Response to Public Comments

On

Proposed Revisions to Utah State Implementation Plan Emission Limits and Operating Practices, Section IX.H.2.h and to Rule R307-110-17

May 4, 2011

Acronyms and Abbreviations Used

AO	approval order
AQB	Utah Air Quality Board
BACT	Best Available Control Technology
BCM	Bingham Canyon Mine
CAA	The Clean Air Act
CMAQ	Community Multi-scale Air Quality Model
CMB	Chemical Mass Balance
UDAQ	Utah Division of Air Quality
EPA	U.S. Environmental Protection Agency
HAP	hazardous air pollutant
ITA	intent to approve
KUC	Kennecott Utah Copper
Mtpy	million tons per year
NOI	notice of intent (to construct)
NSPR	new source plan review
PTE	potential to emit
RRF	relative reduction factor
SIP	state implementation plan
tpy	tons per year
TSD	technical support document
UAC	The Utah Administrative Code
UAM-AERO	Urban Airshed Model
UPHE	Utah Physicians for a Healthy Environment and Western Resource Advocates (collectively)
VMT	vehicle miles traveled

Table of Contents:

I. Introduction

To supply copper ore to its smelter, Kennecott Utah Copper (KUC) desires to move more material at the mine than currently allowed under the Utah State Implementation Plan (SIP) and KUC's current Approval Order (AO). After review by the Division of Air Quality (UDAQ) staff and presentation to the Utah Air Quality Board (Board), on February 2, 2011, the Board proposed two items for public comment and, separately, the Executive Secretary proposed one item for public comment. Those three items are:

1) Revision by the Board to Utah State Implementation Plan Emission Limits and Operating Practices, SIP Section IX.H.2.h;

2) Revision by the Board to Rule R307-110-17; and

3) Executive Secretary's Intent to Approve (UDAQE-IN0105710028-11, dated February 2, 2011), and Associated New Source Plan Review.

The regulatory action addressed in this document is whether the Board should amend R307-110-17 (Item 2 above) to incorporate a revision to the SIP (Item 1.) The revision to section IX.H.2.h of the 2005 PM10 Maintenance Plan involves a change in the amount of material KUC may move at the mine from 197,000,000 tons to 260,000,000 tons per 12 month period.

The Executive Secretary is responsible for the review and the decision on the AO, not the Board. However, there is some overlap between the SIP and the AO (Items 1 and 3) While each action occurs under a different regulatory process, both the SIP and AO actions are required to modify the same regulatory limit currently existing on the amount of material KUC may move in a year at the Bingham Canyon Mine.

This document responds to public comments relating to the SIP. Nonetheless, some SIP and AO comments are intertwined and where they are, they are addressed in this document. Comments that concern only the Intent to Approve and associated New Source Plan Review will be summarized and addressed in a separate document. Public comments have been summarized and grouped by content. The document is organized as described in the Table of Contents.

II. Legal and Process Related Comments

Comment II.1 – While not a formal or final analysis, EPA raised concerns that the proposed revision to the SIP to allow for Kennecott's BCM expansion will not be approvable. Citing Section 110(l) of the Clean Air Act, EPA says it "shall not approve" a SIP revision if it would interfere with any applicable requirement concerning attainment and reasonable further progress. This is pertinent not only to the National Ambient Air Quality Standards (NAAQS) for PM10 says EPA, but to other NAAQS as well, in particular PM2.5, ozone, and NO_2. **(Comment made by the EPA)**

UDAQ Response – *UDAQ disagrees with EPA. The State is modifying a PM10 maintenance plan. A maintenance plan requires a demonstration of adequacy. Under EPA regulations such a plan "must demonstrate that the measures, rules, and regulations contained in it are adequate to provide for the timely attainment and maintenance of the national standard that it implements." 40 CFR § 51.112(a).*

At issue before the Board is whether the increased material moved at the Bingham Canyon Mine (BCM) will still allow the 2005 PM10 plan to make the demonstration of adequacy for PM10. Based on the staff's review of Kennecott's proposal, the revised 2005 SIP can still make the adequacy demonstration because the air quality models do not predict that PM10 concentrations will exceed the PM10 standard at any location in current or future years.

KUC has initiated a parallel process to amend its approval order, which request is governed by a separate set of rules and is currently under review by UDAQ. That review will consider the potential impacts on other air pollutants in addition to PM10. The Executive Secretary's decision on whether to amend KUC's approval order is in part dependent on whether the Air Quality Board approves the proposed amendment to the PM10 Maintenance Plan.

Comment II.2 – EPA, citing its January 8, 2010 comment letter, clarified that the federally enforceable limit applicable to material that may be moved at the BCM is 150.5 million tons per year, as contained in the 1994 PM10 SIP. EPA also referenced its 1999 and December 2009 comments on the inadequacy of Utah's PM10 SIP and contends that those comments also relate to the SIP revision under consideration. **(Comment made by the EPA)**

UDAQ Response – *UDAQ disagrees with EPA's assessment of the federally enforceable limit. In 1999, the 1994 limit affecting the amount of material that could be moved at the mine, 150.5 million tons per year, was revised in Approval Order UDAQE-801-99 and increased to 197 million tons per year. That AO was approved by the Air Quality Board. In 1999, this (Board approval) was a mechanism provided in the EPA-approved 1994 Utah SIP for changing specific limits, such as the limit for the BCM, in the 1994 SIP.*

The item pending before the Board is whether the 2005 PM10 SIP (currently incorporated into State rules) should be revised, to allow an increase in the amount of material moved at BCM from 197 millions tons to 260 million tons per 12-month period.

As noted above, under the 1994 SIP, the Air Quality Board could increase a source's limit specified in the SIP if, first, the source's AO was revised and approved by the Executive Secretary, and then approved by the Board. That option is no longer available under the 2005 SIP. In UDAQ's view, for a source to increase a limit specified in the SIP, the Air Quality Board must amend the maintenance plan (the 2005 SIP), provided the State can still make an adequacy demonstration required by 40 C.F.R. § 51.112(a).

There is often a lag time of many years between the State's submittal of a SIP to EPA and EPA's final action on that submittal. In the interim, business in the State must be able to proceed, provided there is compliance with applicable air quality regulations. That is the case here. As EPA has not taken final action on the 2005 SIP revision (but has issued a notice of intent to disapprove it), and as the 2005 SIP is existing State law, the Board has two options: amend the 2005 SIP to increase the limit applicable to Kennecott or require Kennecott to conduct business within the limit currently in the 2005 SIP which was established pursuant to the 1994 SIP. On the technical merits, UDAQ is recommending the Board approve the increased limit because the 2005 SIP can still meet the adequacy demonstration required by 40 C.F.R. § 51.112(a).

See also the responses to EPA's technical comments: III.A.1, III.B.i.1.

Comment No. II.3 – The TSD has been revised twice, while the NOI has not been revised. These changes have not been documented in a formal way by UDAQ. UPHE requests that UDAQ provide to the public the agency's full technical analysis of information presented in the TSD. **(Comment made by UPHE)**

UDAQ Response – *UDAQ's technical analysis is and has been available to the public. The final TSD released for public comment is the document that UDAQ relies upon to show that the 2005 SIP may be amended as proposed. In particular, the UDAQ is relying on the TSD Section 3, 2005 Maintenance Plan Demonstration and Section 4, Emissions Summary. Other parts of the TSD and references made therein corroborate and support the proposed increased limit. Prior to being finalized, the TSD was a dynamic document, updated and revised by Kennecott to satisfy the staff's analysis that the proposed changes met the regulatory requirements to revise the SIP. On the permitting side, a similar process occurred with the NOI, which was also revised.*

Comment No. II.4 – The administrative processing of the proposed AO has been difficult from the standpoint of an AQB member who had been advised to avoid involvement with the AO, in order to preserve the ability to participate in adjudication of the permit, in the event that it is subsequently challenged. Yet, the SIP TSD refers to some elements of the SIP background contained within the permitting documentation. **(Comment made by Kathy Van Dame, UAQB member)**

UDAQ Response – *All documents relevant to the Kennecott expansion project have been posted on UDAQ's website, including the TSD for the SIP, the NOI for the AO and the Executive Secretary's Intent to Approve the AO; as well as public comments received on the SIP and AO actions. There is no restriction on any Board member reviewing any of the information posted on the UDAQ website. However, the action the Board will take is based on the record for the SIP. That record includes the TSD and where, for example, the TSD cross-references the information and calculations in the NOI, that information forms part of the record for the SIP.*

III. Technical Comments

A. 2005 PM10 Maintenance SIP

Comment No. III.A.1 – Kennecott's CALPUFF modeling analysis in the Technical Support Document (TSD) did not consider any NAAQS but PM10 (see Comment No. II.1) and was based on the 2005 UAM-AERO modeling effort [part of the Utah's proposed maintenance plan for PM10]. EPA Region 8 has proposed to disapprove this plan, in part because of issues with the UAM-AERO modeling. Thus, the current modeling is also inadequate for some of the same reasons cited in the proposed disapproval [*see FR 74, No. 229, pp 62717*], including the modeled release point of banked emissions and lack of speciated relative response factors. Furthermore, there is insufficient information for both CALPUFF and AERMOD simulations described in the TSD. The impacts of the proposed BCM expansion should be evaluated using the new CMAQ model and additional AERMOD simulations with updated emissions data. **(Comment made by the EPA)**

UDAQ Response – *Taken point-by-point:*

> "Kennecott's CALPUFF modeling analysis in the Technical Support Document (TSD) did not consider any NAAQS but PM10 (see Comment No. II.1)"

Response: UDAQ agrees that it only considered PM10, but disagrees that the modeling is inadequate for that reason. The CALPUFF analysis is specific to PM10 standard because that is the focus of the UAM-AERO modeling for the maintenance plan. The CALPUFF analysis was designed to show that additional emissions from the KUC expansion would not increase PM10 concentrations above the design value of 150 ug/m3 used in the UAM-AERO analysis.

> "… was based on the 2005 UAM-AERO modeling effort [*part of the Utah's proposed maintenance plan for PM10.*] EPA Region 8 has proposed to disapprove this plan, in part because of issues with the UAM-AERO modeling. Thus, the current modeling is also inadequate for some of the same reasons cited in the proposed disapproval [*see FR 74, No. 229, pp 62717*], including the modeled release point of banked emissions and lack of speciated relative response factors."

Response: In the reference, FR 74, No. 229, pp 62717, there are three comments that are specifically related to the UAM-AERO modeling. They are detailed in FR 74, No. 229, pp 62722 – 62724 under the heading: "1. Deficiencies applicable to all three maintenance plans." All three of these comments were addressed by UDAQ in responses to EPA in February 2010 – "Concerning EPA proposed disapproval of PM10 Plan.doc" pp 8 – 11, attached).

> "Furthermore, there is insufficient information for both CALPUFF and AERMOD simulations described in the TSD."

Response: UDAQ disagrees with this comment. The summary information is included in the TSD as governed by the demonstration of adequacy requirements contained in 40 C.F.R. § 51.112 (b). The demonstration must include the following: (1) A summary of the computations, assumptions, and judgments used to determine the degree of reduction of emissions (or reductions in the growth of emissions) that will result from the implementation of the control strategy. (2) A presentation of emission levels expected to result from implementation of each measure of the control strategy. (3) A presentation of the air quality levels expected to result from implementation of the overall control strategy presented either in tabular form or as an isopleth map showing expected maximum pollutant concentrations. (4) A description of the dispersion models used to project air quality and to evaluate control strategies.

The TSD satisfies all four requirements, and is therefore sufficient for UDAQ's review.

> The impacts of the proposed BCM expansion should be evaluated using the new CMAQ model and additional AERMOD simulations with updated emissions data.

Response: - The technical analysis for this project was initiated close to two years ago. At that time the CMAQ modeling analysis for $PM_{2.5}$ was in its initial phases and was rejected as a viable approach since its completion date was too far out in the future. The best technical approach available was through the use of CALPUFF and AERMOD.

Comment No. III.A.2 – Section 3 of the TSD discusses the 2005 SIP revision. While approved by the UAQB, a SIP is a federally enforceable document, and as such, must be approved by EPA. Not only has EPA not approved the 2005 SIP, but has published its intention to disapprove the SIP on numerous grounds, including issues with the UAM-AERO modeling that supports the plan. Therefore, Section 3 of the TSD is technically moot. Nevertheless, we raise the following issues concerning the technical details presented in Section 3. **(Comments made by UPHE)**

a) Why were the UAM-AERO modeling files from the 2005 SIP not available from UDAQ?

UDAQ Response – *The UAM-AERO modeling files are available from UDAQ, however, the model itself is not available. UDAQ transitioned to the current generation of photochemical air quality model (the Community Multi-scale Air Quality Model (CMAQ)) soon after the technical work on the PM10 Redesignation Request was completed in 2005. That model was coded for and compiled on computers that are no longer in use at UDAQ or elsewhere. By the same token the input files used for that model are not compatible with this newer class of models.*

All of the input and output files from that modeling exercised are still archived at UDAQ and applicable files needed to apply the CALPUFF results to the UAM-AERO modeled concentrations were provided to KUC.

b) UAM-AERO is a photochemical model. CALPUFF is a dispersion model and does not focus on addressing the primary chemical transformations that occur as UAM-AERO does. How can UDAQ allow the switching of modeling platforms, considering their differences?

UDAQ Response – *UDAQ did not switch modeling platforms, but used both platforms to derive the cumulative impact from all sources including those from the Bingham Canyon Mine expansion. The CALPUFF modeling system contains algorithms for the chemical transformation of precursors to secondary PM10. In the Bingham Canyon Mine expansion analysis the NOx emissions were fully converted to PM10. Using 100% conversion assumes a conservative, i.e., worst case scenario.*

c) Table 3-3 provides PTE information without a pit retention factor. These numbers do not match those presented in Table 1-1, perhaps because Table 3-3 includes the Copperton Concentrator. The mine and concentrator are permitted together and should be considered together in any table.

UDAQ Response – *The differences reported in these two tables are not related to the inclusion, or not, of the Copperton Concentrator.*

Rather, Table 3-3 reports the two inventories used to make the adequacy demonstration with respect to the 2005 maintenance plan. One is the inventory used in that plan for the UAM-AERO demonstration (at 197 Mtpy) and the other is an assessment made, using the same emissions calculation methodology, assuming a material-moved limit of 260 Mtpy.

Pit retention was not considered in making the adequacy demonstration with respect to the 2005 maintenance plan required by 40 C.F.R. § 51.112(a.)

The inventory summarized in Table 1-1 also assumes a material moved limit of 260 Mtpy, but was compiled using the emissions calculation methodology

included as part of the NOI (Appendix B.) The totals in this table reflect the application of a pit retention factor, whereas neither of the two inventories summarized in Table 3-3 made that assumption. See also the response to Comment No. III.D.1.

d) Section 3.3.4 refers to NOx emissions as 5,078 tpy at the 197 Mtpy limit and 7,450 tpy at 260 Mtpy. Why are these differing numbers for NOx not consistent with NOx emissions stated elsewhere in the document?

UDAQ Response – *See response to c), above.*

e) In the Results Section 3.4, UAM-AERO results are not shown for comparison with the increases shown by the CALPUFF runs. They should be.

UDAQ Response – *UAM-AERO results can be deduced through simple subtraction of data provided in Table 3-5 and Table 3-6 on page 3-7 of the TSD. Column 5 in both tables represents the increase in emissions due to the added emissions from the mine expansion. Column 4 in each table represents the UAM-AERO estimate plus the additional concentration from Kennecott. The difference of subtracting column 5 from column 4 will give the UAM-AERO results for the maximum grid cell in the domain. Figures 3-1 and 3-2 on the page 3-8 and page 3-9 show the same data in a graphical format.*

B. 1994 PM10 Attainment SIP

Editorial Note: the reader should understand that the pertinent question for the Board's consideration in this action is whether to revise section IX.H.2.h of the 2005 PM10 Maintenance Plan by changing the amount of material KUC may move at the mine from 197,000,000 tons to 260,000,000 tons per 12 month period.

Issues pertaining to the 1994 PM10 attainment SIP and emissions offsets are of no relevance to the issue before the Board. However, those issues still support an adequacy demonstration with respect to the 1994 PM10 attainment SIP.

Comment No. III.B.1 – Section 2.1 of the TSD states that secondary sulfate and nitrate impacts were assumed to be in direct proportion to a source's relative sulfur dioxide and nitrogen oxides emissions. The 1994 SIP describes Kennecott as a large source of secondary PM10. The commenter requests that UDAQ describe the meaning of this statement and show where the results of the demonstration account for secondary pollutants. **(Comment made by UPHE)**

UDAQ Response – *The 1994 SIP used Chemical Mass Balance (CMB) modeling to show attainment. CMB is well suited to apportioning source contribution for primary PM, but secondary PM (e.g. ammonium sulfate and ammonium nitrate), having undergone transformation between source and receptor, poses problems. To work around this problem, all of the secondary sulfate and nitrate collected on the filters was apportioned*

based on the emissions inventory. Kennecott's inventory showed large amounts of SO_2 and NOx, hence it was considered a large source of secondary PM10.

Comment No. III.B.2 – Section 5 (Conclusion) of the TSD discusses, in the first bullet item, an analysis based on the 1994 SIP supporting the modification of the operational limit at the mine from 150.5 Mtpy to 260. The commenter can find no evidence of this type of analysis, and asks if it was performed previously. **(Comment made by UPHE)**

UDAQ Response – *This topic is first discussed in Section 2.2 of the TSD. The 1994 SIP was built with a limit of 150.5 Mtpy, and the first column reported in Table 2-1 (1994 emission inventory used in the CMB modeling) reflects that limit. The next column shows the emissions as they would have been calculated in 1994, had the limit been 260 Mtpy. The increase is shown in the third column, and this is the basis that was used as the accounting for offsetting with banked emissions. (See also response to Comment No. II.2)*

i. Use of Banked Emission Credits

Comment No. III.B.i.1 – Concerning the proposed use of banked emission credits, the TSD identifies a total emissions increase of 5,417 tons per year that includes increases of both PM10 and NOx. To offset this increase, Kennecott proposes to apply banked SO_2 credits. The credits were generated at the smelter, which is 25 miles away from the pit, and had been released from the 1,200 foot stack. The proposed inter-precursor trade has not been modeled to demonstrate the effect on ambient air quality. Additionally, EPA has previously asked the State to provide evidence to validate the banked credits and identified concerns with the 1994 PM10 SIP's offset provisions. **(Comment made by the EPA)**

UDAQ Response – *Kennecott was required by the 1994 SIP to reduce emissions. In 1999, KUC was credited for modernization efforts undertaken while operating in compliance with this SIP. This modernization resulted in Kennecott banking 17,656.50 tons of actual SO_2 emissions reductions. The offsets were attained from emissions reductions in the same nonattainment area as the BCM and are therefore valid banked emissions (R307-403-4).*

The offsetting rule (R307-403-5) developed for and approved by EPA in the 1994 PM10 SIP combines PM10, SO_2, and NOx, and allows for inter-pollutant trading for minor sources. For an increase of emission greater than 50 tons per year, a 1.2:1 ratio is required in the nonattainment area. In accordance with the offsetting rule, the total emissions increase of 5,492 tons per year is being offset with 6,590 tons of banked SO_2 emissions (see TSD Section 2.2.3.) If the proposed SIP revision is approved by the Air Quality Board, then these offsets will be made enforceable at the time the approval order is finalized. See also response to Comment No. V.C.1.

Comment No. III.B.i.2 – Citing EPA's 6/30/99 letter Re: "Intent To Approve" Production Increase for Kennecott Bingham Canyon Mine, which proposed to increase

the amount of material moved from 150.5 Mtpy to 197, and wherein there was a discussion concerning the application of banked credits in order to offset the projected increase in emissions, EPA stated that, according to State banking letters to Kennecott, the banked credits were generated based on the difference between the annual emissions allowed in the PM10 SIP and the emissions subsequently allowed by the Approval Order for those operations. And, while acknowledging this practice to be in accord with R307-403-7, it does not constitute evidence that actual emission reductions have occurred. Under R307-403-4(2), any emission offsets shall be in terms of actual emissions, yet no evidence has been provided that there has been a reduction of at least 1,105 tpy in actual emissions. **(Comment referencing EPA's earlier comment; Terry Marasco)**

UDAQ Response – *See response to Comment No. III.B.i.1.*

Comment No. III.B.i.3 – Concerning Kennecott's proposed use of banked SO_2 credits, the record does not support the claim that the offsets will provide a positive net air quality benefit in the affected area of nonattainment as required by R307-403-3(3)(d.) **(Comment made by Western Resource Advocates)**

UDAQ Response – *This comment is specific to the Executive Secretary's Intent to Approve (UDAQE-IN0105710028-11, dated February 2, 2011), the NOI, and the associated New Source Plan Review. A detailed response will be provided as part of that record.*

Comment No. III.B.i.4 – Kennecott has offered emission reduction credits to offset increases in emissions. Since offsets do not appear to be required by state or federal law, UDAQ should explain the regulatory basis for the application of these credits to the SIP modification process. **(Comment made by UPHE)**

UDAQ Response – *This comment is specific to the Executive Secretary's Intent to Approve (UDAQE-IN0105710028-11, dated February 2, 2011), the NOI, and the associated New Source Plan Review. A detailed response will be provided as part of that record.*

Comment No. III.B.i.5 – Section 2.2 of the TSD presents the proposal to offset increases in PM10 and NOx. The credits currently represent emissions that are banked and are not being emitted into the airshed. However, the Salt Lake area has experienced exceedances of the PM10 standard even while these credits are in the bank. Using these banked credits to allow additional emissions is problematic and should not be allowed by UDAQ. **(Comment made by UPHE)**

UDAQ Response – *UDAQ disagrees, and continues to believe that the efforts made as part of the 1994 PM10 SIP have resulted in attainment and continued maintenance of the NAAQS. The form of the 24-hr PM10 standard does allow for, on a 3-year average, one exceedance per year. Exceedances monitored beyond that have been due to what UDAQ characterizes as exceptional events, meaning that exceedances would have been*

monitored irrespective of our anthropogenic (man-made) emissions. Typically, these are very windy days, often in spring when melt/freeze conditions have rendered surface soils in surrounding desert areas available for transport. Add to those conditions a turbulent frontal passage and there will be a monitored exceedance of 150 µgm^3. UDAQ acknowledges that EPA has not always agreed with its interpretation of these events, nevertheless, for the reasons described above, UDAQ does not feel that the exchange of these credits will add to the number of PM10 exceedances.

C. Overlap between 2005 SIP and Intent to Approve UDAQE-IN0105710028-11 (dated February 2, 2011) and Associated New Source Plan Review

Comment No. III.C.1 – In Section 4.2.5 of the TSD, Kennecott states that it follows UDAQ's policy (Permitting Branch Memo from R. Olsen, March 10, 2008) of using 75% control efficiency on fugitive emissions from unpaved roads. However, the calculations shown in Table A1-18 show the application of 85 and 95% control, reflecting differences in seasonality. These emissions should be re-calculated using 75% control. **(Comment made by UPHE)**

UDAQ Response – *UDAQ disagrees. A control efficiency of 95% was used for calculating the fugitive emissions from the haul roads when the 1994 and 2005 PM_{10} SIPs were developed. To remain consistent, these same control efficiencies were used when the TSD was written. Table A1-18, and all other calculations shown in Appendix A1 of the TSD, are consistent with the calculations used in the 1994 attainment SIP.*

The NOI follows a different regulatory process which has different requirements. Therefore, the emissions that were calculated for the NOI process followed the guidelines outlined in the memo developed for the NOI process. That memo recommends that a 75% control efficiency be used for calculating the haul road fugitive emissions used in the NOI process.

Comment No. III.C.2 – Table 1-1 of the TSD reports the "most representative" PTE calculations for 260 Mtpy. However, the PTE summary presented in the companion" NOI document does not agree with the summary given in Table 1-1. This discrepancy casts doubt as to the accuracy of both sets of numbers. **(Comment made by UPHE)**

UDAQ Response – *UDAQ disagrees. Both documents have been modified since they were originally submitted to UDAQ in August 2010. The TSD and NOI were reviewed by different individuals, which resulted in the documents being updated at different times. The most current versions were posted on the DEQ/UDAQ web site in January 2010. The emissions from these two documents are listed below:*

The emissions in Table 1-1 of the TSD are listed under Section 1.1, Notice of Intent.

TABLE 1-1
Bingham Canyon Mine Proposed Potential to Emit for 260,000,000 tpy Throughput

Pollutant	*(tpy)*
PM_{10}	*1,513*
SO_2	*6.56*
NO_x	*5,830*
CO	*1,682*
VOC	*314*

The emissions in the NOI are listed in Appendix B-1

Table B1-1
Emissions Summary (260MM case)
KUC – Bingham Canyon Mine

	Post Project BCM PTEs
PM_{10} Emissions (tpy)	*1,513*
$PM_{2.5}$ Emissions (tpy)	*1,513*
SO_2 Emissions (tpy)	*6.56*
NO_x Emissions (tpy)	*5,830*
CO Emissions (tpy)	*1,682*
VOC Emissions (tpy)	*314*
HAP Emissions (tpy)	*1.37*
PM_{10} + SO_2 + NO_x Emissions (tpy)	*7,350*

Also to note, at other locations in these two documents, the emissions were calculated with different equations and emission factors. In the TSD the emissions were calculated based upon emission factors that were used for the 1994 SIP and 2005 Maintenance plan. This was done so that the change could be more accurately shown. If the latest emission factors were used, then the 1994 and 2005 numbers would have been different than what was calculated then. The emissions in the NOI were calculated based upon the current emission factors listed in the latest EPA AP-42.

D. Emissions Estimates

Comment No. III.D.1 – UDAQ's 2008 emissions inventory, representing activities constrained by a 197 Mtpy operational limit, reports 2,915 tons of PM10 from the mine/concentrator. Kennecott's TSD states that with a proposed operational increase of 32% the total PM10 emissions will only be 1,513 tpy, a 48% decrease. The record does not support such a claim. There are no new methods of pollution control. It is perhaps more reasonable to assume that a 32% increase in operational mining will lead to a commensurate increase in actual emissions. **(Comment made by UPHE)**

UDAQ Response – *The action before the Board is whether to revise section IX.H.2.h of the 2005 PM10 Maintenance Plan by changing the amount of material KUC may move at the mine from 197 Mtpy to 260. In order that such action be taken, 40 C.F.R. § 51.112(a) requires a demonstration of adequacy with respect to the PM10 NAAQS. This demonstration was made using CALPUFF, in conjunction with the UAM-AERO demonstration underlying the 2005 PM10 Maintenance Plan. The analysis has been documented in section 3 of the TSD. The emissions inventories used to make this demonstration show that there will be an increase in emissions from what had been relied upon in the 2005 Plan. These inventories are shown in the table below. Units are in tons per year:*

Summary of Emission Inventories (2005 PM10 Maintenance SIP):

	PM10	PM2.5	SO_2	NOx	VOC	CO	Reference
2005 Maintenance SIP Inventory – 197 Mtpy	2,817		69	5,078			TSD Table 3-2 & Appx. A-2
KUC 2005 Inventory – 260 Mtpy	3,185		6	7,442			TSD Table 3-2 & Appx. A-2
Difference	+368		-63	+2,364			TSD Table 3-2 & Appx. A-2

Some discussion concerning these numbers is necessary.

The 2005 PM10 Maintenance SIP inventories show a comparison between the Post-SIP allowable emissions estimate used in the 2005 maintenance SIP and the calculation appearing in Appendix A-2 of the TSD. The 2005 SIP calculation was based on an annual limit of 197 Mtpy of material moved. The TSD calculation uses methods and assumptions that are consistent with the inventory supporting the 2005 maintenance SIP, but assumes a limit of 260 Mtpy. The difference in emissions between these two estimates is what was modeled using CALPUFF and then added to the UAM result. Neither of these inventories assumes any pit retention.

The assumption to use calculation methodologies that are consistent with those in practice when the maintenance demonstration was made is sound. The (2005) UAM-

AERO model was calibrated using base-year inventories for KUC and every other source that were calculated using these practices. This assumption makes comparisons with post-SIP inventories used in the respective demonstrations acceptable.

With regard to the question as to whether there should be an emissions increase that is proportional to the increase in material moved, there are several improvements in the operation of the mine that can be expected with this proposal.

Most notable is the new requirement to apply chemical dust suppressant to those portions of the haul roads outside of the pit where the waste rock is to be hauled.

In 1999, engines used in the haul trucks used what is referred to as a pre-tier 0 engine. Since then EPA has required all new engines that are being developed to use cleaner burn technologies. Kennecott uses engines now that are equipped with tier 1, tier 2, tier 3 and tier 4 technologies. These new engines have reduced the NO_x emissions from the engine exhaust.

When the SIPs were developed, the sulfur content of the diesel fuels were 500 ppm and with the new federal requirements the sulfur content of the sulfur has been reduced to 15 ppm.

When the SIP emission calculations were performed the roads were dustier due to the silt loading in the haul roads. Now Kennecott has installed a road base crusher and places a road base mix on the haul roads which has reduced the silt content of the road surface. This has reduced the fugitive dust emissions from the haul roads.

All of the technologies outlined above have reduced the PM_{10}, SO_2 and NO_x emissions from the Bingham Canyon Mine.

E. Air Flow Patterns & Pit Retention of Fugitive Dust for the Bingham Canyon Mine (Bhaskar and Tandon, 1996)

Editorial Note; as it concerns the item before the Board, proposed modification to the Utah SIP, Section IX.H.2.h, pit retention of emissions was not considered as part of the adequacy demonstration required under 40 CFR 51.112(a.)

Comments collected as part of the process concerning pit retention, as well as the study upon which Kennecott relied to quantify its effect, will be summarized and addressed in a response to comments memorandum as part of the Executive Secretary's Intent to Approve(UDAQE-IN0105710028-11, dated February 2, 2011) and associated New Source Plan Review.

IV. General Comments

Comment No. IV.1 – Many commenters expressed their opposition to the proposed increase in activity at the Bingham Canyon Mine (BCM.) UDAQ lists the comments point by point, then responds to these comments below.

UDAQ Response*: As an initial matter, some questions have been raised about the specific responsibilities of UDAQ and the Utah Air Quality Board. The policy and purpose of the Air Conservation Act is set out below:*

19-2-101. Short title -- Policy of state and purpose of chapter -- Support of local and regional programs -- Provision of coordinated statewide program.

(1) This chapter is known as the "Air Conservation Act."

(2) It is the policy of this state and the purpose of this chapter to achieve and maintain levels of air quality which will protect human health and safety, and to the greatest degree practicable, prevent injury to plant and animal life and property, foster the comfort and convenience of the people, promote the economic and social development of this state, and facilitate the enjoyment of the natural attractions of this state.

(3) Local and regional air pollution control programs shall be supported to the extent practicable as essential instruments to secure and maintain appropriate levels of air quality.

(4) The purpose of this chapter is to:

(a) provide for a coordinated statewide program of air pollution prevention, abatement, and control;

(b) provide for an appropriate distribution of responsibilities among the state and local units of government;

(c) facilitate cooperation across jurisdictional lines in dealing with problems of air pollution not confined within single jurisdictions; and

(d) provide a framework within which air quality may be protected and consideration given to the public interest at all levels of planning and development within the state.

> **Comment IV.1.a**: The role of the UDAQ and its Board is to protect the health of Utah's citizenry and to bring the State into compliance with Federal health standards. Economic consequences are not to be considered.

UDAQ Response*: Economic consequences or concerns played no role in UDAQ's review. As noted in UDAQ's response to Comment II.1. above, UDAQ proposes to modify a PM10 SIP maintenance plan. To do so, a maintenance plan requires a demonstration of adequacy. Under EPA regulations such a plan "must demonstrate that the measures, rules, and regulations contained in it are adequate to provide for the timely attainment and maintenance of the national standard that it implements." 40 CFR § 51.112(a).*

The Clean Air Act, its implementing regulations and the Utah Air Conservation Act all presume that business activity that impacts air quality will occur. The proposal for the Board's consideration has made the necessary demonstration of adequacy, and therefore is consistent with the requirements of applicable law to protect the health of Utah's citizenry.

Comment IV.1.b: Parallel processing of the AO and the SIP imply that the proposed SIP revision is a forgone conclusion.

UDAQ Response*: Please see responses to Comments No. II.4 and V.A.1.*

Comment IV.1.c: Particular hardship imposed upon those suffering from asthma, developing children, and nearby residents of Hi-Country Estates, described as dusty already.

UDAQ Response*: The Clean Air Act, its implementing regulations and the Utah Air Conservation Act all presume that business activity that impacts air quality will occur. The proposal for the Board's consideration has made the necessary demonstration of adequacy, and therefore is consistent with the requirements of applicable law to protect the health of Utah's citizenry.*

Comment IV.1.d: Any perceived benefit to the economy should be tempered by a discussion of the associated increase in health care costs. Additionally, Kennecott's gain may result in additional constraints on other existing businesses as we attempt to solve our problems with PM2.5 and ozone.

UDAQ Response*: Please see response to Comment IV.1.a, above. In addition, PM2.5 and ozone will be reviewed during SIP revision actions for those specific pollutants. Please see response to Comment No. IV.3, below.*

Comment IV.1.e: Kennecott provides relatively few jobs while greatly contributing to industrial air pollution. Breathable air is more important than economic gain.

UDAQ Response*: Please see response to Comment IV.1.a, above.*

Comment IV.1.f: A company that shows a profit of $14 billion should be investing in technologies to pollute less. If Kennecott could reduce an equal amount of particulate emissions from other sources they could proceed with their plans.

UDAQ Response*: The question for the Air Quality Board is whether the appropriate demonstration has been made with regard to the effect the proposed increase in total material moved would have on the 2005 PM10 Maintenance Plan. UDAQ has reviewed the proposal and believes that the demonstration of adequacy has been made. Accordingly, KUC has met the necessary requirement for the amendment to the 2005 plan. Considerations of lower-polluting technologies beyond KUC's current regulatory obligations are not a subject of this action.*

Comment IV.1.g: Approval for the Cornerstone Project to move forward should be reserved until the EPA takes action (by December 1, 2011) on the States proposed maintenance plan for PM10.

UDAQ Response*: Please see responses to Comments No. II.2 and V.A.2.*

Comment IV.1.h: Air quality along the Wasatch Front is already not meeting the federal health standards for PM10, PM2.5 and ozone. This is especially true during wintertime when Utah's air quality is often characterized as "worst in the nation." These episodes coincide with incidences of poor health. We should therefore be looking for ways to reduce our emissions rather than allowing for projects such as this which would make the current situation worse.

UDAQ Response*: Please see response to Comment IV.1.a, above.*

Comment IV.1.i: Despite the PM10 SIP that is in place, Salt Lake County has still exceeded the 24-hr standard for PM10 based on monitored values that UDAQ considers exceptional events. This indicates that the current SIP is not protective enough.

UDAQ Response*: Please see response to Comment No. III.B.i.5*.

Comment IV.1.j: Kennecott claims that the Cornerstone Project will actually reduce air pollution along the Wasatch Front. However the company has projected no credible documentation to support the assertion that their increased hauling of ore and waste will not yield a proportionate increase in particulate pollution.

UDAQ Response*: Please see response to Comment No. III.D.1*.

Comment IV.1.k: Kennecott's assertion that 80% of the emissions never leave the pit are based on a paper written by a University of Utah graduate student that has never been verified or field tested, even as its author advised it should be.

UDAQ Response*: Please see Editorial Note in section III.E.*

Comment No. IV.2 – Many commenters expressed their support for the proposed increase in activity at the Bingham Canyon Mine (BCM.) Reasons given for this support included: jobs, economic development, and Kennecott's charitable contributions and community development.

UDAQ Response – *These commenters were all in favor of the Kennecott BCM expansion and did not present a technical reason for their support. Since the comments are editorial and not technical in nature, UDAQ acknowledges the comments but does not change its recommendation that the Board approve the proposed revision to the 2005 Maintenance Plan.*

Comment No. IV.3 – The Utah Air Quality Board should reserve its decision and require further analysis of the impacts on air quality with respect to PM2.5 due to current and future mine operations. Kennecott's proposal would seemingly result in an increase of NOx emissions. NOx is a precursor to both PM10 and PM2.5. **(Comment made by Ralph Becker, Mayor, Salt Lake City and Peter Corroon, Mayor, Salt Lake County)**

UDAQ Response – *As required by the Clean Air Act, air quality standards are in a constant state of review and have become more stringent over time. Each time EPA revises a standard, a timeline is established to allow states to develop the tools and evaluations necessary to draft a SIP to address that pollutant. The development of the PM2.5 SIP is well underway but is not required to be complete until the end of 2012. The SIP process contains the authority to require controls adequate to provide for the timely attainment and maintenance of the PM2.5 NAAQS. The action before the Board does not impede the development of a future PM 2.5 SIP. The contribution to fine particulate made by NOx emissions will be part of the PM2.5 evaluation.*

V. Kennecott's Comments

A. Legal and Process Related Comments

Comment No. V.A.1 – Kennecott submitted a request to modify the current material movement limitation in both the state 2005 PM10 SIP and the Bingham Canyon Mine Approval Order to ensure the public has sight of the entire proposal. Both requests were submitted to the UDAQ for a parallel but staggered review. **(Comment made by KUC)**

UDAQ Response – *See Introduction and Responses in Section II above. UDAQ sent the revision to the 2005 SIP and a modification of the existing Approval Order out for public comment at the same time with the view that it would enhance the public's understanding of all the regulatory actions that needed to be taken to approve Kennecott's request. In order for Kennecott to proceed with its project, both actions need approval, but, importantly, an Intent to Approve document does not pre-suppose approval of the proposed SIP revision. (See also Comments grouped under section III.C.)*

Comment No. V.A.2 – The 2005 SIP rulemaking does not need to wait for EPA approval because it is a matter of Utah state law. The rulemaking pertains only to the state 2005 PM10 SIP. **(Comment made by KUC)**

Response – *The 2005 maintenance plan was approved by the AQB and is enforceable as a matter of state law. Accordingly, promulgated by the Board as state law, the mechanism to amend the PM10 Maintenance Plan is also by state law.*

The PM10 SIP was submitted to EPA in 2005, but EPA has not yet taken final action. The Air Quality Board approved the PM10 Maintenance plan in 2005, which shows that the Board was satisfied that the PM10 standard would not be violated. The proposed

amendment to the plan would change one limitation in the Board-approved plan, which is supported by an adequacy demonstration that with the amendment complies with the attainment demonstration approved in 2005. Should the Board approve Kennecott's proposal as a matter of state law, it too would need to be submitted to EPA for the agency's consideration. EPA proposed (in 2010) to disapprove the 2005 SIP revision. Given that several years often pass between Utah's SIP submissions and EPA's final actions, UDAQ does not consider it prudent to delay this rulemaking in order to resolve broader disagreements with EPA.

Comment No. V.A.3 – The TSD submitted to UDAQ is intended to demonstrate continued compliance with the PM10 NAAQS in accordance with the respective technical analyses that formed the bases for the attainment and maintenance demonstrations contained in the l994 PM10 SIP and the 2005 PM10 Maintenance plan. Because the SIP rulemaking is limited to modifying the 2005 PM10 SIP, only PM10 and its precursors (SO_2 and NOx) were included in the analysis. Additionally, to support the 1994 SIP modification, KUC is proposing to offset its PM10 and NOx increases from all emission sources on a voluntary basis in a manner consistent with the offsetting provisions of the 1994 SIP and the Utah Administrative Code.

> The Chemical Mass Balance (CMB) receptor model, in conjunction with emissions control and offset requirements, was used in support of the federal 1994 SIP attainment. To offset the emissions increase associated with the BCM expansion 5,485 tons of banked stack-level SO_2 emission credits will be relinquished in addition to the 1,105 tons of banked PM10 and SO_2 credits already relinquished in 1999 [*when the limitation on material moved was revised from 150.5 Mtpy to 197.*] The analysis shows that the increase in the material-moved limitation is consistent with and satisfies the 1994 attainment and maintenance demonstration.
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> The UAM-AERO model was used in support of the 2005 maintenance demonstration[. *Added to that result was a CALPUFF analysis that assumed no pit retention*] and conservatively assumed a 100% conversion rate of NOx to nitrates (secondary particulate matter.) The analysis shows that increases to the UAM-AERO-modeled NOx and primary PM10 will not cause any grid cell to exceed the total PM10 NAAQS of 150 $\mu g/m^3$.
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> Additionally, Kennecott has made a third technical demonstration related to ambient air quality in the immediate vicinity of the mine using the AERMOD model. Despite some conservative assumptions that resulted in the modeling of 30,986 vehicle miles traveled (vmt) per day, despite a daily limit of 30,000 vmt, the analysis demonstrates that the proposed modification will not result in a violation of the 24-hr PM10 NAAQS in the near field.

The three technical demonstrations show that the proposed increase in the material-moved limitation will not adversely affect attainment and maintenance of the PM10 NAAQS. **(Comment made by KUC)**

UDAQ Response – *Kennecott has looked at the PM10 NAAQS from several different standpoints, each in an effort to show that its proposal would not interfere with attainment or maintenance thereof.*

From the standpoint of the federally approved 1994 attainment SIP, KUC has used emissions calculation methods consistent with those used to support the underlying demonstration of attainment in order to evaluate the increase in material moved at the mine (see TSD Section 2 and Appendix A-1.) The increase in emissions calculated thereby was offset in a manner consistent with the rule adopted as part of that SIP which required, for sources or modifications resulting in an increase of (PM10 + SO_2 + NOx) totaling at least 50 tpy, offsets at a ratio of 1.2:1. The offsets were applied to insure that KUC's proposed emissions, including tailpipe and fugitives, would not compromise the attainment demonstration underlying the 1994 SIP. The banked credits used to make this offset were generated by exceeding the emission reductions required by that 1994 demonstration.

From the standpoint of the state-approved 2005 maintenance SIP, KUC has used the emissions calculation methods consistent with those used to support the underlying demonstration of maintenance in order to evaluate the increase in material moved at the mine (see TSD Section 3 and Appendix A-2.) The increase in emissions calculated thereby was modeled using CALPUFF and added to the concentrations predicted by the underlying maintenance demonstration. Given the impossibility of re-running UAM-AERO, UDAQ endorses this approach.

The AERMOD demonstration is not required to satisfy the demonstration of adequacy requirement of 40 C.F.R. § 51.112(a). With respect to the AERMOD demonstration, neither the 1994 attainment demonstration nor the 2005 maintenance demonstration includes any analysis such as this, which might be termed a "hot spot" analysis. As such, AERMOD is a supplemental analysis intended to address any questions concerning near field impact from primary PM10. See also the Editorial Note at section III.E.

Comment No. V.A.4 – Regarding other NAAQS:

The Bingham Canyon Mine is located in Salt Lake County. The airshed has been designated as nonattainment for PM2.5. UDAQ is in the process of developing a SIP for PM2.5.

At this time direct source contributions to ambient PM2.5 concentrations are not known. Particulate emissions from the BCM operations settle in the pit and only a very small fraction escape the pit influence boundary into the atmosphere. During inversions, when there are no winds, there have been observed cases of pit settling approaching 100 percent and retention of gaseous pollutants as well as primary particulates is believed to occur.

As the SIP is developed and an attainment strategy is developed, KUC understands that additional controls may be necessary under the SIP. KUC will meet the requirements of the applicable SIP as mandated in Section 110(l) of the CAA, but cannot commit to control strategies that have not yet been developed or shown to be effective.

With regard to ozone, a SIP has not been developed for the 8-hour ozone standard so specific control strategies have not been developed. As with PM2.5, KUC will meet the requirements of the applicable SIP. Changes to the BCM emissions profile will be included in the development of the ozone SIP and appropriate control strategies will be implemented when they are developed. In the meantime, KUC and the BCM expansion are in compliance with developed PM10 control strategies and approved regulations.

With regard to NO_2, the area is expected to be in attainment of the 1-hour standard. At this time, there is no indication that additional control strategies are required to maintain the NAAQS. As previously stated, if future additional control strategies are required to maintain the 1-hour NO_2 standard, KUC will implement the applicable requirements. **(Comment made by KUC)**

UDAQ Response – *(see response to Comment II.1)*

B. 2005 PM10 Maintenance SIP

Comment No. V.B.1 –Because the previous UAM modeling files are unavailable, the use of the CALPUFF modeling system combined with the previous UAM modeling was used to evaluate the impact of the increase in material moved at the BCM. This approach was required by UDAQ. CALPUFF is a multi-layer, multi-species, non-steady-state Gaussian puff dispersion model that can simulate the effects of time-and space-varying meteorological conditions on pollutant transport, transformation, and removal. CALPUFF can use the 3-dimensional meteorological fields developed by the CALMET model or simple, single station winds. CALPUFF is well suited for this application as it handles very low wind speeds during inversion events and also has the ability to handle complex terrain. The results of the CALPUFF model were added to the predicted UAM concentrations to account for the total impacts after the increase in production. **(Comment made by KUC)**

UDAQ Response – *See Comment No. III.A.2 – Section a). This response addresses the fact that it is not the UAM modeling files that are unavailable from UDAQ, but rather the executable code and programs of the UAM-AERO computer model itself that are unavailable.*

Comment No. V.B.2 – EPA has identified several deficiencies in the modeling performed as part of the 2005 Maintenance SIP, specifically the modeling of banked emissions as though they will be emitted from Kennecott's 1,200 foot stack and the reliance on RRFs based only on total mass.

The modeling presented in the TSD is consistent with the 2005 Maintenance SIP that has been adopted into State law. It is not an attempt to resolve more fundamental issues that EPA has raised regarding the type of modeling demonstration that will be necessary for EPA to approve a future plan.

KUC used the current 2005 UAM modeling and the modeling of the banked emissions as it was completed for the 2005 Maintenance SIP. The RRFs were kept consistent with the state-approved UDAQ modeling.

The maintenance demonstration approved by the AQB remains valid notwithstanding the proposed increase in material moved. **(Comment made by KUC)**

UDAQ Response – *See response to Comment No. III.A.1.*

Comment No. V.B.3 – Regarding EPA's assessment that the combination of CALPUFF simulations with UAM-AERO is insufficient and their recommendation that the impacts of the BCM expansion be evaluated using the new CMAQ model simulations currently being developed by the State for the PM2.5 attainment plan, KUC offers the following:

The PM10 Maintenance plan was approved by the Utah Air Quality Board in 2005 as a matter of State law. Therefore, UDAQ considers the limitations established by the SIP to be enforceable notwithstanding that EPA has yet to take final action on the 2005 Maintenance plan. Accordingly, the material moved limitation must be changed in accordance with state law and in a manner that is consistent with the Board's approval in 2005. It is KUC's understanding that any changes to the BCM operations will be included in the CMAQ model simulations currently being developed by UDAQ. **(Comment made by KUC)**

UDAQ Response – *See response to Comment No. III.A.1.*

C. 1994 PM10 Attainment SIP

Comment No. V.C.1 – EPA has raised concerns about KUC's proposed use of stack-level SO_2 credits to offset ground level PM10 and NOx emissions at the BCM which lies a considerable distance from the 1,200 foot stack. EPA asserts that additional modeling would be required to show non-interference under the CAA section 110(l), and even raises the question of whether the banked credits are valid. To these concerns, KUC offers the following:

KUC says offsets are being provided for the sole purpose of demonstrating that the 1994 attainment demonstration is not adversely affected by the increase in material moved. The offsets being relinquished are entirely consistent with the 1994 PM10 SIP offset provisions. These provisions, as approved by EPA, allow the use of PM10 precursors to offset direct PM10 emissions.

KUC also says, the1994 PM10 SIP attainment demonstration was based on receptor modeling which does not specify source emission heights but does include the relative impacts from sources as measured by the ambient air monitors. Therefore the offsetting program established in the l994 PM10 SIP does not distinguish between release heights. The receptor modeling does account for impacts from the 1,200 foot stack so the impacts from these emissions were included in the attainment demonstration and are creditable.

According to KUC, the 1994 federally-approved SIP and 2005 State Maintenance plan requirements have been met.

Concerning the validity of the banked credits, KUC has submitted written confirmation to UDAQ that the emission reduction credits being relinquished meet the requirements of the offsetting program and are valid offsets. The SO_2 credits were generated in 1996-1998 during the Smelter modernization project. The Smelter modernization project was completed in 1996 and reduced SO_2 emissions by 99.9%. The KUC Smelter continues to be one of the most advanced and cleanest smelters in the world.
(Comment made by KUC)

UDAQ Response – *UDAQ agrees with Kennecott concerning the use of these banked credits, and also points out that the elevation of "ground level" at the pit exceeds the elevation at the top of the 1,200 foot stack by at least 800 feet. (See also response to Comment No. III.B.i.1.)*