RACT Evaluation Report – Hexcel Corporation

UTAH $PM_{2.5}$ SIP RACT

Salt Lake City Nonattainment Area

Utah Division of Air Quality

Major New Source Review Section

October 1, 2014

2.2.T Hercules Aerospace Company - Plant #3 - Graphite Fiber Production

The buildings listed below have been evaluated and determined to have sufficient potential PM_{10} emissions emitted from the buildings, building vents or stacks to require regulation.

Building - 2344 - Graphite fiber production, Lines #1, #2, & #3

Building - 2436 - Graphite fiber production, Lines #4 & #5

Building - 2440 - 3D Carbon-carbon structures

Building - 2478 - Solvent coating and resin prep and handling

Building - 2479 - Graphite fiber production, Lines #6 & #7

Building - 8162 - R & D facility with an incinerator

General Conditions for Plant #3,

The following regulations shall apply to any point or fugitive source at Plant #3:

1. Visible emissions from any point or fugitive emission source associated with the installation or control facilities shall not exceed 10% opacity. Opacity observations of emissions from stationary sources shall be conducted in accordance with 40 CFR 60, Appendix A, Method 9.

2. All plant roads and parking lots shall be paved, with the exception of some power line maintenance roads, and shall be cleaned by a street vacuum equipped with a baghouse or by water flooding as necessary to minimize fugitive dust.

3. The following consumption/production limits shall not be exceeded without prior approval in accordance with Section 3.1, UACR:

   A. 175 million scf of natural gas per year;

   B. 10.8 million lb of carbon fibers from the fiberlines per year.

   Natural gas consumption shall be determined by gas billing records for the plant and graphite products production shall be determined by plant production records.

4. Hercules Plant #3 shall use natural gas as primary fuel in all fuel burning furnaces, ovens, incinerators, and boilers. If any other fuel is to be used, an approval order shall be required in accordance with Section 3.1, UACR.

5. The incinerator exhaust stacks need not be constructed to accommodate testing. However, if the Executive Secretary determines a stack test is necessary, whatever modifications needed to meet 40 CFR 60, Appendix A, Method 1 and to provide OSHA approvable access to the test location shall be retrofitted to the emission point.

6. All emergency generators shall be used only when the normal power sources have failed and created emergency conditions, except for normal maintenance start-up procedures. The total use rate per generator set shall not exceed 65 hours per year unless it is reported under Section 4.7, UACR (unavoidable breakdown).

7. "Allowable emissions" as defined in Section 1.12, UACR, for this source (the entire plant #3) are hereby established at 46.10 tons/yr for PM_{10}, 0.10 ton/yr for SO_2 and 47.8 tons/yr for NO_x

Building - 2344 - Graphite Fiber Production, Lines #1, #2, & #3

1. The installations shall consist of only the following equipment:

   A. Graphite Fiber Lines #1, #2, and #3 with electrically heated oxidation ovens, low temperature carbonization furnaces, high temperature carbonization furnaces, fiber sizing operations, and spooling operations;

   B. Three (3) John Zink or equivalent system, natural gas fired fume incinerators as described in the Material List submitted June 8, 1979, to control emissions from the low temperature carbonization furnaces;

   C. Three (3) standby emergency generators;

      1 @ 250 kw, diesel fueled,
      1 @ 125 kw, diesel fueled and
      1 @ 45 kw, natural gas fueled.

2. The fume incinerators shall be operated and maintained with a minimum temperature of 1400°F. The incinerator temperature shall be monitored with temperature sensing equipment which shall be capable of continuous measurement and readout of the combustion temperature with the readout located such that an inspector/operator can at any time safely read the output. The measurement shall be accurate as specified below. The measurement need not be continuously recorded.

   All instruments shall be calibrated against a primary standard at least once every 180 days. The calibration procedure shall be in accordance with 40 CFR 60, Appendix A, Method 2, paragraph 4.3.

3. The incinerator shall be designed with a minimum residence time of 0.5 sec at maximum flow rate.

4. All effluent stack/vents shall have wire mesh filters to control broken carbon filaments, except those stacks vented to the fume incinerators, high temperature furnace outlet stacks on Fiberlines #2 & #3, end chamber fans on the oxidation ovens and surface treatment stacks.

Building - 2436 - Graphite Fiber Production, Lines #4 & #5

1. The installations shall consist of only the following equipment:

   A. Graphite fiber line #4 with electrically heated oxidation ovens, low temperature carbonization furnace, and high temperature carbonization furnace. The low temperature carbonization furnace emissions shall be controlled by a fume incinerator. The high temperature carbonization furnace shall be retrofitted with a burner box at the furnace entrance equipped with pilot lights to insure that combustion takes place.

   B. Graphite fiber line #5 with natural gas fired oxidation ovens, electrically heated-low temperature carbonization furnace, and high temperature carbonization furnace. The low temperature carbonization furnace emissions shall be controlled by a fume incinerator. The high temperature carbonization furnace shall be retrofitted with a burner box at the furnace entrance equipped with pilot lights to insure that combustion takes place.

   C. Two (2) John Zink, natural gas fired fume incinerators as described in the notice of intent dated November 19, 1980.

   D. One 6.3 MMBTU/Hr natural gas fired standby boiler.

   E. Two Diesel fired emergency generators as follows:

      1. 1 - rated at 180 kw;

      2. 1 - rated at 200 kw.

2. The fume incinerators shall be operated and maintained with a minimum temperature of 1400°F. The incinerator temperature shall be monitored with temperature sensing equipment which shall be capable of continuous measurement and readout of the combustion temperature with the readout located such that an inspector/operator can at any time safely read the output. The measurement shall be accurate as specified below. The measurement need not be continuously recorded.

   All instruments shall be calibrated against a primary standard at least once every 180 days. The calibration procedure shall be in accordance with 40 CFR 60, Appendix A, Method 2, paragraph 4.3.

3. The incinerator shall be designed with a minimum residence time of 0.5 seconds at maximum flow rate.

4. All effluent stack/vents for process emissions shall have wire mesh filters to control broken carbon filaments, except those stacks vented to the fume incinerators.

Building - 2440 - 3D Carbon-Carbon Structures

1. The approved installations shall consist of only the following equipment:

   A. Weaving machines (6);

   B. Exhaust fan with fiber collection system;

   C. Impregnation autoclave;

   D. Carbonization autoclave;

   E. CVD/graphitization furnace;

   F. Lab with fume hood (mini-claves);

   G. Emergency generator, 100 kw - natural gas fired;

   H. Blue M oven (R&D equipment;

   I. Pitch melter and controls;

   J. Incinerator, 1 MMBTU/Hr rate;

   K. Block lacer (1);

   L. Block weaver (1);

   M. Shop area;

   N Fiber collection system (recirculated - no outside exhaust);

   O. Lab area with Pycovac oven;

   P. HiPIC autoclave system;

   Q. Sanding area with fiber collection system.

2. The incinerator (1.J) for the destruction of polynuclear aeromatics and other hydrocarbon vapors exhausted from the facility shall be installed, maintained, and operated in accordance with the notice of intent dated November 17, 1988, and February 17, 1989. The incinerator shall receive the effluent from the impregnation autoclave, the carbonization autoclave and the CVD/graphitization furnace.

3. The weaving machines ventilation exhausts shall be equipped with particulate filters which have a capture efficiency of 95% for .5 μm particles.

4. The following production limits shall not be exceeded without prior approval in accordance with Section 3.1, UACR:

   A. 70 pitch impregnation processes per year;

   B. 50 carbonization processes per year;

   C. 35 graphitization processes per year;

   D. 18 CVD processes per year.

   The operations log shall record the amounts of special resins, coal tar pitch, and furfural used in these different processes.

5. All incidences of "vessel rupture" during operations of the HiPIC autoclave shall be recorded in the operations log.

6. The fume incinerator shall be operated and maintained with a minimum temperature of 1500°F. The incinerator temperature shall be monitored with temperature sensing equipment which shall be capable of continuous measurement and readout of the combustion temperature with the readout located such that an inspector/operator can at any time safely read the output. The measurement shall be accurate as specified below. The measurement need not be continuously recorded.

   All instruments shall be calibrated against a primary standard at least once every 180 days. The calibration procedure shall be in accordance with 40 CFR 60, Appendix A, Method 2, paragraph 4.3.

7. The incinerator shall be designed with a minimum effective temperature residence time of 0.5 second at maximum flow rate.

8. All effluent stack/vents for process emissions shall have wire mesh filters to control broken carbon filaments, where applicable, except those stacks vented to the fume incinerators.

Building - 2478 - Solvent Coating And Resin Prep And Handling

1. The installations for the solvent coater shall consist of only the following equipment:

   A. MEK fume incinerator;

   B. 300 gallon mixer;

   C. 1 - 300 kw diesel fueled generator set.

2. The MEK fume incinerator shall be operated and maintained within a temperature range of 1450°F to 1800°F. The incinerator temperature shall be monitored with temperature sensing equipment which shall be capable of continuous measurement and readout of the combustion temperature with the readout located such that an inspector/operator can at any time safely read the output. The measurement shall be accurate as specified below. The measurement need not be continuously recorded.

   All instruments shall be calibrated against a primary standard at least once every 180 days. The calibration procedure shall be in accordance with 40 CFR 60, Appendix A, Method 2, paragraph 4.3.

   The incinerator shall be designed with a minimum effective temperature residence time of 0.5 second at maximum flow rate.

3. The approved installations/processes for the resin preparation and handling shall consist of the following in accordance with the information submitted in the notice of intent dated December 12, 1985, and the follow up correspondence dated March 21, 1986, and April 11, 1986:

   A. Transfer of powdered curing agents to the hopper shall be done using a Young Conveying System or equivalent system. Equivalency shall be determined by the Executive Secretary. The hopper shall discharge through a feeder into the continuous mixer as a closed system.

   B. Heat sources shall be electrically powered or steam powered from existing plant services. If any other power source is used, a notice of intent shall be filed with the Executive Secretary in accordance with Section 3.1, UACR.

   C. Annual usage rate shall not exceed the following amounts:

      1. Curing agents - 200,000 lb;

      2. Resins - 1,250,000 lb.

4. All effluent stack/vents for process emissions shall have wire mesh filters to control broken carbon filaments, where applicable, except those stacks vented to the fume incinerators.

Building - 2479 - Graphite Fiber Production, Lines #6 & #7

1. The installations in building 2479 for graphite fiber lines #6 shall consist of only the following equipment:

   A. 4 - low temperature natural gas fired oxidation ovens (270°C maximum) with 2 - 2.5 MMBTU/hr burners per oven;

B. 1 - low temperature nitrogen purged carbonization furnace (700°C) with 2 natural gas fired exhaust ports (with pilot lights) that precombusts part of the volatiles prior to the fume incinerator;

C. 1 - John Zink or equivalent fume incinerator that controls emissions from the low temperature carbonization furnaces;

D. 1 - high temperature nitrogen purged carbonization furnace (1450°C) with 2 burner boxes at the furnace entrance equipped with pilot lights to insure that combustion takes place;

E. Finishing area shall have water based wash baths:

1 - Ammonium-bicarbonate;

2 - Water wash baths.

F. The finishing area having a steam heated drum for aqueous based sizing drying. A solvent based sizing process shall use methylene chloride and 1,1,1 trichloroethane as solvents. The use of other solvents shall require an notice of intent and approval in accordance with Section 3.1, UACR.

G. Dry type wire mesh air filter devices shall be installed on all hoods and ventilation stacks to control broken carbon filaments except those vented to an incinerator.

H. The following emergency diesel fired electrical generator shall be installed:

One 250 kw Generating capacity.

2. The installations in building 2479 for graphite fiber line #7 shall consist of only the following equipment:

A. Four low temperature oxidation ovens (270°C maximum). The ovens shall be indirectly heated with 2 - 2.5 MMBTU/hr natural gas fired burners per oven;

B. One electrically heated low temperature nitrogen purged tar removal carbonization furnace (750°C) with 1 natural gas fired port (with pilot light) that ensures partial precombustion of the volatiles prior to exhausting into a fume incinerator;

C. One electrically heated low temperature nitrogen purged carbonization furnace (900°C) with 2 natural gas fired exhaust ports (with pilot light) that precombusts part of the volatiles prior to the fume incinerator;

D. One McGill Inc, or equivalent fume incinerator that controls emissions from both the tar removal and low temperature carbonization furnaces;

E. One electrically heated high temperature nitrogen purged carbonization furnace (1450°C) and a burner box (a pilot light shall be included in the burner box to insure that combustion takes place);

F. Three water based wash baths:

1. One ammonium-bicarbonate;

2. Two water wash baths.

G. Finishing area shall have a steam heated drum for aqueous based sizing drying. A solvent based sizing drying tower may be installed for ease of construction purposes. However, the solvent based sizing shall not be used on line #7 until a control device has been approved and installed in accordance with Section 3.1, UACR.

H. All effluent stack/vents for process emissions shall have wire mesh filters to control broken carbon filaments, where applicable, except those stacks vented to the fume incinerators.

I. The following emergency diesel fired electrical generators shall be installed:

1. 1 @ 100 kw generating capacity;

2. 1 @ 400 kw generating capacity.

The above Equipment shall be installed according to the information submitted to the Executive Secretary in the notice of intent dated May 16, 1989, and subsequent information submitted to the date of this AO.

3. Emissions from line #6 and #7 low temperature carbonization furnaces shall be controlled by a John Zink, McGill, Inc. or equivalent fume incinerator. The following operating parameters for the incinerators shall be maintained within the indicated ranges:

A. Temperature - 1400°F minimum to 1700°F maximum for both incinerators;

B. Percent excess O_2 - 6 minimum for line #7 incinerator.

4. The incinerators required in conditions 1.C and 1.D above shall be monitored with equipment, where applicable, located such that an inspector/operator may at any time safely read the output. The measurements shall be accurate to within the following ranges:

   A. Plus or minus 25°F;

   B. Plus or minus 5% of full scale (0 to 10% scale).

   The incinerator monitors shall be capable of continuous measurement and readout of the monitor values shall be located such that an inspector/operator can at any time safely read the output. The measurement need not be continuously recorded. All monitors shall be calibrated against a primary standard at least once every 180 days. The calibration procedure for the temperature monitor shall be in accordance with 40 CFR 60, Appendix A, Method 2, paragraph 4.3. The calibration procedure for the excess air monitor shall be in accordance with 40 CFR 60, Appendix A, Method 3.

5. The incinerator shall be designed with a minimum effective temperature residence time of 1.0 second at maximum temperature and flow rate.

Building - 8162 R & D Facility For New Processes

1. The installations in building 8162 for research and development of new products and processes shall consist of the following equipment:

   A. A pilot size fiber line with various ovens, furnaces, and process as necessary for research and development purposes;

   B. John Zink, McGill, or equivalent incinerator system rated at 750,000 BTU/hr with a 3/1 turndown.

2. The emissions from each high temperature nitrogen purged carbonization furnace shall have a burner box (a pilot light shall be included in the burner box to insure that combustion takes place).

4. Emissions from the low temperature carbonization furnaces shall be controlled by a John Zink, McGill, Inc., or equivalent fume incinerators. The following operating parameters for the incinerator shall be maintained within the indicated ranges:

   A. Temperature - 1400°F minimum to 1700°F maximum;

   B. Percent of excess O_2 - 6% minimum.

5. The incinerators shall be monitored with equipment located such that an inspector/operator may at any time safely read the output. The measurements shall be accurate to within the following ranges:

   A. Plus or minus 25°F;

   B. Plus or minus 5% of full scale (0 to 10% scale).

   The incinerator monitors shall be capable of continuous measurement and readout of the monitor values located such that an inspector/operator can at any time safely read the output. The measurement need not be continuously recorded. All monitors shall be calibrated against a primary standard at least once every 180 days. The calibration procedure for the temperature monitor shall be in accordance with 40 CFR 60, Appendix A, Method 2, paragraph 4.3. The calibration procedure for the excess air monitor shall be in accordance with 40 CFR 60, Appendix A, Method 3.

6. The incinerator shall be designed with a minimum residence time of 1.0 second at maximum temperature and flow rate.

7. The facility shall be used for development of new fiber products and new process development only and not as a production facility.

State of Utah

GARY R. HERBERT
Governor

GREG BELL
Lieutenant Governor

Department of
Environmental Quality

Amanda Smith
Executive Director

DIVISION OF AIR QUALITY
Bryce C. Bird
Director

MEMORANDUM

To File

From: Camron Harry, Engineer, New Source Review Section, UDAQ

Date: September 17, 2013

Subject: Hexcel Corporation $PM_{2.5}$ SIP Limit

The Hexcel Corporation (Hexcel) RACT Evaluation Report for Utah's $PM_{2.5}$ SIP concluded that the facility currently meets the requirements of RACT. However, the US EPA is requiring SIP limits be imposed on all SIP sources regardless if they meet RACT or not. The following is the rational for the limits being proposed on Hexcel Corporation.

The only pollutants that Hexcel is major for with regards to primary and precursor $PM_{2.5}$ pollutants, is NOx and VOC. Primarily the NOx results from the combustion of natural gas and the VOCs directly from the production of the carbon fiber. Hexcel has completed a build out analysis through 2019 and has determined that the facility can accommodate two additional fiber lines (Fiber Lines 15 and 16) beyond what is currently permitted which has been included in the SIP modeling.

In preparation of an annual limit, Hexcel completed an analysis of historical daily production peaking factors. Between 2006 and 2012, on average, the peak daily production was approximately 42%. However, Hexcel believes this is too conservative for the purposes of the SIP and believes a 30% peak day factor is more appropriate. UDAQ has incorporated this 30% daily peaking factor into both the NOx and VOC daily SIP limitations.

Hexcel estimates that the two additional fiber lines will add an additional 4,005,442 pounds of carbon fiber produced per year above the existing AO limit of 13,100,000 pounds of carbon fiber produced per year. Therefore, Hexcel estimates that the facility will be producing approximately 17,105,442 pounds of carbon fiber per year, or on average 46,864 pounds per day. With an estimated daily peaking factor of 30%, UDAQ is proposing a limit of 0.061 million pounds of carbon fiber produced per day.

Hexcel also estimates that the two additional fiber lines will add an additional 419 million scf of natural gas consumption per year above the existing AO limit of 820.78 million scf of natural gas consumption per year. Therefore, Hexcel estimates that the facility will be consuming approximately 1,240 million scf of natural gas per year, or on average 3.40 million scf of natural gas per day. With an estimated daily peaking factor of 30%, UDAQ is proposing a limit of 4.42 million scf of natural gas consumed per day.

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SIP Limits

1 message

Storrud, Shannon J. <Shannon.Storrud@hexcel.com> Tue, Sep 17, 2013 at 8:04 AM
To: "Camron Harry (caharry@utah.gov)" <caharry@utah.gov>
Cc: "Vineet Masuraha (VMasuraha@trinityconsultants.com)" <VMasuraha@trinityconsultants.com>, "Miriam Hacker (MHacker@TrinityConsultants.com)" <MHacker@trinityconsultants.com>

Good Morning Camron,

Firstly, I wanted to thank you for your help and guidance in developing the SIP limits.

Secondly, Hexcel is fine with your proposed SIP daily limits of natural gas at 5.69 Million scf/day and fiber production at 0.122 Million lb./day. (just want to make sure the numbers are in "millions" when finalized in the SIP).

As justification for our requested 30% peak variability, we have reviewed fiber line variability in our daily/monthly and annual PAN usage rates and below is a brief summary of 2006-2012 production records that were submitted to UDAQ as supporting documentation for Hexcel's emission inventories. The tables below show the average and maximum variability in daily/annual production records. As you will note, our maximum variability is >40% but for conservative estimates, we requested 30% variability for the PM2.5 SIP, which is more in line with our actual average variability in daily production vs. annual average production. If further clarification is needed, we can explain and share the supporting documentation for these calculations.

Again, thank you for your help and please let me know if you have any questions.

Shannon

FIBER LINE PRODUCTION VARIABILITY TABLES

(2006-2012 Data)

	Average	**Maximum**
Line 2	45.52%	62.68%
Line 3	22.64%	52.51%

Line 4	22.52%	45.90%
Line 5	18.38%	22.52%
Line 6	23.05%	31.28%
Line 7	16.27%	20.55%
Line 8	28.09%	42.99%
Line 10	54.73%	81.49%
Average	**28.90%**	**44.99%**

All Lines	**Average**	**Maximum**
2006	20.98%	34.60%
2007	31.17%	62.68%
2008	29.68%	39.29%
2009	35.95%	45.90%
2010	30.49%	52.51%
2011	19.11%	25.21%
2012	16.92%	31.96%
Average	**26.33%**	**41.74%**

Natural Gas Consumption Limit: through Line 16

Existing: Line 2-7, 8-14, Pilot, & Matrix	820.78	MMScf
Matrix (future)	60.76	MMScf
Line 15 (future)	179.14	MMScf
Line 16 (future)	179.14	MMScf
Subtotal	419.04	MMScf
Total Annual	1,240	MMscf
Daily	3.40	MMscf/day
Peaking Factor (historical daily peak)	30%	
Daily Peak	4.42	MMscf/day

Fiber Production Limit: through Line 16

Existing: Lines 2-7, 8-14, Pilot, Matrix	13,100,000	pounds carbon fiber
Line 15 (future)	2,000,000	pounds carbon fiber
Line 16 (future	2,000,000	pounds carbon fiber
Pilot (future)	5,442	pounds carbon fiber
Subtotal	4,005,442	pounds carbon fiber
Total Annual	17,105,442	pounds of Carbon Fibers produced
Daily	46,864	pounds/day
Peaking Factor (historical daily peak)	30%	
Daily Peak	60,923	pounds/day
Daily Peak	0.061	MM lb/day

Hexcel Corporation - RACT PTE estimates

	PM10	PM2.5	SO2	NOx	VOC
Line #2	1.76	1.14	0.00	0.20	0.05
Line #3	8.38	5.00	1.70	14.94	4.01
Line #4	6.49	3.90	1.05	9.44	3.53
Line #5	4.60	2.55	1.06	9.63	2.93
Line #6	3.27	2.13	1.09	9.93	4.00
Line #7	5.09	2.70	1.71	15.59	7.96
	29.59	17.42	6.59	59.73	22.48
Line #8	16.93	10.63	4.14	7.89	31.47
Line #10	16.93	10.63	4.14	7.89	31.47
Line #11	20.80	13.06	4.14	9.69	38.67
Line #12	20.80	13.06	4.15	9.69	38.67
Line #13	0.46	0.26	5.13	11.36	1.89
Line #14	0.46	0.26	5.13	11.36	1.89
Pilot Plant	0.46	0.24	0.12	0.85	0.20
Matrix Operation	0.45	0.45	0.04	5.97	0.33
Line #15	0.46	0.26	5.13	16.32	1.13
Line #16	0.46	0.26	5.13	16.32	1.13
Line #17	0.46	0.26	5.13	16.32	1.13
Line #18	0.46	0.26	5.13	16.32	1.13
Increased Matrix					10.00
	108.72	67.05	54.11	189.71	181.59

SPREADSHEET: POLYACRYLONITRILE (PAN) CONSUMPTION

	PAN	Fiber	Run Hrs.
LINE 2	49,475 LBS	27211	8760
LINE 3	1,731,602 LBS	952381	8760
LINE 4	1,071,944 LBS	589569	8760
LINE 5	1,071,944 LBS	589569	8760
LINE 6	1,104,733 LBS	607603	8760
LINE 7	1,733,580 LBS	953469	8760
LINE 8	2,473,716 LBS	1360544	8760
LINE 10	2,473,716 LBS	1360544	8760
LINE 11	3,040,000 LBS	1672000	8760
LINE 12	3,040,000 LBS	1672000	8760
LINE 13	3,040,000 LBS	1672000	8760
LINE 14	3,040,000 LBS	1672000	8760
LINE 15	3,636,364 LBS	2000000	7884
LINE 16	3,636,364 LBS	2000000	7884
LINE 17	3,636,364 LBS	2000000	7884
LINE 18	3,636,364 LBS	2000000	7884
Pilot	12000.0 LBS	5442	
Total	38,428,164	21,134,332.18	

Natural Gas Balance (MMCF)

Lines 2-7	96.15	Includes Building HVAC
Line 8	121.86	Includes Building HVAC
Line 10	121.86	Includes Building HVAC
Line 11	149.76	Includes Building HVAC
Line 12	149.76	Includes Building HVAC
Line 13	149.76	Includes Building HVAC
Line 14	149.76	Includes Building HVAC
Line 15	179.14	Includes Building HVAC
Line 16	179.14	Includes Building HVAC
Line 17	179.14	Includes Building HVAC
Line 18	179.14	Includes Building HVAC
Total Fibers Process	**1655.48**	**Includes Building HVAC**
Subtotal Matrix Process	119.32	Includes Building HVAC
Subtotal Matrix Process	2.20	Includes Building HVAC
50% Increase with Buildout for Matrix Process	60.76	Includes Building HVAC
Total Matrix	**182.29**	**Includes Building HVAC**
Subtotal All Plant Warehouses, Offices, Labs, etc. H	**148.52**	**Includes Building HVAC**
Total Plant	**1986.29**	**Includes Building HVAC**
Permit Limit - DAQE- AN113860021-13	**820.78**	
Increase Request	**777.32**	

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VIA E-MAIL: caharry@utah.gov

September 11, 2013

Ms. Camron Harry
Utah Department of Air Quality
Division of Air Quality
P.O. Box 144820
Salt Lake City, Utah 84114-482

RE: Proposed SIP Limits and Basis for the Hexcel's West Valley City Plant

Dear Ms. Harry:

Thank you for your email dated September 9 2013, summarizing the items required for the Hexcel West Valley City Plant to be incorporated into State Implementation Plan (SIP) for particulate matter less than 2.5 micron ($PM_{2.5}$). This letter provides the information requested.

SOURCE WIDE EMISSION CALCULATIONS

Facility-wide annual nitrogen oxide (NO_X) and volatile organic compound (VOC) include emissions from following sources:

- Process emissions from currently permitted fiberlines (pilot, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, and 14) and upcoming new fiberlines (15, 16, 17, and 18); and pre-preg manufacturing (matrix) operations
- Natural gas combustion emissions from manufacturing and support operations
- Emissions from various solvent receiving, storage, transfer, and usage operations
- Emissions from various diesel-fired emergency generators

Facility-wide carbon fiber production is currently permitted for 13,100,000 pounds per year. With the addition of upcoming fiberlines 15-18, production will increase to 21,100,000 pounds per year (61% increase). Polyacrylonitrile (PAN) is converted into carbon fiber as a part of the manufacturing operations and Hexcel tracks PAN consumption and carbon fiber production for the facility. In addition to the carbon fiber manufacturing, the facility also operates composite manufacturing operations (pre-preg/matrix). With the increase in carbon fiber production, Hexcel also anticipates an increase in pre-preg/matrix coating production by approximately 50%.

Daily NO_x and VOC emissions are calculated using following methodology:

- Annual emissions discussed above are converted into average daily emissions using the expected operating days per year for the fiberlines (260 days per year using 5 days per week and 52 weeks per year, or hours per year or 71% uptime)
- Average daily emissions are then multiplied with a factor to calculate a maximum daily emissions to account for the maximum daily production variability from the average daily production.

Source wide emission calculations, supporting emission factors, and proposed daily compliance tracking methods are summarized in Attachment 1. Corresponding $PM_{2.5}$ SIP RACT calculations for the Hexcel Facility are also being updated to ensure consistency with the provided calculations and will be provided to UDAQ upon completion.

SITE-WIDE EMISSION FACTORS

As shown in the Appendix 1, following factors are utilized to calculate site-wide NO_x and VOC emissions:

- Source-specific emission factor for older fiberlines 2, 3, 4, 5, 6, and 7
- Source-specific emission factors for newer fiberlines 8, 10, 11, 12, 13, 14, 15, 16, 17, and 18
- U.S. EPA's AP-42 emission factors for natural gas combustion (please note that the fiberlines 13-18 utilize low NOx burners) from Tables 1.4-1 and 1.4-2
- VOC content from the Material Safety Datasheets for solvent usage
- U.S. EPA's TANKS program for solvent storage
- U.S. EPA emission factors and applicable Tier engine requirements for diesel combustion
- Miscellaneous source-specific emission factors are documented in the Appendix 1

VOC emissions from the fiberlines 13-18 are controlled by Regenerative Thermal Oxidizer (RTO) and baghouse. Therefore, process emissions from these fiberlines are calculated assuming 98% control efficiency for VOC, based on manufacturer guarantees.

In cases where emission factors are unavailable, historical engineering estimates have been made for some smaller sources, such as the pilot plant. These are also incorporated into the overall emission estimates.

For Matrix Solvent Coating operations emissions are controlled through the three Tower incinerators. A total facility wide PTE of 20 tpy of VOC has been historically estimated for these operations and is used in these calculations. As stated previously, the anticipated build out of the facility is predicated to require a 50% increase in these operations.

Due to inherent variability in the fiberline process, process throughput, and stack test data, emission rates from each fiberline vary. Hexcel's manufacturing operations are very unique and there are no publicly available emission factors. Therefore, Hexcel, as well as UDAQ, have relied upon the on-site stack testing data as the approved method of emission calculations for all previous NOIs, annual emission inventories, compliance, and peak ozone season emission inventories.

PROJECTED INCREASE IN NO_X FOR BUILD-OUT FIBERLINES

As a part of this review, Hexcel discovered that the natural gas emissions from currently permitted fiberlines were underestimated by a factor of 2. Therefore, for the new lines 15-18, Hexcel had corrected this discrepancy, which results in slightly higher NO_x and VOC emissions than the recently permitted natural gas emissions from the fiberlines 11-14. Additionally, newer lines 15-18 are able to produce approximately 20% higher than the recently permitted fiberlines 11-14. Therefore, NO_x and VOC emissions from the new fiberlines 15-18 are slightly higher than the emissions from the recently permitted fiberlines.

We hope that the provided data is sufficient to meet UDAQ's needs. If you have any questions or comments about the information presented in this letter, please do not hesitate to call me at (949) 567-9880.

Sincerely,

TRINITY CONSULTANTS

Vineet Masuraha
Principal Consultant

Attachments

cc: Mr. Shannon Storrud, Hexcel

ATTACHMENT 1

Summary of Plant Wide Facility Emissions and Proposed SIP Emission Limits

	NOX		
	tpy	lb/day	tons/day
PTE Emissions - DAQE - AN0113860021-13[1]	168.65	1686.5	0.8
Est. Increase Per New Line with the same PAN requirements[2,3]	16.32	97.9	0.05
Est. Increase for 4 new Lines with the same PAN requirements	65.29	391.4	0.2
Total Estimated Maximum NOX Increase Requirements	**65.29**	**391.41**	**0.20**
Total Estimated Maximum NOX Limit Requirements	**233.9**	**2077.9**	**1.04**

	VOC		
	tpy	lb/day	tons/day
PTE Emissions - DAQE - AN0113860021-13[1]	159.48	1594.8	0.8
Est. Increase Per New Line with the same PAN requirements[2,3]	1.13	6.7	0.003
Est. Increase for 4 new Lines with the same PAN requirements	4.54	26.8	0.01
PTE VOC from Solvent Coating[4]	20.00	109.6	0.05
50% increase for Matrix Operations[5]	10.00	54.79	0.03
Total Estimated Maximum VOC Increase Requirements	**14.54**	**81.55**	**0.04**
Total Estimated Maximum VOC Limit Requirements	**174.0**	**1676.3**	**0.84**

1 - Hourly emissions are based on operation 260 days of the year, with a 30% safety factor to account for peak days.
2 - Annual calculation includes Fiberline process emissions, associated natural gas combustion emissions, and associated emergency generators
3 - Hourly emissions do not include intermittent emission sources, such as emergency generators.
4 - PTE from Solvent Coating (Matrix) operations is estimated at 20 tpy.
5 - A 50% increase in Matrix operations corresponds to the increase in PAN consumption for the 4 proposed lines for plant build out (60%).

- Per phone conversation I told them emergency generators should be included (Source Wide limit)
- These numbers should match Rect
- Provided me of data; not a formatted list like I requested
- No information on daily peaking factors —
- No justification for 30% peaking?

	NOx Total (tpy)	VOC Total (tpy)
Fiberline Emission Breakdown		
FL2-7 Process	62.54	25.82
FL8 Process	8.30	21.61
FL10 Process	8.30	21.61
FL11 Process	10.19	26.56
FL12 Process	10.19	26.56
FL13 Process	9.69	0.51
FL14 Process	9.69	0.51
FL8 - Nat Gas	5.75	0.34
FL10 - Nat Gas	5.75	0.34
FL11 - Nat Gas	7.07	0.41
FL12 - Nat Gas	7.07	0.41
FL13 - Nat Gas	3.74	0.41
FL14 - Nat Gas	3.74	0.41
FL15 - 18 Process	11.59	0.61
FL15 - 18 Nat Gas	4.48	0.49
FL15 - 18 Em. Gen.	0.25	0.04
Facility Totals		
Matrix		30
All Generators	9.87	0.81
Pilot	0.97	1.13
HVAC/Towers - Nat Gas	13.27	0.88
FL2-7	62.54	25.82
FL8	14.05	21.94
FL10	14.05	21.94
FL11	17.27	26.97
FL12	17.27	26.97
FL13	13.44	0.92
FL14	13.44	0.92
Facility Total	**176.16**	**158.29**
Proposed Increases		
Matrix		10
FL15	16.32	1.13
FL16	16.32	1.13
FL17	16.32	1.13
FL18	16.32	1.13
Total Proposed Increase	**65.29**	**14.54**

Emission Factors

Fiberline # 4 @ Process rate 1200 ft/hr =

Stack #	NOx lb/Klb PAN	TNHC lb/Klb PAN
400A	0.077865613	0.2083004
400B	0.038339921	0.14229249
401A	0.083399209	0.23478261
401B	0.090118577	0.26758893
404A	0.099604743	0.23083004
404B	0.090513834	0.17944664
407A	0.131225296	0.13913043
407B	0.079051383	0.06561265
409	12.94071146	0
422	4.363636364	0
413	0.225296443	0.48221344
Avg Ovens —	0.086264822	0.18349802

Fiberline # 6 @ Process rate 1500 ft/hr =

Stack #	NOx lb/Klb PAN	TNHC lb/Klb PAN
610	6.995850622	0.01410788
612A	2.093360996	0.00746888
612B	2.107053942	0.03153527

Fiberline # 7 @ Process rate 1500 ft/hr =

Stack #	NOx lb/Klb PAN	TNHC lb/Klb PAN
711	15.63139932	0.01365188
713	3.866894198	0.01467577

Average Incinerators	11.85598713	0.00925325
Average Dragonmouths	4.1436485	0.01789331

The average of the three incinerator tests (409, 610, and 711) were applied to incinerators 308, 409, 509, 610, 711 to account for process rate variability
The average of the three Dragon Mouth incinerator tests (422, 612A + 612B, and 713) applied to Dragon Mouth Incinerators 322, 422, 522, 612, 713 to account for process rate variability.

Emission Factors

Fiberline # 8 Process

Stack #	Stack ID	NOx lb/Klb PAN	TNHC lb/Klb PAN
801	Ox 1 In	0.44905009	0.4594128
802	Ox 1 Out	0.77720207	1.1744387
803	Ox 2 In	0.58376511	0.4870466
804	Ox 2 Out	0.4835924	0.3799655
805	Ox 3 In	0.42141623	0.2210708
806	Ox 3 Out	0.41105354	0.3523316
807	Ox 4 In	0.417962	0.2452504
808	Ox 4 Out	0.42141623	0.2279793
810	LTF In	0.01381693	0.0967185
811	LTF Incinerator (600 C)	0.35578584	0.0414508
812	LTF Out	0.02072539	0.0829016
813	HTF IN (Dragon)	1.95164076	7.3678756
814	HTF Out	0.06908463	0.0725389

Natural Gas Combustion Emission Factors Based on AP-42 Table 1.4-1 and 1.4-2

	NOx	VOC
Fiberlines 2-12, HVAC, Towers	100 lb/MMscf	5.5 lb/MMscf
Fiberlines 13 - 18	50 lb/MMscf	5.5 lb/MMscf

Emission Factors for Generators

	NOx	VOC
All installed prior to 2011	0.031 lb/bhp-l	0.0025 lb/bhp-hr
Installed post 2011	3.5 g/kw-hr	0.5 g/kw-hr

Sizing Operations Emission Factor

0.00107146 Lb xylene/lb Fiber

Fiberline ID	Building	Source ID	Source Description	Emission Calcuation Source	Proposed Daily Tracking
2	2344	203	Incinerator	Manufacture guarantee and AP-42 Factors	Natural Gas Consumption
2	2344	209	HMF Seal Ex. In	Engineering estimation	Fiber Production
2	2344	210	HMF Seal Ex. Out	Engineering estimation	Fiber Production
3	2344	301	Ox.Ov.#1 In.Vest	FL 2-7 oxidation oven average emission factor	Fiber Production
3	2344	302	Ox.Ov.#1 OutVest	FL 2-7 oxidation oven average emission factor	Fiber Production
3	2344	303	Ox.Ov.#2 In.Vest	FL 2-7 oxidation oven average emission factor	Fiber Production
3	2344	304	Ox.Ov.#2 OutVest	FL 2-7 oxidation oven average emission factor	Fiber Production
3	2344	305	Ox.Ov.#3 In.Vest	FL 2-7 oxidation oven average emission factor	Fiber Production
3	2344	306	Ox.Ov.#3 OutVest	FL 2-7 oxidation oven average emission factor	Fiber Production
3	2344	308	Incinerator	FL 2-7 incinerator average emission factor	Fiber Production
3	2344	309	HTF/LTF Seal Ex.	Engineering estimation	Fiber Production
3	2344	310	HTF Seal Ex. Out	FL 2-7 Source 413 - HTF emission factor	Fiber Production
3	2344	313	Ox.Ov.#1 In.Hood	FL 2-7 oxidation oven average emission factor	Fiber Production
3	2344	314	Ox.Ov.#1 OutHood	FL 2-7 oxidation oven average emission factor	Fiber Production
3	2344	315	Ox.Ov.#2 In.Hood	FL 2-7 oxidation oven average emission factor	Fiber Production
3	2344	316	Ox.Ov.#2 OutHood	FL 2-7 oxidation oven average emission factor	Fiber Production
3	2344	317	Ox.Ov.#3 In.Hood	FL 2-7 oxidation oven average emission factor	Fiber Production
3	2344	318	Ox.Ov.#3 OutHood	FL 2-7 oxidation oven average emission factor	Fiber Production
3	2344	322	Burner Box - Dragonmouth	FL 2-7 dragon mouth incinerator average emission factor	Fiber Production
4	2436	400A	Ox.Oven #1 In.A	FL4 source 400A emission factor	Fiber Production
4	2436	400B	Ox.Oven #1 In.B	FL4 source 400B emission factor	Fiber Production
4	2436	401A	Ox.Oven #1 OutA	FL4 source 401A emission factor	Fiber Production
4	2436	401B	Ox.Oven #1 OutB	FL4 source 401B emission factor	Fiber Production
4	2436	402A	Ox.Oven #2 In.A	FL 2-7 oxidation oven average emission factor	Fiber Production
4	2436	402B	Ox.Oven #2 In.B	FL 2-7 oxidation oven average emission factor	Fiber Production
4	2436	403A	Ox.Oven #2 OutA	FL 2-7 oxidation oven average emission factor	Fiber Production
4	2436	403B	Ox.Oven #2 OutB	FL 2-7 oxidation oven average emission factor	Fiber Production
4	2436	404A	Ox.Oven #3 In.A	FL4 source 404A emission factor	Fiber Production
4	2436	404B	Ox.Oven #3 In.B	FL4 source 404B emission factor	Fiber Production
4	2436	405A	Ox.Oven #3 OutA	FL 2-7 oxidation oven average emission factor	Fiber Production
4	2436	405B	Ox.Oven #3 OutB	FL 2-7 oxidation oven average emission factor	Fiber Production
4	2436	406A	Ox.Oven #4 In.A	FL 2-7 oxidation oven average emission factor	Fiber Production
4	2436	406B	Ox.Oven #4 In.B	FL 2-7 oxidation oven average emission factor	Fiber Production
4	2436	407A	Ox.Oven #4 OutA	FL4 source 407A emission factor	Fiber Production
4	2436	407B	Ox.Oven #4 OutB	FL4 source 407B emission factor	Fiber Production
4	2436	409	LTF Incinerator	FL 2-7 incinerator average emission factor	Fiber Production
4	2436	410	LTF Seal Exhaust	Engineering estimation	Fiber Production
4	2436	411	LTF/HTF Seal Ex.	Engineering estimation	Fiber Production
4	2436	412	HTF Seal Exhaust	Engineering estimation	Fiber Production
4	2436	413	HTF Seal Exhaust	FL 2-7 Source 413 - HTF emission factor	Fiber Production
4	2436	422	Burner Box - Dragonmouth	FL 2-7 dragon mouth incinerator average emission factor	Fiber Production
5	2436	501A	Ox.Ov.#1 In.Vest	Engineering estimation	Fiber Production
5	2436	501B	Ox.Ov.#1 In.Hood	Engineering estimation	Fiber Production
5	2436	501C	Ox.Ov.#1 In. Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
5	2436	502A	Ox.Ov.#1 OutVest	Engineering estimation	Fiber Production
5	2436	502B	Ox.Ov.#1-2 Hood	Engineering estimation	Fiber Production
5	2436	502C	Ox.Ov.#1 Out Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
5	2436	503A	Ox.Ov.#2 In.Vest	Engineering estimation	Fiber Production
5	2436	503C	Ox.Ov.#2 In. Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
5	2436	504A	Ox.Ov.#2 OutVest	Engineering estimation	Fiber Production
5	2436	504B	Ox.Ov.#2-3 Hood	Engineering estimation	Fiber Production
5	2436	504C	Ox.Ov.#2 Out Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
5	2436	505A	Ox.Ov.#3 In.Vest	Engineering estimation	Fiber Production
5	2436	505C	Ox.Ov.#3 In. Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
5	2436	506A	Ox.Ov.#3 OutVest	Engineering estimation	Fiber Production
5	2436	506B	Ox.Ov.#3-4 Hood	Engineering estimation	Fiber Production
5	2436	506C	Ox.Ov.#3 Out Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
5	2436	507A	Ox.Ov.#4 In.Vest	Engineering estimation	Fiber Production
5	2436	507C	Ox.Ov.#4 In. Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
5	2436	508A	Ox.Ov.#4 OutVest	Engineering estimation	Fiber Production
5	2436	508B	Ox.Ov.#4 OutHood	Engineering estimation	Fiber Production
5	2436	508C	Ox.Ov.#4 Out Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
5	2436	509	LTF Incinerator	FL 2-7 incinerator average emission factor	Fiber Production
5	2436	510	LTF Seal Exhaust	Engineering estimation	Fiber Production
5	2436	511	HTF Seal Exhaust	Engineering estimation	Fiber Production
5	2436	512	HTF Seal Exhaust	Engineering estimation	Fiber Production
5	2436	522	Dragonmouth	FL 2-7 dragon mouth incinerator average emission factor	Fiber Production

6	2479	601A	Ox. Ov. #1 In.A	Engineering estimation	Fiber Production
6	2479	601B	Ox. Ov. #1 In.B	Engineering estimation	Fiber Production
6	2479	601C	Ox. Ov. #1 Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
6	2479	602A	Ox. Ov. #1 Out.A	Engineering estimation	Fiber Production
6	2479	602B	Ox. Ov. #1 Out.B	Engineering estimation	Fiber Production
6	2479	602C	Ox. Ov. #1 Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
6	2479	603A	Ox. Ov. #2 In.A	Engineering estimation	Fiber Production
6	2479	603B	Ox. Ov. #2 In.B	Engineering estimation	Fiber Production
6	2479	603C	Ox. Ov. #2 Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
6	2479	604A	Ox. Ov. #2 Out.A	Engineering estimation	Fiber Production
6	2479	604B	Ox. Ov. #2 Out.B	Engineering estimation	Fiber Production
6	2479	604C	Ox. Ov. #2 Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
6	2479	605A	Ox. Ov. #3 In.A	Engineering estimation	Fiber Production
6	2479	605B	Ox. Ov. #3 In.B	Engineering estimation	Fiber Production
6	2479	605C	Ox. Ov. #3 Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
6	2479	606A	Ox. Ov. #3 Out.A	Engineering estimation	Fiber Production
6	2479	606B	Ox. Ov. #3 Out.B	Engineering estimation	Fiber Production
6	2479	606C	Ox. Ov. #3 Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
6	2479	607A	Ox. Ov. #4 In.A	Engineering estimation	Fiber Production
6	2479	607B	Ox. Ov. #4 In.B	Engineering estimation	Fiber Production
6	2479	607C	Ox. Ov. #4 Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
6	2479	608A	Ox. Ov. #4 Out.A	Engineering estimation	Fiber Production
6	2479	608B	Ox. Ov. #4 Out.B	Engineering estimation	Fiber Production
6	2479	608C	Ox. Ov. #4 Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
6	2479	609A	LTF Seal In.A	Engineering estimation	Fiber Production
6	2479	609B	LTF Seal In.B	Engineering estimation	Fiber Production
6	2479	610	LTF Incinerator	FL 2-7 incinerator average emission factor	Fiber Production
6	2479	611A	LTF Seal Out.A	Engineering estimation	Fiber Production
6	2479	611B	LTF Seal Out.B	Engineering estimation	Fiber Production
6	2479	612A	HTF Seal In.A	FL 2-7 dragon mouth incinerator average emission factor divided by 2 for two separate emission outlets	Fiber Production
6	2479	612B	HTF Seal In.B	FL 2-7 dragon mouth incinerator average emission factor divided by 2 for two separate emission outlets	Fiber Production
6	2479	613A	HTF Seal Out.A	Engineering estimation	Fiber Production
6	2479	613B	HTF Seal Out.B	Engineering estimation	Fiber Production
7	2479	701A	Ox. Ov. #1 In.A	Engineering estimation	Fiber Production
7	2479	701B	Ox. Ov. #1 In.B	Engineering estimation	Fiber Production
7	2479	701C	Ox. Ov. #1 Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
7	2479	702A	Ox. Ov. #1 Out.A	Engineering estimation	Fiber Production
7	2479	702B	Ox. Ov. #1 Out.B	Engineering estimation	Fiber Production
7	2479	702C	Ox. Ov. #1 Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
7	2479	703A	Ox. Ov. #2 In.A	Engineering estimation	Fiber Production
7	2479	703B	Ox. Ov. #2 In.B	Engineering estimation	Fiber Production
7	2479	703C	Ox. Ov. #2 Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
7	2479	704A	Ox. Ov. #2 Out.A	Engineering estimation	Fiber Production
7	2479	704B	Ox. Ov. #2 Out.B	Engineering estimation	Fiber Production
7	2479	704C	Ox. Ov. #2 Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
7	2479	705A	Ox. Ov. #3 In.A	Engineering estimation	Fiber Production
7	2479	705B	Ox. Ov. #3 In.B	Engineering estimation	Fiber Production
7	2479	705C	Ox. Ov. #3 Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
7	2479	706A	Ox. Ov. #3 Out.A	Engineering estimation	Fiber Production
7	2479	706B	Ox. Ov. #3 Out.B	Engineering estimation	Fiber Production
7	2479	706C	Ox. Ov. #3 Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
7	2479	707A	Ox. Ov. #4 In.A	Engineering estimation	Fiber Production
7	2479	707B	Ox. Ov. #4 In.B	Engineering estimation	Fiber Production
7	2479	707C	Ox. Ov. #4 Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
7	2479	708A	Ox. Ov. #4 Out.A	Engineering estimation	Fiber Production
7	2479	708B	Ox. Ov. #4 Out.B	Engineering estimation	Fiber Production
7	2479	708C	Ox. Ov. #4 Gas	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
7	2479	710	LTF Seal In.	Engineering estimation	Fiber Production
7	2479	711	LTF Incinerator	FL 2-7 incinerator average emission factor	Fiber Production
7	2479	712	LTF Seal Out.A	Engineering estimation	Fiber Production
7	2479	713	HTF Seal In.	FL 2-7 dragon mouth incinerator average emission factor	Fiber Production
7	2479	714	HTF Seal Out.A	Engineering estimation	Fiber Production

8	2480	801	Ox. Ov. #1 In.PAN	FL8 source 801 emission factor	Fiber Production
8	2480	802	Ox. Ov. #1 Out.PAN	FL8 source 802 emission factor	Fiber Production
8	2480	803	Ox. Ov. #2 In.PAN	FL8 source 803 emission factor	Fiber Production
8	2480	804	Ox. Ov. #2 Out.PAN	FL8 source 804 emission factor	Fiber Production
8	2480	805	Ox. Ov. #3 In.PAN	FL8 source 805 emission factor	Fiber Production
8	2480	806	Ox. Ov. #3 Out.PAN	FL8 source 806 emission factor	Fiber Production
8	2480	807	Ox. Ov. #4 In.PAN	FL8 source 807 emission factor	Fiber Production
8	2480	808	Ox. Ov. #4 Out.A	FL8 source 808 emission factor	Fiber Production
8	2480	809	Not Designated	FL8 source 801 emission factor	Fiber Production
8	2480	810	LTF Seal In.	FL8 source 810 emission factor	Fiber Production
8	2480	811	LTF Incinerator	FL8 source 811 emission factor	Fiber Production
8	2480	812	LTF Seal Out.	FL8 source 812 emission factor	Fiber Production
8	2480	813	HTF Seal In.	FL8 source 813 emission factor	Fiber Production
8	2480	814	HTF Seal Out.	FL8 source 814 emission factor	Fiber Production
8	2480	817	Sizing Dryer 1.	Xylene emission factor	Xylene Throughput
8	2480	2480F1a	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
8	2480	2480F2a	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
8	2480	2480F3a	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
8	2480	2480F4a	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
8	2480	2480F5a	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
8	2480	2480F6a	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
8	2480	2480F7a	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
8	2480	2480F8a	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
10	2481	10-01	Ox. Ov. #1 In.PAN	FL8 source 801 emission factor	Fiber Production
10	2481	10-02	Ox. Ov. #1 Out.PAN	FL8 source 802 emission factor	Fiber Production
10	2481	10-03	Ox. Ov. #2 In.PAN	FL8 source 803 emission factor	Fiber Production
10	2481	10-04	Ox. Ov. #2 Out.PAN	FL8 source 804 emission factor	Fiber Production
10	2481	10-05	Ox. Ov. #3 In.PAN	FL8 source 805 emission factor	Fiber Production
10	2481	10-06	Ox. Ov. #3 Out.PAN	FL8 source 806 emission factor	Fiber Production
10	2481	10-07	Ox. Ov. #4 In.PAN	FL8 source 807 emission factor	Fiber Production
10	2481	10-08	Ox. Ov. #4 Out.A	FL8 source 808 emission factor	Fiber Production
10	2481	10-09	Not Designated	FL8 source 801 emission factor	Fiber Production
10	2481	10-10	LTF Seal In.	FL8 source 810 emission factor	Fiber Production
10	2481	10-11	LTF Incinerator	FL8 source 811 emission factor	Fiber Production
10	2481	10-12	LTF Seal Out.	FL8 source 812 emission factor	Fiber Production
10	2481	10-13	HTF Seal In.	FL8 source 813 emission factor	Fiber Production
10	2481	10-14	HTF Seal Out.	FL8 source 814 emission factor	Fiber Production
10	2481	10-17	Sizing Dryer 1.	Xylene emission factor	Xylene Throughput
10	2481	2481F1b	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
10	2481	2481F2b	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
10	2481	2481F3b	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
10	2481	2481F4b	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
10	2481	2481F5b	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
10	2481	2481F6b	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
10	2481	2481F7b	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
10	2481	2481F8b	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
11	2482	11-01	Ox. Ov. #1 In.PAN	FL8 source 801 emission factor	Fiber Production
11	2482	11-02	Ox. Ov. #1 Out.PAN	FL8 source 802 emission factor	Fiber Production
11	2482	11-03	Ox. Ov. #2 In.PAN	FL8 source 803 emission factor	Fiber Production
11	2482	11-04	Ox. Ov. #2 Out.PAN	FL8 source 804 emission factor	Fiber Production
11	2482	11-05	Ox. Ov. #3 In.PAN	FL8 source 805 emission factor	Fiber Production
11	2482	11-06	Ox. Ov. #3 Out.PAN	FL8 source 806 emission factor	Fiber Production
11	2482	11-07	Ox. Ov. #4 In.PAN	FL8 source 807 emission factor	Fiber Production
11	2482	11-08	Ox. Ov. #4 Out.A	FL8 source 808 emission factor	Fiber Production
11	2482	11-09	Not Designated	FL8 source 801 emission factor	Fiber Production
11	2482	11-10	LTF Seal In.	FL8 source 810 emission factor	Fiber Production
11	2482	11-11	LTF Incinerator	FL8 source 811 emission factor	Fiber Production
11	2482	11-12	LTF Seal Out.	FL8 source 812 emission factor	Fiber Production
11	2482	11-13	HTF Seal In.	FL8 source 813 emission factor	Fiber Production
11	2482	11-14	HTF Seal Out.	FL8 source 814 emission factor	Fiber Production
11	2482	11-17	Sizing Dryer 1.	Xylene emission factor	Xylene Throughput
11	2482	2482F1a	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
11	2482	2482F2a	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
11	2482	2482F3a	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
11	2482	2482F4a	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
11	2482	2482F5a	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
11	2482	2482F6a	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
11	2482	2482F7a	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
11	2482	2482F8a	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption

12	2483	12-01	Ox. Ov. #1 In.PAN	FL8 source 801 emission factor	Fiber Production
12	2483	12-02	Ox. Ov. #1 Out.PAN	FL8 source 802 emission factor	Fiber Production
12	2483	12-03	Ox. Ov. #2 In.PAN	FL8 source 803 emission factor	Fiber Production
12	2483	12-04	Ox. Ov. #2 Out.PAN	FL8 source 804 emission factor	Fiber Production
12	2483	12-05	Ox. Ov. #3 In.PAN	FL8 source 805 emission factor	Fiber Production
12	2483	12-06	Ox. Ov. #3 Out.PAN	FL8 source 806 emission factor	Fiber Production
12	2483	12-07	Ox. Ov. #4 In.PAN	FL8 source 807 emission factor	Fiber Production
12	2483	12-08	Ox. Ov. #4 Out.A	FL8 source 808 emission factor	Fiber Production
112	2483	12-09	Not Designated	FL8 source 801 emission factor	Fiber Production
12	2483	12-10	LTF Seal In.	FL8 source 810 emission factor	Fiber Production
12	2483	12-11	LTF Incinerator	FL8 source 811 emission factor	Fiber Production
12	2483	12-12	LTF Seal Out.	FL8 source 812 emission factor	Fiber Production
12	2483	12-13	HTF Seal In.	FL8 source 813 emission factor	Fiber Production
12	2483	12-14	HTF Seal Out.	FL8 source 814 emission factor	Fiber Production
12	2483	12-17	Sizing Dryer 1.	Xylene emission factor	Xylene Throughput
12	2483	2483F1b	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
12	2483	2483F2b	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
12	2483	2483F3b	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
12	2483	2483F4b	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
12	2483	2483F5b	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
12	2483	2483F6b	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
12	2483	2483F7b	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
12	2483	2483F8b	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
13	2484	13-01	Ox. Ov. #1 Zn 1 & 2	AP-42	Natural Gas Consumption
13	2484	13-02	Ox. Ov. #2 Zn 1 & 2	AP-42	Natural Gas Consumption
13	2484	13-03	Ox. Ov. #3 Zn 1 & 2	AP-42	Natural Gas Consumption
13	2484	13-04	Ox. Ov. #4 Zn 1 & 2	AP-42	Natural Gas Consumption
13	2484	13-05	RTO & Baghouse	Total process emissions from FL13 routed through RTO/Baghouse Stack. Emissions estimated based on Fiberline 8 stack test emission factors for total fiberline process emissions, with RTO (98% VOC control) and baghouse (99% PM control) applied.	Fiber Production
13	2484	13-07	Sizing Dryer #1	Included in 13-05 emissions	
13	2484	13-08	Sizing Dryer #2	Included in 13-05 emissions	
13	2484	13-09	Sizing Dryer #3	Included in 13-05 emissions	
13	2484	2484F1	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
13	2484	2484F2	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
13	2484	2484F3	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
13	2484	2484F4	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
13	2484	2484F5	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
13	2484	2484F6	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
13	2484	2484F7	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
13	2484	2484F8	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
14	2485	14-01	Ox. Ov. #1 Zn 1 & 2	AP-42	Natural Gas Consumption
14	2485	14-02	Ox. Ov. #2 Zn 1 & 2	AP-42	Natural Gas Consumption
14	2485	14-03	Ox. Ov. #3 Zn 1 & 2	AP-42	Natural Gas Consumption
14	2485	14-04	Ox. Ov. #4 Zn 1 & 2	AP-42	Natural Gas Consumption
14	2485	14-05	RTO & Baghouse	Total process emissions from FL13 routed through RTO/Baghouse Stack. Emissions estimated based on Fiberline 8 stack test emission factors for total fiberline process emissions, with RTO (98% VOC control) and baghouse (99% PM control) applied.	Fiber Production
14	2485	14-07	Sizing Dryer #1	Included in 14-05 emissions	
14	2485	14-08	Sizing Dryer #2	Included in 14-05 emissions	
14	2485	14-09	Sizing Dryer #3	Included in 14-05 emissions	
14	2485	2485F1	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
14	2485	2485F2	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
14	2485	2485F3	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
14	2485	2485F4	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
14	2485	2485F5	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
14	2485	2485F6	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
14	2485	2485F7	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
14	2485	2485F8	Combustion Fugitives	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
PILOT	8162	PL01	Pilot Plant Oxidation Ovens	Engineering estimation	Fiber Production
PILOT	8162	PL02a	Pilot Plant LT Furnace #1 In	Engineering estimation	Fiber Production
PILOT	8162	PL02b	Pilot Plant LT Furnace #1 Out	Engineering estimation	Fiber Production
PILOT	8162	PL03a	Pilot Plant LT Furnace #2 In	Engineering estimation	Fiber Production
PILOT	8162	PL03b	Pilot Plant LT Furnace #2 Out	Engineering estimation	Fiber Production
PILOT	8162	PL04a	Pilot Plant HT Furnace In	Engineering estimation	Fiber Production
PILOT	8162	PL04b	Pilot Plant HT Furnace Out	Engineering estimation	Fiber Production
PILOT	8162	PL05a	Pilot Plant HM Furnace In	Engineering estimation	Fiber Production
PILOT	8162	Pl05b	Pilot Plant HM Furnace Out	Engineering estimation	Fiber Production
PILOT	8162	PL06	Pilot Plant Incinerator	Engineering estimation	Fiber Production

Nat Gas	2478	2478_1	Tower 1 Incinerator (a.)	Manufacture guarantee and AP-42 Factors	Natural Gas Consumption
Nat Gas	2478	2478_16	Tower 4 Incinerator	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
Nat Gas	2478	2478_17	Tower 3 Incinerator	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
Nat Gas	2343	2343_1	HVAC Heaters	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
Nat Gas	8132	8132_1	HVAC Heaters	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
Nat Gas	8156	8156_1	HVAC Heaters	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
Nat Gas	8167	8167_1	HVAC Heaters	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
Nat Gas	8185	8185_1	Air Conditioners	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
Nat Gas	8186	8186_1	Air Conditioners	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
Nat Gas	8249	8249_1	Boiler	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
Nat Gas	8249	8249_2	Hot Water Heater	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
Nat Gas	8259	8259_1	HVAC Heaters	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
Nat Gas	9364	9364_1	HVAC Heaters	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
Nat Gas	9364	9364_2	Boiler	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
Nat Gas	9370	9370_1	HVAC Heaters	AP-42 Table 1.4-1 and 1.4-2	Natural Gas Consumption
Em Gen	2344	G-31	Fiber Line 2	AP-42 Table 3.3.1	Hours of Operation
Em Gen	2344	G-35	Fiber Line 3	AP-42 Table 3.3.1	Hours of Operation
Em Gen	2436	G-54	Fiber Line 4	AP-42 Table 3.3.1	Hours of Operation
Em Gen	2436	G-58	Fiber Line 5	AP-42 Table 3.3.1	Hours of Operation
Em Gen	2478	G-76	North	AP-42 Table 3.3.1	Hours of Operation
Em Gen	2479	G-81	Fiber Line 6	AP-42 Table 3.3.1	Hours of Operation
Em Gen	8132	G-83	Lab	AP-42 Table 3.3.1	Hours of Operation
Em Gen	2479	G-84	Fiber Line 7	AP-42 Table 3.3.1	Hours of Operation
Em Gen	2478	G-85	South	AP-42 Table 3.3.1	Hours of Operation
Em Gen	2480	G-86	Fiber Line 8	AP-42 Table 3.3.1	Hours of Operation
Em Gen	2480	G-87	Fiber Line 8	AP-42 Table 3.3.1	Hours of Operation
Em Gen	2481	G-88	Fiber Line 10	AP-42 Table 3.3.1	Hours of Operation
Em Gen	2481	G-89	Fiber Line 10	AP-42 Table 3.3.1	Hours of Operation
Em Gen	Plant	CA-239	Plant	AP-42 Table 3.3.1	Hours of Operation
Em Gen	2482	G-90	Fiber Line 11	AP-42 Table 3.3.1	Hours of Operation
Em Gen	2482	G-91	Fiber Line 11	AP-42 Table 3.3.1	Hours of Operation
Em Gen	2483	G-92	Fiber Line 12	AP-42 Table 3.3.1	Hours of Operation
Em Gen	2483	G-93	Fiber Line 12	AP-42 Table 3.3.1	Hours of Operation
Em Gen	2484	G-94	Fiber Line 13	Tier II emission requirements	Hours of Operation
Em Gen	2484	G-95	Fiber Line 13	Tier II emission requirements	Hours of Operation
Em Gen	2485	G-96	Fiber Line 14	Tier II emission requirements	Hours of Operation
Em Gen	2485	G-97	Fiber Line 14	Tier II emission requirements	Hours of Operation

State of Utah

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

Department of
Environmental Quality

Alan Matheson
Executive Director

DIVISION OF AIR QUALITY
Bryce C. Bird
Director

DAQE-AN113860024-15

August 11, 2015

Shannon Storrud
Hexcel Corporation
PO Box 18748
Salt Lake City, UT 84118-0748

Dear Mr. Storrud:

Re: Approval Order: Modification of Approval Order DAQE-AN113860023-15 to Add Carbon Fiber Lines 15 and 16
Project Number: N11386-0024

The attached document is the Approval Order for the above-referenced project. Future correspondence on this Approval Order should include the engineer's name as well as the DAQE number as shown on the upper right-hand corner of this letter. The project engineer for this action is Nando Meli Jr., who may be reached at (801) 536-4052.

Sincerely,

Bryce C. Bird
Director

BCB:NM:kw

cc: Mike Owens
Salt Lake Valley Health Department

STATE OF UTAH

Department of Environmental Quality

Division of Air Quality

APPROVAL ORDER: Modification of Approval Order DAQE-AN113860023-15 to Add Carbon Fiber Lines 15 and 16

Prepared By: Nando Meli Jr., Engineer
Phone: (801) 536-4052
Email: nmeli@utah.gov

APPROVAL ORDER NUMBER

DAQE-AN113860024-15

Date: August 11, 2015

Hexcel Corporation
Salt Lake Operations

Source Contact:
Bryan Wheeler, Environmental Contact
Phone: (801) 508-8583
Email: Bryan.Wheeler@hexcel.com

Bryce C. Bird
Director

Abstract

Hexcel Corporation (Hexcel), a Clean Utah partner, is the owner and operator of the carbon fiber, and fabric pre-impregnation (pre-preg) manufacturing plant located in West Valley City, Salt Lake County. Hexcel is requesting approval to expand its carbon fiber production capacity by constructing two (2) additional fiber lines. This will result in an additional annual fiber production of 3.6 million pounds.

Hexcel is a listed source in subsection IX.H.12 of the Salt Lake County PM 2.5 Nonattainment State Implementation Plan (SIP). Hexcel's current and proposed operations (including this proposal for Fiber Lines 15 and 16) were accounted for in the development of the SIP. Salt Lake County is a nonattainment area of the NAAQS for PM_{10}, $PM_{2.5}$, and SO_2, and is a maintenance area for ozone. NSPS 40 CFR 60 Subparts A and IIII regulations apply to this source. MACT 40 CFR 63 Subparts A, SS, ZZZZ, and HHHHH regulations apply to this source. Title V of the 1990 Clean Air Act applies to this major source.

The TPY emissions will change as follows: PM_{10} + 4.25, $PM_{2.5}$ (subset of PM_{10}) + 3.25, NO_x + 24.67, SO_2 + 11.25, CO + 24.63, VOC + 3.19, cyanide + 2.92, total HAPs (not including cyanide) + 1.92, and CO_2e 17,697.6. This increase in the combined PM_{10}, SO_2 and NO_x emissions will require 40.17 tons of PM_{10} related offsets. The changes in emissions will result in the following PTE totals (TPY): PM_{10} = 123.81, $PM_{2.5}$ (subset of PM_{10}) = 93.71, NO_x = 193.32, SO_2 = 49.26, CO = 125.78, VOC = 162.67, total HAPs = 602.32 and CO_2e = 67,060.

This air quality AO authorizes the project with the following conditions and failure to comply with any of the conditions may constitute a violation of this order. This AO is issued to, and applies to the following:

Name of Permittee:	**Permitted Location:**
Hexcel Corporation PO Box 18748 Salt Lake City, UT 84118-0748	Salt Lake Operations 6800 W. 5400 S. West Valley City, UT 84118

UTM coordinates: 411,200 m Easting, 4,500,600 m Northing, UTM Zone 12
SIC code: 2821 (Plastics Material, Synthetic Resins, & Nonvulcanized Elastomers)

Section I: GENERAL PROVISIONS

I.1 Modifications to the equipment or processes approved by this AO that could affect the emissions covered by this AO must be reviewed and approved. [R307-401]

I.2 All records referenced in this AO or in other applicable rules, which are required to be kept by the owner/operator, shall be made available to the Director or Director's representative upon request, and the records shall include the two-year period prior to the date of the request. Unless otherwise specified in this AO or in other applicable state and federal rules, records shall be kept for a minimum of five (5) years. [R307-150, R307-415]

I.3 At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any equipment approved under this AO including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Director which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source. All maintenance performed on equipment authorized by this AO shall be recorded. [R307-401]

I.4 All definitions, terms, abbreviations, and references used in this AO conform to those used in the UAC R307 and 40 CFR. Unless noted otherwise, references cited in these AO conditions refer to those rules. [R307-101]

I.5 The limits set forth in this AO shall not be exceeded without prior approval. [R307-401]

I.6 The owner/operator shall comply with UAC R307-107. General Requirements: Breakdowns. [R307-107]

I.7 The owner/operator shall comply with UAC R307-150 Series. Inventories, Testing and Monitoring. [R307-150]

Section II: SPECIAL PROVISIONS

II.A The approved installations shall consist of the following equipment:

II.A.1 **Manufacturing Plant**

West Valley Carbon Fiber and Composites Manufacturing Plant

II.A.2 **Building 2344**

Operations are carbon fiber production with surface treatment, fiber sizing, and spooling

One (1) natural-gas fueled, emergency generator rated at 45 kW
One (1) diesel-fueled, emergency generator rated at 100 kW
One (1) diesel-fueled, emergency generator rated at 125 kW

II.A.3 **Building 2344**
Carbon Fiber Production Line #2

One (1) electrically-heated, low-temperature, carbonization furnace
One (1) electrically-heated, high-temperature, carbonization furnace

One (1) Bake Furnace, Inc. incinerator with afterburner system rated at a combined rating of 1.0 MMBtu/hr

II.A.4 **Building 2344**
Carbon Fiber Production Line #3

Three (3) electrically-heated oxidation ovens

One (1) electrically-heated, low-temperature, carbonization furnace
One (1) electrically-heated, high-temperature, carbonization furnace

One (1) John Zink systems, thermal-oxidation fume incinerator rated at 750,000 Btu/hr

II.A.5 **Building 2436**

Operations are carbon fiber production with surface treatment, fiber sizing, and spooling

One (1) diesel-fueled, emergency generator rated at 180 kW
One (1) diesel-fueled, emergency generator rated at 200 kW

II.A.6 **Building 2436**
Carbon Fiber Production Line #4

Four (4) electrically-heated, oxidation ovens

One (1) electrically-heated, low-temperature, carbonization furnace
One (1) electrically-heated, high-temperature, carbonization furnace

One (1) John Zink systems, thermal oxidation fume incinerator rated at 2 MMBtu/hr

II.A.7 **Building 2436**
Carbon Fiber Production Line #5

Four (4) natural gas-fueled, oxidation ovens with two (2) - 2.5 MMBtu/hr burners per each oven

One (1) electrically-heated, low-temperature, carbonization furnace
One (1) electrically-heated, high-temperature, carbonization furnace

One (1) John Zink systems, thermal-oxidation fume incinerator rated at 2 MMBtu/hr

II.A.8 **Building 2478**

Pre-preg coating and resin preparation and handling

Three (3) diesel-fueled, emergency generators rated at 30 kW, 125 kW, and 300 kW

One (1) muffle furnace
Two (2) roof-top furnaces, rated at 177,000 Btu/hr - each

Solvent vapor hood

Laboratory fume hood and test oven

Adwest Technologies, Inc. Retox regenerative thermal oxidizer system with two (2) Maxon Corp. Low NO_x burners, rated at 2.4 MMBtu/hr maximum for the main burner and 4.0 MMBtu/hr maximum for the auxiliary burner

II.A.9 **Building 2478 (Continued)**

Thermal-oxidation fume incinerators:
One (1) rated at 9.5 MMBtu/hr
One (1) rated at 11 MMBtu/hr

Two (2) 8551-7 resin mixing systems

Solvated-resin mixing system consisting of:
Nine (9) five-gallon mixing vessels
One (1) 25-gallon mixing vessel
One (1) 50-gallon mixing vessel
Two (2) 100-gallon mixing vessels
One (1) 250-gallon mixing vessel
Five (5) pole-mounted, blade/propeller type mixers
One (1) 50-gallon reactor vessel
One (1) 1,100-gallon reactor vessel

II.A.10 **Building 2478 (Continued)**

Mixing vessel and portable container vapor collection system consisting of:
sealing lids with vacuum pressure, and venturi-type vapor capture attachments

Four (4) solvent coaters with associated drying towers, each consisting of

1. Creel area
2. Solvated resin dip tank and metering room
3. Vertical drying oven
4. Spooling operations

One (1) solvent-jet container cleaning system

II.A.11 **Building 2478 (Continued)**

Five (5) resin warming ovens
One (1) calcining oven
Three (3) Blue M electrically-heated drying ovens

One (1) 6,000-gallon storage tank
Five (5) 300-gallon solvated mix storage tanks
Six (6) 3,500-gallon storage tanks with dispensing system
Miscellaneous portable stainless steel containers of various capacity (50 to 600 gallons)

II.A.12 **Building 2479**

Operations are carbon fiber production with surface treatment, fiber sizing, and spooling

One (1) diesel-fueled, emergency generator rated at 275 kW
One (1) diesel-fueled, emergency generator rated at 400 kW

One (1) 5,000-gallon storage tank
One (1) 5,000-gallon sizing storage tank
One (1) 300-gallon sizing mixing tank

II.A.13 **Building 2479**
Carbon Fiber Production Line #6

Four (4) low-temperature, natural gas-fueled, oxidation ovens with two (2) - 2.5 MMBtu/hr burners per each oven

One (1) electrically-heated, low temperature, nitrogen-purged carbonization furnace with two (2) attached natural gas-fueled exhaust ports that pre-combust the VOC prior to the fume incinerator

II.A.14 **Building 2479**
Line #6 (Continued)

One (1) electrically-heated, high temperature, nitrogen purged carbonization furnace with one burner box at the furnace entrance

Two (2) water based wash baths:

1. One (1) ammonium bicarbonate treatment bath

2. One (1) water wash bath

One (1) sizing application bath

One (1) McGill, Inc. fume incinerator rated at 750,000 Btu/hr

II.A.15 **Building 2479**
Carbon Fiber Production Line #7

Four (4) low-temperature, natural gas-fueled, oxidation ovens with two (2) - 2.5 MMBtu/hr burners per each oven

One (1) electrically-heated, low temperature, nitrogen-purged carbonization furnace with two (2) attached natural gas-fueled exhaust ports that pre-combust the VOC prior to the fume incinerator

II.A.16 **Building 2479**
Line #7 (Continued)

One (1) electrically-heated, high temperature, nitrogen-purged carbonization furnace with one burner box at the furnace entrance

One (1) ammonium bicarbonate water based treatment bath
One (1) water-based wash bath
One (1) sizing application bath

One (1) John Zink fume incinerator rated at 300,000 Btu/hr

II.A.17 **Building 2480**
Carbon Fiber Production Line #8

Operations are carbon fiber production with surface treatment, fiber sizing, and spooling

Four (4) low-temperature, natural gas-fueled, oxidation ovens with two (2) - one MMBtu/hr burners per each oven

One (1) electrically-heated, low-temperature, nitrogen-purged carbonization furnace with two (2) natural-gas fueled exhaust ports - each that pre-combust the VOC prior to the fume incinerator

II.A.18 **Building 2480**
Line #8 (Continued)

One (1) electrically-heated, high-temperature, nitrogen-purged carbonization furnace with one (1) burner box at each furnace entrance

Two (2) diesel-fueled, standby emergency generators rated at 500 kW - each

One (1) ammonium bicarbonate water based treatment bath
One (1) water based wash bath
One (1) sizing application bath

One (1) John Zink fume incinerator rated at 3 MMBtu/hr

II.A.19 **Building 2481**
Fiberline #10

Operations are carbon fiber production with surface treatment, fiber sizing, and spooling

Four (4) low-temperature, natural gas-fueled, oxidation ovens with two (2) - one MMBtu/hr burners per each oven

One (1) electrically-heated, low-temperature, nitrogen-purged carbonization furnace with two (2) natural gas-fueled exhaust ports - each that pre-combust the VOC prior to the fume incinerator

II.A.20 **Building 2481**
Fiberline #10 (Continued)

One (1) electrically-heated, high-temperature, nitrogen-purged carbonization furnace with one (1) burner box at each furnace entrance

One (1) ammonium bicarbonate water-based treatment bath
One (1) water based wash bath
One (1) sizing application bath

Two (2) diesel-fueled, emergency generators rated at 500 kW - each

One (1) John Zink fume incinerator rated at 3 MMBtu/hr

II.A.21 **Building 2482**
Carbon Fiber Production Line #11

Operations are carbon fiber production with surface treatment, fiber sizing, and spooling

Four (4) low-temperature, natural gas-fueled, oxidation ovens with two (2) - one MMBtu/hr burners per each oven

One (1) electrically-heated, low-temperature, nitrogen-purged carbonization furnace with two (2) natural gas-fueled exhaust ports - each that pre-combust the VOC prior to the fume incinerator

II.A.22 **Building 2482**
Line #11 (Continued)

One (1) electrically-heated, high-temperature, nitrogen-purged carbonization furnace with one (1) burner box at each furnace entrance

One (1) ammonium bicarbonate water-based treatment bath
One (1) water based wash bath
One (1) sizing application bath

Two (2) diesel-fueled, emergency generators rated at 500 kW - each

One (1) John Zink fume incinerator rated at 3 MMBtu/hr

II.A.23 **Building 2483**
Carbon Fiber Production Line #12

Operations are carbon fiber production with surface treatment, fiber sizing, and spooling

Four (4) low-temperature, natural gas-fueled, oxidation ovens with two (2) - one MMBtu/hr burners per each oven

One (1) electrically-heated, low-temperature, nitrogen-purged carbonization furnace with two (2) natural gas-fueled exhaust ports - each that pre-combust the VOC prior to the fume incinerator

II.A.24 **Building 2483**
Line #12 (Continued)

One (1) electrically-heated, high-temperature, nitrogen-purged carbonization furnace with one (1) burner box at each furnace entrance

One (1) ammonium bicarbonate water-based treatment bath
One (1) water based wash bath
One (1) sizing application bath

Two (2) diesel-fueled, emergency generators rated at 500 kW - each

One (1) John Zink fume incinerator rated at 3 MMBtu/hr

II.A.25 **Building 2484**
Carbon Fiber Production Line #13

Operations are carbon fiber production with surface treatment, fiber sizing, and spooling

Four (4) low temperature, hybrid powered oxidation ovens (electric/natural gas heated) with two (2) heated zones per oven. Each zone is rated at 1.35 MMBtu/hr for natural gas combustion with Low NO_x burners.

One (1) electrically-heated, low temperature, nitrogen purged carbonization furnace
One (1) electrically-heated, high temperature, nitrogen purged carbonization furnace

II.A.26 **Building 2484**
Line #13 (Continued)

One (1) low NO_x Burner Direct Fired Thermal Oxidizer (DFTO) rated at 4.5 MMBtu/hr maximum firing rate

One (1) low NO_x burner dual chamber Regenerative Thermal Oxidizer (RTO) rated at 3.55 MMBtu/hr maximum firing rate

One (1) particulate baghouse - design maximum: 31,000 scfm

One (1) ammonium bicarbonate bath and several fresh water wash/rinse baths

One (1) ammonium bicarbonate mix room with bag handler, mixer and water together with ammonium bicarbonate blend tanks

II.A.27 **Building 2484**
Line #13 (Continued)

One (1) sizing area consisting of aqueous based sizing baths(s) and several steam-heated drums and/or electrically heated dryers for aqueous based sizing drying

Metal screen filters installed on the stack ductwork leading to the RTO

Natural gas-fired HVAC system

Two (2) diesel-fueled, emergency generators rated at 500 kW each

II.A.28 **Building 2485**
Carbon Fiber Production Line #14

Operations are carbon fiber production with surface treatment, fiber sizing, and spooling

Four (4) low temperature, hybrid powered oxidation ovens (electric/natural gas heated) with two (2) heated zones per oven. Each zone is rated at 1.35 MMBtu/hr for natural gas combustion with Low NO_x burners.

One (1) electrically-heated, low temperature, nitrogen purged carbonization furnace
One (1) electrically-heated, high temperature, nitrogen purged carbonization furnace

II.A.29 **Building 2485**
Line #14 (Continued)

One (1) low NO_x burner Direct Fired Thermal Oxidizer (DFTO) rated at 4.5 MMBtu/hr maximum firing rate

One (1) low NO_x burner dual chamber Regenerative Thermal Oxidizer (RTO) rated at 3.55 MMBtu/hr maximum firing rate

One (1) particulate baghouse - design maximum: 31,000 scfm

One (1) ammonium bicarbonate bath and several fresh water wash/rinse baths

One (1) ammonium bicarbonate mix room with bag handler, mixer and water together with ammonium bicarbonate blend tanks

II.A.30 **Building 2485**
Line #14 (Continued)

One (1) sizing area consisting of aqueous based sizing baths(s) and several steam-heated drums and/or electrically heated dryers for aqueous based sizing drying

Metal screen filters installed on the stack ductwork leading to the RTO

HVAC
Natural gas-fired HVAC system

Two (2) diesel-fueled, emergency generators rated at 500 kW each

II.A.31 **Building 2486**

Matrix Operations Material Storage Building

Matrix operations materials storage

HVAC
Natural gas-fired HVAC system

II.A.32 **Building 2488**

Flammable Materials Storage Building

Flammable materials storage

HVAC
Natural gas-fired HVAC system

II.A.33 **Building 2489**
Carbon Fiber Production Line#15

Operations are carbon fiber production with surface treatment, fiber sizing, and spooling

Four (4) low temperature, hybrid powered oxidation ovens (electric/natural gas heated) with two (2) heated zones per oven. Each zone is rated at 1.35 MMBtu/hr for natural gas combustion with low NO_x burners.

One (1) electrically-heated, low temperature, nitrogen purged carbonization furnace
One (1) electrically-heated, high temperature, nitrogen purged carbonization furnace

II.A.34 **Building 2489**
Line #15 (Continued)

One (1) low NO_x Burner Direct Fired Thermal Oxidizer (DFTO) rated at 4.5 MMBtu/hr maximum firing rate

One (1) low NO_x burner dual chamber Regenerative Thermal Oxidizer (RTO) rated at 3.55 MMBtu/hr maximum firing rate

One (1) particulate baghouse - design maximum: 31,000 scfm

One (1) ammonium bicarbonate bath and several fresh water wash/rinse baths

One (1) ammonium bicarbonate mix room with bag handler, mixer and water together with ammonium bicarbonate blend tanks

II.A.35 **Building 2489**
Line #15 (Continued)

One (1) sizing area consisting of aqueous based sizing baths(s) and several steam-heated drums and/or electrically heated dryers for aqueous based sizing drying

Metal screen filters installed on the stack ductwork leading to the RTO
Natural gas-fired HVAC system

Two (2) diesel-fueled, emergency generators rated at 500 kW each

II.A.36 **Building 2490**
Carbon Fiber Production Line #16

Operations are carbon fiber production with surface treatment, fiber sizing, and spooling

Four (4) low temperature, hybrid powered oxidation ovens (electric/natural gas heated) with two (2) heated zones per oven. Each zone is rated at 1.35 MMBtu/hr for natural gas combustion with low NO_x burners.

One (1) electrically-heated, low temperature, nitrogen purged carbonization furnace
One (1) electrically-heated, high temperature, nitrogen purged carbonization furnace

II.A.37 **Building 2490**
Line #16 (Continued)

One (1) low NO_x burner Direct Fired Thermal Oxidizer (DFTO) rated at 4.5 MMBtu/hr maximum firing rate

One (1) low NO_x burner dual chamber Regenerative Thermal Oxidizer (RTO) rated at 3.55 MMBtu/hr maximum firing rate

One (1) particulate baghouse - design maximum: 31,000 scfm

One (1) ammonium bicarbonate bath and several fresh water wash/rinse baths

One (1) ammonium bicarbonate mix room with bag handler, mixer and water together with ammonium bicarbonate blend tanks

II.A.38 **Building 2490**
Line #16 (Continued)

One (1) sizing area consisting of aqueous based sizing baths(s) and several steam-heated drums and/or electrically heated dryers for aqueous based sizing drying

Metal screen filters installed on the stack ductwork leading to the RTO

HVAC
Natural gas-fired HVAC system

Two (2) diesel-fueled, emergency generators rated at 500 kW each

II.A.39 **Building 8132**

Laboratory

Fume hoods

One (1) diesel-fueled, emergency generators rated at 150 kW

II.A.40 **Building 8162**

Research and Development (R & D) facility for new processes

John Zink or McGill fume incinerator system rated at 750,000 Btu/hr with at 3:1 turndown ratio capability

Manufacturing Equipment
A pilot scale fiber line with various ovens, furnaces, and other processes as necessary for research and development purposes, and production of specialty materials

II.B Requirements and Limitations

II.B.1 Source Wide

II.B.1.a Hexcel shall notify the Director in writing when the installations of Fiber Lines #15 in Building 2489, and #16 in Building 2490, have been completed and are operational. To ensure proper credit when notifying the Director, send your correspondence to the Director, attn: Compliance Section.

If construction and/or installation have not been completed within 18 months from the date of this AO, the Director shall be notified in writing on the status of the construction and/or installation. At that time, the Director shall require documentation of the continuous construction and/or installation of the operation and may revoke the AO. [R307-401-18]

II.B.1.b Hexcel shall notify the Director in writing when the installation of Fiber Lines #13 and #14, and the Direct Fired Thermal Oxidizers (DFTO) for Fiber lines #13 and #14 have been completed and are operational. To ensure proper credit when notifying the Director, send your correspondence to the Director, attn: Compliance Section.

If construction and/or installation have not been completed by July 8, 2016, the Director shall be notified in writing on the status of the construction and/or installation. At that time, the Director shall require documentation of the continuous construction and/or installation of the operation and may revoke the AO. [R307-401-18]

II.B.1.c Visible emissions from all emission points shall not exceed a 10% opacity limit. Opacity observations of emissions from stationary sources shall be conducted according to 40 CFR 60, Appendix A, Method 9. [R307-401-8]

II.B.1.d The following limits shall not be exceeded:

1. 1,543 million cubic feet of natural gas consumed per rolling 12-month period.

2. 16,760,000 pounds of carbon fibers produced from the fiber lines per rolling 12-month period.

3. The total use rate for maintenance and testing per emergency generator engine shall not exceed 65 hours per rolling 12-month period.

[R307-401-8]

II.B.1.d.1 Compliance with each limitation shall be determined on a rolling 12-month total. No later than 20 days after the end of each month, a new 12-month total shall be calculated using data from the previous 12 months. Records of consumption, production, and generator engine hours shall be kept on a monthly basis, for all periods when the plant is in operation. Records of consumption, production and generator engine hours including rolling 12-month totals shall be made available to the Director or Director's representative upon request. Natural gas consumption shall be determined by examination of the natural gas billing records for the plant. Graphite production shall be determined by examination of plant production records. Emergency generator engine hours of operation shall be determined by examination of maintenance records, which shall be kept on site. [R307-401-8]

II.B.1.e Diesel-fueled power generator engines shall be used for electricity producing operation only during the periods when electric power from the public utilities is interrupted, for regular maintenance of the generators, or during periodic maintenance of the company owned electrical substation. [R307-401-8]

II.B.1.f The residence time within the various furnaces or fume incinerators shall be demonstrated using the following equation:

R = Vol/Q

Where,

R = residence time in seconds
Vol = inside volume of the incinerator - Ft^3
Q = maximum exhaust gas flow rate - Ft^3 /second

[R307-401-8]

II.B.1.g Fume incinerator temperatures shall be monitored with temperature sensing equipment that is capable of continuous measurement and readout of the combustion temperature. The readout shall be located such that an inspector/operator can at any time safely read the output. The measurement shall be accurate within ± 25°F at operating temperature. The measurement need not be continuously recorded. All instruments shall be calibrated against a primary standard at least once every 180 days. The calibration procedure shall be in accordance with 40 CFR 60, Appendix A, Method 2, paragraph 6.3, and 10.31, or use a type "K" thermocouple. [40 CFR 60]

II.B.1.h Unless otherwise indicated, all carbon fiber production thermal-oxidation fume incinerators shall be operated at the following parameters:

A. At a minimum temperature of 1,400 °F

B. At a minimum residence time of 0.5 seconds

[R307-401-8]

II.B.1.i Unless otherwise indicated, all solvent-coating fume incinerators shall be operated at the following parameters:

A. At a minimum temperature of 1,450 °F
B. At a minimum residence time of 0.5 seconds. [R307-401-8]

II.B.1.j All high-temperature carbon fiber furnaces shall utilize a dedicated burner box at each furnace entrance. Each burner box shall be equipped with pilot lights to ensure that combustion occurs. [R307-401-8]

II.B.1.k Except for in Graphite Fiber Lines 13, 14, 15, and 16, emissions from all low-temperature carbonization furnaces shall be routed to, and combusted within a dedicated fume incinerator in each case before being discharged to the atmosphere. [R307-401-8]

II.B.1.l Emissions from all solvent coating towers shall be routed to, and combusted within a thermal-oxidization fume incinerator in each case before being discharged to the atmosphere. [R307-401-8]

II.B.1.m HAP emissions from all solvated-resin mixing vessels vapor collection systems, and portable container cleaning vapor collection systems shall be routed to, and combusted within a thermal-oxidization fume incinerator, dual chambered regenerative thermal oxidizer, or flare device in each case before being discharged to the atmosphere. [R307-401-8]

II.B.1.n The fume incinerator exhaust stacks need not be constructed to accommodate gravimetric stack testing. However, if the Director determines a stack test is necessary, whatever modifications needed to meet 40 CFR 60, Appendix A, Method 1, and to provide OSHA approvable access to the test location shall be retrofitted to the emission point. [R307-401-8]

II.B.1.o All effluent stack/vents for process emissions from carbon fiber production shall have wire mesh filters to control broken carbon filaments, except those stacks vented to the fume incinerators, high-temperature furnace outlet stacks, end chamber stacks on the oxidation ovens and surface treatment stacks. [R307-401-8]

II.B.1.p Hexcel shall comply with all applicable requirements of UAC R307-309 for PM_{10} nonattainment areas (Salt Lake County) for Fugitive Emission and Fugitive Dust sources. To be in compliance, Hexcel must operate in accordance with the most current version of R307-309. [R307-309]

II.B.1.q The in-plant access roads and parking lots shall be paved, except for power supply right-of way access roads, and shall be periodically swept or sprayed clean as dry conditions warrant or as determined necessary by the Director. Records of cleaning paved roads shall be made available to the Director or the Director's representative upon request. [R307-401-8]

II.B.1.r The owner/operator shall use only natural gas as primary fuel for all fuel burning HVAC units, burner boxes, solvent coating - drying towers, miscellaneous ovens, and boilers. Process off-gas may be used to supplement the operation of any of these devices in which such fuel would be compatible. This condition does not apply to steam, or electrically powered units. [R307-401-8]

II.B.1.s The owner/operator shall use vapor recovery system off-gas as primary fuel, and natural gas as supplemental fuel for all thermal oxidation fume incinerators attached to the solvent coating - drying towers. [R307-401-8]

II.B.1.t The sulfur content of any fuel oil or diesel burned shall not exceed:

0.0015 percent by weight for diesel fuels consumed in any equipment.

The sulfur content shall be determined by ASTM Method D-4294-89 or approved equivalent. Certification of diesel fuels shall be either by Hexcel's own testing or test reports from the fuel marketer. [R307-401-8]

II.B.1.u Hexcel shall comply with all applicable requirements of UAC R307-325, and R307-335 for VOC sources located in Davis and Salt Lake Counties, and ozone and $PM_{2.5}$ nonattainment areas, or any of the applicable requirements of 40 CFR 63.8055 whichever is most stringent. To be in compliance, this facility must operate in accordance with the most current version of UAC R307-325 and R307-335 or the applicable section(s), if renumbered. [40 CFR 63, R307-325, R307-335]

II.B.1.v The emissions from all plant-wide operations shall not exceed:

162.67 tons per rolling 12-month period for VOCs
102.42 tons per rolling 12-month period for Hydrogen Cyanide

486.12 tons per rolling 12-month period for Methylene Chloride
13.78 tons per rolling 12-month period for the combined Xylene, Toluene, and Dimethylformamide

[R307-401-8]

II.B.1.v.1 Compliance with each limitation shall be determined on a rolling 12-month total. No later than 20 days after the end of each month, a new 12-month total shall be calculated using data from the previous 12 months. [R307-401-8]

II.B.1.v.2 The VOC or HAP emissions shall be determined by maintaining a record of VOC or HAP emitting materials used each month. The record shall include the following data for each material used:

A. Name of the VOC, or HAPs emitting material, such as: paint, adhesive, solvent, thinner, reducers, chemical compounds, toxics, isocyanates, etc.

B. Density of each material used (pounds per gallon)

C. Percent by weight of all VOC, or HAP in each material used

D. Gallons of each VOC, or HAP emitting material used

E. The amount of VOC, or HAP emitted monthly by each material used shall be calculated by the following procedure:

VOC = % VOC by Weight / 100 x [Density (lb / gal)] x Gal Consumed x 1 ton / 2000 pounds
HAP = % HAP by Weight / 100 x [Density (lb / gal)] x Gal Consumed x 1 ton / 2000 pounds

F. The amount of VOC, or HAP emitted monthly from all materials used.

G. The amount of VOCs, or HAPs reclaimed for the month shall be similarly quantified and subtracted from the quantities calculated above to provide the monthly total VOC, or HAP emissions.

H. VOC emissions from the fuel burning devices (products of incomplete combustion generated by the boilers, curing ovens, generators, and etc.) are included in the above total.

[R307-401-8]

II.B.2 **<u>Building 2478 (Solvent Coating and Resin Preparation and Handling)</u>**

II.B.2.a The approved installations/processes for the resin preparation and handling shall consist of the following:

Cleaning of the resin mixers shall be done using Butyrolactone (BLO), or M-Pyrol (NMP) aqueous based solvent, Dimethylformamide (DMF), Methyl Ethyl Ketone, or Acetone. Waste contaminated wiping materials shall be placed in a covered container and disposed in a manner that prevents volatilized solvent from being emitted into the atmosphere. Portable containers shall be cleaned using the solvent-jet cleaning device, or by hand. The solvent-jet cleaning device will be attached to the vapor collection system when using a HAP solvent for cleaning. [R307-401-8]

II.B.2.b Water based epoxy resin coating may be used on fiber lines in addition to the solvent based coating used on tower solvent coating (listed for informational purposes only). [R307-401-8]

II.B.3 **Building 2479 (Carbon Fiber Lines 6 & 7)**

II.B.3.a The following operating parameters for the incinerator shall be maintained within the indicated ranges:

1. The incinerator shall be operated with a minimum residence time of 1.0 second at the maximum temperature and flow rate.

2. Temperature - 1,400°F minimum to 1,700°F maximum

3. Percent excess O_2 - 6 % minimum on Fiberline 7

[R307-401-8]

II.B.3.b Each tank, except the sizing-mixing tank, shall have submerged fill to prevent volatilization during filling of the tank. Each of these tanks shall contain sizing, or pre-discharge water (prior to filling with the intended material). [R307-401-8]

II.B.3.c The finishing area shall have a steam heated drum for aqueous based sizing drying and the water based wash baths:

1. Ammonium bicarbonate wash bath

2. Water wash baths

3. Sizing application bath

[R307-401-8]

II.B.3.d The Fiber Line #7 fume incinerator exhaust stack shall be monitored with oxygen content sensing equipment that is capable of continuous measurement and readout of the oxygen content within the stack. The readout shall be located such that an inspector/operator can at any time safely read the output. The measurement shall be accurate within ± 5 % of full scale (0 to 10% scale) at operating conditions. The measurement need not be continuously recorded. All instruments shall be calibrated as per manufacturer's standard at least once every 180 days. [R307-401-8]

II.B.3.e The sizing process on lines #6 and #7 shall use only aqueous base sizing solution. [R307-401-8]

II.B.4 **Building 2480 (Carbon Fiber Line 8) & Building 2481 (Carbon Fiber Line 10)**

II.B.4.a These fume incinerators exhaust stacks shall be monitored with oxygen content sensing equipment that is capable of continuous measurement and readout of the oxygen content within the stack. The readouts shall be located such that an inspector/operator can at any time safely read the output. The measurements shall be accurate within ± 5 % of full scale (0 to 10% scale) at operating conditions. The measurements need not be continuously recorded. All instruments shall be calibrated as per manufacturer's standard at least once every 180 days. [R307-401-8]

II.B.4.b The following operating parameters for the incinerators shall be maintained within the indicated ranges:

1. The incinerators shall be operated with a minimum residence time of 1.0 second at the maximum temperature and flow rate.

2. temperature - 1,400°F minimum to 1,700°F maximum

3. Percent excess O_2 - 6 % minimum

[R307-401-8]

II.B.5 **Building 2482 (Carbon Fiber Line 11) & 2483 (Carbon Fiber Line 12)**

II.B.5.a These fume incinerators exhaust stacks shall be monitored with oxygen content sensing equipment that is capable of continuous measurement and readout of the oxygen content within the stack. The readouts shall be located such that an inspector/operator can at any time safely read the output. The measurements shall be accurate within ± 5 % of full scale (0 to 10% scale) at operating conditions. The measurements need not be continuously recorded. All instruments shall be calibrated as per manufacturer's standard at least once every 180 days. [R307-401-8]

II.B.5.b The following operating parameters for the incinerators shall be maintained within the indicated ranges:

1. The incinerators shall be operated with a minimum residence time of 1.0 second at the maximum temperature and flow rate.

2. Temperature - 1,400°F minimum to 1,700°F maximum

3. Percent excess O_2 - 6 % minimum

[R307-401-8]

II.B.6 **Building 2484 (Carbon Fiber Line 13) and Building 2485 (Carbon Fiber Line 14)**

II.B.6.a The RTO exhaust stacks shall be monitored with oxygen content sensing equipment that is capable of continuous measurement and readout of the oxygen content within the stack. The readouts shall be located such that an inspector/operator can at any time safely read the output. The measurements shall be accurate within ± 5 % of full scale (0 to 10% scale) at operating conditions. The measurements need not be continuously recorded. All instruments shall be calibrated as per manufacturer's standard at least once every 180 days. [R307-401-8]

II.B.6.b The baghouse pressure drop monitoring devices will be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and will be accurate to within one of the following:

1. +/- 0.5 inches water gauge pressure (+/- 125 pascals); or

2. +/- 0.5% of span.

[R307-401-8]

II.B.7 **Building 2489 (Carbon Fiber Line 15) and Building 2490 (Carbon Fiber Line 16)**

II.B.7.a The RTO exhaust stacks shall be monitored with oxygen content sensing equipment that is capable of continuous measurement and readout of the oxygen content within the stack. The readouts shall be located such that an inspector/operator can at any time safely read the output. The measurements shall be accurate within ± 5 % of full scale (0 to 10% scale) at operating conditions. The measurements need not be continuously recorded. All instruments shall be calibrated as per manufacturer's standard at least once every 180 days. [R307-401-8]

II.B.7.b The baghouse pressure drop monitoring devices will be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and will be accurate to within one of the following:

1. +/- 0.5 inches water gauge pressure (+/- 125 pascals); or

2. +/- 0.5% of span

[R307-401-8]

II.B.8 **Building 8162 (Research & Development Facility)**

II.B.8.a This fume incinerator exhaust stacks shall be monitored with oxygen content sensing equipment that is capable of continuous measurement and readout of the oxygen content within the stack. The readouts shall be located such that an inspector/operator can at any time safely read the output. The measurements shall be accurate within ± 5 % of full scale (0 to 10% scale) at operating conditions. The measurements need not be continuously recorded. All instruments shall be calibrated as per manufacturer's standard at least once every 180 days. [R307-401-8]

II.B.8.b The following operating parameters for the incinerators shall be maintained within the indicated ranges:

1. The incinerators shall be operated with a minimum residence time of 1.0 second at the maximum temperature and flow rate.

2. Temperature - 1,400°F minimum to 1,700°F maximum

3. Percent excess O_2 - 6 % minimum.

[R307-401-8]

II.B.8.c The R&D facility shall be used only for new fiber products development, new manufacturing processes development, and specialty materials production. [R307-401-8]

II.B.8.d Any surface treatment or sizing performed on the fibers produced in the R&D facility shall be water based, except for the use of no more than 200 lb of VOC solvents per year. If the 200 lb quantity should ever be exceeded, the emissions shall be directed to an approved emissions control device. [R307-401-8]

Section III: APPLICABLE FEDERAL REQUIREMENTS

In addition to the requirements of this AO, all applicable provisions of the following federal programs have been found to apply to this installation. This AO in no way releases the owner or operator from any liability for compliance with all other applicable federal, state, and local regulations including UAC R307.

NSPS (Part 60), A: General Provisions
NSPS (Part 60), IIII: Standards of Performance for Stationary Compression Ignition Internal Combustion Engines
MACT (Part 63), A: General Provisions
MACT (Part 63), SS: National Emission Standards for Closed Vent Systems, Control Devices, Recovery Devices and Routing to a Fuel Gas System or a Process
MACT (Part 63), ZZZZ: National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines
MACT (Part 63), HHHHH: National Emission Standards for Hazardous Air Pollutants: Miscellaneous Coating Manufacturing
Title V (Part 70) major source

PERMIT HISTORY

This AO is based on the following documents:

Incorporates	Additional Information dated May 29, 2015
Incorporates	Additional Information dated May 8, 2015
Incorporates	Additional Information dated April 30, 2015
Incorporates	Additional Information dated April 29, 2015
Incorporates	Additional Information dated March 12, 2015
Incorporates	Additional Information dated February 10, 2015
Incorporates	Additional Information dated January 23, 2015
Is Derived From	Notice of Intent dated January 20, 2015
Supersedes	AO DAQE-AN113860023-15 dated January 8, 2015

ADMINISTRATIVE CODING

The following information is for UDAQ internal classification use only:

Salt Lake County
CDS A
MACT (Part 63), Nonattainment or Maintenance Area, Title V (Part 70) major source, $PM_{2.5}$ Moderate Area SIP, PM_{10} SIP / Maint Plan, Major HAP source, NSPS (Part 60),

ACRONYMS

The following lists commonly used acronyms and associated translations as they apply to this document:

40 CFR	Title 40 of the Code of Federal Regulations
AO	Approval Order
BACT	Best Available Control Technology
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CDS	Classification Data System (used by EPA to classify sources by size/type)
CEM	Continuous emissions monitor
CEMS	Continuous emissions monitoring system
CFR	Code of Federal Regulations
CMS	Continuous monitoring system
CO	Carbon monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent - 40 CFR Part 98, Subpart A, Table A-1
COM	Continuous opacity monitor
DAQ/UDAQ	Division of Air Quality
DAQE	This is a document tracking code for internal UDAQ use
EPA	Environmental Protection Agency
FDCP	Fugitive dust control plan
GHG	Greenhouse Gas(es) - 40 CFR 52.21 (b)(49)(i)
GWP	Global Warming Potential - 40 CFR Part 86.1818-12(a)
HAP or HAPs	Hazardous air pollutant(s)
ITA	Intent to Approve
LB/HR	Pounds per hour
MACT	Maximum Achievable Control Technology
MMBTU	Million British Thermal Units
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOI	Notice of Intent
NO_x	Oxides of nitrogen
NSPS	New Source Performance Standard
NSR	New Source Review
PM_{10}	Particulate matter less than 10 microns in size
$PM_{2.5}$	Particulate matter less than 2.5 microns in size
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
R307	Rules Series 307
R307-401	Rules Series 307 - Section 401
SO_2	Sulfur dioxide
Title IV	Title IV of the Clean Air Act
Title V	Title V of the Clean Air Act
TPY	Tons per year
UAC	Utah Administrative Code
VOC	Volatile organic compounds

Camron Harry <caharry@utah.gov>

Addendum to Hexcel PM2.5 SIP RACT assessment

1 message

Miriam Hacker <MHacker@trinityconsultants.com> Wed, Aug 7, 2013 at 11:55 AM
To: Camron Harry <caharry@utah.gov>
Cc: "Storrud, Shannon J." <Shannon.Storrud@hexcel.com>, Vineet Masuraha <VMasuraha@trinityconsultants.com>

Cameron,

As discussed, Hexcel would like to post an addendum to the PM2.5 SIP RACT analysis originally submitted January 11, 2012. Please find attached a cover letter describing the changes and revised tables to be included with the report. Please let us know if you have any questions or require anything further.

Kind Regards,
Miriam

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2 attachments

Hexcel PM2.5 SIP RACT Development_addendum 080713.zip
136K

RACT Addendum Cover Letter.pdf
529K

August 7, 2013

Ms. Camron Harry
Utah Department of Air Quality
Division of Air Quality
P.O. Box 144820
Salt Lake City, Utah 84114-482

RE: PM2.5 SIP RACT – Addendum
Hexcel Corporation's West Valley City Plant

Dear Ms. Harry:

As discussed, Hexcel would like to submit an addendum to the PM2.5 SIP RACT analysis dated January 11, 2012. Hexcel believes that costs associated with installing select control technologies were estimated to be conservatively low. Hexcel believes that costs associated with the installation of a Regenerative Thermal Oxidizer (RTO) on the fiber lines were estimated too conservatively. Additionally, costs associated with profit loss from the installation of Low-NO_X and Ultra Low-NO_X burners (LNB and ULNB) on the ovens were not estimated previously for fiber lines 11 and 12 because operations data was not available at the time of the calculations. Following is a description of the proposed changes made to the cost analyses and subsequent cost/ton estimations for the fiber lines.

On p. 18 of the analysis, in section 2.1.4.5, it is noted that "Costs associated with loss of production have conservatively not been included in the total costs associated with the installation of VOC controls for the older lines." Hexcel believes this conservative estimation is not representative of conditions at the plant, and therefore has chosen to update Tables B-8 and Tables A-1 through A-10, accordingly. Costs associated with loss of profit from the installation of the RTO are estimated, consistently with the estimation of profit loss calculated for the installation of LNB and ULNBs on the ovens. A description of the estimation is provided below.

Lost Revenue and days required for retrofit were estimated by Hexcel on 12/19/11. Lines 11 and 12 were not operational on 12/19/11 so lost profit was not able to be estimated based on normal operating data. Lost Revenue for Lines 11 and 12 were estimated by Hexcel on 8/5/13 at $33,000 per day per line. As of 8/5/13, Hexcel estimates 1 month to 6 weeks of downtime per line to install the RTO.

For cost estimates associated with installation of LNBs or ULNBs on fiber lines 11 and 12, on 08/05/13 Hexcel provided an estimate of profit loss of $33,000 per day per line, with 2 weeks of downtime estimated to replace each oven, and 4 ovens in each line. Because profit loss was not previously represented appropriately, Hexcel has chosen to update Tables B-6 and B7, as well as Tables A-9 and A-10, accordingly.

In addition, Hexcel would like to clarify the question of what control efficiency was used in the calculation of NO_X control from installation of ULNBs. On p. 12, section 2.1.3.1 of the PM2.5 SIP RACT analysis, in the discussion regarding ULNBs, it is stated that "There are many variations on the LNB theme of reducing NO_X that can produce more than 80% Destruction Removal Efficiency (DRE)." This statement is based on a reference sited as "U.S. EPA Technical Bulletin "Nitrogen Oxides (NOX) Why and How are They Controlled", EPA 456/F-99-006R November 1999." This statement provides a general idea of what may be expected from ULNB control. In the calculations of ULNB control, provided in Appendix B, note J provides an explanation of the calculation used, specifically "Ultra-Low NO. burner emissions were calculated assuming 68% control efficiency. AP-42 Table 1.4-1. Comparison of uncontrolled emissions from a small boiler (100 lb/106 scf) to controlled Ultra-Low-NOX burner emissions from a small boiler (32 lb/106 scf). [1-32/100 = 68%]." We apologize that this assumption was not made more clearly in the document. No revisions have been made regarding this calculation.

All revised tables are provided as an attachment to this letter. Changes in the tables are bolded and highlighted in yellow. If you have any questions or comments about the information presented in this letter, please do not hesitate to call me at (801) 508-8011.

Sincerely,

Shannon Storrud
Environmental Engineer
Hexcel Corporation

Table A-1: PM2.5 RACT Summary - Fiber Line 2

Site Name:	Hexcel Corporation Salt Lake City Operations	Site ID:		Source Type:	
Owner Name:	Hexcel Corporation	Site Location:	West Valley City, UT		
Component ID:		Quick Component Description:	Fiber Line 2		

RACT Option Analysis	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
RACT option 1	Good Combustion Practices	Good Combustion Practices	Natural Gas	Good Combustion Practices	Good Combustion Practices	Good Combustion Practices	Good Operating Practices
RACT option 2	Baghouse	Baghouse	Venturi Scrubber	Natural Gas	Natural Gas	Natural Gas	Leak Detection and Repair Program
RACT option 3	Venturi Scrubber	Venturi Scrubber		Low NOx Burner	Existing Incineration/ Flares	Existing Incineration/ Flares	Venturi Scrubber
RACT option 4	Wet ESP	Wet ESP		Ultra Low NOx Burner with Flue Gas Recirculation	Thermal Oxidization	Thermal Oxidization	
RACT option 5				Selective Catalytic			
RACT option 5				Selective Non-Catalytic Reduction			

Controlled Emissions Table (tpy):	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Existing Allowable Emissions (tn/yr)	1.76	1.14	0.00022	0.20	0.05	0.08	0.00
RACT option 1	1.76	1.14	0.00022	0.20	0.05	0.08	0.00
RACT option 2	0.05	0.03	0.00002	0.20	0.05	0.08	NA[1]
RACT option 3	0.01	0.02		0.099	0.05	0.08	0.000
RACT option 4	NA[1]	NA[1]		0.063	0.00	0.01	
RACT option 5				NA[1]			
RACT option 6				NA[1]			

Option 1 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emission Reduction (tons)							
Cost Effectiveness ($/ton)							

Option 2 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 324,710	$ 324,710	$153,827.9	$ -	$ -	$ -	NA[1]
Emission Reduction (tons)	1.71	1.11	0.00020				
Cost Effectiveness ($/ton)	$ 190,028	$ 291,958	$ 763,163,540				

Option 3 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 151,780	$ 151,780		$211,642.8	$ -	$ -	NA[1]
Emission Reduction (tons)	1.75	1.12		0.099			
Cost Effectiveness ($/ton)	$ 86,851	$ 135,480		$ 2,147,568			

Option 4 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	NA[1]	NA[1]		$219,790.6	$595,150	$595,150	
Emission Reduction (tons)				0.112 ~~0.184~~	0.05	0.07	
Cost Effectiveness ($/ton)				$ 1,639,886	$ 11,554,346	$ 7,946,147	

1 - Not technically feasible

Table A-2: PM2.5 RACT Summary - Fiber Line 3

Site Name:	Hexcel Corporation Salt Lake City Operations	Site ID:		Source Type:	
Owner Name:	Hexcel Corporation	Site Location:	West Valley City, UT		
Component ID:		Quick Component Description:	Fiber Line 3		

RACT Option Analysis	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
RACT option 1	Good Combustion Practices	Good Combustion Practices	Natural Gas	Good Combustion Practices	Good Combustion Practices	Good Combustion Practices	Good Operating Practices
RACT option 2	Baghouse	Baghouse	Venturi Scrubber	Natural Gas	Natural Gas	Natural Gas	Leak Detection and Repair Program
RACT option 3	Venturi Scrubber	Venturi Scrubber		Low NOx Burner	Existing Incineration/ Flares	Existing Incineration/ Flares	Venturi Scrubber
RACT option 4	Wet ESP	Wet ESP		Ultra Low NOx Burner with Flue Gas Recirculation	Thermal Oxidization	Thermal Oxidization	
RACT option 5				Selective Catalytic			
RACT option 5				Selective Non-Catalytic Reduction			

Controlled Emissions Table (tpy):	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
v	8.38	5.00	1.69641	14.94	4.01	2.92	3.06
RACT option 1	8.38	5.00	1.69641	14.94	4.01	2.92	3.06
RACT option 2	2.75	1.80	0.13571	14.94	4.01	2.92	NA[1]
RACT option 3	0.04	0.10		9.71	4.01	2.92	0.918
RACT option 4	NA[1]	NA[1]		7.83	0.08	0.29	
RACT option 5				NA[1]			
RACT option 6				NA[1]			

Option 1 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emission Reduction (tons)							
Cost Effectiveness ($/ton)							

Option 2 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 674,464	$ 674,464	$227,336.3	$ -	$ -	$ -	NA[1]
Emission Reduction (tons)	5.64	3.20	1.56				
Cost Effectiveness ($/ton)	$ 119,660	$ 210,878	$ 145,664				

Option 3 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 431,633	$ 431,633		$596,141.9	$ -	$ -	$227,336.3
Emission Reduction (tons)	8.34	4.90		5.13			2.14
Cost Effectiveness ($/ton)	$ 51,736	$ 88,116		$ 116,151			$ 106,176

Option 4 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	NA[1]	NA[1]		$604,146.2	$1,571,019	$1,571,019	
Emission Reduction (tons)				6.98	3.93	2.63	
Cost Effectiveness ($/ton)				$ 86,552	$ 400,107	$ 597,809	

1 - Not technically feasible

Table A-3: PM2.5 RACT Summary - Fiber Line 4

Site Name:	Hexcel Corporation Salt Lake City Operations		Site ID:		Source Type:	
Owner Name:	Hexcel Corporation		Site Location:	West Valley City, UT		
Component ID:		Quick Component Description:	Fiber Line 4			

RACT Option Analysis	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
RACT option 1	Good Combustion Practices	Good Combustion Practices	Natural Gas	Good Combustion Practices	Good Combustion Practices	Good Combustion Practices	Good Operating Practices
RACT option 2	Baghouse	Baghouse	Venturi Scrubber	Natural Gas	Natural Gas	Natural Gas	Leak Detection and Repair Program
RACT option 3	Venturi Scrubber	Venturi Scrubber		Low NOx Burner	Existing Incineration/ Flares	Existing Incineration/ Flares	Venturi Scrubber
RACT option 4	Wet ESP	Wet ESP		Ultra Low NOx Burner with Flue Gas Recirculation	Thermal Oxidization	Thermal Oxidization	
RACT option 5				Selective Catalytic			
RACT option 5				Selective Non-Catalytic Reduction			

Controlled Emissions Table (tpy):	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Existing Allowable Emissions (tn/yr)	6.49	3.90	1.05016	9.44	3.53	2.77	2.70
RACT option 1	6.49	3.90	1.05016	9.44	3.53	2.77	2.70
RACT option 2	3.02	1.90	0.08401	9.44	3.53	2.77	NA[1]
RACT option 3	0.03	0.08		6.20	3.53	2.77	0.810
RACT option 4	NA[1]	NA[1]		5.03	0.07	0.28	
RACT option 5				NA[1]			
RACT option 6				NA[1]			

Option 1 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emission Reduction (tons)							
Cost Effectiveness ($/ton)							

Option 2 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 624,669	$ 624,669	$226,526.8	$ -	$ -	$ -	NA[1]
Emission Reduction (tons)	3.47	2.00	0.97				
Cost Effectiveness ($/ton)	$ 180,097	$ 311,738	$ 234,465				

Option 3 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 436,882	$ 436,882		$488,212.4	$ -	$ -	$226,526.8
Emission Reduction (tons)	6.46	3.83		3.18			1.89
Cost Effectiveness ($/ton)	$ 67,677	$ 114,215		$ 153,659			$ 119,879

Option 4 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	NA[1]	NA[1]		$499,697.4	$1,376,381	$1,376,381	
Emission Reduction (tons)				4.32	3.45	2.50	
Cost Effectiveness ($/ton)				$ 115,643	$ 398,394	$ 551,311	

1 - Not technically feasible

Table A-4: PM2.5 RACT Summary - Fiber Line 5

Site Name:	Hexcel Corporation Salt Lake City Operations	Site ID:		Source Type:	
Owner Name:	Hexcel Corporation	Site Location:	West Valley City, UT		
Component ID:		Quick Component Description:	Fiber Line 5		

RACT Option Analysis	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
RACT option 1	Good Combustion Practices	Good Combustion Practices	Natural Gas	Good Combustion Practices	Good Combustion Practices	Good Combustion Practices	Good Operating Practices
RACT option 2	Baghouse	Baghouse	Venturi Scrubber	Natural Gas	Natural Gas	Natural Gas	Leak Detection and Repair Program
RACT option 3	Venturi Scrubber	Venturi Scrubber		Low NOx Burner	Existing Incineration/ Flares	Existing Incineration/ Flares	Venturi Scrubber
RACT option 4	Wet ESP	Wet ESP		Ultra Low NOx Burner with Flue Gas Recirculation	Thermal Oxidization	Thermal Oxidization	
RACT option 5				Selective Catalytic			
RACT option 5				Selective Non-Catalytic Reduction			

Controlled Emissions Table (tpy):	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Existing Allowable Emissions (tn/yr)	4.60	2.55	1.05520	9.63	2.93	3.20	0.88
RACT option 1	4.60	2.55	1.05520	9.63	2.93	3.20	0.88
RACT option 2	1.95	1.19	0.08442	9.63	2.93	3.20	NA[1]
RACT option 3	0.02	0.05		4.81	2.93	3.20	0.265
RACT option 4	NA[1]	NA[1]		3.08	0.06	0.32	
RACT option 5				NA[1]			
RACT option 6				NA[1]			

Option 1 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emission Reduction (tons)							
Cost Effectiveness ($/ton)							

Option 2 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 449,919	$ 449,919	$310,505.1	$ -	$ -	$ -	NA[1]
Emission Reduction (tons)	2.66	1.37	0.97				
Cost Effectiveness ($/ton)	$ 169,331	$ 329,431	$ 319,850				

Option 3 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 620,098	$ 620,098		$689,143.9	$ -	$ -	$310,505.1
Emission Reduction (tons)	4.58	2.50		4.81			0.62
Cost Effectiveness ($/ton)	$ 135,373	$ 247,733		$ 143,129			$ 502,488

Option 4 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	NA[1]	NA[1]		$791,896.0	$1,664,345	$1,664,345	
Emission Reduction (tons)				6.55	2.87	2.88	
Cost Effectiveness ($/ton)				$ 120,933	$ 579,756	$ 578,474	

1 - Not technically feasible

Table A-5: PM2.5 RACT Summary - Fiber Line 6

Site Name:	Hexcel Corporation Salt Lake City Operations	Site ID:		Source Type:	
Owner Name:	Hexcel Corporation	Site Location:	West Valley City, UT		
Component ID:		Quick Component Description:	Fiber Line 6		

RACT Option Analysis	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
RACT option 1	Good Combustion Practices	Good Combustion Practices	Natural Gas	Good Combustion Practices	Good Combustion Practices	Good Combustion Practices	Good Operating Practices
RACT option 2	Baghouse	Baghouse	Venturi Scrubber	Natural Gas	Natural Gas	Natural Gas	Leak Detection and Repair Program
RACT option 3	Venturi Scrubber	Venturi Scrubber		Low NOx Burner	Existing Incineration/ Flares	Existing Incineration/ Flares	Venturi Scrubber
RACT option 4	Wet ESP	Wet ESP		Ultra Low NOx Burner with Flue Gas Recirculation	Thermal Oxidization	Thermal Oxidization	
RACT option 5				Selective Catalytic			
RACT option 5				Selective Non-Catalytic Reduction			

Controlled Emissions Table (tpy):	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Existing Allowable Emissions (tn/yr)	3.27	2.13	1.08748	9.93	4.00	3.45	3.38
RACT option 1	3.27	2.13	1.08748	9.93	4.00	3.45	3.38
RACT option 2	1.54	1.24	0.08700	9.93	4.00	3.45	NA[1]
RACT option 3	0.02	0.04		4.97	4.00	3.45	1.014
RACT option 4	NA[1]	NA[1]		3.18	0.08	0.35	
RACT option 5				NA[1]			
RACT option 6				NA[1]			

Option 1 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emission Reduction (tons)							
Cost Effectiveness ($/ton)							

Option 2 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 371,571	$ 371,571	$265,635.8	$ -	$ -	$ -	NA[1]
Emission Reduction (tons)	1.74	0.89	1.00				
Cost Effectiveness ($/ton)	$ 213,635	$ 415,624	$ 265,509				

Option 3 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 527,610	$ 527,610		$1,136,872.1	$ -	$ -	$265,635.8
Emission Reduction (tons)	3.26	2.09		4.97			2.37
Cost Effectiveness ($/ton)	$ 161,930	$ 252,239		$ 228,885			$ 112,256

Option 4 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	NA[1]	NA[1]		$1,236,464.7	$2,502,217	$2,502,217	
Emission Reduction (tons)				6.76	3.92	3.11	
Cost Effectiveness ($/ton)				$ 183,041	$ 638,010	$ 805,177	

1 - Not technically feasible

Table A-6: PM2.5 RACT Summary - Fiber Line 7

Site Name:	Hexcel Corporation Salt Lake City Operations		Site ID:		Source Type:	
Owner Name:	Hexcel Corporation		Site Location:	West Valley City, UT		
Component ID:		Quick Component Description:	Fiber Line 7			

RACT Option Analysis	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
RACT option 1	Good Combustion Practices	Good Combustion Practices	Natural Gas	Good Combustion Practices	Good Combustion Practices	Good Combustion Practices	Good Operating Practices
RACT option 2	Baghouse	Baghouse	Venturi Scrubber	Natural Gas	Natural Gas	Natural Gas	Leak Detection and Repair Program
RACT option 3	Venturi Scrubber	Venturi Scrubber		Low NOx Burner	Existing Incineration/ Flares	Existing Incineration/ Flares	Venturi Scrubber
RACT option 4	Wet ESP	Wet ESP		Ultra Low NOx Burner with Flue Gas Recirculation	Thermal Oxidization	Thermal Oxidization	
RACT option 5				Selective Catalytic			
RACT option 5				Selective Non-Catalytic Reduction			

Controlled Emissions Table (tpy):	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Existing Allowable Emissions (tn/yr)	5.09	2.70	1.70650	15.59	7.96	5.40	1.66
RACT option 1	5.09	2.70	1.70650	15.59	7.96	5.40	1.66
RACT option 2	2.43	1.62	0.13652	15.59	7.96	5.40	NA[1]
RACT option 3	0.03	0.05		7.79	7.96	5.40	0.497
RACT option 4	NA[1]	NA[1]		4.99	0.16	0.54	
RACT option 5				NA[1]			
RACT option 6				NA[1]			

Option 1 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emission Reduction (tons)							
Cost Effectiveness ($/ton)							

Option 2 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 391,584	$ 391,584	$299,171.5	$ -	$ -	$ -	NA[1]
Emission Reduction (tons)	2.66	1.08	1.57				
Cost Effectiveness ($/ton)	$ 146,948	$ 363,916	$ 190,558				

Option 3 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 449,128	$ 449,128		$1,506,889.3	$ -	$ -	$299,171.5
Emission Reduction (tons)	5.07	2.64		7.79			1.16
Cost Effectiveness ($/ton)	$ 88,619	$ 169,958		$ 193,331			$ 257,861

Option 4 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	NA[1]	NA[1]		$1,606,306.0	$3,347,470	$3,347,470	
Emission Reduction (tons)				10.60	7.80	4.86	
Cost Effectiveness ($/ton)				$ 151,534	$ 428,946	$ 688,368	

1 - Not technically feasible

Table A-7: PM2.5 RACT Summary - Fiber Line 8

Site Name:	Hexcel Corporation Salt Lake City Operations	Site ID:		Source Type:	
Owner Name:	Hexcel Corporation	Site Location:	West Valley City, UT		
Component ID:		Quick Component Description:	Fiber Line 8		

RACT Option Analysis	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
RACT option 1	Good Combustion Practices	Good Combustion Practices	Natural Gas	Good Combustion Practices	Good Combustion Practices	Good Combustion Practices	Good Operating Practices
RACT option 2	Baghouse	Baghouse	Venturi Scrubber	Natural Gas	Natural Gas	Natural Gas	Leak Detection and Repair Program
RACT option 3	Venturi Scrubber	Venturi Scrubber		Low NOx Burner	Existing Incineration/ Flares	Existing Incineration/ Flares	Venturi Scrubber
RACT option 4	Wet ESP	Wet ESP		Ultra Low NOx Burner with Flue Gas Recirculation	Thermal Oxidization	Thermal Oxidization	
RACT option 5				Selective Catalytic			
RACT option 5				Selective Non-Catalytic Reduction			

Controlled Emissions Table (tpy):	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Existing Allowable Emissions (tn/yr)	16.93	10.63	4.14494	7.89	31.47	15.48	21.84
RACT option 1	16.93	10.63	4.14494	7.89	31.47	15.48	21.84
RACT option 2	8.65	6.00	0.33160	7.89	31.47	15.48	NA[1]
RACT option 3	0.08	0.21		3.94	31.47	15.48	6.552
RACT option 4	NA[1]	NA[1]		2.52	0.63	1.55	
RACT option 5				NA[1]			
RACT option 6				NA[1]			

Option 1 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emission Reduction (tons)							
Cost Effectiveness ($/ton)							

Option 2 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 1,152,234	$ 1,152,234	$1,414,378.1	$ -	$ -	$ -	NA[1]
Emission Reduction (tons)	8.28	4.63	3.81				
Cost Effectiveness ($/ton)	$ 139,144	$ 248,758	$ 370,902				

Option 3 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 1,277,429	$ 1,277,429		$1,254,706.9	$ -	$ -	$1,414,378.1
Emission Reduction (tons)	16.84	10.42		3.94			15.29
Cost Effectiveness ($/ton)	$ 75,846	$ 122,643		$ 318,177			$ 92,514

Option 4 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	NA[1]	NA[1]		$1,352,802.7	$3,210,456	$3,210,456	
Emission Reduction (tons)				5.36	30.84	13.93	
Cost Effectiveness ($/ton)				$ 252,245	$ 104,107	$ 230,454	

1 - Not technically feasible

Table A-8: PM2.5 RACT Summary - Fiber Line 10

Site Name:	Hexcel Corporation Salt Lake City Operations			Site ID:		Source Type:	
Owner Name:	Hexcel Corporation			Site Location:	West Valley City, UT		
Component ID:		Quick Component Description:		Fiber Line 10			

RACT Option Analysis	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
RACT option 1	Good Combustion Practices	Good Combustion Practices	Natural Gas	Good Combustion Practices	Good Combustion Practices	Good Combustion Practices	Good Operating Practices
RACT option 2	Baghouse	Baghouse	Venturi Scrubber	Natural Gas	Natural Gas	Natural Gas	Leak Detection and Repair Program
RACT option 3	Venturi Scrubber	Venturi Scrubber		Low NOx Burner	Existing Incineration/ Flares	Existing Incineration/ Flares	Venturi Scrubber
RACT option 4	Wet ESP	Wet ESP		Ultra Low NOx Burner with Flue Gas Recirculation	Thermal Oxidization	Thermal Oxidization	
RACT option 5				Selective Catalytic			
RACT option 5				Selective Non-Catalytic Reduction			

Controlled Emissions Table (tpy):	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Existing Allowable Emissions (tn/yr)	16.93	10.63	4.14494	7.89	31.47	15.48	10.04
RACT option 1	16.93	10.63	4.14494	7.89	31.47	15.48	10.04
RACT option 2	8.65	6.00	0.33160	7.89	31.47	15.48	NA[1]
RACT option 3	0.08	0.21		3.94	31.47	15.48	3.012
RACT option 4	NA[1]	NA[1]		2.52	0.63	1.55	
RACT option 5				NA[1]			
RACT option 6				NA[1]			

Option 1 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emission Reduction (tons)							
Cost Effectiveness ($/ton)							

Option 2 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 1,152,234	$ 1,152,234	$1,414,378.1	$ -	$ -	$ -	NA[1]
Emission Reduction (tons)	8.28	4.63	3.81				
Cost Effectiveness ($/ton)	$ 139,144	$ 248,758	$ 370,902				

Option 3 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 1,277,429	$ 1,277,429		$2,484,571.9	$ -	$ -	$1,414,378.1
Emission Reduction (tons)	16.84	10.42		3.94			7.03
Cost Effectiveness ($/ton)	$ 75,846	$ 122,643		$ 630,055			$ 201,264

Option 4 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	NA[1]	NA[1]		$2,582,667.7	$5,670,186	$5,670,186	
Emission Reduction (tons)				5.36	30.84	13.93	
Cost Effectiveness ($/ton)				$ 481,567	$ 183,870	$ 407,019	

1 - Not technically feasible

Table A-9: PM2.5 RACT Summary - Fiber Line 11

Site Name:	Hexcel Corporation Salt Lake City Operations		Site ID:		Source Type:	
Owner Name:	Hexcel Corporation		Site Location:	West Valley City, UT		
Component ID:		Quick Component Description:	Fiber Line 11			

RACT Option Analysis	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
RACT option 1	Good Combustion Practices	Good Combustion Practices	Natural Gas	Good Combustion Practices	Good Combustion Practices	Good Combustion Practices	Good Operating Practices
RACT option 2	Baghouse	Baghouse	Venturi Scrubber	Natural Gas	Natural Gas	Natural Gas	Leak Detection and Repair Program
RACT option 3	Venturi Scrubber	Venturi Scrubber		Low NOx Burner	Existing Incineration/ Flares	Existing Incineration/ Flares	Venturi Scrubber
RACT option 4	Wet ESP	Wet ESP		Ultra Low NOx Burner with Flue Gas Recirculation	Thermal Oxidization	Thermal Oxidization	
RACT option 5				Selective Catalytic			
RACT option 5				Selective Non-Catalytic Reduction			

Controlled Emissions Table (tpy):	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Existing Allowable Emissions (tn/yr)	20.80	13.06	4.14494	9.69	38.67	19.02	10.04
RACT option 1	20.80	13.06	4.14494	9.69	38.67	19.02	10.04
RACT option 2	8.31	5.67	0.33160	9.69	38.67	19.02	NA[1]
RACT option 3	0.10	0.26		4.85	38.67	19.02	3.012
RACT option 4	NA[1]	NA[1]		3.10	0.77	1.90	
RACT option 5				NA[1]			
RACT option 6				NA[1]			

Option 1 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emission Reduction (tons)							
Cost Effectiveness ($/ton)							

Option 2 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 1,525,094	$ 1,525,094	$1,144,453.6	$ -	$ -	$ -	NA[1]
Emission Reduction (tons)	12.49	7.39	3.81				
Cost Effectiveness ($/ton)	$ 122,118	$ 206,426	$ 300,118				

Option 3 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 1,120,086	$ 1,120,086		$1,929,071.3	$ -	$ -	$1,144,453.6
Emission Reduction (tons)	20.70	12.80		4.85			7.03
Cost Effectiveness ($/ton)	$ 54,116	$ 87,505		$ 398,063			$ 162,854

Option 4 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	NA[1]	NA[1]		$2,027,255.3	$2,180,213	$2,180,213	
Emission Reduction (tons)				6.59	37.90	17.12	
Cost Effectiveness ($/ton)				$ 307,590	$ 57,529	$ 127,348	

1 - Not technically feasible

Table A-10: PM2.5 RACT Summary - Fiber Line 12

Site Name:	Hexcel Corporation Salt Lake City Operations			Site ID:		Source Type:	
Owner Name:	Hexcel Corporation			Site Location:	West Valley City, UT		
Component ID:		Quick Component Description:		Fiber Line 12			

RACT Option Analysis	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
RACT option 1	Good Combustion Practices	Good Combustion Practices	Natural Gas	Good Combustion Practices	Good Combustion Practices	Good Combustion Practices	Good Operating Practices
RACT option 2	Baghouse	Baghouse	Venturi Scrubber	Natural Gas	Natural Gas	Natural Gas	Leak Detection and Repair Program
RACT option 3	Venturi Scrubber	Venturi Scrubber		Low NOx Burner	Existing Incineration/ Flares	Existing Incineration/ Flares	Venturi Scrubber
RACT option 4	Wet ESP	Wet ESP		Ultra Low NOx Burner with Flue Gas Recirculation	Thermal Oxidization	Thermal Oxidization	
RACT option 5				Selective Catalytic			
RACT option 5				Selective Non-Catalytic Reduction			

Controlled Emissions Table (tpy):	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Existing Allowable Emissions (tn/yr)	20.80	13.06	4.14494	9.69	38.67	18.73	10.04
RACT option 1	20.80	13.06	4.14494	9.69	38.67	18.73	10.04
RACT option 2	8.31	5.67	0.33160	9.69	38.67	18.73	NA[1]
RACT option 3	0.10	0.26		4.85	38.67	18.73	3.012
RACT option 4	NA[1]	NA[1]		3.10	0.77	1.87	
RACT option 5				NA[1]			
RACT option 6				NA[1]			

Option 1 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emission Reduction (tons)							
Cost Effectiveness ($/ton)							

Option 2 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 1,525,094	$ 1,525,094	$1,144,453.6	$ -	$ -	$ -	NA[1]
Emission Reduction (tons)	12.49	7.39	3.81				
Cost Effectiveness ($/ton)	$ 122,118	$ 206,426	$ 300,118				

Option 3 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	$ 1,120,086	$ 1,120,086		$1,929,071.3	$ -	$ -	$1,144,453.6
Emission Reduction (tons)	20.70	12.80		4.85			7.03
Cost Effectiveness ($/ton)	$ 54,116	$ 87,505		$ 398,063			$ 162,854

Option 4 Cost/Benefit Analysis Summary	PM10	PM2.5	SO2	NOx	VOC	CO	NH3
Annualized Cost ($)	NA[1]	NA[1]		$2,027,255.3	$2,180,213	$2,180,213	
Emission Reduction (tons)				6.59	37.90	16.85	
Cost Effectiveness ($/ton)				$ 307,590	$ 57,529	$ 129,365	

1 - Not technically feasible

Table B-6: Low NOX Burner Annualized Cost Estimate for NOX Control

Table B-6.1. 2011 Vendor Estimated Low NOx Burner Costs

Capacity	Basic Equipment Cost [a]	Total Installed Cost [a]	$/MMBtu
750,000 BTU/hr	$7,000	$20,000	$26,667
2.7 MMBtu/hr	$10,000	$30,000	$11,111
13 MMBtu/hr	$60,000	$150,000	$11,538

[a] The basic equipment and installed cost of a Low NOx Burner emailed from Western Combustion Engineering to J. Falcetti (Trinity) on 11/28/11.

Table B-6.2. Hexcel Burner Count

Hexcel Line No.	Equipment <=750,000 BTU/hr	Equipment > 0.75 MMBtu/hr and <=2.7 MMBtu/hr	Equipment > 2.7 MMBTU and <=13 MMBtu/hr
2	1	0	0
3	1	0	0
4	0	1	0
5	0	9	0
6	1	8	0
7	1	8	0
8	1	8	0
10	1	8	0
11	1	8	0
12	1	8	0
13	NA	NA	NA
14	NA	NA	NA
PILOT	1	0	0
Matrix	2	0	3

Fiber Lines 13 and 14 have been designed with Ultra-Low NOX burners and are therefore not part of this assessment.

Table B-6.3. Annualized Low-NOX Burner Cost Per Hexcel Line

Parameter	Equation[a]	Total Value	Hexcel Line No. 2	3	4	5	6	7	8	10	11	12	PILOT	Matrix
Direct Costs														
Purchased equipment costs														
Total Purchased Equipment Cost (Burners)	PEC [c]	$636,000	$7,000	$7,000	$10,000	$90,000	$87,000	$87,000	$87,000	$87,000	$87,000	$87,000	$7,000	$194,000
Installation Costs														
Total Direct Installation Cost	DIC [d]	$1,264,000	$13,000	$13,000	$20,000	$180,000	$173,000	$173,000	$173,000	$173,000	$173,000	$173,000	$13,000	$296,000
Total Direct Costs (TDC)	PEC + DIC	$1,900,000	$20,000	$20,000	$30,000	$270,000	$260,000	$260,000	$260,000	$260,000	$260,000	$260,000	$20,000	$490,000
Indirect Installation Costs														
Engineering	0.10 PEC	$63,600	$700	$700	$1,000	$9,000	$8,700	$8,700	$8,700	$8,700	$8,700	$8,700	$700	$19,400
Construction & field expenses	0.10 PEC	$63,600	$700	$700	$1,000	$9,000	$8,700	$8,700	$8,700	$8,700	$8,700	$8,700	$700	$19,400
Contractor fees	0.10 PEC	$63,600	$700	$700	$1,000	$9,000	$8,700	$8,700	$8,700	$8,700	$8,700	$8,700	$700	$19,400
Start-up	0.01 PEC	$6,360	$70	$70	$100	$900	$870	$870	$870	$870	$870	$870	$70	$1,940
Performance test	0.01 PEC	$6,360	$70	$70	$100	$900	$870	$870	$870	$870	$870	$870	$70	$1,940
Contingencies	0.03 PEC	$19,080	$210	$210	$300	$2,700	$2,610	$2,610	$2,610	$2,610	$2,610	$2,610	$210	$5,820
Total Indirect Costs, IC	0.35 PEC	$222,600	$2,450	$2,450	$3,500	$31,500	$30,450	$30,450	$30,450	$30,450	$30,450	$30,450	$2,450	$67,900
TOTAL CAPITAL INVESTMENT [e] (2011$)	(DC + IC) * 1.4 (retrofit factor)	$2,971,640	$31,430	$31,430	$46,900	$422,100	$406,630	$406,630	$406,630	$406,630	$406,630	$406,630	$31,430	$781,060
Annual Cost Summary														
Total Direct Annual Cost														
Operation/Maintenance Cost [f]	DAC	$137,627	$2,025	$2,025	$2,025	$18,767	$18,767	$18,767	$18,767	$18,767	$18,767	$18,767	$2,025	$10,426
Profit Loss														
Revenue Lost per 24-hour down time [b]	$/24 hours	NA	$9,700	$28,030	$22,780	$28,690	$50,075	$67,720	$55,900	$114,465	$33,000	$33,000	NA	NA
Days Required for Retrofit [b]	days lost		21	21	21	21	21	21	21	21	56	56		
Total Profit Lost	PL = $/hr*hours lost	NA	$203,700	$588,630	$478,380	$602,490	$1,051,575	$1,422,120	$1,173,900	$2,403,765	$1,848,000	$1,848,000	NA	NA
Indirect Annual Costs														
	Labor Ratio [g]		0.9136	0.5692	0.5692	0.4060	0.4916	0.4447	0.0928	0.0928	0.1163	0.1163	0.1163	0.1163
Overhead	60% of sum of operating and maintenance labor	$22,390	$1,143	$712	$712	$4,571	$5,535	$5,007	$1,045	$1,045	$1,309	$1,309	$145	$727
Administrative charges	2% of TCI	$59,433	$629	$629	$938	$8,442	$8,133	$8,133	$8,133	$8,133	$8,133	$8,133	$629	$15,621
Property tax	1% of TCI	$29,716	$314	$314	$469	$4,221	$4,066	$4,066	$4,066	$4,066	$4,066	$4,066	$314	$7,811
Insurance	1% of TCI	$29,716	$314	$314	$469	$4,221	$4,066	$4,066	$4,066	$4,066	$4,066	$4,066	$314	$7,811
Capital recovery factor	15 Years, 7% interest		0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Capital Recovery [f]	CRF*TCI	$326,880	$3,457	$3,457	$5,159	$46,431	$44,729	$44,729	$44,729	$44,729	$44,729	$44,729	$3,457	$85,917
Total Indirect Annual Costs	Total	$468,136	$5,858	$5,427	$7,747	$67,886	$66,530	$66,002	$62,039	$62,039	$62,304	$62,304	$4,860	$117,886
TOTAL ANNUAL COST		$12,226,324	$211,643	$596,142	$488,212	$689,144	$1,136,872	$1,506,889	$1,254,707	$2,484,572	$1,929,071	$1,929,071	$6,945	$128,313

Notes

[a] Unless otherwise noted, equations are taken from U.S. Environmental Protection Agency, EPA Air Pollution Control Cost manual, Sixth Edition. EPA/452/B-02-001, January 2002.

[c] Email correspondence between Chris Paul (Western Combustion Engineering) and John Falcetti (Trinity) on November 28, 2011.

[d] Retrofit factors are not mentioned for Low NOX burners in the OAQPS Manual. Thus, the retrofit factor for a venturi scrubber is applied. Retrofit factor based on average of 1.3 - 1.5, provided in OAQPS Manual, Section 6, Chapter 2, Page 2-49.

[e] EPA Technical Bulletin, Nitrogen Oxides (NOx) Why and How They Are Controlled, EPA/456/F-99-006R (http://epa.gov/ttn/catc/dir1/fnoxdoc.pdf), November 1999. Operational costs obtained from Table 14 - Costs of NOx Controls, multiplied by a ratio of 2011 capital costs to 1993 capital costs, to estimate 2011 operational costs.

Maximum estimated 1993 Capital Cost ($/MMBtu)	$8,300	
Maximum estimated 1993 Operational Cost ($/MMBtu)	$1,300	
Estimated 2011 Operational Cost ($/MMBtu)	$2,025	= $11,538/$8,300 * $2,025 (mid-range (for 13 MMBtu/hr burner) estimated 2011 $/MMBtu was used for the calculation)

[f] Ratio of operation and Maintenance labor costs to total operation and maintenance costs from scrubber operations

[b] Lost Revenue and days required for retrofit estimated by Hexcel 12/19/11. Lines 11 and 12 were not operational on 12/19/11 so lost profit was not able to be estimated based on operating normals.
Lost Revenue for Lines 11 and 12 were estimated by Hexcel on 8/2/13 at $33,000 per day per line, with 2 weeks of downtime estimated to replace each oven, and 4 ovens in each line.

[g] Office of Air Quality Planning and Standards (OAQPS), EPA Air Pollution Control Cost Manual, Sixth Edition, Sec 6, Chpt 2, Table 2.9, EPA 452-B-02-001 (http://www.epa.gov/ttn/catc/products.html#cccinfo), Mussatti and Hemmer, July 2002.

Table B-7: Ultra Low NOX Burner Annualized Cost Estimate for NOX Control

Table B-7.1. 2011 Vendor Estimated Ultra Low NOx Burner Costs

Capacity	Basic Equipment Cost [a]	Total Installed Cost [a]	$/MMBtu
750,000 BTU/hr	$17,500	$50,000	$66,667
2.7 MMBtu/hr	$25,000	$75,000	$27,778
13 MMBtu/hr	$70,000	$200,000	$15,385

[a] The installed cost of an Ultra Low NOx Burner emailed from Western Combustion Engineering to M. Hacker (Trinity) on 12/07/11. Basic equipment cost was interpolated.

Table B-7.2. Hexcel Burner Count

Hexcel Line No.	Equipment <=750,000 BTU/hr	Equipment > 0.75 MMBtu/hr and <=2.7 MMBtu/hr	Equipment > 2.7 MMBTU and <=13 MMBtu/hr
2	1	0	0
3	1	0	0
4	0	1	0
5	0	9	0
6	1	8	0
7	1	8	0
8	1	8	0
10	1	8	0
11	1	8	0
12	1	8	0
13	NA	NA	NA
14	NA	NA	NA
PILOT	1	0	0
Matrix	2	0	3

Fiber Lines 13 and 14 have been designed with Ultra-Low NOX burners and are therefore not part of this assessment.

Table B-7.3. Annualized Ultra Low-NOX Burner Cost Per Hexcel Line

Parameter	Equation[c]	Total Value	Hexcel Line No. 2	3	4	5	6	7	8	10	11	12	PILOT	Matrix
Direct Costs														
Purchased equipment costs														
Total Purchased Equipment Cost (Burners)	PEC [d]	$1,590,000	$17,500	$17,500	$25,000	$225,000	$217,500	$217,500	$217,500	$217,500	$217,500	$217,500	$17,500	$245,000
Installation Costs														
Total Direct Installation Cost	DIC [e]	$3,160,000	$32,500	$32,500	$50,000	$450,000	$432,500	$432,500	$432,500	$432,500	$432,500	$432,500	$32,500	$455,000
Total Direct Costs (TDC)	PEC + DIC	$4,750,000	$50,000	$50,000	$75,000	$675,000	$650,000	$650,000	$650,000	$650,000	$650,000	$650,000	$50,000	$700,000
Indirect Installation Costs														
Engineering	0.10 PEC	$159,000	$1,750	$1,750	$2,500	$22,500	$21,750	$21,750	$21,750	$21,750	$21,750	$21,750	$1,750	$24,500
Construction & field expenses	0.10 PEC	$159,000	$1,750	$1,750	$2,500	$22,500	$21,750	$21,750	$21,750	$21,750	$21,750	$21,750	$1,750	$24,500
Contractor fees	0.10 PEC	$159,000	$1,750	$1,750	$2,500	$22,500	$21,750	$21,750	$21,750	$21,750	$21,750	$21,750	$1,750	$24,500
Start-up	0.01 PEC	$15,900	$175	$175	$250	$2,250	$2,175	$2,175	$2,175	$2,175	$2,175	$2,175	$175	$2,450
Performance test	0.01 PEC	$15,900	$175	$175	$250	$2,250	$2,175	$2,175	$2,175	$2,175	$2,175	$2,175	$175	$2,450
Contingencies	0.03 PEC	$47,700	$525	$525	$750	$6,750	$6,525	$6,525	$6,525	$6,525	$6,525	$6,525	$525	$7,350
Total Indirect Costs, IC	0.35 PEC	$556,500	$6,125	$6,125	$8,750	$78,750	$76,125	$76,125	$76,125	$76,125	$76,125	$76,125	$6,125	$85,750
TOTAL CAPITAL INVESTMENT [f] (2011$)	(DC + IC) * 1.4 (retrofit factor)	$7,429,100	$78,575	$78,575	$117,250	$1,055,250	$1,016,575	$1,016,575	$1,016,575	$1,016,575	$1,016,575	$1,016,575	$78,575	$1,100,050
Annual Cost Summary														
Total Direct Annual Cost														
Operation/Maintenance Cost [f]	DAC	$183,503	$2,780	$2,780	$2,780	$25,023	$25,023	$25,023	$25,023	$25,023	$25,023	$25,023	$2,780	$13,902
Profit Loss														
Revenue Lost per 24-hour down time [b]	$/24 hours	NA	$9,700	$28,030	$32,780	$28,690	$50,075	$67,720	$55,900	$114,465	$33,000	$33,000	NA	NA
Days Required for Retrofit [b]	days lost		21	21	21	21	21	21	21	21	56	56		
Total Profit Lost	PL = $/hr*hours lost	NA	$203,700	$588,630	$678,380	$602,490	$1,051,575	$1,422,120	$1,173,900	$2,403,765	$1,848,000	$1,848,000	NA	NA
Indirect Annual Costs														
	Labor Ratio [g]		0.9136	0.5692	0.5692	0.4060	0.4916	0.4447	0.0928	0.0928	0.1163	0.1163	0.1163	0.1163
Overhead	60% of sum of operating and maintenance labor	$29,854	$1,524	$950	$950	$6,095	$7,380	$6,677	$1,393	$1,393	$1,746	$1,746	$194	$970
Administrative charges	2% of TCI	$148,582	$1,572	$1,572	$2,345	$21,105	$20,332	$20,332	$20,332	$20,332	$20,332	$20,332	$1,572	$22,001
Property tax	1% of TCI	$74,291	$786	$786	$1,173	$10,553	$10,166	$10,166	$10,166	$10,166	$10,166	$10,166	$786	$11,001
Insurance	1% of TCI	$74,291	$786	$786	$1,173	$10,553	$10,166	$10,166	$10,166	$10,166	$10,166	$10,166	$786	$11,001
Capital recovery factor	15 Years, 7% Interest		0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Capital Recovery [f]	CRF*TCI	$817,201	$8,643	$8,643	$12,898	$116,078	$111,823	$111,823	$111,823	$111,823	$111,823	$111,823	$8,643	$121,006
Total Indirect Annual Costs	Total	$1,144,219	$13,310	$12,736	$18,537	$164,383	$159,867	$159,163	$153,880	$153,880	$154,232	$154,232	$11,980	$165,977
TOTAL ANNUAL COST		$12,948,282	$219,791	$604,146	$699,697	$791,896	$1,236,465	$1,606,306	$1,352,803	$2,582,668	$2,027,255	$2,027,255	$14,761	$179,879

Notes

[c] Unless otherwise noted, equations are taken from U.S. Environmental Protection Agency, EPA Air Pollution Control Cost manual, Sixth Edition. EPA/452/B-02-001, January 2002.

[d] Email correspondence between Chris Peel (Western Combustion Engineering) and John Falcetti (Trinity) on November 28, 2011.

[e] Retrofit factors are not mentioned for Low NOX burners in the OAQPS Manual. Thus, the retrofit factor for a venturi scrubber is applied. Retrofit factor based on average of 1.3 - 1.5, provided in OAQPS Manual, Section 6, Chapter 2, Page 2-49.

[f] EPA Technical Bulletin, Nitrogen Oxides (NOx) Why and How They Are Controlled, EPA/456/F-99-006R (http://epa.gov/ttn/catc/dir1/fnoxdoc.pdf), November 1999. Operational costs obtained from Table 14 - Costs of NOx Controls, multiplied by a ratio of 2011 capital costs to 1993 capital costs, to estimate 2011 operational costs.

Maximum estimated 1993 Capital Cost ($/MMBtu)	$8,300	
Maximum estimated 1993 Operational Cost ($/MMBtu)	$1,500	
Estimated 2011 Operational Cost ($/MMBtu)	$2,780	= $11,538/$8,300 * $2,085 (mid-range (for 13 MMBtu/hr burner) estimated 2011 $/MMBtu was used for the calculation)

[g] Ratio of operation and Maintenance labor costs to total operation and maintenance costs from scrubber operations

[b] Lost Revenue and days required for retrofit estimated by Hexcel 12/19/11. Lines 11 and 12 were not operational on 12/19/11 so lost profit was not able to be estimated based on operating normals.
Lost Revenue for Lines 11 and 12 were estimated by Hexcel on 8/5/13 at $33,000 per day per line, with 2 weeks of downtime estimated to replace each oven, and 4 ovens in each line.

[a] Office of Air Quality Planning and Standards (OAQPS), EPA Air Pollution Control Cost Manual, Sixth Edition, Sec 6, Chpt 2, Table 2.9, EPA 452-B-02-001 (http://www.epa.gov/ttn/catc/products.html#cccinfo), Muneeti and Hemmer, July 2002.

Table B-8.3. Annualized Regenerative Thermal Oxidizer Cost Per Hexcel Line

Parameter	Equation[e]	Hexcel Line No. 2	3	4	5	6	7	8	10	11	12	PILOT	Matrix
Direct Annual Costs													
Operating Labor													
Operator	2hr/shift* 3 shift/day*360 days/yr * $23.50/hr	$50,760	$50,760	$50,760	$50,760	$50,760	$50,760	$50,760	$50,760	$50,760	$50,760	$50,760	$50,760
Supervisor	15% of operator	$7,614	$7,614	$7,614	$7,614	$7,614	$7,614	$7,614	$7,614	$7,614	$7,614	$7,614	$7,614
Maintenance													
Labor	1hr/shift* 3 shift/day*360 days/yr * $29.00/hr	$31,320	$31,320	$31,320	$31,320	$31,320	$31,320	$31,320	$31,320	$31,320	$31,320	$31,320	$31,320
Operating Materials													
Natural Gas[f]	RTO Natural Gas Consumption Calculations	$802	$140,419	$155,768	$174,377	$131,393	$191,068	$414,014	$414,014	$370,550	$370,550	$61,055	$61,055
Electricity													
Fan	Assume no combustion air needed	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Direct Annual Cost	Total	$90,496	$230,113	$245,462	$264,071	$221,087	$280,762	$503,708	$503,708	$460,244	$460,244	$150,749	$150,749
Indirect Annual Costs													
Overhead	60% of sum of operating and maintenance labor	$53,816	$53,816	$53,816	$53,816	$53,816	$53,816	$53,816	$53,816	$53,816	$53,816	$53,816	$53,816
Administrative charges	2% of TCI	$5,792	$14,644	$16,046	$18,864	$16,555	$22,487	$40,684	$40,684	$37,354	$37,354	$14,819	$15,019
Property tax	1% of TCI	$2,896	$7,322	$8,023	$9,432	$8,278	$11,243	$20,342	$20,342	$18,677	$18,677	$7,409	$7,510
Insurance	1% of TCI	$2,896	$7,322	$8,023	$9,432	$8,278	$11,243	$20,342	$20,342	$18,677	$18,677	$7,409	$7,510
Capital recovery factor	15 Years, 7% Interest	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Capital Recovery[f]	CRF*TCI	$31,854	$80,542	$88,251	$103,750	$91,053	$123,678	$223,763	$223,763	$205,445	$205,445	$81,504	$82,605
Total Indirect Annual Costs	Total	$97,254	$163,646	$174,159	$195,294	$177,980	$222,468	$358,948	$358,948	$333,969	$333,969	$164,958	$166,460
Profit Lost[g]													
Revenue Lost per 24-hour down time[h]	$/24 hours	$9,700	$28,030	$22,780	$28,690	$50,075	$67,720	$55,900	$114,465	$33,000	$33,000	NA	NA
Days Required for Retrofit[h]	days lost	42	42	42	42	42	42	42	42	42	42		
Total Profit Lost	PL = $/hr*hours lost	$407,400	$1,177,260	$956,760	$1,204,980	$2,103,150	$2,844,240	$2,347,800	$4,807,530	$1,386,000	$1,386,000	NA	NA
TOTAL ANNUAL COST		$595,150	$1,571,019	$1,376,381	$1,664,345	$2,502,217	$3,347,470	$3,210,456	$5,670,186	$2,180,213	$2,180,213	$315,707	$317,209

[e] Unless otherwise noted, equations were taken from U.S. Environmental Protection Agency, EPA Air Pollution Control Cost manual, Sixth Edition. EPA/452/B-02-001, January 2002.

[d] The ductwork cost including supports was e-mailed from Southern Environmental, Inc. to L. Mintzer (Trinity) on 11/7/11 for a 25,000 acfm collector. The ductwork cost estimate of$300/linear foot x 450 feet = $135,000 was conservatively added to the basic equipment cost only for flows greater than 20,000 acfm.

[e] Retrofit factors are not mentioned for RTOs in the OAQPS Manual. Thus, the retrofit factor for a venturi scrubber is appliedRetrofit factor based on average of 1.3 - 1.5, provided in OAQPS Manual, Section 6, Chapter 2, Page 2-49.

[f] Office of Air Quality Planning and Standards (OAQPS), EPA Air Pollution Control Cost Manual, Sixth Edition, Sec 6, Chpt 2, Table 2.9, EPA 452-B-02-001 (http://www.epa.gov/ttn/catc/products.html#cccinfo), Mussatti and Hemmer, July 2002.

[g] Lost Revenue and days required for retrofit estimated by Hexcel 12/19/11. Lines 11 and 12 were not operational on 12/19/11 so lost profit was not able to be estimated based on operating normals.

Lost Revenue for Lines 11 and 12 were estimated by Hexcel on 8/5/13 at $33,000 per day per line. Hexcel estimates 1 month to 6 weeks of downtime per line to install the RTO.

Total cost of lost revenue for RTO installation was discussed in the Hexcel submittal, but was not quantified. This addendum includes the cost of the lost revenue associated with RTO installation on the Lines.

Table B-8: Regenerative Thermal Oxidizer (RTO) Annualized Cost Estimate

Table B-8.1. Vendor Estimated Regenerative Thermal Oxidizer Cost

Flow Rate (scfm)	Basic Equipment Cost[a]
50,000	$675,000
40,000	$590,000
30,000	$500,000
20,000	$360,000
10,000	$210,000

[a]Estimated regenerative thermal oxidizer cost was e-mailed from Surewest, a pollution control equipment supplier, to Hexcel on 11/1/11.

Table B-8.2. Hexcel Exhaust Flow Rate

Hexcel Line No.	Average[b] Flow Rate (scfm)	Average[b] Flow Rate (acfm)	VOC Emission Rate (lb/hr)	CO Emission Rate (lb/hr)
2	254	750	0.01	0.02
3	16,321	23,000	0.91	0.67
4	18,866	21,200	0.80	0.63
5	23,980	35,350	0.67	0.73
6	19,790	28,100	0.91	0.79
7	30,557	9,900	1.82	1.23
8	53,724	85,800	7.18	3.53
10	53,724	85,800	7.18	3.53
11	47,678	72,750	8.83	4.34
12	47,678	72,750	8.83	4.28
13	NA	NA	NA	NA
14	NA	NA	NA	NA
PILOT	6,776	8,150	0.05	0.05
Matrix	7,140	10,000	0.07	0.54
112	NA	NA	NA	NA

[b]The average flow rate shown is the sum of flow rates per Hexcel line for point sources with non-negligible VOC emission rates presented in Table B-1. Point sources with negligible VOC emission rates were considered not technologically feasible to control with an RTO.

Table B-8.3. Annualized Regenerative Thermal Oxidizer Cost Per Hexcel Line

Parameter	Equation[c]	Hexcel Line No. 2	3	4	5	6	7	8	10	11	12	PILOT	Matrix
Direct Costs													
Purchased equipment costs													
Basic Equipment, Venturi scrubber, BE	Interpolated from Table 1	$121,943	$308,325	$337,840	$397,172	$348,565	$473,457	$742,194	$742,194	$672,069	$672,069	$197,601	$201,819
Ductwork[d]	$300/linear ft x 450 ft, vendor estimate for 25,000 acfm	not estimated	not estimated	not estimated	not estimated	not estimated	not estimated	$135,000	$135,000	$135,000	$135,000	$135,000	$135,000
Instrumentation	0.10 BE	$12,194	$30,833	$33,784	$39,717	$34,857	$47,346	$74,219	$74,219	$67,207	$67,207	$19,760	$20,182
Sales taxes	0.03 BE	$3,658	$9,250	$10,135	$11,915	$10,457	$14,204	$22,266	$22,266	$20,162	$20,162	$5,928	$6,055
Freight	0.05 BE	$6,097	$15,416	$16,892	$19,859	$17,428	$23,673	$37,110	$37,110	$33,603	$33,603	$9,880	$10,091
Purchased Equipment Cost, PEC	PEC = 1.18 BE	$143,893	$363,824	$398,652	$468,663	$411,307	$558,679	$1,010,788	$1,010,788	$928,041	$928,041	$368,170	$373,146
Direct Installation Costs, DIC	0.3 PEC	$43,167.96	$109,147.22	$119,595.48	$140,598.84	$123,392.13	$167,603.64	$303,236.51	$303,236.51	$278,412.30	$278,412.30	$110,450.88	$111,943.85
Total Direct Costs, DC	PEC + DIC	$187,061.17	$472,971.30	$518,247.07	$609,261.63	$534,699.22	$726,282.45	$1,314,024.88	$1,314,024.88	$1,206,453.31	$1,206,453.31	$478,620.48	$485,090.00
Indirect Installation Costs													
Engineering	0.10 PEC	$14,389	$36,382	$39,865	$46,866	$41,131	$55,868	$101,079	$101,079	$92,804	$92,804	$36,817	$37,315
Construction & field expenses	0.05 PEC	$7,195	$18,191	$19,933	$23,433	$20,565	$27,934	$50,539	$50,539	$46,402	$46,402	$18,408	$18,657
Contractor fees	0.10 PEC	$14,389	$36,382	$39,865	$46,866	$41,131	$55,868	$101,079	$101,079	$92,804	$92,804	$36,817	$37,315
Start-up	0.02 PEC	$2,878	$7,276	$7,973	$9,373	$8,226	$11,174	$20,216	$20,216	$18,561	$18,561	$7,363	$7,463
Performance test	0.01 PEC	$1,439	$3,638	$3,987	$4,687	$4,113	$5,587	$10,108	$10,108	$9,280	$9,280	$3,682	$3,731
Contingencies	0.03 PEC	$4,317	$10,915	$11,960	$14,060	$12,339	$16,760	$30,324	$30,324	$27,841	$27,841	$11,045	$11,194
Total Indirect Costs, IC	0.31 PEC	$44,607	$112,785	$123,582	$145,285	$127,505	$173,190	$313,344	$313,344	$287,693	$287,693	$114,133	$115,675
TOTAL CAPITAL INVESTMENT[e] (2011$)	(DC + IC) * 1.25 retrofit factor	$289,585	$732,196	$802,286	$943,184	$827,756	$1,124,341	$2,034,212	$2,034,212	$1,867,683	$1,867,683	$740,941	$750,957

RACT EVALUATION REPORT
Hexcel Corporation

1.0 INTRODUCTION AND FACULTY DESCRIPTION

Hexcel Corporation (Hexcel) owns and operates a carbon fiber and fabric pre-impregnation (pre-preg) manufacturing plant in West Valley City, Salt Lake County. The primary SIC Code for the West Valley City Plant is 2821- Plastics Material, Synthetic Resins, & Nonvulcanized Elastomers. Products made at Hexcel are used in commercial aerospace primary and secondary structures, helicopters, defense aircraft, satellites and sporting equipment. Hexcel is a major source of air pollution for $PM_{10,}$ NO_x, CO, VOCs, and HAPs.

Hexcel's Plant began producing carbon fiber in 1970 and pre-preg tape in 1971. Currently, the 128,000 square foot facility consists of five buildings, a raw material receiving warehouse and a material testing laboratory. The Plant manufactures carbon fibers and hot melt pre-pregs with both woven and uni-directional reinforcements. The plant also produces epoxy resins, adhesive films and solvated fabrics which are supplied to Hexcel's Casa Grande plant where they are converted into core materials.

The plant operates under Utah DAQ AO DAQE-AN113860021-13 dated June 11, 2013. The plant is subject to 40 CFR 60 Subpart A- General Provisions, 40 CFR 60 Subpart IIII- Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, 40 CFR 63 Subpart A- General Provisions, 40 CFR 63 Subpart SS- National Emission Standards for Closed Vent Systems, Control Devices, Recovery Devices and Routing to a Fuel Gas System or a Process, 40 CFR 63 Subpart ZZZZ- National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, and 40 CFR 63 Subpart HHHHH- National Emission Standards for Hazardous Air Pollutants: Miscellaneous Coating Manufacturing. Additionally, Title V of the 1990 Clean Air Act also applies to the Hexcel West Valley City Plant operations.

1.1 Hexcel Corporation Facility Identification

Name:	Salt Lake Operations- West Valley City Plant
Address:	6800 West 5400 South West Valley City, Utah 84118
Owner/Operator:	Hexcel Corporation
UTM coordinates:	410,900 m Easting, 4,500,600 m Northing, UTM Zone 12

1.2 Facility Process Summary

Carbon fiber is a lightweight, high strength reinforcement material used in the manufacture of various composite structure items. The manufacturing process begins with a raw material called polyacrilonitrile (PAN).

Stabilization

In this first step, the PAN fibers are stabilized in an air oxidation process. The PAN is un-spooled, and fed into a series of low temperature (225-300 C), natural gas fueled ovens. A chemical conversion occurs as the fiber passes through the ovens, with oxidation, and polymerization taking place. This process also provides the initial alignment of the molecules in the fiber strand. The off-gas from this step in the process includes hydrogen cyanide (HCN), non-HAP VOCs, NH_3, CO, and PM_{10}. The off-gas is captured by ventilation hoods at each oven or within the oven structure itself and directed to a flameless natural gas injection (NGI) dual chambered Regenerative Thermal Oxidizer (RTO) for VOC, CO, and HCN destruction and then to a baghouse for particulate removal.

Carbonization

This step includes two different phases. The first phase, tar removal, occurs within an electrically heated low temperature (300-800° C) heated furnace (LT furnace) through which the fiber continuously passes. The tar removal phase removes unwanted elements from the molecular structure and plays a key role in further aligning the polymer chain. There are no emissions associated with the combustion.

During the entire carbon fiber manufacturing process, the PAN fibers lose approximately 50% of its original weight with the vast majority of that loss occurring in the tar removal phase. During this phase, the LT furnace is constantly blanketed with an inert atmosphere (primarily nitrogen) to prevent the fiber from self-combusting. Process emissions generated from the tar removal phase are primarily HCN, other VOCs and particulates that will be directed to a RTO/baghouse system.

The next phase occurs at higher temperatures (1,200°-1,450° C) than those of the tar removal phase. This process occurs in an electrically heated high temperature furnace (HT furnace). This phase is necessary to promote the crystalline structure growth of the molecules and to remove the final non-carbon components from the polymer rings. The resulting fiber is about 92%-95% carbon.

This phase of carbonization evolves primary HCN, other VOC emissions and particulates which will be directed to a RTO/baghouse system. Once the process is at steady state, the RTO is fueled by both natural gas and other combustible gases (HCN, VOC) that are off gassing from the process.

Surface Treatment

The carbon fiber that exits the last HT furnace is at its final molecular structure. However, surface treatment is necessary in order for the finished fibers to bond with the resins that are used as binders during the manufacture of composite structures. This step involves an electrolytic process where the fiber acts as the conductor. This step involves the addition of hydroxyl units attaching to the fiber that chemically bond to the resins. The surface treatment bath is an aqueous mixture containing ammonium bicarbonate. Since this phase of the process mainly produces ammonia emissions, these emissions are not routed to the RTO/baghouse system.

Sizing
The final phase of the process may consist of an application of a thin coat of epoxy resin onto the surface of the carbon fiber that acts to hold the filaments together and improve the operability of the fiber in customer's operations. This process is referred to as the sizing operation and depending on the resin being used, it may contain a small percentage of xylene that is driven off during the drying process. Because of the very low concentration of xylene, abatement is not being considered for this step, these emissions are not routed to the RTO/baghouse system.

After the sizing process, the fiber is wound into cores and packaged for shipment.

The Pilot Plant is a fiber line operation but along with R&D work, specialty products are produced here (Building 2344).

Solvent Coater Prepreg (Matrix Operations)
The solvent coating operation consists of two distinct phases, the manufacture of the solvated epoxy resin and the application of the manufactured resin to the woven graphite cloth/fabric. The production of the solvated epoxy resin consists of mixing specified resins with measured amounts of MEK. The MEK carrier allows the resin to distribute evenly over and into the fabric weave (impregnate). The application of the resin to woven graphite fabric consists of a piece of machinery (solvent coater) with a series of drive rollers, a dip bath, a heated tower and a fume incinerator with heat recover. The solvent coater assembly essentially impregnates the woven graphite fabric with a specified amount of solvated resin.

1.3 Facility Criteria Air Pollutant Emissions Sources

Fiber Lines (2-8 and 10-14)
Pilot Furnace and Ovens
Matrix Operation
HVAC Systems
Emergency Generators

1.4 RACT Cut-off Threshold

Based on 2008 baseline actual emissions, add on controls for the following emission points would not significantly reduce emissions:

HVAC Systems: 2008 actual baseline emissions for the HVAC systems were reported as follows, in tpy: $PM_{2.5}$ = 0.11, NOx = 1.43, SOx = 0.01, and VOC = 0.10

Emergency Generators: 2008 actual baseline emissions for the emergency generators were reported as follows, in tpy: $PM_{2.5}$ = 0.12, NOx = 1.72, SOx = 0.11, and VOC = 0.37. In addition to low actual emissions, emergency generators operate less than 100 hours per year for maintenance and testing purposes.

2.0 RACT Evaluation

2.1 Emission Source – Fiber Lines

The Fiber Lines include: Oxidation Ovens, Incinerators, Low-Temperature Furnaces, High Temperature Furnaces, Surface Treatment Equipment, and Ammonium Bicarbonate/RO Water Mix Rooms. Fiber lines 2, 3 and 4 have been established with electrically heated ovens, which emit no combustion emissions. Fiber lines 5–8 and 10-14, the Pilot Plant and Matrix Operations have been established with natural gas heated ovens.

Emissions associated with the stabilization and carbonization processes in the Fiber Lines are primarily hydrogen cyanide (HCN), VOCs, NH_3, CO, PM_{10} and $PM_{2.5}$, but also small amounts of NOx and SOx.

2008 baseline actual emissions for Fiber Lines 2-8 were reported as follows, in tpy: $PM_{2.5}$ = 18.97, NOx = 90.75, SO_2 = 9.84, and VOC = 59.44. However, Fiber Lines 10-14 have since been permitted for operation at the facility. Hexcel reports that they operate very close to PTE emission levels when a production line is fully operational. Therefore, for consistency, PTE emission estimates will be used in place of 2008 baseline actual emissions when evaluating all Fiber Line potential reductions or cost per ton analyses.

Fiber Line PTE Emissions use in Reduction and Cost Analyses				
Fiber Line	$PM_{2.5}$	NOx	SOx	VOC
2	1.14	0.20	0.00	0.05
3	5.00	14.94	1.70	4.01
4	3.90	9.44	1.05	3.53
5	2.55	9.63	1.06	2.93
6	2.13	9.93	1.09	4.00
7	2.70	15.59	1.71	7.96
8	10.63	7.89	4.14	31.47
10	10.63	7.89	4.14	31.47
11	13.06	9.69	4.14	38.67
12	13.03	9.69	4.14	38.67
13	0.26	11.36	5.13	1.89
14	0.26	11.36	5.13	1.89

Fiber Line PTE Emissions use in Reduction and Cost Analyses				
Fiber Line	$PM_{2.5}$	NOx	SOx	VOC
Pilot Plant	0.24	0.85	0.12	0.20
Matrix Operations	0.45	5.97	0.04	0.33
Total PTE	66.01	124.43	35.59	167.07

Existing Controls:

There is a plant wide carbon fiber production limit of 13,100,000 lb per rolling 12-month period and a VOC limit of 158.48 tons per rolling 12-month period. There is also a natural gas combustion limit of 820,780,000 scf per rolling 12-month period for NOx and SOx control along with various operational controls on incinerators/ovens.

Fiber Lines 13 and 14 currently are permitted with a baghouse for PM control, the use of ultra-low NOx burners for NOx control, and use of RTO for VOC emission control.

The R&D facility surface treatment and sizing performed on the fiber produced shall be water based except for the use of no more than 200 lb of VOC solvents per year before emission controls are required.

$PM_{2.5}$

Available Control Technology

Based on the review of U.S. EPA RBLC database and similar operations, the following control technologies have been identified that would be applicable for controlling filterable PM_{10} and $PM_{2.5}$ emissions from the proposed gas streams:

1.GCP,
2. Baghouse,
3. Venturi Scrubber, and
4. Wet Electrostatic Precipitator (ESP)

The search of the RBLC database produced one carbon fiber manufacture facility. Additional searches of the database, for similar combustion units fired with natural gas were also conducted. The controls applicable to filterable PM_{10} are assumed to provide a level of control for $PM_{2.5}$ as well

GCP
U.S. EPA's RBLC database lists several operations where GCP are the accepted technology for minimizing particulate emissions. GCP reduce particulate emissions by keeping the burners maintained properly so that they continue to operate according to their design.

Baghouse

Baghouses remove particulates by collecting particulates on the filter bag as the exhaust stream passes through the baghouse. Baghouses typically cannot withstand high exhaust temperatures (greater than 500 ºF). Fabric filer technology is a well-established particulate control technology that has historically been established as BACT. Properly designed and well run baghouses generally have higher PM control efficiency than scrubbers due to smaller void spaces in fabric filtration used by a baghouse versus atomized water adsorption used in a scrubber, generally a baghouse can achieve 95% control efficacy for $PM_{2.5}$. Baghouse control efficiencies are highly dependent upon inlet grain loading to the baghouse. For this reason, U.S. EPA typically sets grain loading versus control efficiency limits on baghouses in the NESHAP regulations in 40 CFR 63. Many of Hexcel's fiber line emission rates are lower than the typical grain loading limits considered MACT in the NESHAP regulations.

In 2012, a baghouse was determined to be BACT for controlling PM emissions for Fiber Lines 13 and 14.

Venturi Scrubber

A venturi scrubber was scoped for Hexcel rather than a packed bed scrubber because particulate from Hexcel operations might clog a packed bed scrubber. Venturi scrubbers are generally applied for controlling particulate matter and sulfur dioxide. They are designed for applications requiring high removal efficiencies of submicron particles, between 0.5 and 5.0 micrometers in diameter. A venturi scrubber employs a gradually converging and then diverging section, called the throat, to clean incoming gaseous streams. Liquid is either introduced to the venturi upstream of the throat or injected directly into the throat where it is atomized by the gaseous stream. Once the liquid is atomized, it collects particles from the gas and discharges from the venturi. High efficiency wet scrubbers have been shown to achieve 98% capture for $PM_{2.5}$.

Wet ESP

As part of this analysis, the possibility of using a Wet ESP was reviewed. Wet ESP technology removes particulates by electrically charging the particles and collecting the charged particles on plates. The collected particulate is washed off the plates and collected in hoppers at the bottom of the ESP. High efficiency ESPs have been shown to achieve control of particulates up to 99.5% capture for $PM_{2.5}$.

Technically Infeasible RACT Controls

Wet ESP

Hexcel has experienced systematic failure of an ESP due to the presence of small carbon fiber filaments when incinerating carbon pre-impregnated fiber at a Davis County disposal facility in the 1990's. Specifically, the very fine broken carbon filaments in the process gas stream are conductive and, as a result, they short circuited the ESP. Based on this, EPSs are technically infeasibe.

The RBLC database does not contain any examples of carbon fiber facilities installing particulate control devices for RACT, BACT, or LAER. It has been shown that the wet ESP technology is infeasible for Hexcel's operations.

Evaluation and Ranking of Technically Feasible RACT Controls

A venturi scrubber, baghouse and existing controls of GCP remain as feasible control technologies for $PM_{2.5}$ from Fiber Lines 2-8 and 10-12. Fiber Lines 13 and 14 are currently permitted with a baghouse.

Venturi Scrubber

The high pressure drop through these systems results in high energy use, and the relatively short gas-liquid contact time restricts their application to highly soluble gases. Therefore, they are infrequently used for the control of volatile organic compound emissions in dilute concentration. The RACT analysis estimates scrubber $PM_{.5}$ control efficiency at 98%.

Retrofits and redesign of the Fiber Lines would require significant loss in production for Hexcel. Costs associated with loss of production have conservatively been included in the total costs associated with the installation of particulate controls for the older lines.

Baghouse

Baghouse control was calculated for Hexcel emission sources with emission rates greater than 0.005 gr/dscf, which is a MACT standard for iron and steel foundries.

PM2.5 Technically Feasible Control Options Cost Analysis Baghouse/Venturi Scrubber				
Fiber Line	Baghouse PM2.5 Removal (tpy)	Baghouse Cost ($) / Ton	Venturi Scrubber PM2.5 Removal (tpy)	Venturi Scrubber Cost ($) / Ton
2	1.11	$291,958	1.12	$135,480
3	3.20	$210,878	4.90	$88,116
4	2.00	$311,738	3.83	$114,215
5	1.37	$329,431	2.50	$319,850
6	0.89	$415,624	2.09	$252,239
7	1.08	$363,916	2.64	$169,958
8	4.63	$248,758	10.42	$122,643
10	4.63	$248,758	10.42	$122,643
11	7.39	$206,426	12.80	$87,505
12	7.39	$206,426	12.80	$87,505
Pilot Plant	0.09	$4,348,649	0.24	$1,407,208

PM2.5 Technically Feasible Control Options Cost Analysis Baghouse/Venturi Scrubber				
Fiber Line	Baghouse PM2.5 Removal (tpy)	Baghouse Cost ($) / Ton	Venturi Scrubber PM2.5 Removal (tpy)	Venturi Scrubber Cost ($) / Ton
Matrix Operation	--	--	0.44	$772,503

Retrofitting Fiber Lines with a venturi scrubber or a baghouse is economically infeasible.

Selection of RACT controls

The continued use of GCP is recommended as RACT for the control of $PM_{2.5}$ emissions from Fiber Lines 2-8 and 10-12, the Pilot Plant, and the Matrix Operations.

The continued use of GCP and baghouse add on control is recommended as RACT for the control of $PM_{2.5}$ emissions from Fiber Lines 13 and 14.

<u>SO_2</u>

Available Control Technology

The oxidation process is completed with the operation of oxidizer ovens set at specified temperatures in order to achieve the required amount of oxidation reaction for the fiber stabilization process. The ovens are either electrical (Fiber Lines 2, 3, and 4) or natural gas heated (Fiber Lines 5-8 and 10-14). Process emissions generated during the oxidation process within the ovens are not combined with the natural gas combustion emissions in the existing configuration of Fiber Lines 5-7, but are combined with the combustion emissions in the configuration of Fiber Lines 8-10 and 10-14. Therefore, lower SO_2 emissions (as well as other emissions) will be seen for stacks where natural gas combustion emissions are not mixed with the process emissions.

Based on the review of U.S. EPA RBLC database and similar operations, the following control technologies have been identified that could be applicable for controlling SO_2 emissions from the Fiber Lines:

1. Use of Natural Gas Only as Fuel, and
2. Venturi Scrubber

The search of the RBLC database produced one carbon fiber manufacture facility. Results of additional searches of the database, indicate that SO_2 controls are rarely implemented for similar types of units.

<u>Use of Natural Gas Only as Fuel</u>
SO_2 emissions from natural gas are generally lower than from other fuels such as diesel. Thus, natural gas usage as fuel is a control technology option for Hexcel combustion sources.

Venturi Scrubber

A venturi scrubber was scoped for Hexcel rather than a packed bed scrubber, which is typically used for controlling SO_2, because particulate from Hexcel operations might clog a packed bed scrubber. Venturi scrubbers are generally applied for controlling particulate matter and sulfur dioxide. A venturi scrubber is expected to achieve about 90 to 95% SO_2 removal. Emissions estimates from the fiber lines with Venturi scrubber technology installed are calculated assuming 92% control efficiency.

Technically Infeasible RACT Controls

All identified control technologies are technically feasible.

Evaluation and Ranking of Technically Feasible RACT Controls

Redesign of the Fiber Lines would require significant loss in production for Hexcel. Costs associated with loss of production have conservatively not been included in the total costs associated with the installation of SO_2 controls.

SO_2 Technically Feasible Control Options Cost Analysis Venturi Scrubber		
Fiber Line	**SO_2 (tpy) Reduction**	**Cost ($) / Ton Reduction**
2	**0.0002**	**$763,163,540**
3	**1.56**	**$145,664**
4	**0.97**	**$234,465**
5	**0.97**	**$234,465**
6	**1.00**	**$265,509**
7	**1.57**	**$190,558**
8	**3.81**	**$370,902**
10	**3.81**	**$370,902**
11	**3.81**	**$300,118**
12	**3.81**	**$300,118**
13	**4.72**	**$398,747**
14	**4.72**	**$398,747**
Pilot Plant	**0.11**	**$1,467,410**
Matrix Operation	**0.03**	**$10,115,962**

Retrofitting Fiber Lines with a venturi scrubber is economically infeasible. Because a

venturi scrubber is a control option specifically for PM and SO_2, the reductions for both pollutants were combined to determine economic feasibility.

($PM_{2.5}$ + SO_2) Technically Feasible Control Options Cost Analysis Venturi Scrubber		
Fiber Line	**($PM_{2.5}$ + SO_2) (tpy) Reduction**	**Cost ($) / Ton Reduction**
2	**1.12**	**$137,346**
3	**6.46**	**$35,336**
4	**4.80**	**$47,527**
5	**3.47**	**$89,943**
6	**3.09**	**$85,966**
7	**4.21**	**$71,062**
8	**14.23**	**$99,394**
10	**14.23**	**$99,394**
11	**16.61**	**$68,901**
12	**16.61**	**$68,901**

This cost analysis also indicates that retrofitting Fiber Lines with a venturi scrubber is economically infeasible even with the combined reductions of PM and SO_2.

Selection of RACT controls

The continued use of natural gas is recommended as RACT for the control of SO_2 emissions from Fiber Lines 2-8 and 10-14, the Pilot Plant, and the Matrix Operations.

<u>NOx</u>

Available Control Technology

The oxidation process is completed with the operation of oxidizer ovens set at specified temperatures in order to achieve the required amount of oxidation reaction for the fiber stabilization process. The ovens have the capability to be either electrical or natural gas heated. Fiber lines 2, 3 and 4 have been established with electrically heated ovens, which emit no combustion emissions. Fiber lines 5 – 7, 8, 10, 11 and 12 have been established with natural gas heated ovens. Process emissions generated during the oxidizing process within the ovens are not combined with the natural gas combustion emissions in the existing configuration of Fiber Lines 5 – 7, but are combined with the combustion emissions in the configuration of Fiber Lines 8, 10, 11, 12, 13 and 14. For the purpose of this analysis, combined emissions from the fiber lines were evaluated.

Based on the review of U.S. EPA RBLC database and similar operations, the following control technologies have been identified for controlling NOx emissions from the proposed gas streams:

1. GCP,
2. Use of Natural Gas Only as Fuel,
3. Low-NOx Burners (LNB),
4. Ultra-Low-NOx Burners (ULNB),
5. Selective Catalytic Reduction (SCR), and
6. Selective Non-Catalytic Reduction (SNCR)

The search of the RBLC database produced one carbon fiber manufacture facility. This facility installed LNB as NOx controls. Additional searches of the database, for similar combustion units fired with natural gas were also conducted. The results of these searches produced the same list of control devices for NOx as shown above.

GCP

U.S. EPA's RBLC database lists numerous operations where GCP are the accepted technology for minimizing NOx emissions. GCP reduce NOx emissions by keeping the burners maintained properly so that the burners continue to operate according to their design.

Use of Natural Gas Only as Fuel

Restricting fuel type to natural gas may limit NOx emissions, because other fuels combusted may raise NOx emission rates.

LNB

A search of control technologies associated with combustion sources similar to the oxidation ovens at the Hexcel plant reveal that LNB are accepted technology for control of NOx. Implementation of LNB technology has been shown to reduce NOx emissions by 50% compared with standard burners.

ULNB

An ULNB incorporates a LNB with an additional system such as flue gas recirculation to further reduce NOx. ULNBs provide a stable flame that has several different zones. There are many variations on the LNB theme of reducing NOx that can produce more than 80% Destruction Removal Efficiency (DRE). NOx emission rates as low as 9 ppmv have been achieved in practice.

In 2012, GCP and ULNB were determined to be BACT for controlling NOx emissions for Fiber Lines 13 and 14.

SCR

SCR has been applied to large (>250 MMBtu/hr) utility and industrial boilers, process heaters, and combined cycle gas turbines. SCR can be applied as a stand-alone NOx control or with other technologies such as combustion controls. In practice, SCR systems

operate at to achieve NOx control efficiencies in the range of 70% to 90%.

The SCR process is based on the chemical reduction of the NOx molecule. The SCR employs a metal-based catalyst with activated sites to increase the rate of the reduction reaction. A nitrogen based reducing agent (reagent), such as ammonia or urea, is injected into the post combustion flue gas. The reagent reacts selectively with the flue gas NOx within a specific temperature range and in the presence of the catalyst and oxygen to reduce the NOx into molecular nitrogen (N_2) and water vapor (H_2O).

SNCR

SNCR is currently being used for NOx emission control on industrial boilers, electric utility steam generators, thermal incinerators, and municipal solid waste energy recovery facilities. Its use on utility boilers has generally been limited to units with output of less than 3,100 MMBtu. SNCR can be applied as a stand-alone NOx control or with other technologies such as combustion controls. The SNCR system can be designed for seasonal or year-round operations. SNCR can achieve NOx reduction efficiencies of up to 75 percent (%) in short-term demonstrations. In typical field applications, however, it provides 30% to 50% NOx reduction. Reductions of up to 65% have been reported for some field applications of SNCR in tandem with combustion control equipment such as LNB.

SNCR is based on the chemical reduction of the NOx molecule into molecular nitrogen (N_2) and water vapor (H_2O). A nitrogen based reducing agent (reagent), such as ammonia or urea, is injected into the post combustion flue gas. The reagent can react with a number of flue gas components. However, the NOx reduction reaction is favored over other chemical reaction processes for a specific temperature range and in the presence of oxygen; therefore, it is considered a selective chemical process.

The technique requires thorough mixing of reagent into the furnace chamber with at least 0.5 seconds of residence time at a temperature above 1600F and below 2100F. Optimally, the reagent is usually injected into the furnace at approximately 1900 - 1950F which is a good tradeoff between the competing reaction of oxidation of ammonia to NOx and maximizing the residence time prior to the low temperature limit.

The hardware associated with an SNCR installation is relatively simple and readily available. Consequently, SNCR applications tend to have low capital costs compared to LNB and SCR. Installation of SNCR equipment requires minimum downtime.

Technically Infeasible RACT Controls

SCR

There has been limited application of SCR to combustion devices and processes such as simple cycle gas turbines, stationary reciprocating internal combustion engines, nitric acid plants, and steel mill annealing furnaces. Results of the RBLC search for similar operations to Hexcel's, support that this type of control technology has not been used in operations similar to Hexcel operations.

Operation of an SCR requires installation of a baghouse to filter particulate from the Hexcel exhaust prior to entering the SCR to minimize catalyst plugging or poisoning. However, Silica Oxide (SiO_2) present in the Hexcel gas stream at a very small particle size (0.3 µm) may not be captured within the baghouse. These particles have a high potential to poison or plug the catalyst of the SCR and will make the SCR an ineffective control for the fiber line process.

An SCR does not control emissions effectively at high temperatures, in excess of 1000ºF, as well as low temperatures, below 700ºF. In order for the baghouse to operate properly, the air stream will need to be cooled to a maximum of 450ºF. In order to operate the SCR after the baghouse, the air stream would be reheated to above 700ºF. This would require significant operational expense and additional combustion related emissions.

Another drawback to the SCR system is additional ammonia emissions. Ammonia slip does not remain constant as the SCR system operates but increases as the catalyst activity decreases. Ammonia is considered as a pre-cursor to the $PM_{2.5}$ formation. For all of these combined reasons, SCR technology is considered to be technically infeasible for controlling NOx emissions from the Fiber Lines.

<u>SNCR</u>

Though simple in concept, it is challenging in practice to design an SNCR system that is reliable, economical, simple to control, and meets other technical, environmental, and regulatory criteria. Practical application of SNCR is limited by the system design and operating conditions.

SNCR's NOx control efficiency declines at temperatures below 1600ºF. Proposed particulate capture for the system will be conducted through a baghouse. In order for the baghouse to operate properly, the air stream will need to be cooled to a maximum of 450ºF. In order to operate the SNCR after the baghouse, the air stream would be required to be reheated to above 1600ºF. The Hexcel exhaust stream thus requires heating for effective NOx destruction, which consequently increases combustion emissions and fuel cost.

Another drawback to the SNCR system is additional ammonia emissions associated with the ammonia injection process. The Normalized Stoichiometric Ratio (NSR) defines the amount of reagent needed to achieve the targeted NOx reduction in the SNCR system. Typical NSR values require significantly more reagent to be injected in practice than required by the theoretical stoichiometric ratio. In addition, the amount of NOx removed is generally much less than the amount of uncontrolled NOx. This leaves a large portion of the injected reagent unreacted. Most of the excess reagent used in the process is destroyed through other chemical reactions. However, a small portion remains in the flue gas as ammonia slip. Ammonia is considered as a pre-cursor to $PM_{2.5}$ formation.

Results of the RBLC search for similar operations support that this type of control

technology has not been used in operations similar to Hexcel operations. For all of these reasons, this proposed technology is considered to be technically infeasible.

Evaluation and Ranking of Technically Feasible RACT Controls

GCP, use of natural gas, LNB, and ULNB are all technically feasible NOx control options for Fiber Lines 2-7, 8, 10, 11, and 12. ULNB is the best available control for this type of gas stream and has been proposed for use with the newly planned Fiber Lines 13 and 14.

Existing units in Fiber Lines 2 through 7, 8, 10, 11, and 12 incorporate burners that were installed from 1981 through 2011. The burners on the ovens for these Fiber Lines were installed based on permitted allowable emissions for the Hexcel site. Retrofit of the existing burners to incorporate LNB technology would require many expensive operational adjustments to the ovens, including:

1. Demolition of existing operations;
2. Redesign of hoods;
3. Burner box (Ductwork, ID-fan and stack) redesign;
4. Air flow adjustments;
5. Gas line input retrofit; and
6. Installation of pressure regulators.

A retrofit factor of 1.4 was included in the cost of installing the LNB based on documentation provided in the OAQPS manual, however this likely does not represent the true additional costs associated with retrofitting the older lines to incorporate newer burners.

Because proper oxidation is essential to the carbon stabilization process, redesign of the oven burner operations would initiate a complete redesign of the Fiber Line process to achieve consistent production levels. This redesign of the Fiber Lines would require significant loss in production for Hexcel. Costs associated with loss of production have been included in the total costs associated with the installation of LNB for the older lines. However, they have conservatively not been included in the total costs associated with the installation of other NOx controls for the older lines. For these reasons, this proposed technology is considered to be cost prohibitive for controlling NOx emissions from Fiber Lines 2 through 7, 8, 10, 11 and 12. NOx control for the newer proposed Fiber Lines 13 and 14 will incorporate ULNB as established in the AO approved for Hexcel December 2011.

NOx Technically Feasible Control Options Cost Analysis LNB/ULNB Scrubber				
Fiber Line	LNB NOx Removal (tpy)	LNB Cost ($) / Ton	ULNB & FGR NOx Removal (tpy)	ULNB & FGR Cost ($) / Ton
2	0.10	$2,147,568	0.16	$219,791
3	5.13	$116,151	11.95	$50,548

NOx Technically Feasible Control Options Cost Analysis LNB/ULNB Scrubber				
Fiber Line	LNB NOx Removal (tpy)	LNB Cost ($) / Ton	ULNB & FGR NOx Removal (tpy)	ULNB & FGR Cost ($) / Ton
4	3.18	$153,659	7.55	$66,168
5	4.81	$143,129	7.70	$102,790
6	4.97	$228,885	7.94	$155,648
7	7.79	$193,331	12.47	$128,793
8	3.94	$318,177	6.31	$214,322
10	3.94	$630,055	6.31	$409,168
11	4.85	$398,063	7.75	$261,514
12	4.85	$398,063	7.75	$261,514
Pilot Plant	0.42	$16,404	0.68	$21,707
Matrix Operation	2.98	$43,013	4.77	$37,663

Retrofitting Fiber Lines 2-8 and 10-12, Pilot Plant, and Matrix Operations with LNB or ULNB & FGR is economically infeasible.

Selection of RACT controls

The continued use of GCP and natural gas is recommended as RACT for the control of NOx emissions from Fiber Lines 2-8 and 10-12, the Pilot Plant, and the Matrix Operation.

The continued use of UNLB and natural gas is recommended as RACT for the control of NOx emissions from Fiber Lines 13 and 14.

VOC

Available Control Technology

Based on the review of U.S. EPA RBLC database and similar operations, the following control technologies have been identified that could be applicable for controlling VOC emissions from the Fiber Lines:

1. GCP,
2. Use of Natural Gas Only as Fuel,
3. Flares,
4. Incinerators, and
5. Regenerative Thermal Oxidizer (RTO)

The search of the RBLC database produced one carbon fiber manufacture facility. It should be noted that the only VOC control associated with the found carbon fiber manufacture facility is a wet scrubber for the control of VOCs from an acrylonitrile delivery storage tank. This type of system does not exist at the Hexcel facility.

GCP

U.S. EPA's RBLC database lists numerous operations where GCP are the accepted technology for minimizing VOC emissions. GCP reduce VOC emissions by keeping the burners maintained properly so that they operate according to their design.

Use of Natural Gas Only as Fuel

Restricting fuel type to natural gas limits VOC emissions, because other fuel options, such as diesel or coal, generate more VOC emissions per heat output. VOC emissions from natural gas combustion are lower than emissions from any other readily available fuel. Thus, natural gas usage as fuel is a control technology option for Hexcel combustion sources.

Flares

Flaring is a volatile combustion control process for organic compound in which the VOCs are piped to a remote, usually elevated, location and burned in an open flame in the open air using a specially designed burner tip, auxiliary fuel, and steam or air to promote mixing for nearly complete (> 98%) VOC destruction. Completeness of combustion in a flare is governed by flame temperature, residence time in the combustion zone, turbulent mixing of the components to complete the oxidation reaction, and available oxygen for free radical formation. Flares can be used to control almost any high concentration VOC stream, and can handle fluctuations in VOC concentration, flow rate, heating value, and inert content. Flaring is appropriate for continuous, batch, and variable flow vent stream applications.

Incinerators

A major advantage of incineration is that virtually any gaseous organic stream can be incinerated safely and cleanly, provided proper engineering design is used. The heart of an incinerator system is a combustion chamber in which the VOC-containing waste stream is burned. Since the inlet waste gas stream temperature is generally much lower than that required for combustion, energy must be supplied to the incinerator to raise the waste gas temperature. Seldom, however, is the energy released by the combustion of the total organics (VOCs and others) in the waste gas stream sufficient to raise its own temperature to the desired levels, so that auxiliary fuel (e.g., natural gas) must be added.

The heart of the thermal incinerator is a nozzle-stabilized flame maintained by a combination of auxiliary fuel, waste gas compounds, and supplemental air added when necessary. Upon passing through the flame, the waste gas is heated from its inlet temperature to its ignition temperature. The ignition temperature varies for different compounds and is usually determined empirically. It is the temperature at which the combustion reaction rate (and consequently the energy production rate) exceeds the rate

of heat losses, thereby raising the temperature of the gases to some higher value. Thus, any organic/air mixture will ignite if its temperature is raised to a sufficiently high level.

The organic-containing mixture ignites at some temperature between the preheat temperature and the reaction temperature. That is, ignition, as defined in this section, occurs at some point during the heating of a waste stream as it passes through the nozzle-stabilized flame regardless of its concentration. The mixture continues to react as it flows through the combustion chamber.

The required level of VOC control of the waste gas that must be achieved within the time that it spends in the thermal combustion chamber dictates the reactor temperature. The shorter the residence time, the higher the reactor temperature must be. Once the unit is designed and built, the residence time is not easily changed, so that the required reaction temperature becomes a function of the particular gaseous species and the desired level of control.

RTO

A flameless natural gas injection NGI dual chambered RTO system uses a bed of ceramic material to absorb heat from the exhaust gas, and then uses the captured heat to preheat the incoming process gas stream. Emissions associated with implementation of the RTO technology were calculated assuming 98% control efficiency.

RTOs are suited to applications with low VOC concentrations but high waste stream flow rates. This is due to their high thermal energy recovery. The basic operation of an RTO consists of passing a hot gas stream over a heat sink material in one direction and recovering that heat by passing a cold gas stream through that same heat sink material in an alternate cycle. They are used to destroy air toxics and VOCs that are discharged in industrial process exhausts. Once the proposed process is at steady state, the RTO is fueled by both natural gas and other combustible gases (HCN, VOC) that are off gassing from the process.

In 2012, GCP and NGI dual chambered RTO was determined to be BACT for controlling VOC emissions for Fiber Lines 13 and 14.

Technically Infeasible RACT Controls

All identified technologies are technically feasible.

Evaluation and Ranking of Technically Feasible RACT Controls

Existing controls, including GCP, use of natural gas as fuel, incineration and flaring technology are remaining feasible control technologies.

The proposed operation of a RTO, following a high temperature furnace is clearly the best available control for this type of gas stream and has been proposed for use with the newly planned Fiber Lines 13 and 14. Redesign of the Fiber Lines would require

significant loss in production for Hexcel, costs associated with loss of production have been included in the total costs associated with the installation of VOC controls for the older lines.

VOC Technically Feasible Control Options Cost Analysis Thermal Oxidation		
Fiber Line	**VOC (tpy) Reduction**	**Cost ($) / Ton Reduction**
2	**0.05**	**$12,145,918**
3	**3.93**	**$399,771**
4	**3.46**	**$397,867**
5	**2.87**	**$579,628**
6	**3.92**	**$638,321**
7	**7.80**	**$429,119**
8	**30.84**	**$104,098**
10	**30.84**	**$183,855**
11	**37.90**	**$57,531**
12	**37.90**	**$57,531**
Pilot Plant	**0.20**	**$1,596,751**
Matrix Operation	**0.32**	**$986,419**

Retrofitting Fiber Lines 2-8, 10-12, the Pilot Plant, and the Matrix Operation with thermal oxidation is economically infeasible.

Selection of RACT controls

Continued use of GCP, natural gas as fuel, incineration and flaring technology are recommended as RACT for Fiber Lines 2-8 and 10-12, the Pilot Plant, and the Matrix Operations.

Continued use of GCP, natural gas as fuel, RTO, incineration and flaring technology are recommended as RACT for Fiber Lines 13 and 14.

3.0 Startup Shutdown

Hexcel's standard operating procedure is to not start processing product until desired operating conditions have been achieved. For the fiber line operations, the startup sequence begins prior to the input or while passing of polyacrylonitrile (PAN) through the first oxidation oven. For the pre-preg operations the desired operating condition is

achieved prior to passing pre-preg through the system. Similarly, shutdown of the system is conducted at a time which no product is running through the fiber lines or pre-preg processes. The natural gas fired oxidation ovens (LNB), low and high temperature furnaces (RTO and fume incinerators), and burner boxes are brought to temperature specification prior to fiber passing through the process. Therefore, during startup and shutdown of the carbon lines, small amounts of process related emissions are expected but are accounted for as "normal process emissions" in Hexcel's facility-wide process or natural gas emission/consumption enforceable limits, not excess emissions.

Oxidation Ovens

During startup the LNB ovens are brought to temperature prior to initiating PAN to pass through the process. It is critical for optimal processing of PAN for all systems to be at normal operating conditions to result in a desired fiber product. To compress the startup time, Hexcel brings the oxidation ovens to temperature in sequence within two hours. During startup of a cold oven, NOx emissions tend to be lower because of lower oven temperatures and excess ambient air.

Low Temperature Carbonization Furnaces

Emissions from the low temperature carbonization furnaces are controlled by a dedicated fume incinerator (fiber lines 2, 3, 4, 5, 6, 7, 8, 10, 11, & 12) or a RTO (fiber lines 13 & 14). Hexcel's internal procedures require the incinerators/oxidizer be brought on-line and at permitting temperature as well as the baghouse to be operating prior to initiating fiber line operations. There will not be any excess (startup) emissions because emissions from natural gas combustion during this time will be similar or less than normal operations.

High Temperature Carbonization Furnaces

For each fiber line, a burner box is dedicated to each high temperature carbonization furnace. Fiber lines 13 & 14 have an additional RTO and baghouse controls. Hexcel's internal procedures require igniting the burner boxes and starting the RTO and baghouse prior to fiber being passed through high temperature carbonization furnaces. There will not be any excess (startup) emissions because emissions from natural gas combustion during this time will be similar or less than normal operations.

Hexcel preforms the following daily inspections:

- Visual confirmation of a flame in fume incinerators
- Visual confirmation of a flame in burner boxes
- Temperature readings are observed and recorded
- O_2 levels are monitored and recorded.
- Signs and labels of operating parameters are included on all the abatement equipment readouts
- An environmental compliance tag is attached to abatement equipment notifying observers if anything it out of specification. In the event of parameters being

observed out of range, the Environmental Engineer and Maintenance Department are to be notified immediately.

In addition, Hexcel is required by permit and subpart applicability to the following maintenance requirements:

- Every 180 days the thermocouples are calibrated in accordance with 40 CFR 60, Appendix A, Method 2, paragraph 6.3 and 10.31 or use a K type thermocouple; and O2 monitors calibrated in accordance with manufacturer's standard.
- At least annually, baghouse pressure drop monitoring devices will be calibrated according to manufacturer's standards.
- The oxidation ovens are subject to 40 CFR 63 Subpart DDDDD
    - (5-10 MMBtu/hr) tune ups every two years
    - (< 5 MMBtu/hr) tune ups every five years
    - Compliance reports due by January 31, 2016 with subsequent reports due every two years thereafter
    - Energy assessment of existing process heaters
    - Additional MACT work practice standards, reports and maintenance records

For shutdown, Hexcel follows an internal procedure to discontinue passing fiber through the process prior to control devices being shutdown (or cooled off).

4.0 Conclusion- Emissions Reduction through RACT implementation

Emission reductions were not established in the RACT analysis because many technologies were eliminated due to insignificant or no current emissions or cost concerns. However, the following limits shall not be exceeded for Fiber Lines 2-8, 10-16, the Pilot Plant, and Matrix Operations:

A. 4.42 MMscf of natural gas consumed per day.

B. 0.061 MM pounds of carbon fiber produced per day.

C. Compliance with each limit shall be determined by the following methods:
Natural Gas consumption shall be determined by examination of natural gas billing records for the plant.

Fiber production shall be determined by examination of plant production records.

Records of consumption and production shall be kept on a daily basis for all periods then the plant is in operation.

5.0 Implementation Schedule

Hexcel's SIP limits do not have an implementation date associated with them because the limits are based on throughput and consumption which including two additional fiber lines (15 & 16) not currently in operation at the facility. However, Hexcel proposes to submit an application for the modification to add fiber lines 15 & 16 in Fall 2014 with expected construction by mid-2015.

6.0 Notes

1. In TechLaw's July 16, 2013 Evaluation report, page 11, a couple of erroneous references were made, they are as follows: (1) Reference is made to Hill Air Force Base (HAFB) instead of Hexcel, and (2) reference to VOC and HAP limitations being provided in the facilities operating permit, however, Hexcel does not currently have an operating (Title V) permit.
2. Hexcel's ULNB emission reduction calculations are based on 68% removal efficiency for NOx. DAQ determined a more appropriate reduction efficiency is 80% and recalculated NOx reductions from ULNB with this efficiency and adjusted the cost/ton estimate to reflect these reductions.

7.0 References

1. Hexcel Corporation. 11386 Emission Inventory Data. 2008
2. Trinity Consultants. Project Report, Hexcel Corporation, Salt Lake City Facility, Reasonable Available Control Technology Analysis for $PM_{2.5}$. January 11, 2012
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5. Hexcel Corporation. PM2.5 SIP RACT – Request for Additional Information. May 2, 2013.
6. Hexcel Corporation. Addendum to Hexcel $PM_{2.5}$ SIP RACT Assessment. August 7, 2013.
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