PM_{10} SIP/Maintenance Plan Evaluation Report: Kennecott Utah Copper – Molybdenum Autoclave Plant

Salt Lake County Nonattainment Area

Utah Division of Air Quality

Major New Source Review Section

October 1, 2015

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PM_{10} SIP/MAINTENANCE PLAN EVALUATION REPORT
KUC Smelter

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 Maintenance Plan; to address the Salt Lake County PM_{10} Nonattainment Area. This document specifically serves as an evaluation of the Kennecott Utah Copper Smelter located in Salt Lake County.

Note on document identification: The intention of the Utah Division of Air Quality is to develop a Maintenance Plan to address PM_{10}. 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in Salt Lake and Davis Counties and IX.H.3 Source-Specific Particulate Emission Limitations for Utah County will be repealed and replaced. Subsection IX.H.4 will be repealed and replaced with Interim Emission Limits and Operating Practices.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.

These SIP Subsections 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. Thus, this evaluation report also references an earlier SIP version originally dated June 28, 1991. This SIP was adopted by EPA and published in the federal register on July 8, 1994. This earlier SIP version is often referred to as the "original SIP." In order to distinguish between the various documents in this report, a 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- Since Section IX.H of the 2005 State-only SIP will be repealed entirely, there is no need to refer to that document version within this report.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 $^{\{OS\}}$ 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$^{\{OS\}}$ from the original SIP.

1.1 Facility Identification

Name: Kennecott Utah Copper Smelter
Address: 12000 West 2100 South, Magna, Utah, Salt Lake County
Owner/Operator: Kennecott Utah Copper, LLC
UTM coordinates: 4,508,000 m Northing, 399,000 m Easting, Zone 12

1.2 Facility Process Summary

Kennecott Utah Copper operates a copper smelter in Salt Lake County, Utah. The Smelter processes copper concentrate by means of flash smelting and flash converting furnaces.

Molten copper at approximately 99.5 percent purity is cast into plate anodes to be sent to the Kennecott Refinery for further purification.

1.3 Facility Criteria Air Pollutant Emissions Sources

The following is a listing of the main emitting units from the KUC Smelter:

- Main Stack Operations
  - Rotary Dryer
  - Furnace operations
  - Matte Drying and Grinding Plant
  - Anode Area operations
  - Acid Plant
  - Powerhouse boiler and superheater
- Powerhouse Holman Boiler
- Material handling and associated control equipment
- Small nature gas combusting equipment
- Emergency Equipment (Diesel)
- Emergency Equipment (Natural Gas)

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

The Main Stack table below outlines the emission sources that vent to the Main Stack. It is divided by emission type (PM_{10} SO_2 and NO_x) and emission source. Each source may appear more than once because the table is divided by emission type.

Main Stack Source Table

Source Name	**Source Description**
PM_{10} Emissions – 89.5 lb/hr (filterable, daily average)	**The following sources contribute to the PM_{10} emissions measured at the main stack.**
Hot Metals Building	The secondary gas system collects fugitive emissions in the Hot Metals Building (typically associated with the furnaces) and vents them through a baghouse and a sodium based scrubber before they are vented to the Main Stack.
Concentrate Dryer	The concentrate dryer burns natural gas to heat/dry concentrate for use in the FS furnace. It is operated with low-NOx burners along with lower dryer temperatures minimizes the formation of NOx while also preventing the formation of SO_2. Kennecott operates both a baghouse and a scrubber as controls for the concentrate dryer.
Matte Grinding Circuit	The Matte Grinding circuit crushes and dries granulated matte for use in the Flash Converting furnace. The ground matte is collected in a baghouse and pneumatically conveyed to the Flash Converting furnace feed bin. NOx emissions from natural gas combustion are controlled with Low NOx burners and low

	temperature firing and PM10 emissions are controlled with the production baghouse.
Anode Area	In the anodes area, blister copper from the Flash Converting furnace is refined in two available refining furnaces to remove the final traces of sulfur. Copper production can be supplemented with copper scrap which can be added to the refining furnaces for re-melt. The anodes refining furnaces are natural gas fired with oxy-fuel burners. Off-gas is vented (in series) to a quench tower, lime injection, baghouse, and scrubber and vented to the Main Stack. NOx reduction activities also include maintaining furnaces to prevent ingress of air.
Anode Area Shaft and Holding Furnaces	The Shaft furnace and holding furnace are used to re-melt anode scrap and other copper scrap to incorporate into copper production. Low NOx burners are used to reduce NOx from the natural gas combustion and a baghouse is operated to control PM10 emissions. The Shaft furnace is located in the anodes area, but vents separately to the Main Stack.
NO_X Emissions – 35 lb/hr, annual average	**The following sources contribute to the NO_X emissions measured at the main stack.**
Concentrate Dryer	The concentrate dryer burns natural gas to heat/dry concentrate for use in the FS furnace. It is operated with low-NOx burners along with lower dryer temperatures minimizes the formation of NOx while also preventing the formation of SO_2. Kennecott operates both a baghouse and a scrubber as controls for the concentrate dryer.
Matte Grinding Circuit	The Matte Grinding circuit crushes and dries granulated matte for use in the Flash Converting furnace. The ground matte is collected in a baghouse and pneumatically conveyed to the Flash Converting furnace feed bin. NOx emissions from natural gas combustion are controlled with Low NOx burners and low temperature firing and PM10 emissions are controlled with the production baghouse.
Anode Area	In the anodes area, blister copper from the Flash Converting furnace is refined in two available refining furnaces to remove the final traces of sulfur. Copper production can be supplemented with copper scrap which can be added to the refining furnaces for re-melt. The anodes refining furnaces are natural gas fired with oxy-fuel burners. Off-gas is vented (in series) to a quench tower, lime injection, baghouse, and scrubber and vented to the Main Stack. NOx reduction activities also include maintaining furnaces to prevent ingress of air.
Anode Area Shaft and Holding Furnaces	The Shaft furnace and holding furnace are used to re-melt anode scrap and other copper scrap to incorporate into copper production. Low NOx burners are used to reduce NOx from the natural gas combustion and a baghouse is operated to control PM10 emissions. The Shaft furnace is located in the anodes area, but vents separately to the Main Stack.

Foster Wheeler Boiler	The boiler is used to provide process steam at the Smelter. The boiler is ducted to the main stack and is equipped with Low NO_X Burners and Flue Gas Recirculation.
Powerhouse Superheater	The Powerhouse superheater provides a supplemental source of heat for the steam produced by the smelter waste heat boilers, which is used to drive the acid plant compressors and the smelter turbine generator. The superheater off gasses are ducted to the main stack. NOx emissions are controlled by ultra-low NOx burners and flue gas recirculation.
SO_2 Emissions – 552 lb/hr, 3-hour rolling average	**The following sources contribute to the SO_2 emissions measured at the main stack.**
Concentrate Dryer	The concentrate dryer burns natural gas to heat/dry concentrate for use in the FS furnace. It is operated with low-NOx burners along with lower dryer temperatures minimizes the formation of NOx while also preventing the formation of SO_2. Kennecott operates both a baghouse and a scrubber as controls for the concentrate dryer.
Anode Area	In the anodes area, blister copper from the Flash Converting furnace is refined in two available refining furnaces to remove the final traces of sulfur. Copper production can be supplemented with copper scrap which can be added to the refining furnaces for re-melt. The anodes refining furnaces are natural gas fired with oxy-fuel burners. Off-gas is vented (in series) to a quench tower, lime injection, baghouse, and scrubber and vented to the Main Stack. NOx reduction activities also include maintaining furnaces to prevent ingress of air.
Hot Metals Building	The secondary gas system collects fugitive emissions in the Hot Metals Building (typically associated with the furnaces) and vents them through a baghouse and a sodium based scrubber before they are vented to the Main Stack.
Acid Plant	The double contact acid plant removes SO_2 from the off gases of the furnaces. The sulfuric acid produced by the plant is sold. Among other technologies, the system is equipped with tubular candle fiber mist eliminators and the tail gas is discharged to the main stack.

1.4 Facility 2011 Baseline Actual Emissions and Current PTE

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

Table 1: Actual Emissions

Pollutant	Actual Emissions (Tons/Year)
PM_{10}	247.68

SO_2	695.89
NO_x	157.44

The current PTE values for the KUC Smelter, as established by the most recent AO issued to the source (DAQE-AN103460054-14) are as follows:

Table 2: Current Potential to Emit

Pollutant	Potential to Emit (Tons/Year)
PM_{10}	510.82
SO_2	1,085.72
NO_x	185.29

2.0 Demonstration of Maintaining Attainment

These values have been used in the modeled attainment demonstration. The 2011 actual emissions were used as baseline for model validation. The Smelter emissions were projected for future years using growth factors for the manufacturing industry in Salt Lake County. Those emissions projected with growth are intended to represent future actual emissions for the Smelter.

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 PM2.5 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 – including the KUC Smelter in specific. 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 PM2.5 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. This is discussed in greater detail in Item 3 below.

3.0 Comparison of Requirements – Original SIP and New Maintenance Plan

The KUC Smelter is a previously listed SIP source. In the original PM_{10} SIP document for Davis and Salt Lake Counties [IX.H.2 Emission Limitations and Operating Practices (Davis and Salt Lake Counties) – dated 28 June 1991 and Updated 4 November 1992]{OS}, the smelter was listed in Subsection IX.H.2.b.V{OS} as Kennecott Utah Copper Smelter. As a listed source there were several requirements and conditions that applied to the facility.

In addition, the smelter is also a listed source in the PM2.5 Section of the SIP (see SIP Section IX.H.12.n.i). As was discussed above in Item 2.0, all limits in this maintenance plan are based on the limits in the PM2.5 SIP; either in the general requirements of subsection IX.H.11 or the source specific requirements of IX.H.12.n.i. Therefore, a comparison between the original SIP requirements, and those found in this new maintenance plan can be found below:

3.1 Original SIP General Requirements

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 Counties. As the then Smelter was located in Salt Lake County, only the general requirements of IX.H.2.a{OS} applied. However, except for the additional requirements found under IX.H.2.a.M{OS} for petroleum refineries and the specific fuel requirements of IX.H.2.a.N{OS}, the two subsections are essentially identical.

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 PM_{10} standard no longer exists.

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{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. Not needed. This is inherent in the NSR permitting program.

2.a.H. Future Modifications{OS} – 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.

2a.I. Unpaved Operational Areas{OS} – established rules for treating fugitive dust with water sprays or chemical dust suppression.

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. This requirement is outdated and obsolete.

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.M. Petroleum Refineries{OS} – This is a fairly lengthy subsection pertaining only to the petroleum refineries. This subsection has its own sub-subsections that are either moved or no longer necessary. This section is not applicable to the KUC Smelter.

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.

3.3 Original SIP Source Specific Requirements

KUC initiated a Smelter modernization project in the mid-1990s, thus constructing and now operating one of the cleanest copper smelters in the world. The modernization lead to major reductions in emissions from its smelting operations. These SIP conditions are therefore no longer current.

The U.S. E.P.A. performed extensive technology reviews of smelter emissions in support of the 2002 primary copper smelting major source MACT standard (40 CFR 63 Subpart QQQ) and the 2007 primary copper smelting area source MACT standard (40 CFR 63 Subpart EEEEEE). Specific discussion of the unique aspects of pollution controls at the KUC Smelter are included in the Federal Register notices associated with the draft and final promulgation of both of these rules. Both of these standards go so far as to establish a separate category for only the KUC Smelter due to its unique design and emission performance not achievable by conventional technology. The primary copper smelting area source MACT standard specifically identifies KUC Smelter main stack emission performance as MACT for copper smelters (existing sources not using batch copper converters). Smelter process and emission controlling technologies that contributed to EPA's designation of the modernized smelter as a separate MACT category for HAP emissions, including off gases from furnaces, also contribute to the control of fine particulate and precursor emissions.

The Federal Register 72FR2930, January 23, 2007 has additional information on the MACT standard. No new major developments in technologies or costs have occurred subsequent to promulgation of the MACT standards.

Table 3 shows the reduction from the smelter upgrade.

Table 3: Potential to Emit

Pollutant	Potential to Emit (Tons/Year)

Current PM_{10}	510.82
Current SO_2	1,085.72
Current NO_x	185.29
Original SIP PM_{10}	1,340
Original SIP SO_2	18,575
Original SIP NO_x	145

Individual source requirements:

2.b.V.A.1.{OS} This subsection was a listing of the equipment at the smelter – this subsection has been superseded and is irrelevant. A simple listing of equipment does not constitute an emission limitation, does not impose any restriction on daily emissions, and rapidly becomes out of date as well as impossible to enforce. The original listing found in this subsection does not match the current equipment installed and operating at the smelter and would represent a significant step backwards in emission control and smelting technology.

2.b.V.A.2.{OS} Emission limits for the Powerhouse and Rotary Concentrate Dryer Stack. This subsection is irrelevant because it is for equipment that has been removed or replaced when the "new-upgraded" smelter was constructed in 1994.

2.b.V.A.3.{OS} Testing frequencies for Rotary Concentrate Dryer Stack. This subsection is irrelevant because it is for equipment that has been removed or replaced when the "new-upgraded" smelter was constructed in 1994.

2.b.V.A.4.{OS} Opacity limits. This subsection is irrelevant because it is for equipment that has been removed or replaced when the "new-upgraded" smelter was constructed in 1994.

2.b.V.A.5.{OS} Opacity observations. This subsection is irrelevant. These pieces of equipment have been removed when the "new-upgraded" smelter was constructed in 1994.

2.b.V.A.6.{OS} Water sprays for equipment. This subsection is irrelevant. These pieces of equipment have been removed when the "new-upgraded" smelter was constructed in 1994.

2.b.V.A.7.{OS} Natural gas requirement for the Powerhouse and Rotary Dryer. This subsection is irrelevant because it is for equipment that has been removed or replaced when the "new-upgraded" smelter was constructed in 1994.

2.b.V.A.8.{OS} This subsection is for the operation and maintenance of the primary and secondary hooding systems; dust collection mechanism of waste heat boilers, dropout chambers and shot coolers; hot cyclones; and dry electrostatic precipitators. This subsection is irrelevant because it is for equipment that has been removed or replaced when the "new-upgraded" smelter was constructed in 1994.

2.b.V.A.9.{OS} This was a requirement for meeting the main stack emission limit for PM. This subsection has been replaced with limits for PM10 and PM2.5.

2.b.V.A.10.{OS} This subsection outlines SO2 emission limit compliance. This subsection is irrelevant. New main stack emission limits have been established with the appropriate stack testing requirements.

2.b.V.A.11.{OS} This subsection outlines compliance demonstration for the main stack opacity limits. Subsection IX.H.1.f of the new maintenance plan covers the use of CEMs and opacity monitoring. Therefore, this subsection is irrelevant.

2.b.V.A.12.{OS} This subsection outlines the requirements for startup/shutdown. This section is irrelevant because it is for equipment that has been removed or replaced when the "new – upgraded" smelter was constructed in 1994.

2.b.V.A.13.{OS} This a statement that the section outlined above is effective upon adoption by the Committee. This subsection is irrelevant.

2.b.V.B.1.{OS} This subsection sets main stack and acid plant emission limits. The emission limits have been revised with the "new-upgraded" Smelter so these are superseded by the updated limits in subsection IX.H.2. The emission for the main stack in the condition set the PM_{10} at 400 lbs/hr (24 hour average) and the new limit is 89.5 lbs/hr (daily average). In the 1994 SIP, the SO_2 main stack limit was 6,450 lb/hr (3 hour average) and the new limit is 552 lbs/hr (3 hour average).

Table 4: Main Stack Comparison

Pollutant	1994 SIP	Maintenance Plant
PM_{10} daily average		
Filterable	400 lb/hr	89.5 lb/hr
Filterable + condensable		439 lb/hr
SO_2		
3-hr average	6,450 lb/hr	552 lb/hr
Daily average	5,700 lb/hr	422 lb/hr

The acid plant SO_2 emissions are vented to the main stack. The SO_2 emissions (1,050 ppmdv 3-hr ave and 650 ppmdv 6-hr ave) are included in the main stack limits (522 lb/hr 3-hr ave and 422 lb/hr 6-hr ave. Based on the fact that these emissions are not emitted to the atmosphere and that they are included in the main stack emission limit, an emissions limit has not been included as a separate requirement.

2.b.V.B.2.{OS} This subsection is for visible emissions monitoring from the main stack and the roof vents using method 9. This section is irrelevant because it is for equipment that has been removed or replaced when the "new –upgraded" smelter was constructed in 1994.

2.b.V.B.3.{OS} This subsection required the use of a CEM to demonstrate compliance with the Acid Plant SO2 limit. Subsection IX.H.1.f of the new maintenance plan covers the use of CEMs and opacity monitoring. This subsection is irrelevant.

2.b.V.B.4.{OS} Annual Emissions – established total annual emissions for the entire smelter. The Smelter operations have since been modified and upgraded thus making these emissions estimates irrelevant.

2.b.V.B.5.{OS} This subsection established an effective date for the smelter limits except for the three hour SO_2 limits. The effective date has already passed and therefore this subsection is

irrelevant.

2.b.V.B.6.{OS} This subsection established an effective date for the smelter SO_2 three hour average limits. The effective date has already passed and therefore this subsection is irrelevant.

Subsections 2.b.V.C.1 thru 2.b.V.C.7{OS} are for temporary conditions. These temporary conditions have already been met and therefore, this subsection is irrelevant.

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.

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_{10}, NO_x, or SO_2). 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.

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 – Smelter Specific Requirements

IX.H.2.n.i.A This condition establishes limits for the Main stack, Acid Plant Tail Gas stack and the Holman boiler. The PM_{10} limits are based on a daily average. This protects the 24 hour PM_{10} standard. The Daily NO_x limit has been added to protects the 24 hour PM_{10} standard.

I. Main Stack (Stack No.11)

1. PM_{10}
   a. 89.5 lbs/hr (filterable, daily average)
   b. 434 lbs/hr (filterable + condensable, daily average)

2. SO_2
   a. 552 lbs/hr (3 hr. rolling average)
   b. 422 lbs/hr (daily average)

3. NO_x
   a. 154 lbs/hr (daily average)

II. Acid Plant Tail Gas

1. SO_2
   a. 1,050 ppmdv (3 hr. rolling average)
   b. 650 ppmdv (6 hr. rolling average)

III. Holman Boiler

1. NO_x
   a. 9.34 lbs/hr, 30-day average
      0.05 lbs/MMBTU, 30-day average

IX.H.2.n.i.B This condition establishes stack test frequencies for the Main Stack, Acid Plant and Holman boiler.

EMISSION POINT	POLLUTANT	TEST FREQUENCY
I. Main Stack (Stack No. 11)		
	PM_{10}	every year
	SO_2	CEM
	NO_x	CEM
II. Holman Boiler	NO_x	CEM or alternate method determined according to applicable NSPS standards

Currently the Holman boiler does not have a CEM and Kennecott uses an alternative monitoring plan to determine the NO_x emissions. Kennecott continuously monitors operational parameters to predict NO_x emissions and to ensure proper boiler operation. The parameters monitored are fuel use (to predict NO_x emissions lbs/hr), stack oxygen (to

monitor proper boiler operation and compliance with NO_x lbs/MMBtu emission limit), and steam output (used to estimate heat input if fuel use unavailable). The ranges for these parameters were developed during a 30-day monitoring campaign where data from a certified NO_x analyzer was used to develop predictive equations with the operational parameters. The alternative monitoring method identified in this condition is consistent with the applicable NSPS.

IX.H.2.n.i.C During startup/shutdown operations, NO_x and SO_2 emissions are monitored by CEMS or alternate methods in accordance with applicable NSPS standards.

5.1 Monitoring, Recordkeeping and Reporting

Monitoring for all three emission points is addressed through a variety of methods, depending on the emission point in question. Stack testing, CEMs, or alternative monitoring as allowed under NSPS Subpart Db – all are viable options, and have been included in the language of IX.H.2.n.i.b and IX.H.2.n.1.C. As appropriate, these monitoring requirements are complemented by the general provisions of IX.H: 1.e for stack testing, 1.f for CEMs and other continuous monitors, 1.c for recordkeeping and reporting.

5.2 Discussion of Attainment Demonstration

Generally, the calculation methodology for determination of emissions from the smelter is identical to the method used in during the 1991/1992 timeframe of the original SIP. However, several key differences exist:

1. Emissions in the new maintenance plan are lower or equal to the original SIP

Smelter emissions for PM_{10} and SO_2 are significantly lower than those in the original SIP. As discussed earlier in this document, KUC initiated a Smelter modernization project in the mid-1990s, thus constructing and now operating one of the cleanest copper smelters in the world.

2. Condensable emissions, which were excluded from the original SIP, are included in the new maintenance plan

The original SIP was based on filterable PM_{10} emissions only. The new maintenance plan includes both filterable and condensable PM_{10} emissions. The hourly PM_{10} limit listed in IX.H.2.n.1.A includes condensable emissions from several emission sources that emit to the Main Stack.

6.0 Implementation Schedule

The requirements imposed on the smelter are currently in effect. While some provision was made for sources generally to implement the RACT requirements of the PM2.5 SIP (and which were included as part of the modeled emission values for each source as discussed in that section above), the smelter did not have any required RACT modifications to undertake. The emission limits listed in IX.H.2.j can be applied immediately. Similarly, the provisions of IX.H.1.a-f (the General Requirements) can also be applied immediately.

7.0 References

- Kennecott Smelter, $PM_{2.5}$ SIP Major Point Source RACT Documentation
- UDSHW Contract No. 12601, Work Assignment No. 7, Utah $PM_{2.5}$ SIP RACT Support – TechLaw Inc.
- Smelter AO DAQE-AN103460054-14
- Smelter/Refinery Title V 3500030003

Evaluation Report – KUC Smelter

UTAH PM_{10} SIP/MAINTENANCE PLAN

Salt Lake County Nonattainment Area

Supporting Information

PM_{10} SIP/Maintenance Plan Evaluation Report: Kennecott Utah Copper - Refinery

Salt Lake County Nonattainment Area

Utah Division of Air Quality

Major New Source Review Section

October 1, 2015

PM_{10} SIP/MAINTENANCE PLAN EVALUATION REPORT
KUC Refinery

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 Maintenance Plan; to address the Salt Lake County PM_{10} Nonattainment Area. This document specifically serves as an evaluation of the Kennecott Utah Copper Refinery facility.

Note on document identification: The intention of the Utah Division of Air Quality is to develop a Maintenance Plan to address PM_{10}. 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.

These SIP Subsections 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. Thus, this evaluation report also references an earlier SIP version originally dated June 28, 1991. This SIP was adopted by EPA and published in the federal register on July 8, 1994. This earlier SIP version is often referred to as the "original SIP." In order to distinguish between the various documents in this report, a 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 $^{\{OS\}}$ 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$^{\{OS\}}$ from the original SIP.

1.1 Facility Identification

Name: Kennecott Utah Copper Refinery
Address: 12000 West 2100 South, Magna, Utah, Salt Lake County
Owner/Operator: Kennecott Utah Copper, LLC
UTM coordinates: 4,508,450 m Northing, 401,550 m Easting, Zone 12

1.2 Facility Process Summary

Kennecott Utah Copper LLC operates a copper Refinery in Salt Lake County, Utah. Molten copper at approximately 99.5 percent purity is cast into plate anodes at the Smelter and sent to the

Refinery for further purification. At the Refinery, anodes are lowered into an electrolyte solution where for 10 days, an electric current is sent between the anode and the cathode, causing the copper ions to migrate to a steel sheet forming a plate cathode of 99.99 percent pure copper.

1.3 Facility Criteria Air Pollutant Emissions Sources

The following is a listing of the main emitting units from the Kennecott Utah Copper Refinery:

- Electrolytic Refining Tanks and associated control devices
- Cathode and Anode Scrap Washing
- Precious Metals operations and associated control devices
- Tankhouse Boilers
- Storage Tanks
- Emergency Generators (diesel and LPG)
- Combined Heat and Power Unit

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

1.4 Facility 2011 Baseline Actual Emissions and Current PTE

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

Table 1: Actual Emissions

Pollutant	Actual Emissions (Tons/Year)
PM_{10}	10.02
SO_2	0.85
NO_x	20.63

The current PTE values for the Kennecott Utah Copper Refinery, as established by the most recent AO issued to the source (DAQE-AN103460045-10) are as follows:

Table 2: Current Potential to Emit

Pollutant	Potential to Emit (Tons/Year)
PM_{10}	25.64
SO_2	4.44
NO_x	38.57

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. Generally speaking, beginning with the PTE values listed in Table 2 (from the most recent approval order issued to each source), these values were "trued-up" by including the expected effects from implementation of RACT from the PM2.5 SIP. This yields a 2019 Projected Emission Value for each of the pollutants of concern. Where necessary, these

values were 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 PM2.5 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 – including the Kennecott Utah Copper Refinery in specific. 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 PM2.5 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. This is discussed in greater detail in Item 3 below.

3.0 Comparison of Requirements – Original SIP and New Maintenance Plan

The Kennecott Refinery is a previously listed SIP source. In the original PM_{10} SIP document for Davis and Salt Lake Counties [IX.H.2 Emission Limitations and Operating Practices (Davis and Salt Lake Counties) – dated 28 June 1991 and Updated 4 November 1992]{OS}, the Refinery was listed in Subsection IX.H.2.b.Y{OS} as Kennecott Utah Copper Refinery, Garfield, Utah. As a listed source there were several requirements and conditions that applied to the facility.

In addition, the Refinery is also a listed source in the PM2.5 Section of the SIP (see SIP Section IX.H.12.n.i). As was discussed above in Item 2.0, all limits in this maintenance plan are based on the limits in the PM2.5 SIP; either in the general requirements of subsection IX.H.11 or the source specific requirements of IX.H.12.n.ii. Therefore, a comparison between the original SIP requirements, and those found in this new maintenance plan can be found below:

3.1 Original SIP General Requirements

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 Counties. As the then the Refinery was located in Salt Lake County, only the general requirements of IX.H.2.a{OS} applied. However, except for the additional requirements found under IX.H.2.a.M{OS} for petroleum refineries and the specific fuel requirements of IX.H.2.a.N{OS}, the two subsections are essentially identical.

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 PM_{10} standard no longer exists.

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{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. Not needed. This is inherent in the NSR permitting program.

2.a.H. Future Modifications{OS} – 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.

2a.I. Unpaved Operational Areas{OS} – established rules for treating fugitive dust with water sprays or chemical dust suppression.

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. This requirement is outdated and obsolete.

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.M. Petroleum Refineries{OS} – This is a fairly lengthy subsection pertaining only to the petroleum refineries. This subsection has its own sub-subsections that are either moved or no longer necessary.

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.

3.3 Original SIP Source Specific Requirements

Kennecott Utah Copper initiated a modernization project in the mid-1990s, which included the Refinery along with the Smelter.

Individual source requirements:

2.b.Y.1.{OS} This subsection was a listing of the equipment at the Refinery – this subsection has been superseded and is irrelevant. A simple listing of equipment does not constitute an emission limitation, does not impose any restriction on daily emissions, and rapidly becomes out of date as well as impossible to enforce. The original listing found in this subsection does not match the current equipment installed and operating at the Refinery and would represent a significant step backwards in emission control and refining technology.

2.b.Y.2.{OS} Stack emission limits. This subsection is irrelevant. The pieces of equipment with stack testing limits have been removed/replaced when the Refinery was modernized and reconstructed in the mid-1990s.

2.b.Y.3.{OS} Testing frequencies for equipment limits listed in subsection 2.b.Y.2.{OS}. This subsection is irrelevant. These pieces of equipment have been removed/replaced when the Refinery was modernized and reconstructed in the mid-1990s.

2.b.Y.4.{OS} Opacity limits. This subsection is irrelevant. These pieces of equipment have been removed when the Refinery was modernized and reconstructed in the mid-1990s. This subsection is irrelevant. These pieces of equipment have been removed/replaced when the Refinery was modernized and reconstructed in the mid-1990s.

2.b.Y.5.{OS} Basis for minimizing SO_2 emissions from the Selenium Extraction Process. This subsection required Kennecott Utah Copper to monitor parameters in order to minimize SO_2 on a daily basis. This subsection is irrelevant. These pieces of equipment have been removed when the Refinery was modernized and reconstructed in the mid-1990s.

2.b.Y.6.{OS} This subsection established requirements for the Dore' furnace secondary hood baghouse. This subsection is irrelevant. These pieces of equipment have been removed when the Refinery was modernized and reconstructed in the mid-1990s.

2.b.Y.7.{OS} This subsection sets limits for the total fuel consumption including coal and #2 fuel oil. Kennecott Utah Copper has modified its combustion operations at the Refinery. Therefore, this subsection is irrelevant.

2.b.Y.8.{OS} This subsection established when Kennecott Utah Copper could use natural gas, fuel oil or coal. Kennecott Utah Copper has modified its combustion operations at the Refinery. Therefore, this subsection is irrelevant.

2.b.Y.9.{OS} This required the fugitive emissions from coal piles and associated roads to be minimized by water spraying. This subsection is irrelevant. Kennecott Utah Copper is not allowed to burn coal at the Refinery.

2.b.Y.10.{OS} This subsection set conditions for the burning of coal at the Refinery boilers. This subsection is irrelevant. Kennecott Utah Copper is not allowed to burn coal at the Refinery.

2.b.Y.11.{OS} This subsection set conditions for the burning of coal at the Refinery steam plant. This subsection is irrelevant. Kennecott Utah Copper is not allowed to burn coal at the Refinery.

2.b.Y.12.{OS} This subsection required Kennecott Utah Copper to notify the Executive Secretary when coal was burned in order for DAQ to conduct an inspection. This subsection is irrelevant. Kennecott Utah Copper is not allowed to burn coal at the Refinery.

2.b.Y.13.{OS} Annual Emissions – established total annual emissions for the entire Refinery. The emissions from the Refinery have significantly reduced since the original PM_{10} SIP was approved. The PM_{10} standard is a 24-hour standard. Therefore, the annual limits have been eliminated. Salt Lake County has not shown an exceedance in over ten years and the reduction in allowable emissions, see table 3, will demonstrate a prevention of backsliding.

Table 3: Potential to Emit

Pollutant	Potential to Emit (Tons/Year)
Current PM_{10}	25.64
Current SO_2	4.44
Current NO_x	38.57
Original SIP PM_{10}	51.9
Original SIP SO_2	162.6
Original SIP NO_x	121.0

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_{10}, NO_x, or SO_2). 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.

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 – Refinery Specific Requirements

There are nine pieces of equipment with limits listed in the AO (DAQE-AN0103460045-10) and the Title V. These nine pieces of equipment were not listed in the 1994 PM_{10} SIP. The two boilers and the turbine are included in the proposed PM_{10} SIP limits. The boilers, in 1994, were rated at 67 MMBTU/hr and have been replaced with boilers that are now rated at 82 MMBTU/hr. The new boilers have low NO_x burners and flue gas recirculation. The remaining pieces of equipment were not included because of the type or the size of the emission rate (less than 1.0 lb/hr). The Demister Pads have an acid mist limit with the Liberator having the highest limit set at 0.46 lb/hr (0.004 gr/dscf). When it was tested in March 2012, the results were less than 0.0001 gr/dscf. Based on this fact and that acid is not a PM_{10} precursor, the demister pads were not included in the proposed PM_{10} Maintenance Plan.

The Precious Metals Recovery scrubber has an SO_2 emission rate of 1.77 lb/hr (42 lbs/hr). It was tested in May 2012 and it had an emission rate of 0.1 lb/hr (2.4 lbs/day). The Silver Production scrubber has an H_2SO_4 emission rate of 0.22 lb/hr (5.2 lbs/hr). It was tested in May 2012 and it had an emission rate of 0.004 lb/hr (0.096 lb/day). The Gold/Silver Recovery Baghouse has a PM_{10} stack test limit of 0.43 lb/hr (10.3 lbs/day). It was tested in March 2012 and it has an emission rate of 0.005 lb/hr (0.12 lbs/day). Based on the emission limits and the tested emission rates, these sources were not included in the proposed PM_{10} Maintenance Plan.

The opacity limits for source specific emission units have not been included in the PM_{10} Maintenance Plan for KUC. Opacity readings do not usually have a direct correlation with the emission rates. An opacity reading has to be taken at the time of the stack test in order to set a correlation with the emission rates. Most of the emission points at the refinery have an opacity limit of 15% or less. All of these emission points listed above have no visible emissions unless there is an upset of the control unit. An opacity limit will not limit the emission rates or allow a visual check on the emission rates from these sources. Therefore, an opacity limit has not been set for these emission points.

IX.H.2.n.ii.A This condition establishes limits for the two Tankhouse boilers and the Combined Heat Plant.

The new boiler NO_x limits are lower than the original SIP boiler limits.

Tankhouse Boilers	1994(67.4 MMBTU/hr)	New (82 MMBTU/hr)
NO_X	0.6 lb/MMBTU	
	40.4 lbs/hr	9.5 lbs/hr

The Combined Heat Plant has a NO_X emission rate of 5.96 lbs/hr (0.07 tons/day)

IX.H.2.n.ii.B This condition establishes stack test frequencies for the boilers. The boiler NO_x emission limits are tested every three years and the combined Heat Plant is tested annually. The boilers uses are subject to the NSPS standards in Subpart Db-Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units.

IX.H.2.n.ii.C This subsection requires Kennecott Utah Copper to use standard operating procedures during start-up and shut-down to minimize emissions.

5.1 Monitoring, Recordkeeping and Reporting

Monitoring for all three emission points is addressed through stack testing. As appropriate, these monitoring requirements are complemented by the general provisions of IX.H: 1.e for stack testing, and 1.c for recordkeeping and reporting.

5.2 Discussion of Attainment Demonstration

Generally, the calculation methodology for determination of emissions from the refinery is identical to the method used in during the 1991/1992 timeframe of the original SIP. However, one key difference exists:

1. Emissions in the new maintenance plan are lower or equal to the original SIP

As is shown above in Table 4, the emissions of PM_{10}, NO_X and SO_2 for the Refinery have decreased from those listed in the original SIP.

2. Condensable emissions, which were excluded from the original SIP, are included in the new maintenance plan

The original SIP was based on filterable PM_{10} emissions only. The new maintenance plan modeled both filterable and condensable PM_{10} emissions.

6.0 Implementation Schedule

The requirements imposed on the Refinery are currently and will remain in effect. While some provision was made for sources generally to implement the RACT requirements of the PM2.5 SIP (and which were included as part of the modeled emission values for each source as discussed in that section above), the refinery did not have any required RACT modifications to undertake. The emission limits listed in IX.H.2.i can be applied immediately. Similarly, the provisions of IX.H.1.a-f (the General Requirements) can also be applied immediately.

7.0 References

- KENNECOTT UTAH COPPER Refinery, $PM_{2.5}$ SIP Major Point Source RACT Documentation
- UDSHW Contract No. 12601, Work Assignment No. 7, Utah $PM_{2.5}$ SIP RACT Support – TechLaw Inc.
- Refinery AO DAQE-AN103460045-10
- Refinery stack test reports for 2012 stack tests
- Smelter/Refinery Title V 3500030003

Evaluation Report – Kennecott Utah Copper Refinery

UTAH PM_{10} SIP/MAINTENANCE PLAN

Salt Lake County Nonattainment Area

Supporting Information

PM_{10} SIP/MAINTENANCE PLAN EVALUATION REPORT
Molybdenum Autoclave Process Plant

1.0 Introduction

This evaluation report (report) provides Technical Support for Section IX, Part H.1 and Section IX, Part H.2 of the Utah Maintenance Plan; to address the Salt Lake County PM_{10} Nonattainment Area. This document specifically serves as an evaluation of the Kennecott Utah Copper's Molybdenum Autoclave Process (MAP) Plant.

Note on document identification: The intention of the Utah Division of Air Quality is to develop a Maintenance Plan to address PM_{10}. As part of this effort, Maintenance Plan 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.

These SIP Subsections 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. Thus, this evaluation report also references an earlier SIP version originally dated June 28, 1991. This SIP was adopted by EPA and published in the federal register on July 8, 1994. This earlier SIP version is often referred to as the "original SIP." In order to distinguish between the various documents in this report, a 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 $^{\{OS\}}$ 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$^{\{OS\}}$ from the original SIP.

1.1 Facility Identification

Name: Kennecott Utah Copper Molybdenum Autoclave Process Plant
Address: 12000 West 2100 South, Magna, Utah, Salt Lake County
Owner/Operator: Kennecott Utah Copper, LLC
UTM coordinates: 4,508,950 m Northing, 401,300 m Easting, Zone 12

1.2 Facility Process Summary

Kennecott Utah Copper is constructing the Molybdenum Autoclave Process plant in Magna, located in Salt Lake County, Utah. In the copper ore, molybdenum exists as molybdenum

disulfide (MoS2). The Copperton Concentrator produces bulk concentrate which consists of copper, molybdenum, gold, and silver among other metals. The molybdenum concentrate is separated from the bulk concentrate using differential flotation. KUC is adding a Molybdenum Autoclave Process (MAP) plant, which will process MoS_2 into MoO_3.

1.3 Facility Criteria Air Pollutant Emissions Sources

The following is a listing of the main emitting units from the KUC MAP plant:

- Combined Heat and Power (CHP) Unit
- Packaging Area Dust Collector
- Calciner
- Dryers
- Reoxidizer

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

1.4 Facility 2011 Baseline Actual Emissions and Current PTE

In 2011, the MAP plant did not exist and therefore does not have actual emissions.

The current PTE values for the Kennecott Utah Copper MAP plant, as established by the most recent AO issued to the source (DAQE-AN103460052-13), are as follows:

Table 2: Current Potential to Emit

Pollutant	Potential to Emit (Tons/Year)
PM_{10} (filterable)	13.11
SO_2	2.43
NO_x	35.57

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. Generally speaking, beginning with the PTE values listed in Table 2 (from the most recent approval order issued to each source), these values were "trued-up" by including the expected effects from implementation of RACT from the PM2.5 SIP. This yields a 2019 Projected Emission Value for each of the pollutants of concern. Where necessary, these values were 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 $PM_{2.5}$ 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 PM_{10} SIP sources – including the KUC MAP plant in

specific. 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 PM_{10} 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

The KUC MAP plant is a not a previously listed SIP source. It was permitted after original PM_{10} SIP document for Davis and Salt Lake Counties [dated 28 June 1991 and Updated 4 November 1992]$^{\{OS\}}$, was written.

However, it is a listed source in the PM2.5 Section of the SIP (see SIP Section IX.H.12.n.iii). As was discussed above in Item 2.0, all limits in this maintenance plan are based on the limits in the PM2.5 SIP; either in the general requirements of subsection IX.H.11 or the source specific requirements of IX.H.12.n.iii.

4.0 New Maintenance Plan – General Requirements

The general requirements for all listed sources are found in Maintenance Plan 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 Maintenance Plan 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 Maintenance Plan 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_{10}, NO_x, or SO_2). 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.

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 – MAP Plant Specific Requirements

IX.H.2.n.iii.A This condition establishes limits for the natural gas turbine with duct burner and TEG firing.

The CHP has a limit for NO_x.

Combined Heat Plant	NO_x 5.01 lbs/hr

IX.H.2.n.iii.B This condition establishes a stack test frequency for the CHP.

The CHP is still under construction and is not in operation. When the CHP begins operation, KUC will be required to test the NO_x emission limits annually.

IX.H.2.n.iii.D This subsection requires KUC to use standard operating procedures during start-up and shut-down to minimize emissions.

The MAP, refinery and smelter are permitted together in the same Title V permit because of their location. The processes at the smelter and refinery are dependent on each other but the process at the MAP is independent of them. The refinery processes copper plates from the smelter and then sends the plates back to the smelter. The smelter then processes the plates again before finished copper is shipped off site. The MAP will receive ore from the Bingham Canyon Mine that has a higher concentration of molybdenum than the ore concentrate that is sent to the smelter.

The majority of the Molybdenum ore body is the located in the bottom of the Bingham Canyon Mine and it is covered with waste material. When the mine had a slide in 2013, it covered the bottom of the open pit mine and the equipment that was located at the bottom of the mine. Since the slide at the mine on April 2013, KUC has been moving the waste material from the slide. They have to haul to material from the bottom of the pit to the ore dumping sites that are located at the top of the pit. The 30,000 mileage limit prevents them from moving it out quickly. KUC will probably not be operating the MAP unit until after the cleanup has been finished.

5.1 Monitoring, Recordkeeping and Reporting

Monitoring for all the CHP emission point is addressed through a stack testing. As appropriate, this monitoring requirement is complemented by the general provisions of IX.H: 1.a for stack testing, and 1.c for recordkeeping and reporting.

5.2 Discussion of Attainment Demonstration

Generally, the calculation methodology for determination of emissions from the PM_{10} SIP sources is identical to the method used in during the 1991/1992 timeframe of the original SIP. However, condensable emissions, which were excluded from the original SIP, are included in the new

maintenance plan. The original SIP was based on filterable PM_{10} emissions only. The new maintenance plan includes both filterable and condensable PM_{10} emissions. The MAP facility is not a listed source in the original PM_{10} SIP.

6.0 Implementation Schedule

The requirements imposed on the MAP will be effective upon commencement of operations. While some provision was made for sources generally to implement the RACT requirements of the PM2.5 SIP (and which were included as part of the modeled emission values for each source as discussed in that section above), the MAP did not have any required RACT modifications to undertake. The emission limits listed in IX.H.2.j can be applied immediately. Similarly, the provisions of IX.H.1.a-f (the General Requirements) can also be applied immediately.

7.0 References

- Kennecott MAP, $PM_{2.5}$ SIP Major Point Source RACT Documentation
- UDSHW Contract No. 12601, Work Assignment No. 7, Utah $PM_{2.5}$ SIP RACT Support – TechLaw Inc.
- MAP AO DAQE-AN103460052-13

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UTAH PM_{10} SIP/MAINTENANCE PLAN

Salt Lake County Nonattainment Area

Supporting Information