

**PM<sub>10</sub> SIP/Maintenance Plan Evaluation Report:**  
**Brigham Young University – Main Campus**

**Utah Nonattainment Area**

**Utah Division of Air Quality**

**Major New Source Review Section**

**October 1, 2015**

# PM<sub>10</sub> SIP/MAINTENANCE PLAN EVALUATION REPORT

## Brigham Young University – Main Campus

### 1.0 Introduction

This evaluation report (report) provides Technical Support for Section IX, Part H.1 and Section IX, Part H.3 of the Utah Implementation Plan; to address the Utah County PM<sub>10</sub> Nonattainment Area. This document specifically serves as an evaluation of Brigham Young University's Main Campus.

Note on document identification: The intention of the Utah Division of Air Quality is to develop a Maintenance Plan to address PM<sub>10</sub>. 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in Salt Lake and Davis Counties and IX.H.3 Source-Specific Particulate Emission Limitations for Utah County will be repealed and replaced. Subsection IX.H.4 will be repealed and replaced with Interim Emission Limits and Operating Practices.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<sub>2.5</sub> 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.” The Utah County portion of the SIP was further updated on June 5, 2002 and made effective by EPA on January 22, 2003. 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- Since Section IX.H of the 2005 State-only SIP will be repealed entirely, there is no need to refer to that document version within this report.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 (the one issued in 1991/1992 and adopted by EPA in 1995), the qualifier <sup>(OS)</sup> will follow any citation from that document.
- In reference to the updated Utah County SIP with an effective date of January 22, 2003 the qualifier <sup>(UC)</sup> will follow any citation from that document.
- 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<sup>(OS)</sup> from the original SIP.*

### 1.1 Facility Identification

*Name:* Brigham Young University – Main Campus

*Address:* Main Campus, Brigham Young University, Provo, Utah, Utah County

*Owner/Operator:* Brigham Young University

*UTM coordinates:* 4,455,200 km Northing, 445,000 km Easting, Zone 12

### 1.2 Facility Process Summary

Brigham Young University (BYU) provides the full range of services normally found at a large university. Emissions from BYU are primarily due to the operation of: boilers, comfort heating equipment, and emergency generators. Two boilers located at the central heating plant are subject to 40 CFR 60 Subpart Db, Standards of Performance for Industrial-Commercial-Institutional Steam Generation Units and one is subject to 40 CFR 60 Subpart Dc, Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units. 40 CFR 63, Subpart JJJJJ, National Emission Standards for Hazardous Air Pollutants for Industrial-Commercial-Institutional Boilers Area Sources applies. Certain emergency power generation engines are subject to 40 CFR 63, Subpart ZZZZ, National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines and 40 CFR 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines.

**1.3 Facility Criteria Air Pollutant Emissions Sources**

The following is a listing of installations at the BYU campus:

- Liquid petroleum-fired emergency generator
- Central Heating Plant Boilers
  - Unit #1 (natural gas-fired)
  - Unit #2 (coal-fired)
  - Unit #3 (coal-fired)
  - Unit #4 (natural gas-fired)
  - Unit #5 (coal-fired)
  - Unit #6 (natural gas-fired)
- Central Heating Plant Baghouse
- Boilers less than 5.0 MMBtu/hr (natural gas-fired)
- Emergency Generators

This is not meant to be a complete listing of all equipment which may be involved or required during permitting activities at BYU, rather it is a listing of all significant emission units.

**1.4 Facility 2011 Baseline Actual Emissions and Current PTE**

In 2011, the BYU Campus baseline actual emissions were determined to be the following (in tons per year):

**Table 1: Actual Emissions**

Pollutant	Actual Emissions (Tons/Year)
PM <sub>10</sub>	11.40
SO <sub>2</sub>	99.22
NO <sub>x</sub>	131.71

The current PTE values, as established by the most recent AO issued to the source (DAQE-AN107900015-13), are as follows:

**Table 2: Current Potential to Emit**

Pollutant	Potential to Emit (Tons/Year)
PM <sub>10</sub>	13.06

SO <sub>2</sub>	215.12
NO <sub>x</sub>	113.72

## 2.0 Demonstration of Maintaining Attainment

Unlike the base year inventory, which used only the 2011 actual emissions for each source to set the baseline for modeling, a modified version of the PTE values was used for the modeled attainment demonstration. Beginning with the PTE values listed in Table 2 (from the most recent approval order issued to BYU in 2013), these emissions were then “trued-up” by including the expected effects from implementation of RACT from the PM<sub>2.5</sub> SIP. This true-up yields a 2019 Projected Emission Value for each of the pollutants of concern. Where necessary, these values were further corrected for condensable particulates using simple correction factors based on fuel consumed or process type.

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<sub>2.5</sub> 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 PM<sub>10</sub> 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<sub>2.5</sub> sections of the SIP, and include this additional RACT application. All requirements from the original PM<sub>10</sub> 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. This is discussed in greater detail in Item 3 below.

## 3.0 Comparison of Requirements – Original SIP and New Maintenance Plan

BYU is a previously listed SIP source. In the original PM<sub>10</sub> SIP document for Utah County [IX.H.1 Emission Limitations and Operating Practices (Utah County) – dated 24 September 1990 and Updated June 28, 1991]<sup>(OS)</sup>, BYU was listed in Subsection IX.H.1.b.B<sup>(OS)</sup> as Brigham Young University (Heating Plant). As a listed source there were several requirements and conditions that applied to the facility.

The original PM<sub>10</sub> SIP for Utah County was superseded in 2002, and was made effective by EPA on January 22, 2003. BYU was not a listed source in the EPA approved Utah County PM<sub>10</sub> SIP. Therefore, a comparison was not made of the approved PM<sub>10</sub> SIP and the new maintenance plan.

### 3.1 Original SIP General Requirements

#### IX.H.1.a General Requirements<sup>(UC)</sup>

The original SIP was a divided document, having two separate sets of General Requirements. The requirements found at IX.H.1.a<sup>(OS)</sup> applied to the listed sources found in Utah County, while those found at IX.H.2.a<sup>(OS)</sup> applied to the listed sources found in Salt Lake and Davis County. Those original requirements were then fully superseded with the Utah County updated SIP<sup>(UC)</sup> issued in 2002 and made effective by EPA in January 2003. The comparison shown here is between the new maintenance plan and that most recent EPA-approved version.

1.a.A. Stack Testing<sup>{UC}</sup> – this subsection covered the general methods and procedures for conducting stack testing. As with the original SIP, it included the establishment of a pretest conference, and the use of specific EPA test methods. However, it lacked the establishment of a pretest protocol. This subsection has since been updated and superseded by SIP subsection IX.H.1.e which incorporates equivalent language.

1.a.B. Annual Emission Limitations<sup>{UC}</sup> – 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 PM<sub>10</sub> 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.

1.a.C. Recordkeeping Requirements<sup>{UC}</sup> – 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.

1.a.D. Proper Maintenance<sup>{UC}</sup> – established that all facilities need to be adequately and properly maintained. Not needed. This is inherent in the NSR permitting program, under R307-401-4(1).

1.a.E. Definitions<sup>{UC}</sup> – 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.

1.a.F. Visible Emissions<sup>{UC}</sup> – 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.

1.a.G. Visible Emissions (cont.)<sup>{UC}</sup> – 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.

1.a.H. Unpaved Operational Areas<sup>{UC}</sup> – established rules for treating fugitive dust with water sprays or chemical dust suppression. This requirement has been superseded by the nonattainment area fugitive dust rules of R307-309.

There were several additional subsections found in the original SIP for Utah County which did not appear in the Utah County updated SIP<sup>{UC}</sup>. These conditions were primarily outdated and no longer applicable. For the sake of completeness, they are included below.

1.a.F. Approval Orders<sup>{OS}</sup> – 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.H. Future Modifications<sup>{OS}</sup> – established that future modifications to the approved facilities were also subject to the NSR permitting requirements. Not needed. This is inherent in the NSR permitting program, under R307-401-3(1)(b).

2.a.K. Test if Directed<sup>{OS}</sup> – 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.

#### 4.0 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.

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 (PM<sub>10</sub>, NO<sub>x</sub>, or SO<sub>2</sub>). 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<sup>(OS)</sup> and IX.H.2.a.A<sup>(OS)</sup> 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<sup>(OS)</sup> and IX.H.2.a.C<sup>(OS)</sup> of the original SIP. The original SIP requirements of IX.H.1.a.B<sup>(OS)</sup> and IX.H.2.a.B<sup>(OS)</sup>, 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.

#### **4.1 Monitoring, Recordkeeping and Reporting**

As stated above, the general requirements IX.H.1.a through IX.H.1.f primarily serve as declaratory or clarifying conditions, and do not impose compliance provisions themselves. Rather, they outline the scope of the conditions which follow the source specific requirements of IX.H.2 and IX.H.3.

For example, most of the conditions in those subsections include some form of short-term emission limit. This limitation also includes a compliance demonstration methodology – stack test, CEM, visible opacity reading, etc. In order to ensure consistency in compliance demonstrations and avoid unnecessary repetition, all common monitoring language has been consolidated under IX.H.1.e and IX.H.1.f. Similarly, all common recordkeeping and reporting provisions have been consolidated under IX.H.1.c.

#### **4.2 Discussion of Attainment Demonstration**

As is discussed above in Items 4.0 and 4.1, these are general conditions and have few if any specific limitations and requirements. Their inclusion here serves three purposes. 1. They act as a framework upon which the other requirements can build. 2. They demonstrate a prevention of backsliding. By establishing the same or functionally equivalent general requirements as were included in the original SIP, this demonstrates both that the original requirements have been considered, and either retained or updated/replaced as required. 3. 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 can be made in that regard, the requirement was simply removed.

#### **5.0 New Maintenance Plan – Brigham Young University Specific Requirements**

The BYU specific conditions in Section IX.H.3 address those limitations and requirements that apply only to the BYU Campus in particular.

IX.H.3.a.i This condition requires that all of the central heating plant boilers to operate on natural gas during the winter season from November 1 to February 28. It limits sulfur content of the backup fuel, fuel oil.

IX.H.3.a.ii This condition sets the NO<sub>x</sub> emission rates for Units #1 thru #6.

BYU will be required to upgrade units #4 and #6 by January 1, 2017. The upgraded boilers will be tested by March 1 of that year.

Units #2, #3 and #5 operate on coal. Therefore, they cannot operate during the winter months.

The NO<sub>x</sub> lb/hr emission rate is calculated with the following equation:

$$\text{ER} = (\text{ppm conc}/1,000,000) * \text{Mol wt of gas (g)} * (1/453.59) * (\text{DSCFM}/0.848930) * 60$$

or

$$\text{ER} = \text{ppm} * (1.194 \times 10^{-7}) * (Q_s \text{ flow rate in dscf/min} * 60)$$

The ppm for the last stack test in August 2014 for Unit #4 was 74 with a flow rate of 37,500 dscfm. This calculated to a mass emission rate of 15.1 lb/hr. Unit #6 was 81 ppm with a flow rate of 34,800 dscfm. This calculated to a mass emission rate of 18.6 lb/hr. The flow rates were determined by 40 CFR Part 60 Appendix A Method 2 and the concentrations were determined by 40 CFR Part 60 Appendix A Method 7e.

The ppm for the last stack test in August 2014 for Unit #2 was 207 with a flow rate of 18,522 dscfm. This calculated to a mass emission rate of 11.4 lb/hr. Unit #3 was 218 ppm with a flow rate of 30,338 dscfm. This calculated to a mass emission rate of 21.9 lb/hr. Unit #5 was 242 ppm with a flow rate of 27,156 dscfm. This calculated to a mass emission rate of 25.6 lb/hr.

IX.H.3.a.iii This condition sets the stack testing frequency and when the initial test is required. It allows Unit #1 to be operated as a back-up boiler.

BYU is upgrading Units #4 and #6 to a NO<sub>x</sub> rating of 36 ppm by January 1, 2017. This is why they are required to perform a stack test by March 1, 2017. These items represent large capital investments with significant lead times, engineering, construction, startup, shakedown and testing involved. These dates were reached through negotiation with the source based on the source's expected construction schedule after consideration of each factor.

IX.H.3.b.iv This condition limits the emissions from the central heating plant. The first requirement limits the amount of hours used during start-up and shutdown. This limit gives BYU time to ramp up the boilers in the winter months when classes are being held and shut them down when the weather permits.

The second requirement is for limiting SO<sub>2</sub> emissions by limiting the coal sulfur content. This condition also sets the requirements for how the sulfur content is tested.

## 5.1 Monitoring, Recordkeeping and Reporting

Monitoring, recordkeeping and reporting for the conditions above is addressed through the general requirements in Subsection IX.1.c.

## 5.2 Discussion of Attainment Demonstration

Generally, the calculation methodology for determination of emissions for the BYU Campus is similar to the method used in during the 1991/1992 timeframe of the original SIP and the Utah

County SIP.

## **6.0 Implementation Schedule**

The requirements imposed on BYU are effective immediately. BYU is scheduled to replace Unit #4 and Unit #6 burner spud tips with low NO<sub>x</sub> tips and add a minimum of 18% Flue Gas Recirculation by January 1, 2017. The general requirements, IX.H.1.a-f, can also be applied immediately.

## **7.0 References**

- BYU, PM<sub>2.5</sub> SIP Major Point Source RACT Documentation
- UDSHW Contract No. 12601, Work Assignment No. 7, Utah PM<sub>2.5</sub> SIP RACT Support – TechLaw Inc.
- BYU Approval Order DAQE-AN107900015-13
- BYU Title V Operating Permit 4900004002
- BYU stack test results for 2014 and 2011.

**Evaluation Report – BYU Campus**  
**UTAH PM<sub>10</sub> SIP/MAINTENANCE PLAN**  
**Utah County Nonattainment Area**  
**Supporting Information**

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