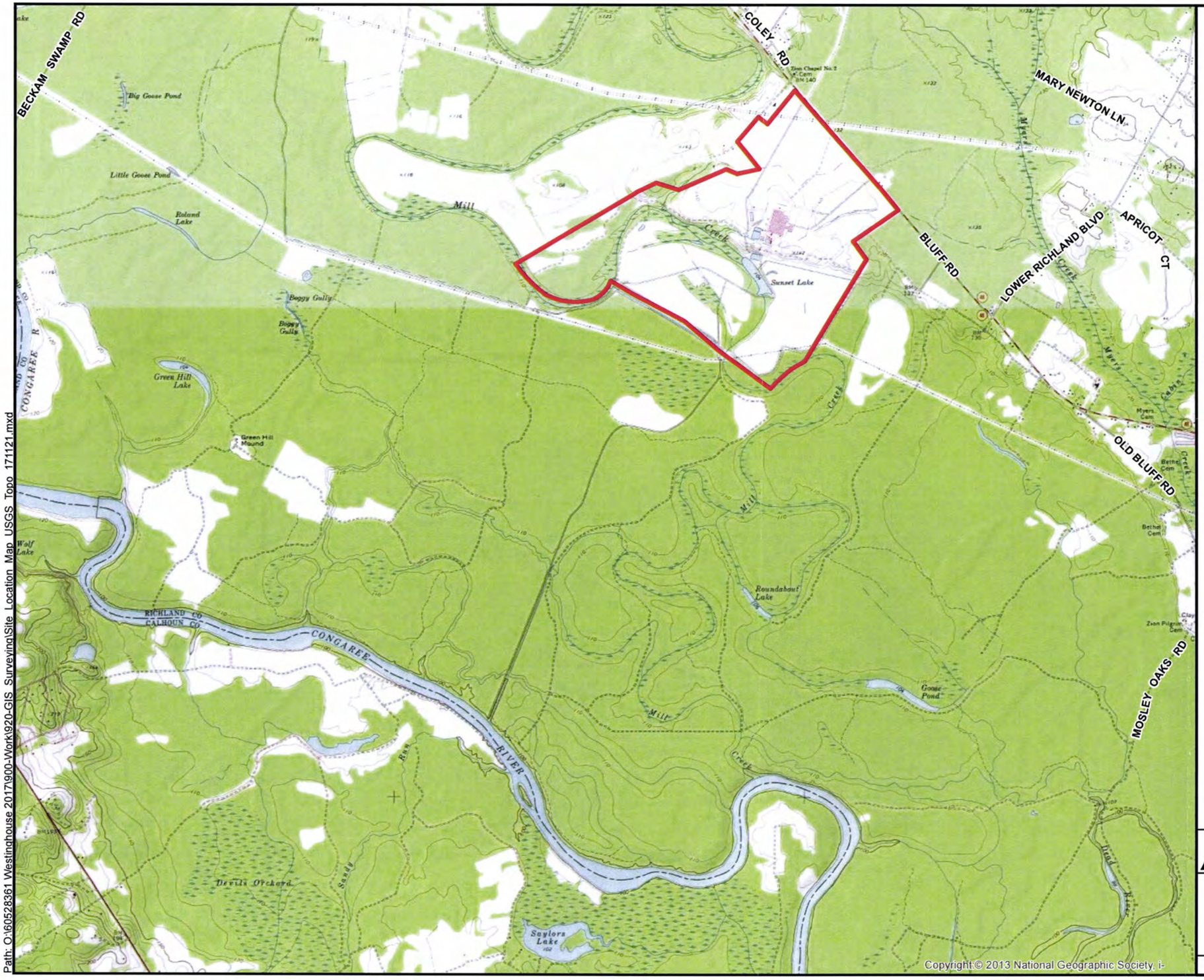
8) Particulate is exclusive of any particulates in combustion air or other sources of residual particulates from material.

9) Heat input is based on high heating value (HHV).

10.) Emission produced in tons per year (tpy) is based on 24 hours per day for 365 days = 8,760 hours per year

11.) Exhaust data is based on a clean and properly sealed boiler.

SITE LOCATION



Path: O:\60528361 Westinghouse 2017\900-Work\920-GIS_Surveying\Site_Location_Map_USGS_Topo_171121.mxd

N

Legend

Facility Property Boundary

Source:
Seamless, USGS Topographic Map obtained ArcGIS Map Service. (http://services.arcgisonline.com)

3,000 0 3,000 Feet

1:36,000

Map Projection: NAD 1983, South Carolina State Plane, FIPS 3900, Feet

Datum: North American 1983

AECOM

101 Research Dr
Columbia, SC 29203-9389
T: (803) 254-4400 F: (803) 771-6676

SITE LOCATION MAP

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60528361	KPM	November 2017	FIGURE 1

FACILITY LAYOUT

Property Bounday

Structures and Sources

MODELING SUMMARY

WESTINGHOUSE ELECTRIC COMPANY LLC

HOPKINS, SOUTH CAROLINA

AIR DISPERSION MODELING SUMMARY

Introduction

Westinghouse Electric Company LLC fabricates nuclear fuel assemblies containing low-enriched (< 5% U-235) uranium oxide fuel for use in commercial light-water nuclear powered reactors. Fuel fabrication operations are conducted at the Westinghouse Electric Company LLC facility located at 5801 Bluff Road under Permit No. 1900-0050. Westinghouse is planning to replace three (3) existing boilers with two (2) new boilers. In accordance with the requirements of the South Carolina Air Quality Control Regulations, Westinghouse Electric LLC has performed air dispersion modeling to demonstrate compliance with applicable South Carolina Air Quality Control Regulations.

Pollutant Identification

Emissions from equipment located at this facility are included in Table 1 of this modeling summary. The air dispersion modeling was performed for pollutants above modeling exemption levels resulting from this project, NOx. Emission calculations are based on the manufacturer data or AP-42 emission factors. There are no air toxics associated with associated with this project other than those from the combustion of virgin fuels.

Stack parameters for the various stacks were compiled. The stack parameters are contained in Table 2. The stack locations are noted on the site plan included with this air permit application package.

Air Dispersion Modeling

Air dispersion modeling was conducted for all NOx emissions sources at Westinghouse Electric Company LLC as directed by SCDHEC. The Aermod air dispersion model was utilized to determine the highest concentration at or beyond the property boundary for each air pollutant.

The model considers control options, source data, receptor locations, meteorological data, terrain data and output options. The BPIP Prime Program (Building Profile Input Program) was utilized to determine the downwash effects caused by the surrounding buildings on pollutants being emitted from the various stacks. The BPIP Prime Program compiles an input file of building widths and building heights for each stack, which is utilized by the Aermod Model to account for downwash effects.

AERMAP was utilized to calculate elevation data for all receptors. National Elevation Dataset (NED) files were obtained from the USGS Multi-Resolution Land Characteristics (MRLC) website. The coordinate system of the site was defined by importing a DXF file into the model. The AERMAP files are included on the enclosed CD.

The Aermod input files are included to show which model options were used for Westinghouse Electric Company LLC. Point sources were considered in estimating the concentrations at or beyond the property boundary. Columbia Metro Airport meteorological data for 2002 through 2006 was used to determine the NO_2 1-hour and annual concentrations. The input and output files are included on a disk with this report. As indicated in Table 3, the maximum concentrations for all pollutants are below the allowable concentrations as listed in South Carolina Air Quality Standard No. 2 (Ambient Air Quality Standard). Therefore, Westinghouse Electric Company LLC has demonstrated compliance with all applicable South Carolina Air Quality Standards.

TABLES

TABLE 1

Westinghouse

Potential Hours of Operation 8760
Actual Hours of Operation - Varies

Source	Pollutant	Stack Number	Operating Hours	Modeled Emission Rate (lb/hr)	Same as Permitted?	Controlled or Uncontrolled	Averaging Period
22 - Boiler	NOx	S-22	8760	2.683	NA	Uncontrolled	1-hr, annual
23 - Boiler	NOx	S-23	8760	2.683	NA	Uncontrolled	1-hr, annual

TABLE 2

Westinghouse

STACK PARAMETERS

Parameter		S-22 Boiler	S-23 Boiler
Stack Height (feet)		25	25
Stack Diameter (feet)		2.00	2.00
Stack Temperature (F)		322	322
Stack Exit Velocity	Actual (ft/sec)	27.38	27.38
(ft/sec)	Used in Modeling	27.38	27.38
Distance to Nearest Property Boundary (feet)		2215	2215
Building Height (feet)		See modeling files	See modeling files
Building Width (feet)			
Building Length (feet)			

TABLE 3

Westinghouse

MODELING RESULTS

Pollutant	Averaging Time	Maximum Modeled Concentration (ug/m^3)	Background Concentration (ug/m^3)	Total Concentration (ug/m^3)	Allowable Concentration (ug/m^3)	Shows Compliance?
SC Regulation No. 62.5 - Standard No. 2 - Ambient Air Quality Standard						
NOx	1 hour	70.64	83.4	154.04	188	Yes
	Annual	1.42	8.8	10.22	100	Yes

2011 - 2013

NOx	Sandhill	Richland
CO	Parklane	Richland

October 2018 Correspondence – Process Equipment List for Scrubbers

From: Joyner, Diana P
To: goodeac@dhec.sc.gov
Cc: Parr, Nancy B.
Subject: Process Equipment List for Scrubbers
Date: Monday, October 29, 2018 12:51:01 PM

Austin -
Please find below the requested information for the air permit renewal.
Diana

S-2A/2B
The main function of the S2A and S2B scrubber system is to ventilate the non-ammonia service vessels in the conversion area, URRS, and Solvent extraction (SOLX)
Vaporizers (10)
Hydrolysis columns passive overflow (5)
Spiking Station Mix tanks (2)
S-707 Scrubber for dissolver residue drying (URRS oxidation ovens)
Vent Pot 717 (services all SOLX vessels through a main header)
Dirty Dissolver Processing Tanks, V-756, V-754A and V-754B (3)

S-1030
The Conversion Scrubber S-1030 is a horizontal wet-packed bed scrubber which ventilates hoods, vessels, cleaning operations, and scrap recovery in the Conversion area to remove fumes and particulates from the effluent air streams from this area prior to discharge to atmosphere.
Scrap cage filter press, "FP-1058" (1)
Standpipe and flex hose at standpipe (1)
1030 Scrubber Tanks, V-1030 A-J (10)
Dissolver hood (filter press cake) (1)
Decon Room flex arms (2)
X-06 column cream can ventilation (5)
Off-gas condenser, s-x31 (5)
Flex hoses at decanters (5)
Flex hose at x05 and x06 (5)
Flex hoses at ADU Receiver Tank, x19 (5)
Flex hoses used to rod out calciner scrubber (5)
Flex hoses used to rod out calciner vent lines (5)

Mop water dump stations

S-1008
The main function of the ammonia fume ventilation system is to ventilate ammonia source vessels in the conversion area and remove ammonia from the effluent air stream prior to discharge from the plant.
Q-tanks (6)
Vent Pot, "V-1019" (includes vent from liquid scrap, V1005, V1006, V1016)
Line filter presses (10)
Precipitator columns (7)
Ammonia Centrate Clarifying Tanks (5)
Dryer condenser exhaust (5)
Dryer filter bag housing (5)
ADU receiver tanks, V-x19 (5)
Ammonia Centrate Receiver Tanks V-x20 (5)
Pressure relief from ammonia heat exchanger, "HX-1278" (1)

S-958
The Solvent Extraction 8A/8B Stack Scrubber services the Safe Geometry Dissolver processes, vessel vents, and hoods in the URRS area.
Dissolver Channels (5)
Clean dissolver process vessels, V-736, V-746, and V-743 (3)
Maintenance Rebuild Hood
Wet Residue Discharge Hoods (3)
SOLX product concentrator
URRS Ultrasonic Wash Bath
Wet trash collection scales (2)

Information Regarding Uranium Volatilization in the Incinerator (Leidos)

Westinghouse

Westinghouse Electric Company
Nuclear Fuel
Columbia Fuel Fabrication Facility
5801 Bluff Road
Hopkins, South Carolina 29061
USA

SCDHEC
Bureau of Air Quality
Air Permitting Division
2600 Bull Street
Columbia, SC 29201

Direct tel: 803.647.1920
Direct fax: 803.695.4152
e-mail: joynerdp@westinghouse.com

Your ref:
Our ref: LTR-RAC-18-85

December 6, 2018

Subject: Request for Information Regarding Uranium Volatilization in the Incinerator

Mr. Goode:

On October 16th, 2018 Westinghouse and SCDHEC representatives met to discuss additional information needed by the Department to continue its review of the previously submitted air permit renewal application by Westinghouse (LTR-RAC-17-59). One requested clarification was regarding the physical state of uranium during the incineration process. The attached letter from Leidos, an engineering firm with considerable radiological expertise, provides the technical basis to conclude that uranium volatilization is negligible during incineration.

Please call if you have any additional questions or need additional information regarding the contents of the attached technical letter.

Respectfully,

Diana P. Joyner

Diana P. Joyner
Principal Environmental Engineer
Columbia Fuel Fabrication Facility
Westinghouse Electric Company
803.497.7062 (m)

cc: N. Parr, Licensing Manager
A. Pearson, Manager Environmental Engineering & HP Operations
D. Wagoner, Radiation Safety Engineer
A. Hansen, Lead Principal Engineer, SME Incinerator
ENOVIA Records

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December 5, 2018

leidos

Westinghouse Columbia Fuel Fabrication Facility
C/O: Diana Joyner
5801 Bluff Road
Hopkins, SC 29061

Subject: **Potential Volatilization of Uranium Compounds during Incineration for Uranium Recovery at the Columbia Fuel Fabrication Facility**

Dear Ms. Joyner:

During operations the Columbia Fuel Fabrication Facility (CFFF) generates combustible materials incidental to the fuel fabrication process that are contaminated with uranium. Because of the expense involved with uranium, recovery of this uranium is viable and reduces the amount of radioactive waste requiring disposal. For decades the CFFF has operated an incinerator as part of this uranium recovery process (Reference 1). The incinerator ash is chemically processed to separate the uranium so it can be used in fuel fabrication. The purpose of this letter is to summarize information regarding the potential for uranium compounds to volatize during the incineration process.

At the CFFF, the incinerator consists of the material feed system, the primary and secondary combustion chambers, and the ash drop chute. Combustible materials containing uranium for recovery are loaded into the incinerator through the feed system by a ram feeder. The primary combustion chamber, commonly referred to as the lower chamber due to its relative position, is where the material is burned. As material enters the primary combustion chamber, the combustible compounds (e.g., carbon) begin to volatilize into moisture and carbonaceous and pyrolytic products of partial combustion. The secondary combustion chamber, commonly referred to as the upper chamber, is for the burning of rising particles (carbon) and carbon monoxide (CO) gas given off during combustion. The secondary chamber is connected to the primary chamber by a passageway which is referred to as the flameport area. As combustible gases leave the primary chamber, and prior to entry to the secondary chamber, they pass through a highly turbulent mixing area where air is injected into the gases in the flameport area. Upon exposure to this additional air, final combustion of the gases commences and continues throughout the volume of the secondary chamber. The secondary chamber is sized volumetrically so as to provide the retention time required for final combustion to be completed prior to the gases entering the off-gas system (Reference 2). Typical operational temperatures of the incinerator range from 750 to 1,000°C, while maximum excursion temperatures, which rarely occur, may reach 1,200°C.

Coupled with the incinerator is an ash handling system. This system is composed of an ash ejector ram mounted at the bottom of the incinerator primary chamber, an ash cooling chute followed by a tubular flight conveyor which transports partially cooled ash to the ash recovery process separation hood and a compactor mill for further processing.

Also coupled with the incinerator is an off-gas system. This system consists of three refractory-lined crossover ducts leading to three quench vessels followed by three wet venturi scrubbers and three packed-bed absorber columns. From the absorber outlets, gas is transferred to a single stainless steel duct through the demister assembly. The off-gas then passes through a high efficiency particulate air (HEPA) filtering system prior to being exhausted to ambient air via induced-draft fans.

Because the incineration system is designed to recover as much uranium as possible from the feed material, the ash handling system and off-gas system are designed with the intent to capture both the particulate matter, and small amounts of gas generated during the process. Gases and fly ash coming from the incinerator vent exhaust are cooled in the quench towers, drawn through a venturi scrubber, and then a packed scrubber column where scrubber solution falls through the column packing counter-current to the gas flow. The off-gas from the packed scrubber column passes through four demister pads. The wire mesh pads drop out almost all the entrained water droplets in the off-gas ventilation stream. The off-gas then passes through a set of in-line duct heaters and into one of the HEPA filter housings, after which it discharges out to the atmosphere via a 1650 cubic feet per minute (CFM) blower through a no loss stack located on the roof. Ash, along with captured particulates and the cooled and precipitated gases are fed back into the uranium recovery process. Furthermore, procedures are in place to ensure that only trained operators meeting South Carolina Department of Health and Environmental Control (SC-DHEC) requirements are permitted to operate the incinerator. Procedural controls require that the off-gas system must be operating before lighting off the incinerator, and that incinerator operations are immediately suspended if visible stack emissions are observed.

Based on vapor pressure relations (Reference 3), the volatility temperature of uranium metal is approximately 1,700°C. Because this value is higher than the operating temperature of the CFFF incinerator, uranium is not expected to be volatile in the incinerator. The Department of Energy (DOE) has performed research that supports this expectation through the evaluation of potential for radionuclides, including uranium, to volatilize during heating of ashes from the prior incineration of radioactive materials (Reference 4). The ashes were heated to and held at various temperatures between 900°C and 1,300°C for at least 2 hours. The research concludes that total volatilization of uranium was approximately 0.05 percent, and it is practically independent of heat treatment temperature within the range of 900 to 1,300°C. Because the maximum incinerator operational temperatures (maximum 1,200°C) are well below the volatility temperature of uranium (1,700°C) and the maximum incineration temperature researched by the DOE (1,300°C), the total volatilization of uranium during CFFF incineration is reasonably predicted to be less than 0.05 percent.

This small percentage will be reduced as the uranium cools below its volatility temperature and precipitates from its gaseous form into solid form. The off-gas system has multiple stages for cooling and collecting precipitates as part of the uranium recovery process. Returning the potentially volatilized uranium to a solid form also means that it could be captured by particulate sampling systems.

Site air sampling data supports the conclusion that the incinerator system is operating within specifications. Uranium emits alpha radiation, so the concentration of alpha radioactivity can be conservatively used as a surrogate for the concentration of uranium. From 2007 to 2017 the average annual alpha air concentration released from the incinerator stack is 5.07E-13 µCi/ml (compared to the ALARA goal of 6E-13 uCi/ml average alpha air concentration) with a range of 2.09E-13 µCi/ml to 1.16E-12 µCi/ml (compared to the investigation action level of 4E-12 µCi/ml alpha air concentration [Reference 5]). Air samples are collected from the incinerator exhaust stack daily, accordance with site procedures from the point of stack exhaust. As the exhausted air travels to the site perimeter, a dilution factor of at least 1,000 is expected, further reducing the potential public impact to negligible levels. For comparison, a continuous release of 6E-11 µCi/ml alpha air concentration measured at the stack is calculated to result in an estimated 10 mrem dose equivalent at the site boundary over the course of a year (as determined in accordance with U.S. Nuclear Regulatory Commission (NRC) Reg Guide 4.16, and provided by the CFFF Environmental Health and Safety [EH&S] Operations Department).

The incinerator at the CFFF is operated within the parameters analyzed in research literature that showed a negligible percentage was volatilized. The system is designed to condense and capture both gas and particulate matter, and to discharge all cooled exhaust through a HEPA filtration system, to a monitored exhaust point. Site air monitoring data supports the conclusion that the system is operating within specifications, with air effluent concentrations that are protective of human health and the environment.

Sincerely,

Leidos, Inc.

W. Clark Evers, CHP
Certified Health Physicist

References:

1) Incineration Facilities for Treatment of Radioactive Wastes: A Review – B.L. Perkins, LANL
2) CSE-13-A, Rev. 12 – Criticality Safety Evaluation for the Incinerator System – Westinghouse CFFF 2018
3) The Thermochemical Properties of Uranium Compounds – M.H. Rand and O. Kubaschewski
4) Volatilization of Alpha-Activity During Heating of Radioactive Ashes - A.S. Aloy, V.Z. Belov, B.S. Kuznetsov, KRI; D. Gombert, D. Knecht, LMITCO; Y. Macheret, USDOE; (USA/RUSSIA)
5) RA-219-1 – ALARA Goals – Westinghouse CFFF 2018

cc: N. Parr, Westinghouse
A. Pearson, Westinghouse
V. Kelmeckis, Westinghouse

Inherency Documentation (Westinghouse and GEL)

Westinghouse

Westinghouse Electric Company
Nuclear Fuel
Columbia Fuel Fabrication Facility
5801 Bluff Road
Hopkins, South Carolina 29061
USA

Mr. Chris Hardee, P.E.
Bureau of Air Quality – Air Permitting Division
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Direct tel: 803.647.1920
Direct fax: 803.695.4152
e-mail: joynerdp@westinghouse.com

Your ref:
Our ref: LTR-RAC-19-12

February 25, 2019

Re: Inherency Documentation
Westinghouse Electric Company LLC
Permit No. 1900-0050-R1
Hopkins, South Carolina

Dear Chris:

Westinghouse Electric Company LLC (Westinghouse) operates a facility in Hopkins, South Carolina that fabricates nuclear fuel assemblies containing low-enriched (< 5% U-235) uranium oxide fuel for use in commercial light-water nuclear power reactors. Westinghouse is working with the South Carolina Department of Health and Environmental Control (DHEC) to renew the facility's air emissions operating permit (No. 1900-0050-R1). As part of the renewal process, DHEC has requested additional information from Westinghouse and visited the facility on January 18, 2019 to observe the processes and control equipment listed on the operating permit.

During the site visit, questions arose as to whether various devices described in the permit were installed to control radiological emissions for purposes of Nuclear Regulatory Commission (NRC) licensing/compliance or for the purpose of controlling traditional air emissions regulated by USEPA/DHEC. With respect to this question, DHEC requested Westinghouse to provide additional information on the control equipment. Specifically, DHEC requested Westinghouse to provide information on the inherency criteria outlined in a USEPA guidance memorandum dated May 25, 2018.

Westinghouse has reviewed the specific functions of the control equipment as well as the internal operating procedures the facility must follow to maintain compliance with its NRC license. A description of the control equipment and relevant information regarding inherency are provided below.

I. Control Equipment – Wet Packed Bed Scrubber – ID No. S-1030

The S-1030 scrubber is a horizontal wet-packed bed scrubber that serves hoods, vessels, cleaning operations, and scrap recovery in the uranium conversion area. Treated air from the scrubber is discharged through HEPA filters to remove any remaining uranic particulates prior to entering the atmosphere. The system ventilates the uranium conversion area equipment for the purpose of employee safety and exposure prevention. Operation of the scrubber is performed in accordance with the facility's Special Nuclear Material license and Integrated Safety Analysis. To meet NRC requirements, Westinghouse would have installed and operated this scrubber if no USEPA/DHEC air quality regulations

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were in place. Per COP-815020, R23, Step 6.6, if the scrubber goes offline, processes in the uranium conversion area must shut down. Captured uranium in the scrubber liquid and HEPA filters is recovered and recycled back into the process.

II. Control Equipment – Scrubber System – ID No. S2A and S2B

The S2A/S2B scrubber system serves the non-ammonia service vessels in both the uranium conversion area and Uranium Recovery/Recycle Services (URRS). Treated air from the scrubber is discharged through HEPA filters to remove any remaining uranic particulates prior to entering the atmosphere. The system ventilates equipment in the uranium conversion area and URRS, removing fluorides and uranium, for the purpose of employee safety and exposure prevention. Operation of the scrubber is performed in accordance with the facility's Special Nuclear Material license and Integrated Safety Analysis. To meet NRC requirements, Westinghouse would have installed and operated this scrubber if no USEPA/DHEC air quality regulations were in place. Per COP-814325, R31, Step 6.1.1, if the scrubber goes offline, processes in the conversion area and URRS must shut down. Captured uranium in the scrubber liquid and HEPA filters is recovered and recycled back into the process.

III. Control Equipment – Scrubber System – ID No. S-1008

The S1008 scrubber system serves ammonia source vessels in the uranium conversion area. The system removes ammonia fumes from the uranium conversion area for the purpose of employee safety and exposure prevention. Treated air from the scrubber is discharged through HEPA filters to remove any remaining uranic particulates prior to entering the atmosphere. Operation of the scrubber is performed in accordance with the facility's Special Nuclear Material license and Integrated Safety Analysis. To meet NRC requirements, Westinghouse would have installed and operated this scrubber if no USEPA/DHEC air quality regulations were in place. Per COP-815413, R26, Section 2.0, if the scrubber goes offline, associated processes in the uranium conversion area must shut down. Captured uranium in the scrubber liquid and HEPA filters is recovered and recycled back into the process.

IV. Control Equipment – Solvent Extraction Scrubber – ID No. S-958

The S-958 solvent extraction scrubber serves nitric acid source vessels in URRS. The system removes acid fumes for the purpose of employee safety and exposure prevention. Treated air from the scrubber is discharged through HEPA filters to remove any remaining uranic particulates prior to entering the atmosphere. Operation of the scrubber is performed in accordance with the facility's Special Nuclear Material license and Integrated Safety Analysis. To meet NRC requirements, Westinghouse would have installed and operated this scrubber if no USEPA/DHEC air quality regulations were in place. Per COP-836036, R13, III, if the scrubber goes offline, associated processes in URRS must shut down. Captured uranium in the scrubber liquid and HEPA filters is recovered and recycled back into the process.

V. Control Equipment – Waterglass Scrubber – ID No. S-1190

The S-1190 scrubber serves the waterglass liquid waste effluent treatment process that recovers residual uranium from various process wastewater streams. The system removes ammonia fumes for the purpose of employee safety and exposure prevention. Operation of the scrubber is performed in accordance with the facility's Special Nuclear Material license and Integrated Safety Analysis. To meet NRC requirements, Westinghouse would have installed and operated this scrubber if no USEPA/DHEC air quality regulations were in place. Per CSE 15-C, R6, if the scrubber goes offline, associated processes in waterglass operation must shut down. Scrubber liquid is reprocessed so that captured uranium and/or ammonia can be recovered.

VI. Control Equipment – Control System for Natural Gas-Fired Incinerator

Westinghouse incinerates various items generated at the plant (hoods, mops, personal protective equipment, gloves, paper, filters, etc.) that contain varying concentrations of unencapsulated uranic material. These items are incinerated onsite so that the uranium can be recovered and recycled into the process. The multi-level incinerator controls consist of quench vessels, wet venturi scrubbers, and packed bed absorber columns followed by HEPA filters to remove any remaining uranic particulates prior to entering the atmosphere.

Operation of the incinerator and its control system is performed in accordance with the facility's Special Nuclear Material license and Integrated Safety Analysis. To meet NRC requirements, Westinghouse would have installed and operated this control system if no USEPA/DHEC air quality regulations were in place. Per COP-830210, R46, Step 5.1, incinerator operations cannot commence if the control equipment is not operating. Captured uranium from the incinerator ash, scrubber liquid, and HEPA filters is recovered and recycled back into the process.

VII. Control Equipment – Plating Room Scrubber – S-4025

The S-4025 scrubber serves the plating room. Plating room operations do not contain radiological material and are not a regulated activity covered by the facility's Special Nuclear Material license. The plating room scrubber was installed to control acid, alkaline, and metallic emissions regulated by USEPA/DHEC.

Based on the information provided above, Westinghouse believes that all the control equipment except for the Plating Room Scrubber S-4025 is inherent to the processes.

Respectfully,

Diana P. Joyner
Principal Environmental Engineer
Columbia Fuel Fabrication Facility
Westinghouse Electric Company
803.497.7062 (m)

cc: A. Goode, SCDHEC Permit Writer, Sandhills Section
N. Parr, Environmental Engineering Manager
C. Logsdon, Principal Environmental Engineer
V. Kelmeckis, Corporate Environmental Manager
J. Speer, Systems Engineering Manager
A. Harripaul, Principal Manufacturing Engineer
ENOVIA Records

Report on Engineering Evaluation Testing (CleanAir Engineering)

Due to length (943 pages) this document is available by FTP download, contact jwm@gel.com for download link.

Equipment ID Descriptions (May 30, 2019 minor revision)

Westinghouse Electric Equipment ID Descriptions, Rev 1
Revised May 30th, 2019

S-1008: The main function of the S-1008 scrubber is to ventilate ammonia source vessels in the conversion area and remove ammonia from the effluent air stream prior to discharge from the plant. It consists of two sub-systems – the S-1008 scrubber system and the pH adjustment system. The scrubber system removes the ammonia from the air stream and captures it in the liquid phase, then the pH adjustment system adjusts the liquid pH to a range suitable for discharge to collection tanks. Off gas is pulled through various sized duct work, enters the scrubber and is contacted via spray nozzles with nitric acid solution while passing through the packing material – this neutralizes the ammonia. The effluent air passes through a demister, is heated to vaporize any entrained liquid and is then discharged into two 18" ducts. The air passes through the ducts to pre-filters and HEPA filters before discharging to the atmosphere.

S-1030: The S-1030 ventilates and scrubs off gas from process vessels in the conversion area that involve water, fluoride, uranium compounds, nitric acid and nitrous oxide emissions (from the reaction of uranium dioxide and nitric acid). Off gas is pulled from various sized ductwork prior to entering the scrubber transition. The airstream is contacted with circulating liquid from the system sump tanks while passing through scrubber vessel packed media. The effluent air passes through chevron baffles, a demister pad and an outlet transition, and is then heated to vaporize any leftover entrained liquid. The air effluent is filtered through prefilters and HEPA filters prior to discharge to atmosphere. Continuous "bleed and feed" occurs by adding process water to sump tanks and discharging solution to other holding tanks, which improves scrubbing efficiency. The S-1030 sump level is maintained automatically. The bag filters in the liquid recirculation loop collect solids entrained from the process effluent or resulting from precipitation of salts from acid/base reactions. The scrubber inlet is inspected weekly.

2A, 2B: The main function of the S-2A/2B scrubber system is to ventilate the non-ammonia service vessels in the conversion and URRS areas and remove acidic vapor from the effluent air streams prior to discharge from the plant. The ventilation gas stream is pulled downward through one of two Venturi scrubbers, S-2A or S-2B, in parallel. The Venturi scrubber is a section of vertical ductwork consisting of three sections: a "converging" section, a "throat" section, and a "diverging" section. The inlet gas stream enters the converging section (upper conical section), and as the diameter tapers to the more narrow throat section below (cross-sectional area decreases), the velocity of the gas stream increases significantly. Scrubbing water (re-circulated water with process water makeup), is injected in the converging section. The increase in gas stream velocity in the throat section results in atomization of the scrubbing water (formation of tiny droplets), thus enhancing the scrubbing action on vapors and entrained particulate within the throat. The subsequent decrease in gas stream velocity in the diverging section below the throat (lower conical section which tapers to a larger diameter than the throat) results in the formation of larger water droplets, which trap the scrubbed vapors and particulate. The gas/liquid stream flows into a vertical cyclone separator vessel driven by a fan. Centrifugal forces cause a large fraction of the liquid droplets (which trap the scrubbed vapors and particulates) entrained in the rotating gas stream to collect on the inner wall of the vessel and flow down toward the bottom of the vessel. The liquid flows through discharge piping on the bottom of the vessel and into the sump (slab) tank. The gas exhausts through a duct on top of the separator

vessel. After the scrubber, the effluent air passes through a heater to vaporize any entrained liquid, prefilters and HEPA filters before discharging to the atmosphere.

S-1190: The S-1190 scrubber removes ammonia from vents of the ammonia-bearing processes in the waste treatment area. The ammonia vapor stream enters the scrubber and is contacted via spray nozzles with a nitric acid solution while passing through packing material – this neutralizes the ammonia. The effluent air stream is then discharged to the atmosphere. A description of these processes follows. The Waterglass process removes uranium from the ammoniated waste stream from Conversion. The Ammonia Distillation process (Still 1 and Still 2) concentrates this ammonia to sufficient concentration (23.5% to 25.0%) for recycle and reuse by the Conversion area. The Storage process is where this recycled ammonia is stored and sampled, prior to transfer to Conversion. The Warm Caustic
process concentrates the uranium in the filter cake generated in the Waterglass process for recovery and recycle of the uranium.

S-958: This scrubber primarily serves the dissolver channels, where uranium-bearing powders are contacted with nitric acid. The process releases nitric oxides as well as nitric acid vapor. Other inputs to the scrubber are the wet trash collection scales (potential source of ammonia or nitric acid vapors), ultrasonic cleaning (nitric acid vapor), the Blue-M ovens (nitric acid, ammonia, possibly fluorides), and the pump rebuild shop (minor source, whatever liquids may be present on equipment in the shop). This scrubber pulls vapors through two horizontal, packed chambers that are continuously sprayed with water. The scrubber liquid is bled off slowly (10-20 gph), and replenished by city water.

Calciner: Calcination is the final of three chemical changes in the ammonium diuranate (ADU) conversion of uranium hexafluoride (UF6) to uranium dioxide (UO2). Calcination is a high-temperature heat treatment process within a specific atmosphere to bring about thermal decomposition. A relatively dry ADU powder enters the calciner tube through a feed screw. It is contacted with a countercurrent flow of steam and hydrogen to strip fluorides and reduce oxygen, producing the final chemical product UO2. The calciner tube is housed inside a combustion chamber, where natural gas and forced air combust to generate the high-temperatures needed for calcination. This combustion chamber is sealed from the calciner tube. The combustion chamber off-gases to the atmosphere through a chimney using similar principles to a home fireplace. The calciner tube off-gases to a process scrubber that removes solids, cools the gas and forces effluent air through the ventilation to the S-1030 scrubber (described above).

Incinerator Emissions Control: This system essentially contains three components: Quench, venturi scrubber, and absorber column. The quench columns contact the hot (~1800 °F) gases coming from the incinerator with water to cool it down. The venturi scrubbers have
pinch valves to control differential pressure, and scrub particulates. The absorber columns are packed with tellerettes, and continuously sprayed to dissolve any acidic gases. The scrubber system is continuously recirculated, and is fed with sodium hydroxide to maintain a
pH of ~10-12. This system is also bled off (2.5 gpm normally) and replenished by city water.