

PM₁₀ SIP/Maintenance Plan Evaluation Report:
Hexcel

Salt Lake County Nonattainment Area

Utah Division of Air Quality

Major New Source Review Section

October 1, 2015

PM₁₀ SIP/MAINTENANCE PLAN EVALUATION REPORT

Hexcel Corporation

1.0 Introduction

This evaluation report (report) provides Technical Support for Section IX, Part H.1 and Section IX, Part H.2 of the PM₁₀ Maintenance Plan (Maintenance Plan); to address the Salt Lake County PM₁₀ Nonattainment Area. This document specifically serves as an evaluation of Hexcel Corporation.

Note on document identification: The intention of the Utah Division of Air Quality is to develop a Maintenance Plan to address PM₁₀. As part of this effort, SIP Subsections IX.H.1 Emission Limits and Operating Practices – General Requirements, IX.H.2 Source-Specific Particulate Emission Limitations in Salt Lake and Davis Counties and IX.H.3 Source-Specific Particulate Emission Limitations for Utah County will be repealed and replaced. Subsection IX.H.4 will be repealed and replaced with Interim Emission Limits and Operating Practices. This subsection provides interim limits, consistent with the limits codified in the PM_{2.5} SIP, until future controls have been implemented within timeframes identified in Section IX Part H.2.

This evaluation report references the SIP version originally dated June 28, 1991 and made effective by EPA on August 8, 1994. This SIP version is often referred to as the “original SIP.” Additional SIP revisions were adopted by the Air Quality Board on July 6, 2005 and became state law on August 1, 2005. However, this version of the SIP was not adopted by EPA and therefore never became federal law. In order to distinguish between the various documents in this report, the following coding scheme will be used:

- Since Section IX.H of the 2005 State-only SIP will be repealed entirely, there is no need to refer to that document version within this report.
- When referencing the original SIP with an effective date of August 8, 1994 the qualifier ^{OS} will follow any citation from that document.
- When referencing any new Maintenance Plan/SIP condition or requirement, the citation will be left blank.
- When referencing any new SIP condition or requirement, the citation will be left blank.

Therefore, a particular sentence of this document might read as follows:

SIP Subsection IX.H.1.c – Stack Testing supersedes 2.a.A^{OS} from the original SIP.

2.0 Facility Identification

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

3.0 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 polyacrylonitrile (PAN).

Stabilization

In this first step, the PAN fibers are stabilized in an air oxidation process. The PAN is unspooled, 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, NH₃, CO, and PM₁₀. 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 this process. 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 employed 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 recovery. The solvent coater assembly essentially impregnates the woven graphite fabric with a specified amount of solvated resin.

4.0 Facility Criteria Air Pollutant Emissions Sources

The facility consists of the following emission sources

- Fiber lines (2-8 and 10-16)
- Pilot furnace and ovens
- Matrix operation
- HVAC systems
- Emergency generators

5.0 Facility 2011 Baseline Actual Emissions and Current PTE

Actual emissions from Hexcel's operation in 2011 were lower than the Potential to Emit for all pollutants.

Table 1: Comparison of Actual and Potential Emissions

Pollutant	Actual Emissions (Tons/Year) ¹	Potential to Emit (Tons/Year) ²
PM ₁₀	64.58	123.81
SO ₂	12.16	38.01
NO _x	108.31	168.65

¹ Hexcel's 2011 actual emissions

² PTE's for Hexcel's AO issued DAQE-AN113860024, dated August 11, 2015

6.0 Projected Emissions for 2019

The 2019 projected emissions were estimated with the addition of lines 12 through 16 to the actual emissions inventory submitted for 2011. Lines 12 through 16 were not permitted or constructed in 2011. NO_x emissions are primarily products of natural gas combustion.

Table 3: 2019 Projected Emission Values or Modeled Emission Values

Pollutant	Potential to Emit (Tons/Year)
PM ₁₀	70.43
SO ₂	35.64
NO _x	139.47

7.0 Comparison of Requirements – Original SIP and New Maintenance Plan

Hexcel is a previously listed SIP source. In the original PM₁₀ SIP document for Salt Lake County, Hexcel was included under the name Hercules Aerospace Company – Plant #3^{OS}. Requirements for Hexcel are found in IX.2.2.T^{OS}.

Although a specific application of new RACT is not a requirement of the maintenance plan, the limitations found within this maintenance plan are based on the most recent PM_{2.5} Section of the SIP. This section of the SIP required the application of RACT above and beyond the existing controls already required of most listed PM₁₀ SIP sources. The conditions, requirements and emission limitations contained within this maintenance plan are based on those in Sections IX.H.11, IX.H.12 and IX.H.13 – which comprise the PM_{2.5} sections of the SIP, and include this additional RACT application. All requirements from the original PM₁₀ SIP that have not been superseded or replaced, and which are still necessary, will also be retained. By necessary, meaning: needed in the demonstration of attainment of the 24-hour standard, or in demonstrating that no backsliding in the application of RACT has taken place.

All limits in this maintenance plan are based on the limits in the PM_{2.5} SIP; either in the general requirements of subsection IX.H.11 or the source specific requirements of IX.H.12.k. Therefore, a comparison between the original SIP requirements, and those found in this new maintenance plan can be found below.

7.1 SIP General Requirements

The following is a list of the requirements from the Salt Lake County^{OS} SIP and a discussion of each of the requirement including current relevance and expected changes.

IX.H.2.a General Requirements^{OS}

The original SIP was a divided document, having two separate sets of General Requirements. The requirements found at IX.H.1.a^{OS} applied to the listed sources found in Utah County, while those found at IX.H.2.a^{OS} applied to the listed sources found in Salt Lake and Davis County.

2.a.A. Stack Testing^{OS} – this subsection covered the general methods and procedures for

conducting stack testing, including the establishment of a pretest protocol, pretest conference, and the use of specific EPA test methods. This subsection has since been updated and superseded by SIP subsection IX.H.1.e which incorporates equivalent language.

2.a.B. Visible Emissions^{OS} – covered the establishment of designated opacity limitations for specified process units and/or process equipment. This subsection has since been superseded by SIP subsection IX.H.1.f which incorporates equivalent language.

2.a.C. Visible Emissions (cont.)^{OS} – covered the procedure by which visible emission observations would be conducted. This subsection has since been superseded by SIP subsection IX.H.1.f which incorporates equivalent language.

2.a.D. Annual Emission Limitations^{OS} – established that annual emissions would be determined on a rolling 12-month basis, and that a new 12 month emission total would be calculated on the first day of each month using the previous 12 months data. This subsection is no longer needed as the annual PM₁₀ standard no longer exists, and no source-specific annual SIP Caps appear in either IX.H.2 or IX.H.3 of the new maintenance plan.

2.a.E. Recordkeeping Requirements^{OS} – established that records need to be kept for all periods that the plant is in operation, for a period of at least two years, and provided upon request. This subsection has since been superseded by SIP subsection IX.H.1.c which incorporates equivalent language.

2.a.F. Approval Orders (AOs)^{OS} – established that this subsection of the SIP superseded any previously issued AOs. No longer applicable, as this subsection of the SIP will be superseded, and no previously issued AOs are still in existence.

2.a.G. Proper Maintenance^{OS} – established that all facilities need to be adequately and properly maintained. The requirement is not needed, as this is inherent in the NSR permitting program, under R307-401-4(1).

2.a.H. Future Modifications^{OS} – established that future modifications to the approved facilities were also subject to the NSR permitting requirements. The requirement is not needed, as this is inherent in the NSR permitting program, under R307-401-3(1)(b).

2.a.I. Unpaved Operational Areas^{OS} – established rules for treating fugitive dust with water sprays or chemical dust suppression. This requirement has been superseded by the nonattainment area fugitive dust control requirements of R307-309.

2.a.J. Actual Emissions^{OS} – established that the actual emissions included for each listed source in subsection IX.H.2.b would not be used for compliance purposes. This subsection is no longer needed as a listing of individual source actual emissions are no longer included in the requirements of subsection IX.H of the SIP.

2.a.K. Test if Directed^{OS} – established a definition of this term. No longer needed as this term is no longer used and the condition itself no longer applies. UDAQ has a minimum test

frequency established under R307-165-2. This same rule also allows for (and requires) any additional testing to demonstrate compliance status as deemed necessary by the Director.

2.a.L. Definitions^(OS) – established that the definitions contained in R307 apply to Section IX.H.2. This subsection has since been superseded by SIP subsection IX.H.1.b which incorporates equivalent language.

2.a.N. Specific Fuel Requirements for Coal and/or Oil^(OS) – established that specific rules for the sulfur content of these fuels also existed and applied. This subsection has since been superseded by the individual source requirements found in IX.H.2 and IX.H.3 (see specifically the sources Kennecott and BYU). This requirement is now largely irrelevant as few sources have the ability or authority to burn coal, and the rules on the sulfur content of fuel oil have been updated with lower sulfur requirements – specifically the requirements on the sulfur content allowed in diesel fuel found under 40 CFR 80.510(c) for off-highway diesel and 40 CFR 80.520(a) for on-highway diesel. None of the listed sources have the ability to burn any other fuel oils

7.2 SIP Source Specific Requirements

The requirements and limits specific to Hexcel were extensive and will not be added to this document. Rather a summary of the requirements and highlights of the requirements will be discussed. As multiple buildings exist at Hexcel, the document was divided into general requirements, applicable to the entire source, and into building specific requirements.

The general Hexcel requirements limited visible emissions to less than or equal to 10% opacity; required that plant roads and parking lots be paved and cleaned by street vacuums; required the use of natural gas as the primary fuel in all fuel burning furnaces, ovens, incinerators, and boilers; required incinerator exhaust stacks be constructed to accommodate stack testing; and required operation of the emergency generators only when normal power sources failed, except during normal maintenance operation. In addition to the above general Hexcel requirements, natural gas consumption was limited to 175 MMSCF per year and carbon fiber production was limited to 10.8 MM pounds per year.

Visible emissions limitations do not limit emissions quantitatively. Rather they point to proper maintenance activities. These sorts of activities are inherent to the requirements from the NSR permitting program. Visible emission limits in the PM₁₀ SIP are not warranted and will be removed. However, these limits will remain in the AO and the Title V requirements.

Movement of material by the haul truck and parking lots is not a significant source of emissions. In 2011, PM₁₀ emissions from access roads were 0.29 tons per year. The requirements to pave and clean the roads and parking lots are not warranted and these requirements from the PM₁₀ SIP will be removed.

The furnaces, ovens, incinerators and boilers at Hexcel are not capable of using a fuel other than natural gas; therefore, this requirement is not warranted and will be removed from the PM₁₀ SIP.

From the 2011 emission inventory, emissions from all 14 incinerators (all operations except fiber lines 12-16) combined were 11.42 tons of PM₁₀, 38.12 tons of NO_x, and 3.96 tons of SO₂. It is not clear how requiring testing lines for the incinerators would result in meaningful emission controls or estimates. The requirement to add exhaust stacks that accommodate stack testing will be removed from the PM₁₀ SIP.

The emissions from the emergency engines are each less than 5 tons per year for maintenance and testing operations and these engines are regulated by 40 CFR 63 subpart ZZZZ. Therefore, their inclusion in the PM₁₀ SIP is not warranted.

The building specific requirements listed extensive equipment descriptions and operating requirements. The equipment listed in each building will be replaced with the equipment description listed in the section of this document titled Facility Criteria Air Pollutant Emissions Sources. The previous equipment list does not allow Hexcel to easily install new equipment with improved efficiencies and/or decreased emissions. The updated equipment list will allow Hexcel to update equipment more easily than the previous equipment list without modifying the PM₁₀ Maintenance Plan.

Inherent in the NSR permitting program, is the requirement to determine Best Available Control Technology (BACT) for each new additional fiber line. As new controls, with corresponding decreased emissions, are determined to be BACT, Hexcel will be required to include this new level of control with each successive fiber line addition. The addition of a fiber line with higher emissions than existing lines will not be permitted through the NSR permitting program.

7.3 New Maintenance Plan – General Requirements

The general requirements for all listed sources are found in SIP Subsection IX.H.1. These serve as a means of consolidating all commonly used and often repeated requirements into a central location for consistency and ease of reference. As specifically stated in subsection IX.H.1.a below, these general requirements apply to all sources subsequently listed in either IX.H.2 (Salt Lake County) or IX.H.3 (Utah County), and are in addition to (and in most cases supplemental to) any source-specific requirements found within those two subsections.

- IX.H.1.a. This paragraph states that the terms and conditions of Subsection IX.H.1 apply to all sources subsequently addressed in the following subsections IX.H.2 and IX.H.3. It also clarifies that should any inconsistency exist between the general requirements and the source specific requirements, then the source specific requirements take precedence.
- IX.H.1.b States that the definitions found in State Rule 307-101-2, Definitions, apply to SIP Section IX.H. Since this is stated for the Section (IX.H), it applies equally to IX.H.1, IX.H.2 and IX.H.3.
- IX.H.1.c This is a recordkeeping provision. Information used to determine compliance shall be recorded for all periods the source is in operation, maintained for a minimum

period of five (5) years, and made available to the Director upon request. As the general recordkeeping requirement of Section IX.H, it will often be referred to and/or discussed as part of the compliance demonstration provisions for other general or source specific conditions. This recordkeeping requirement includes records of startup/shutdown implementation procedures, as well as CEMS testing data and stack testing data, as applicable.

- IX.H.1.d Statement that emission limitations apply at all times that the source or emitting unit is in operation, unless otherwise specified in the source specific conditions listed in IX.H.2 or IX.H.3.

This is the definitive statement that emission limits apply at all times – including periods of startup or shutdown. It may be that specific sources have separate defined limits that apply during alternate operating periods (such as during startup or shutdown), and these limits will be defined in the source specific conditions of either IX.H.2 or IX.H.3.

Conditions 1.a, 1.b and 1.d are declaratory statements, and have little in the way of compliance provisions. Rather, they define the framework of the other SIP conditions. As condition 1.c is the primary recordkeeping requirement, it shall be further discussed under item 4.2 below.

- IX.H.1.e This is the main stack testing condition, and outlines the specific requirements for demonstrating compliance through stack testing. Several subsections detailing Sample Location, Volumetric Flow Rate, Calculation Methodologies and Stack Test Protocols are all included – as well as those which list the specific accepted test methods for each emitted pollutant species (PM₁₀, NO_x, or SO₂). Finally, this subsection also discusses the need to test at an acceptable production rate, and that production is limited to a set ratio of the tested rate.

These stack testing requirements supersede those found in IX.H.1.a.A^{OS} and IX.H.2.a.A^{OS} of the original SIP.

- IX.H.1.f This condition covers the use of CEMs and opacity monitoring. While it specifically details the rules governing the use of continuous monitors (both emission monitors and opacity monitors), it also covers visible opacity observations through the use of EPA reference method 9.

These requirements specifically supersede those found in IX.H.1.a.C^{OS} and IX.H.2.a.C^{OS} of the original SIP. The original SIP requirements of IX.H.1.a.B^{OS} and IX.H.2.a.B^{OS}, both of which addressed individual equipment opacity, will be superseded as necessary by the particular source specific limitations found in IX.H.2 or IX.H.3.

Both conditions 1.e and 1.f serve as the mechanism through which sources conduct monitoring for the verification of compliance with a particular emission limitation.

7.4 New Maintenance Plan – Hexcel Specific Requirements

IX.H.2.e Hexcel Corporation: Salt Lake Operations

- i. The following limits shall not be exceeded for fiber line 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:
 - I. Natural gas consumption shall be determined by examination of natural gas billing records for the plant and onsite metering.
 - II. Fiber production shall be determined by examination of plant production records.
 - III. Records of consumption and production shall be kept on a daily basis for all periods when the plant is in operation.
- ii. After a shutdown and prior to startup of a fiber line, all control equipment shall be started and remain in operation during production. Control equipment on each fiber line may consist of incinerators, baghouses, and regenerative thermal oxidizers.
 - a. Compliance with control equipment operation during production shall be determined by keeping record of control equipment that is not operating on the fiber line(s) in production.

Discussion – The natural gas and fiber production limits were changed from the yearly limits given in the 1994 SIP to daily limits. These limits were determined by dividing the yearly natural gas consumption limit by 365 days per year and then multiplying this value by a 30 % peaking factor. An analysis of Hexcel’s historical daily production from 2006 to 2012 showed that on average the peak daily production was approximately 42%. DAQ selected a 30 % rather than a 42 % peaking factor into the calculation of the daily consumption and production limits. Emission calculations to convert yearly natural gas consumption and carbon fiber production limits are provided in the appendix. AP-42 or equipment specific emission factors are used to calculate emissions. A daily emission limit, rather than a yearly limit, was included as a 24-hour PM₁₀ standard now applies.

Incinerators and regenerative thermal oxidizers reduce VOCs and CO emissions. PM emissions are reduced with baghouses.

8.0 Monitoring, Recordkeeping and Reporting

Compliance monitoring of the limits is given in IX.H.2.e.i.c. Hexcel monitors its daily production and natural gas combustion limits through examination of production records and

natural gas billing records.

All common recordkeeping and reporting provisions have been consolidated under IX.H.1.c.

9.0 Discussion of Attainment Demonstration

The general requirements act as a framework that the other requirements can build. Second, they demonstrate a prevention of backsliding. Through the use of general requirements that are either the same as or functionally equivalent to those in the 1994 Original SIP, backsliding has been prevented. Finally, when a general requirement has been removed, careful consideration was given as to its specific need, and whether its retention would in any way aid in the demonstration of attainment with the 24-hr standard. If no argument could be made in that regard, the requirement was simply removed.

Hexcel has added new lines, and increased natural gas consumption and carbon production limits, through the use of offsets during the AO modification process. The AOs that required the use of offsets were DAQE-AN1386014-06, dated October 23, 2006 and DAQE-AN0113860016-08, dated September 18, 2008, DAQE-AN113860019-11, dated December 28, 2011, and DAQE-AN113860024-15, dated August 11, 2015. Backsliding has been prevented as permitted emission increases since 1994 have been offset under the PM₁₀ offsetting program with a ratio of at least 1:1.

Source specific limits are equivalent to the requirements from the 1994 Original SIP. The original SIP included yearly natural gas consumption and production limits, rather than emission limits with stack testing to verify emission factors.

10.0 Implementation Schedule

The requirements imposed on the Hexcel are effective immediately. It did not have any required RACT modifications to undertake from the PM_{2.5} SIP RACT requirements. Therefore, the natural gas consumption and carbon fiber production limits listed in IX.H.3.g can be applied immediately. Similarly, the general requirements, IX.H.1.a-f, can also be applied immediately.

11.0 Daily Emissions

Potential daily emission estimates from the 1994 SIP and current operations shows that emissions have increased, as described in Table 3. Offsets have been used with these emission increases, as discussed in the prior sections of this document, to prevent backsliding.

The potential daily emission estimates from the 1994 SIP were calculated assuming the yearly emission estimates were evenly divided over 365 days per year. The potential daily emission estimates for the currently permitted operations, AO DAQE-AN113860024, dated August 11, 2015, were calculated assuming that yearly PTE for each pollutant that was increased by a 30% peaking factor and divided evenly over 365 days per year. This was the same process used to calculate the daily natural gas consumption and fiber line production limits during the

preparation of the PM_{2.5} SIP. The daily emission estimates or emissions from individual fiber lines are equivalent to the emissions resulting from the daily natural gas consumption and fiber production limits. Calculations are further described in the appendix.

Table 3: Yearly Emission Estimates and Potential Daily Emissions

All values in tons	Original SIP NO_x	NO_x	Original SIP SO₂	SO₂	Original SIP PM₁₀	PM₁₀
Annual Emissions	98.9 ^{OS}	193.32 ^{**}	0.1 ^{OS}	49.26 ^{**}	76.8 ^{OS}	123.81 ^{**}
Daily (24-hr)	0.27 [*]	0.69 ^{***}	>0.01 [*]	0.18 ^{***}	0.21 [*]	0.44 ^{***}

* Assumes NO_x annual emission estimates divided by 365 days per year.

** PTE from AO DAQE-AN113860023, dated January 8, 2015 (all fiber lines except lines 15-16)

*** Assumes PTE from AO DAQE-AN113860024, dated August 11, 2015 increased by a 30% peaking factor and divided by 365 days per year

12.0 References

Evaluation Report –
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Supporting Information