

## Public Comments Received On Kennecott Bingham Canyon Mine

The following comments have been received either in writing or by e-mail during the public comment period. Although DEQ is not required to post these comments on its website, it has done so to aid the public discourse.

Some of these comments have been made to the Planning Section for the rules change and have been included in the AO revision.

**02-24-2011** Leo Stanko

First, thank you for your time and any consideration of my concerns...

The mission of the DAQ and its Board is to protect the health of Utah's citizenry. The Rio Tinto/Kennecott expansion adds significantly to the health risks and costs of Wasatch Front communities. While you have heard Rio Tinto/Kennecott staff and certain government officials state at a recent meeting the economic benefits of this project, you must strike these comments from the record as they are completely unrelated to your mission.

I completely oppose the Cornerstone expansion and wish that my comment be entered into both the SIP modification and the ITA regarding the Cornerstone expansion.**03-15-2011** Mark Dihlein

**03-15-2011** Carol Walters

Please make this part of the public record of comment on the Rio Tinto application to change the state SIP.

I live in Provo, and work with the Utah Valley Earth Forum, but the things that Rio Tinto does affect those of us in Utah Valley as well as those in Salt Lake Valley. We are among their down winders. Every morning in the winter, I wake up with a sinus headache. I have had pneumonia repeatedly. I watch my children and grandchildren struggle with asthma and other respiratory problems that are exacerbated by our terrible air quality, which, as you know is often among the worst in the nation. For us this has been incapacitating. For others it is life threatening. I sympathize with the relatively small percentage of Utah workers whose jobs are dependent on Rio Tinto, but a job isn't much good if you can't breathe.

When air quality is discussed, people tend to throw up their hands and say, "Well, it is just a function of the geological configuration of our area." While that is partly true, it is not an excuse for doing nothing. It is, in fact the reason for doing all we can do to prevent garbage being dumped into our air.

I appreciate the things that Rio Tinto has done to become more environmentally responsible, but this application is not one of them. Their own published information refutes their claims that this expansion will not increase pollution, especially during the months of our worst air quality problems. If they were serious about reducing pollution, their profits would certainly allow them

to replace all their coal fired plants with natural gas, or better yet with wind generated power, whether or not their application for expansion were approved.

I want to express my objection to the fact that representatives of the local municipalities which have received "contributions" from Rio Tinto were given precedence in the meeting, allowing them to take most of the time when the press was present, and thereby preventing the press from hearing the objections to the application from the majority of the citizens in attendance.

I ask that the DEQ reject this Rio Tinto application for expansion of their mining operation. You have been given the responsibility to protect the public good and we all have to breathe.

**03-16-2011** Terry Marasco

**RE: ADDITIONAL CONCERNS WITH KENNECOTT'S DOCUMENTATION AND UNWILLINGNESS TO THOROUGHLY ADDRESS AIR QUALITY CONCERNS**

The June, 1999 letter from the EPA to the UT DAQ (Ursula Trueman) stated concerns with the pit retention student thesis. Kennecott's discussion of this thesis is as follows (NOI to Increase Annual KUC...mine Production of Ore and Waste Rock, 2/23/1999, p. 18):

1. Kennecott refers to the thesis as "Airflow Patterns and Pit-Retention of Fugitive Dust for the Bingham Canyon Mine" Bhaskar and Tandon, 1996, and further states: "This model has not been validated because extensive data collection would be necessary for that task..." There are two problems here:

a. The DAQ is again considering a thesis that has been twice questioned by the EPA (June 30, 1999 to Trueman, and Feb 25, 2011 to Heying), had NOT been investigated/validated by the UT DAQ then as it has not been investigated/validated now. I may remind you that there is no such report ("Airflow Patterns and Pit-Retention of Fugitive Dust for the Bingham Canyon Mine") but a student thesis that was/is used word for word with, in my opinion, is a fictitious cover, and paid for by Kennecott. It appears that the only page Kennecott did not provide with the thesis was the copyright page noting only Tandon as the sole author. Bhaskar did not appear in the copyright.

b. By its own admission Kennecott sees it as unreasonable to validate its own model. The UT DAQ as far as one can tell has not validated this model, nor asked Kennecott to conduct the appropriate validation and peer review of this thesis. The UT DAQ needs to require Kennecott to collect the real-time field data to validate the model before any permits are considered for this project. The UT DAQ's mission is the public's health and for the massive amount of emissions that the thesis is used to eliminate, it MUST require validation and review. This submission calls into question the entire documentation by Kennecott historically and currently.

c. Critical omission by Kennecott in its discussion of percentages of pit-retention (they state 10-20%). In fact in a worst case scenario noted as Appendix A in the student thesis about a 33% escape factor resulted with a wind at 30mph. The UT DAQ needs to consider the worst case. Even this worst case is much too conservative as it is not uncommon for winds of 60-80 mph in the Oquirrh. Again, everything about this thesis is to be ignored and a thorough real-time field data test be conducted.

2. In a letter from the EPA to Ursula Trueman (8/26/1999, Re: Review of State response to EPA Comments...) the EPA renders untenable Kennecott's claim that "screening models available today cannot account for complex terrain." The EPA knew there are such models that

“can account for high percentages of the emissions remaining in the working pit”, and Kennecott, with its many engineers makes such an incorrect claim. This is one more example of Kennecott’s refusal to address the emissions issues. The DAQ should require full investigation into these issues before any permits are considered.

3. Again, with its crew of “competent” engineers Kennecott makes a hugely incorrect statement regarding HAPS. On p 2 of Kennecott’s Bingham Canyon Engineering Review 4/13/1999, Kennecott answers YES to “Toxic Air Pollutants other than HAPs” and states these others as Cadmium and Manganese. In fact, these are HAPs and if Kennecott engineers are ignorant of HAPs, the DAQ needs to be concerned of the entire documentation that such engineers provide historically and currently.

Given this history of Kennecott’s reliance on weak documentation and gross ignorance of pollution inputs, the DAQ needs to cease all processing of permits until Kennecott provides accurate peer reviewed and validated documents to support its position.

**03-17-2011** Howie Garber

Regarding Cornerstone Project:

I’ve been an Emergency Physician for 27 years and a resident of Salt Lake City and County for 39 years. In November of 2009 EPA declared SL County a non compliant area for PM2.5. In 2010 we exceeded the EPA's standards for PM 2.5 on 51 days. On some of these days there are twenty five percent more strokes and heart attacks because of bad air. This is in addition to exacerbations of asthma and COPD. Within a month of EPA designation, the DAQ approved a coke fired power plant within 5 miles of Salt Lake City. It was apparent to me that our Division of Air Quality is an industry permitting agency completely oblivious to public health.

This event 15 months ago also made me think that our DAQ operates in complete disregard for the EPA. I wonder what type of environmental quality we would have in Utah without the federal Clean Air Act and Clean Water Act.

The current situation with Rio Tinto is completely analogous to the Coke fired power plant. SL County is already in violation of the EPA's national air quality standards for PM10, Ozone, and PM2.5. The EPA has put the Utah DAQ on notice that they are proposing to disallow the state implementation plan (SIP) for PM10 in Salt Lake and Utah Counties.

My understanding is that RT is trying to increase mine activity 32%. How much of this pollution will stay in their pit is based on a student thesis which has never been validated. Further pollution increases will result from their proposed natural gas plants. Rio Tinto already contributes over 30% to particulate air pollution in the SL valley. This affects one and a half million people.

While much has been said by Chamber of Commerce type folks and some elected officials regarding Kennecott’s contribution to the community, these comments should be stricken from the record unless added health care costs of Kennecott’s air pollution be estimated. When operating in a densely populated area, Kennecott should be willing to do everything possible to decrease their air pollution. What does the price of copper and Kennecott’s bottom line have to do with the health and well being of one million people? Allowing Rio Tinto/Kennecott expansion is analogous to giving subsidies to tobacco farmers.

DAQ now has a choice: Protect public health and say no to Kennecott expansion or continue to bow down to industry. We should welcome EPA intervention because without their help many environmental problems in Utah will never be solved. I completely oppose the Cornerstone expansion and wish that my comment be entered into both the SIP modification and the ITA regarding the Cornerstone expansion.

**03-17-2011** JORO WALKER

Thank you for the opportunity to comment on the Division of Air Quality (DAQ) proposal to revise Utah Admin. Code R307-110-17 (General Requirements: State Implementation Plan, Section IX, Control Measures for Area and Point Sources, Part H, Emissions Limits) and Utah State Implementation Plan (SIP) Section IX.H (PM10 SIP). I submit these comments on behalf of Utah Physicians for a Healthy Environment and Western Resource Advocates. Our organizations represent hundreds of Utahns who care deeply about protecting the air quality in Utah, particularly along the Wasatch Front. We, our families and our patients are regularly exposed to unhealthy levels of air pollution by virtue of living, working and recreating in areas along the Wasatch Front. The proposed PM10 SIP revision would allow Kennecott Utah Corporation (Kennecott) to expand its mining operations in Salt Lake County by 32 percent, increasing the maximum amount of ore and waste material the company is permitted to move from 197 million tons per year to 260 million tons per year. In proposing the SIP amendment, DAQ is endorsing an intensification of mining operations at Kennecott that would substantially increase PM10 and NOX emissions – emissions that will cause or contribute to violations of national health-based standards – without showing, in any credible manner, how air quality in the valley will be protected or improved. Moreover, this mushrooming activity will occur in an area that is currently not meeting air quality standards for PM10, PM2.5 and ozone. The revision does not function to alleviate exposure to these harmful air pollutions or otherwise take steps to improve air quality in the Salt Lake County, but rather is a significant step backwards. As your agency is charged with reducing our exposure to PM10 and NOX and with keeping concentrations of air pollutions below national health based standards, we ask that you reject the proposed amendment as inconsistent with that duty.

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Based on these concerns and the requirements of state and federal law, we strongly encourage DAQ not to revise its PM10 SIP as proposed. Rather, we request that DAQ: 1) enforce the 150.5 tons per year limit on Kennecott's operations as specified in the applicable 1994 PM10 SIP; and 2) turn its full attention to reducing, rather than allowing increases in the emission of air pollution and thereby ensuring that air quality in the Salt Lake Valley comes into compliance with national health-based standards as soon as possible. More specifically, we point out the following inadequacies with the proposed PM10 SIP amendment.

The Revision is Unlawful Because it Interferes Reasonable Further Progress and Attainment.

We are very troubled by DAQ's proposed revision to its PM10 SIP by allowing Kennecott to expand significantly its mining operations in Salt Lake County. What is particularly unsettling about this proposal is that the Kennecott mine is located in a nonattainment area for PM10 as well as PM2.5 and in an area that will almost certainly be designated as not attaining the 8-hour standard for ozone. This means that the State proposes to permit an increase in PM10 and NOX emissions that will further cause or contribute to violations of National Ambient Air Quality Standards (NAAQS), thereby adding to a serious public health crisis in the Salt Lake Valley, rather than taking steps to

improve air quality by reducing emissions of PM10 and NOX.

In Salt Lake County, ammonium nitrate comprises more than 50 percent of the measured PM2.5 on days that exceed the 24-hour PM2.5 NAAQS. Increased NOX emissions resulting from the Kennecott expansion will contribute to increased ambient concentrations of ammonium nitrate in the valley. The result will be an increase in PM2.5 concentrations in a nonattainment area, thereby frustrating efforts to bring the area into compliance with NAAQS and to secure the health benefits associated with meeting these standards.<sup>1</sup> By the same token, increased NOX emissions will exacerbate the creation of ozone in Salt Lake County and likewise undermine efforts to reduce ozone concentrations in this densely populated area. Plainly, a government that is motivated to protect the health and welfare of its citizens, as well as the environment in which they live, will not take such a significant step in the wrong direction by approving a proposal that will thwart efforts to bring down air pollution levels the Salt Lake area.

Moreover, the U.S. Environmental Protection Agency (EPA) recently proposed to disapprove Utah's request to redesignate the Salt Lake County, Utah County and Ogden City PM10 nonattainment areas as attainment and to disapprove other associated SIP

1 Because Kennecott will emit PM2.5 and no approved SIP is in place for this pollutant, DAQ may not approve the proposed modification. Utah Admin. Code R307-403-3(3)(e) (Approval of a proposed source modification that will contribute to existing NAAQS violations will be denied unless there is an approved implementation plan in effect for the pollutant to be emitted by the proposed source.).

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revisions.<sup>2</sup> This means that these areas are still nonattainment for PM10 and that EPA has determined that air quality in the Salt Lake area is not meeting health-based standards. Moreover, the most recent EPA-approved PM10 SIP – the 1994 PM10 SIP – sets a federally enforceable limit on Kennecott's operations of 150.5 million tons per year of material moved. From this fact, several conclusions necessarily follow. First, Kennecott's current operations violate a federally enforceable SIP provision. Second, any expansion of those operations would also violate a federally enforceable SIP provision. Third, Utah's failure to convince EPA and the public that the 2005 PM10 SIP will achieve NAAQS and failure to meet its legal obligations under the Clean Air Act to improve air quality in, inter alia, Salt Lake County, demonstrates that any proposal to allow increased PM10 and NOX emissions must be rejected.

Additionally, for these and other reasons, the PM10 SIP revision is unlawful. This is because the technical analysis that purports to support the revision fails to establish that a significant increase in air pollution causing activity – particularly activity that will increase emissions of PM10 and NOX in a nonattainment area for PM10, PM2.5 and ozone – will not interfere with attainment or reasonable further progress toward attainment of NAAQS in the Salt Lake area. Nor does the record show that the revision will otherwise comply with the Clean Air Act and the Utah Air Conservation Act. See 42 U.S.C. § 7401(1); Utah Code Ann. §§ 19-2-101 et seq.

First, as stated above, the SIP revision conflicts with the federally enforceable limit on Kennecott's mining activities that prevents the company from moving more than 150.5 million tons of material each year. Therefore the revision is illegal. In any case, before Kennecott may exceed the yearly production rate of 150.5 million tons, sound evidence must exist that Kennecott has achieved the necessary reductions in actual emissions, those reductions must be reflected in enforceable and federally approved SIP and in enforceable permit limits and models of those reductions must show with certainty that reasonable further progress toward and compliance with NAAQS will be achieved.

Second, the proposed amendment fails to show reasonable further progress toward reducing emissions of PM10, as well PM2.5, and concentrations of ozone in Salt

Lake County necessary to bring the area into compliance with national health-based air quality standards.

Third, the record fails to show how the increase in mining activity and the corresponding escalation in PM10 and NOX emissions will comply with the NAAQS. While Kennecott undertook modeling for PM10, it did not do so for the other NAAQS. Moreover, the company's PM10 modeling is insufficient to meet the requirements of the law. That modeling is inadequate for the same reasons identified by EPA in its proposed 2 In recognition of the strong arguments EPA advances to support its proposed disapproval of the request to redesignate the PM10 nonattainment areas, we hereby reference and incorporate the findings and conclusions found in the Federal Register, Vol. 74, No. 229, December 1, 2009. These arguments further underscore the impropriety of the SIP revision.

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disapproval of the 2005 PM10 SIP and we incorporate that analysis herein. Specifically: 1) the combination of CALPUFF simulations with UAM-AERO is insufficient; 2) the reliance on relative response factors (RRFs) based on total PM10 mass alone, rather than including RRFs for components of PM10 is legally unsupported; and, 3) the modeling of banked emissions as though they would be emitted from a 1,200 foot stack rather than at near-ground level fails to support the proposed revision.

Fourth, the offset proposal is not supported by the record and does not comply with the relevant statutory or regulatory provisions. It appears that Kennecott proposes to use banked SO2 credits to offset its increase in emissions. However, these SO2 credits are from operations located 25 miles away from the mine and are derived from emissions released from a 1200 stack. Because the proper concern is whether air quality in the nonattainment area is improved, the record does not support the claim that these offsets will "provide a positive net air quality benefit in the affected area of nonattainment." Utah Admin. Code R307-403-3(3)(d). Moreover, record must show continued further progress toward attainment. In a situation such as this, where millions of Utahns are exposed to unhealthy levels of air pollution each year and the SIP revision on its face seems to exacerbate rather than address air quality conditions in the Salt Lake area, the record must establish that improvements in conditions will result from the offsets and must provide for meaningful public comment on any such assertions.

Fifth, the heavy reliance on the pit escape factor is not supported by the record.

Kennecott claims that most of the PM emissions in its mine do not escape the pit and therefore do not contaminate the Salt Lake airshed. This claim is central to justifying the SIP revision. However, the record does not support DAQ's reliance on the pit escape factor. For example: 1) the study is not ground-truthed, as the study's author recommends, and does not compare model-simulated concentrations to monitoring data; 2) DAQ did not independently verify or review the study; 3) the model sensitivity simulations were performed at the bottom of the pit and therefore underestimated PM releases from sources located elsewhere in the pit; 4) the record fails to include source location information sufficient to verify that the pit escape factor has been appropriately applied; and 5) the record fails to indicate the pit escape factor was applied to modeling that already accounted for pit topography, thereby overestimating the effect of the pit. The Proposed SIP and Technical Support Document Suffer from Several Significant Deficiencies.

We have attached detailed comments on the several significant deficiencies that are evident in the technical support document (TSD) submitted by Kennecott purportedly to support the SIP revision proposal. As we make clear, this document does not do what it is required to do to adequately support the proposed PM10 SIP revision. The TSD fails to establish that a significant increase in air pollution causing activity – particularly activity

that will increase emissions of PM10 and NOx in a nonattainment area for PM10, PM2.5 and ozone – will not interfere with securing attainment or reasonable further progress toward securing attainment of NAAQS in the Salt Lake area and will otherwise comply

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with the Clean Air Act and the Utah Air Conservation Act. See 42 U.S.C. § 7401(l); Utah Code Ann. §§ 19-2-101 et seq.

These comments reinforce what has been stated above, but provide more thorough analysis of the inadequacies of the TSD. Moreover, we have made additional points that deserve close consideration.

Utah's Current 2005 PM10 SIP Fails to Protect Utahns from Unhealthy Levels of Air Pollution.

As you are well aware, Salt Lake County, Utah County, Ogden City, along with other significant areas in Utah, experience some of the highest – if not the highest – concentrations of air pollution in the nation. Moreover, Utah has the youngest population of any state in our country. This means that the vast segment of Utah's population particularly vulnerable to the significant adverse effects of air pollution – Utah's children – is routinely subjected to unhealthy levels of air pollution. Exposure to these concentrations of pollution can harm these children for the rest of their lives. Finally, as you are also aware, many significant areas in Utah, including Salt Lake County, Utah County and Ogden City, are not meeting current NAAQS for PM2.5 and ozone and that air quality in these areas can often exceed these standards by alarming rates.

Despite this reality, Utah asked that Salt Lake County, Utah County and Ogden City be re-designated as attainment for PM10. This request is based on, inter alia, monitoring data and maintenance plans that are intended to show current and future compliance with NAAQS. However, as EPA has correctly pointed out, these efforts fail to establish that PM10 concentrations in the affected areas have reached safe levels or that Utahns will be protected from unhealthy concentrations of PM10 in the future. As a result, EPA has proposed to disapprove Utah's request to redesignate Salt Lake County, Utah County and Ogden City PM10 nonattainment areas as attainment and to disapprove other associated SIP revisions.

We back EPA's decision to require Utah to prove rigorously any claims it makes that apparent PM10 NAAQS violations meet the strict requirements of the Exceptional Events Rule or Natural Events Policy. We also applaud EPA's demand that the modeling that accompanies Utah's submission be accurate and conform to relevant regulations. We appreciate EPA's refusal to allow Utah to weaken its PM10 SIP and to rely on provisions or omissions that may lead to violations of the PM10 NAAQS. We also appreciate EPA's proposed decision to reject various amendments to Utah's air quality rules that do not adequately protect the health of Utahns or ensure compliance with health-based air quality standards. We also commend EPA's refusal to allow Utah to rely on an inadequate PM10 maintenance plan. We believe that each of EPA's proposed decisions is soundly supported and required by the Clean Air Act and its implementing regulations.

In addition to lending our support to EPA's proposed action, we make the following specific comments:

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Utah's most populated counties are failing PM2.5 NAAQS. Rather than muddying its SIP, seeking a relaxation of controls on air pollution in these areas and asking for an attainment designation, Utah should be dedicating its time, effort and resources to immediately adopting and implementing significant measures to reduce air pollution, particularly PM2.5, along the Wasatch Front. Utah's current request is a step backwards in its efforts to come into compliance with the

NAAQS.

The severe adverse health impacts from an “exceptional event” are identical to those from an “unexceptional event.” Therefore, EPA is right to demand rigorous documentation of any claim to an exceptional event, including by requiring strict compliance with the relevant regulations. To do otherwise would be to undermine the goal of the Clean Air Act to force States to comply with the NAAQS. In other words, an exceptional event must truly be exceptional and beyond any efforts to correct it.

We believe that all permit terms and conditions on which Utah relies in its SIPs should appear in both the relevant permits, even where no Title V permit is required, as well as in the SIP. Only in this way can the purpose of the Clean Air Act be met and the public be informed of the scope of controls on any given stationary source.

Utah’s refineries, Kennecott, and Utah’s gravel pits require more rigorous pollution control. These sources appear to contribute significant particulate pollution to the Wasatch Front and appear to be insufficiently controlled and monitored.

Consistent and accurate monitoring is critical to the success of permit terms and conditions, as well as SIP conditions. Monitoring every five years is unacceptable. Moreover, monitoring should be required that is sufficiently rigorous and regular to ensure compliance with applicable permits and SIP conditions.

Emissions during maintenance, start up and shut down are significant. As a result, EPA is correct to refuse to allow Utah to exempt these events from control and enforcement. Permit terms and conditions should control these events and excess emissions must be treated as violations. To do otherwise would undermine the goal of the Clean Air Act to control and reduce air pollution and to require sources to operate within the confines of their permits and SIP conditions.<sup>3</sup>

Emission limits must be clear, enforceable and monitored. To allow otherwise would violate the letter and purpose of the Clean Air Act.

<sup>3</sup> Because of Utah Admin. Code R307-107 – Utah’s Unavoidable Breakdown Rule – Utah is not in a position to attain or maintain the NAAQS or to otherwise comply with the requirements of the Clean Air Act. There is no reason to believe that facilities will maintain their pollution control equipment or operate with permit compliance in mind. Moreover, for the purposes of modeling, there is no evidence that regulated industries have kept or will keep within the confines of their permits. Rather, sources are free to attribute any excess emissions to an “unavoidable” event and indeed, are free to prolong this event indefinitely and are free from recourse.

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Thus, because Utah’s proposed 2005 PM10 SIP is faulty on several scores and fails to establish that the Salt Lake area is meeting NAAQS for PM10, we find it particularly inappropriate for DAQ to allow a significant increase in mining activity and PM10 emissions by Kennecott. Before allowing new emissions in the valley, DAQ should first demonstrate attainment of the NAAQS. Moreover, if the SIP revision is to be considered by the agency, DAQ must demand rigorous and transparent modeling and clear, convincing and consistent data and analysis. DAQ must not pin its PM10 SIP revision on a master thesis that it has not independently confirmed, that is incomplete, that has not been peer-reviewed and that has not been verified with monitoring data. Moreover, the agency must inform and involve the public in this critical decision making in a way that allows individuals to make meaningful comments and have their concerns adequately addressed.

Thank you for this opportunity to comment and for your agency's actions on behalf of the people of Utah. We hope that the State of Utah will reject the proposed SIP revision. At a minimum, we ask that DAQ demand and undertake significantly more analysis before changing measures designed to protect our health and the health of our families and patients. Please keep us informed of any actions DAQ takes relative to the PM10 SIP revision or the Kennecott expansion proposal, including of any requests the agency makes of EPA.

**03-17-2011** Utah Physicians for a Healthy Environment and Western Resource Advocates

RE: Technical Support Document (TSD) submitted (revised) in January 2011 by Kennecott Utah Copper (Kennecott), in support of increasing the PM10 State Implementation Plan operational Page |1 limitation on the company from 197 MM tons of mined material per year to 260 MM tons of mined material per year.

#### A. General Comments

1. Section 1.0 of the TSD states that a Notice of Intent (NOI) has been submitted as a "companion document" to the TSD and that revision of the PM10 SIP and consideration of the Intent to Approve (ITA) Kennecott's proposed increase will proceed on a parallel track. It is apparent that the TSD is intended to support both the SIP amendment as well as claims made in the NOI.

However, the proposed SIP limitation change from 197 MM tons to 260 MM tons must first be evaluated, reviewed, commented upon, and then, either approved or denied, based on extensive technical analysis. Only after this process is complete can an NOI suggesting a proposed permit increase, which presumably then complies with the SIP, be submitted for review.

When both documents are submitted concurrently and freely refer to each other as references to support one another, the "chicken and the egg" conundrum arises: how can the first document (the TSD) rely upon data submitted in the second document (the NOI), when the foundational approach of the second document is contingent upon approval of the first document? The situation is circular, confusing and unclear. For DAQ to proceed on this parallel track undermines the integrity of the permitting and rule making process and conveys to the public the suggestion that DAQ has made up its mind with regard to both. UPHE requests that DAQ clearly define and follow an appropriate procedure that provides that a SIP modification will precede consideration of an NOI and carefully explain this procedure to the public.

2. Apparently missing from DAQ's website and otherwise unavailable to the public are DAQ's analysis of the TSD and various documents submitted by Kennecott in support of its expansion proposal. DAQ has already indicated that it plans to issue a permit to Kennecott allowing the company to expand its mining operations.<sup>1</sup> This indicates that DAQ has already completed a technical analysis of the proposal and therefore that there are documents created by DAQ, along with documents submitted by Kennecott to support its proposal, that are not readily available. By failing to provide these documents

<sup>1</sup> Kennecott Utah Copper LLC, Mine & Copperton Concentrator, Intent to Approve: Modify Approval Order DAQE-AN0105710023-08 to Allow for Material Movement Increase and Add a Crusher, Project Number: N010571-0028, Posted by DAQ on February 2, 2011.

to the public for the purposes of the present rulemaking undermines the ability of UPHE to participate in this process in a meaningful way and to direct its comments to issues raised by those technical documents. UPHE therefore requests that DAQ provide to the public the agency's full technical analysis of information presented in the TSD, including any technical analysis of the Bhaskar & Tandon thesis (discussed below in Section G).

Page |2 Further comments made in this section refer to the TSD as it relates to the proposed change of the PM10 SIP, and not the NOI, except where relevant.

3. The TSD has been revised twice since it was first submitted in August of 2010. The NOI, however, was submitted in August of 2010 and has not been correspondingly revised. The TSD has been altered to reflect changes in emissions, but these changes have not been documented by DAQ in a formal way that allows for evaluation by the public. UPHE requests that DAQ provide a list of tracked changes between revisions to the TDS so that UPHE can appropriately evaluate these in comparison to the NOI, which has remained static.

4. There are two documents that officially report the air emissions currently being emitted by Kennecott's mining operations. The first is the existing DAQ Approval Order (AO) (DAQE-AN0105710023-08), which declares that current mining operations have the potential to emit (PTE) 2,559 tons of PM10 per year. The second is the 2008 emissions inventory data compiled by DAQ, in which Kennecott reports its annual emissions. In 2008, at an operational limitation of 197MM tons/year, Kennecott self-reported greater annual emissions: 2,915 tons of PM10 from mine/concentrator operations.<sup>2</sup>

Despite annual PM10 emissions from the mine currently hovering around 2,915 tons of PM10 per year, the TSD states that with the proposed operational limitation increased by 32% to the requested 260MM tons/year, the total PM10 emissions PTE will only be 1,513 tons/year, a decrease of 1,402 tons, or 48%.

The obvious question, then, is: how can a mine increase operational capacity by 32% while simultaneously reducing its PM10 emissions by over 48%. Plainly, the record does not support such a claim. The current emissions information for Kennecott is illustrated in the following table:

\* Note: emissions listed are tons per year.

Based upon the above, we make the following comments:

2 Utah DAQ, 2008 Annual Emissions from Point Sources by County.

Utah Physicians for a Healthy Environment March 1, 2011 Comments on Rio Tinto/Kennecott Utah Copper Proposed SIP modification.

a). We understand that tailpipe emissions from offroad sources must be included in the emissions inventory, but are not required to be calculated as part of the PTE. While Kennecott has a large fleet consisting of various types of offroad equipment (graders, dozers, loaders, etc.), by far the largest volume of offroad tailpipe emissions comes from the mine haul trucks, and these tailpipe emissions are included in the PTE and estimated at 191 tons of PM10/year. Even if

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that figure were doubled, then, to liberally account for all offroad sources that are not included in the PTE, a total of 1,020 tons of actual, reported emissions still remains unexplained by the TSD.

b). Other than a new baghouse with increased control efficiencies that accounts for only a few tons of PM10 reduction, there are no new methods of pollution control or a more stringent BACT analysis performed that would account for this "missing" 1,020 tons of actual emissions.

c). The fugitive dust control plan on which Kennecott relies to maintain existing reduction efficiencies, already allows Kennecott to claim higher control efficiencies on numerous dust-producing operations than allowed by other sources conducting similar operations in Salt Lake County. However, these efficiencies are already included in the PTE calculations for fugitive emissions. UPHE is concerned that, despite heavy reliance on the control plan to claim large reductions in PM10 emissions by utilizing various types of watering controls, the plan itself was not provided for review along with the TSD. The result is that the public has not been given a chance to review all pertinent data related to the proposed PM10 SIP revision. UPHE requests that the fugitive dust control plan be posted by DAQ so that the public can review the document

as part of this rulemaking process and that a new period be established so that the public can submit comments on the plan, together with comments on the SIP.

d). UPHE has limited its evaluation of the apparently inexplicable difference between actual 2008 emissions and newly-proposed future PTE emissions to a discussion of available, published numbers. However, with no significant, observable proposed changes in pollution reduction efforts at the mine (i.e. enclosing areas of operations, replacing haul trucks with conveyors, or other similar measures), it is reasonable to assume that an operational mining increase of 32% will lead to a commensurate increase in actual emissions. It is logical, then, to project that if Kennecott emits 2,915 tons of PM10 operating at 197 MM tons of mined materials per year, the company's PM10 emissions will increase by 32% to 3,847 tons/year were production to increase to 260 MM tons of mined material per year.

e). Kennecott recognizes that its operational emissions will increase significantly and has offered emission reduction credits to potentially offset these increases (see also comment C-2 below). However, as offsets do not appear to be required by state or federal law for a SIP modification process, we view the offering of such offsets as a measure calculated to make these actual emission increases more palatable to DAQ and the general public rather than a binding obligation. Moreover, DAQ must remember that a SIP revision is appropriate only if the amendment does not interfere with any applicable requirement concerning attainment and reasonable further progress or any other applicable requirement of the Clean Air Act. With these considerations in mind, UPHE requests that DAQ provide the regulatory basis for the application of these credits to the SIP modification process.

f). Kennecott relies solely upon the Bhaskar-Tendon paper to justify a wholesale 80% discount to new as well as previously reported emissions that occur within the mine pit, which, Page | 4 as the TSD describes, make up 78% of all mine emissions.

5. The TSD relies on the Bhaskar-Tandon Master's degree thesis, Airflow Patterns and Pit-Retention of Fugitive Dust for the Bingham Canyon Mine, to assert that only 80% of in-pit PM10 emissions escape the pit. This Master's thesis does not present an adequate or complete technical justification of the use of such a large emissions reduction factor. Because of the importance of this issue, this thesis is discussed separately in Section G below.

#### B. Section 1.0: Introduction and Purpose

1. Table 1-1 purports to provide the "most representative" PTE calculations for 260 MM tons per year. As a basis for this claim, the table refers to AERMOD modeling performed as part of the NOI document. However, the TSD does not otherwise reference AERMOD modeling, and in fact, the bulk of the TSD is comprised of CMB, UAM-AERO, and CALPUFF modeling results. As the AERMOD information is unsupported in the TSD, mention of AERMOD tends to obfuscate other modeled emissions demonstrated by the TSD.

When cross-referenced, the PTE figures from the TDS and the total PTE summary presented in the "companion" NOI document (NOI Table 3-16) do not agree. This discrepancy is summarized in the following table:

This discrepancy casts doubt as to the accuracy of both set of numbers, calls into question Kennecott's quality assurance procedures and underscores the problem with considering two documents concurrently when one document purports to rely on the other. (See General Comments #1 & #2 above).

#### C. Section 2.0: 1994 PM10 SIP Demonstration

1. Section 2.1 states that "[s]econdary sulfate and nitrate impacts were assumed to be in direct proportion to a source's relative sulfur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>) emissions." In light of

the 1994 SIP determination that Kennecott is a "large source of secondary PM10,"<sup>3</sup> it is unclear whether this indicates that an equivalent amount of emissions for secondary impacts were added

as PM10 to the original emissions amount or whether the emissions were measured as additional SO2 and NOX emissions

only. UPHE requests that DAQ describe the meaning of this statement and show where the results of the demonstration account for secondary pollutants.

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2. Section 2.2, Offset Proposal. Section 2 presents use of emission reduction credits that will be applied as offsets to mitigate proposed increases of PM10 and NOX related to the proposed production increase. While the use of credits is questionable (Section A-4, paragraph e.), the credits currently represent emissions that are banked and are not being emitted into the airshed. However, the Salt Lake area is currently nonattainment and has experienced exceedences of PM10 ambient standards even while these emission reduction credits resided in the bank. Now, these credits will be exchanged for 5,485 tons of actual 'new' air pollution (i.e. pollution that is not currently being emitted into the airshed). Plainly, based on the record, DAQ should not allow these new, actual pollutions to be emitted into the already troubled airshed. Alternately, if emission reduction credits were allowed to be applied, the offset ratio should be increased to a minimum of 1 ton actual emissions requiring 1.5 tons of credits

(1: 1.5), or even two tons of credits (1: 2). In any case, there must be a demonstrated non-interference with attainment or reasonable further progress and improvement in air quality.

3. Section 2.2, Pit Escape Factor.

This section first mentions the Bhaskar-Tandon Masters degree thesis, Airflow Patterns and Pit-Retention of Fugitive Dust for the Bingham Canyon Mine, to contend that in-pit PM10 emissions can be reduced by 80% to calculate the emissions that escape the pit. The emissions reduction factor of 80% is not supported by the record and is not justified. See Section G below for specific comments regarding this thesis.

D. Section 3: 2005 Maintenance Plan Demonstration

1. This section of the TSD provides an in-depth discussion of the 2005 PM10 SIP development. However, while approved by the Air Quality Board, a SIP is a federally-enforceable document and, as such, must be approved by EPA. Not only has the EPA not approved the 2005 SIP, but on December 1, 2009, the agency published in the Federal Register<sup>4</sup> its intention to disapprove the SIP on numerous grounds, including identified flaws with the UAM-AERO modeling intended to support the plan. Therefore, Section 3 of the TSD is technically moot, as the SIP it discusses has not been federally and has been identified as flawed by the EPA.

2. Section 3.1. Why were the UAM-AERO modeling files from the 2005 SIP not available from the DAQ?

3. Section 3.1. CALPUFF was substituted for modeling originally performed with UAM-AERO. UAM-AERO is a photochemical model that simulates the changes of pollutant concentrations in the ambient air by characterizing chemical and physical processes in the atmosphere. This model is typically used in a policy or regulatory assessment to simulate impacts from all sources and evaluates pollutants over large spatial domains. CALPUFF, on the other hand, is a dispersion model that assesses dispersion

3 SIP Section IX, Part A, Page 28. 4 Federal Register / Vol. 74, No. 229 / Tuesday, December 1, 2009 / Proposed Rules

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characteristics of a single source and the impacts of the source at surrounding receptors, and does not focus on addressing the primary chemical transformations that occur, as UAM-AERO does. UPHE understands that the CALPUFF domain was designed to simulate the UAM-AERO scenario as well as possible. However, given the model category-type differences between these two models, UPHE requests that the DAQ describe how the agency can allow the switching of modeling platforms, considering their different category-types (i.e. photochemical vs. dispersion),

and, in a related matter, justify how Section 3.3 of the TSD can compare the results from two disparate models which rely upon different algorithms, especially given the dissimilarity of these models category-type (photochemical vs. dispersion).

4. Table 3-3 provides PTE information without a “pit retention” factor added. These numbers do not match to those presented in Table 1-1, perhaps because Table 3-3 includes the Copperton Concentrator, whereas Table 1-1 does not. Why are emissions shown with the concentrator in one area, but not in the other? The public must be able to determine the emissions from the pit without the retention factor (as this information is not directly provided), and intermittent use of the concentrator data obfuscates this. The mine and concentrator are permitted together as a single source and therefore emissions from each of these areas should be combined in any table demonstrating “total PTEs.” It is assumed that concentrator emissions are included in the 22% of emissions claimed to occur outside of the mine pit, but no statement to this effect is provided in the TSD.

5. Section 3.3.4: Source Emissions. The second paragraph refers to NOX emissions as 5078 tpy at the 197 MM tons/year production scenario and 7,450 tons per year at the 260 MM tons/year production scenario. While neither of these numbers are substantiated, the numbers appear to be the actual, non-reduced NOX emission numbers for the mine. Note that they are listed as both 7,430 tons as calculated, 7,442 tons in the 260 MM tons/year case, and 5078 in the 197 MM tons/year case. Why are these differing numbers for NOX emissions not consistent with NOX emissions stated elsewhere in the document? For example, the summary PTE table (Table 1-1) states that NOX emissions are 5,830 tons/year.

Much of this apparent confusion stems from the application of the Bhaskar-Tandon 80% reduction factor in some sections of the TSD, but not in others. In addition, it is not clear from any modeling data presented when the adjusted numbers were used, as opposed to when they were not. UPHE requests that the DAQ offer a definitive explanation of the development of each of the numbers used in the report so that the public may understand the basis for the proposed SIP revision. UPHE also requests that DAQ provide a table that indicates full emission increases at all in-pit and out-of-pit sources (inclusive of standard control efficiencies, such as watering) and clearly identifies any additional control factors (i.e. Bhaskar-Tandon) that lead to the adjustment of any of these numerical values.

6. Section 3.4: Results. The first paragraph regarding extraction of CALPUFF runs using CALPOST and then comparing these against the UAM-AERO runs for 2011 and 2015, is confusing. UAM-AERO emissions results are not shown for comparison. Rather, only the increases shown by the CALPUFF runs are provided. UPHE requests that DAQ provide the UAM-AERO modeling run results so that the public may compare them to the CALPUFF runs.

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#### E. Section 4: Emissions Summary

1. Section 4.0. The introductory paragraph states that all PM10 in-pit calculated emissions are reduced by 80% based solely on the Bhaskar-Tandon thesis. However, it is necessary to point out that, relying on the qualified results of one graduate student thesis, Kennecott is claiming thousands of tons of reductions that may or may not be actual reductions. Plainly, the record does not support such reductions. This issue is discussed separately in Section G below.

2. Section 4.2.5: Haulroad emissions. Kennecott states that the company follows DAQ policy<sup>5</sup> of using a 75% control efficiency on unpaved road fugitive dust emissions. However, the company’s

spreadsheet calculations (Table A1-18) show that instead of using the 75% control efficiency factor, Kennecott used incorrect 85% and 95% control efficiency factors. UPHE requests that these emissions be recalculated using the correct factor, as was stated in the text of Section 4.2.5.

In addition, Kennecott has used a control efficiency of 85% in summer/spring/fall (275 days) vs. control efficiency of 95% in winter in order to account for wetter conditions in the wintertime. In addition to the previous comment, it should be noted that DAQ policy does not allow for seasonal variation in dust calculations from roadways. UPHE requests that seasonal control efficiencies be removed when conducting recalculations as requested in the preceding paragraph.

Has DAQ flagged these calculation errors as part of a quality assurance effort?

Because it appears that the DAQ's guidance policy for calculating fugitive roadway dust has not been as widely disseminated as believed, UPHE has attached a copy of the DAQ Policy for reference by Kennecott.

3. Table 4.16 is improperly labeled as "Generator Location" emissions.

4. In keeping with our comment in Section D – 5 that requests a table be presented that demonstrates the fugitive PM10 emissions that have had a control factor of 80% applied to them, UPHE requests to evaluate methodology for determining fugitive control factors for vehicles that operate both in and outside of pit, i.e. haul trucks.

5 Utah DAQ, Permitting Branch Memo from R. Olsen, March 10, 2008, also included as an attachment to this document.

#### F. Section 5: Conclusion

1. The first bulleted paragraph in Section 5 discusses that "[a]n analysis based on the 1994 SIP demonstration methodology was used to support the modification of the 1994 SIP from the 150,500,000 tpy originally modeled to a material movement limitation of 260,000,00 tpy." UPHE can find no

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evidence of this type of analysis in the TSD document. Was this performed previously? Most of the analysis conducted in the TSD is related to base year and future scenarios as presented in the 2005 SIP.

2. The conclusion suggests that increased emissions are acceptable as they have been offset by reduction credits. However, application of offsets is allowed under the NSR permitting program under State air rules assuming a SIP is already established that allows for such credits to be used. Offsets may not be required for a SIP analysis, as these emissions are already modeled within the existing SIP. Use of offsets to revise a SIP also sets a precedent for other sources, who may choose to raise their SIP limitation ceilings through application of offset credits. UPHE requests that DAQ explain the use of offsets in absence of any clear guidance or rulemaking regarding their applicability to a SIP revision and evaluate the precedence that this approach sets for other sources in the same airshed and other nonattainment areas.

3. As discussed in preceding sections, the modeling demonstration that is being used as a foundation to allow for the proposed increase is based on the 2005 PM10 SIP modeling demonstration. The 2005 SIP has been proposed for disapproval by the EPA. Therefore, all conclusions based on the 2005 SIP must be suspended until the SIP is approved by EPA.

G. Comments on Airflow Patterns and Pit-Retention of Fugitive Dust for the Bingham Canyon Mine, Bhaskar-Tandon Masters Degree Thesis, 1996.

DAQ is considering a revision to the Salt Lake County PM10 SIP that that would allow Kennecott to increase its production from 197 million tons to 260 million tons of mined material per year. According to Kennecott's TSD, this increase in production will actually decrease PM10 emissions by 1,762 tons per year. This seeming impossibility is only feasible if all PM10 emissions that occur within mine pit ("in-pit" emissions) are reduced by 80%, which is indeed what Kennecott has proposed. This 80% reduction is based solely on the results of a "study" submitted to DAQ by Kennecott that estimates only 20% of PM10 particles escape from the mine pit and are released into the ambient airshed. This "study" is actually a master's degree thesis authored by a University of Utah, Department of Engineering graduate student Navin Tandon in 1996 – 15 years ago.

Mr. Tandon's thesis evaluates the potential for particles emitted within the mine pit to 'escape' into the surrounding airshed of Salt Lake County. It is critical to note that without reliance on Mr. Tandon's thesis, Kennecott estimated emissions may in fact be more than four times greater than the company currently calculates them to be for the purposes of the SIP revision. This is because Kennecott asserts that escaped emissions represent only 20% of overall calculated emissions. UPHE makes the following six general comments and four technical comments on this master's degree thesis:

#### General Comments

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1. An original thesis was authored and copyrighted by Navin Tandon in 1996. Mr. Tandon is noted as the sole author. However, as is customary in academia, his supervisor and thesis advisor at the University of Utah, Dr. Ragula Bhaskar, is listed as a co-author. It appears that Kennecott has printed a new cover page for this study that lists Dr. Bhaskar first as primary author (note that this cover page does not exist on the "official" copy of this thesis, which is archived at the Marriot Library at the University of Utah).

This type of change is misleading, appears to deliberately play upon the strength of Dr. Bhaskar's Ph.D. credentials, and leads the reader to believe that Dr. Bhaskar is the primary author of this paper. As a thesis advisor, Dr. Bhaskar may have been the driving force behind the work, but he is not an author of this thesis. In actuality, when a proper literature search was performed for this paper at the University of Utah, Dr. Bhaskar's name never appears as author. Rather only his student, Navin Tandon, is listed as author of the document.

2. It appears that this paper was written at the request of Kennecott, based on the fact that the study was submitted to the company. This further suggests that the analysis was funded by Kennecott, raising a potential conflict of interest. UPHE requests that Kennecott fully disclose its involvement in this research.

3. The thesis has never been a) externally peer-reviewed, b) presented at a conference or published in a conference proceedings, or c) published in a peer-reviewed scientific journal. If a scientific paper is referenced or relied upon for its results, or is referred to as a "study," it must have been subjected to at least one or more of these types of reviews, performed outside the institution from which the paper was produced. That the paper has never been externally peer-reviewed (i.e. beyond the thesis-advisor level) discredits its use as a "study," while to claim it is a definitive study of particulate emissions from the Kennecott mine is misrepresentative. In any case, DAQ is obligated to undertake independent analysis of the paper, a duty compounded by the fact the rigor of the study is suspect.

We are also concerned that this paper is now 15 years old and Kennecott presents no additional corroborating studies or other types of assessments that may support the findings of this graduate

student's work that have been conducted in the last 15 years. We are also troubled by the fact that, although this thesis was completed in 1996, Kennecott has not presented it during the previous Approval Order modifications (at least three) that have occurred since thesis completion.

4. Perhaps our most important comment is that the thesis paper lacks proper validation. The thesis author, Mr. Tandon, states clearly in his summary and conclusions that observational data must be made in order to compare predicted modeling results with actual events that occur at the mine site. Specifically, he states that meteorological and source parameter assumptions should be verified through monitoring on-site within the pit to verify his results. He also implies that the sensitivity analyses

conducted as part of his modeling effort are computationally-limited based on financial resources required for additional computational support, and suggests improved methods of completing modeling evaluation which may not limit the modeling study.

5. The author also states clearly that he has made various assumptions in completing this paper that must be clarified with actual data. The author bases his assumptive values on literature searches Page | 10 and has incorporated them as fixed constants into his modeling calculations. However, the author himself cautions that these constants are actually variables that need to be accurately measured on-site in order to validate his modeling findings. It does not appear that Kennecott has in anyway attempted to follow the author's recommendations that on-site data be collected to verify the claims of the thesis.

6. DAQ should understand well the author's concern that efforts be made to verify the precision and accuracy of the results presented in his thesis. DAQ often performs airshed modeling, while at the same time conducting extensive and on-going monitoring of ambient air. DAQ frequently states that monitoring data do not agree with modeling predictions, and in fact, admits that the two values are very different from each other. This has most recently been evident in the development of the current PM2.5 SIP, during which DAQ has stated on record, that the agency was not able to get the selected model to simulate or predict past, well-documented days of non-compliance that have occurred in the past, even when all meteorological variables and air monitoring data were well-known. Why, then, is DAQ prepared to accept this thesis based on a fluid flow model, without ever requiring validation through monitoring, especially when the author himself recommends it? UPHE requests that DAQ share its technical review and analysis of this thesis document for public review together with the proposed SIP revision. This is particularly important because the justification for the SIP revision and the validity of the TSD hinges upon the validity of the thesis.

#### Technical Comments

7. A three-dimensional finite element model was developed. This computational model included the mine and surrounding regions. The flow field over and inside the mine cavity were modeled with the Reynolds-Averaged Navier-Stokes (RANS) equations with a k-epsilon turbulence closure model. A near-wall modeling approach was used next to the boundaries (in the viscous layers). Given boundary conditions and initial conditions, a flow field approximation was calculated. The author discusses that the k-epsilon model is not appropriate in low-turbulence regions and the boundary layer (in these flows) is assumed to be low turbulence. However, there must be a height in the flow field where the smooth flow (RANS) and turbulent flow (k-epsilon) models are interfaced. The corresponding mesh element height must match properly with the mixing height in order for model predictions to be accurate. This is not adequately demonstrated in the thesis.

8. The spatial dimensions used by this model are not valid. The finite element model utilized an area of approximately 23,000 ft by 20,000 feet. This is meant to capture the mine and "surrounding regions." However, a justification for the size of the modeling domain is not given. The simple site map submitted by Kennecott as part of the companion NOI does not have a scale included. As a result, neither the public nor DAQ can adequately compare current or projected conditions to those that existed

15 years ago when this modeling exercise was completed. This calls into question the impacts of the inflow and outflow locations with respect to the topographic features of the pit. In addition, Kennecott has stated publicly that the pit footprint size will increase at least 1,000 feet south of the existing pit. This is not reflected in the thesis. In addition, in figure 5-10 the author indicates that the area modeled was rectangular in nature, while figure 5-8 shows a trapezoidal configuration to the spatial domain.

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Nevertheless, because the modeling domain has changed greatly, the results of the thesis cannot be generally apply to the pit, no matter what dimensions it has attained since the thesis was completed.

9. Numerous assumptions are used in the model. The author himself states that these should be verified or contradicted by use of field studies to validate the results of the modeling.

The analysis relied on a RANS model rather than on a direct numerical simulation (DNS). DNS would attempt to capture all scales of motion of the fluid. RANS requires a closure model. The closure model used in this study was the classic k-epsilon model. As stated in the thesis, this model has several limitations: it is appropriate for only high-turbulence regimes and it requires a collection of constants (parameters) which are assumptions not verified through field study.

The thesis states the constants used (for reproducibility), but does not justify the particular constants other than by stating that they are from the literature. Appropriateness of the constants for the particular situation/study is not discussed.

The thesis does not explicitly address if the isotropic turbulence assumption is a good assumption for this study.

The mesh node information is made available in the thesis (both in terms of number of nodes and images of slides of the domain). However, resolution of the mesh elements in feet is not given, so the spatial scale of the mesh study is not clearly defined. Due to computational costs, a mesh resolution study did not appear to have been performed (i.e. a hierarchical mesh refinement to understand the impact of spatial resolution on the flow field characteristics). The thesis provides images of mesh nodes, but no statement or elaboration of what each mesh element represents.

A mixing layer assumption is made by the thesis. This assumption, along with other atmospheric condition assumptions, affects further parameters such as the height of the near-wall modeling layer. This is one of the reasons why the author states that onsite meteorology must be conducted to provide verification or contradiction of the thesis claim.

9. The model does not handle anisotropy and therefore cannot predict directional dependence of particles outside of meteorological influence. Relevant data measurements have never been submitted by Kennecott.

10. The author describes reasonable "next steps" for the refinement of his thesis conclusions. This confirms that while the thesis may be a good starting point for the justification of pit retention, the

analysis primarily demonstrates that the modeling may be an appropriate tool for this type of application. However, the thesis in no way can justify the pit retention results (80% of PM10), if for no other reason than what the author concludes – that the findings need to be validated in order to verify the results.

Given these conditions as listed and described, UPHE requests the following: Page | 12

- a) Site verification of thesis claims in accordance with author's recommendations that involves collection of meteorological data (at a minimum) from various levels of the mine pit.
- b) Additional, peer-reviewed and DAQ-authorized studies using monitoring data yet to be collected so that assumption constants are known from site-specific data. These studies will lead to better understanding of pit dynamics and either confirm or contradict the 20% PM10 emission factor developed by the Bhaskar-Tandon thesis.

**03-20-2011** BREATHE UTAH\_Deborah Burney-Sigman

Thank you for the opportunity to provide comments on the proposed revisions to the State Implementation Plan, and the proposed modification of Approval Order DAQE-AN0105710023-08.

Breathe Utah is a group of citizens and professionals who aim to advance solutions to Utah's air quality problem. We strive to address root causes of pollution through legal, medical, and environmental research that leads to science-based solutions and effective public policy. Breathe Utah emphasizes the need for individuals, businesses, and industry to accept responsibility, both for their role in causing air pollution and for taking positive steps to effect solutions.

We share many of the concerns expressed by Salt Lake City in the comments of Mayor Ralph Becker dated March 3, 2011. More research is necessary before a well-informed decision may be made about the true air quality impacts of the proposed expansion of mining operations by Kennecott.

As noted by Mayor Becker, Salt Lake City and the greater Salt Lake Valley are substantially out of compliance with the existing national ambient air quality standard (NAAQS) for PM2.5 pollution during the winter months. The health impacts and resulting economic costs of PM2.5 pollution to Salt Lake Valley residents are unacceptably high.

We are concerned that the proposed action will increase PM2.5 emissions. First, the potential increase in PM2.5 emissions has not been properly modeled or revealed by Kennecott. The airshed in the Salt Lake Valley is of exceedingly poor quality in the winter months, and any significant increase in PM2.5 emissions is unacceptable. Proper scientific modeling must be completed in order to adequately understand how the proposed changes could affect PM2.5 levels.

Second, as discussed by Mayor Becker, Kennecott's modeling predicts a substantial increase in PM10 emissions, such that the Salt Lake Valley air quality will be close to exceeding the NAAQS for PM10. Because the majority of PM10 increases come from NOx, the increases will necessarily increase PM2.5 emissions as well.

To adequately protect the public health it is essential, before proceeding with the requested actions, that the Board require an analysis of how the proposed changes will affect the Salt Lake Valley's already unhealthy air quality during the winter months. We join Mayor Becker in his assertion that it is not prudent, protective of health, or allowable for the Board to approve the SIP change or modification of Approval Order that would impede Salt Lake County's attainment of

the NAAQS standard for PM2.5.

**03-15-2011** Utah Physicians for a Healthy Environment and Western Resource Advocates

RE: Technical Support Document (TSD) submitted (revised) in January 2011 by Kennecott Utah Copper (Kennecott), in support of increasing the PM10 State Implementation Plan operational Page |1 limitation on the company from 197 MM tons of mined material per year to 260 MM tons of mined material per year.

#### A. General Comments

1. Section 1.0 of the TSD states that a Notice of Intent (NOI) has been submitted as a “companion document” to the TSD and that revision of the PM10 SIP and consideration of the Intent to Approve (ITA) Kennecott’s proposed increase will proceed on a parallel track. It is apparent that the TSD is intended to support both the SIP amendment as well as claims made in the NOI.

However, the proposed SIP

limitation change from 197 MM tons to 260 MM tons must first be evaluated, reviewed, commented upon, and then, either approved or denied, based on extensive technical analysis. Only after this process is complete can an NOI suggesting a proposed permit increase, which presumably then complies with the SIP, be submitted for review.

When both documents are submitted concurrently and freely refer to each other as references to support one another, the “chicken and the egg” conundrum arises: how can the first document (the TSD) rely upon data submitted in the second document (the NOI), when the foundational approach of the second document is contingent upon approval of the first document? The situation is circular, confusing and unclear. For DAQ to proceed on this parallel track undermines the integrity of the permitting and rule making process and conveys to the public the suggestion that DAQ has made up its mind with regard to both. UPHE requests that DAQ clearly define and follow an appropriate procedure that provides that a SIP modification will precede consideration of an NOI and carefully explain this procedure to the public.

2. Apparently missing from DAQ’s website and otherwise unavailable to the public are DAQ’s analysis of the TSD and various documents submitted by Kennecott in support of its expansion proposal. DAQ has already indicated that it plans to issue a permit to Kennecott allowing the company to expand its mining operations.<sup>1</sup> This indicates that DAQ has already completed a technical analysis of the proposal and therefore that there are documents created by DAQ, along with documents submitted by Kennecott to support its proposal, that are not readily available. By failing to provide these documents

<sup>1</sup> Kennecott Utah Copper LLC, Mine & Copperton Concentrator, Intent to Approve: Modify Approval Order DAQE-AN0105710023-08 to Allow for Material Movement Increase and Add a Crusher, Project Number: N010571-0028, Posted by DAQ on February 2, 2011.

to the public for the purposes of the present rulemaking undermines the ability of UPHE to participate in this process in a meaningful way and to direct its comments to issues raised by those technical documents. UPHE therefore requests that DAQ provide to the public the agency’s full technical analysis of information presented in the TSD, including any technical analysis of the Bhaskar & Tandon thesis (discussed below in Section G).

Page |2 Further comments made in this section refer to the TSD as it relates to the proposed change of the PM10 SIP, and not the NOI, except where relevant.

3. The TSD has been revised twice since it was first submitted in August of 2010. The NOI, however, was submitted in August of 2010 and has not been correspondingly revised. The TSD has been altered to reflect changes in emissions, but these changes have not been documented by DAQ in a formal way that allows for evaluation by the public. UPHE requests that DAQ provide

a list of tracked changes between revisions to the TSD so that UPHE can appropriately evaluate these in comparison to the NOI, which has remained static.

4. There are two documents that officially report the air emissions currently being emitted by Kennecott’s mining operations. The first is the existing DAQ Approval Order (AO) (DAQE-AN0105710023-08), which declares that current mining operations have the potential to emit (PTE) 2,559 tons of PM10 per year. The second is the 2008 emissions inventory data compiled by DAQ, in which Kennecott reports its annual emissions. In 2008, at an operational limitation of 197MM tons/year, Kennecott self-reported greater annual emissions: 2,915 tons of PM10 from mine/concentrator operations.<sup>2</sup>

Despite annual PM10 emissions from the mine currently hovering around 2,915 tons of PM10 per year, the TSD states that with the proposed operational limitation increased by 32% to the requested 260MM tons/year, the total PM10 emissions PTE will only be 1,513 tons/year, a decrease of 1,402 tons, or 48%.

The obvious question, then, is: how can a mine increase operational capacity by 32% while simultaneously reducing its PM10 emissions by over 48%. Plainly, the record does not support such a claim. The current emissions information for Kennecott is illustrated in the following table:

Pollutant	Potential to Emit as stated in current AO (2008) (Operating at 197 MM tons/yr)	Kennecott mine emissions in 2008 (DAQ Inventory)	Future Emissions Stated in TSD (tons/yr) (Operating at 260 MM tons/yr)
PM <sub>10</sub>	2,559	2,915	1,513
NO <sub>x</sub>	5,061	4,846	5,830

\* Note: emissions listed are tons per year.

Based upon the above, we make the following comments:

<sup>2</sup> Utah DAQ, 2008 Annual Emissions from Point Sources by County.

that figure were doubled, then, to liberally account for all offroad sources that are not included in the PTE, a total of 1,020 tons of actual, reported emissions still remains unexplained by the TSD.

b). Other than a new baghouse with increased control efficiencies that accounts for only a few tons of PM10 reduction, there are no new methods of pollution control or a more stringent BACT analysis performed that would account for this “missing” 1,020 tons of actual emissions.

c). The fugitive dust control plan on which Kennecott relies to maintain existing reduction efficiencies, already allows Kennecott to claim higher control efficiencies on numerous dust-producing operations than allowed by other sources conducting similar operations in Salt Lake County. However, these efficiencies are already included in the PTE calculations for fugitive emissions. UPHE is concerned that, despite heavy reliance on the control plan to claim large reductions in PM10 emissions by utilizing various types of watering controls, the plan itself was not provided for review along with the TSD. The result is that the public has not been given a chance to review all pertinent data related to the proposed PM10 SIP revision. UPHE requests that the fugitive dust control plan be posted by DAQ so that the public can review the document as part of this rulemaking process and that a new period be established so that the public can submit comments on the plan, together with comments on the SIP.

d). UPHE has limited its evaluation of the apparently inexplicable difference between actual 2008 emissions and newly-proposed future PTE emissions to a discussion of available, published numbers. However, with no significant, observable proposed changes in pollution reduction efforts at the mine (i.e. enclosing areas of operations, replacing haul trucks with conveyors, or other similar measures), it is reasonable to assume that an operational mining increase of 32% will lead to a commensurate increase in actual emissions. It is logical, then, to project that if Kennecott emits 2,915 tons of PM10 operating at 197 MM tons of mined materials per year, the company's PM10 emissions will increase by 32% to 3,847 tons/year were production to increase to 260 MM tons of mined material per year.

e). Kennecott recognizes that its operational emissions will increase significantly and has offered emission reduction credits to potentially offset these increases (see also comment C-2 below). However, as offsets do not appear to be required by state or federal law for a SIP modification process, we view the offering of such offsets as a measure calculated to make these actual emission increases more palatable to DAQ and the general public rather than a binding obligation. Moreover, DAQ must remember that a SIP revision is appropriate only if the amendment does not interfere with any applicable requirement concerning attainment and reasonable further progress or any other applicable requirement of the Clean Air Act. With these considerations in mind, UPHE requests that DAQ provide the regulatory basis for the application of these credits to the SIP modification process.

f). Kennecott relies solely upon the Bhaskar-Tendon paper to justify a wholesale 80% discount to new as well as previously reported emissions that occur within the mine pit, which, Page | 4 as the TSD describes, make up 78% of all mine emissions.

5. The TSD relies on the Bhaskar-Tandon Master's degree thesis, Airflow Patterns and Pit-Retention of Fugitive Dust for the Bingham Canyon Mine, to assert that only 20% of in-pit PM10 emissions escape the pit. This Master's thesis does not present an adequate or complete technical justification of the use of such a large emissions reduction factor. Because of the importance of this issue, this thesis is discussed separately in Section G below.

**B. Section 1.0: Introduction and Purpose**

1. Table 1-1 purports to provide the "most representative" PTE calculations for 260 MM tons per year. As a basis for this claim, the table refers to AERMOD modeling performed as part of the NOI document. However, the TSD does not otherwise reference AERMOD modeling, and in fact, the bulk of the TSD is comprised of CMB, UAM-AERO, and CALPUFF modeling results. As the AERMOD information is unsupported in the TSD, mention of AERMOD tends to obfuscate other modeled emissions demonstrated by the TSD.

When cross-referenced, the PTE figures from the TSD and the total PTE summary presented in the "companion" NOI document (NOI Table 3-16) do not agree. This discrepancy is summarized in the following table:

Pollutant	TSD (tons/yr)	NOI (tons/yr)
PM <sub>10</sub>	1,513	1,472
PM <sub>2.5</sub>	Not given	363
SO <sub>2</sub>	6.56	6.56
NO <sub>x</sub>	5,830	5,830
CO	1,682	1,461
VOC	314	320

This discrepancy casts doubt as to the accuracy of both set of numbers, calls into question Kennecott's quality assurance procedures and underscores the problem with considering two documents concurrently when one document purports to rely on the other. (See General Comments #1 & #2 above).

#### C. Section 2.0: 1994 PM10 SIP Demonstration

1. Section 2.1 states that "[s]econdary sulfate and nitrate impacts were assumed to be in direct proportion to a source's relative sulfur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>) emissions." In light of

the 1994 SIP determination that Kennecott is a "large source of secondary PM<sub>10</sub>,"<sup>3</sup> it is unclear whether this indicates that an equivalent amount of emissions for secondary impacts were added as PM<sub>10</sub> to the original emissions amount or whether the emissions were measured as additional SO<sub>2</sub> and NO<sub>x</sub> emissions

only. UPHE requests that DAQ describe the meaning of this statement and show where the results of the demonstration account for secondary pollutants.

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2. Section 2.2, Offset Proposal. Section 2 presents use of emission reduction credits that will be applied as offsets to mitigate proposed increases of PM<sub>10</sub> and NO<sub>x</sub> related to the proposed production increase. While the use of credits is questionable (Section A-4, paragraph e.), the credits currently represent emissions that are banked and are not being emitted into the airshed. However, the Salt Lake area is currently nonattainment and has experienced exceedences of PM<sub>10</sub> ambient standards even while these emission reduction credits resided in the bank. Now, these credits will be exchanged for 5,485 tons of actual 'new' air pollution (i.e. pollution that is not currently being emitted into the

airshed). Plainly, based on the record, DAQ should not allow these new, actual pollutions to be emitted into the already troubled airshed. Alternately, if emission reduction credits were allowed to be applied, the offset ratio should be increased to a minimum of 1 ton actual emissions requiring 1.5 tons of credits

(1: 1.5), or even two tons of credits (1: 2). In any case, there must be a demonstrated non-interference with attainment or reasonable further progress and improvement in air quality.

3. Section 2.2, Pit Escape Factor.

This section first mentions the Bhaskar-Tandon Masters degree thesis, Airflow Patterns and Pit-Retention of Fugitive Dust for the Bingham Canyon Mine, to contend that in-pit PM<sub>10</sub> emissions can be reduced by 80% to calculate the emissions that escape the pit. The emissions reduction factor of 80% is not supported by the record and is not justified. See Section G below for specific comments regarding this thesis.

#### D. Section 3: 2005 Maintenance Plan Demonstration

1. This section of the TSD provides an in-depth discussion of the 2005 PM<sub>10</sub> SIP development. However, while approved by the Air Quality Board, a SIP is a federally-enforceable document and, as such, must be approved by EPA. Not only has the EPA not approved the 2005 SIP, but on December 1, 2009, the agency published in the Federal Register<sup>4</sup> its intention to disapprove the SIP on numerous grounds, including identified flaws with the UAM-AERO modeling intended to support the plan. Therefore, Section 3 of the TSD is technically moot, as the SIP it discusses has not been federally and has been identified as flawed by the EPA.

2. Section 3.1. Why were the UAM-AERO modeling files from the 2005 SIP not available from the DAQ?

3. Section 3.1. CALPUFF was substituted for modeling originally performed with UAM-AERO. UAM-AERO is a photochemical model that simulates the changes of pollutant concentrations in

the ambient air by characterizing chemical and physical processes in the atmosphere. This model is typically used in a policy or regulatory assessment to simulate impacts from all sources and evaluates pollutants over large spatial domains. CALPUFF, on the other hand, is a dispersion model that assesses dispersion characteristics of a single source and the impacts of the source at surrounding receptors, and does not focus on addressing the primary chemical transformations that occur, as UAM-AERO does.

UPHE understands that the CALPUFF domain was designed to simulate the UAM-AERO scenario as well as possible. However, given the model category-type differences between these two models, UPHE requests that the DAQ describe how the agency can allow the switching of modeling platforms, considering their different category-types (i.e. photochemical vs. dispersion), and, in a related matter, justify how Section 3.3 of the TSD can compare the results from two disparate models which rely upon different algorithms, especially given the dissimilarity of these models category-type (photochemical vs. dispersion).

4. Table 3-3 provides PTE information without a “pit retention” factor added. These numbers do not match to those presented in Table 1-1, perhaps because Table 3-3 includes the Copperton Concentrator, whereas Table 1-1 does not. Why are emissions shown with the concentrator in one area, but not in the other? The public must be able to determine the emissions from the pit without the retention factor (as this information is not directly provided), and intermittent use of the concentrator data obfuscates this. The mine and concentrator are permitted together as a single source and therefore emissions from each of these areas should be combined in any table demonstrating “total PTEs.” It is assumed that concentrator emissions are included in the 22% of emissions claimed to occur outside of the mine pit, but no statement to this effect is provided in the TSD.

5. Section 3.3.4: Source Emissions. The second paragraph refers to NOX emissions as 5078 tpy at the 197 MM tons/year production scenario and 7,450 tons per year at the 260 MM tons/year production scenario. While neither of these numbers are substantiated, the numbers appear to be the actual, non-reduced NOX emission numbers for the mine. Note that they are listed as both 7,430 tons as calculated, 7,442 tons in the 260 MM tons/year case, and 5078 in the 197 MM tons/year case. Why are these differing numbers for NOX emissions not consistent with NOX emissions stated elsewhere in the document? For example, the summary PTE table (Table 1-1) states that NOX emissions are 5,830 tons/year.

Much of this apparent confusion stems from the application of the Bhaskar-Tandon 80% reduction factor in some sections of the TSD, but not in others. In addition, it is not clear from any modeling data presented when the adjusted numbers were used, as opposed to when they were not. UPHE requests that the DAQ offer a definitive explanation of the development of each of the numbers used in the report so that the public may understand the basis for the proposed SIP revision. UPHE also requests that DAQ provide a table that indicates full emission increases at all in-pit and out-of-pit sources (inclusive of standard control efficiencies, such as watering) and clearly identifies any additional control factors (i.e. Bhaskar-Tandon) that lead to the adjustment of any of these numerical values.

6. Section 3.4: Results. The first paragraph regarding extraction of CALPUFF runs using CALPOST and then comparing these against the UAM-AERO runs for 2011 and 2015, is confusing. UAM-AERO emissions results are not shown for comparison. Rather, only the increases shown by the CALPUFF runs are provided. UPHE requests that DAQ provide the UAM-AERO modeling run results so that the public may compare them to the CALPUFF runs.

#### E. Section 4: Emissions Summary

1. Section 4.0. The introductory paragraph states that all PM10 in-pit calculated emissions are reduced by 80% based solely on the Bhaskar-Tandon thesis. However, it is necessary to point out that, relying on the qualified results of one graduate student thesis, Kennecott is claiming thousands of tons of reductions that may or may not be actual reductions. Plainly, the record does not support such reductions. This issue is discussed separately in Section G below.

2. Section 4.2.5: Haulroad emissions. Kennecott states that the company follows DAQ policy<sup>5</sup> of using a 75% control efficiency on unpaved road fugitive dust emissions. However, the company's spreadsheet calculations (Table A1-18) show that instead of using the 75% control efficiency factor, Kennecott used incorrect 85% and 95% control efficiency factors. UPHE requests that these emissions be recalculated using the correct factor, as was stated in the text of Section 4.2.5.

In addition, Kennecott has used a control efficiency of 85% in summer/spring/fall (275 days) vs. control efficiency of 95% in winter in order to account for wetter conditions in the wintertime. In addition to the previous comment, it should be noted that DAQ policy does not allow for seasonal variation in dust calculations from roadways. UPHE requests that seasonal control efficiencies be removed when conducting recalculations as requested in the preceding paragraph.

Has DAQ flagged these calculation errors as part of a quality assurance effort?

Because it appears that the DAQ's guidance policy for calculating fugitive roadway dust has not been as widely disseminated as believed, UPHE has attached a copy of the DAQ Policy for reference by Kennecott.

3. Table 4.16 is improperly labeled as "Generator Location" emissions.

4. In keeping with our comment in Section D – 5 that requests a table be presented that demonstrates the fugitive PM10 emissions that have had a control factor of 80% applied to them, UPHE requests to evaluate methodology for determining fugitive control factors for vehicles that operate both in and outside of pit, i.e. haul trucks.

<sup>5</sup> Utah DAQ, Permitting Branch Memo from R. Olsen, March 10, 2008, also included as an attachment to this document.

#### F. Section 5: Conclusion

1. The first bulleted paragraph in Section 5 discusses that "[a]n analysis based on the 1994 SIP demonstration methodology was used to support the modification of the 1994 SIP from the 150,500,000 tpy originally modeled to a material movement limitation of 260,000,00 tpy." UPHE can find no

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evidence of this type of analysis in the TSD document. Was this performed previously? Most of the analysis conducted in the TSD is related to base year and future scenarios as presented in the 2005 SIP

evidence of this type of analysis in the TSD document. Was this performed previously? Most of the analysis conducted in the TSD is related to base year and future scenarios as presented in the 2005 SIP.

2. The conclusion suggests that increased emissions are acceptable as they have been offset by reduction credits. However, application of offsets is allowed under the NSR permitting program under State air rules assuming a SIP is already established that allows for such credits to be used. Offsets may not be required for a SIP analysis, as these emissions are already modeled within the existing SIP. Use of offsets to revise a SIP also sets a precedent for other sources, who may choose to raise their SIP limitation ceilings through application of offset credits. UPHE requests that DAQ explain the use of offsets in absence of any clear guidance or rulemaking regarding their applicability to a SIP revision and evaluate the precedence that this approach sets for other sources in the same airshed and other nonattainment areas.

3. As discussed in preceding sections, the modeling demonstration that is being used as a foundation to allow for the proposed increase is based on the 2005 PM10 SIP modeling demonstration. The 2005 SIP has been proposed for disapproval by the EPA. Therefore, all conclusions based on the 2005 SIP must be suspended until the SIP is approved by EPA.

G. Comments on Airflow Patterns and Pit-Retention of Fugitive Dust for the Bingham Canyon Mine, Bhaskar-Tandon Masters Degree Thesis, 1996.

DAQ is considering a revision to the Salt Lake County PM10 SIP that that would allow Kennecott to increase its production from 197 million tons to 260 million tons of mined material per year. According to Kennecott's TSD, this increase in production will actually decrease PM10 emissions by 1,762 tons per year. This seeming impossibility is only feasible if all PM10 emissions that occur within mine pit ("in-pit" emissions) are reduced by 80%, which is indeed what Kennecott has proposed. This 80% reduction is based solely on the results of a "study" submitted to DAQ by Kennecott that estimates only 20% of PM10 particles escape from the mine pit and are released into the ambient airshed. This "study" is actually a master's degree thesis authored by a University of Utah, Department of Engineering graduate student Navin Tandon in 1996 – 15 years ago.

Mr. Tandon's thesis evaluates the potential for particles emitted within the mine pit to 'escape' into the surrounding airshed of Salt Lake County. It is critical to note that without reliance on Mr. Tandon's thesis, Kennecott estimated emissions may in fact be more than four times greater than the company currently calculates them to be for the purposes of the SIP revision. This is because Kennecott asserts that escaped emissions represent only 20% of overall calculated emissions.

#### General Comments

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1. An original thesis was authored and copyrighted by Navin Tandon in 1996. Mr. Tandon is noted as the sole author. However, as is customary in academia, his supervisor and thesis advisor at the University of Utah, Dr. Ragula Bhaskar, is listed as a co-author. It appears that Kennecott has printed a new cover page for this study that lists Dr. Bhaskar first as primary author (note that this cover page does not exist on the "official" copy of this thesis, which is archived at the Marriot Library at the University of Utah).

This type of change is misleading, appears to deliberately play upon the strength of Dr. Bhaskar's Ph.D. credentials, and leads the reader to believe that Dr. Bhaskar is the primary author of this paper. As a thesis advisor, Dr. Bhaskar may have been the driving force behind the work, but he is not an author of this thesis. In actuality, when a proper literature search was performed for this paper at the University of Utah, Dr. Bhaskar's name never appears as author. Rather only his student, Navin Tandon, is listed as author of the document.

2. It appears that this paper was written at the request of Kennecott, based on the fact that the study was submitted to the company. This further suggests that the analysis was funded by Kennecott, raising a potential conflict of interest. UPHE requests that Kennecott fully disclose its involvement in this research.

3. The thesis has never been a) externally peer-reviewed, b) presented at a conference or published in a conference proceedings, or c) published in a peer-reviewed scientific journal. If a scientific paper is referenced or relied upon for its results, or is referred to as a “study,” it must have been subjected to at least one or more of these types of reviews, performed outside the institution from which the paper was produced. That the paper has never been externally peer-reviewed (i.e. beyond the thesis-advisor level) discredits its use as a “study,” while to claim it is a definitive study of particulate emissions from the Kennecott mine is misrepresentative. In any case, DAQ is obligated to undertake independent analysis of the paper, a duty compounded by the fact the rigor of the study is suspect.

We are also concerned that this paper is now 15 years old and Kennecott presents no additional corroborating studies or other types of assessments that may support the findings of this graduate student’s work that have been conducted in the last 15 years. We are also troubled by the fact that, although this thesis was completed in 1996, Kennecott has not presented it during the previous Approval Order modifications (at least three) that have occurred since thesis completion.

4. Perhaps our most important comment is that the thesis paper lacks proper validation. The thesis author, Mr. Tandon, states clearly in his summary and conclusions that observational data must be made in order to compare predicted modeling results with actual events that occur at the mine site. Specifically, he states that meteorological and source parameter assumptions should be verified through monitoring on-site within the pit to verify his results. He also implies that the sensitivity analyses conducted as part of his modeling effort are computationally-limited based on financial resources required for additional computational support, and suggests improved methods of completing modeling evaluation which may not limit the modeling study.

5. The author also states clearly that he has made various assumptions in completing this paper that must be clarified with actual data. The author bases his assumptive values on literature searches Page | 10 and has incorporated them as fixed constants into his modeling calculations. However, the author himself cautions that these constants are actually variables that need to be accurately measured on-site in order to validate his modeling findings. It does not appear that Kennecott has in anyway attempted to follow the author’s recommendations that on-site data be collected to verify the claims of the thesis.

6. DAQ should understand well the author’s concern that efforts be made to verify the precision and accuracy of the results presented in his thesis. DAQ often performs airshed modeling, while at the same time conducting extensive and on-going monitoring of ambient air. DAQ frequently states that monitoring data do not agree with modeling predictions, and in fact, admits that the two values are very different from each other. This has most recently been evident in the development of the current PM2.5 SIP, during which DAQ has stated on record, that the agency was not able to get the selected model to simulate or predict past, well-documented days of non-compliance that have occurred in the past, even when all meteorological variables and air monitoring data were well-known. Why, then, is DAQ prepared to accept this thesis based on a fluid flow model, without ever requiring validation through monitoring, especially when the author himself recommends it? UPHE requests that DAQ share its technical review and analysis of this thesis document for public review together with the proposed SIP revision. This is particularly important because the justification for the SIP revision and the validity of the TSD hinges upon the validity of the thesis.

7. The concept of pit retention of particulate matter must also be informed by the fact that Kennecott is located in a PM<sub>2.5</sub> nonattainment area, as well as the increasingly robust medical research showing that not only is PM<sub>2.5</sub> more toxic than PM<sub>10</sub>, but that ultrafine PM (<.1microns) is also more toxic than PM<sub>2.5</sub>. In other words, medical research increasingly concludes that the smaller the particles, the greater the capability of those particles to penetrate cell membranes and cause a broad array of adverse intracellular responses and physiologic consequences. Pit retention of PM<sub>2.5</sub> and ultrafine PM will be much less than PM<sub>10</sub>, reducing significantly the legitimacy of any claim that public health impacts are profoundly reduced by pit retention. In any case, as the record does not support the pit escape factor of 20% for PM, it does not support a pit escape factor of 21% for PM<sub>2.5</sub>. Plainly, an adequate analysis of any pit retention must, at a minimum, thoroughly address the buoyancy of PM<sub>2.5</sub> and the impact of the Kennecott operations on Utah's PM<sub>2.5</sub> nonattainment areas. Moreover, given DAQ's mandate to protect the public health, the agency would be well advised to consider separately the rate at which ultrafines escape the pit.

#### Technical Comments

8. A three-dimensional finite element model was developed. This computational model included the mine and surrounding regions. The flow field over and inside the mine cavity were modeled with the Reynolds-Averaged Navier-Stokes (RANS) equations with a k-epsilon turbulence closure model. A near-wall modeling approach was used next to the boundaries (in the viscous layers). Given boundary conditions and initial conditions, a flow field approximation was calculated. The author discusses that the k-epsilon model is not appropriate in low-turbulence regions and the boundary layer (in these flows) is assumed to be low turbulence. However, there must be a height in the flow field where the smooth flow (RANS) and turbulent flow (k-epsilon) models are interfaced. The corresponding mesh element height must match properly with the mixing height in order for model predictions to be accurate. This is not adequately demonstrated in the thesis.

9. The spatial dimensions used by this model are not valid. The finite element model utilized an area of approximately 23,000 ft by 20,000 feet. This is meant to capture the mine and "surrounding regions." However, a justification for the size of the modeling domain is not given. The simple site map submitted by Kennecott as part of the companion NOI does not have a scale included. As a result, neither the public nor DAQ can adequately compare current or projected conditions to those that existed 15 years ago when this modeling exercise was completed. This calls into question the impacts of the inflow and outflow locations with respect to the topographic features of the pit. In addition, Kennecott has stated publicly that the pit footprint size will increase at least 1,000 feet south of the existing pit. This is not reflected in the thesis. In addition, in figure 5-10 the author indicates that the area modeled was rectangular in nature, while figure 5-8 shows a trapezoidal configuration to the spatial domain. Nevertheless, because the modeling domain has changed greatly, the results of the thesis cannot be generally apply to the pit, no matter what dimensions it has attained since the thesis was completed.

10. Numerous assumptions are used in the model. The author himself states that these should be verified or contradicted by use of field studies to validate the results of the modeling.

The analysis relied on a RANS model rather than on a direct numerical simulation (DNS). DNS would attempt to capture all scales of motion of the fluid. RANS requires a closure model. The closure model used in this study was the classic k-epsilon model. As stated in the thesis, this model has several limitations: it is appropriate for only high-turbulence regimes and it

requires a collection of constants (parameters) which are assumptions not verified through field study.

The thesis states the constants used (for reproducibility), but does not justify the particular constants other than by stating that they are from the literature. Appropriateness of the constants for the particular situation/study is not discussed.

The thesis does not explicitly address if the isotropic turbulence assumption is a good assumption for this study.

The mesh node information is made available in the thesis (both in terms of number of nodes and images of slides of the domain). However, resolution of the mesh elements in feet is not given, so the spatial scale of the mesh study is not clearly defined. Due to computational costs, a mesh resolution study did not appear to have been performed (i.e. a hierarchical mesh refinement to understand the impact of spatial resolution on the flow field characteristics). The thesis provides images of mesh nodes, but no statement or elaboration of what each mesh element represents.

e. A mixing layer assumption is made by the thesis. This assumption, along with other atmospheric condition assumptions, affects further parameters such as the height of the near-wall modeling layer. This is one of the reasons why the author states that onsite meteorology Page | 12 must be conducted to provide verification or contradiction of the thesis claim.

11. The model does not handle anisotropy and therefore cannot predict directional dependence of particles outside of meteorological influence. Relevant data measurements have never been submitted by Kennecott.

12. The author describes reasonable “next steps” for the refinement of his thesis conclusions. This confirms that while the thesis may be a good starting point for the justification of pit retention, the analysis primarily demonstrates that the modeling may be an appropriate tool for this type of application. However, the thesis in no way can justify the pit retention results (80% of PM10), if for no other reason than what the author concludes – that the findings need to be validated in order to verify the results.

Given these conditions as listed and described, UPHE requests the following:

- a) Site verification of thesis claims in accordance with author’s recommendations that involves collection of meteorological data (at a minimum) from various levels of the mine pit.
- b) Additional, peer-reviewed and DAQ-authorized studies using monitoring data yet to be collected so that assumption constants are known from site-specific data. These studies will lead to better understanding of pit dynamics and either confirm or contradict the 20% PM10 emission factor developed by the Bhaskar-Tandon thesis.

**03-20-2011** JORO WALKER, Director, Utah Office WESTERN RESOURCE ADVOCATES

Re: Proposed Changes to Utah Admin. Code R307-110-17 (General Requirements: State Implementation Plan. Section IX, Control Measures for Area and Point Sources, Part H. Emissions Limits) and Utah State Implementation Plan Section IX.H.

Dear Acting Director and Mr. Bird,

Thank you for the opportunity to comment on the Division of Air Quality (DAQ) proposal to revise Utah Admin. Code R307-110-17 (General Requirements: State Implementation Plan. Section IX, Control Measures for Area and Point Sources, Part H. Emissions Limits) and Utah State Implementation Plan (SIP) Section IX.H (PM10 SIP). I submit these comments on behalf of Utah Physicians for a Healthy Environment and Western Resource Advocates. Our organizations represent hundreds of Utahns who care

deeply about protecting the air quality in Utah, particularly along the Wasatch Front. We, our families and our patients are regularly exposed to unhealthy levels of air pollution by virtue of living, working and recreating in areas along the Wasatch Front. The proposed PM10 SIP revision would allow Kennecott Utah Corporation (Kennecott) to expand its mining operations in Salt Lake County by 32 percent, increasing the maximum amount of ore and waste material the company is permitted to move from 197 million tons per year to 260 million tons per year. In proposing the SIP amendment, DAQ is endorsing an intensification of mining operations at Kennecott that would substantially increase PM10 and NOX emissions – emissions that will cause or contribute to violations of national health-based standards – without showing, in any credible manner, how air quality in the valley will be protected or improved. Moreover, this mushrooming activity will occur in an area that is currently not meeting air quality standards for PM10, PM2.5 and ozone. The revision does not function to alleviate exposure to these harmful air pollutions or otherwise take steps to improve air quality in the Salt Lake County, but rather is a significant step backwards. As your agency is charged with reducing our exposure to PM10 and NOX and with keeping concentrations of air pollutions below national health based standards, we ask that you reject the proposed amendment as inconsistent with that duty.

Based on these concerns and the requirements of state and federal law, we strongly encourage DAQ not to revise its PM10 SIP as proposed. Rather, we request that DAQ: 1) enforce the 150.5 tons per year limit on Kennecott's operations as specified in the applicable 1994 PM10 SIP; and 2) turn its full attention to reducing, rather than allowing increases in the emission of air pollution and thereby ensuring that air quality in the Salt Lake Valley comes into compliance with national health-based standards as soon as possible. More specifically, we point out the following inadequacies with the proposed PM10 SIP amendment.

**The Revision is Unlawful Because it Interferes With Reasonable Further Progress and Attainment.**

We are very troubled by DAQ's proposed revision to its PM10 SIP by allowing Kennecott to expand significantly its mining operations in Salt Lake County. What is particularly unsettling about this proposal is that the Kennecott mine is located in a nonattainment area for PM10 as well as PM2.5 and in an area that will almost certainly be designated as not attaining the 8-hour standard for ozone. This means that the State proposes to permit an increase in PM10 and NOX emissions that will further cause or contribute to violations of National Ambient Air Quality Standards (NAAQS), thereby adding to a serious public health crisis in the Salt Lake Valley, rather than taking steps to improve air quality by reducing emissions of PM10 and NOX.

According to EPA, in Salt Lake County, ammonium nitrate comprises more than 50 percent of the measured PM2.5 on days that exceed the 24-hour PM2.5 NAAQS. Increased NOX emissions resulting from the Kennecott expansion will contribute to increased ambient concentrations of ammonium nitrate in the valley. The result will be an increase in PM2.5 concentrations in a nonattainment area, thereby frustrating efforts to bring the area into compliance with NAAQS and to secure the health benefits associated with meeting these standards.<sup>1</sup> By the same token, increased NOX emissions will exacerbate the creation of ozone in Salt Lake County and likewise undermine efforts to reduce ozone concentrations in this densely populated area. Plainly, a government that is motivated to protect the health and welfare of its citizens, as well as the environment in which they live, will not take such a significant step in the wrong direction by approving a proposal that will thwart efforts to bring down air pollution levels the Salt Lake area.

<sup>1</sup> Because Kennecott will emit PM<sub>2.5</sub> and no approved SIP is in place for this pollutant, DAQ may not approve the proposed modification. Utah Admin. Code R307-403-3(3)(e) (Approval of a proposed source modification that will contribute to existing NAAQS violations will be denied unless there is an approved implementation plan in effect for the pollutant to be emitted by the proposed source.).

Moreover, the U.S. Environmental Protection Agency (EPA) recently proposed to disapprove Utah's request to redesignate the Salt Lake County, Utah County and Ogden City PM<sub>10</sub> nonattainment areas as attainment and to disapprove other associated SIP revisions.<sup>2</sup> This means that these areas are still nonattainment for PM<sub>10</sub> and that EPA has determined that air quality in the Salt Lake area is not meeting health-based standards. Moreover, the most recent EPA-approved PM<sub>10</sub> SIP – the 1994 PM<sub>10</sub> SIP – sets a federally enforceable limit on Kennecott's operations of 150.5 million tons per year of material moved. From this fact, several conclusions necessarily follow. First, Kennecott's current operations violate a federally enforceable SIP provision. Second, any expansion of those operations would also violate a federally enforceable SIP provision. Third, Utah's failure to convince EPA and the public that the 2005 PM<sub>10</sub> SIP will achieve NAAQS and failure to meet its legal obligations under the Clean Air Act to improve air quality in, inter alia, Salt Lake County, demonstrates that any proposal to allow increased PM<sub>10</sub> and NO<sub>x</sub> emissions must be rejected.

<sup>2</sup> In recognition of the strong arguments EPA advances to support its proposed disapproval of the request to redesignate the PM<sub>10</sub> nonattainment areas, we hereby reference and incorporate the findings and conclusions found in the Federal Register, Vol. 74, No. 229, December 1, 2009. These arguments further underscore the impropriety of the SIP revision.

Additionally, for these and other reasons, the PM<sub>10</sub> SIP revision is unlawful. This is because the technical analysis that purports to support the revision fails to establish that a significant increase in air pollution causing activity – particularly activity that will increase emissions of PM<sub>10</sub> and NO<sub>x</sub> in a nonattainment area for PM<sub>10</sub>, PM<sub>2.5</sub> and ozone – will not interfere with attainment or reasonable further progress toward attainment of NAAQS in the Salt Lake area. Nor does the record show that the revision will otherwise comply with the Clean Air Act and the Utah Air Conservation Act. See 42 U.S.C. § 7401(l); Utah Code Ann. §§ 19-2-101 et seq.

First, as stated above, the SIP revision conflicts with the federally enforceable limit on Kennecott's mining activities that prevents the company from moving more than 150.5 million tons of material each year. Therefore the revision is illegal. In any case, before Kennecott may exceed the yearly production rate of 150.5 million tons, sound evidence must exist that Kennecott has achieved the necessary reductions in actual emissions, those reductions must be reflected in enforceable and federally approved SIP and in enforceable permit limits and models of those reductions must show with certainty that reasonable further progress toward and compliance with NAAQS will be achieved. Second, the proposed amendment fails to show reasonable further progress toward reducing emissions of PM<sub>10</sub>, as well PM<sub>2.5</sub>, and concentrations of ozone in Salt Lake County necessary to bring the area into compliance with national health-based air quality standards.

Third, the record fails to show how the increase in mining activity and the corresponding escalation in PM<sub>10</sub> and NO<sub>x</sub> emissions will comply with the NAAQS. While Kennecott undertook modeling for PM<sub>10</sub>, it did not do so for the other NAAQS.

Moreover, the company's PM10 modeling is insufficient to meet the requirements of the law. That modeling is inadequate for the same reasons identified by EPA in its proposed disapproval of the 2005 PM10 SIP and we incorporate that analysis herein. Specifically: 1) the combination of CALPUFF simulations with UAM-AERO is insufficient; 2) the reliance on relative response factors (RRFs) based on total PM10 mass alone, rather than including RRFs for components of PM10 is legally unsupportable; and, 3) the modeling of banked emissions as though they would be emitted from a 1,200 foot stack rather than at near-ground level fails to support the proposed revision.

Fourth, the offset proposal is not supported by the record and does not comply with the relevant statutory or regulatory provisions. It appears that Kennecott proposes to use banked SO2 credits to offset its increase in emissions. However, these SO2 credits are from operations located 25 miles away from the mine and are derived from emissions released from a 1200 stack. Because the proper concern is whether air quality in the nonattainment area is improved, the record does not support the claim that these offsets will "provide a positive net air quality benefit in the affected area of nonattainment." Utah Admin. Code R307-403-3(3)(d). Moreover, record must show continued further progress toward attainment. In a situation such as this, where millions of Utahns are exposed to unhealthy levels of air pollution each year and the SIP revision on its face seems to exacerbate rather than address air quality conditions in the Salt Lake area, the record must establish that improvements in conditions will result from the offsets and must provide for meaningful public comment on any such assertions.

Fifth, the heavy reliance on the pit escape factor is not supported by the record. Kennecott claims that most of the PM emissions in its mine do not escape the pit and therefore do not contaminate the Salt Lake airshed. This claim is central to justifying the SIP revision. However, the record does not support DAQ's reliance on the pit escape factor. For example: 1) the study is not ground-truthed, as the study's author recommends, and does not compare model-simulated concentrations to monitoring data; 2) DAQ did not independently verify or review the study; 3) the model sensitivity simulations were performed at the bottom of the pit and therefore underestimated PM releases from sources located elsewhere in the pit; 4) the record fails to include source location information sufficient to verify that the pit escape factor has been appropriately applied; 5) the pit escape factor fails to account for the fact that PM2.5 and ultrafines are most likely to be dispersed into the community airshed, which is of particular concern given that these small particles represent the greatest health hazard of the PM subsets; and 6) the record fails to indicate the pit escape factor was applied to modeling that already accounted for pit topography, thereby overestimating the effect of the pit.

The Proposed SIP and Technical Support Document Suffer from Several Significant Deficiencies.

We have attached detailed comments on the several significant deficiencies that are evident in the technical support document (TSD) submitted by Kennecott purportedly to support the SIP revision proposal. As we make clear, this document does not do what it is required to do to adequately support the proposed PM10 SIP revision. The TSD fails to establish that a significant increase in air pollution causing activity – particularly activity that will increase emissions of PM10 and NOx in a nonattainment area for PM10, PM2.5 and ozone – will not interfere with securing attainment or reasonable further progress toward securing attainment of NAAQS in the Salt Lake area and will otherwise comply with the Clean Air Act and the Utah Air Conservation Act. See 42 U.S.C. § 7401(i); Utah Code Ann. §§ 19-2-101 et seq.

These comments reinforce what has been stated above, but provide more thorough analysis of the inadequacies of the TSD. Moreover, we have made additional points that deserve close consideration.

## Utah's Current 2005 PM10 SIP Fails to Protect Utahns from Unhealthy Levels of Air Pollution.

As you are well aware, Salt Lake County, Utah County, Ogden City, along with other significant areas in Utah, experience some of the highest – if not the highest – concentrations of air pollution in the nation. Moreover, Utah has the youngest population of any state in our country. This means that the vast segment of Utah's population particularly vulnerable to the significant adverse effects of air pollution – Utah's children – is routinely subjected to unhealthy levels of air pollution. Exposure to these concentrations of pollution can harm these children for the rest of their lives. Finally, as you are also aware, many significant areas in Utah, including Salt Lake County, Utah County and Ogden City, are not meeting current NAAQS for PM2.5 and ozone and that air quality in these areas can often exceed these standards by alarming rates.

Despite this reality, Utah asked that Salt Lake County, Utah County and Ogden City be re-designated as attainment for PM10. This request is based on, inter alia, monitoring data and maintenance plans that are intended to show current and future compliance with NAAQS. However, as EPA has correctly pointed out, these efforts fail to establish that PM10 concentrations in the affected areas have reached safe levels or that Utahns will be protected from unhealthy concentrations of PM10 in the future. As a result, EPA has proposed to disapprove Utah's request to redesignate Salt Lake County, Utah County and Ogden City PM10 nonattainment areas as attainment and to disapprove other associated SIP revisions.

We back EPA's decision to require Utah to prove rigorously any claims it makes that apparent PM10 NAAQS violations meet the strict requirements of the Exceptional Events Rule or Natural Events Policy. We also applaud EPA's demand that the modeling that accompanies Utah's submission be accurate and conform to relevant regulations. We appreciate EPA's refusal to allow Utah to weaken its PM10 SIP and to rely on provisions or omissions that may lead to violations of the PM10 NAAQS. We also appreciate EPA's proposed decision to reject various amendments to Utah's air quality rules that do not adequately protect the health of Utahns or ensure compliance with health-based air quality standards. We also commend EPA's refusal to allow Utah to rely on an inadequate PM10 maintenance plan. We believe that each of EPA's proposed decisions is soundly supported and required by the Clean Air Act and its implementing regulations.

In addition to lending our support to EPA's proposed action, we make the following specific comments:

Utah's most populated counties are failing PM2.5 NAAQS. Rather than muddying its SIP, seeking a relaxation of controls on air pollution in these areas and asking for an attainment designation, Utah should be dedicating its time, effort and resources to immediately adopting and implementing significant measures to reduce air pollution, particularly PM2.5, along the Wasatch Front. Utah's current request is a step backwards in its efforts to come into compliance with the NAAQS.

The severe adverse health impacts from an "exceptional event" are identical to those from an "unexceptional event." Therefore, EPA is right to demand rigorous documentation of any claim to an exceptional event, including by requiring strict compliance with the relevant regulations. To do otherwise would be to undermine the goal of the Clean Air Act to force States to comply with the NAAQS. In other words, an exceptional event must truly be exceptional and beyond any efforts to correct it.

We believe that all permit terms and conditions on which Utah relies in its SIPs

should appear in both the relevant permits, even where no Title V permit is required, as well as in the SIP. Only in this way can the purpose of the Clean Air Act be met and the public be informed of the scope of controls on any given stationary source.

Utah's refineries, Kennecott, and Utah's gravel pits require more rigorous pollution control. These sources appear to contribute significant particulate pollution to the Wasatch Front and appear to be insufficiently controlled and monitored.

Consistent and accurate monitoring is critical to the success of permit terms and conditions, as well as SIP conditions. Monitoring every five years is unacceptable. Moreover, monitoring should be required that is sufficiently rigorous and regular to ensure compliance with applicable permits and SIP conditions.

Emissions during maintenance, start up and shut down are significant. As a result, EPA is correct to refuse to allow Utah to exempt these events from control and enforcement. Permit terms and conditions should control these events and excess emissions must be treated as violations. To do otherwise would undermine the goal of the Clean Air Act to control and reduce air pollution and to require sources to operate within the confines of their permits and SIP conditions.<sup>3</sup>

<sup>3</sup> Because of Utah Admin. Code R307-107 – Utah's Unavoidable Breakdown Rule – Utah is not in a position to attain or maintain the NAAQS or to otherwise comply with the requirements of the Clean Air Act. There is no reason to believe that facilities will maintain their pollution control equipment or operate with permit compliance in mind. Moreover, for the purposes of modeling, there is no evidence that regulated industries have kept or will keep within the confines of their permits. Rather, sources are free to attribute any excess emissions to an "unavoidable" event and indeed, are free to prolong this event indefinitely and are free from recourse.

Emission limits must be clear, enforceable and monitored. To allow otherwise would violate the letter and purpose of the Clean Air Act. Thus, because Utah's proposed 2005 PM10 SIP is faulty on several scores and fails to establish that the Salt Lake area is meeting NAAQS for PM10, we find it particularly inappropriate for DAQ to allow a significant increase in mining activity and PM10 emissions by Kennecott. Before allowing new emissions in the valley, DAQ should first demonstrate attainment of the NAAQS. Moreover, if the SIP revision is to be considered by the agency, DAQ must demand rigorous and transparent modeling and clear, convincing and consistent data and analysis. DAQ must not pin its PM10 SIP revision on a master thesis that it has not independently confirmed, that is incomplete, that has not been peer-reviewed and that has not been verified with monitoring data. Moreover, the agency must inform and involve the public in this critical decision making in a way that allows individuals to make meaningful comments and have their concerns adequately addressed.

Thank you for this opportunity to comment and for your agency's actions on behalf of the people of Utah. We hope that the State of Utah will reject the proposed SIP revision. At a minimum, we ask that DAQ demand and undertake significantly more analysis before changing measures designed to protect our health and the health of our families and patients. Please keep us informed of any actions DAQ takes relative to the PM10 SIP revision or the Kennecott expansion proposal, including of any requests the agency makes of EPA.

The Utah Valley Earth Forum would like to submit the following comments to the Department of Environmental Quality, and ask that they be entered into the public record concerning Rio Tinto's application to change the State SIP to increase the size of their mining operation.

The open-pit Bingham Copper Mine is a disgrace to the state of Utah. Rio Tinto is the major industrial polluter on the Wasatch Front, responsible for about 30% of the pollution in the Salt Lake Valley. The expansion of their operation will only make that worse. Their claim that the added pollution will be offset by replacing some of their coal fired plants with natural gas plants is not backed up by data. Before that claim can be accepted, it must be evaluated and validated by a thorough, independent, scientific investigation, paid for by Rio Tinto, but managed by the Utah State DEQ to assure its impartiality.

Since Utah is already in violation of Federal limits on PM10, PM2.5, Ozone and multiple other air and water pollutants, and since the lives and health of the people of Utah are at risk as a result of that pollution, we ask that the DEQ deny Rio Tinto's application. In order for Utah to have a SIP that might be approved by the EPA, Rio Tinto must significantly decrease their emissions of PM10, PM2.5, PM1, NOx /Ozone, and CO2 (especially during our winter bad-air season). It is also time for them to decrease their contamination of Wasatch Front air, water and soil with heavy metals and radioactive elements, which are persistent in the environment and which are a threat to the health of everyone on the Wasatch Front. We ask the DEQ to act to protect the people of Utah.

The American Lung Association states that coal fired power plants, such as those that Rio Tinto uses in their operation, produce at least 84 toxic substances, including arsenic, lead, formaldehyde, hydrogen chloride, mercury, and dioxins. A company as environmentally responsible as Rio Tinto claims to be should be replacing all their coal-fired plants, and Rio Tinto has the profits to do that without any expansion in their mining. That they have only offered to replace some of them, and only on the condition that their expansion is approved, must call their willingness to act responsibly into question.

Again, we urge the Utah DEQ to deny Rio Tinto's application for expansion.

Utah Valley Earth Forum Board of Directors

Don Jarvis	Charles Nuckolls
David & Donna Dalton	Carol Walters
David E Paulsen	Ernie Rogers
Rick Mathews	Jim Westwater

**03-21-2011** UPHE

Note: UPHE has reviewed not only the DAQE-AN0105710023-08 Intent-to-Approve (ITA) document, but also has reviewed the Notice of Intent (NOI) dated August, 2010, and the

Technical Support Document (TSD) dated January 2011; these documents were submitted as the basis for the ITA. Our comments, therefore, are directed at all three of these documents, as the TSD and NOI were used to produce the NOI.

#### A. General Comments

1. Section 1.1 of the NOI states that the current (2005) State Implementation Plan (SIP) for PM<sub>10</sub> specifies a limitation of 197,000,000 million (MM) tons per year of materials-moved. It should be noted that while this amount has been approved by the Utah Air Quality Board (UAQB), the approval of a SIP requires EPA sign-off. The EPA has stated that they intend to mostly disapprove the 2005 SIP, as it contains numerous technical and assumptive flaws.' The NOI confirms this fact in Section 1.1, however, the NOI goes on to request an even large increase over the amount which is currently proposed for disapproval. Obviously, this NOI cannot be processed or acted-upon unless a change to the SIP is conducted, and that change is further approved by the EPA. This means that the ITA and its foundational NOI document are premature at best, and reckless at worst, as the ITA is based entirely upon the presumption that the current SIP will be changed by the UACTB, despite EPA's ultimate primacy in the issue.

Completing an ITA based on this NOI, then, appears to be presumptive, premature, and injudicious on DA(X)s part. The public should not be limited to commenting on a projected future document as if it reflects current reality. This appears to be acting in "bad-faith" by DAO, and UPHE requests that the NOI and resultant ITA be rescinded by DACJ until SIP issues are resolved which would even allow for this ITA to be written; only then should public comment be received on this matter.

2. KUC's selection of background concentration for dispersion modeling is suspect, as it disagrees with direction given by DACT modelers. UPHE is concerned that the DACT has rejected in-house expertise for that of the source; without further explanation included we can only deduce that external pressure was applied to repudiate the DAQ modeler's advice. This comment is included below in Section B, Item 5e.

#### B. Comments Specific to the NOI

1. Section 1.2: Initiatives to Reduce Emissions. KUC makes statements about how they have implemented emission reduction practices for PM, NO<sub>x</sub>, and SO<sub>2</sub>. We find this interesting in light that KUC is requesting an increase of NO<sub>x</sub> from a current potential-to-emit (PTE) of 5,061 tons/year to a proposed PTE of 5,830 tons/year... an increase of 769 tons/year.

2. Section 2.0: Introduction. KUC indicates that they have relied upon an 'escape-fraction' which Page E indicates how much particulate (both PM<sub>10</sub> and PM<sub>2.5</sub>) are emitted from sources (point and fugitive) that operate within the pit confines. This escape-fraction is identified by a paper entitled "Airflow Patterns and Pit-Retention of Fugitive Dust for the Bingham Canyon Mine", which was submitted as part of the TSD. UPHE's comments on the veracity of this paper (also referred to as the Bhaskar-Tandon Thesis) are extensive, and are included in their entirety within Section C: Comments Specific to the TSD.

3. Section 3.2.5: Haulroads and Haultruck Emissions. This section is confusing to the reviewer. The calculation tables in the referred appendix (Appendix B-1), specifically Table BI-19, pages 10 - 16 of Haultruck emissions. These pages contain tables that lack headers or any other descriptive information by which years of operations the emissions tables are supposed to reflect. A short table is included on page 16, but it in no way summarizes the data presented in the

preceding pages. UPHE requests that these pages be regenerated so that corresponding years and control factors can be properly studied by UPHE.

4. Appendix B-3: Pit Influence Boundary. UPHE is astonished that a key drawing is lacking the following information:

- A scale. A map is never complete without a scale.
- Listed contours. This is a contour map.
- No delineation or nomenclature of prominent pit features (called-out in Bhaskar-Tandon paper).
- No legend describing location of roads, or associated mileages of roadways within and without the pit.
- A north arrow indicating direction.

UPHE is curious as to how DAQ verified haul-route lengths with no supporting information submitted by KUC which shows the basis of their haul-road calculations.

5. Appendix C: Aermot Report

5a. Section 1.1: Regulatory Status. There is no mention of PM<sub>2.5</sub> non-attainment. 5b. Section 1.2: Monitor Data. Paragraph 2 of this section discusses selection of a representative background, and states that the current emissions from the mine must be excluded from a representative background value. UPHE requests that DAQ explain this statement. We feel that proposed emission increases should be excluded from representative background, but current operational emissions at the current permitted level should be included into the background calculation. If this is the case, then the proposed background factor presented by KUC (59.1 ug/m<sup>3</sup>) would be too low of a value, and would skew modeling results based upon it. Again, UPHE requests that DAQ address this question with an explanation of the intent of this paragraph.

5C. UPHE is concerned that KUC was not required to use a State-operated monitoring station, but was allowed to develop data based upon their own in-house monitoring station. In addition, the meteorological ("met") data appears to have been developed from a met site near Herriman, UT. Is there no met station conjoined with KUC's PM<sub>10</sub> monitoring site? If not, this would appear to prevent the use of the monitoring concentration values of the KUC monitor.

5d. Appendix C-1: PM<sub>10</sub> Ambient Monitor Data. Related to the previous comment. Met data was utilized from DAQ's Herriman and Salt Lake City monitoring stations, whereas PM<sub>10</sub> concentrations were used from KUC's in-house monitoring station located in Copperton, at the toe of the thousand-foot tailings slope. UPHE understands that there are large topographical as well as meteorological differences between these sites, especially in relation to prevailing wind speed. The Copperton monitor is shadowed and protected from various directional flows by the Oquirrh mountain range as well as the mine site itself, therefore, it is unreasonable and suspect to use unrelated data when developing your background PM<sub>10</sub> ambient concentration measurement. UPHE requests an explanation from DAQ regarding this issue.

5e. Appendix C-3: Email from UDAQ. This email states the DA(Xs position that a specific day (July 21, 2005) should be used as the highest measured background calculation (80 ug m<sup>3</sup>), and disavows KUC's notion that this day should be invalidated due to gusty winds. Instead, KUC selected the day of February 4, 2004 as the "most representative" for background (59.1 ug/m<sup>3</sup>). Why did KUC not follow DA(Xs rationale? One reason we can surmise is as follows, based upon the NAAQS regulatory threshold of 150 ug/m<sup>3</sup>:

Scenario 1: (using KUCs suggested background concentration):

59.1 ug/m3 + 85 ug/m3 modeled impact = 144.1 ug/m3 PASS

Scenario 2: (Using DAQ@s suggested background concentration)

80 ug/m3 background + 85 ug/m3 modeled impact = 165 uglm3 FAIL

UPHE requests an explanation from DAQ on why their own modeler's recommendation was ignored by KUC in their development of background concentration, and why the DAQ permit engineer accepted KUC's submitted background concentration over that recommended by the DAQ modeler.

5f. UPHE requests a modeling map (required by DAQ modeling guidelines) that show the location of the sources of emission points and areas at the facility. We also request that this map contain the features listed in Item #4 above, as well as all appropriate descriptors.

### C. Comments Specific to the TSD

#### Section 1.0: Introduction and Purpose

1. Table 1-1 provides the 'most representative' Potential to Emit (PTE) calculations for 260 mm tons per year. As a basis for this claim, it refers to AERMOD modeling performed as part of the NOI document. However, conclusions of the TSD do not reference the AERMOD modeling, and in fact, the bulk of the TSD is comprised of CMB, UAM-AERO, and CALPUFF modeling results. AS the AERMOD information is unsupported in the TSD, its mention tends to obfuscate other modeled emissions demonstrated by the TSD.

When cross-referenced against the Total PTE summary presented in the "companion" NOI document (NOI Table 3-16), the stated PTE values do not agree with each other. This discrepancy is summarized in the following table:

Pollutant	TSD (tons/yr)	NOI (tons/yr)
PM10	1,513	1,472
PM2.5	Not given	363
S02	6.56	6.56
NOx	5,830	5,830
CO	1,682	1,461
VOC	314	320

This discrepancy casts doubt as to which set of numbers are accurate, and calls into question the quality assurance procedures of KUC and their consultant, and also points out the procedural flaws in considering two documents concurrently when one document allegedly must rely on the other, as the DAQ is doing in this case.

Comments on "Airflow Patterns and Pit-Retention of Fugitive Dust for the Bingham Canyon Mine", Bhaskar-Tandon Masters degree thesis, 1996.

The DAQ is considering a proposal change for the Salt Lake County PM10 SIP, which would allow KUC to be able to increase their production from 197 million tons to 260 million tons of mined material per year. According to KUC's TSD, an increase in production will actually decrease PM10 emissions by 1,762 tons per year. This seeming impossibility is only possible if all PM10 emissions that occur within mine pit ("in-pit" emissions) are reduced by 80%, which is indeed what KUC has proposed. This 80% reduction factor is based solely on the results of a "study" submitted to DAQ by Rio Tinto, which estimates that only 20% of PM10 particles escape

from the pit and are released into the ambient airshed. This "study" is actually a master's degree thesis from the University of Utah, authored by a Department of Engineering graduate student Navin Tandon in 1996 - 15 years ago.

Mr. Tandon's thesis evaluates the potential of particles emitted within the mine pit to 'escape' into the surrounding airshed of Salt Lake County. It is critical to note that without reliance on Mr. Tandon's thesis, Rio Tinto's estimated emissions may exceed four times as much as the amount they currently have calculated for the SIP modification, since that amount only represents 20% of overall calculated emissions.

Given this master's degree thesis, UPHE makes the following six general comments, and four technical comments:

### **General Comments**

1. An original thesis was authored and copyrighted by Navin Tandon in 1996. Mr. Tandon is noted as the sole author, however, as is customary in academia, his Supervisor and Thesis Advisor at the University of Utah, Dr. Ragula Bhaskar, is listed as a co-author. It appears that KUC has printed a new cover page for this study' which lists Dr. Bhaskar first as primary author (note that this cover page does not exist on the "official" copy of this thesis, which is archived at the Marrict Library at the University of Utah).

This type of change is misleading and disingenuous, and deliberately plays upon the strength of Dr. Bhaskars' Ph.D. credentials, and leads the reader to believe that Dr. Bhaskar is the primary author of this paper. As a thesis advisor, there is no doubt that Dr. Bhaskar is the driving force behind the work, but he is not an author of this thesis. In actuality, when a proper literature search was performed for this paper at the University of Utah, Dr. Bhaskar's name never appeared as author, rather, only the name of its only author, student Navin Tandon.

2. It appears that this paper was written at the request of Kennecott Utah Copper; we can only surmise that because the study was submitted to Kennecott, that it was fully funded by Kennecott, which calls into question a potential conflict of interest in regards to their reliance on this thesis to support their position. UPHE requests that KUC fully disclose their involvement in this research, if any, beyond providing funding for its completion, and have completed an appropriate conflict-of-interest analysis.

3. The thesis has never been a) externally peer-reviewed, b) presented at a conference or published in a conference proceedings, or c) published in a peer reviewed scientific journal. If a scientific paper is referenced or relied upon for its results, or is referred to as a "study", it must have at least been subjected to one or more of these types of reviews, performed externally from the institution that produced the paper. The fact that this paper has never been externally peer-reviewed -(i.e. beyond the thesis-advisor level) discredits its use as a "study", and in fact, requires that it simply remain a master's degree thesis. To claim this paper as a definitive study of particulate emissions within the KUC mine is misrepresentative.

This paper is now 15 years old. Why has Rio Tinto presented no additional corroborating studies or other types of assessments that may support the findings of this graduate students work that have been

conducted in the engineering field in the 15 years since this thesis was written? In addition, as this thesis was completed in 1996, why has KUC not presented this thesis during previous Approval Order modifications (at least three) that have occurred since thesis completion?

4. Perhaps our most important comment is that the thesis paper lacks proper validation. The thesis author, Mr. Tandon, states clearly in his summary and conclusions that observational data must be made in order to compare predicted modeling results with actual events that occur at the mine site. Specifically, he states that meteorologic and source parameter assumptions should be verified through monitoring on-site within the pit to verify the results of his thesis. He also implies that the sensitivity analyses conducted as part of his modeling effort are computationally-limited based on financial resources required for additional computational support, and suggests more improved methods of completing modeling evaluation which may not limit the modeling study presented within the paper.

5. The author has stated clearly that he has made various assumptions in completing this paper that must be clarified with actual data. The author has based his assumptive values on literature searches, and has incorporated them as fixed constants into his modeling calculations. However, the author himself cautions that these constants are actually variables which need to be accurately measured on-site in order to validate his modeling findings. It does not appear that KUC has ever attempted to follow the author's recommendation that on-site data be collected to verify the claims of the thesis.

6. The Utah DAQ should well-understand this thesis author's concern over the validation efforts that would be required to verify the precision and accuracy of the results presented in this thesis. The DAQ is an agency that often performs airshed modeling, while at the same time conducting extensive and on-going monitoring of the ambient air. The DAQ oftentimes freely comments that the monitoring data do not agree with modeling predictions, and in fact, are oftentimes the two values are very different from each other. This has most recently been the case in development of the current PM2.5 SIP, where DAQ has stated on record publicly that they were not able to get the selected model to simulate or predict past, well-documented days of non-compliance that have occurred in the past, when all meteorological variables and air monitoring data were well-known. Why, then, is the DAQ prepared to accept this thesis based on a fluid flow model, without ever requiring validation through monitoring, especially when the author himself recommends it? UPHE requests that DAQ share their technical review and analysis of this thesis document, since the entire TSD hinges upon its acceptance by DAQ.

### **Technical Comments**

7. A three-dimensional finite element model was developed. This computational model included the mine and surrounding regions. The flow field over and inside the mine cavity were modeled with the Reynolds-Averaged Navier-Stokes (RANS) equations with a k-epsilon turbulence closure model. A near-wall modeling approach was used next to the boundaries (in the viscous layers). Given boundary conditions and initial conditions, a flow field approximation was calculated. The author discusses that the k-epsilon model is not appropriate in low-turbulence regions, and the boundary layer (in these flows) is assumed to be low turbulence. However, there must be a height in the flow field where the smooth flow (RANS) and turbulent flow (k-epsilon) models are interfaced. The corresponding mesh element height must match properly with the mixing height in order for model predictions to be accurate. This is not adequately demonstrated in the thesis.

8. The spatial dimensions used by this model are not valid. The finite element model approximated an area of approximately 23,000 ft by 20,000 feet. This is meant to capture the mine and "surrounding regions". However, a justification for the size of the modeling domain is not given. The simple site map submitted by KUC as part of the companion NOI does not have a scale included, and so cannot adequately compare current or projected conditions to those that existed 15 years ago when this modeling exercise was completed. This would call into question the impacts of the inflow and outflow locations with respect to the topographic features of the pit. In addition, KUC is on public record stating that the pit footprint size will increase at least 1,000 feet south of the existing pit footprint. This is not reflected in the thesis. In addition, the author, in figure 5-10, indicates that the area modeled was rectangular in nature, however, figure 5-8 shows a trapezoidal configuration to the spatial domain. Nevertheless, since the modeling domain has changed greatly, the results of the thesis are not valid to generally apply to the pit, no matter what dimensions it has attained since the thesis was completed.

9. Numerous assumptions are used in the model. The author himself states that these should be verified or contradicted by use of field studies to validate the results of the modeling.

a. A RANS model was used as opposed to accomplishing a direct numerical simulation (DNS). DNS would attempt to capture all scales of motion of the fluid. RANS requires a closure,; model. The closure model used in this study was the classic k-epsilon model. As stated in the thesis, this model has several limitations: it is appropriate for only high-turbulence regimes; it requires a collection of constants (parameters) which are assumptions not verified through field study.

b. The thesis states the constants used (for reproducibility) but does not justify the particular constants other than stating that they are from the literature. Appropriateness of the constants for the particular situation/study is not discussed.

c. The thesis does not explicitly address if the isotropic turbulence assumption is a good assumption for this study.

d. The mesh node information is made available in the thesis (both in terms of number of nodes and images of slides of the domain). However, resolution of the mesh elements in feet is not given, so the spatial scale of the mesh study is not clearly defined. Due to computational costs, a mesh resolution study did not appear to have been performed (i.e. a hierarchical mesh refinement to understand the impact of spatial resolution on the flow field characteristics). The thesis provides images of mesh nodes, but no statement or elaboration of what each mesh element represents.

e. A mixing layer assumption is made by the thesis. This assumption, along with other atmospheric condition assumptions, affects further parameters such as the height of the near-wall modeling layer. This is one of the reasons why the author requires onsite meteorology to be conducted in order to provide verification or contradiction of the thesis claim.

9. The model does not handle anisotropy, and therefore cannot predict directional dependence of particles outside of meteorologic influence, of which data measurements have never been submitted by KUC.

10. The author describes reasonable "next steps" for the refinement of his thesis conclusions. This statement confirms that this thesis is perhaps a good starting point for the justification of pit retention, but primarily demonstrates that the modeling as conducted by this thesis effort may provide an appropriate tool for this type of application, but in no way provides a good argument for justification of the pit retention results (80% of PMIO), based primarily on what the author has stated in the conclusion - that the findings of the thesis need to be validated in order to verify the conclusions stated in the thesis.

Given these conditions as listed and described, UPHE requests the following:

a): Site verification of thesis claims, in accordance with author's recommendation, that involves collection of meteorological data (at a minimum) from various levels of the mine pit.

b): That additional, peer-reviewed and DAQ-authorized studies be conducted, using monitoring data yet to be collected, so that assumption constants are known from site-specific data. These studies will lead to better understanding, and either confirm or contradict the 20% PMIO emission factor developed by the Bhaskar-Tandon thesis.

#### D. Comments Specific to the ITA

1. Abstract, 2nd Paragraph. Text states that KUC has voluntarily requested a facility-wide emissions cap, however, the terms of the cap (i.e. tonnages of pollutants) are never specified. A cap cannot be effective unless it is known. Are the values shown in the abstract representative of the cap? UPHE requests that the abstract be expanded to include the voluntary cap tonnages.

2. Condition 11. A. 11: The NOI, as reviewed, presents only four emergency generators; the ITA presents five (with addition of the Dinkeyville Hill generator. Please explain this disparity, and demonstrate that emissions from a fifth generator were included in emission summaries as well as modeling impacts.