UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

OFFICE OF THE
REGIONAL ADMINISTRATOR

February 21, 2012

Jim Upchurch, Forest Supervisor
Coronado National Forest
300 W. Congress Street
Tucson, AZ 85701

Subject: Draft Environmental Impact Statement for the Rosemont Copper Project, Coronado National Forest, Pima County, Arizona [CEQ# 20110350]

Dear Mr. Upchurch,

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (Draft EIS) for the Rosemont Copper Mine Project (Project). Our review and comments are provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) Regulations (40 CFR Parts 1500-1508), and our review authority under Section 309 of the Clean Air Act (CAA). These comments were also prepared under the authority of, and in accordance with, the provisions of the Federal Guidelines (Guidelines) promulgated at 40 CFR 230 under Section 404(b)(1) of the Clean Water Act (CWA). We appreciate the additional time that the Forest Service granted us to complete our review of this complex proposal.

The proposed action would authorize the construction, operation and closure of the Rosemont Copper Mine (Project) on approximately 3,670 acres of National Forest System land, 995 acres of private land owned by Rosemont Copper, 15 acres of Bureau of Land Management administered land, and 75 acres of Arizona State Land Department land. According to the Draft EIS, the Proposed Project and its alternatives (including the preferred alternative) will violate some of the National Ambient Air Quality Standards (NAAQS) for particulate matter of 10 microns or less (PM_{10}), particulate matter of 2.5 microns or less ($PM_{2.5}$), nitrogen dioxide (NO_2), and ozone (O_3). Despite the inclusion of all proposed mitigation into the air quality modeling for the Project, these impacts are projected to remain at levels that are unacceptable in their risk to human health and the environment. Numerous scientific studies have linked particulate pollution exposure to a range of health problems, including premature death, increased hospital and emergency room visits for cardiovascular and respiratory effects, and development of chronic respiratory disease. Likewise, exposure to NO_2 and ozone has been correlated with increased visits to emergency rooms and hospital admissions for respiratory issues, especially asthma. Furthermore, without additional mitigation, these emissions could cause or contribute to non-attainment designations for Pima County. Such a designation would require Pima County to impose air pollution control requirements on other businesses in the County to meet the air quality standard as quickly as possible.

EPA believes that the Proposed Project also represents a threat to the water quality of Davidson Canyon Wash and Cienega Creek. These water bodies are designated as "Outstanding Arizona Waters" by the State of Arizona under Arizona Administrative Code R18-11-112 and must be afforded the highest level of protection, per Section 303 of the Clean Water Act (CWA) and regulations at 40 CFR 131.12. In response to the Army Corps of Engineers (Corps) Public Notice 2008-00816-MB for the proposed Rosemont Copper Mine Project, EPA issued letters on January 5, 2012 and February 13, 2012, identifying these resources as "Aquatic Resources of National Importance" and identifying this permit action as a candidate for EPA and Corps headquarters review on the basis that permit approval will have substantial and unacceptable impacts on aquatic resources of national importance. This parallel process is occurring pursuant to the EPA-Corps Memorandum of Agreement (MOA) for implementing CWA Section 404(q). The Project would include filling between 26.5 and 50.5 acres of jurisdictional Waters that contribute to these Outstanding Waters. According to the DEIS, this would have direct and indirect consequences on water quantity, quality, and habitat. EPA also believes that the water quality analysis presented in the DEIS may underestimate the project's potential to release contaminated drainage into Waters of the US. In addition to these impacts, the proposed project has the potential to result in adverse environmental impacts to tribal and cultural resources, biological resources, and human health and safety.

The Draft EIS does not adequately assess the potentially significant environmental impacts of the proposed Project. The Draft EIS does not support the conclusion that the Project would not result in exceedance of NAAQS and a potential non-attainment designation for the Tucson area. The Draft EIS makes reference to a number of additional mitigation measures that could be applied to reduce air quality impacts; however, in the absence of modeling and quantification of the effectiveness of these measures, EPA cannot determine that they will sufficiently reduce the projected pollutant emissions to meet standards. The Draft EIS also does not support the conclusion that the operation will not violate State or federal water quality standards. We recommend that the discussion regarding potential impacts to surface and ground water quality be expanded and that the full range of reasonably foreseeable scenarios be analyzed. In addition, the Draft EIS states that the Project will result in the loss of multiple tribal sacred sites and historical sites of national importance, including 111 National Register of Historic Places (many of which contain human remains) and an additional 63 sites of tribal significance. Given the impacts to tribal and historical sites, and the significant objections to the project by the Tohono O'odham Nation and other tribes, we recommend further means to mitigate these impacts. Furthermore, EPA believes that the level of detail contained in the Draft EIS in regards to reclamation/closure and long term, post-closure financial assurance is inadequate to meet the requirements of NEPA. These aspects of mine design are essential to determining long term environmental consequences and should, therefore, be considered in detail in the EIS. Finally, the discussion of mitigation and monitoring in the Draft EIS is inadequate and does not support the conclusion that mitigation measures will protect air and water quality.

Further discussion and recommendations regarding the issues that we have identified are provided in the enclosed "Detailed Comments" and the enclosed copy of our February 13, 2012 letter to the Corps of Engineers, which we are hereby incorporating into our comments on the Draft EIS

Based on the magnitude of the environmental impacts described in the Draft EIS and the significant inadequacies of the document, EPA believes the project should not proceed as proposed, and the information provided in the Draft EIS is inadequate to meet the purposes of NEPA. Accordingly, EPA has rated this Draft EIS as EU-3 – Environmentally Unsatisfactory – Inadequate Information (see

enclosed "Summary of Rating Definitions and Follow-Up Action"). Improved analyses are necessary to ensure that the information in the Draft EIS is adequate to fully inform decision-makers and the public. EPA believes that that the information needed to address the aforementioned inadequacies should be circulated for full public review in a revised or supplemental Draft EIS prior to the issuance of any decision regarding the project. EPA remains available to work with the Forest Service and project proponents to resolve the issues that we have identified. If we cannot resolve these issues in the Final EIS, this matter may be a candidate for referral to the Council on Environmental Quality.

We are available to further discuss all recommendations provided. Please send one hard copy of the Revised or Supplemental EIS and two CD ROM copies to this office at the same time it is officially filed with our Washington D.C. Office. If you have any questions, please contact me at 415-947-8702, or contact Carter Jessop, the lead reviewer for this Project. Carter can be reached at 415-972-3815 or jessop.carter@epa.gov.

Sincerely,

/s/

Jared Blumenfeld
Regional Administrator

Enclosures: Summary of EPA Rating Definitions
Detailed Comments
US EPA response to Army Corps of Engineers Public Notice 2008-00816-MB the Proposed Rosemont Mine Project, dated 2/13/2012

Cc:
Colonel R. Mark Toy, District Engineer, Los Angeles District, U.S. Army Corps of Engineers
Steven Spangle, Field Supervisor, Tucson Field Office, United States Fish and Wildlife Service
Brian Bellew, Field Manager, Tucson Field Office, United States Bureau of Land Management
Ned Norris, Jr., Chairman, Tohono O'odham Nation
C.H. Huckelberry, County Administrator, Pima County
Henry R. Darwin, Director, Arizona Department of Environmental Quality
Maria Baier, Land Commissioner, Arizona State Land Department
Josh Avey, Habitat Branch Chief, Arizona Department of Game and Fish

Air Quality

Impact on National Ambient Air Quality Standards

The Preferred Action (Alternative 4) and all action alternatives will violate, or risk violation of, the National Ambient Air Quality Standards (NAAQS) for particulate matter of 10 microns or less (PM_{10}), particulate matter of 2.5 microns or less ($PM_{2.5}$), and nitrogen dioxide (NO_2). The Draft EIS states that modeling of the Forest Service's Preferred Alternative (Alternative 4) indicates that maximum predicted ambient concentrations for NO_2 (1-hour), PM_{10} (24-hour) and $PM_{2.5}$ (24-hour) are in violation of the corresponding NAAQS at the project site (p. 187). As described in more detail below, we have also identified issues with the modeling performed for the Proposed Action that may affect these values. With respect to Tucson area air quality, the Draft EIS states, "the higher end of the modeled impacts, compared with the maximum PM_{10} level for the Tucson area in 2008, is consistently within 98 percent of the NAAQS," and one modeled result showed an exceedance of the PM_{10} NAAQS (p. 186-87). In addition, the maximum background ozone levels for the Tucson area are already elevated at 0.074 parts per million, or 99% of the NAAQS. (p.186) The Draft EIS states that any of the action alternatives could increase Pima County NO_X concentrations by approximately 5 percent. This pollutant, acting as a key ozone precursor, could increase ozone concentrations in the region. Thus, the project may contribute to potential NAAQS violations in the Tucson area for these pollutants.[1] According to the Draft EIS at p. 200, all modeled air quality impacts account for the application of mitigation measures identified on pages 196-200. Considering the above discussion, it is therefore apparent that these mitigation measures are inadequate to prevent NAAQS violation. For each action alternative, the Draft EIS states that compliance with the NAAQS may be achieved with additional mitigation in the form of changes to the perimeter fencing, the project boundary or additional control measures for haul roads; however the Draft EIS does not provide any commitments to such measures nor any details to allow assessment of their likely impacts or effectiveness.

Recommendations:

- Analyze additional mitigation measures, including, but not limited to those referenced in the Draft EIS as "currently being evaluated," to reduce air pollutant emissions to levels below the NAAQS. Fully describe and discuss these measures in the Revised or Supplemental DEIS, and include the modeling results to support the emissions projections.
- The Revised or Supplemental Draft EIS should discuss the adequacy and practical applications of the mitigation measures, and disclose the requirements of the Air Permit for this project. For example, the original air permit application suggested that control equipment such as a baghouse, and control technologies such as electrostatic precipitation and dust collector could be used. However, these were not identified as committed measures in the Draft EIS.

[1] A more in depth analysis would be necessary to determine the exact expected NOx increase (for this and other cases) and if that impact would indeed violate the ozone NAAQS. (Note: the magnitude and location of the project's NOx emissions relative to other precursors and meteorology would need to be considered. We also cannot assume that the project's greatest contributions to ozone levels will occur at the site of the highest monitor on the highest monitored days.)

- The Revised or Supplemental DEIS should disclose any impacts of the air quality mitigation measures on other resources. For example, if changes to the project boundary could alter the project's impacts on water resources, such impacts should be discussed.

EPA notes that Pima County denied the proponent's application for a permit under the Clean Air Act on September 28, 2011. The Draft EIS makes frequent reference to the Air Quality Permit that Pima County, Department of Environmental Protection (Pima County DEQ) would issue for the Rosemont Project. The Draft EIS relies upon the Air Permit application (and Mine Plan of Operations) as the reference from which the proposed air quality mitigation measures have been determined.

> **Recommendations:** The Revised or Supplemental Draft EIS should discuss the status of the Air Permit application, the reasons for its denial by Pima County DEQ, and the implications of that denial for the Project. The Forest Service should consider incorporating additional mitigation measures directly into the Revised or Supplemental Draft EIS rather than relying on references to the Air Permit application.

The Draft EIS does not consider the ramifications of a possible NAAQS violation and non-attainment designation to Pima County. If the area violates a NAAQS, Pima County, or a portion thereof, could be designated as nonattainment for that pollutant. Such a designation would trigger Clean Air Act requirements for a State Implementation Plan for the nonattainment area, with controls on all significant sources of that pollutant. This would result in widespread effects on actions to be taken in the region, not just the Rosemont Mine. Nonattainment designations for NAAQS would lead to requirements for County and State NAAQS attainment plans; higher costs for communities, industries and businesses; and more stringent regulations.

> **Recommendations**: The Revised or Supplemental Draft EIS should include a detailed discussion of the potential for and ramifications of putting Pima County, or a portion thereof, into non-attainment for any criteria pollutant. The social and economic implications of such action should be considered and discussed, including the implications of what PM_{10}, $PM_{2.5}$, NO_2, and ozone nonattainment designations would have on the Tucson and Saguaro National Park East areas.

The Draft EIS does not provide sufficient justification for the use of 33.0 μg/m^3 as the background 24-hour PM_{10} concentration. In determining the 24-hour PM_{10} background concentration, EPA believes that while it may be appropriate to exclude the 71 μg/m3 value on the basis that it appears to be a statistical outlier, additional justification should be provided in the EIS for doing so. In addition, the Draft EIS relies on the average of concentration values from multiple years (33.0 μg/m3).The 40.3 μg/m3 value would seem a more reasonable concentration to use as it is an actual observed value and represents a more appropriately conservative approach. We also note that EPA guidance also allows for the use of different concentrations for different categories of meteorological conditions, such as stability and wind direction, so that the single high background value is not applied for all hours (40 CFR Part 51 Appendix W, "Guideline on Air Quality Models", section 8.2).

> **Recommendations**: The Revised or Supplemental Draft EIS should discuss the rationale for using the 33.0 μg/m^3 average value as the background concentration level. Unless a sufficient justification can be identified for the use of this value, EPA believes that the Draft EIS should revert to the 40.3 μg/m3 concentration in order to reflect a conservative, real world condition.

No rationale is provided for the scenario used for the NO_2 modeling. According to the Draft EIS, the modeled NO_2 emissions projections rely upon modeling scenarios that utilize an NO_2 to NO_x ratio of 0.1 and 0.05. These ratios are much lower than the generally accepted NO_2 to NO_x default value of 0.50. The Draft EIS states that the NO_2 impacts under scenario 2, which utilized the generally accepted default ratio of 0.50 for NO_2:NO_x were not analyzed. EPA's AERMOD guidance recommends the use of a 0.50 ratio in the absence of more appropriate source-specific information.[2] In addition, modeling results for scenario 3 indicate that the 1-hour NO_2 NAAQS would be exceeded at the project site, whereas results from scenario 4 indicate compliance with the 1-hour NO_2 NAAQS. The Draft EIS fails to explain why it considers one scenario to be more representative than the other in predicting accurate NO_x emissions.

> **Recommendations**: In the absence of more source-specific NO_2:NO_x ratios, scenario 2 should be the primary modeling scenario because it uses the accepted default value. Modeling reflecting scenario 2 should be performed and the results made available and analyzed in the Revised or Supplemental Draft EIS.

Impacts on Class 1 Areas

The Draft EIS indicates that the Proposed Action and the action alternatives would have significant visibility impacts on six Class I areas, including: Saguaro National Park East, Saguaro National Park West, Chiricahua Wilderness Area, Chiricahua National Monument, Galiuro Wilderness Area, and Superstition Wilderness Area. According to the Draft EIS (p. 200), the modeling and analysis contained in the Draft EIS already incorporate all proposed mitigations; therefore, the mitigation efforts proposed thus far for the protection of Class 1 areas are not adequate. To date, EPA believes that the actions taken by the State of Arizona to protect visibility in Class I areas have not been as successful as is needed to achieve long-term visibility maintenance. Additional contributions by the Rosemont project would exacerbate this issue. The Draft EIS also states that the maximum annual average deposition for nitrogen exceeds the Deposition Analysis Threshold at Saguaro National Park West and Galiuro Wilderness Area that would trigger management concerns, but does not identify what would constitute applicable adverse impact thresholds (p.195). Lastly, the EPA notes that the Draft EIS omits mention of two existing sources that impact visibility in Class I areas: Arizona Portland Cement in Rillito and the H. Wilson Sundt Generation Station in Tucson. This project represents a source of cumulative impacts to visibility and should be considered as such.

> **Recommendations**:
> - The Revised or Supplemental Draft EIS should include and discuss far-field CALPUFF modeling results for each action alternative. We recommend presenting this information in a format similar to that of Table 45 on page 194.
> - The Revised or Supplemental Draft EIS should discuss the thresholds for adverse impacts (above which it would be implied that the impacts were adverse) for nitrogen deposition at Saguaro National Part West and Galiuro Wilderness Area, and the implications of exceeding those thresholds. It should also discuss whether further mitigation measures could be applied to address these impacts.

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[2] For both the OLM and PVMRM NO-to-NO2 conversion methods in AERMOD, EPA recommends: "General acceptance of 0.50 as a default in-stack ratio of NO2/NOx for input to the PVMRM and OLM options within AERMOD, in the absence of more appropriate source-specific information on in-stack ratios." ("Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard", Memorandum from Tyler Fox, EPA Air Quality Modeling Group to EPA Regional Air Division Directors, March 1, 2011, p.5).

- The Revised or Supplemental Draft EIS should consider Arizona Portland Cement in Rillito and H. Wilson Sundt Generation Station as contributors to the cumulative deterioration of visibility in Class I areas.

Effectiveness of Proposed Air Quality Mitigation Measures

In regards to particulate emissions, the Draft EIS relies upon the implementation of the minimum statutory requirements, rather than the maximum practicable applications.

Recommendations:

- The level of effectiveness of the proposed mitigation measures should be evaluated individually to allow an understanding of each alternative's effectiveness in controlling fugitive particulate matter emissions that might not be addressed by the air permitting process (e.g., from the tailings area).
- A monitoring and enforcement program should be identified and adopted, where applicable, for each mitigation measure.
- The Revised or Supplemental Draft EIS should explain whether all practicable means to avoid or minimize environmental harm from the alternatives have been adopted, and if not, why they were not.
- In the mitigation measures applicable to the particulate emissions from dry stack tailings, the Revised or Supplemental Draft EIS should identify procedures and criteria by which the plans would be approved or evaluated to ensure that the design of the buttresses at the tailings area would be practicable and adequate in order to "break up air flow" to mitigate or avoid "exposure of the area to windy conditions." Also, please clarify the proper moisture content to ensure that dust generation would be abated; the methods by which binder material and agglomeration chemicals would be applied to the surface of tailings to minimize particulate emissions; and the adequacy of the amounts of such materials and chemicals that would be applied.
- Consider whether Tier 4 cleaner-burning diesel engines would be a proper mitigation measure to reduce engine emissions, e.g. emissions from haul trucks, as Tier 4 engines are commercially available.

Public Health and Safety

The modeling data contained in the Draft EIS suggests that the Project represents a risk to human health as a consequence of exceedance of NAAQS standards. Any modeled concentration exceeding the level of the NAAQS represents a risk to human health and welfare. The Draft EIS states, however, that air quality impacts resulting from the project do not represent a public health threat (p. xxvi). As cited on page 173 of the DEIS, numerous scientific studies have identified a link between particulate pollution exposure and a range of health problems, including decreased lung function, aggravated asthma, heart attack, and premature death in individuals with heart or lung disease. Likewise, exposure to NO_2 has been correlated with increased visits to emergency departments and hospital admissions for respiratory issues, especially asthma. Please refer to EPA's website for additional information on the human health impacts associated with exposure to adverse air quality conditions (http://www.epa.gov/airquality/urbanair/).

Finally, according to U.S. Department of Health and Human Services, Health Resources and Services Administration at http://www.hrsa.gov/, many of the regions within Pima County are designated as

Health Professional Shortage Areas (HPSA). Consequently, some of those individuals impacted by the air emissions associated with this project will not have access to the medical care they require in order to adequately manage their health.

Recommendations: The Revised or Supplemental DEIS should:

- Be revised to reflect the potential health hazards posed by exceedance or near exceedance of the NAAQS.
- Include an assessment of the potential human health risks associated with the incremental contribution of the Rosemont Copper project to regional air quality.
- Address and discuss mortality and morbidity levels that may be associated with that incremental increase and the adverse economic impact of the healthcare costs associated.
- Discuss whether the project occurs in an HPSA or Medically Underserved Area (MUA) and the extent to which a lack of access to medical care may further exacerbate potential health impacts.
- Identify mitigation measures to minimize the Project's impacts on public health and safety due to air pollutant emissions.

Geochemistry and Water Quality

Potential to produce seepage

Based upon the information contained in the Draft EIS, EPA believes that the project may pose a risk to both ground and surface water quality as a consequence of possible seepage from mine facilities. Although the Draft EIS states that none of the alternatives are expected to result in any seepage that exceeds Arizona Water Quality standards, this determination is not adequately supported in the Draft EIS. The analysis, as described in the DEIS, is not based upon a reasonable assumption in its determination of the project's potential to produce leachate, both in terms of the quantity and the contaminant load of possible seepage. As a result, EPA believes that the analysis employed for this project underestimates the risk to water resources.

The Draft EIS does not support the assumption that meteoric water infiltration and seepage will be negligible. According to the Draft EIS, "Overall, infiltration from precipitation over tailings, waste rock, or the heap leach facility is expected to be negligible. Near-surface storage is expected to be such that any precipitation that does not immediately run off will be stored in the near surface and lost to evaporation or transpiration by vegetation" (p. 287). Given extensive evidence of water infiltration through mine features resulting in seepage at Arizona and New Mexico mine sites that have climatic conditions similar to the Rosemont site, we would expect a similar outcome at Rosemont. EPA has identified the following key issues related to modeling of water infiltration through the mine features:

- In a technical memorandum issued by SRK Consulting on April 30, 2010, entitled "Technical Review of *Infiltration, Seepage, Fate and Transport Modeling Report,* Tetra Tech, 2010, Prepared for Rosemont Copper Company," SRK states, "The transient simulations reported… are one year in duration using average climatic conditions. However, movement of moisture through such materials often takes many years, a reasonable approach would be to conduct the 50-year transient simulations utilizing the entire 50-year climatic data set..." (p. 19) In the November 23, 2010 response to this document prepared by Tetra Tech for the Rosemont Copper Company, EPA was unable to identify where this particular matter was addressed. We concur

with SRK Consulting in their assessment of this issue and believe that the model should be run utilizing the entire 50-year climatic data set without averaging.

- The original *Infiltration, Seepage, Fate and Transport Modeling Report,* Tetra Tech, 2010, prepared for Rosemont Copper Company, states that the average conditions "dataset has small amounts of precipitation everyday because of the averaging of many years of data." (P. 21) Tetra Tech goes on to refer to this approach as "conservative". SRK Consulting subsequently questioned this approach in their April 30, 2010 review memorandum. Tetra Tech (2011) responded that "[t]he average conditions dataset…has precipitation nearly every day of the year. This is not likely to occur in Arizona, but would be a worst case scenario. Water is more likely to readily infiltrate into a facility if the upper surface is wet, so considering a climate conditions with a small amount of precipitation each day would produce such a condition and provide a result of the worst case infiltration" (p. 2). EPA believes that Tetra Tech's observation supports just the opposite of its conclusion. By modeling a small amount of precipitation each day, any excess moisture is rapidly removed by evaporation. However, in reality, precipitation tends to fall in periodic events wherein large volumes of water accumulate and are not always subject to sufficient evaporation before moving through the soil profile. This effect has been demonstrated at various mine sites in the western U.S. and has resulted in a general understanding, not applied in the Rosemont modeling effort, that actual rather than averaged data is critical to accurate assessment of potential for seepage to occur from mine features.
- The modeling employed to predict possible seepage does not address the potential for preferential flow paths to develop through mine features. Preferential flow pathways are typically more likely to be responsible for seepage moving through mine features than the homogenous conditions assumed by the model. Experience at other sites has shown that preferential pathways occur to varying degrees, but are particularly prevalent in waste rock dumps, which are highly heterogeneous. This effect may also occur to varying degrees in tailings and leach piles where the nature of their construction can promote formation of preferential flow even through relatively homogenous material.

Recommendations: The Revised or Supplemental Draft EIS should:

- Explain how predictions of water infiltration at the Rosemont site are determined, including what assumptions were used and how they address the range of climactic conditions that might be expected to occur.
- The hydrological modeling performed for the project should be further conducted to resolve the issues identified above (e.g. climate data for period of record, averaging of data, artificial boundary conditions for water penetration).
- A sensitivity analysis should be performed which allows for variance of key assumptions. The revised or supplemental Draft EIS should incorporate the additional findings and be based upon supportable results from the sensitivity analysis. Any assumption of the presence of seepage should be supported by a 95% confidence level or higher within the sensitivity analysis.

Geochemical Characterization

The Draft EIS does not adequately describe the procedures used and assumptions made in regards to geochemical characterization; nor does it adequately consider the real world implications of laboratory test results. The Draft EIS contains a relatively brief discussion of geochemistry and the geochemical analysis performed for the Rosemont project (intermixed through pages 287-293 and 339-345). In our 7/28/11 comments on the Deliberative Draft EIS, we recommended

that this discussion be expanded significantly and consolidated into a single section in order to better describe the tests performed and assumptions made in order to reach the conclusions contained in the EIS. EPA finds that the discussion of geochemistry in the Draft EIS is still inadequate.

The geochemical analysis in the Draft EIS relies heavily upon the synthetic precipitation leaching procedure (SPLP). The SPLP (USEPA Method 1312) was developed to evaluate the fate and transport of metals in an engineered land disposal facility from which municipal solid waste is excluded. USGS modified the procedure to be used to measure fraction that controls rapid leaching. SPLP, like all short-term leach tests provides an indication of extent of leaching of salts and readily dissolvable constituents from dried mine materials. Static tests of this nature provide a preliminary simulation of short-term interaction with rain/snowmelt. These tests do not, however, provide any data regarding when acidification may occur or the rates at which acid generation and neutralization reactions will proceed. As such, they are useful only for screening samples for their potential behavior.

Furthermore, the high liquid:solid ratio (20:1) that is used in this method may dramatically underestimate leachability and the contaminant load of potential leachate. In a November 23, 2010 technical memorandum issued by Tetra Tech entitled, "Rosemont Infiltration, Seepage, Fate and Transport Response to Comments", Tetra Tech indicates that "No adjustments were made to the Synthetic Precipitation Leaching Procedure (SPLP) and Meteoric Water Mobility Procedure (MWMP) data prior to using the information in the modeling. There is much debate about the proper scale up methods applied to this type of data, and there is currently not enough information to implement any type of adjustment." (p. 12) Under real world conditions, it is reasonable to anticipate that seepage may occur with far less dilution than employed in the SPLP test, in which case, expected concentrations of constituents such as arsenic and selenium could be many times those predicted by this method.

Recommendations: The Revised or Supplemental Draft EIS should:

- Further describe the SPLP procedure performed. It should be supplemented with a detailed discussion of the results of the kinetic testing performed for the project.
- Include an explanation of how static testing methods like SPLP meet the Arizona Department of Environmental Quality's Best Available Demonstrable Control Technology requirements for characterization of mining waste when it is a generally agreed that kinetic testing is the best method upon which to base any long-term water quality predictions.
- Clearly state that the SPLP test method is intended to predict short-term water quality only, and is not a good predictor of long-term leachate quality unless samples have been aged to allow salt formation to occur prior to testing.
- Examine whether SPLP is the most appropriate geochemical test for determining the mine's potential to produce long term water quality impacts. EPA recommends that the Coronado NF closely consider whether the kinetic test results might form stronger basis for this analysis in the Draft EIS. A more conservative approach for the Rosemont mine should recognize the potential for significant seepage and address mitigation in a pro-active manner.
- Include and evaluate additional tests using methods with a more appropriate liquid:solid ratio, such as bottle roll leach tests using a 2:1 liquid to solid ratio, This is more reflective of limited infiltration rates should be included and evaluated in the Revised or Supplemental EIS in addition to the kinetic test results.

While the Draft EIS contains a lengthy discussion on the geology and mineralogy of deposit (p. 109-136) it provides no mention of comparison to other regional copper deposits to provide for site analogs. Site analogs are an important consideration in the evaluation of acid rock drainage and contaminant

leaching potential. Site analogs are often times are much more predictive of future site conditions at new mines than baseline geochemical characterization methods presently allow.

> **Recommendations**: The Revised or Supplemental Draft EIS should discuss other regional copper deposits as site analogs from the standpoint of geology and geochemistry. The document should also discuss why it expects the Rosemont project to have different results from regional copper porphyry mines (e.g. Sierrita, Mission, etc) where water quality impacts have been observed that likewise were not predicted.

Waste Rock Seepage

The analysis of possible waste rock seepage in the Draft EIS appears to underestimate both seepage volume and the potential water quality impacts that could result. According to the Draft EIS, "No seepage is expected from the waste rock storage areas, although stormwater control basins along the periphery and benches may result in infiltration that may contact waste rock, and very large precipitation events could result in infiltration and seepage" (p. 287). As EPA noted in our 7/28/11 comments on the Deliberative Draft EIS, the use of stormwater retention/detention basins of any sort on top of tailings or waste rock facilities seems directly contradictory to the goal of avoiding water infiltration into these facilities. Such a design feature would seemingly serve to ensure infiltration by accumulating any appreciable precipitation into one location where the overall rate of evaporative loss would be slowed. Even if these basins are to be lined, this design feature would create an unnecessary long term maintenance issue that would need to be addressed and paid for post closure.

> **Recommendations**: EPA recommends that stormwater control structures on and adjacent to waste rock or tailings impoundments be designed in a manner consistent with the stated goal of reducing infiltration into these facilities. The construction of stormwater retention basins of any nature on top of waste rock piles seems imprudent, at best, and should be carefully reconsidered and thoroughly justified if such features are to remain in the project design.

SPLP test results may significantly understate the potential for seepage waters to exceed Arizona Aquifer Water Quality Standards. Based on SPLP testing methods, the Draft EIS concludes that "None of the constituents predicted in the waste rock seepage exceed current Arizona Aquifer Water Quality Standards (AWQS). Arsenic (As) is predicted to exceed the proposed lower arsenic standard of 0.010 milligram per liter" (p. 288). In EPA's experience, and based on information at other sites, it is highly likely that the approximately 2,000 acre waste rock pile will produce seepage in an intermittent manner, highly dependent on annual and/or seasonal precipitation cycles. This will result in relatively small amounts of seepage being exposed to large amounts of potential contaminants, leading to leachates of much higher concentration than predicted by SPLP testing methods. Arsenic is present as a contaminant at numerous hardrock sites in the western US and is likely associated with copper mineralization. Because of its relatively high solubility at neutral pH it is often overlooked when focusing on acid rock drainage, and has frequently resulted in concentrations greater than predicted by SPLP tests at other sites.

It should also be noted that selenium is predicted to be 0.036 milligram per liter, versus the AWQS of 0.05 milligram per liter. Less than doubling of predicted concentration would result in an exceedance of water quality standards for selenium. Given the high liquid:solid dilution ratio employed in the SPLP tests performed for the geochemical characterization, EPA believes that it is highly likely that any seepage produced from waste rock storage facilities would exceed the Arizona Aquifer Water Quality

Standard of 0.05 mg/L for selenium. Selenium has been a contaminant of concern at other hardrock mine sites in the U.S., is mobilized under neutral conditions similar to arsenic, and can result in significant additional reclamation and groundwater remediation costs.

> **Recommendations**: As previously stated, the analysis in regards to the potential for waste rock seepage should be more conservatively considered. EPA believes that it is appropriate for the Forest Service to require the project proponent to develop a contingency/adaptive management plan that recognizes the potential for various adverse impacts to occur, including release of arsenic to groundwater at concentrations exceeding applicable standards. EPA recommends that a means of mitigating those events be considered as part of the original Plan of Operations. By considering what might be necessary as a contingency measure, it is possible to affect initial designs to more readily, efficiently, and cost effectively mitigate potential future problems.

The Draft EIS does not address actual fate and transport of contaminants from the waste rock pile. The Draft EIS assumes that "Seepage from the waste rock facility is not expected to occur, but in the event it does because of large precipitation events, it is not expected to exceed any numeric Arizona Aquifer Water Quality Standards" (p. 290). As previously stated, EPA does not agree with this conclusion and believes it is based upon an analysis that is not appropriately conservative in its assumptions and conclusions.

> **Recommendations**: The Revised or Supplemental Draft EIS should recognize that this seepage has to potential to exceed selenium, arsenic and other water quality standards. Accordingly, the document should discuss the fate and transport of these contaminants, their potential downstream effects, how these effects would be mitigated, and the expected effectiveness of any such mitigation.

Tailings Predicted Seepage

The analysis of tailings seepage in the Draft EIS appears to underestimate both seepage volume and the potential water quality impacts that could result. According to the Draft EIS, "Seepage from the tailings stack will develop as a result of the loss of the pore water present during stacking. Seepage from the tailings facility is estimated to rise to 8.4 gallons per minute (gpm) over the active life of the mine, …reaching zero seepage approximately 500 years after closure." The Draft EIS also indicates that, based on synthetic precipitation leaching procedure (SPLP) tests, the predicted water quality for seepage from tailings is not expected to exceed applicable standards (p. 287). EPA disagrees with these conclusions. Firstly, the Draft EIS appears to again understate the project's potential to produce seepage. For example, if it is assumed that overall infiltration of precipitation equals 0.25 inches on an annual basis, then for an 870 acre tailings facility footprint such as described in the document, this would equate to 11.2 gpm, rather than the 8.4 gpm referenced in the Draft EIS.[3] Secondly, as discussed above, SPLP measures readily soluble components of mine wastes. SPLP does not provide the type of long-term leach rate data necessary to conservatively make this determination.

> **Recommendations**: The Revised or Supplemental Draft EIS should:
> - Further evaluate infiltration/seepage rates and include conservatively predicted values. A more conservative approach would recognize the potential for significant seepage and addresses mitigation in a pro-active manner.

[3] (0.25 inch/yr x ft/12 inch x 870 acres x 43560 ft2/acre x 7.48 gallons/ft3 x yr/365 days x day/24 hr x hr/60 min)

- Include and evaluate kinetic testing and additional tests using methods with a more appropriate liquid:solid ratio, such as bottle roll leach tests using a 2:1 liquid to solid ratio that is more reflective of limited infiltration rates.
- Include kinetic testing for the project and provide a more detailed discussion of the results.

Heap Leach

The analysis of heap leach seepage in the Draft EIS does not include an adequate discussion of the risks of employing an essentially untested design strategy (complete encapsulation in waste rock), nor does it adequately disclose the design or effectiveness of drain-down control methods. According to the Draft EIS, "Seepage from the heap leach facility will be present and collected during the leaching process, which is expected to take approximately 6 years. Seepage will also be present and collected approximately 3 years after cessation of leaching, at which time the heap leach facility will be closed and encapsulated with waste rock. At the time of closure, seepage from the heap leach facility is estimated to be approximately 10 gallons per minute. Modeling indicates that heap leach seepage will decrease to 5 gallons per minute 5 years after closure and to 1 gallon per minute 45 years after closure and that seepage will cease approximately 115 years after closure (Tetra Tech 2010e)" (p. 287).

The Draft EIS also states that "Encapsulation of a heap leach facility with waste rock is not typical with open-pit mines, as usually heap leach activities continue throughout the life of the mine… Waste rock encapsulation is expected to be beneficial for two reasons: prevention of infiltration through the heap leach, and the presence of large volumes of acid-neutralizing waste rock. However, access to collect and treat the heap leach seepage after encapsulation has not yet been determined; this will be determined as part of the aquifer protection permit" (p. 287). EPA is not aware of any previous examples in the U.S. where a heap leach has been encapsulated within a waste rock pile, much less an acid-based copper heap leach pile. As discussed above, EPA questions the assumption that meteoric water will not infiltrate the waste rock pile and produce seepage and believes that encapsulation of the heap leach facility in waste rock will not necessarily prevent infiltration. In addition, the presence of large volumes of acid-neutralizing waste rock, as mentioned in the text of the Draft EIS, would only be beneficial to the extent that such material is to be located below or downgradient of any heap leach seepage. Furthermore, EPA believes that the omission of detailed information with regard to how heap leach drain down will be accessed and treated after closure of this facility is not appropriate for the purposes of NEPA compliance. This is a significant design component that could have substantial bearing on the environmental impacts of the project.

Recommendations: The Revised or Supplemental Draft EIS should:

- Address whether the cited heap leach drain down rates are adequately conservative. It should discuss how Rosemont would proceed should seepage rates exceed their expectations at the time that they intend to begin encapsulation with waste rock.
- Further elaborate on the proposal to encapsulate the heap leach pile with waste rock and provide information from any analog sites where this method has been utilized. It should better support the assertion that encapsulation would prevent infiltration, given the above comments and the history of copper mining in the region.
- If neutralizing waste rock is expected to act as a buffer against acidic drainage, the Revised or Supplemental Draft EIS should cite the analysis performed to indicate that this strategy would be successful and why the resulting neutral drainage would also meet standards.
- Include the specific design to be utilized to capture and treat all heap leach drain down and possible seepage to ensure water quality protections. In addition to a more detailed discussion

of the method whereby any potential seepage will be collected, EPA believes that the Revised or Supplemental Draft EIS should consider a heap leach closure plan that incorporates an engineered, sloped, low permeability cap to more effectively preclude meteoric water infiltration. In EPA's opinion, such measures may represent the difference between a facility with low risk of environmental contamination and one that represents a substantial risk to the environment.

Predicted heap leach drain down will exceed standards if it is not adequately treated. Data provided in the Draft EIS show that modeled water quality for untreated seepage from heap leach exceeds standards for cadmium, fluoride, nickel, and selenium. The modeling also shows that after treatment with an engineered biological system, this seepage would be expected to meets standards. According to the Draft EIS, "While modeling demonstrates the ability to meet groundwater standards with treatment, the actual requirements for treatment, discharge, and monitoring of seepage following closure of the heap leach facility and burial in waste rock will be determined by the Arizona Department of Environmental Quality. A long-term maintenance plan to ensure continuation of treatment, if needed, has not yet been developed and is expected to be included under the Aquifer Protection Permit program administered by the Arizona Department of Environmental Quality" (p. 289-290). The effectiveness of the seepage treatment system is a critical factor in determining the environmental impacts of the project. The results presented suggest extremely low concentrations of nickel and selenium would be achieved (8.89E-07 and 7.6E-13 respectively). These values are well below known instrument detection levels or reduction efficiencies (+99.9999%). EPA is skeptical that the reported efficiencies are scientifically supportable. We have significant concerns that this treatment scheme may never perform at the levels necessary to ensure that heap leach drain down does not exceed Arizona Aquifer Water Quality Standards.

Recommendations: The Revised or Supplemental DEIS should provide more information on the engineered biological system that was utilized to model compliance with water quality standards. EPA believes that the Aquifer Protection Permit or the provisions therein should be summarized or attached to the Revised or Supplemental Draft EIS in order to better inform the public and decision makers of the environmental protection measures that will be applied.

Groundwater Impacts

The Draft EIS does not include sufficient discussion of how Best Available Demonstrated Control Technology will be implemented for groundwater protection. According to the Draft EIS, the analysis of the project's potential impacts on water quality is based on two factors: 1) Ability to meet Arizona Water Quality Standards and 2) Ability to demonstrate best available demonstrated control technology (BADCT) (p. 279). The Draft EIS defines BADCT to mean "the use of the most applicable and effective techniques available to prevent groundwater contamination." (p. 281). According to the Draft EIS, the project demonstrates BADCT based on: (1) geochemical modeling of potential seepage from the tailings and waste rock facility, which demonstrates that the design is capable of preventing discharge of contaminants to groundwater, and (2) geochemical modeling of the heap leach, which indicates that one type of passive treatment system is *conceptually* capable of preventing discharge of contaminants (p. 295-296). No further information is provided on how BADCT is applied to potential water quality issues and no further technical details are provided to describe how post operation heap leach drain down will be treated. The Draft EIS does not consider the possibility that real world conditions may not replicate modeling results, or that modeling results underestimated the potential risks

posed by the project. As previously stated, based upon our experience with other mine sites, EPA believes that a greater level of conservatism should be applied to the modeling and analysis at this site in order to adequately ensure water resources are protected.

> **Recommendations:** The Revised or Supplemental Draft EIS should include a more detailed discussion of how ADEQ's BADCT requirements will be applied at the site should seepage or other water quality impacts be identified.

The provisions and requirements of the Arizona Aquifer Protection Permit should be included, at least in draft form, in the Revised or Supplemental Draft EIS. Much of the discussion of engineering design and performance, seepage and leakage monitoring and recovery, and potential groundwater impacts in general hinges on the regulatory requirements of the Arizona Department of Environmental Quality's (ADEQ) Aquifer Protection Permit (APP). In our July 28th, 2011 comments on the Deliberative Draft EIS for this project, EPA recommended that the provisions of this Permit be discussed to the extent possible in the Draft EIS. We have not been able to identify any additional substantive details of this Permit in the Draft EIS. The APP would include everything from monitoring frequency, mitigation action thresholds, and provisions whereby ADEQ could mandate post-closure financial assurance. The APP, therefore, is expected to contain information that EPA believes to be critical to the determination of the project's potential impacts upon the environment and, as such, necessary for the Draft EIS to meet the requirements of NEPA. EPA understands that as of December 20, 2011, the ADEQ Draft APP based upon the original Mine Plan of Operations for the Rosemont Copper Project is available for public review and comment.

> **Recommendations**: The Revised or Supplemental Draft EIS should:
> - Include a summary of the details and requirements of the Arizona Aquifer Protection Plan, in at least its draft form.
> - Describe how BADCT would be applied to prevent potential water quality issues.
> - Address the potential that future water quality monitoring at the Rosemont mine may show contaminated discharge issues and address how mitigation and financial assurance requirements would be determined.

Background arsenic concentrations in groundwater may exceed the new proposed standard. According to the Draft EIS "Arsenic is a common naturally occurring metal contaminant in Arizona groundwater, and concentrations in project area groundwater samples ranged from below detection limits to 0.026 milligram per liter, well below the Arizona Aquifer Water Quality Standard of 0.05 milligram per liter. However, it should be noted that the standard for arsenic is proposed to decrease to 0.01 milligram per liter." (p. 285)

> **Recommendations**: The Revised or Supplemental Draft EIS should clearly state that existing concentrations of arsenic range to as high as half the existing standard of 0.05 milligram per liter, and in some cases exceed the proposed standard of 0.01 milligram per liter. Half the existing standard should not be characterized as "well below the…standard", particularly where the standard is likely to be lowered, resulting in those concentrations being greater than the standard.

Financial Assurance Bonding

The Draft EIS does not contain an adequate discussion of the project's potential need for long term post-closure treatment and corresponding financial assurance bonding. The Draft EIS states

that "As part of the approval of an MPO [Mine Plan of Operations] for the Rosemont Copper Mine, the Forest Service would require Rosemont Copper to post financial assurance, or reclamation bond, that would provide adequate funding to allow the Forest Service to complete reclamation and postclosure operation… for as long as required to return the site to a stable and acceptable condition." (p. 80). However, the Draft EIS does not contain any information in regards to the nature of the post-closure activities that the site may require, nor the projected costs associated with these activities. EPA is, therefore, unable to determine the extent to which the project may represent a long term financial liability. While the APP program is referenced in regards to providing an alternate mechanism for ensuring adequate long term financial bonding, EPA's understanding of the APP system is that it operates in a reactive way, requiring financial obligations for mitigation once monitoring identifies such a need. It should be noted, however, that at a number of existing copper mines in Arizona, it appears that after several years of monitoring of pit lakes, tailings and leach piles, the APP for these sites has resulted in the determination of requirements for significant activities and financial assurance to address contaminated water discharge issues. This includes APP BADCT requirements related to tailings and the open pit at the Bagdad copper mine with a financial assurance cost estimate of $50.3 million, and the Morenci copper mine open pit with a financial assurance cost estimate of $120.6 million. These large financial assurance requirements are illustrative of the scale of the liability an under bonded or unbonded project could present.

> **Recommendations:** The Revised or Supplemental DEIS should further discuss the project's need for long term financial assurance. It should summarize all post-closure activities that the Forest Service anticipates and their associated costs. It should contain, in a draft form, a financial assurance cost estimate. Furthermore, it should address how financial assurance requirements would be obtained based on future monitoring through the APP program if the project proponent were no longer financially viable following the unplanned cessation or planned conclusion of operations.

Aquatic Resources

The information presented in the Draft EIS does not adequately support the conclusion that the significant direct and indirect impacts of the project upon Waters of the US and Outstanding Arizona Waters can be reduced or mitigated to the extent necessary to meet State and Federal statutory requirements. Army Corps of Engineers regulations prohibit issuance of a CWA Section 404 permit if it would jeopardize the continued existence of listed species, result in violation of water quality or toxic effluent standards (40 CFR 230.10(b)), or cause or contribute to significant degradation of waters (40 CFR 230.10(c). In addition, pursuant to section 303 of the Clean Water Act (CWA) and regulations at 40 CFR 131.12, the state's "Outstanding Water" designation means both Davidson Canyon Wash and Cienega Creek must be afforded the highest level of protection, and that no degradation of water quality is allowable.

Impacts to Davidson Canyon Wash and Cienega Creek

EPA believes that the Draft EIS understates the environmental impacts that will result from the loss of upstream contributions of surface water to Davidson Canyon wash and Cienega Creek. According to the Draft EIS, the Project would result in the permanent loss of 26.5 to 50.5 acres of waters of Waters of the United States (depending upon which alternative is selected). The Barrel Alternative, the preferred alternative, would result in the loss of 39.9 acres of Waters, including the Scholefield and Fig Tree Springs wetlands. EPA notes that, according to the Draft EIS, the direct and indirect loss of

riparian habitat supported by ephemeral and intermittent waters totals 1,364 acres (Table 98, p. 358), representing ~29% of the total riparian habitat found within the 145,000-acre project area. Additional indirect effects include: 1) change in hydrology of the waters; 2) decrease in water quality from the impairment of floodplain and ecosystem services, including water filtration, groundwater recharge, and flood attenuation; 3) disruption of hydrological and ecological connectivity; and 4) decrease in biodiversity and ecosystem stability.

All of the proposed alternatives will result in alteration of the natural surface hydrology by way of either direct loss of watershed area (i.e. the pit itself) or modification of natural flow in the form of stormwater basins and diversions designed to slow or convey storm water around mine areas. Impacts related to surface water quantity include the modification of stormwater peak flows, modification to overall runoff volume from the watershed, and the direct loss of stock tanks. Reductions in runoff are primarily important because they indirectly impact the water availability for downstream use. The preferred action will reduce stormwater runoff from the project area by 33.8%; other alternatives reduce runoff between 22.8% - 45.8% (p. 314, Table 80). The Draft EIS estimates stormwater flow in the Davidson Canyon watershed will be reduced 3.6 -7.1% (p. 315). Reductions in surface water availability in Davidson Canyon will result in adverse effects to riparian vegetation and wildlife use, including by endangered, threatened or sensitive aquatic species.

From a modeling perspective, the Draft EIS mistakenly evaluates flow conditions based on average annual flow volumes and peak flow volumes. This analysis overlooks the importance of downstream ecological resources, specifically, the perennial flow of a stream located in southern Arizona. The continued existence of perennial flow in these stream reaches is based on critical (e.g., low flow) conditions, not average or peak flow conditions. It is unclear from the Draft EIS the extent to which the perennial stream flow is dependent upon upstream surface flows and subsurface alluvial waters contributed from the project site and, therefore, the full extent of impacts the project will have on critical conditions at downstream Outstanding Waters. Based upon the DEIS, the project will adversely affect portions of Davidson Canyon Wash and Cienega Creek that are designated by the State of Arizona as *Outstanding Arizona Waters*.

Additionally, the Draft EIS states the proposed project will reduce sediment delivery by 51% from the project site, and by 5% at the mouth to Davidson Canyon (page xxvii). The reduction in the delivery of sediment to Davidson Canyon Wash and Cienaga Creek will adversely affectwater quality by increasing total suspended sediment in surface water flows and geomorphologically altering the stream bed, causing problems with soil scour or aggradation. Aggradation and scour can result in the filling and scouring of pools and riffles used by fish and other aquatic organisms. These changes in channel morphology can also include bank erosion and the loss of riparian vegetation as the channel adjusts to a new sediment, water, and energy equilibrium.

Increased scour will likely result in significant changes to water quality by increasing total suspended sediment in surface water flows. Elevated levels of suspended sediment or moderate-to-high turbidity will likely have significant adverse effects on aquatic organisms in Davidson Canyon Wash and Cienega Creek. Beyond recognizing that changes in sediment delivery "have the potential to cause aggradation or scour, including riparian areas in the reaches designated Outstanding Waters", the Draft EIS does not further analyze or quantify this potentially significant impact.

Recommendations:

- EPA believes the impacts of flow volume reduction from the proposed project to downstream Arizona Outstanding Waters should be classified as a "direct" impact, not "indirect."
- Given what appear to be inconsistencies in the data presented on pages 308 and 315, the Revised or Supplemental Draft EIS should clarify all calculations used to determine projected flow regimes.
- The Revised or Supplemental Draft EIS should provide a detailed evaluation of the existing hydrologic and geomorphic flow regimes from the project site along Davidson Canyon to its confluence with Cienega Creek, as well as a detailed evaluation of the projected hydrologic and geomorphic impacts of the project to this same area. The potential impacts to downstream areas, especially perennial waters, should be described in detail. Specifically, the impacts to perennial waters should be evaluated based on low-flow, critical periods in addition to the evaluation of average annual and peak flows.

Cienega Creek should be included in the analysis area for impacts to surface water quantity resulting from the project. The Draft EIS evaluated the direct modification of the topography and alteration of the surface water regime on the project area as a result of mining and associated infrastructure, as well as the indirect effects of the mining activities on downgradient surface water drainages. The analysis area included the immediate sub-watershed and the portion of Davidson Canyon that receives discharges from the project area and is tributary to lower Cienega Creek. The Draft EIS did not include Cienega Creek within the analysis area for surface water quantity (p. 297). The applicant did not analyze Cienega Creek because they concluded that the affected drainages represent approximately 2 percent of the Cienega Creek watershed and expect reductions in flow to be negligible. According to Zeller (2011), a regression equation estimated a reduction in annual runoff for Cienega Creek at Pantano Wash at 1 percent due to the proposed project (p. 297).

The Pima Association of Governments (PIMA AG) has conducted 20 years of hydrologic monitoring along Cienega Creek, including documentation of the relative contribution of surface and groundwater flows from Davidson Canyon Wash to base flows in Cienega Creek. (PIMA AG 2003)[4]. Davidson Canyon Wash, an intermittent stream upstream of its confluence with Cienega Creek, contributes significant flood flows to Cienega Creek during runoff events. Through analysis of water chemistry and stable isotopes, PAG also found that between 8 and 24% of Cienega's perennial base flows are attributable Davidson Canyon Wash's underflow contributions. Any decreases in the surface flows of Davidson Canyon resulting from the mine are therefore likely to significantly reduce contributing base flows to Cienega Creek. In addition, base flows in Davidson Canyon Wash are lower in dissolved solids than Cienega Creek, which could dilute Cienega Creek and provide beneficial effects to some aquatic species (PIMA AG 2003).

While the Draft EIS did not analyze adverse effects to Cienega Creek through surface water modifications of its contributing tributaries, the Biological Resources section of Chapter 3 identifies several adverse environmental effects to Cienega Creek as a result of mining. These include expected drawdown in Cienega Creek of 1% to 3% of annual flow after 1,000 years and the potential to result in perennial sections of Cienega Creek to stop flowing during critical times. Although the Draft EIS states the decrease in groundwater would occur over a long period of time, the reduction in stream flow could impact aquatic species needing standing or flowing water (p. 387). Monitoring has indicated the region is in the midst of the long term drought (PIMA AG webpage). Any changes in the hydrological regime of Cienega Creek would serve to further exacerbate the deleterious effects brought on by drought.

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[4] Pima Association of Governments .2003. *Contribution of Davidson Canyon to Base Flows in Cienega Creek*, 40pp.

Additionally, approximately 490.0 acres of hydroriparian and mesoriparian habitat along Cienega Creek will most likely be impacted by potential changes in groundwater level.

As stated in the Draft EIS (p. 322), all action alternatives would result in some variation of irreversible and irretrievable commitment of surface water resources, with each alternative resulting in varying amounts of indirect loss to ephemeral flow in downstream drainages. EPA believes these losses are not restricted to reductions in ephemeral flow, but will adversely affect intermittent and perennial flows in downstream drainages, namely Cienega Creek. Therefore, based upon the information contained in the Draft EIS, surface water modifications of its contributing tributaries will have significant impacts upon Cienega Creek.

> **Recommendations**: Cienega Creek should be evaluated in the Revised or Supplemental DraftEIS to fully disclose the direct and indirect impacts as a result of the proposed project, a complete functional assessment of all waters of the U.S. on the project site, and additional analysis of the project's indirect effects to waters of the U.S.

Impacts to Springs and Seeps

The Draft EIS should include a functional assessment of seeps and springs on the project site and a more quantitative analysis of the project's predicted impact upon the ecosystem services provided by these water sources. According to the Draft EIS, 63 springs are expected to be lost from direct disturbance or lowering of the groundwater table during construction and operation (table 108, p. 436). Impacts to Scholefield No. 1 and Fig Tree springs are likely to occur within the active life of the mine as a result of drawdown in the regional aquifer. Riparian vegetation associated with these springs likely would be lost completely; WestLand Resources estimates approximately 0.8 acre of riparian habitat are associated with these springs (WestLand Resources Inc. 2010d)." (page 388).

Wetlands are special aquatic sites under EPA's Guidelines at 40 CFR 230.41. Special aquatic sites are given special recognition under CWA regulation because of their importance in maintaining the health of the aquatic ecosystems. The special aquatic sites impacted by the proposed project possess special ecological characteristics of high food-web productivity, physical habitat for aquatic life, water quality functions, and other important and easily disrupted ecological functions. The wetlands contribute to the general overall environmental health and functional capacity of the entire ecosystem of the region.

Desert springs, often the sole sources of water for wildlife, support wetland ecosystems including rare and endemic species (Patten et al 2007)[5]. Anthropogenic alteration of groundwater resources is considered one of the greatest threats to long-term sustainability of groundwater dependent ecosystems in arid and semi-arid regions (Patten et al 2007). Direct and indirect impacts to these seeps and springs as a result of the preferred alternative will affect the aquatic biota dependent on the range of spring-associated water sources. Following groundwater withdrawal, should the spring continue to flow, the wetlands supported by the outflow would be truncated. The amount of area suitable to support wetland species would be greatly reduced and the species least tolerant of drying conditions would be extirpated first and eventually replaced by transition upland species (Patten et al 2007).

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[5] Patten, P.T., L. Rouse and J.C. Stromberg. 2007. *Isolated Spring Wetlands in the Great Basin and Mojave Deserts, USA: Potential Response of Vegetation to Groundwater Withdrawal.* Environmental Management DOI 10.1007/s00267-007-9035-9. 16pp.

Recommendations: The Revised or Supplemental Draft EIS should provide a functional assessment of all waters on the project site, including seeps and springs, as well as an additional analysis on the indirect effects of groundwater drawdown on habitat and wildlife use of seeps and springs.

Compliance with Clean Water Act Section 404(b)(1) Guidelines

The proposed discharge does not appear to comply with the substantive requirements in the regulations at 40 CFR 230.10 (a)-(d). The purpose of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of waters of the United States. These goals are achieved, in part, by prohibiting discharges of dredged or fill material that would result in avoidable or significant adverse impacts on the aquatic environment pursuant to EPA's *Federal Guidelines for Specification of Disposal Sites for Dredged or Fill Materials* (40 CFR 230), promulgated pursuant to Section 404(b)(1) of the CWA (Guidelines). The burden to demonstrate compliance with the Guidelines rests with the permit applicant.

The Guidelines contain four main, independent requirements that must be met to obtain a permit.

1. Section 230.10(a) prohibits a discharge if there is a less environmentally damaging practicable alternative to the proposed project.
2. Section 230.10(b) prohibits discharges that will result in a violation of water quality standards or toxic effluent standards, jeopardize a threatened or endangered species, or violate requirements imposed to protect a marine sanctuary.
3. Section 230.10(c) prohibits discharges that will cause or contribute to significant degradation of waters. Significant degradation may include individual or cumulative impacts to human health and welfare; fish and wildlife; ecosystem diversity, productivity and stability; and recreational, aesthetic or economic values.
4. Section 230.10(d) prohibits discharges unless all appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem.

EPA's response to the Corps Public Notice for the Proposed Rosemont Mine Project, dated February 13, 2012, provides detailed comments regarding the specific deficiencies related to each of the regulatory restrictions on 404 discharges described above. Based on the information currently available to EPA, the proposed discharge does not appear to comply with the substantive requirements in the regulations at 40 CFR 230.10 (a)-(d), and will result in substantial and unacceptable impacts to aquatic resources of national importance. This document has been included as an attachment to this letter, and is thereby incorporated by reference and should be considered as the EPA's comments on CWA 404 compliance for the purpose of the Draft EIS.

Groundwater

Baseline Groundwater Quality

The Draft EIS provides insufficient justification for the determination of baseline groundwater quality conditions in regards to volatile organic compounds and radiochemical constituents. Volume 3, Page 285 presents the results of the analysis of groundwater samples taken from 38 wells and 6 springs in the project area. The samples were analyzed for volatile organic and semi-volatile organic compounds. Although these compounds were detected in 104 samples, the Draft EIS dismisses their

presence as either laboratory contamination, interference, or a result of the ubiquitous presence of gasoline or its breakdown products in the environment. Based on these findings the DEIS concludes on page 286 "no existing contamination by volatile organic compounds or semi-volatile organic compounds is believed to exist in the area. " It would seem reasonable for further sampling and analysis to be conducted to support such a conclusion. Radiochemical constituents were also found to be present in the groundwater and these have been determined as attributable to naturally occurring radiation sources in the bedrock. It is important for the applicant to establish the current groundwater conditions for the project area in order to assess the effects of the proposed project, if any.

> **Recommendations**: EPA recommends that additional collection and analysis of groundwater samples be performed and discussed in the Revised or Supplemental Draft EIS. Potential sources of any contamination should be assessed before the Project is implemented. The EIS should also include any on-going groundwater monitoring as a groundwater mitigation measure.

Irretrievable commitment of resources

The proposed action and all action alternatives would result in the same commitment of groundwater resources. Estimates of the amount of water lost in perpetuity from evaporation ranges from 170 acre-feet per year to 370 acre-feet per year, depending on which groundwater model is used as the basis. This water loss could also affect the drawdown of the approximately 500-550 domestic or other production wells registered with the Arizona Department of Water Resources in the project vicinity. During mine operation, the estimated loss of groundwater would increase from 9 to 75 percent. After mine closure, when the aquifer reaches equilibrium, the estimated loss of groundwater would be equivalent to a 2 to 5 percent reduction in recharge, and an increase in evaporative water loss from the aquifer from 3 to 31 percent. This loss will also include impacts to 63 of 132 springs, of which 18 are expected to have major impacts (disturbed, covered, or otherwise removed and no longer functioning as a natural spring). A number of mitigation measures are proposed to mitigate some of the effects of the project, such as water treatment, storage and recharge, a well owner protection program, repair of water supply structures, well deepening, and storm water diversion. EPA also notes that the use of Central Arizona Project (CAP) water for recharge and storage to mitigate groundwater extraction is only an applicable mitigation measure so long as excess CAP water remains available for purchase.

> **Recommendations**:
> - The Revised or Supplemental Draft EIS should incorporate water use efficiency, conservation and reuse management measures into the project design and management to maximize efficient use of scarce water supplies. EPA understands the water savings that will be accomplished by use of the "dry stack" tailings design, but believe that this discussion should be expanded to include all aspects of project design. Efficient water use can be enhanced through design, infrastructure, and drinking water policies. We recommend the Revised or Supplemental Draft EIS describe potential mechanisms to support water use efficiencies in order to reduce the estimated long term groundwater resource loss.
> - The Revised or Supplemental Draft EIS should discuss the extent to which excess CAP water is expected to remain available for purchase and infiltration as groundwater quantity mitigation.

Groundwater Monitoring

The Draft EIS states that Rosemont Copper will annually fund the U.S. Geological Survey's (USGS) costs to operate and maintain an existing surface water flow measurement gauge " for at least 5 years following completion of mining operations" at Barrel Canyon as an element of the overall groundwater quantity mitigation measures proposed for the project (p. 277). The impacts from active pumping at the project are not expected to recover until 100 to 140 years following pumping (although the project is anticipated to have irretrievable losses of groundwater resources overall), therefore, a 5-year period following the completion of mining operations seems unacceptably brief for the implementation of this groundwater mitigation measure.

> **Recommendations**: EPA recommends that the Forest Service require the mine operator to fund groundwater monitoring efforts until such time that the Forest has deemed that these funds are no longer necessary to ensure adequate groundwater protections. Considering the scale of the potential impacts to groundwater resources, it would be appropriate to require adequate funding remain available for the entirety of the 100-140 year period during which impacts from active pumping are expected to continue.

Tribal Resources

The proposed project and its alternatives would have severe, irretrievable and largely unmitigated impacts upon tribal and cultural resources, in particular those of the Tohono O'odham Nation. The Barrel Alternative (preferred alternative) would result in the loss of 111 National Register of Historic Places eligible historic properties. Approximately one third of these sites are known or likely to have human remains. In addition, because seeps and springs are considered spiritual sites by regional tribal nations, the total impact upon sites of tribal significance is another 63 sites greater. EPA is aware that the Tohono O'odham Nation has informed the USFS that they are formally opposed to the proposed development. The Nation has indicated that the proposed mitigation for adverse effects on historic, cultural and spiritual sites is not adequate and the impacts remain unacceptable. The Draft EIS indicates that the Forest Service intends to enter into a memorandum of agreement (MOA) with the Arizona State Historic Preservation Office, the tribes and other cooperating agencies in order to establish a historic properties treatment plan that will outline the extent of mitigation for the project's adverse effect on historic places and cultural sites (p.698).

> **Recommendation**: EPA recommends that the details of the above mentioned MOA be included in the Revised or Supplemental DEIS. EPA also recommends that the Revised or Supplemental Draft EIS recognize and discuss the position of the Tohono O'odham Nation in regards to their direct opposition to the proposed development in greater detail and consider further means to mitigate this significant adverse impact.

Reclamation and Closure

The Draft EIS indicates that the Reclamation and Closure plan would be completed "prior to the publication of the FEIS". As we stated in our 7/28/11 comments on the Deliberative DEIS, EPA does not believe that this is an appropriate approach to Reclamation and Closure or NEPA. NEPA is intended to consider the entire life and potential impacts of a proposed action. Improper or poorly executed Reclamation and Closure can and has led to severe and irretrievable environmental impacts at other mine sites, including those in the state of Arizona. EPA therefore considers Reclamation and Closure to be a critical component of the Draft EIS. EPA has noted that Rosemont has published a Reclamation and Closure Plan (Tetra Tech Project No. 320614-400 July 2007) for the original proposed project as

identified in the MPO. Many investigations were in progress at the time that this plan was produced it is therefore considered an incomplete document for specific comment purposes.

> **Recommendations**: The Revised or Supplemental Draft EIS should contain a detailed discussion and summary of the Reclamation and Closure Plan and the ways in which the Plan will address and prevent potential post-closure contamination (including issue specific measures to the extent feasible). As a key part of the alternatives analysis, the reclamation and closure plan should be altered for each alternative, or reclamation measures can be considered themselves as an alternative. Some reclamation and closure measures may be common to all alternatives, but some measures may be specific to a given alternative. A given alternative likewise might better accomplish reclamation and closure objectives. We also recommend that the Reclamation and Closure Plan be included as an appendix to the Revised or Supplemental Draft EIS (perhaps in an electronic format).

Project Design

The Proposed Project provides details of a Central Drain system which will direct surface stormwater runoff under and through the waste rock and tailings facilities. The Draft EIS states that discharges from the central drain would consist of seepage through waste rock and tailings facilities and would drain for up to 30 days to convey stormwater from a 100 year, 24 hour event (page 51). EPA notes that the discharge from the Central Drain as described in the Draft EIS would be classified as mine drainage due to commingling with seepage and would not be eligible for coverage under Arizona's Mining MSGP 2010 General Permit. (see Section 8.G.2.2 , *Prohibition of Non-Stormwater Discharges* of the MSGP. "The following discharges are not authorized by this permit: adit drainage, and contaminated springs or seeps discharging from waste rock dumps that do not directly result from precipitation events (see also the standard Limitations on Coverage in Part 1.1.4).")

> **Recommendations:** The Revised or Supplemental EIS should describe how the owner or operator of the mine will obtain an individual permit for non-stormwater discharges from the Central Drain, and describe how the facility will meet effluent limitations and standards for the discharge of mine drainage. Alternatively the facility can be constructed to avoid all under drain components, thereby preventing the potential contamination issues associated with an under drain system.

Biological Resources

According to the DEIS, thirteen federally listed endangered, threatened, or candidate species are known to occur within or adjacent to the analysis area for which impacts are reasonably foreseeable (Ch. 3, p. 376). This includes Chiricahua leopard frog, Gila chub, Gila topminnow, Huachuca water umbel, jaguar, lesser long-nosed bat, ocelot, Pima pineapple cactus, and Southwestern willow flycatcher, desert tortoise, northern Mexican gartersnake, Rosemont talussnail, and western yellow-billed cuckoo. Although it is unclear from the text of the Draft EIS, EPA understands that the Forest Service has not yet begun formal consultation with the U.S. Fish and Wildlife Service (USFWS) for this project. As stated in the Draft EIS, the Endangered Species Act of 1973 requires Federal agencies to consult with the USFWS to ensure that their actions will not jeopardize the continued existence of any listed species.

> **Recommendations**: Formal consultation between USFWS and the USFS may reveal additional avoidance, minimization or mitigation measures that could be employed to further reduce

impacts to the numerous sensitive, threatened or endangered species that may be affected by this project. EPA recommends that the Revised or Supplemental Draft EIS include the details and outcome of that consultation as well as including the Biological Opinion as an appendix to the Draft EIS.

Traffic and Public Safety

EPA notes that according to the Draft EIS, the proposed project and its alternatives are anticipated to result in an increase in traffic on State Route 83 of up to 356% by year 20. This corresponds to a decrease in traffic safety, which is anticipated to result in approximately one to two fatalities per year along this corridor (as compared to a current fatality rate of approximate one death every three years). Although the Draft EIS proposes carpooling as a mitigation measure and suggests that Rosemont could contribute to roadway improvement efforts, such as additional highway pullouts, the Draft EIS does not state that Rosemont would be required to do so. In addition, EPA understands that the Arizona Department of Transportation has added plans to expand and improve SR 83 to its long range plans for the region. Such activities may have the potential to impact Davidson Canyon Wash and Cienega Creek.

Recommendations: The Revised or Supplemental Draft EIS should:

- Quantify the extent to which additional highway pull outs, scheduling of haul trips to avoid peak hours and the other traffic-related mitigation measures mentioned could be expected to reduce overall risk to human health.
- Discuss long range plans to expand/improve SR 83, if and to what extent these plans might be a consequence of the Rosemont Project, and how these plans may contribute to any cumulative impacts to the waters of Davidson Wash and Cienega Creek.