



State of Utah

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N0105710028-11 Department of
Environmental Quality

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DIVISION OF AIR QUALITY
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MEMORANDUM

DAQE-MN0105710028-11

To: File N0105710028 Dated 2011

Through: Martin Gray, MNSR Section Manager

From: Nando Meli, New Source Review Engineer

Date: June 21, 2011

Subject: Public Comments Received for Kennecott Utah Copper LLC Bingham Canyon Mine Modification, Salt Lake County, Utah.

On August 17, 2010, Kennecott Utah Copper LLC (KUC) submitted a Notice of Intent (NOI) requesting modification to its Bingham Canyon Mine Approval Order (AO), DAQE-AN105710023-08 dated August 13, 2008. The NOI centered on a requested increase in the limit of material moved from 197 million tons per year to 260 million tons per year. The Utah Division of Air Quality (UDAQ) reviewed and analyzed the request and prepared a draft AO or "Intent to Approve" document for the modification request. A public comment period was held from February 6, 2011 to March 20, 2011 for the draft AO. Two public hearings were held. One was held in Salt Lake City on February 22, 2011, and one was held in West Jordan on March 7, 2011. Oral comments were received at the public hearings and written comments were received during the public comment period.

The NOI associated with this modification was submitted in parallel with a request to amend the material movement limits in the State Implementation Plan (SIP), as well as Utah Administrative Code (UAC) R307-110-17 of the state rules. On May 4, 2011 the Air Quality Board approved the SIP change that allows the Bingham Canyon Mine to increase material movement in the mine from 197 million tons per year to 260 million tons per year. Although the NOI was reviewed in parallel with the SIP change request, final action could not be taken on the permit unless the SIP change was approved.

As a result of the comments received, the DAQ discussed with KUC various permit conditions that go beyond the minimum requirements of the New Source Review (NSR) rules and that provide validation of emissions from the pit and augment the fugitive dust control plan. Specific additional conditions that have been incorporated into the permit include the following:

1. Fugitive dust control measures. The DAQ is exceeding the minimum requirements by taking key provisions from the fugitive dust control plan and incorporating those

conditions into the permit. This will provide assurance that these key provisions for minimizing fugitive dust from the mine will be subjected to public review in order to be modified as opposed to off-permit changes that don't allow for public review. See AO condition II.B.3

2. PM_{10} ambient air monitoring. New permit conditions will require KUC to conduct ambient air monitoring for PM_{10} at two locations versus the one that was proposed in the draft AO. The permit will also require daily versus an every three day level of monitoring. Subject to approval by the DAQ, the monitors will be placed at locations where modeling predicts the highest impact. These monitoring stations will provide validation that the PM_{10} National Ambient Air Quality Standard (NAAQS) is not being violated as a result of increased Bingham Canyon Mine operations. See AO condition II.B.4.
3. Pit retention factor validation. The permit will require KUC to conduct a study to validate the pit retention factors used in establishing the combined emissions caps for PM_{10} , SO_2 and NO_x ; and for $PM_{2.5}$, SO_2 and NO_x . Although these caps are for all sources of emissions at the mine and are currently not required by regulation, they have been incorporated into the permit to further control and monitor emissions from the pit. See AO condition II.B.5

A summary of comments received and the DAQ response, in consideration of comments, is provided in the attached pages.

Consideration and Review of Comments

Permitting Process

Comment No. 1 – One commenter suggested the DAQ was acting in bad faith in that DAQ sent the Intent to Approve (ITA) out for public comment before the Air Quality Board met to take action on the SIP modification.

DAQ Response – The DAQ disagrees. UAC R307-401-6 requires that DAQ review an NOI within 30 days of receipt to determine completeness. The DAQ conducted the completeness review as required and then developed the engineering review. From the engineering review the ITA was developed and made available for public comment as the DAQ believed it would benefit reviewers to have the opportunity to review the SIP change and the ITA concurrently.

The DAQ determined, prior to releasing the ITA for public comment, that an action to approve the AO could not be taken until the amount of material moved, as limited by the SIP, had been modified to allow 260 million tons per year (TPY) of material moved over a rolling 12 month period. This fact was made clear in the public comment notice. Final action on the AO was on hold until the Board took final action on the SIP. Thus, the DAQ acted appropriately, given that the SIP and the ITA have common subject matter.

Comment No. 2 – Many commenters expressed support for the proposed increase in activity at the Bingham Canyon Mine (BCM), but provided no regulatory or technical basis for their support.

DAQ Response – The comments are noted. However, since no technical issues have been raised by this comment, no changes have been made to the ITA.

Comment No. 3 – Many commenters expressed opposition to the proposed increase in activity at the BCM, but provided no regulatory or technical basis for their opposition.

DAQ Response – Please see response to Comment No. 2.

Comment No. 4 – One comment suggested that the increased NO_x emissions will contribute to the formation of ammonium nitrate which is measured as PM_{2.5}. The commenter stated that “because Kennecott will emit PM_{2.5} and no approved SIP is in place for this pollutant, UAC R307-403-3(3)(e) does not permit DAQ to approve the proposed modification.”

DAQ Response – The DAQ disagrees with the conclusion of the commenter. UAC R307-403-3 applies to major sources of air quality in non-attainment areas. “Major Source” is defined in UAC R307-101-2. The BCM does not meet the definition of major source; accordingly, UAC R307-403-3 does not apply to this action.

AO Conditions

Comment No. 5 – One commenter requested that DAQ include the emissions cap in the ITA abstract.

DAQ Response – The emissions cap is located at condition II.B.1.f. of the AO. As requested by the commenter, the DAQ will also include a reference to the emissions cap in the AO abstract.

Comment No. 6 – A commenter suggests 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.

DAQ Response – The DAQ disagrees that the difference in the tables casts doubt on the accuracy of the numbers. Both documents have been modified since they were originally submitted to UDAQ in August 2010. The TSD and NOI were reviewed by different individuals and under different regulatory programs, which resulted in the documents being updated at different times. The most current versions were posted on the DEQ/UDAQ web site in January 2011. Please see response to comment III.C.2, to the SIP response to comments memorandum dated May 4, 2011.

Comment No. 7 – A commenter felt the haul road and haul truck emissions tables referenced by the NOI were confusing and requested the DAQ regenerate the tables so the tables can be reviewed.

DAQ Response – There are numerous complex tables included in the NOI. While acknowledging the complexity of the data, DAQ believes that the data has been presented in the tables in as simplified a manner as possible. The tables were labeled correctly and were available for public review, which fulfills DAQ’s regulatory responsibilities to provide for public review pursuant to UAC R307-401-7(2)(a).

Comment No. 8 – One commenter suggested that KUC separated the Copperton Concentrator from the Bingham Canyon Mine to avoid showing the combination as a major source.

DAQ Response – The DAQ disagrees that the BCM and the Copperton Concentrator (CC) are separated to avoid major source classification. The BCM and the Copperton Concentrator (CC) permits are separated for administrative convenience. Fugitive emissions are not included in determining whether a source is major in this case (40 CFR 51.165(a)(1)(iv)(A)). The emissions for the two sources combined do not exceed a major source threshold for any given pollutant, as shown by the following point source emissions, in tons per year:

The CC plant site wide emissions (AO DAQE-AN0105710029-10) are as follows: $PM_{10} = 21.85$, $PM_{2.5} = 21.85$, $SO_2 = 0.10$, $NO_x = 11.03$, $CO = 10.18$, $VOC = 2.36$ and Hydrogen Cyanide = 2.24.

The BCM site wide emissions (AO DAQE-AN0105710028-11) are as follows: $PM_{10} = 6.28$, $PM_{2.5} = 2.60$, $SO_2 = 0.0002$, $NO_x = 1.17$, $CO = 10.6$, and $VOC = 0.20$.

The combined CC and BCM emissions are as follows: $PM_{10} = 28.13$, $PM_{2.5} = 24.45$, $SO_2 = 0.1002$, $NO_x = 12.20$, $CO = 20.78$, and $VOC = 2.56$.

Comment No. 9 – One commenter noted that the NOI listed four generators and the ITA listed five generators.

DAQ Response – The initial NOI had four generators listed. A fifth generator was added after the original NOI was submitted. The final NOI has five generators listed and the emissions from all five generators are included in the emissions calculations.

Comment No. 10 – One commenter noted that the NOI incorrectly identifies two Hazardous Air Pollutants (HAPs), cadmium and manganese, as non-HAPs.

DAQ Response – The DAQ agrees that the NOI incorrectly identified cadmium and manganese as non-HAPS. However, this error was discovered by DAQ during the agency's review, and the two pollutants have been treated as HAPs in the ITA.

Pollution Controls

Comment No. 11 – Some comments suggested that control efficiencies were arbitrarily assigned. The comments specifically questioned the control efficiencies for drilling, blasting, front end loaders, dozers, haul roads and graders.

DAQ Response – The DAQ disagrees. The control efficiencies are based upon internal and external documentation. The drilling control efficiencies of 90% are based upon factors used in the Technical Support Document for the 1994 SIP and the Technical Support Document for the 2005 SIP. The 0% control efficiency used for blasting was based on the most conservative assumption. The front end loaders used a 70% control efficiency that was based on the Permitting Branch Memo from R. Olsen, dated November 3, 2008 (DAQ permitting guidance) for haul roads. The dozers are assigned a 61% control efficiency that was documented in the Western Regional Air Partnership Fugitive Dust handbook. The emissions from haul roads, 75% for water roads and 85% for chemically treated roads, also rely on the DAQ permitting guidance. Therefore, these control efficiencies were not arbitrarily assigned.

Comment No. 12 – A commenter questioned why electrowinning emissions are not controlled.

DAQ Response – UDAQ disagrees. The emissions from the electrowinning process are controlled. The emissions from the electrowinning process are H_2SO_4 and VOCs. H_2SO_4 emissions are controlled by an acid mist eliminator, which the DAQ has determined meets BACT. VOC emissions are controlled by a cover that provides an 80% reduction in VOCs, which also meets BACT (condition II.B.2.g-h).

Comment No. 13 – One commenter suggested the BACT assessment is substandard and incomplete. Control technologies for each source should be listed, and then eliminated where not technically/economically feasible. This process should be described within the NOI. Instead, various controls are eliminated without demonstration of efficacy. More info should be provided.

DAQ Response – The DAQ disagrees. The BACT analysis did list control technologies and identified those that were not technically or economically feasible (see Section 5.0, Best Available Control Technology, of the NOI). The DAQ believes that the analysis was sufficient (UAC R307-401-2). Specifically, the BACT analysis is performed for new sources and modified sources as required by UAC R307-401-5. The second in-pit crusher, the accompanying conveyor system and the 71 hp LPG emergency generator are the only new sources. The BACT analysis required that a baghouse be installed to control emissions from the crusher and that the transfer points be partially enclosed. Based on engineering expertise and experience, these controls are understood to be the best available control technology for these emission units. It is also recognized that LPG emergency generators meet BACT for emergency generators. A BACT analysis was also performed on the haul roads. This analysis required road base and water sprays for the sources inside the pit and chemical suppressants for haul roads outside the pit. Chemical dust suppressants are not required inside the pit because of loss of traction and for safety reasons.

Fugitive Dust

Comment No. 14 – One commenter expressed concern that the Kennecott fugitive dust control plan allows KUC to claim higher control efficiencies on numerous dust-producing operations than allowed by other sources conducting similar operations in Salt Lake County. The commenter also contends the fugitive dust control plan was not provided for review.

DAQ Response – The DAQ disagrees. Fugitive dust, construction activities, and roadways associated with mining activities are regulated under the provisions of UAC R307-309-6 and UAC R307-309-10. UAC R307-309-6 requires a source to submit a plan to control fugitive dust. UAC R307-309-10 requires any person who owns or operates a mining operation to minimize fugitive dust as an integral part of site preparation, mining activity, and reclamation operations. This rule also outlines specific control measures that can be used to reduce fugitive dust.

Fugitive Dust Control Plans are source-specific and are tailored for each individual source and any two sources may have different requirements and plans. The control efficiencies in this case are based upon internal and external guidance (please see response to Comment No. 11). The Fugitive Dust Control Plan was available to the public during the public comment period on the DEQ web site as an attachment to Intent to Approve DAQE-IN0105710028-11, dated February 2, 2011.

As noted above, a fugitive dust control plan is required under the rules but its provisions are not typically included as specific conditions in the AO. However, in this case the DAQ intends to include key provisions of the fugitive dust control plan into the AO to highlight the controls and provide for public participation in accordance with R307-401-7, as necessary if Kennecott requests to modify these key provisions.

The key requirements that are being added to the AO are:

All active haul roads located within the pit influence boundary (A copy of the pit influence boundary map is included in the Fugitive Dust Control Plan that is attached to the AO DAQE-AN0105710028-11) shall be covered with a layer of road base material or chemical dust suppressant and watering of the haul roads shall be performed as defined in the fugitive dust control plan.. See AO condition II.B.3.k.A.1.

Chemical dust suppressant shall be applied to active ore and waste haulage roads located outside of the Pit Influence Boundary, no less than twice per year. See AO condition II.B.3.k.A.2.

Chemical dust suppressant shall be applied on unpaved access roads that receive minimal haul truck traffic and elevated light vehicle traffic. See AO condition II.B.3.k.C.

KUC shall use graders to perform haul road maintenance and clean up activities as well as other operational functions. See AO condition II.B.3.k.D.

Ore conveyors shall transport crushed ore from the BCM to the CC. See AO condition II.B.3.k.B.

The commenter did not identify any specific sources that had different control technologies, hence we are unable to respond to any specific differences that may exist.

Comment No. 15 – One commenter noted that haul roads are the major source of PM₁₀ emissions in the mine, but are not adequately addressed in the NOI with the assumptions and resultant emissions. The commenter is concerned about traffic patterns, material handling and acres of land disturbed.

DAQ Response – The DAQ agrees that the haul roads are the major source of PM₁₀ emissions. The major source of these emissions is from the haul truck traffic. These emissions are limited by the mileage limit of 30,000 miles per day (condition II.B.1.e.C of the AO) and fugitive dust control requirements on the haul roads. The fugitive dust is controlled by applying water and chemical dust suppressant to the roads, covering the roads with a road base material (AO condition II.B.3.k), haul truck restrictions (AO conditions II.B.1.e.D and II.B.1.e.E), and the emissions cap (AO condition II.B.1.f).

The movement of the material is accounted for in the emission calculations included in the NOI. The calculations also include part of the material hauled, dumped, then reloaded and hauled again. In the peak year 260,000,000 tons of material is moved. All of this material is hauled within the pit and only a portion of it is hauled outside of the pit. However, in the emission calculations, all (260,000,000 tons) material is considered to be hauled both inside and outside of the pit influence boundary. In reality, 85,000,000 tons is crushed in the Main In-pit Crusher or Second In-pit Crusher. This means that only 175,000,000 tons are actually hauled outside the pit. The 85,000,000 tons of material that is dumped in the crushers is dumped into the Main In-pit Crusher or Second In-pit Crusher; but again, for calculation purposes, all 85,000,000 tons were calculated as going to each crusher. This conservative method assures that all of the emissions from the additional dumping and hauling that may occur are accounted for.

In the Original NOI submitted by KUC in August 2010, KUC estimated that the total disturbed ground for the entire project would include 1,485 acres during the non-winter months and 371 acres during the winter months. In the final NOI emission calculations, KUC has calculated that the disturbed ground on a 12-month basis would be a maximum of 256 acres outside the pit influence boundary and 310 acres inside the pit influence boundary. KUC is required to control disturbed or stripped areas 24 hours per day and they are required to record the treatment and reclamation. These requirements are in AO Condition II.B.3.c. The emissions from the disturbed

land are included in the emissions cap which limits the amount of PM₁₀ and PM_{2.5}. The emissions cap is listed in AO Condition II.B.1.f.

Emissions Reduction Credits

Comment No. 16 – Multiple comments were received regarding: 1) the need to obtain emission offsets; 2) the validity of the offsets used and; 3) validation that the offsets are enforceable. One commenter doesn’t believe the use of banked SO₂ credits will provide a positive net air quality benefit in the affected area of non-attainment as required by UAC R307-403-3(3)(d.)

DAQ Response – KUC is not required to obtain offsets for this AO (AO or permit) (see UAC R307-403-5). Offsets are required when emissions at a source are increased above certain triggering levels. For this project there is a permitted emissions decrease. The table below shows the change in Potential to Emit (PTE) from current levels of material moved to new levels of material moved, both with and without pit retention. The emissions listed below were calculated using the most current emission factors and methodologies, which are different than those used in previous AOs.

<i>No Pit Retention</i>	<i>197 MM tpy</i>	<i>260 MM tpy</i>	<i>Difference 197 MM to 260 MM</i>
<i>PM₁₀</i>	<i>5,901.34</i>	<i>4,118.00</i>	<i>-1,783.34</i>
<i>PM_{2.5}</i>	<i>1,113.50</i>	<i>641.00</i>	<i>-472.50</i>
<i>SO₂</i>	<i>97.00</i>	<i>6.56</i>	<i>-90.44</i>
<i>NO_x</i>	<i>7,246.64</i>	<i>5,830.00</i>	<i>-1,416.64</i>
<i>CO</i>	<i>4,361.27</i>	<i>1,682.00</i>	<i>-2,679.27</i>
<i>VOC</i>	<i>674.68</i>	<i>314.00</i>	<i>-360.68</i>
<i>HAP</i>	<i>1.09</i>	<i>1.49</i>	<i>0.40</i>
<i>PM₁₀ + SO₂ + NO_x</i>	<i>13,245</i>	<i>9,955</i>	<i>-3,290</i>
 <i>With Pit Retention</i>			
<i>PM₁₀</i>	<i>2,609.66</i>	<i>1,513.00</i>	<i>-1,096.66</i>
<i>PM_{2.5}</i>	<i>780.20</i>	<i>368.00</i>	<i>-412.20</i>
<i>SO₂</i>	<i>97.00</i>	<i>6.56</i>	<i>-90.44</i>
<i>NO_x</i>	<i>7,246.64</i>	<i>5,830.00</i>	<i>-1,416.64</i>
<i>CO</i>	<i>4,361.27</i>	<i>1,682.00</i>	<i>-2,679.27</i>
<i>VOC</i>	<i>674.68</i>	<i>314.00</i>	<i>-360.68</i>
<i>HAP</i>	<i>1.02</i>	<i>1.37</i>	<i>0.35</i>
<i>PM₁₀ + SO₂ + NO_x</i>	<i>9,953</i>	<i>7,350</i>	<i>-2,604</i>

In determining the amount of emissions, a source is required to evaluate fugitive emissions as well as point source emissions. In the current case of an increase in the amount of material hauled (from 197M tpy to 260M tpy on a 12 month rolling total basis), potential emissions will

actually be reduced from previous levels. This reduction is a function of several measures that have been or will be taken by Kennecott to include:

chemical suppressant on the haul roads

road base on main in-pit haul roads

new, cleaner engines in the new trucks being purchased

larger trucks hauling larger payloads, reducing vehicle miles traveled

improved bag houses on the in-pit crushers

improved enclosures for the conveyor

Under the conditions of this modification Kennecott can increase its actual emissions but will not reach its PTE, due to the improved operations¹. Many of the improved operational measures will now be required as permit conditions.

Additionally, while the DAQ believes that the demonstration submitted by KUC supports a pit retention factor, we also understand that there is concern and disagreement among various stakeholders and members of the public on this issue. To help alleviate the concern, the DAQ is adding a condition to the AO to validate the pit retention factor within a certain amount of time by requiring a new study that will be reviewed by an independent third party (AO condition II.B.5.a).

Also, as noted above, the analysis looked at conservative numbers and circumstances, which support issuance of this AO with pit retention included. Even if pit retention were not included, there would still be a permitted emissions decrease. This means that offsets would still not be required.

However, KUC has voluntarily offered to surrender 6,590 TPY of SO₂ emissions that had previously been credited to them. These emissions will be permanently removed from the emissions registry at the time the AO is finalized².

Regarding the validity of the credits, KUC was required by the 1994 SIP to reduce emissions and a baseline PTE was established. In 1999, KUC was credited for modernization efforts undertaken while operating in compliance with this SIP. This modernization resulted in KUC banking 17,656.50 tons of actual SO₂ emissions reductions. These credits are from actual

¹ It is important to note that permitted or “potential to emit” (PTE) emissions almost always exceed “actual” emissions. Hence, while “actual” emissions may increase, PTE emissions could decrease. All analysis is based on the higher and more conservative, PTE. As a result, if the analysis shows that the higher emissions will not cause an exceedance of the ambient air quality standards, we can be sure that the lower, “actual” emissions, even if increasing, will not result in an ambient air standard exceedance.

² It should also be noted here that the analysis conducted for the companion revision to the 2005 PM₁₀ maintenance plan included all emissions that reside in the emissions registry as if they were emitted, adding another layer of conservatism to the analysis.

emissions reductions in the same non-attainment area as the BCM and are therefore valid banked emissions (UAC R307-403-4).

Emissions Impact Assessment

Comment No. 17 – The Environmental Protection Agency (EPA) commented that Utah's pre-construction permitting rules were adopted into the SIP to carry out the intent of CAA section 110, and that the SIP rules include provisions for evaluating the ambient air quality impact of a proposed emission increase before issuing a permit. The comments stated that no analysis of the ambient air quality impact of an allowed increase in material movement and the associated emission increase at the BCM is presented in Utah's' New Source Plan Review.

DAQ Response – The DAQ disagrees that an ambient air quality impact analysis is required. Protection of the NAAQS in a non-attainment area is achieved through various means other than modeling, such as lowest achievable emissions rate (LAER) for major sources and offsets (to account for increases in non-attainment pollutants that would exceed certain thresholds). In Utah, all sources are required to conduct a BACT analysis as well (unless a LAER analysis is required), a level of control for minor sources not typically required in most states.

To ensure that the NAAQS will not be adversely affected by the BCM project, the DAQ assessed the change in potential emissions for all air pollutants. The result of this assessment showed an overall decrease in potential emissions for the criteria pollutants, despite an increase in material moved, due in part to improvements in KUC's truck fleet, enhanced dust control measures, and various stationary source controls (please see response to Comment No. 16). Hence, there was no need to conduct an analysis of the ambient air quality impact (see UAC R307-410).

However, KUC did choose to submit an AERMOD analysis to further show no impact to the ambient standard for PM₁₀. Additionally, the AO will require KUC to install and operate two PM₁₀ monitors to confirm that the ambient standard for PM₁₀ is not being violated. While the modeling was not required, it will be used to site the monitors that will be required in the AO (AO condition II.B.4.a).

Although unrelated to this permit action, computer modeling conducted by DAQ staff estimates lead impacts in the vicinity of the mine are about 10% of the new lead NAAQS. Preliminary monitoring results from the Magna site suggest that the new NAAQS for lead will be met in the populated areas surrounding the smelter. Monitoring in the vicinity of the mine is expected to begin near the end of 2011.

Comment No. 18 – Salt Lake City and Salt Lake County municipal governments requested the DAQ to conduct additional analysis on the impact that this project will have on PM₁₀, PM_{2.5} and NO_x levels in the County. They also requested that the Board require further analysis of PM_{2.5} air quality impacts from the current and future mine operations.

DAQ Response –The analysis of impacts to the airshed was conducted to support the May 2011 SIP modification and was presented in the Technical Support Document that accompanied that rulemaking.

In response to the comment regarding PM_{2.5} impacts, the DAQ is currently developing a SIP for PM_{2.5}, and the contribution to the valley airshed from KUC will be part of that evaluation. That PM_{2.5} SIP will be completed in December of 2012. Until that time, the DAQ processes NOIs and

issues AOs based on existing regulations. The DAQ cannot impose permit conditions based on unknown future requirements. Please see response to Comment No. 17.

Comment No. 19 – Numerous comments were submitted regarding the modeling effort conducted by KUC. One commenter was concerned that inappropriate background concentrations were used in the modeling.

EPA expressed concern that most of the model sensitivity simulations for pit retention were only performed at the pit bottom, there were no comparisons with monitored concentrations and there is no way to verify the modeling. Other commenters raised issues related to the pit retention study's validity to include a) who actually authored the study, b) KUC's stake in its preparation, c) the absence of external peer review, d) the use of assumed values in place of actual measured or monitored values, and e) the model's development and whether or not it is representative of the actual mine. One commenter requested the DAQ to either verify the pit retention study prior to including it in the NOI review process, or require the applicant to provide additional information pertaining to pit retention, based on site-specific measured and monitored values.

DAQ Response – The DAQ disagrees. Since this permit action results in a decrease in potential emissions, no permit modeling was required (please see response to Comment No. 17). Regulatory modeling for this project was conducted to support the SIP modification.

The pit retention study is being used to establish a new, more restrictive permit condition not previously in the AO. This condition is the cap of combined emissions of PM₁₀, NO_x, and SO₂ and a cap on PM_{2.5}, NO_x, and SO₂. This new, more restrictive permit condition is not required by any regulatory program and is voluntary on the part of Kennecott in anticipation of the upcoming PM_{2.5} SIP.

The DAQ has established permit conditions that require Kennecott to monitor for PM₁₀ (AO condition II.B.4.a – II.B.4.h) and to further study pit retention to better quantify the pit retention factor (condition II.B.5.a.). If the results of the study show pit retention values have been overestimated, Kennecott will be required to modify applicable conditions in the AO, to ensure total PM₁₀ and PM_{2.5} emissions from the BCM do not exceed the voluntary cap Kennecott has requested for its AO.

With regard to comments regarding the validity of the pit retention study, please refer to response to Comment No. 16.

KUC Comments

Comment No. 20 – KUC made numerous comments to support their position that the conditions of the ITA meet all applicable requirements.

DAQ Response – While the DAQ notes the efforts made by KUC to support the modification request by submitting its own comments, Kennecott's comments do not represent the position of the Division of Air Quality. Accordingly, the DAQ has provided cross-references to its own responses after each Kennecott comment, and in some cases, provides its own clarification to the information provided.

Comment No. 21 – Fugitive sources (haul roads) may cause a majority of the emissions at the mine. Commenters have asked how the emissions from haul roads were calculated for the NOI and what KUC is doing to control fugitive dust and how is this reported to the DAQ. To address these questions, KUC offers the following:

A Fugitive Dust Control Plan detailing the dust control measures to be implemented at the BCM has been submitted to DAQ. Each year KUC reports dust control measures implemented at the BCM during the previous year with details such as volume of water and commercial dust suppressant applied, planned treatments, dust control equipment used, planned dust suppressant activity, etc.

Emissions of PM₁₀ and PM_{2.5} were estimated using methodology from EPA's AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition (AP-42), Section 13.2.2. For the portion of haul roads located within the Pit Influence Boundary, PM₁₀ and PM_{2.5} emissions were calculated with the pit escape fraction.

DAQ policy states that a control efficiency of 75% is used for haul roads that use watering and road base application. A control efficiency of 85% is used for application of commercial dust suppressants.

In 2016 material haulage will be 260 million tons per year which translates to 25,822 vehicle miles traveled per day. The AERMOD modeling analysis assumed a conservative 20 % daily variability factor which resulted in the modeled PM₁₀ emissions being based on 30,986 VMT per day but the limit for the haul trucks is 30,000 VMT/day. Therefore haul road emissions will be effectively capped below modeled levels on a daily basis.

The emission calculations were based upon 240-ton trucks to the farthest destination but the average truck fleet size is larger than 240-tons and a percentage of material would be on shorter haulage routes. Larger haul trucks on shorter hauls result in lower overall emissions.

DAQ Response – The DAQ intends to include key provisions of the fugitive dust control plan into the AO to highlight the controls and provide for public comment if KUC requests to modify these key provisions. The emissions from haul roads were calculated using the equations and emission factors found in the “Unpaved Roads” chapter of AP-42. KUC is required to follow a Fugitive Dust Control Plan to control fugitive emissions at the BCM. KUC is required to submit by February 1 of each year, an annual road dust control report, in conjunction with the fugitive dust control plan.

Comment No. 22 – KUC offers these clarifications with respect to questions concerning: how many acres of land will be disturbed by the mine expansion, whether these areas were included in the emissions calculations done as part of the NOI, and how the escape fraction or pit retention of particulates was used in the calculations.

Approximately 565 total acres of land will be subject to active disturbance per year. Of that total, 310 acres (55 percent) are within the Pit Influence Boundary. AP-42, Table 11.9-4 was used to calculate the PM emissions. Since the emission source is partially located within the Pit Influence Boundary, that portion of emissions is calculated with the pit escape fraction.

DAQ Response – Please see response to Comment No. 15.

Comment No. 23 – KUC offers these clarifications with respect to questions concerning whether the BACT assessment in the NOI is complete.

The BACT analysis is performed for new sources and modified sources. The only new sources are the second in-pit crusher with conveyor system. This source has been analyzed and meets BACT. The BACT assessment in the NOI has been determined to be technically complete by DAQ.

DAQ Response – Please see response to Comment No. 13.

Comment No. 24 – KUC offers these clarifications with respect to questions concerning whether KUC is separating the BCM mine and the CC in air permits to avoid the major source threshold of 100 TPY.

The BCM and CC are considered a single source for Title V Part 70 applicability purposes. The CC operates under a separate AO from the BCM for administrative convenience. (The emission units and control requirements are distinct for each operations and different individuals have responsibility for the mine and concentrator.) The aggregated emissions from stationary sources at the BCM and CC do not approach major source status.

DAQ Response – Please see response to Comment No. 8.

Comment No. 25 – To EPA's concern that the New Source Plan Review does not: 1) discuss the need to obtain emission offsets; 2) indicate that the required offsets have been obtained; 3) specify where the offsets were obtained; or 4) verify that the offsets are enforceable, and that without such analysis, is unable to conclude that the offsets satisfy the requirement of UAC R307-403, KUC offers the following:

Offsets are not required under the permitting requirements of UAC R307-403. 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.

DAQ Response – Please see response to Comment No. 16.

Comment No. 26 – The New Source Review (NSR) Plan need not include an analysis of ambient air quality impact due to emissions associated with an increase in material movement at the BCM. As specified in UAC R307-410-4, air quality dispersion modeling is required only in areas that are in attainment for criteria pollutants. Consistently, DAQ modeling guidelines specifically provide that, "The DAQ currently does not require sources to perform dispersion modeling for pollutants that are not in attainment of the NAAQS, if that source is located in an area that is non-attainment for that pollutant."

Nonetheless, KUC performed AERMOD modeling to demonstrate the material movement increase would not cause an exceedance of the PM₁₀ NAAQS. This modeling is included in Appendix C of the NOI. Results from this analysis show a maximum concentration of 144.2 µg/m³. This value is the sum of a modeled concentration of 85.1 µg/m³ and a background concentration of 59.1 µg/m³, measured at Copperton. This total is below the NAAQS which is set at 150 µg/m³. This analysis includes the following conservative assumptions: 1) The modeled emissions represent the total potential PM₁₀ emissions from the BCM, including those from current operations. 2) A background PM₁₀ concentration from the data measured at the Copperton, Utah monitor site is

added to the modeled value. 3) All material was modeled as moved by using the smallest haul trucks (results in more miles traveled, in practice the largest trucks available on the market will be used) 4) AERMOD modeling was run for the peak year, not an average of all years 5) A 20% increase was added to the already inflated vehicle miles to account for any potential variability that may occur.

It is likely that the measured data include emissions from current operations under some meteorological conditions. Therefore, addition of the modeled concentration and the background measured concentrations is likely double counting contributions from current operations. In addition a new monitor will be installed in the Lower Butterfield Canyon area, near the peak modeled impacts, to further demonstrate compliance.

DAQ Response – Please see response to Comment No. 19.

Comment No. 27 – In response to the questions concerning what will be the increase in air emissions with the proposed increase in mining activity, KUC states that there will be a small increase in stationary source emissions and KUC has voluntarily proposed an emissions cap for PM₁₀ and precursors as well as PM_{2.5} and precursors that include tailpipe and fugitive emissions. All listed air pollutants decrease from their current re-estimated PTEs to their future PTEs because KUC has committed to implementing new emissions controls strategies, such as changing its truck fleet to one with cleaner, bigger trucks, and using better dust control.

DAQ Response – Please see response to Comment No. 16.

Comment No. 28 – EPA has serious concerns regarding the study Airflow Patterns and Pit-retention of Fugitive Dust for the BCM (Bhaskarand Tandon, 1996). The concerns are as follows:

- 1) Most of the model sensitivity simulations were only performed at the pit bottom which could underestimate the amount of particulate released from sources that are located at other locations in the pit
- 2) The TSD lacks the source location information to verify that the pit escape fraction has been appropriately applied;
- 3) The study does not compare the model-simulated concentrations to monitoring data; and
- 4) The TSD lacks information to verify that the pit escape fraction has not been applied in addition to model calculations that account for the pit topography, essentially overestimating the effect of the pit and underestimating the impact to air quality.

In an effort to address these concerns, KUC offers the following:

To reasonably estimate emissions and perform the AERMOD modeling for the 24-hour PM₁₀ impact one escape fraction for all particulate sources in the pit was used. This approach required the selection of a single value for the escape fraction that is representative but also conservative. It is impossible for any one technical study to examine all possible scenarios; therefore, numerous conservative assumptions were made in deriving a single escape fraction of 20 percent from the data that is available in Bhaskar and Tandon (1996). Because conservative assumptions were made at every step in the process, the value of 20 percent is conservative for all cases and all

times. The details of the conservative assumptions are included in Appendix D-2 of the NOI. They are summarized below:

For all but two cases in Bhaskar and Tandon (1996), the maximum escape fraction from the sensitivity analyses is 12.6 percent or less. Consequently, a conservative value of 12.6 percent was used as the starting escape fraction.

A 5.5 percent upward adjustment was made based on the difference between 100 percent trap and 100 percent ricochet from the two "worst case" scenarios. This is conservative because the difference for a less severe case would likely be less and because the actual scenario lies between 100 percent trap and 100 percent ricochet. Furthermore, based on theory, the actual scenario should be closer to 100 percent trap because generally small particles do not possess sufficient inertia to bounce off a surface (see, for example, section 19.4.2 of Atmospheric Chemistry and Physics by Seinfeld and Pandis, 2006). With this adjustment, the conservative 12.6 percent starting value was increased to 18.0 percent.

To be even more conservative, a final escape fraction of 20 percent was chosen.

Appendix B of the NOI application provides detailed emissions calculations for all emission sources at the BCM, including the pit escape fraction for sources located within the pit influence boundary. The AERMOD analysis did not overestimate the effect of the pit as it did not use the built-in pit algorithm to determine impacts. The pit escape was used for particulates within the influence of the pit boundary. Gases were assumed to escape with no pit retention and likewise no pit retention factor was used for particulates outside of the pit influence boundary.

DAQ Response – Please see response to Comment No. 17.

Comment No. 29 – KUC offers these clarifications with respect to questions concerning whether the University of Utah white paper regarding "Escape emissions" from the mine/pit has ever been peer-reviewed by a qualified peer reviewer.

The "Airflow Patterns and Pit-Retention of Fugitive Dust for the Bingham Canyon Mine" study was conducted by Dr. Ragula Bhaskar and Navin Tandon, Department of Mining Engineering at the University of Utah. The 1994 and 2005 SIPs did not use an escape fraction to demonstrate the NAAQS attainment status. Also the Copperton monitor has not shown any discernable changes in monitored PM₁₀ concentrations associated with the previous mining phases mentioned above. This demonstrates that particulates settle in the BCM and that only a small portion of the particulates generated in the pit escape the mine. The study later became part of a Master's thesis and before a master's thesis is published at the U of U, the document is reviewed by a committee of at least three PhD level individuals.

DAQ Response – Please see response to Comment No. 17.

Comment No. 30 – KUC offers these clarifications with respect to questions concerning how gaseous pollutants were handled in the model and whether a pit retention factor was applied to NO_x or any other gaseous pollutants.

The gaseous emissions were modeled as required by the respective modeling program. No pit retention was used for the gaseous pollutants and they were modeled at 100% of their generation rate.

DAQ Response – Please see response to Comment No. 17.

Comment No. 31 – KUC offers these clarifications with respect to questions concerning whether a pit escape fraction was applied to all emission sources at the BCM.

No, a pit escape fraction was not applied to all sources at the BCM. The pit retention was only used on fugitive dust sources and particulate point sources located within the pit boundary. No pit retention was used for sources outside the pit boundary.

For fugitive and stationary emission sources of particulates located within the Pit Influence Boundary, PM₁₀ emissions are calculated taking into account a pit escape fraction of 20 percent. For PM_{2.5}, the escape fraction was determined to be 21 percent. These factors are based on Airflow Patterns and Pit-Retention of Fugitive Dust for the Bingham Canyon Mine, which predicts the escape fraction for different conditions at the BCM (Bhaskar and Tandon, 1996). Table 3 provides a summary of emission sources at the BCM and whether the source is located within the Pit Influence Boundary, outside the Pit Influence Boundary or both.

The analysis submitted with the NOI application is consistent with 1999 letter sent by Richard R. Long, EPA Director, Air and Radiation Program to Ursula Trueman DAQ Executive Secretary which states that, "We are aware of the argument expressed by your staff that most PM₁₀ emissions never leave the Bingham Canyon Mine pit. While we believe this may be true for some or most of the ore hauling, which occurs entirely within the pit, we do not believe this is true for the projected emission increase in the permit action. The State's engineering review explains, on page 5, that most of the allowed increase in truck hauling will be for waste rock, not ore, which is hauled out of the pit to waste piles up to 3.5 miles away. We would not expect fugitive PM₁₀ emissions from that hauling to remain mostly in the pit. "

As discussed in the NOI, pit settling (via emissions estimations with the application of a pit escape fraction) is only accounted for the portion of the haul roads within the Pit Influence Boundary. Pit settling is not accounted for emission sources outside the Pit Influence Boundary such as waste rock placement areas and portions of haul roads.

DAQ Response – Please see response to Comment No. 17.

Comment No. 32 – Kennecott wishes to submit a revised pit retention analysis to support its conclusions in the original analysis.

DAQ Response – Please see response to Comment No. 17. Kennecott presented the results of a revised pit retention analysis to the DAQ in a power point presentation via the web. A revised pit retention analysis was not provided to the DAQ. The DAQ did not consider the results of the revised analysis in development of the AO.

Comment No. 33 – KUC says it has operated a PM₁₀ monitor in Copperton since prior to 1994. KUC believes that all activities proposed through this mine expansion are similar in scope but on an incrementally larger scale than previous mining phases. KUC assumes the ambient impacts

observed from the proposed expansion will be consistent with those associated with previous mining phases and show no discernable changes in monitored concentrations. KUC is proposing an additional ambient air quality monitor in lower the Butterfield Canyon area (near peak modeled impacts) as a permit condition to verify continued compliance with the NAAQS, and to provide the public with additional ambient monitoring data.

DAQ Response – The consideration of this monitoring data is justified, particularly when considering that the material moved limitation was revised in 1999 from 150.5 Mtpy to 197 Mtpy. A review of this data reveals no resultant impact (no increased PM_{10}) from the increased mining activity.