APPENDIX E

Response to Technical Comments

APPENDIX E-1

Response to NOI Technical Review Comments

UDAQ Review	KUC Responses
2.1 Point Sources	
2.1.1 In-pit Crusher New Crusher – 0.007 gr/dscf 12,989 hr/yr	KUC is proposing to add a new in-pit crusher at the BCM. The new crusher will be nearly identical to the existing in-pit crusher. Based on the design of the existing crusher and the discussions with vendors, the baghouse on the new in-pit crusher will have an estimated air flow of 12,989 dscfm and a grain loading of 0.007 gr/dscf.
2.2 Fugitive Dust Sources	
2.2.1 Drilling & Blasting 90,000 holes per year with 90% efficiency (how was 90% determined)	The control efficiency listed is based on previous determinations of BACT by UDAQ. This control efficiency has been applied in the 1994 SIP and 2005 SIP calculations and modeling.
2.2.2 Material Movement Ore stockpiled not double counted (Separate limit for Stockpiles?). Top soil movement, road base and reclamation material not counted towards limit (separate limit?)	The total material moved (ore and waste) limit is applied to tons mined at the shovel face. Fugitive emissions from operations such as ore stockpiling, road base crushing, work completed by dozers and loaders, etc. have been included in the NOI. Tonnage of material handled for these operations is not double counted against the ore and waste limit.
2.2.2 Material Movement 85,000,000 tpy of ore crushed – this project represented as a no production increase? Fugitive dust from conveyors controlled at 90% (how was it estimated?). Crushers to remain below pit line with canyon? If reclaim tunnel conveyor processes 85,000,000 tpy, is remainder stockpiled? If so, is reprocessing emissions counted?	The proposed modification will result in an increase in ore crushed. This increase in necessary to accommodate decreasing ore quality and to maintain current level of metal production. 85,000,000 tpy is a typical long term average value. UDAQ has previously specified enclosures (current levels of controls) on conveyor transfer points as BACT. The control efficiency is based on previous determinations of BACT by UDAQ. This control efficiency has been applied in the 1994 SIP and 2005 SIP calculations and modeling. Field observation indicates minimal dust generation from conveyor transfer points. The in-pit crushers will be located within the pit influence boundary as discussed in the NOI. For conservative emission estimates, KUC will be revising emissions calculations to include emissions associated with transfer of ore to the ore stockpile (BCM205).
2.2.2 Material Movement Calculation of rock transferred outside of pit influence?	Emissions calculations for waste rock haulage are provided in Appendix B, Table B1-19.
2.2.3 Low-grade Ore Stockpiles How is movement calculated and monitored for movement of stockpiles? How effective is water application and where did assumptions originate?	KUC monitors and maintains records of material movement to the stockpiles. Water application and dumping practices are consistent with waste dumping applications. Fugitive emissions from the stockpile, as well as ore dumping at the stockpile, are calculated in the NOI (BCM1.13 and BCM205).

UDAQ Review	KUC Responses
2.2.4 Disturbed Areas How estimated and verified that 1,485 acres of additional land disturbed in summer? 371 acres in winter?	It is estimated, according to proposed mine plan, that approximately 565 total acres of land is disturbed per year. Of that total, 310 acres (55%) are within the Pit Influence Boundary. KUC monitors and maintains records of areas disturbed for mining.
2.2.5 Haul Roads How often water applied? How is application determined? How testing of road base for specification? What specification used?	Application of water and commercial dust suppressant on the haulroads will be maintained and monitored through the fugitive dust control plan. A copy of the revised fugitive dust control plan is provided as Attachment C. Water application practices have been refined by years of experience. Detailed truck movement data are tracked by GPS and maintained for inspection. Effectiveness of dust control measures has been regularly inspected by UDAQ for several years without incident. The road base is applied as necessary on the haulroads. During the winter months, the waste rock is screened to approximately 2-inch diameter and is screened to approximately 1.5-inch diameter during the remainder of the year. The application of the road base material will be regulated through the fugitive dust control plan.
Is FDCP being revised?	A copy of the revised fugitive dust control plan is provided as Attachment C.
2.3 VOC Sources	
2.3.1 Degreasing Degreasers – 500 gpy. Lids closed as all time.	As discussed Section 2.3.1 of the NOI – "The annual use of solvent from all the degreasers combined is approximately 500 gallons. When not in use, the lids on the degreasers are kept closed at all times to minimize emissions. The solvent is recycled frequently, and no significant loss in volume is observed, implying minimal losses as emissions. For purposes of estimating emissions, a conservative estimate of one solvent change-out lost per year is assumed."
2.3.2 Fuel Stations 530,000 gpy gasoline 55,000,000 gpy diesel	As discussed in Section 2.3.2 of the NOI – "For the proposed modification, the peak year annual throughput at the fueling stations will be approximately 530,000 gallons of gasoline and 55,000,000 gallons of diesel fuel."
2.3.3 SX/EW plant SX/EW plant with 1,100 ft2. How is settlers covered? How is the control efficiency estimated at 80%? How is exhaust air routed through mist eliminators?	The settlers will be covered with insulated stainless panels. These panels are used to lower VOC emissions and prevent heat loss. The control efficiency is based on the design of the process. Control of 80% will be achieved by the placement of covers at all times except during inspection, sampling, and adjustment. The exhaust air will be routed through the mist eliminators and then outside the building into the atmosphere.

UDAQ Review	KUC Responses
3.0 Emissions Summary	
3.1 Emissions from Point Sources How was $PM_{2.5}$ = to 40% of PM_{10} determined for input crushers, ventilation systems, silos? Is the emissions below the valley floor have a higher pit retention?	Emissions of $PM_{2.5}$ from sources handling ore material are based on factors from AP-42, Table B.2.2, Category 3 – Mechanically Generated Aggregate and Unprocessed Ore. Emissions of $PM_{2.5}$ from the Lime Bins are based on factors from AP-42, Table B.2.2, Category 4 – Mechanically Processed Ores and Nonmetallic Minerals. A revised Emissions Summary section is provided as Attachment A. Based on the University of Utah study, a single pit escape factor of 20 percent was applied to PM_{10} emissions and 21 percent was applied to $PM_{2.5}$ emissions for sources located within the pit influence boundary. A summary of the University of Utah study was included in Appendix D-1 in the NOI. This pit escape factor is intended to be a simple conservative approach to quantification of in-pit settling. While it would be possible to model in-pit settling as a function of numerous variables, this would significantly complicate downstream analysis and modeling.
3.2 Emissions from Fugitive Sources	
3.2.1 Drilling and Blasting AP-42 11.9-1 is for horizontal area and does not include vertical for bench. Is for blasting depth <70 ft.	Based on discussions with the mine, the average blasting depth is less than 70 ft.
3.2.2 Material Movement What are material characteristics that limit dust? What is natural moisture content of soil? How monitor for dust control? Watering?	The characteristics of the waste rock/ore material, such as large diameter material, and inherent material moisture content of 4 percent, limit dust being generated during the transfer operations. The run-of-mine material consists of large diameter material with very little fine dust. Blowing dust from the material is a one-time occurrence. Visual observations have shown that the large diameter material left behind results in no further generation of dust. The current AO limits the visible emissions from all conveyor transfer points at 10 percent opacity.
3.2.3 Low-grade Ore Stockpile How was engineering estimate determined for PM_{10} and $PM_{2.5}$? How does material characteristics and compaction minimize emissions?	Please see attached revised Emissions Summary section (Section 3) of the NOI provided as Attachment A. The revised includes assumptions for PM_{10} and $PM_{2.5}$ emissions based on ratio of transfer particle size multipliers in AP-42, *Fifth Edition*, Table 13.2.4 (EPA, 2006) for Aggregate Handling and Storage Piles. The ratio of transfer particle size multipliers are 0.74 for PM, 0.35 for PM_{10} and 0.053 for $PM_{2.5}$. Therefore, PM_{10} is estimated to be 47 percent of PM (0.35/0.74) and $PM_{2.5}$ is estimated to be 15 percent of PM_{10} (0.053/0.35). The run-of-mine material consists of large diameter material with very little fine dust. Blowing dust from the material is a one-time occurrence. Visual observations have shown that the large diameter material left behind results in no further generation of dust.

UDAQ Review	KUC Responses
3.2.4 Disturbed Areas What engineering estimates used to determine $PM_{2.5}$ = 15% PM_{10}. How is topsoil removal within pit boundary?	Please see attached revised Emissions Summary section (Section 3) of the NOI provided as Attachment A. The revised includes assumptions for PM_{10} and $PM_{2.5}$ emissions based on ratio of transfer particle size multipliers in AP-42, *Fifth Edition*, Table 13.2.4 (EPA, 2006). The ratio of transfer particle size multipliers are 0.74 for PM, 0.35 for PM_{10} and 0.053 for $PM_{2.5}$. Therefore, PM_{10} is estimated to be 47 percent of PM (0.35/0.74) and $PM_{2.5}$ is estimated to be 15 percent of PM_{10} (0.053/0.35). Fugitive emissions from Disturbed Areas are included in the NOI workbook (BCM1.9)
3.2.5 Haul Roads Haul road emissions limited to 8.3 miles roundtrip. When is application of water or chemicals determined to control dust? What portion of haul roads outside pit boundary? Hours of operation for haul trucks? Loaders? Tier level of trucks phased in? 85% for chemical dust suppressant when applied?	Detailed emissions calculations for the haul roads are provided in Appendix B-1, Table B1-12 of the NOI. Per UDAQ policy, for haulroads within the pit influence boundary, a control efficiency of 75 percent is used for watering and road base application. For haulroads outside the pit influence boundary, a control efficiency of 85 percent is used for application of commercial dust suppressants. Details of this activity will be regulated through the fugitive dust control plan, which is updated and submitted annually to UDAQ. Hours of operation and details on tier levels of the haul truck engines can be found in Appendix B-1, Table B1-36 of the NOI. Hours of operation and details on tier levels of the support equipment engines can be found in Appendix B-1, Table B1-37 of the NOI.
3.2.6 Road Base What is specification road base? When is it applied? When or how often is existing road base tested? Is road base used outside of pit?	The road base is applied as necessary to the haulroads. During the winter months, the waste rock is screened to approximately 2-inch diameter and is screened to approximately 1.5-inch diameter during the remainder of the year. The application of the road base, generally to haulroads inside the pit influence boundary, will be regulated through the fugitive dust control plan.
3.3 VOC Sources	
3.3.3 SX/EW Plant How assume 33% emissions? How assumed 0.004 gr/dscf H_2SO_4 emissions	As discussed in the May 12, 2008 NOI for SX/EW plant, the design of the plant estimates that less than one-third (maximum 33 percent) of the residual organic in the raffinate from the proposed plant will evaporate and result in emissions. The design of the electrowinning process estimates the exhaust gas sulfuric acid concentration to be 0.004 gr/dscf.
3.4 Support Equipment	
3.4.1 Trackers, Dozers, Graders, Loaders Tier level of existing vehicles	Detailed calculations for tailpipe emissions from support equipment are provided in Appendix B-1, Table B1-37 of the NOI.

UDAQ Review	KUC Responses
3.5 Miscellaneous Sources 3.5.1 Emergency Generators	The existing emergency generators are currently limited to 500 hours per year for testing and maintenance activities. Detailed calculations for emergency generator emissions are provided in Appendix B-1, Table B1-34 of the NOI. Emission calculations for a proposed emergency generator are provided in Appendix B-1, Table B1-41 of the NOI. The proposed generator will be limited to 100 hours per year for testing and maintenance activities.
5.0 BACT	
5.1 BACT for Haul Roads **5.2 BACT for Ore and Waste**	Please see attached revised BACT section (Section 5) of the NOI provided as Attachment B.
Appendix A	
Tier 0,1,2,4f emissions	Detailed calculations for tailpipe emissions from the haultrucks and the support equipment are provided in Appendix B-1, Tables B1-36 and B1-37 of the NOI. Appendix A, of the NOI, discusses the methodology for estimation of tailpipe emissions from haultrucks and support equipment using NONROAD. Tables in Appendix A of the NOI are meant to provide a summary of emissions.
Appendix B-1 Post Mod emission calculations	
How were $PM_{2.5}$ percentages determined? What are their justifications? What are engineering estimates and how are they justified? Copy of 2007 AEI? How is AEI verified? Copy of Colorado guidance? Why not use AP-42?	Please see attached revised Emissions Summary section (Section 3) of the NOI provided as Attachment A. The revised includes assumptions for PM_{10} and $PM_{2.5}$ emissions. Volatile organic compound emissions from diesel fueling stations are estimated using emission factors from Colorado Department of Public Health and Environment's guidance on *Gasoline and Diesel Fuel Dispensing Stations*. A copy of the guidance was provided in Appendix B-2 of the NOI. EPA's *AP-42, Fifth Edition*, does not provide emission factors for diesel fueling stations.
Appendix B1-2 PM_{10} escape factor – 20%, what is $PM_{2.5}$ escape factor? Control $PM_{2.5}$ = 0.21 $PM_{2.5}$. What is the justification? How is 0.4 PM_{10} = $PM_{2.5}$	The escape factor for $PM_{2.5}$ was determined to be 21 percent as discussed in Appendix D-1 of the NOI. This escape factor was applied to determine controlled emissions for the emission source located within the pit influence boundary. Please see attached revised Emissions Summary section (Section 3) of the NOI provided as Attachment A. The revised includes assumptions for $PM_{2.5}$ emissions based on factors from AP-42, Table B.2.2, Category 3 - Mechanically Generated Aggregate and Unprocessed Ores. The table shows PM_{10} to be 51% of the particle distribution and $PM_{2.5}$ to be 15%. Therefore $PM_{2.5}$ is estimated to be 29% (0.15/0.51) of PM_{10} for operations including material handling and processing of aggregate and unprocessed ore such as milling, grinding, crushing, screening, conveying, cooling and drying.

UDAQ Review	KUC Responses
Appendix B1-3 New in-pit crusher. 12,898 dscf/min * 0.007 gr/dscf. How is 0.4 PM_{10} = $PM_{2.5}$. Controlled $PM_{2.5}$ = 0.21*$PM_{2.5}$	The escape factor for $PM_{2.5}$ was determined to be 21 percent as discussed in Appendix D-1 of the NOI. This escape factor was applied to determine controlled emissions for the emission source located within the pit influence boundary. Please see attached revised Emissions Summary section (Section 3) of the NOI provided as Attachment A. The revised includes assumptions for $PM_{2.5}$ emissions based on factors from AP-42, Table B.2.2, Category 3 - Mechanically Generated Aggregate and Unprocessed Ores. The table shows PM_{10} to be 51% of the particle distribution and $PM_{2.5}$ to be 15%. Therefore $PM_{2.5}$ is estimated to be 29% (0.15/0.51) of PM_{10} for operations including material handling and processing of aggregate and unprocessed ore such as milling, grinding, crushing, screening, conveying, cooling and drying.
Appendix B1-4 C6/C7 conveyor transfer point 0.007 gr/dscf @ 5,120 dscf/min. DAQE-AN0105710023-08 August 13, 2008. Condition 18.B is 0.016 gr/dscf. Condition 13 is 5,000 acfm.	As discussed in Section 2.1.1 of the NOI – "The BCM has two ore conveyor transfer drop points near Copperton that are equipped with baghouses—Point C6/C7 and Point C7/C8. All exhaust air from each transfer drop point is routed through the respective baghouse before being vented to the atmosphere. The C6/C7 drop point baghouse is designed to handle 5,120 dscfm, and the C7/C8 drop point baghouse is designed to handle 3,168 dscfm (UDAQ, 2008). Both baghouses are permitted to operate 8,760 hours per year. KUC is proposing to upgrade both baghouses. The upgrades will include replacing the bags and modifying hopper discharge design to provide a higher PM_{10} capture rate. This will result in reducing grain loading from 0.016 gr/dscf to 0.007 gr/dscf.". Condition 13 of the AO states – "The controlled transfer point C6/C7 baghouse shall control process streams from the drop point. This baghouse shall be sized to handle at least 5,000 acfm for the existing conditions…" As discussed in the NOI, the air flow from the baghouse will be greater than 5,000 acfm.
Table B1-1 260 MM case **Table B1-2 In Pit Crusher** Which category in AP-42 B.2.2 was used to define emission factors? How was $PM_{2.5}$ conversion performed? In Category #4 PM_{10} = 85% and $PM_{2.5}$ = 30% (30/85) 7.75 tpy = 2.735 tpy $PM_{2.5}$ PM_{10} emissions calculated using the escape factor of 20%, The $PM_{2.5}$ calculations are not designated.	KUC proposal is based on a 260,000,000 ton ore and waste combined mine plan. Emissions for $PM_{2.5}$ based on factors from AP-42, Table B.2.2, Category 3 - Mechanically Generated Aggregate and Unprocessed Ores. The table shows PM_{10} to be 51% of the particle distribution and $PM_{2.5}$ to be 15%. Therefore $PM_{2.5}$ is estimated to be 29% (0.15/0.51) of PM_{10} for operations including material handling and processing of aggregate and unprocessed ore such as milling, grinding, crushing, screening, conveying, cooling and drying. Based on a University of Utah study, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI.

UDAQ Review	KUC Responses
Table B1-3 New Pit Crusher Which category in AP-42 B.2.2 was used to define emission factors? How was $PM_{2.5}$ conversion performed? PM_{10} emissions calculated using the escape factor of 20%, The $PM_{2.5}$ calculations are not designated.	Emissions for $PM_{2.5}$ based on factors from AP-42, Table B.2.2, Category 3 - Mechanically Generated Aggregate and Unprocessed Ores. The table shows PM_{10} to be 51% of the particle distribution and $PM_{2.5}$ to be 15%. Therefore $PM_{2.5}$ is estimated to be 29% (0.15/0.51) of PM_{10} for operations including material handling and processing of aggregate and unprocessed ore such as milling, grinding, crushing, screening, conveying, cooling and drying. Based on a University of Utah study, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI.
Table B1-4 C6/C7 Conveyor Transfer Point Which category in AP-42 B.2.2 was used to define emission factors? How was $PM_{2.5}$ conversion performed?	Emissions for $PM_{2.5}$ based on factors from AP-42, Table B.2.2, Category 3 - Mechanically Generated Aggregate and Unprocessed Ores. The table shows PM_{10} to be 51% of the particle distribution and $PM_{2.5}$ to be 15%. Therefore $PM_{2.5}$ is estimated to be 29% (0.15/0.51) of PM_{10} for operations including material handling and processing of aggregate and unprocessed ore such as milling, grinding, crushing, screening, conveying, cooling and drying.
Table B1-5 C7/C8 Conveyor Transfer Point Which category in AP-42 B.2.2 was used to define emission factors? How was $PM_{2.5}$ conversion performed?	Emissions for $PM_{2.5}$ based on factors from AP-42, Table B.2.2, Category 3 - Mechanically Generated Aggregate and Unprocessed Ores. The table shows PM_{10} to be 51% of the particle distribution and $PM_{2.5}$ to be 15%. Therefore $PM_{2.5}$ is estimated to be 29% (0.15/0.51) of PM_{10} for operations including material handling and processing of aggregate and unprocessed ore such as milling, grinding, crushing, screening, conveying, cooling and drying.
Table B1-6 Lime Bin Which category in AP-42 B.2.2? How was $PM_{2.5}$ conversion performed? This is a refined material and its size distribution is not the same as a crushed ore size distribution. Size distribution used here is same as distribution used for crushed ore.	Emissions for $PM_{2.5}$ based on factors from AP-42, Table B.2.2, Category 4 - Mechanically Generated Processed Ores and Nonmetallic Minerals. Lime is an industrial nonmetalic mineral. The table shows PM_{10} to be 85% of the particle distribution and $PM_{2.5}$ to be 30%. Therefore $PM_{2.5}$ is estimated to be 35% (0.30/0.85) of PM_{10} for operations including material handling and processing of processed ores and nonmetallic minerals such as lime.
Table B1-7 Lime Bin Which category in AP-42 B.2.2? How was $PM_{2.5}$ conversion performed? This is a refined material and its size distribution is not the same as a crushed ore size distribution. Size distribution used here is same as distribution used for crushed ore.	Emissions for $PM_{2.5}$ based on factors from AP-42, Table B.2.2, Category 4 - Mechanically Generated Processed Ores and Nonmetallic Minerals. Lime is an industrial nonmetalic mineral. The table shows PM_{10} to be 85% of the particle distribution and $PM_{2.5}$ to be 30%. Therefore $PM_{2.5}$ is estimated to be 35% (0.30/0.85) of PM_{10} for operations including material handling and processing of processed ores and nonmetallic minerals such as lime.

UDAQ Review	KUC Responses
Table B1-8 Sample Preparation How was 0.016 gr/dscf determined? Justified? Is the sample preparation the same as crushed ore? Is the size distribution the same as crushed ore distribution? How is it justified? PM_{10} emissions calculated using the escape factor of 20%, The $PM_{2.5}$ calculations are not designated.	Baghouse grain loading rate is based on vendor data. Material handled during sample preparation is ore and waste rock material and size distribution is the same. Emissions of $PM_{2.5}$ based on factors from AP-42, Table B.2.2, Category 3 - Mechanically Generated Aggregate and Unprocessed Ores. The table shows PM_{10} to be 51% of the particle distribution and $PM_{2.5}$ to be 15%. Therefore $PM_{2.5}$ is estimated to be 29% (0.15/0.51) of PM_{10} for operations including material handling and processing of aggregate and unprocessed ore such as milling, grinding, crushing, screening, conveying, cooling and drying. Based on a University of Utah study, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI.
Table B1-9 Gas and Diesel Fueling Where are MSDS used to calculate HAPs for gasoline and diesel?	HAP emissions from gasoline and diesel fueling are calculated using the *Composition, Information on Ingredients* section of the MSDS.
Table B1-10 Truck Offloading Ore at In-Pit Crusher AP-42 13.2.4 Reference #12 states that 90% may be used if water and chemical are used for fugitive dust control. Research 1994 SIP control efficiency of 90%. PM_{10} emissions calculated using the escape factor of 20%, The $PM_{2.5}$ calculations are not designated. How was 4% moisture determined? How was wind speed determined at crusher? The wind speed at the SLC airport is 9 mph and is used along the Wasatch front for data requiring wind speeds. The SLC airport is a value that is accepted by DAQ for determining emissions. Also rawinsonde data indicate that wind speeds increase and change direction as altitudes increase.	Control efficiency of 90% is based on previous determination of BACT by UDAQ. This control efficiency has been applied in the 1994 SIP and 2005 SIP calculations and modeling. Based on a University of Utah study, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI. Moisture content of 4% for ore and waste rock handled at the BCM is based on a site sampling effort during the summer of 1994. This sampling effort is the best available site specific data for the BCM. Wind speed of 7 mph is a historical average based on meteorological stations located at BCM.
Table B1-39 Truck Offloading Ore at New In-Pit Crusher AP-42 13.2.4 Reference #12 states that 90% may be used if water and chemical are used for fugitive dust control. Research 1994 SIP control efficiency of 90%. PM_{10} emissions calculated using the escape factor of 20%, The $PM_{2.5}$ calculations are not designated. How was 4% moisture determined? How was wind speed determined at crusher?	Control efficiency of 90% is based on previous determination of BACT by UDAQ. This control efficiency has been applied in the 1994 SIP and 2005 SIP calculations and modeling. Based on a University of Utah study, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI. Moisture content of 4% for ore and waste rock handled at the BCM is based on a site sampling effort during the summer of 1994. This sampling effort is the best available site specific data for the BCM. Wind speed of 7 mph is a historical average based on meteorological stations located at BCM.

Rio Tinto

UDAQ Review	KUC Responses
Table B1-40 Truck Offloading Ore at Stockpile AP-42 13.2.4 Reference #12 states that 90% may be used if water and chemical are used for fugitive dust control. Research 1994 SIP control efficiency of 90%. How was 4% moisture determined? How was wind speed determined at crusher?	Control efficiency of 90% is based on previous determination of BACT by UDAQ. This control efficiency has been applied in the 1994 SIP and 2005 SIP calculations and modeling. Moisture content of 4% for ore and waste rock handled at the BCM is based on a site sampling effort during the summer of 1994. This sampling effort is the best available site specific data for the BCM. Wind speed of 7 mph is a historical average based on meteorological stations located at BCM.
Table B1-11 In-Pit Enclosed Transfer Points 1, 2, & 3 AP-42 13.2.4 Reference #12 states that 90% may be used if water and chemical are used for fugitive dust control. Research 1994 SIP control efficiency of 90%. How was 4% moisture determined after it is crushed? How was wind speed determined at transfer points?	Control efficiency of 90% is based on previous determination of BACT by UDAQ. This control efficiency has been applied in the 1994 SIP and 2005 SIP calculations and modeling. Moisture content of 4% for ore and waste rock handled at the BCM is based on a site sampling effort during the summer of 1994. This sampling effort is the best available site specific data for the BCM. Wind speed of 7 mph is a historical average based on meteorological stations located at BCM.
Table B1-12 New In-Pit Enclosed Transfer Points 1, 2, & 3 AP-42 13.2.4 Reference #12 states that 90% may be used if water and chemical are used for fugitive dust control. Research 1994 SIP control efficiency of 90%. How was 4% moisture determined after it is crushed? How was wind speed determined at transfer points?	Control efficiency of 90% is based on previous determination of BACT by UDAQ. This control efficiency has been applied in the 1994 SIP and 2005 SIP calculations and modeling. Moisture content of 4% for ore and waste rock handled at the BCM is based on a site sampling effort during the summer of 1994. This sampling effort is the best available site specific data for the BCM. Wind speed of 7 mph is a historical average based on meteorological stations located at BCM.
Table B1-13 In-Pit Enclosed Transfer Points 4 & 5 AP-42 13.2.4 Reference #12 states that 90% may be used if water and chemical are used for fugitive dust control. Research 1994 SIP control efficiency of 90%.How was 4% moisture determined after it is crushed? How was wind speed determined at transfer points?	Control efficiency of 90% is based on previous determination of BACT by UDAQ. This control efficiency has been applied in the 1994 SIP and 2005 SIP calculations and modeling. Moisture content of 4% for ore and waste rock handled at the BCM is based on a site sampling effort during the summer of 1994. This sampling effort is the best available site specific data for the BCM. Wind speed of 7 mph is a historical average based on meteorological stations located at BCM.
Table B1-14 Conveyor-Stacker Transfer Point AP-42 13.2.4 Reference #12 states that 90% may be used if water and chemical are used for fugitive dust control. Research 1994 SIP control efficiency of 90%. How was 4% moisture determined after it is crushed? How was wind speed determined at transfer points?	Control efficiency of 90% is based on previous determination of BACT by UDAQ. This control efficiency has been applied in the 1994 SIP and 2005 SIP calculations and modeling. Moisture content of 4% for ore and waste rock handled at the BCM is based on a site sampling effort during the summer of 1994. This sampling effort is the best available site specific data for the BCM. Wind speed of 7 mph is a historical average based on meteorological stations located at BCM.

UDAQ Review	KUC Responses
Table B1-15 Coarse Ore Stacker AP-42 13.2.4 Reference #12 states that 90% may be used if water and chemical are used for fugitive dust control. Research 1994 SIP control efficiency of 90%. How was 4% moisture determined after it is crushed? How was wind speed determined at stacker?	Control efficiency of 90% is based on previous determination of BACT by UDAQ. This control efficiency has been applied in the 1994 SIP and 2005 SIP calculations and modeling. Moisture content of 4% for ore and waste rock handled at the BCM is based on a site sampling effort during the summer of 1994. This sampling effort is the best available site specific data for the BCM. Wind speed of 7 mph is a historical average based on meteorological stations located at BCM.
Table B1-16 Reclaim Tunnels AP-42 13.2.4 Reference #12 states that 90% may be used if water and chemical are used for fugitive dust control. Research 1994 SIP control efficiency of 90%. How was 4% moisture determined after it is crushed? How was wind speed determined at reclaim tunnels?	Control efficiency of 90% is based on previous determination of BACT by UDAQ. This control efficiency has been applied in the 1994 SIP and 2005 SIP calculations and modeling. Moisture content of 4% for ore and waste rock handled at the BCM is based on a site sampling effort during the summer of 1994. This sampling effort is the best available site specific data for the BCM. Wind speed of 7 mph is a historical average based on meteorological stations that were located in at and near BCM.
Table B1-17 Disturbed Areas Spreadsheet notes state that PM emission factors derived from ration in AP-42 Table 13.2.4 Tasble 13.2.4.1 is for silt & moisture content. Also assumption of PM_{10} = 47% of PM and $PM_{2.5}$ is 15% of PM_{10}. What is the basis for this assumption? How was $PM_{2.5}$emission factor obtained? Controlled PM_{10} shows PM_{10}*escape/100, How is $PM_{2.5}$ emissions calculated. Reference #12 states that 90% may be used if water and chemical are used for fugitive dust control.	PM emission factor estimated using methodology in AP-42, Section 11.9-4 (Wind Erosion of Exposed Areas). PM_{10} and $PM_{2.5}$ emission factors derived from ratio of transfer particle size multipliers in AP 42, Fifth Edition, Table 13.2.4 (EPA, 2006). The ratio of transfer particle size multipliers are 0.74 for PM, 0.35 for PM_{10} and 0.053 for $PM_{2.5}$. Therefore, PM_{10} is estimated to be 47 percent of PM (0.35/0.74) and $PM_{2.5}$ is estimated to be 15 percent of PM_{10} (0.053/0.35). Based on a University of Utah study, for sources located in the pit, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI.
Table B1-18 Cold Solvent Degreasing Parts What are the HAPs from degreasing parts?	Degreasing solvent does not contain HAPs.
Table B1-19 Haul Roads How was an average vehicle weight limit of 293 tons determined? How will the weight of the haul trucks be verified to be an average of 293 tons and not the lower vehicle weight limit of 240 tons? How is mileage determined?	By the current Approval Order, “Minimum design payload per ore and waste haul truck shall not be less than 240-tons.” PTE emissions for this source were estimated by assuming the full 260 MMT of ore and waste rock are hauled by 240-ton trucks as a maximum emissions case. Year by year round trip haulage mile projections are provided by the KUC mine group. KUC operates larger trucks during any given year, so that emissions from haul truck traffic would be less than predicted.

UDAQ Review	KUC Responses
Table B1-20 Low-Grade Coarse Ore Storage Piles Spreadsheet notes state that PM emission factors derived from ratio in AP-42 Table 13.2.4Tasble 13.2.4.1 is for silt & moisture content. Also assumption of PM_{10} = 47% of PM and $PM_{2.5}$ is 15% of PM_{10}. What is the basis for this assumption? How was $PM_{2.5}$ emission factor obtained? Controlled PM_{10} shows PM_{10}*escape/100, How is $PM_{2.5}$ emissions calculated. Research 1994 SIP control efficiency of 80%. How was 4% moisture determined after it is crushed? How was wind speed determined at ore storage piles?	PM emission factor estimated using methodology in AP-42, Table 11.9-1 (Active Storage Pile). PM_{10} and $PM_{2.5}$ emission factors derived from ratio of transfer particle size multipliers in AP 42, Fifth Edition, Table 13.2.4 (EPA, 2006). The ratio of transfer particle size multipliers are 0.74 for PM, 0.35 for PM_{10} and 0.053 for $PM_{2.5}$. Therefore, PM_{10} is estimated to be 47 percent of PM (0.35/0.74) and $PM_{2.5}$ is estimated to be 15 percent of PM_{10} (0.053/0.35). Based on a University of Utah study, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI. Moisture content of 4% for ore and waste rock handled at the BCM is based on a site sampling effort during the summer of 1994. This sampling effort is the best available site specific data for the BCM. Wind speed of 7 mph is a historical average based on meteorological stations located at BCM.
Table B1-21 Front-End Loaders How was 4% moisture determined? Controlled PM_{10} shows PM_{10}*escape/100, How is $PM_{2.5}$ emissions calculated.	Moisture content of 4% for ore and waste rock handled at the BCM is based on a site sampling effort during the summer of 1994. This sampling effort is the best available site specific data for the BCM. Based on a University of Utah study, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI.
Table B1-22 Truck Loading How was 4% moisture determined? Research 1994 SIP control efficiency of 80%. Controlled PM_{10} shows PM_{10}*escape/100, How is $PM_{2.5}$ emissions calculated. How was wind speed determined at truck loading sites?	Moisture content of 4% for ore and waste rock handled at the BCM is based on a site sampling effort during the summer of 1994. This sampling effort is the best available site specific data for the BCM. Based on a University of Utah study, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI. Wind speed of 7 mph is a historical average based on meteorological stations located at BCM.
Table B1-23 Truck Offloading of Waste Rock How was 4% moisture determined? How was 7 mph wind speed determined? The SLC airport reports a & mph wind speed but the wind speed would be higher for a higher elevation and at the edge of the dumping area. Research 1994 SIP control efficiency of 80%. How was wind speed determined at truck offloading sites?	Moisture content of 4% for ore and waste rock handled at the BCM is based on a site sampling effort during the summer of 1994. This sampling effort is the best available site specific data for the BCM. Wind speed of 7 mph is a historical average based on meteorological stations located at BCM.
Table B1-24 Graders Controlled PM_{10} shows PM10*escape/100, How is $PM_{2.5}$ emissions calculated? How was vehicle speed determined?	Based on a University of Utah study, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI. Grader operation speed at the BCM is provided by the KUC mine group.

UDAQ Review	KUC Responses
Table B1-25 Bulldozers (Track Dozers) Controlled PM_{10} shows PM_{10}*escape/100, How is $PM_{2.5}$ emissions calculated. How was 8% silt content determined? What is the historical data for 4% moisture content?	Based on a University of Utah study, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI. Bulldozers operate mainly on haulroads and waste rock disposal areas performing "cleanup" operations. Thus, material handled by dozers is subject to FDCP measures. Per the EPA Compilation of Emission Factors, "In the absence of locally derived surface material silt content, users may choose to use the values in this table as default values." The default silt content for the State of Utah, 4%, was applied. (http://www.epa.gov/ttnchie1/ap42/ch13/related/c13s02-2.html) Moisture content of 4% for ore and waste rock handled at the BCM is based on a site sampling effort during the summer of 1994. This sampling effort is the best available site specific data for the BCM.
Table B1-26 Wheeled Dozers Controlled PM_{10} shows PM_{10}*escape/100, How is $PM_{2.5}$ emissions calculated. How was 8% silt content determined? What is the historical data for 4% moisture content?	Based on a University of Utah study, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI. Dozers operate mainly on haulroads and waste rock disposal areas performing "cleanup" operations. Thus, material handled by dozers is subject to FDCP measures. Per the EPA Compilation of Emission Factors, "In the absence of locally derived surface material silt content, users may choose to use the values in this table as default values." The default silt content for the State of Utah, 4%, was applied. (http://www.epa.gov/ttnchie1/ap42/ch13/related/c13s02-2.html) Moisture content of 4% for ore and waste rock handled at the BCM is based on a site sampling effort during the summer of 1994. This sampling effort is the best available site specific data for the BCM.

UDAQ Review	KUC Responses
Table B1-27 Drilling with Water Injection How was 90% control efficiency determined for water injection? How was 90.000 holes per year determined? How is 47% of PM = to PM_{10} and 15% = to $PM_{2.5}$ PM10 emissions calculated using the escape factor of 20%, The $PM_{2.5}$ calculations are not designated.	The control efficiency listed is based on previous determinations of BACT by UDAQ. This control efficiency has been applied in the 1994 SIP and 2005 SIP calculations and modeling. KUC mine group has projected 90,000 holes per year based on 260,000,000 ton mine plan. PM_{10} and $PM_{2.5}$ emission factors derived from ratio of transfer particle size multipliers in AP 42, Fifth Edition, Table 13.2.4 (EPA, 2006). The ratio of transfer particle size multipliers are 0.74 for PM, 0.35 for PM_{10} and 0.053 for $PM_{2.5}$. Therefore, PM_{10} is estimated to be 47 percent of PM (0.35/0.74) and $PM_{2.5}$ is estimated to be 15 percent of PM_{10} (0.053/0.35). Based on a University of Utah study, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI.
Table B1-28 Blasting with Minimized Area What is basis of historical Industrial Hygiene assessment for ammonia? How is blasting area and # of blasts determined? PM_{10} emissions calculated using the escape factor of 20%, The $PM_{2.5}$ calculations are not designated.	In the absence of an applicable emission factor, ammonia emissions are estimated based on a site Industrial Hygiene assessment. The basis of the assessment was the conversion of odorless Ammonium Nitrate to Ammonia, odor threshold of 5 ppm. Blasting area and the number of blasts are projections provided by the KUC mine group. Based on a University of Utah study, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI.
Table B1-29 Tertiary Crushing Controlled PM_{10} shows PM_{10}*escape/100, How is $PM_{2.5}$ emissions calculated.	Based on a University of Utah study, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI.
Table B1-30 Screening Controlled PM_{10} shows PM_{10}*escape/100, How is $PM_{2.5}$ emissions calculated.	Based on a University of Utah study, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI.
Table B1-31 Transfer Points Controlled PM_{10} shows PM_{10}*escape/100, How is $PM_{2.5}$ emissions calculated.	Based on a University of Utah study, emissions of $PM_{2.5}$ are calculated using an escape factor of 21%. A summary of the University of Utah study was included in Appendix D-1 in the NOI.
Table B1-32 SX/EW Copper Extraction How is 80% control determined? How is vaporization rate determined?	The control efficiency is based on the design of the process. Control of 80% will be achieved by the placement of covers at all times except during inspection, sampling, and adjustment. As discussed in the May 12, 2008 NOI for SX/EW plant, the design of the plant estimates that less than one-third (maximum 33 percent) of the residual organic in the raffinate from the proposed plant will evaporate and result in emissions.

UDAQ Review	KUC Responses
Table B1-33 Electrowinning When acf is converted to dscf the atmospheric pressure based upon altitude, is required as is shown here, but the temperature and Humidity are also required for the conversion. How is concentration determined?	Table B1-33 converts acfm to dscfm based on Salt Lake City average temperature, atmospheric pressure and humidity.
Table B1-34 LPG Generators Text states emission data taken from previous NOIs, which NOIs were they taken from?	KUC NOI submitted 12/21/2005 included details for the generators located at Production Control Building, Communication 6190, and Lark Gate. KUC NOI submitted 05/12/2008 included details for the Galena Gulch emergency generator.
Table B1-35 Metal HAP Emissions The HAPs are calculated by PM_{10}*HAP ration on mg/kg, where were these HAP ratios obtained?	Metal HAP concentrations are based on ore and waste rock sampling at the BCM.
Table B1-36 2011 – 2029 Haul Truck Emissions – 260 Mtpy	Tailpipe emissions from haul trucks are summarized in Table B1-36 for the 260,000,000 ton mine plan.
Table B1-37 2011 – 2029 Haul Truck Emissions – 260 Mtpy	Tailpipe emissions from mobile support equipment are summarized in Table B1-37 for the 260,000,000 ton mine plan.
Table B1-38 Emissions Summary	Table B1-38 is a summary table of Point and Fugitive source emissions.
Appendix D-1	
Comments on the University of Utah study	CH2M HILL staff, an expert on CFD modeling, provided a briefing on the study at UDAQ offices on November 3, 2010.