

Rosemont Copper Mine

Objection Review

Objection # (s): 0011-CKestler; 0016-KPaul; 0017-MStock; 0018-JConnelly; 0019-ALannon; 0022-RMaki; 0027-SBrowning; 0028-TPurdon; 0035-DHanna; 0038-KBeck; 0049-CDowning; 0056-SWhitehouse; 0058-NWall; 0059-AIventosch; 0073-MSheldonDiVito; 0074-SHey; 0077-DWeinstein; 0078-ADanowitz; 0079-JMoney; 0080-CShinsky; 0081-GShinsky; 0082SReichardt; 0083-FICO; 0084-SSSR; 0087-BobAnderson; 0089-TMoney; 0109-SWind; 0115-KChristian; 0118-KLowery

Resource Area(s): Ground Water Resources – General (GWR-1)

Objection Issue:

- 0074-1: Where does Rosemont get the water they need?
- 0081-1: The USFS has done very little to alleviate the concerns of over 500 well owners in the Hilton Ranch Rd. valley, Singing Valley 1North, Singing Valley South, and the Sonoita plains region. Your studies for water depletion from the Rosemont project are lacking the necessary data for a more definitive prediction of two major watersheds, Cienega Creek drainage and Davidson Canyon (fed by Barrel Canyon Drainage).
- 0078-1: The USFS response to the potential loss of well water to homeowners remains completely inadequate.
- 0082-2: I find nothing in the FEIS that insures that we will have (domestic well) water.
- 0083-1: Arizona law permits mines to pump essentially an unlimited amount of groundwater. However the USFS failed to provide any analysis of the potential impacts of this increased groundwater pumping (pump water above and beyond what their permit currently allows), particularly for neighboring landowners.
- 0118-1: I feel that the water issues have not been adequately addressed or satisfied. To allow the mine to pump thousands of cubic feet/acres of water from our water table in the desert where there are thriving communities that depend on it, puts these communities at risk for safe potable water in the future. A second issue connected to the mine pumping thousands of acres of water is the price they pay for it compared to what a community consumer pays. I believe the communities that have been established surrounding the Santa Rita Mountains long before the mine should have the right to object to their water table and forest areas being confiscated by a foreign mining company.
- 0027-1: I am very concerned about the impact the mine will have on my well. A dry well resulting in an uninhabitable, worthless property will have far greater impacts than (described in the FEIS). How do you defend not conducting adequate assessment of the economic and mental damage that will be thrust on individual U.S. citizens? ...I have

seen nothing that relates to the financial ruin and heart break that many of us face who have the misfortune to be affected by this proposed project.

- 0018-1: The adverse environmental effects and adverse effects on the water table are more negative and outweigh any financial benefit to the miners and workers employed by Rosemont Copper Company.
In my opinion the Army Corps of Engineers and Environmental Protection Agency should deny the Rosemont Mine from being allowed in the Santa Rita Mountains because in part of the 5,000 – 6,000 acre feet of water per year probably more that Rosemont mine would use and the adverse effects on the water table and the water in Davidson Canyon and Cienega Creek in the BLMs Las Cienegas National Conservation Area.
- 0016-1: The largest issue we have here in the Sonoran desert is clean water for consumption by the citizens as well as local wildlife. The U of A has even studied this and come to the conclusion that this area will in the very near future require desalination plants and the purchase of sea water from Mexico to supply our fresh drinking water. U of A studies estimate that the local area will have a one trillion gallon supply shortfall in as early as 10 years if trends continue in our proposed consumption without extensive modifications of supply and use.
- 0077-4: Only in the last few weeks estimates of the effect of water consumption on the Colorado River basin have been raised to alarm levels and questions about allocation of that water have become paramount.
- 0087-1: The EIS neglects to assess the Project's long range impact on water resources.
- 0056-7: The impacts of ground water drawdown are unacceptable (summarized from the original).
- 0035-2: The "Effect on Well Owners" water studies are unacceptable and incomplete.
- 0035-3: Contrary to what is stated, there is no well agreement, this was not completed on the east side of the Santa Rita's, specifically The Hilton Ranch Rd Community.
- 0080-4: The mine pit will result in a permanent hydraulic sink, lowering of the regional aquifer. The waters of Davidson Canyon and Cienega Creek would be permanently degraded and the aquatic resources substantially diminished.
- 0115-2: Our water comes from Cienega Creek, which would be poisoned by mine chemicals and disrupted/diverted by mine tailings. There is NO mitigation enacted years from now that would correct this immediate threat.
- 0118-3: A third water issue is the fact that as the mining pit becomes deeper it sucks the water into the pit that would normally flow east toward Las Cienegas and other surrounding canyons and grasslands. In my opinion the report really did not address these long term effects (climate change and drought; effects of drying conditions and increased dust and dust storms). It will also affect fauna of the area as their habitat changes, as well as, the recreational opportunities that many of us enjoy.
- 0028-1: Regarding subsidence and drawdown of potable water from the aquifer on the west side of the Santa Ritas (paraphrased): There are no restrictions on the amount of water that Rosemont could use. This is unacceptable when agriculture and other users

are trying hard to reduce water draw down because we know we are facing a prolonged draught situation all over the desert southwest.

- 0059-1: Chief among my concerns is the damage that the mine will cause to local springs and riparian areas such as Cienega Creek, Davidson Canyon and others. Despite FEIS's attempt at equanimity it remains clear that the aquifer and riparian areas such as Cienega Creek and Davidson Canyon are at risk if the proposed mine is allowed.
- 0083-10: The USGS has identified the area immediately around the Rosemont production well site as an area of highest local land subsidence in area. Adding a new potentially unlimited groundwater user will prevent sustainable groundwater yield and further exacerbate subsidence in this area.
- 0109-1: The FEIS because does not adequately address my concern of the negative impact on the water table evaporation from the lake after mining operations have ended.
- 0022-1: The DEIS stated that water samples used in pit lake modeling were taken from Why, Arizona rather than from the local area. The FEIS indicates samples were taken from Organ Pipe National Monument, 200 miles from the project area. *Note this is paraphrased from the original*
- 0049-2: Heavy metals and acids will leak into our water supply.
- 0056-8: The impacts to groundwater quality from the project are unacceptable (summarized from the original).
- 0079-1: Water quality as it related to domestic water wells and safe drinking water has not been adequately addressed in the FEIS.
- 0081-2: The FEIS fails to establish credible analysis of acid rock drainage. The only action you are willing to take is to follow the lead of Arizona Department of Environmental Quality (ADEQ) in the placement of Point of Compliance (POC) wells. The USFS is also following ADEQ and Rosemont with their placement of POC wells two years after initial construction begins. This hardly adequate mitigation for the contamination of Davidson Canyon.
- 0089-1: Several comments that I submitted on the DEIS regarding the mine impact on the water quality of domestic groundwater wells were dismissed by a statement in Chapter 3 of the FEIS that there would be no adverse impact to water quality since (primary) standards are predicted to be met. There is also a discussion that aesthetic or secondary standards are not mandatory and therefore were not considered. I object to these statements.
- 0011-6: I am also still very much concerned about the impact of the proposed Rosemont Copper Mine on the water quality in the entire Southern AZ area. Unlike others, mines are essentially unregulated water users. There is no legal limit on the amount of water that can be extracted from the aquifer. Regardless of current claims, Rosemont can pump as much water as they wish in the future. Since this company has no actual mining experience, I do not see any way they can reliably predict their future needs.
- 0011-7: I am convinced that the proposed mine will use and pollute water that is desperately needed by the Native American populations and the other residents of the area including Green Valley and developing areas of southern Tucson.

- 0084-61: With the heap leach facility not included in the Barrel Alternative, it's not clear an engineered biological system (EBS) is necessary, since the FEIS claims there are no exceedances of AWQS from the tailings piles or the waste rock storage facilities that could be treated with an EBS. The new MPO indicates that there will be an oxide ore storage facility, but as yet there has been no testing of possible seepages from such a facility, thus no established need for an EBS. In any event, claiming such a system will cure aquifer contamination problems on an actual mine scale, as opposed to the lab scale of the preliminary experiments, is clearly wishful thinking and the USFS cannot rely on this to mitigate the impacts.
- 0017-9: There are so many possible harmful effects of the mine that are dealt with to an uncertain or inadequate degree: 8. possible pollution of the groundwater by sulfates and dissolved solids.
- 0084-159: The Coalition objects to the inadequate USFS response to the issue of potential groundwater contamination by arsenic from Rosemont Copper Project facilities. The USFS response is overly legalistic and bureaucratic; focusing on what the current Arizona aquifer water quality standard for arsenic is, rather than on what the proper standard should be to provide adequate human health protection
- 0058-6: Quality of the water is just as vital. I know Augusta has promised to recharge the water they use, but what good is contaminated water to anyone?
- 0083-2: The USFS does not provide specifics, details, or additional clarifications of the proposed well protection plan that would provide an objective basis for determining its adequacy as a mitigation measure. Also, Rosemont's Copper Project promise to recharge available CAP water to offset groundwater pumping in the Sahuarita is meaningless. USFS fails completely to address the issue of the voluntary nature of the mitigation measures proposed by the Rosemont Copper Project.
- 0017-1: Though the mine company plans mitigations, I think it is foolish to extend CAP water to the mine for use there, in a time of likely continued drought. It is very possible, early in the life of the mine, that this CAP water will no longer flow to the Tucson area, as agreements between the 7 states stipulates.
- 0019-1: With a drought "nearly unrivaled in 1,250 years" CAP water cannot be counted on to replenish aquifers. A drawdown on Rosemont's scale without guaranteed recharge will ruin a huge area for many, many years, and leave ranchers, farmers and ordinary households unable to sustain themselves.
- 0073-1: If they cannot replenish the water they are taking they should be forced to shut down. They say in documented evidence that they will replenish all used water with CAP water.
- 0058-4: The Central Arizona Project water, which is no longer plentiful, should not be hogged by industry in a rapidly growing area that will need that water in the near future. Mining requires huge quantities of water. Pumping of groundwater would negatively affect Sahuarita and other nearby communities as well as drying up what few springs and creeks are still running.

- 0087-2: The EIS fails to acknowledge that the project will cause irreversible and irretrievable impact upon groundwater quantity, groundwater quality, upon surface water quantity and surface water quality.
- 0038-5: Even more long-term (water) effects studies are needed.

Remedy Supplied by Objector (if any):

0081-1: More extensive modeling of groundwater depletion, including increased number of monitoring wells, and additional core sampling and flow monitoring. More comprehensive plan for surface water diversion. Removal of Well Protection Plan from mitigation list. Issue a new or revised DEIS.

0078-1: Conduct appropriate credible analyses using proper methodology and based on current, accurate data of the effects of well draw downs and loss of water; prepare and circulate for public review and comment a Revised DEIS or Supplemental Draft EIS.

0080-4: Require Rosemont Copper to complete at least a partial backfill as discussed on page 104 and 105 of Chapter 2 in the FEIS.

0081-2: Revisit the seepage problem and revise analysis with additional geochemistry testing and flow rates and a variety of scenarios be simulated. Analyze the need for increased numbers of POC wells. Include an engineered drainage system for the tailings. Issue a new or revised DEIS.

0083-1: Require additional NEPA analysis should Rosemont propose to increase its groundwater pumping anytime during the life of the mine, or if it makes any other changes to any other Federal, state or local permits, or the proposed Mine Plan of Operation, and include this requirement in a revised DEIS that is made available for public review and comment.

0083-2: Prepare a revised DEIS that either eliminates from discussion Rosemont Copper using Central Arizona Project water as a mitigation measure or includes enough detail about the availability of CAP water for recharge, the proposed well protection plan, and the Rosemont United Sahuarita Well Owners agreements to allow for a credible assessment of their effectiveness as mitigation measures.

0109-1: Choose Alternative 1 - No Action

0115-2: Mine must be denied.

0027-1: Independent, credible, and quantifiable studies of the effects of well drawdowns and water loss of the neighboring residential wells should be conducted, and impacted property owners should be fully compensated for that loss.

0011-6, 7 – Deny Rosemont Copper’s permit application.

0116-1: Prepare and circulate for public review and comment a Revised DEIS or Supplemental Draft EIS.

0084-61: Should the need for a mine-scale EBS be deemed necessary, for example if the additional testing suggested above proves A WQS violations, then a major effort will be required to demonstrate mine-scale capability for EBS systems.

0035-2: Complete the water studies and offer a water guarantee to the designated wells on the east side of the Santa Ritas

0084-159: The USFS must revise the geochemical testing for arsenic and use the 10 ug/L MCL for arsenic in order to adequately assess risks to human health protection for well owners who may be impacted by potential arsenic contamination of groundwater from the Rosemont Copper Project.

0035-3: 1. Put in place a simple warranty to guarantee potable water availability to the well owners, in question, due to the de-watering of the mine. 2. The Forest Service have Rosemont or future owners of this project, to have a surety bond in place, to insure if any of the wells , go dry, due to de-watering of the pit, or polluted by mine related operations.

Law, Regulation and/or Policy: Council on Environmental Quality (CEQ) Regulations at 40 CFR 1500-1508; Clean Water Act (CWA) [33 U.S.C. §1251 et seq. (1972)]; Forest Service Manual FSM 2500, Watershed and Air Management; Forest Service Manual FSM 2560, Groundwater Resource Management; Arizona Revised Statutes ARS 45-513, Dewatering permit; ARS 45-514, Mineral extraction and metallurgical processing permit; Arizona Revised Statutes ARS 49-221 to 225 (water quality standards); Arizona Revised Statutes ARS 49-241 to 252 (aquifer protection).

Review Team Member Response:

The objectors raise a variety of issues regarding groundwater, including technical aspects of the analysis regarding impacts to individual wells, water quality, subsidence, and general water availability, and concerns regarding mitigation.

The Forest Service analysis of impacts to groundwater is guided by CEQ regulations for NEPA disclosure, requirements under the CWA, Forest Service guidance, and State of Arizona jurisdiction over groundwater pumping and aquifer water quality.

The Forest Service has a responsibility for proper disclosure of impacts under NEPA. According to 40 CFR 1500.22, the agency will include within the environmental impact statement:

- (1) incomplete or unavailable information,
- (2) the relevance of the incomplete or unavailable information to evaluating significant adverse impacts, and
- (3) a summary of credible scientific evidence that is relevant to evaluating such impacts, and the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community.

40 CFR 1502.24 states agencies should:

- (1) assure the scientific integrity of the analyses and discussion,

- (2) describe methodologies used, and
- (3) cite references or sources used.

In addition to meeting disclosure requirements, an FEIS [PR 047511] analysis must meet the regulatory requirements of Clean Water Act (33 United States Code 1251–1376) and the objective of “restore and maintain the chemical, physical, and biological integrity of the nation’s waters.”

The Forest Service approach to groundwater resources is also guided by Forest Service policy (FSM 2560). Objectives include requirements for analysis and disclosure: “To gather and make available information on NFS groundwater resources and their uses to provide for informed decisions during Forest Service planning and development and implementation of Forest Service projects,” as well as mitigation: “consider the effects on NFS groundwater resources of all proposed activities on and uses of NFS lands and to avoid, minimize, or mitigate adverse effects to the extent practical or as required by law.” FSM 2560 also makes clear that the Forest Service must coordinate with states having jurisdiction over water resources: “require written authorization holders operating on NFS lands to obtain water rights in compliance with applicable State law, FSM 2540, and the terms and conditions of their authorization.”

The State of Arizona has such authority with respect to the groundwater supply for the mine. The water supply has been authorized under ARS 45-514, Mineral extraction and metallurgical processing permit. The State of Arizona also has authority under ARS 49-241 through 49-252 to regulate aquifer water quality and discharges to aquifers. This includes requirements for monitoring, mitigation measures in the event of problems, and best available control methods and technology to prevent problems from occurring. The State of Arizona also has the authority under ARS 49-221 to 49-225 to set surface water and aquifer water quality standards.

In addition to disclosure requirements, CEQ regulations also indicate that mitigation measures must be analyzed (40 CFR 1502.14): “Include appropriate mitigation measures not already included in the proposed action or alternatives.”

Many mitigation measures have been proposed by the public and cooperating agencies over the course of the project. Appropriate measures include ones that have been brought forward by the applicant, mitigation required and under the jurisdiction of federal agencies (U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service), mitigation required and under the jurisdiction of state agencies (i.e., required air mitigation, required stormwater controls), and additional mitigation developed by the Forest Service to respond to resource impacts. The mitigation the Forest Service can require is defined by Forest Service mining regulations. However, the Forest Service jurisdiction for requiring mitigation is limited to Forest Service surface resources, and with respect to this objection, specifically Forest Service groundwater resources: “Require that monitoring and mitigation appropriate to the scale and nature of potential effects is conducted, evaluated, and reported when authorizing a proposed use or Forest Service activity that has a significant potential to adversely affect NFS groundwater resources.”

The State of Arizona has authority with respect to the groundwater supply for the mine. The water supply has been authorized under ARS 45-514, Mineral extraction and metallurgical

processing permit issued by the Arizona Department of Water Resources. These statutes do not contain requirements for mitigation of pumping impacts.

Response to objection issues 0074-1, 0081-1, 0078-1, 0082-2, 0083-1, 0118-1, 0027-1, 0018-1, 0016-1, 0056-7, 0035-2, and 0035-3

These issues relate to loss of water to local well owners, inadequate analysis, inadequate mitigation for these losses, and overall use of groundwater by the mine.

Supply water needed by Rosemont for mineral processing activities will come mainly from groundwater pumped from the Sahuarita, Arizona area west of the Santa Rita Mountains. Potential impacts to the Sahuarita/Green Valley area were simulated and reported in the modeling documents [PR 012068, PR 013790] and disclosed in the FEIS [PR 047511_3, pp. 328-339).

The potential impact of reduced water supply to well owners on the east side and west side of the Santa Rita Mountains is acknowledged in the FEIS as a significant issue [PR 047511_2, pp. 16-17], and analyzed [PR 047511_3, pp. 288-362]. The economic effects from groundwater impacts and Environmental Justice issues are also covered in the FEIS [PR 047511_4, pp. 1107-1124]. East side long term water supply issues are analyzed extensively in the FEIS [PR 047511_3, pp. 288-570]. On page 301, the permanent loss to the local groundwater system is given as 170 to 370 acre-feet per year, depending on the surface area of the final pit lake. This is the amount of evaporation from the pit lake surface, and this amount of water would be balanced by an equivalent loss in natural discharge elsewhere; whether from evapotranspiration, perennial stream discharge, or springs. This permanent loss could also mean somewhat less water available for domestic wells. In addition, on page 353, the initial dewatering loss to the local east side groundwater system during operations is given as 13,000 to 18,500 acre-feet.

Groundwater pumping on the west side may be mitigated with artificial recharge in Green Valley, or within the Santa Cruz Basin, though Rosemont may not be able to recharge more water than it uses for mine purposes [PR 047511_4, p. 1132]. Groundwater drawdown on the east side from dewatering of the pit would be perpetuated by the hydraulic sink created by the pit lake and would constitute a permanent change [PR 047511_4, p. 1133]. However, see Figure 57 [PR 047511_3, p. 344] for the ultimate (1000-year) extent of the 5-foot drawdown contours for the Montgomery & Associates and the Tetra Tech models. Wells within those contours may experience some impact. According to the FEIS [PR 047511_2, p. xxx], modeling “. . . indicates that drawdown could occur up to 10 feet for residences in Singing Valley and at Hilton Ranch Road within 20 years of mine closure; drawdown over 5 feet would not be likely for Corona del Tucson residences, along Cienega Creek, along Gardner Canyon, or at the Davidson Canyon/Cienega Creek confluence. Drawdown of up to several feet could potentially occur along Empire Gulch beginning 50 years or more after mine closure. An estimated 360 to 370 registered wells are located within this area of drawdown; specific impacts to these wells, if any, are not known.”

On the west side, Rosemont may not pump an unlimited amount of water in the Green Valley area. They may only pump a maximum of 6,000 acre-feet per year as granted by ADWR [PR

047511_3, p. 320]. Pumping on the east side of the Santa Rita Mountains will only be what is needed to dewater the mine pit, estimated by modeling to be a maximum of 1050 acre-feet per year [PR 047511_3, p. 353], for a total of up to 18,500 acre-feet [PR 047511_3, p. 320].

The FEIS discloses that there are limitations to the analysis of impacts to individual wells [PR 047511_3, pp. 291, 293-294]. “The geological information needed to assess this connection for an individual well is largely unavailable, although driller logs are available for some wells detailing the hydrologic units encountered during drilling. The Coronado remains unable to assess impacts to individual wells; therefore, the analysis essentially remains as it was presented in the DEIS, although it is presented with greater details of the progression of potential impacts in space and time.”

The role of the Coronado under its primary authorities (36 CFR 228, Subpart A) is to ensure that mining activities minimize adverse environmental effects on NFS surface resources [PR 047511_6, p. B-3]. Mitigation of the impacts to private well owners is discussed in Appendix B, the Mitigation and Monitoring Plan. On page B-91 to B-92 [PR 047511_6], Rosemont agrees to implement a legally binding well owner protection agreement. This would involve a number of compensation options, including well-deepening, water level monitoring, water well pump warrantee, or a cash option.

Agreements for the west side Sahuarita Heights neighborhood are already in place and effective; agreements for the east side Hilton Ranch, Helvetia, and Singing Valley areas would become effective when Rosemont Copper receives final Forest Service approval for the project.

Under CEQ regulations as well as Forest Service policy and guidance, the Forest Service has a responsibility to disclose impacts to groundwater resources and individual wells. The FEIS analyzes the losses of water from the aquifer due to pumping, dewatering, and long-term evaporation from the pit lake. The FEIS analyzes the drawdown that would occur from these losses, and the geographic location within which wells would be impacted. The FEIS also recognizes the potential socioeconomic effects from impacts to property owners. Where uncertain or unknown information prevents full analysis of impacts to individual wells, the FEIS discloses the lack of information and the effect it has on the analysis. With respect to disclosing impacts, the FEIS is consistent with CEQ regulations and Forest Service policy and guidance. Mitigation can be required by the Forest Service if it derives from the authority of another federal agency, a state agency, or affects Forest Service surface resources. Groundwater pumping and losses are not under the jurisdiction of other federal agencies, and the state of Arizona statutes do not include requirements for mitigation of pumping impacts. The Forest Service has no authority to require mitigation for individual wells located off of Forest Service lands. In the FEIS, Appendix G a response is given to objections about negative impacts to property values as a result of mining: “According to federal regulations (36 CFR 228.8), the Forest Service is directed to mitigate impacts to National Forest surface resources. Loss of private property value is not a Forest Service surface resource, and there is no basis in law that would allow the Forest Service to require Rosemont to mitigate for reduced property values” [PR 047511-7, CD, PCS 461, p. 1]. The Forest Service has no authority to require this mitigation, but does have a responsibility to properly disclose the effectiveness and limitations of the mitigation. The Forest

Service has met guidance and disclosure requirements by identifying the limitations of this mitigation measure.

Response to objection issues 0022-1, 0059-1, 0080-4, 0109-1, 0115-2, and 0118-3

These issues are related to the effects of the mine pit, including technical aspects of the pit lake modeling, and effects on riparian areas.

The Forest Service evaluated whether the hydrologic effects of the mine pit on the aquifer could be avoided altogether during the alternatives analysis, specifically exploration of two pit backfill alternatives.

Use of Why, AZ precipitation data: The discussion of the selection of precipitation samples for the mine pit lake water quality model being selected from Organ Pipe National Monument, as the nearest Atmospheric Deposition Program station, is found in the FEIS [PR 047511_3, p. 388]. Further detail on why Organ Pipe National Monument was selected is contained in the pit lake modeling report in the project record [PR 014599, pp. 10-11]. This report underwent iterative peer review by SRK, details of which are contained in the water process memo [PR 047366, p. 12 and p. 5 of Attachment 4]. Key peer review documents in the record are listed in this memo; a search indicates none of them identified the use of the Atmospheric Deposition Program as a modeling issue. In addition, significant technical questions were raised by Dr. Tom Myers on the pit lake model, and these questions were reviewed in detail by SRK [PR 017372]; use of the Atmospheric Deposition Program was not raised in this document.

Backfill of open pit: The complete backfill option was explored in the FEIS [PR 047511_2, pp. 104-105], and was included in the Alternatives Considered but Eliminated from Detailed Study FEIS [PR 047511_2, pp. 104-105]. One advantage to the complete backfill option is that the pit would be erased and lake evaporation would not occur. A disadvantage would be a minimum of another 16 years of mine operation at a cost of nearly a billion dollars. As discussed in the FEIS, it would be a significant safety hazard for those involved, as rock would have to be either hauled downhill or dumped over the edge, and light and sound pollution effects would be continued throughout the reclamation period. The responsible official determined that complete pit backfill would not be considered in detail [PR 047511_2, p. 104].

Partial backfill of open pit: Partial backfill of the open was explored in the FEIS (PR 047511_2, p. 105), and was included in the Alternatives Considered but Eliminated from Detailed Study FEIS [PR 047511_2, p. 100-114]. This alternative was rejected for the same reasons as the complete backfill option: extended environmental impacts, financial implications, and safety issues of a partial waste rock pit backfill.

In addition, a modeling sensitivity run was conducted to determine the potential effect of a pit backfill option and found that the largest geographic effect comes from the initial dewatering during operations, not from the continued evaporation [PR 015550]. No viable alternatives would prevent the initial drawdown from occurring. Therefore, the FEIS analyzes the widespread effects of this drawdown on groundwater quantity and wells [PR 047511_3, pp. 288-362], and springs and riparian areas [PR 047511_3, pp. 485-570].

A specific objection is to some of the input parameters to the pit lake water quality model, specifically for precipitation. Explanation for why this parameter was appropriate and selected is contained in the pit lake modeling report in the project record [PR 014599, p. 10-11]. This report underwent iterative peer review by SRK, details of which are contained in the water process memo [PR 047366, see p. 12 and p. 5 of Attachment 4], and selection of this parameter was not raised as a concern.

Mitigation specific to Cienega Creek is outlined in the Mitigation Plan in Appendix B [PR 047511_6, pp. B-25 and B-26]. Rosemont would purchase 1122 acre-feet of surface water rights held by Del Lago Golf Course, to be used to enhance aquatic habitat in the Cienega Creek watershed. The measure is mandatory and required by the current Biological Opinion [PR 047511_7, pp 50-53].

The review of potential alternatives concerning pit backfill, the disclosure of impacts resulting from the mine pit on wells, riparian areas, and the aquifer, and the peer review of pit lake modeling are consistent with CEQ regulations for alternatives development and disclosure of impacts.

Response to objection issues 0028-1 and 0083-10

These issues relate to subsidence.

The FEIS [PR 047511_3, pp. 325-326] discloses the likelihood of incremental subsidence in the Green Valley area of the Santa Cruz Basin. However, Rosemont will not be allowed to pump more than what has been permitted. The Arizona Division of Water Resources has granted Rosemont rights to extract and use up to 6,000 acre-feet of groundwater per year from the Santa Cruz Basin [PR 047511_3, pp 320-321]. This is water that will be used for mineral extraction and processing. Rosemont plans to use up to 5,400 acre-feet per year for the first 8 years of active mining and 4,700 acre-feet per year for the remaining active mine life. Subsidence is not a trivial impact, but in perspective, the record for 2006 shows total withdrawals from nonexempt wells in the Green Valley area of 82,100 acre feet [PR 047511_3, p. 325]. A maximum Rosemont withdrawal of 6,000 acre-feet would have comprised up to 6.8 percent of the total withdrawals in the area. Rosemont's water supply pumping is also limited to 25 years of active mine life and 3 years of final reclamation and closure [PR 047511_2, p. vii]. The agricultural and public supply uses will most likely continue in perpetuity, and is expected to increase [PR 047511_3, p. 329].

Disclosure of the amount of water to be pumped by the applicant, the current conditions of the aquifer, and the resulting effects on the aquifer and wells is consistent with CEQ regulations for disclosure of impacts.

Response to objection issues 0049-2, 0056-8, 0079-1, 0081-2, 0089-1, 0011-6, 0011-7, 0084-61, 0017-9, 0084-159, and 0058-6

These issues relate to effects on water quality, mostly in general, but also specific to acid rock drainage potential.

Acid rock drainage is analyzed in the FEIS [PR 047511_3, pp 375-376 and 468 -471], as well as the potential for other contaminants [PR 047511_3, pp 471-479]. Most rocks were tested by the Acid Base Accounting (or ABA) method, which gives their likelihood of producing acid by their composition. Those rocks with an ABA of greater than 12 [PR 047511_3, p. 375] were subjected to kinetic, or humidity cell analysis for 25 to 35 weeks. In the project area less than 3 percent of the rocks present have the potential to produce acid drainage. However, acid-neutralizing limestone in the project area is abundant [PR 047511_3, pp. 383, 468, and 469]. The potential for acid drainage from the handling, breaking, and exposing of rock is minimal to nonexistent. These opinions are founded on a series of expert documents and peer review, which can be found in the project record [PR 047366].

In the case of waste rock seepage and water quality monitoring the Forest Service has jurisdiction over Forest Service groundwater resources (FSM 2560), while still coordinating with state authorities governing aquifer protection. In this case, the State of Arizona has issued an aquifer protection permit to the applicant [PR 016928] which includes monitoring requirements for both groundwater levels and quality.

ADEQ monitoring requirements are included in the FEIS [PR 047511_6, Appendix B]: OA-GW-02 (p. B-84, waste rock characterization required by APP), OA-GW-06 (p. B-87, water quality and water level monitoring at point-of-compliance wells required by APP), OA-SW-01 (p. B-88, stormwater testing required by stormwater permit).

The following requirements are included in the FEIS and were developed solely by the Forest Service to address Forest Service groundwater resources including acid rock drainage specifically [PR 047511_6, Appendix B]: FS-GW-01 (p. B-16, waste rock seepage), FS-GW-02 (p. B-17, water quality at wells and springs beyond the APP point-of-compliance wells), FS-GW-03 (p. B-19, waste rock characterization above that required by APP), FS-BR-22 (p. B-48, monitoring of flow, water levels, and water quality downstream in Barrel and Davidson Canyons), FS-BR-27 (p. B-53, rerunning of groundwater models. Note that in order to rerun the models, this measure includes a variety of data collection requirements including water levels in wells other than APP point-of-compliance wells). Collaborative development of these monitoring measures by the Forest Service is described in the record [PR 047009].

The extensive review of available geochemical testing data, the peer review of these data by outside geochemical experts, and the development of a comprehensive suite of monitoring measures to identify potential problems are consistent with CEQ regulations for disclosure and Forest Service mining regulations to minimize impacts to groundwater resources.

Response to objection issues 0077-4, 0083-2, 0017-1, 0019-1, 0073-1, and 0058-4

These issues relate to the use of Central Arizona Project (CAP) water, primarily that there is no guarantee that it will be effective, either because it is voluntary and cannot be required, because

of expected CAP shortages, or because recharge would not take place near the point of withdrawal.

Neither the Corps nor the USFWS have the jurisdiction to require recharge to occur or have made recharge part of required mitigation. The State of Arizona does not have a mitigation or recharge requirement under state statutes governing the withdrawal permit issued to Rosemont. The Forest Service cannot require mitigation of non-Forest Service groundwater resources. Therefore, CAP water recharge and analysis of the well owners' protection agreements are voluntary mitigation measures.

The Forest Service has a responsibility to analyze this mitigation measure and to fully disclose the effectiveness in the FEIS. Because the CAP recharge is voluntary, recharge with CAP water by Rosemont was not assumed in the groundwater modeling and effects analysis; therefore, the impacts disclosed in the FEIS [PR 047511_3, pp. 328-357] are appropriate given the limitations of the CAP recharge requirement. Rosemont Copper/Augusta Resource is not required by ADWR to store water, but they have elected to store water in the Tucson Active Management Area. As of December 31, 2010, their long-term storage balance was 42,593.02 acre-feet of CAP credits [PR 047504, Draft Record of Decision, p. 45].

Note that the FEIS discusses the potential shortfalls that may occur in CAP water, and outlines other methods by which recharge credits could be obtained by Rosemont under State law [PR 047511_3, pp. 359-361]. The FEIS also identifies that recharge undertaken to date has not been near the area of pumping, that future recharge may not be near the area of pumping, and has described the pipeline construction that could allow direct recharge in the area [PR 047511_3, pp. 359-361]. The FEIS also identifies the voluntary statements that Rosemont has made regarding their intentions with recharge, but clearly notes that those statements are not requirements. Finally, the FEIS also identifies that one permit (right-of-way encroachment permit for the Town of Sahuarita) would require recharge to occur, and also identifies that exertion or execution of this permit may or may not occur [PR 047511_3, pp. 359-361].

The Forest Service has met guidance and disclosure requirements by identifying the limitations of this mitigation measure.

Response to objection issues 0087-1, 0087-2 and 0038-5

These issues relate to general water depletion.

Irretrievable and irreversible impacts on water resources are described in the Required Disclosures section [PR 047511_4, pp. 1138-1139]. Mitigation and monitoring measures associated with water resources are described in Appendix B of the FEIS [PR 047511_6, pp. B-3 to B-102]; the effectiveness of these measures is analyzed in each resource chapter. Impacts on and mitigation for water resources are further described in the Draft Record of Decision [PR 047504, pp. 5, 10, 14-17, 20-22, 34-36, 44-45, 56 and 62]. The FEIS meets disclosure requirements under CEQ regulations for general water depletion and long term loss of water from the aquifer.

Recommended Remedy by Review Team Member (if any): The remedies suggested by the objectors are not warranted. No remedy is required.

Review Team Member: Roger D. Congdon, Ph.D., hydrogeologist; Washington Office, Centralized National Operation.

Rosemont Copper Mine

Objection Review

Objection # (s): 0084-SSSR

Resource Area(s): Groundwater Resources – Legal (GWR-3)

Objection Issue:

- 0084-142: The Project Fails To Protect Federally-Reserved Water Rights On The Las Cienegas National Conservation Area (LCNCA) As Well As Public Water Reserves. The USFS is under an obligation to ensure that federal reserved water rights are not impaired, used, or appropriated by private interests such as Rosemont to the detriment of the purposes for which the right was created. The USFS is under an obligation to prevent any impairment of the Las Cienegas and Public Water Reserve 107 reserved water rights, both under the Las Cienegas Act and PWR 107 itself (and the Stock-Raising Homestead Act of 1916, 39 Stat. 865) as well as the general duty to not dispose of federal property without appropriate authorization. That it failed to do here.
- 0084-124: The FEIS fails to analyze the impacts of proposed groundwater pumping on overdraft of the regional aquifer within the Tucson AMA. The USFS failed to respond to our comments regarding the impact that groundwater pumping for the Rosemont Copper Project will have on groundwater overdraft and achieving the goal of safe-yield within the Tucson AMA. We were unable to find in the FEIS any discussion of Rosemont's additional groundwater pumping and consistency with the Third Management Plan for the Tucson AMA.
- 0084-143: The FEIS claims that this (pit) water will be of potable quality and could be used for mineral processing or dust control (FEIS at 41, 43). However, there is no accounting for the ownership of this water or whether it has been paid for.

Remedy Supplied by Objector (if any):

0084-124: Revise the analysis to include a complete discussion of additional groundwater pumping for the Rosemont Copper Project and how that additional pumping affects achievement of the goal of safe yield within the Tucson AMA.

0084-143: Not all of the mine pit is on Rosemont's private land and that part is on Federal land and although the water may be pumped from Rosemont's part of the pit, it drains in from surrounding aquifers under land of Federal and probably private ownership. The USFS should disclose this information in a revised DEIS that is made available for public comment and review.

Law, Regulation and/or Policy: Council on Environmental Quality Regulations at 40 CFR 1500-1508; Clean Water Act (CWA); Forest Service Mining Regulations at 36 CFR 228; Arizona Groundwater Management Act; ARS 45-451; ARS-514;

Review Team Member Response:

Response to objection issue 0084-142:

The Property Clause of the U.S. Constitution provides that “Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the territory or other Property belonging to the United States.” U.S. Const. Art IV, Sec. 3, cl. 2. Congress has provided a limited delegation of that authority to the United States Forest Service in 16 U.S.C. 551, which provides general authority to regulate use of the National Forests. As indicated in 36 CFR 228.1, in approving locatable mineral operations, the Forest Service seeks to minimize adverse impacts to surface resources on Forest Service lands. Nothing in Federal law provides authority for the Forest Service to manage lands administered by other Federal agencies or to manage resources on those lands. The objectors do not cite any legal authority which provides the Forest Service the authority to regulate impacts to lands or resources managed by other Federal agencies. The Forest Service only has the authority delegated to it by Congress and “[r]egardless of how serious the problem an administrative agency seeks to address” it may not exceed its congressionally delegated authority. See FDA v Brown and Williamson, 120 S.Ct. 1291, 1297 (2000) (Finding FDA’s assertion of jurisdiction over tobacco products impermissible.) However, BLM does have the authority and discretion to manage the resources of concern to the objectors. If the claimed impairment does materialize, BLM would be the agency with the authority and discretion to determine any appropriate action. Various legal remedies are potentially available for BLM to manage and protect these resources within its jurisdiction if and when any such impairment ever occurred. Such measures could range from voluntary cooperation to formal judicial intervention such as in Cappaert v U.S., 426 U.S. 128 (1976). However, this issue is reserved to the discretion and the authority of BLM which may decide within its discretion if or when any such action is needed to protect federally owned water rights.

Response to objection issue 0084-124:

The objector contends the FEIS fails to analyze the impacts of proposed groundwater pumping on overdraft of the regional aquifer within the Tucson AMA. In Chapter 2 of the FEIS, the impact from groundwater withdrawals by Rosemont of 5400 acre feet per year in the Upper Santa Cruz Subbasin “. . . represents a 6 to 7 percent increase over the current estimated pumpage demand of 82,000 acrefeet; within the entire Tucson Active Management Area, it represents a 2 percent increase over the estimated pumpage demand of 252,000 acre-feet” [PR 047511_3, p. 338]. Also, the FEIS clearly states that water extracted from the Upper Santa Cruz Subbasin would only be done under conditions of a groundwater withdrawal permit or water right granted by the Arizona Department of Water Resources (ADWR) [PR 047511_3, p. 319]. Wells drilled “. . . must comply with well construction standards, as administered by the ADWR” [PR 047511_3, p. 318].

Response to objection issue 0084-143

The objector contends there is no accounting for the ownership of the pit water or whether it has been paid for even though the FEIS claims it will be of potable quality and could be used for mineral processing or dust control.

The mine plan of operations does not grant any water rights. Ownership of water rights is an issue of State law and is within the discretion of the State of Arizona to determine. See 16 USC 481 “All waters within the boundaries of national forests may be used for domestic, mining, milling, or irrigation purposes, under the laws of the State wherein such national forests are situated, or under the laws of the United States and the rules and regulations established thereunder.” The analysis complies with NEPA in its analysis of substantive environmental effects. The legal issue of ownership and potential legal rights due to potential effects on other’s water rights is outside the scope of the decision and the authority of the Forest Service.

Recommended Remedy by Review Team Member (if any): The remedies suggested by the objector are not warranted. No remedy is required.

Review Team Member: Roger D. Congdon, Ph.D., hydrogeologist; Washington Office, Centralized National Operation.

Rosemont Copper Mine

Objection Review

Objection # (s): 0014-DNiemi; 0027-SBrowning; 0028-TPurdon; 0083-FICO; 0084-SSSR; 0091-PimaCounty; 0092-GFurnier; 0108-DPierson; 0115-KChristian; 0117-CienegaWatershedPartnership

Resource Area(s): Groundwater Resources – Mitigation (GWR-4)

Objection Issue:

- 0084-116: The Rosemont Copper Project commitment to recharging available CAP water to offset groundwater pumping in the Sahuarita area is an empty promise. The key word qualifying Rosemont's commitment and which renders the commitment meaningless is the modifier, "available," before "Central Arizona Project water." While the USFS acknowledges these issues and public concerns in the FEIS at p. 360, the USFS did not provide any substantive response to the issues raised by the Coalition. We object to the USFS uncritical acceptance of Rosemont promises to mitigate groundwater mining at its mine supply well field.
- 0084-117: Groundwater quality and waste rock seepage: (FEIS Appendix B at B-17). With approximately eight linear miles of waste rock buttresses surrounding the perimeter of the project, having a minimum of four monitoring locations is grossly inadequate and in no way represents appropriate coverage for statistical sampling purposes. The FEIS fails to provide any support for this number, and nowhere in the FEIS can a value be found for the linear length of the waste rock perimeter.
- 0084-118: Groundwater quality and pit lake geochemistry: (FEIS Appendix B-22.) If the subject monitoring and modeling were done only every five years, this would require only four updates during the projected active life of the mine. Other than initial modeling results, only two data points per decade will be considered, which is grossly inadequate considering the potential environmental consequences that would last in perpetuity.
- 0084-119: The USFS did not adequately respond to Coalition comments on groundwater monitoring. The only references to groundwater quality and aquifer level monitoring in the FEIS are found in Groundwater Quality section in the discussion of mitigation effectiveness. (See FEIS at 395- 396.) The USFS may not defer to ADEQ to ensure that adequate monitoring takes place in order to identify water quality problems; rather the agency is required under NEPA to provide adequate information and analysis regarding the monitoring that would be required in order to ensure that any water quality problems are identified.
- 0084-79: The FEIS does not include a USFS response to Coalition comments regarding the frequency of groundwater monitoring and storm water runoff monitoring.

- 0091-23: The FEIS ignores good science and observations that have found that precipitation seepage through waste rock and tailings discharges from a point at a concentrated location (preferential flow) rather than spreading across the entire facility. This discharge results in inadequate mitigation and monitoring at two points only, which increases likelihood that water quality impacts could be overlooked.
- 0014-1: The destruction of our groundwater resources is said to be easily mitigated by the importation of Colorado River water through the Central Arizona Project. More droughts in California and the other southwestern states would rapidly dry up the Colorado and force cuts in CAP deliveries. Arizona and Nevada will be the first states to be hit by a cut in CAP supplies, then California. We can't afford to use up our groundwater and we can't afford the risk of another mining operation polluting what supplies there are.
- 0092-1: CAP deliveries to Sahuarita cannot be an effective mitigation if they are not available.
- 0115-3: The Colorado River is not being replenished, so sufficient CAP water is not assured. The Forest Service cannot just accept Augusta's specious assurances – thereby discounting the obvious flaws and fallacies of this plan.
- 0028-2: The proposed plan to allow Rosemont to enter into a contract with Community Water Company of Green Valley to build a CAP pipeline extension ... and to acquire credits to recharge is ludicrous ... and without any guarantees. (T)here are no approved recharge sites and ... not enough uncommitted CAP allocations to balance out the overdraw from the proposed replacement.
- 0117-5: It is not clear in the FEIS what resulting action will be taken from documenting increasing or decreasing impacts. The documented uncertainty in groundwater elevation and spring, seep, surface water, and riparian impacts of mine operation and closure make the ongoing monitoring and model updating a critical piece of the draft ROD. While the monitoring and updating of projections is explained and robust there is no indication of how this information will be used.
- 0027-2: Your suggestion for (individual water well) mitigation is woefully inadequate, insulting, and insensitive to those of us who may very well lose our life savings if this mine goes through and our wells become drawn down or dry, and our properties become worthless.
- 0084-115: The FEIS fails to analyze the Sahuarita Heights Well Owner Agreements to determine whether they constitute an adequate mitigation measure. The Coalition was unable to find in the FEIS where the USFS provides specifics, details, or additional clarifications of the proposed well protection plan that would provide an objective basis for determining the adequacy of the well protection plan as a mitigation measure. The USFS merely restates the unsupported assertion that the proposed Rosemont United Sahuarita Well Owners (RUSWO) well protection program will ensure that residential water wells in the Sahuarita area would " ... remain productive throughout the life of minerals production operations." (FEIS Executive Summary at xxix; FEIS at 359.) It is impossible to evaluate the effectiveness of the RUSWO agreement as a mitigation measure from the information provided in the FEIS.

- 0108-3: The recharge area is downstream of the affected aquifer and would have no beneficial effect.
- 0083-11: Availability of CAP water to mitigate Rosemont's groundwater pumping is questionable.
- 0028-2: ... mitigation the proposed plan to allow Rosemont to enter into a contract with Community Water Company of Green Valley to build a CAP pipeline extension ... and to acquire credits to recharge is ludicrous ... and without any guarantees. (T)here are no approved recharge sites and ... not enough uncommitted CAP allocations to balance out the over-draw from the proposed replacement.
- 0083-12: The DEIS identified two alternative water sources that were eliminated from detailed study because, among other reasons, there is "no guarantee that available excess effluent or reclaimed water would be available" and "there is no indication that Rosemont Copper could obtain the necessary rights or permits to use such water." DEIS, at 88. The same logic equally applies to Central Arizona Project water as a source for recharge in the DEIS.
- 0091-19: The FEIS fails to include a well owner mitigation plan for the east side of the mountain range.

Remedy Supplied by Objector (if any):

0084-116: Either eliminate from discussion Rosemont Copper using Central Arizona Project water as a mitigation measure or, in the alternative, includes enough detail about the availability of CAP water for recharge, the proposed well protection plan, and the Rosemont United Sahuarita Well Owners agreements to allow for a credible assessment of their effectiveness as mitigation measures.

0084-117: Re-evaluate the number of monitoring stations required for the linear length of the ultimate waste rock buttresses involved. The USFS should use this information to revise the number of required monitoring stations.

0084-118: Require that pit lake monitoring occur annually for at least the first seven years.

0084-119: Require more frequent groundwater quality and stormwater monitoring as mitigation measures independent of state requirements.

0092-1: Require a multi-billion dollar deposit in a USFS escrow account to cover potential environmental and economic damages to others and require the company guarantee the baseline flow and water quality in Ciénega Creek.

0115-3: Mine must be denied.

0117-5: 1) that the ROD state what resulting action or processes will be followed if documentation of an increased (or decreased) impact on surrounding ecosystems, resources, or landholders occurs; and 2) that the ROD (and eventual permit and bonding) require substantial mitigation to "fix" the issues revealed in the comprehensive monitoring program.

0027-2: Independent, credible, and quantifiable studies of the effects of well drawdowns and water loss of the neighboring residential wells should be conducted, and property owners impacted owners should be fully compensated for that loss.

0084-115: Either eliminate from discussion Rosemont Copper using Central Arizona Project water as a mitigation measure or, in the alternative, includes enough detail about the availability of CAP water for recharge, the proposed well protection plan, and the Rosemont United Sahuarita Well Owners agreements to allow for a credible assessment of their effectiveness as mitigation measures.

0083-11: Prepare a revised DEIS that either eliminates from discussion use of CAP water as a mitigation measure or includes enough detail about the availability of CAP water for recharge, the proposed well protection plan, and the Rosemont United Sahuarita Well Owners agreements to allow for a credible assessment of their effectiveness as mitigation measures.

0083-12: Either eliminate from discussion Rosemont Copper using Central Arizona Project water as a mitigation measure or include the previously eliminated alternatives for full analysis in a revised or supplemental DEIS for public review and comment.

Law, Regulation and/or Policy: Council on Environmental Quality (CEQ) Regulations at 40 CFR 1500-1508; 36 CFR Ch. II, Subpart A- Locatable Minerals; Forest Service Manual (FSM) 2500, Watershed and Air Management; FSM 2560, Groundwater Resource Management; Arizona Revised Statutes ARS 45-513 and ARS 45-514 (water supply permitting); Arizona Revised Statutes ARS 49-241 through 49-252 (aquifer protection permits).

Review Team Member Response:

The objectors raise a variety of issues regarding groundwater mitigation. How the Forest Service deals with mitigation for groundwater issues is guided by CEQ regulations for NEPA disclosure (40 CFR 1500-1508), Forest Service mining regulations (36 CFR 228), and Forest Service guidance on groundwater management (FSM 2560). In addition, the State of Arizona has jurisdiction over regulation of groundwater, and the water supply pumping by the mine is governed by ARS 45-513 and ARS 45-514.

The Forest Service has a responsibility for proper disclosure of impacts under NEPA. According to 40 CFR 1500.22, the agency will include within the environmental impact statement:

- (1) incomplete or unavailable information,
- (2) the relevance of the incomplete or unavailable information to evaluating significant adverse impacts, and
- (3) a summary of credible scientific evidence that is relevant to evaluating such impacts, and the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community.

40 CFR 1502.24 states agencies should:

- (1) assure the scientific integrity of the analyses and discussion,

- (2) describe methodologies used, and
- (3) cite references or sources used.

In addition to disclosure requirements, CEQ regulations also indicate that mitigation measures must be analyzed (40 CFR 1502.14): “Include appropriate mitigation measures not already included in the proposed action or alternatives.”

Many mitigation measures have been proposed by the public and cooperating agencies over the course of the project. Appropriate measures include ones that have been brought forward by the applicant, mitigation required and under the jurisdiction of federal agencies (U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service), mitigation required and under the jurisdiction of state agencies (i.e., required air mitigation, required stormwater controls), and additional mitigation developed by the Forest Service to respond to resource impacts. The mitigation the Forest Service can require is defined by Forest Service mining regulations. FSM 2560 requires the Forest to consider mitigation: “consider the effects on NFS groundwater resources of all proposed activities on and uses of NFS lands and to avoid, minimize, or mitigate adverse effects to the extent practical or as required by law.” However, the Forest Service jurisdiction for requiring mitigation is limited to Forest Service surface resources, and with respect to this objection specifically Forest Service groundwater resources: “Require that monitoring and mitigation appropriate to the scale and nature of potential effects is conducted, evaluated, and reported when authorizing a proposed use or Forest Service activity that has a significant potential to adversely affect NFS groundwater resources.”

The State of Arizona has authority with respect to the groundwater supply for the mine. The water supply has been authorized under ARS 45-514, Mineral extraction and metallurgical processing permit. These statutes do not contain requirements for mitigation of pumping impacts.

The State of Arizona also has authority under ARS 49-241 through 49-252 to regulate aquifer water quality and discharges to aquifers. This includes requirements for monitoring, mitigation measures in the event of problems, and best available control methods and technology to prevent problems from occurring.

Response to objection issues 0014-1, 0028-2, 0084-116, 0092-1, 0115-3, 0083-11, 0108-3, 0028-2 and 0083-12

These issues are related to the use of Central Arizona Project (CAP) water, primarily that there is no guarantee that it will be effective, either because it is voluntary and cannot be required, because of expected CAP shortages, or because recharge would not take place near the point of withdrawal.

Neither the Corps nor the USFWS have the jurisdiction to require recharge to occur or have made recharge part of required mitigation. The State of Arizona does not have a mitigation or recharge requirement under state statutes governing the withdrawal permit issued to Rosemont. The Forest Service cannot require mitigation of non-Forest Service groundwater resources.

Therefore, CAP recharge and analysis of the well owners' protection agreements are voluntary mitigation measures.

The Forest Service has a responsibility to analyze this mitigation measure and to fully disclose the effectiveness in the FEIS. Because the CAP recharge is voluntary, recharge with CAP water by Rosemont was not assumed in the groundwater modeling and effects analysis; therefore, the impacts disclosed in the FEIS [PR 047511_3, pp. 328-357] are appropriate given the limitations of the CAP recharge requirement. Note that the FEIS refers to use of "available Central Arizona Project water," discusses the potential shortfalls that may occur in CAP water, and outlines other methods by which recharge credits could be obtained by Rosemont under State law [PR 047511_3, pp. 359-361]. The FEIS also identifies that recharge undertaken to date has not been near the area of pumping, that future recharge may not be near the area of pumping, and has described the pipeline construction that could allow direct recharge in the area [PR 047511_3, pp. 359-361]. The FEIS also identifies the voluntary statements that Rosemont has made regarding their intentions with recharge, but clearly notes that those statements are not requirements. Finally, the FEIS also identifies that one permit (right-of-way encroachment permit for the Town of Sahuarita) would require recharge to occur, and also identifies that exertion or execution of this permit may or may not occur [PR 047511_3, pp. 359-361].

The Forest Service has met guidance and disclosure requirements by identifying the limitations of this mitigation measure.

Response to objection issues 0027-2, 0084-115 and 0091-19

These issues are related to water well mitigation and whether this mitigation is adequate.

Similar to the previous objection issues, the Forest Service has no authority to require mitigation for individual wells located off of Forest Service lands. In the FEIS, Appendix G, a response is given to objections about negative impacts to property values as a result of mining: "According to federal regulations (36 CFR 228.8), the Forest Service is directed to mitigate impacts to National Forest surface resources. Loss of private property value is not a Forest Service surface resource, and there is no basis in law that would allow the Forest Service to require Rosemont to mitigate for reduced property values" [PR 047511-7, CD, PCS 461, p. 1]. As with the CAP recharge, the Forest Service has no authority to require this mitigation, but does have a responsibility to properly disclose the effectiveness and limitations of the mitigation.

There are two different well owner agreements that Rosemont has constructed, one for the west side of the Santa Ritas and one for the east side of the Santa Ritas. These are voluntary agreements, and are only protective if well owners sign up for them. This is disclosed in the FEIS.

Effectiveness of Sahuarita Heights Well Owner Agreements: Agreements for the Sahuarita Heights neighborhood are already in place and effective [PR 047511_3, p. 359].

Effectiveness Well Owner Agreements for the east side of the Santa Ritas: Well Owner Agreements for Hilton Ranch, Helvetia, and Singing Valley areas on the east side of the Santa Ritas would become effective when Rosemont Copper receives final Forest Service approval for the project. According to the FEIS on Mitigation Effectiveness: A “. . . program has been offered on the east side of the Santa Rita Mountains and is intended to offset any impacts associated with dewatering associated with the mine pit; similarly, this program would be effective at mitigating any impacts, provided that those owners have entered into the agreement” [PR 047511_3, p. 359].

The Forest Service has met guidance and disclosure requirements by identifying the limitations of this mitigation measure.

Response to objection issues 0084-117, 0084-118, 0084-119, 0084-79 and 0091-23

These issues are related to monitoring and waste rock seepage and water quality, including inadequate scope of monitoring, and a perceived deference to ADEQ to define monitoring requirements.

Unlike the previous two objection issues discussed in which the Forest Service has no authority to require mitigation, in the case of waste rock seepage and water quality monitoring the Forest Service has jurisdiction over Forest Service groundwater resources (FSM 2560), while still coordinating with state authorities governing aquifer protection. In this case, the State of Arizona has issued an aquifer protection permit to the applicant [PR 016928] which includes monitoring requirements for both groundwater levels and quality.

ADEQ monitoring requirements are included in the FEIS [PR 047511_6, Appendix B]: OA-GW-02 (p. B-84, waste rock characterization required by APP), OA-GW-06 (p. B-87, water quality and water level monitoring at point-of-compliance wells required by APP), OA-SW-01 (p. B-88, stormwater testing required by stormwater permit).

Objector 0084 is incorrect in stating that the Forest Service has solely relied on ADEQ for waste rock and water quality monitoring requirements. The following requirements are included in the FEIS and were developed solely by the Forest Service to address Forest Service groundwater resources [PR 047511_6, Appendix B]: FS-GW-01 (p. B-16, waste rock seepage), FS-GW-02 (p. B-17, water quality at wells and springs beyond the APP point-of-compliance wells), FS-GW-03 (p. B-19, waste rock characterization above that required by APP), FS-BR-22 (p. B-48, monitoring of flow, water levels, and water quality downstream in Barrel and Davidson Canyons), FS-BR-27 (p. B-53, rerunning of groundwater models. Note that in order to rerun the models, this measure includes a variety of data collection requirements including water levels in wells other than APP point-of-compliance wells). Collaborative development of these monitoring measures by the Forest Service is described in the record [PR 047009].

Monitoring is further required under the Biological Opinion. Groundwater monitoring to take place in accordance with the Biological Opinion is described in the Mitigation and Monitoring Plan [PR 047511_6, pp. 49-50]: “This measure was put forth by Rosemont Copper as a voluntary

conservation measure for consideration under consultation with the USFWS under the Endangered Species Act,” and it goes on to say that “These conservation measures are no longer considered voluntary for the purposes of this appendix, as implementation of these conservation measures is required under the biological opinion.”

With respect to the total of four waste rock dump water quality monitoring wells being insufficient; the mitigation plan allows for monitoring up to 10 springs and 16 new and existing wells (PR 047511_6, page B-17).

The pit water quality will be monitored through the use of perimeter wells (PR 047511_3, p. 395), and new data from wells and waste rock analyses will be used in order to update the pit lake geochemical model [PR 047511_6, p. B-22]. Pit water is expected to be of similar composition as that of the ambient groundwater [PR 012105, p. 29]. The continuous collection of data will ensure quality control.

Information concerning the frequency of monitoring is included in the FEIS. The periodic validation and rerunning of the model is found in Chapter 3 [PR 047511_3, p. 357] and frequency of monitoring is given in Appendix B [PR 047511_6, pp. B-53 – B-54]. Further, groundwater and surface water monitoring measures are described in Chapter 3 [PR 047511-4, pp. 439-441], and detailed in Appendix B, including frequency [PR 047511_6, pp. B-26 – B-27 and B-48 – B-50].

One of the most widespread comments, including comments by the EPA, questioned the prediction that precipitation would not infiltrate the waste rock or tailings facilities and cause seepage, which could potentially impact groundwater quality. In direct response to these concerns, the Forest requested that additional modeling scenarios be conducted by Rosemont Copper for more conservative precipitation conditions. Rosemont Copper responded by conducting modeling under seven different reclamation scenarios—including a scenario in which ponding occurs on the surface of the waste rock and tailings facilities—and under four different climatic scenarios. The additional modeling reinforces earlier predictions that, under all scenarios, conditions are such that any precipitation infiltrating the waste rock or tailings would quickly evaporate, and no additional seepage would result [PR 047511_4, p. 362].

The Forest Service incorporated monitoring not only required under the state authority of ADEQ, but also collaboratively developed monitoring to address Forest Service groundwater resources. Monitoring has been developed specifically to address waste rock characterization, monitoring of waste rock seepage, and monitoring of water quality in a variety of wells and springs above and beyond those required by ADEQ. These efforts are consistent with Forest Service guidance and regulation.

Response to objection issue 0117-5

This objection issue indicates that the Forest Service has not made clear what actions will be taken once impacts are documented through monitoring.

The Draft Record of Decision [PR 047504, pp. 30-43] spells out in detail the Mitigation measures, frequency of monitoring, and measures to be taken by Rosemont Copper, as well as specific compliance references.

In addition, the Forest Service chose to incorporate an adaptive management approach to monitoring, in order to avoid predicting and requiring actions that may or may not be effective if a problem occurs. Adaptive management is a key component of many of the mitigation and monitoring measures [PR 047511_6, Appendix B]: FS-SR-01 (p. B-8 – B-11); FS-SR-02 (p. B-11 – B-13); FS-BR-04 (B-42 – B-44); FS-BR-16 (B-43), and OA-SW-01 (B-88 – B-99). Adaptive management is also a key component in the Biological Opinion [PR 047511_7, Appendix F, pp. 31, 33, 35, 47, 49, 51, 57, 60, 93, 98-100, 111, 139, 141, 167, 205, 223-224, 267, and 288].

The adaptive management approach is described in the FEIS [PR 047511_2, pp. 95-97], and would consist of a multi-jurisdictional review team to analyze data and propose recommendations to the Forest Supervisor for necessary mitigation actions. This approach is responsive to Forest Service guidance as it would ensure effective mitigation for Forest Service groundwater resources, if needed.

Recommended Remedy by Review Team Member (if any): The remedies suggested by the objectors are not warranted. No remedy is required.

Review Team Member: Roger D. Congdon, Ph.D., hydrogeologist; Washington Office, Centralized National Operation.

Rosemont Copper Mine

Objection Review

Objection # (s): 0016-KPaul; 0026-DCreed; 0039-JFisher; 0045-RParr; 0052-SHart; 0083-FICO; 0084-SSSR; 0090-AZGFD; 0091-PimaCounty; 0100-TohonoOodhamNation; 0105-RCasavant;

Resource Area(s): Groundwater Resources – Effects (GRW-5)

Objection Issue:

- 0026-4: The pit will be subject to windblown sand and dust which will be cemented by silicates, blanking off the neutralizing effect of the carbonates in the pit.
- 0026-6: With the above referenced evaporation, there should be a buildup of the heavy metal ions in the 200 year lake (Table 75). How else do they vanish? With the blanking of the lake walls and its neutralizing effect, pH will drop. The toxic metal ions will concentrate {arsenic, lead, nickel, selenium, thallium and zinc). Most groundwater pumped in this area contains natural amounts of arsenic. Dust control in the mine will allow arsenic to build up in the pit lake.
- 0039-22: The FEIS has inadequately addressed the problems of selenium in groundwater and surface waters and their effects on wildlife.
- 0045-1: Your study data (for impacts to individual wells) is inadequate and more independent analysis is needed on water draw down.
- 0052-1: Physical and mineralogical nature of test samples are inadequate or undefined.
- 0052-2: Humidity cell tests are not presented as cumulative values as required by ASTM protocol D5744-07.
- 0052-4: Lack of a microbial component in leach tests.
- 0084-120: The FEIS does not adequately characterize potential cumulative effects from project-related groundwater drawdown and increasing demand for groundwater as a result of residential and commercial growth within the context of drought and projected climate change. Resolution: The potential additive/cumulative adverse effects from the project and other water demands on streams, wetlands, and riparian areas in the context of climate change should be clearly discussed in a revised DEIS.
- 0084-126: There is no quantitative or even a qualitative analysis of a reduction in groundwater availability nor any socioeconomic analysis of the effect of groundwater mining on existing well owners.
- 0084-131: The FEIS analysis has numerous problems with the infiltration, fate and transport modeling. The seepage, fate and transport modeling are still incomplete and fail to address numerous important issues. When initial tailing are emplaced, they will be thin, un-compacted, and will not have the hydraulic conductivity profiles that were modeled. There will be no "cone of depression" from the open pit, thus all groundwater

flow will be "downhill", and not captured by the open pit. As the tailings pile builds up, it will be variably compacted by dust-control measures, and will not have a homogeneous permeability structure. It will certainly not start out with the extremely low hydraulic conductivity that was chosen for the modeling. Likewise, the underlying alluvium and bedrock will have many high permeability paths. None of this complexity has been actually modeled. The FEIS tries to circumvent this failure by repetitively mentioning one of the outcomes that arose from the preliminary modeling effort, namely that the total seepage from the tailings pile would be only 8 gpm.

- 0084-132: The Coalition objects to the inadequate USFS response to Coalition comments regarding the impacts of seepage from Rosemont Copper Project facilities. Also, the USFS has provided new information in the FEIS to support its conclusions that seepage from mine facilities will be "negligible." We object to the lack of any opportunity to members of the public to review and evaluate the revised infiltration modeling results provided to USFS by consultants for the Rosemont Copper Company, the project proponent. We object to the USFS overreliance on data and information (in this case the results of revised infiltration models) that are conducted by technical consultants for the Rosemont Copper Company and that the agency refuses to share with the public.
- 0084-134: The USFS conclusion that "no water is incorporated into the waste rock, and as no precipitation infiltrates the facility even under extreme climatic and ponding conditions, no seepage is expected from the waste rock facility" simply defies common sense understandings of how rainfall infiltrates into the ground (even into waste rock dumps!).
- 0084-135: The FEIS fails to address deficiencies in the leach tests due to the lack of a microbial component. The USFS responds by referring the reader to Vol. 2 of the FEIS, without any mention of a biological component in the leaching experiments. (FEIS Appendix G #906.) There is no mention either in Vol. 2, or any of the post-DEIS reports or references in the project record. We note that there are references to "biological treatments" or "bioengineering", particularly in Hudson and Williamson, 2011. It is absolutely clear that this issue has been totally ignored, despite our initial comments on the DEIS.
- 0084-136: The FEIS fails to address deficiencies in the leach tests due to the lack of a microbial component. The USFS responds by referring the reader to Vol. 2 of the FEIS, without any mention of a biological component in the leaching experiments. (FEIS Appendix G #906.) There is no mention either in Vol. 2, or any of the post-DEIS reports or references in the project record. We note that there are references to "biological treatments" or "bioengineering", particularly in Hudson and Williamson, 2011. It is absolutely clear that this issue has been totally ignored, despite our initial comments on the DEIS.
- 0084-139: The issue of mineralogical studies was brought up repeatedly in comments to the DEIS. Peer reviews of earlier reports (e.g. Hoag, Bird and Day, 2012) on the one hand emphasize the need for thorough mineralogical studies, but then state that the earlier reports have done an acceptable job. In fact, the earlier reports contain virtually no

quantitative mineralogical studies, with thin section evaluations aided by electron probe analyses, X-ray diffraction, etc.

- 0084-140: The USFS did not adequately respond to technical concerns raised by the Coalition regarding the adequacy and completeness of the geochemical testing and predictive groundwater flow modeling used by USFS to predict geochemical impacts. We object to summary of impacts presented in the FEIS relating to the ability to meet aquifer water quality standards based upon incomplete information and flawed geochemical testing. In particular, we object to the USFS failure to conduct the necessary mineralogical analyses to support the geochemical analyses and that would reduce scientific uncertainty about the reactivity of waste rock piles.
- 0084-141: The statement that "Geochemical analysis conducted by Rosemont Copper generally supported the finding that elevated levels of radioactive materials were not present" is questionable. 1) The original data which Rosemont submitted on the radioactive chemical content of their ore source material was deficient. Rosemont's consultants never characterized thorium, found in large quantities separately from uranium in areas of the Southwest in the vicinity of the Rosemont claims. Nor did Rosemont report any attempts to check for and quantify the mildly radioactive lanthanide (rare earth) elements, which might also be present. Rosemont actually omitted from their tables of chemical analyses of the composition of the ores any radioactive elements. Rosemont has never corrected their data tables accordingly. 2) Further, the background geochemical characterization did not include detailed and complete mineralogical analyses of the samples. 3) The FEIS fails to provide an adequate analysis of the potential for the mining process to concentrate naturally radioactive materials in the tailings. 4) The FEIS does not clearly characterize "mobility" of uranium from the tailings. 5) The CNF cannot depend solely on its consultant report Kline (20 12) because that report noted that the authors simply assumed that samples were handled properly, the results reported properly, and that all quality control aspects of a chain of custody were accounted for. However, the authors did not question the quality of the data, nor comment on the background geochemistry report notes from the radioactivity analyses presented. 6) The last sentence of the above-cited passage from the FEIS (FEIS at 384: "The investigation focused on the ranges of uranium...") is contradicted by the materials in the background geochemistry characterization report. The only leachate sample reported in any specialized background radioactivity testing confirmed the presence of the uranium in the leachate and the ore, and its leaching potential, thus showing detectability. 7) A radioactive substance that is found naturally at a given level in a given geological stratum does not mean it is not an environmental hazard. Erosion from the dry stack and blasting will both release the material to the environment and make it toxicologically available whereas it might not be if it remained originally trapped in undisturbed mineral strata.
- 0090-9: The screening level data developed by the Coronado National Forest does not support the claim in the FEIS that the mine does not have the potential to change the biological integrity along any portion of Lower Cienega Creek.

- 0090-11: Technical reports contradict the FEIS statement that mine-related contaminants in the dry stack tailings seepage will be contained by the capture zone of the mine pit lake.
- 0090-12: The technical data does not support the statement in the FEIS Groundwater Section at 379-80 that if dry stack tailings seepage were to daylight or appear downstream, none of the concentrations reported in the tailings seepage would exceed the applicable surface water quality standards in Barrel Canyon.
- 0090-13: The FEIS Required Disclosures text at 1131 that dry stack tailings seepage is not expected to exceed any numeric Arizona Aquifer Water Quality Standard, and that irreversible or irretrievable commitments are not anticipated for groundwater quality, does not address the issue of other contaminants in dry stack tailings seepage that potentially exceed surface water quality standards for the downstream watershed.
- 0090-14: The FEIS does not discuss or analyze the potential impacts of sulfates and total dissolved solids in dry stack tailings seepage on groundwater or downstream surface water quality.
- 0091-18: The FEIS fails to analyze and disclose impacts to approximately 360-370 individual domestic and production wells, apparently because insufficient information was available.
- 0105-2: The fact that none of this data (provided by the objector and associates) was stated or referenced in the FEIS and ROD, implies that these objective data sets and valid interpretations, provided in good faith, were either inadvertently omitted or biased against in the CFS ID team or contractors reviews. Thus, the ability to assess variations, risk and model impacts, or determine a range of monitoring or mitigation steps in relations to a surface water-groundwater characterization may have been hindered. Thus, potential interactions and subsequent monitoring protocols and needs remain potentially handicapped, when the full range of interpretation and potential outcomes and linkage are not considered—both within the mineralized region of interest and outside of it. Effects on drawdown rates, direction and impacts to riparian and spring resource may not be fully ascertained before impacts are noted and become irreversible.
- 0100-17: The FEIS does not adequately address the impacts to Nation water resources. The models completed by the Forest Service predict 10 feet of additional water table decline at the San Xavier wells near the Desert Diamond Casino, as well as potential broader impacts to Nation water resources. FEIS at 316. The FEIS fails to adequately analyze the impact to the Nation of this drawdown. The destruction and the consequent impacts of sacred springs on the Nation are not fully analyzed in the FEIS.
- 0083-13: FICO objects to the inclusion of the unsupported conclusion in the FEIS that groundwater pumping from the Rosemont mine supply wells will only have a "minor" impact on the migration of the Sierrita sulfate plume. There is no data or information in the FEIS that supports the USFS conclusion.
- 0084-123: FEIS fails to provide an adequate analysis of the potential impacts to the groundwater system of the Sonoita Plain. The FEIS does not acknowledge that map B included in the Statement of Concern suggests the possibility for unacceptable decline throughout the Sonoita Plain, or that curves of Larry Winter show potential water-level

declines as far east of the mine as 50 km (30 miles). (SSSR Appendix D (i) at 20; 25- 26.) Nor does the FEIS address directly artesian versus phreatic ground-water conditions, varying primary versus secondary permeabilities relative to rock characteristics, or a regional reduction of water pressure or water level in beds underlying the Sonoita Plain. Because the FEIS does not contain mention of permeability, except for with regard to fault zones, or the related concepts of transmissivity and potentiometric surface, it appears that the USFS either rejects the investigation results that Drs. Osterkamp and Winter have presented, or it lacks the technical expertise to do so. Nowhere in the FEIS is there response to Myers' conclusion that mine excavation could "lower the regional water table by up to 1500 feet. P. 180. In dismissing these relevant and legitimate concerns (Dr. Osterkamp or Dr. Winter regarding the information submitted in the Statement of Concern), the FEIS states that such concerns "are not substantiated by available data and do not rise to a level to suggest that the modeling assumptions and modeling techniques used in this analysis are inappropriate." (FEIS at 299.) We strongly disagree with this demonstrably false statement.

- 0026-1: The draft EIS said the lake pH would be 4.7. The final EIS says it will be neutral. I could not find an explanation for the change.
- 0084-138: The FEIS states, "A waste rock segregation plan has been incorporated into the design of the facility and would be informed by continued monitoring and testing of waste rock for acid-generating potential as it is developed from the mine and placed into the waste rock facility." (FEIS at 397.) However, there is no waste rock segregation plan presented as a reference to the FEIS, or is there sufficient information presented in the FEIS to be able to determine how waste rock will be segregated to help prevent acid rock drainage.
- 0084-154: The USFS fails to address how Rosemont Copper's groundwater pumping will alter the migration of the Sierrita sulfate plume. The Coalition objects to the inclusion of the unsupported conclusion in the FEIS that groundwater pumping from the Rosemont mine supply wells will only have a "minor" impact on the migration of the Sierrita sulfate plume.
- 0052-6: Numerous problems with the infiltration, fate and transport modeling.
- 0016-7: If this mine is going to receive any further consideration the USFS must conduct appropriate credible analyses using proper methodology and based on current, accurate data of the effects of well draw downs and loss of water along with future impact. The Rosemont Copper Project (or its consultants) should be required to conduct an inventory of the estimated 500 to 550 individual wells that could be affected by groundwater pumping at the production for the Rosemont Copper Project.
- 0084-122: The FEIS fails to adequately analyze impacts to regional groundwater sources. The USFS fails to adequately respond to this comment in the FEIS. While the USFS extended the temporal bounds of the groundwater models to 140 years for the Santa Cruz Basin and 1,000 years for the eastern side of the Santa Rita Mountains, the USFS did not provide any meaningful analysis of the hydrologic impacts of the Rosemont Copper Project within the extended temporal boundaries. In particular, the USFS failed to analyze the long-term impacts of the Rosemont Copper Project groundwater withdrawals

on water resources during the indefinite post-closure period after the mine ceases active operations. It is not an adequate response to describe "potential" impacts and then downplay predicted impacts as "speculative at best" or uncertain.

- 0084-125: The FEIS also failed to identify a response to the contention that there is a disparity between the rate of exurban development in the Sonoita Plain and the ground water needed to support present and future housing and businesses. There is no acknowledgment that (1) the subsurface is the only available source of water for environmental and human needs, (2) inadequate hydrologic assessments for developments may cause water scarcity for property owners and a disruption of ground-water recharge, and (3) disturbance to the hydrologic system, such as drought, excessive ground-water withdrawals, or drainage into a deep open pit will exacerbate previous overdrafts.
- 0039-21: The FEIS has assumed the wrong position on the discussion of arsenic in groundwater.
- 0039-20: The investigation into the potential for the mining process to concentrate naturally radioactive materials in the tailings is seriously flawed.
- 0084-133: The FEIS contains some contradictory and confusing statements, including that the plan is "to minimize infiltration" , "the top of the tailings facility would be relatively impervious", "that is, all precipitation would remain on top of the tailings", and again "to limit infiltration into the tailings". (FEIS at 46.).
- 0084-121: The USFS failed to analyze the impacts resulting from the fact that Rosemont can apply for a modification to their Ground Water Withdrawal Permit and approval is essentially rubber-stamped, and there is no upper limit for groundwater pumping with the approval process. The response to objector's comments on the DEIS (App. G, # 916) is inadequate as there is no guarantee that an increase in Rosemont's groundwater use would require additional NEPA analysis, and is overly vague as to how the determination would be made.
- 0084-130: The USFS response to Coalition comments regarding the failure to demonstrate BADCT is inadequate. The USFS may not defer to ADEQ to make BADCT determinations through the Aquifer Protection Permit (APP) program; rather the agency is required under NEPA to provide adequate information and analysis regarding this determination independently. In addition, the FEIS fails to acknowledge that the APP issued for this project is currently under appeal by multiple plaintiffs challenging ADEQ's issuance of the APP and the state agency's BADCT determinations.
- 0084-127: The failure to provide quantified analysis of reductions in aquifer recharge violates NEPA.
- 0091-20: The FEIS underestimates impacts to low flow springs and streams by relying on a five-foot threshold of concern for predicting the environmental and social impacts of groundwater drawdown caused by the mine, including impacts to federally endangered fish and frogs.
- 0090-4: The methods used by the CNF to develop its "screening analysis" of the potential impacts of mine waste rock runoff on Barrel Canyon water quality is not the best data

available, and is not generally accepted in the scientific community where more scientifically- defensible data is readily available.

- 0084-129: Additional information regarding the potential adverse environmental consequence of seemingly small changes in groundwater levels must be added in the revised DEIS. The FEIS repeatedly characterizes changes in ground water levels of < 1 foot as "small." The use of the descriptors "small" or "very small" are not meaningful absent some relative measure of ecological significance or risk.
- 0052-3: Many deficiencies in analytical protocols, reporting of results and failures to meet AWQS.
- 0052-5: Lack of leach test data on oxide ore lithographs.
- 0084-137: The FEIS analysis lacks leach test data on oxide ore lithologies. The USFS does not seem to address these concerns in the FEIS or in any of the peer-reviews or reports of record. With the proposed plan to eliminate the heap leach facility, the problem of leaching and seepage from the oxide ore becomes even more critical.

Remedy Supplied by Objector (if any):

0039-22: Issue a new DEIS or Supplement EIS subject to public comment.

0052-1: Supply the necessary documentation if available, and run additional tests under more realistic conditions. Conduct detailed mineralogical studies.

0052-2: Use existing data values for new seepage, fate and transport modeling.

0052-4: Run more experiments under well-designed and carefully executed conditions.

0084-126: Conduct an inventory of the 500 to 550 individual wells that could be affected by groundwater pumping at the production for the Rosemont Copper Project, and provide either a quantitative, or qualitative hydrologic and socioeconomic analysis of the likely impact of the predicted 90-foot drawdown of the regional aquifer over the next 100 to 140 years, and analyze the reasonably foreseeable effects of groundwater pumping on existing water users in the local community in the upper Santa Cruz Basin.

0084-131: Run a full 3-dimensional seepage, fate and transport model, with moving boundaries, presence of flow localization both in the tailings pile and in the substrate, rainfall that mimics the 3-day 13 inch black swan events that have actually occurred in southern Arizona.

0084-132: The USFS should make available the results of the revised infiltration modeling conducted by Tetra Tech in a revised DEIS so the results can be reviewed and analyzed by members of the public.

0084-134: The conclusion that there will be no seepage from the waste rock dump is counterintuitive and the public should have the opportunity to critically review the data and information that supports that surprising conclusion.

0084-135: The USFS should use the existing data, which are already sufficient to be used as starting values for new seepage, fate and transport modeling, and conduct modeling using these more appropriate values.

0084-136: Run more experiments under well planned and carefully executed conditions. The only way to mitigate the problem of leaching is to fully line the tailings piles. The USFS should require this of Rosemont as an alternative, before this project moves forward.

0084-139: The USFS must supply the necessary documentation if available, and run additional tests under more realistic conditions in order to adequately assess the potential for leaching from the tailings. The USFS should conduct detailed mineralogical studies.

0084-140: The USFS must revise its analysis and conduct more extensive geochemical testing and predictive groundwater flow monitoring in order to adequately demonstrate that aquifer water quality standards will not be violated.

0090-9: Analyze and disclose potential impacts of stormwater waste rock runoff on taxa richness, species composition, tolerance and functional organization of Lower Cienega Creek.

0090-11: Strike all references in the FEIS that the mine pit lake will capture all dry stack seepage. Revise FEIS and analysis per specific suggestions in the objection.

0090-12: Revise the discussion of tailings seepage in the Groundwater Section of the FEIS to reflect the text and Table 105 of the FEIS at 475 that daylighted seepage in Barrel Canyon is predicted to exceed the Aquatic and Wildlife-warm water ephemeral surface water standards for Barrel Canyon. Analyze temporal effects of the seepage for Davidson Canyon and Cienega Creek.

0090-13: Perform additional waste characterization and revise FEIS according to suggestions in objection.

0090-14: The FEIS should fully disclose the impacts of the sulfate plume from the dry stack tailings facility to downstream receptors, including wells and surface waters.

0091-18: Analysis could be based on groundwater modeled drawdown at those locations even with caveats that these are average predictions.

0083-13: Revise the analysis to include more complete hydrologic modeling data; provide relevant supporting evidence for the conclusion that mine supply pumping will have only a minor effect on the Sierrita sulfate plume; or withdraw the conclusory statement that mine supply groundwater pumping is not expected to affect the sulfate plume. Provide this information in a revised DEIS.

0084-123: Expand the "analysis area" to encompass the full area to be impacted, including the Sonoita Plan. Consider a worst-case scenario and must inventory in detail the occurrences of springs and seeps.

0084-138: The USFS must revise its analysis and conduct additional geochemical testing and waste rock characterization in order to demonstrate that proposed Rosemont Copper Project facilities will not cause acid mine drainage. The USFS must also develop a comprehensive waste rock segregation plan, including well defined waste identification, segregation, and placement procedures.

0084-154: Revise the analysis to include more complete hydrologic modeling data. The agency must provide relevant supporting evidence for the conclusion that mine supply pumping will have only a minor effect on the Sierrita sulfate plume. Or withdraw the conclusory statement that mine supply groundwater pumping is not expected to affect the sulfate plume.

0052-6: Run a full 3-dimensional Infiltration, Seepage, Fate and Transport model, with moving boundaries, presence of flow localization both in the tailings pile and in the substrate, rainfall that mimics the 3-day 13" black swan events.

0016-7: Prepare and circulate for public review and comment a Revised DEIS or Supplemental Draft EIS.

0084-122: Provide a more detailed analysis of the predicted impacts to groundwater resources within the extended temporal and geographic boundaries of the hydrologic analysis; make a reasonable attempt to describe likely and reasonably foreseeable impacts of the Rosemont Copper Project's groundwater pumping on regional groundwater impacts; make a credible attempt to analyze the environmental and socioeconomic impacts on existing water users over the active mine life.

0039-21: Issue a new DEIS or Supplement EIS subject to public comment.

0039-20: Issue a new DEIS or Supplement EIS subject to public comment.

0084-133: Neutralization of acid is important and the UFSS should provide more detail regarding their plans to address this issue and show that the proposed plan is feasible. The USFS should present this information in a revised DEIS that is made available for public comment and review.

0084-121: Require additional NEPA analysis should Rosemont propose to increase its groundwater pumping anytime during the life of the mine, or if makes any other changes to any other Federal, state or local permits, and include this requirement in a revised DEIS.

0084-130: Analyze and disclose how this project meets all applicable standards and provide this information in a revised DEIS.

0091-20: There is precedent for the use of models based on a one-foot threshold.

0090-4: Perform waste rock characterization with laboratory method detection limits set for Arizona surface water quality standards, and then compare the data to the AW&We standards for the ephemeral portion of Davidson Canyon and to the AW&Ww standards in OAWs Davidson Canyon and Cienega Creek.

0052-3: Make the aquifer and surface water As standards the same, and then apply the "connectivity principle" to both the Outstanding Arizona Waters "Tier 3 Anti-Degradation criteria", and to the modeling of the impacts of arsenic (and other toxic elements) on the aquifer.

0052-5: Additional leach testing of drill core composites that accurately represent both the oxide material that may be stockpiled, and the mixed oxide/sulfide ore grade material that will end up on the tailings piles. These tests must include Humidity Cell tests that have an active microbial component, the data must be cumulated according to ASTM protocol, and this must then be used as "starting values" for new seepage, fate and transport modeling.

0084-137: Do additional leach testing of drill core composites that accurately represent both the oxide material that may be stockpiled, and the mixed oxide/sulfide ore grade material that will end up on the tailings piles.

Law, Regulation and/or Policy: Council on Environmental Quality (CEQ) Regulations at 40 CFR 1500-1508; Forest Service Manual FSM 2500, Watershed and Air Management; Forest Service Manual FSM 2560, Groundwater Resource Management; Arizona Revised Statutes ARS 45-513 and ARS 45-514; Arizona Water Quality Standards (Title 18 Arizona Administrative Code Chapter 11)

Review Team Member Response:

The objectors raise a variety of issues regarding analysis and disclosure of groundwater impacts. The Forest Service analysis of impacts to groundwater is guided by CEQ regulations for NEPA disclosure, requirements under the CWA, Forest Service guidance, and State of Arizona jurisdiction over groundwater pumping and aquifer water quality.

The Forest Service has a responsibility for proper disclosure of impacts under NEPA. According to 40 CFR 1500.22, the agency will include within the environmental impact statement:

- (1) incomplete or unavailable information,
- (2) the relevance of the incomplete or unavailable information to evaluating significant adverse impacts, and
- (3) a summary of credible scientific evidence that is relevant to evaluating such impacts, and the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community.

40 CFR 1502.24 states agencies should:

- (1) assure the scientific integrity of the analyses and discussion,
- (2) describe methodologies used, and
- (3) cite references or sources used.

In addition to meeting disclosure requirements, an FEIS [PR 047511] analysis must meet the regulatory requirements of Clean Water Act (33 United States Code 1251–1376) and the objective of “restore and maintain the chemical, physical, and biological integrity of the nation’s waters.” The State of Arizona has specific jurisdiction over water quality deriving from the Clean Water Act Section 401 (33 United States Code 1341) and Section 402 (33 United States

Code 1342). Arizona regulations (Title 18 Arizona Administrative Code Chapter 11) identify surface water standards that must be met, including those for Outstanding Arizona Waters. Arizona administers Section 402 authority through the Arizona Pollutant Discharge Elimination System (Title 18 Arizona Administrative Code Chapter 9), which requires permitting for discharges to waters of the U.S.

The State of Arizona has the sole authority to make a determination under Clean Water Act Section 401 concerning a proposed project and potential actions that may violate State Water Quality regulations by degrading Outstanding Arizona Waters (OAWs) [PR 047511_3, p. 503]. The FEIS states that no federal permit action may be approved if the state denies certification [PR 047511_3, p. 449]. The DROD also states that a 401 certification must be issued prior to approval of a final MPO [PR 047504, p. 44], and that the Forest Supervisor consulted with the Arizona Department of Environmental Quality (ADEQ) about the likelihood of 401 certification being issued [PR 047504, p. 15].

The State of Arizona has delegated authority to issue permits under Clean Water Act Section 402 for discharge of stormwater to waters of the U.S. [PR 047511_3, p. 449-450] and has issued authorization for the project [PR 045094]. The Forest reviewed the Stormwater Pollution Prevention Plan submitted as part of the AZPDES authorization, which contains many of the operational details for compliance with the permit, [PR 046071].

The Forest Service approach to groundwater resources is also guided by Forest Service policy (FSM 2560). Objectives include requirements for analysis and disclosure: “To gather and make available information on NFS groundwater resources and their uses to provide for informed decisions during Forest Service planning and development and implementation of Forest Service projects,” as well as mitigation: “consider the effects on NFS groundwater resources of all proposed activities on and uses of NFS lands and to avoid, minimize, or mitigate adverse effects to the extent practical or as required by law.” FSM 2560 also makes clear that the Forest Service must coordinate with states having jurisdiction over water resources: “require written authorization holders operating on NFS lands to obtain water rights in compliance with applicable State law, FSM 2540, and the terms and conditions of their authorization.”

The State of Arizona has such authority with respect to the groundwater supply for the mine. The water supply has been authorized under ARS 45-514, Mineral extraction and metallurgical processing permit. The State of Arizona also has authority under ARS 49-241 through 49-252 to regulate aquifer water quality and discharges to aquifers. This includes requirements for monitoring, mitigation measures in the event of problems, and best available control methods and technology to prevent problems from occurring. The State of Arizona also has the authority under ARS 49-221 to 49-225 to set surface water and aquifer water quality standards.

Response to objection issues concerning water quality: 0039-22, 0084-131, 0084-132, 0084-134, 0084-140, 0084-141, 0090-9, 0090-11, 0090-12, 0090-13, 0090-14, 0083-13, 0084-138, 0084-154, 0052-6, 0039-21, 0039-20, 0084-130, and 0090-4

Radionuclides: The issue of radioactive elements and their potential for contamination of natural waters is covered in the FEIS [PR 047511_3, pp. 363 and 384], and in an SRK Consulting

technical memorandum [PR 018755, pp. 14-16]. The waste rock will be composed mainly of the carbonate host rock, characterized by low uranium concentrations (0.99 – 2.2 ppm), as per research compiled for crustal rocks.

Selenium: Selenium toxicity is adequately addressed in the FEIS [PR 047511_3, pp. 369-392, pp. 447-479, pp. 549-552], and Appendix F of the FEIS [PR 047511_7, pp. 216-217], and Appendix G of the FEIS [PR 047511_7, p. G-65], as well as being explicitly addressed in technical reports by SRK [PR 017366, pp. 10-12] and [PR 017372].

An arsenic standard of 0.01 mg/l should have been used: The Arizona Aquifer Water Quality Standard for arsenic is still 0.05 mg/l, and requiring the more conservative standard would be inconsistent with state law [PR 047511_3, p. 372]. Therefore, the individual aquifer protection permit issued to Rosemont Copper uses the current aquifer standard of 0.050 milligram per liter. The state of Arizona has jurisdiction to set water quality standards, and the FEIS approach is consistent with Arizona regulations.

Leach tests did not have a microbial component. A commentary on the Rosemont Copper Company Draft EIS [PR 033126_14126], written by Dr. Stanley R. Hart, addresses this by explaining the issues with biological leach-enhancement. “Active biological processes can increase weathering and leaching rates of some toxic metals by huge factors” [PR 033126_14126, p. 3]. Dr. Hart expressed the opinion that a few such ““worst case scenarios” should be explored . . .” and that the burden of proof is on Rosemont to demonstrate lack of impacts. However, NEPA does not require analysis of a “worst case” scenario (40 CFR1502.22). The state of Arizona has authority for control of discharges to the aquifer, and has specific expertise pertinent to analyzing leach tests and characterizing waste rock; ADEQ requirements are codified in the BADCT manual [PR 012173]. Microbial component analysis of humidity cells is not generally required, nor was it specifically required for the aquifer protection permit issued by ADEQ [PR 016928].

ADEQ has jurisdiction over discharges to aquifers, and issued an aquifer protection permit to the applicant [PR 016928]. The aquifer protection permit was appealed through the administrative procedures put in place by the State of Arizona. The appeal involved issues and supporting testimony mirroring the objections raised to the Forest Service. The outcome of the appeal upheld the agency’s decision to issue the permit. According to ADEQ’s Final Permit Decision and Response to Comments [PR 016929, p. 46]: “The preponderance of the evidence shows that Rosemont followed industry standards and the BADCT Manual in conducting the leach testing...The preponderance of the evidence shows that the leach testing samples were of an appropriate grain size and that these samples were not abiotic.”

Incomplete geochemical analyses: In Appendix G [PR 047511_7, p. G-37] the peer review process that the leaching tests were exposed to led to the conclusion that the analyses were “reasonable and appropriate.” However, it goes on to state that “. . . modeling represents a prediction of impacts, and cannot be taken as proof that impacts won't occur.” Prediction of the future cannot be guaranteed. For this reason, the Forest Service required a comprehensive suite of monitoring requirements incorporating ADEQ requirements, as well as requirements

developed by the Forest Service under their authority to protect Forest Service groundwater resources.

Biological integrity of Davidson Canyon and Cienega Creek will be compromised: The FEIS discloses [PR 047511_3, p. 548] that runoff may be reduced by 4.3 to 11.5 percent, though it is noted that the prediction has a high level of uncertainty. Runoff water quality from waste rock and soil cover is predicted to meet surface water standards, unless those standards are currently exceeded. Arizona Water Quality Standards (Title 18 Arizona Administrative Code Chapter 11) as described in the FEIS [PR 047511_3, p. 451], apply to all groundwater and surface water. The regulations state that “surface water shall not contain pollutants in amounts that: (1) settle to form bottom deposits that inhibit the growth of aquatic life; (2) cause objectionable odor; (3) cause off-taste or odor in drinking water; (4) cause off-flavor in aquatic organisms; (5) are toxic to humans, plants, animals, or other organisms; (6) cause growth of algae that inhibit the growth of other aquatic life or impair recreational use; (7) cause a violation of an aquifer water quality standard; or (8) change the color of the surface water. If any of these conditions occur, Rosemont would be in violation.

The Forest Service is required to disclose impacts. Disclosure and analysis of impacts to biological integrity standards is in the FEIS [PR 047511_3, p. 553]. Beyond disclosure, the State of Arizona has the sole authority under Sections 401 of the CWA to determine whether the proposed project would violate downstream standards, particularly at the Outstanding Arizona Waters [PR 047511_3, p. 503]. The FEIS states that no federal permit action may be approved if the state denies certification [PR 047511_3, p. 449]. The DROD also states that a 401 certification must be issued prior to approval of a final MPO [PR 047504, p. 44], and that the Forest Supervisor consulted with the Arizona Department of Environmental Quality (ADEQ) about the likelihood of 401 certification being issued [PR 047504, p. 15]. The FEIS adequately discloses potential impacts, and the Forest Service consulted with ADEQ, who has authority for determining whether the 401 water quality certification would be issued.

Contaminants from dry stack tailings: According to the FEIS [PR 047511_3, p. 379], “(t) he predicted water quality for seepage from tailings is not expected to exceed any numeric Arizona Aquifer Water Quality Standards.” This is the conclusion reached by examination of the Infiltration, Seepage, Fate and Transport Modeling Report, Revision 2 [PR 017310, p. 82] which concludes that “(t)he results of the mixing model suggest that if seepage were to develop from the Waste Rock Storage Area that it would have constituents below the AWQS.” The results of the modeling were confirmed after review in a Tetra Tech memo [PR 015188]. In addition, the FEIS analyzes the potential for tailings seepage to “daylight” into Barrel Canyon [PR 047511_3, pp., 473, 475-477]; this analysis was based on SPLP geochemical testing and was compared to surface water standards applicable to Barrel Canyon. The potential for tailings seepage to “daylight” was also incorporated into the screening analysis for Outstanding Arizona Waters [PR 047511_3, 549-553] using a different methodology, more fully detailed in the record [PR 045677]. If seepage from the dry stack tailings should appear downstream, the surface waters should not be degraded.

Sulfates and Total Dissolved Solids not considered: The modeled sulfate content of the Dry Stack Tailings seepage was 559 mg/l, and Total Dissolved Solids of 810 mg/l [PR 017310, pp.

86-87; PR 015188]. Additional documentation is in the record, particularly concerning dissolved solids in the pit lake [PR 046267]. However, there is no established or enforceable AWQS for sulfate or Total Dissolved Solids. The EPA has a secondary standard of 250 mg/l for sulfate and 500 mg/l for Total Dissolved Solids, but these are given as non-enforceable guidelines related to cosmetic or aesthetic effects. The potential for contaminants with secondary standards to be exceeded in surface water is discussed in the FEIS, specifically for Total Dissolved Solids and sulfate [PR 047511_3, p. 474]. Narrative water quality standards also must be met, both for groundwater and surface water, each of which are analyzed in the FEIS [PR 047511_3, p. 392 (groundwater), and PR 047511_3, p. 474 (surface water)].

Sierrita sulfate plume: The FEIS discusses Sierrita's and ADEQ's agreement for Sierrita to conduct pumping in order to intercept the northward expansion of the sulfate plume [PR 047511_3, p. 391]. The interception pumping lies between the Rosemont water supply pumping, 5.5 miles to the north, and the source of the sulfate plume. Although drawdown may be somewhat deepened by synergy with the Sierrita mitigation pumping, further migration of the sulfate plume due to the Rosemont water supply pumping is not expected, because the location of the Sierrita sulfate plume is at the margin of the 10-foot drawdown contour of the ultimate cone of depression resulting from mine supply pumping [PR 047511_3, p. 331], only a minor effect is expected. In addition, the interception pumpage is occurring immediately and ongoing, whereas the minimal changes to groundwater gradient due to Rosemont pumping would take years to develop.

No waste rock segregation plan reference: The waste rock segregation plan can be found in two Tetra Tech Technical Memoranda [PR 013402 and PR 015038]. The waste rock segregation plan was also provided as a reference to the FEIS (Krizek 2011), and is referenced directly in the FEIS [PR 047511_3, pp. 470, 472].

Unsatisfactory infiltration, fate and transport modeling: The infiltration, fate, and transport modeling for seepage through the tailings and waste rock facilities was subject to extensive review and revision [PR 047366, Attachment 4]. This includes three revisions to the modeling report [PR 012121, PR 013382, PR 017310], a series of expert peer review memoranda [PR 015020, PR 015304, PR 014598, PR 013425], and technical meetings [PR 014115]. Some revisions include more extensive precipitation modeling scenarios directly in response to concerns raised in the DEIS. The Forest Service undertook a robust modeling effort, involving recognized experts in geochemical and infiltration modeling participating in a collaborative peer review process, in order to ensure that the modeling was conducted appropriately.

ADEQ has jurisdiction over discharges to aquifers, and issued an aquifer protection permit to the applicant [PR 016928]. The aquifer protection permit was appealed through the administrative procedures put in place by the State of Arizona. The appeal involved issues and supporting testimony mirroring the objections raised to the Forest Service. The outcome of the appeal upheld the agency's decision to issue the permit. According to ADEQ's Final Permit Decision and Response to Comments [PR 016929, p. 31] "The level of data collected through water levels, water quality data, aquifer testing, and modeling is not inadequate, and is comparable to and generally exceeds data collection at other APP-permitted mine sites throughout the state."

One objector raises concerns that seepage will not be captured by the mine pit. Discussions of the fate and transport of seepage are included in the FEIS; specifically, the potential for seepage to migrate away from the tailings facility and not be captured by the mine pit is already disclosed in the FEIS [PR 047511_3, p. 386].

One objector raises concerns that mineralogical analysis was not adequately completed. The geochemical tests used to support the conclusions of the FEIS analysis were extensive [PR 047511_3, pp. 374-376], were conducted in a manner consistent with Arizona guidance for mining sites [PR 012173], were deemed acceptable through the Arizona aquifer protection permit appeals process [PR 016929], and were subject to peer review by outside geochemical experts [PR 047511_3, p. 376; PR 047366, specifically Attachment 4, pp. 1-3]. The peer review addressed the issue of mineralogical analysis after similar comments as the objector's were received on the DEIS [PR 017372, pp. 5-6, 16]. The discussion of professional disagreement about mineralogical analysis is disclosed in the FEIS [PR 047511_3, p. 368]. The Forest Service addressed this continued professional disagreement by implementation of additional waste rock characterization measures during operations [PR 047511_3, pp. 368-369; PR 047511_6, Appendix B, pp. B-19 to B-21], as well as additional groundwater quality sampling [PR 047511_6, Appendix B, pp. B-17 to B-19].

Mishandling of the screening analyses: According to a memorandum to the project record [PR 045677, p. 9]:

“Under the waste rock runoff scenario, only two analytes suggest that care should be taken with respect to downstream waters. Molybdenum (both dissolved and total) is approximately 20% higher under the post-mine scenario, and sulfate (both dissolved and total) is almost 50-100% higher.

Under the soil cover runoff scenario, molybdenum and sulfate are acceptable but dissolved arsenic, iron, and sodium are elevated (up to about 20% higher), and both total and dissolved mercury are significantly elevated (200 to 1,000% higher). The high mercury is driven by one extremely high SPLP soil sample.

The actual runoff would likely be a mix of these two scenarios, and also would be mitigated by testing and waste rock segregation activities. Given that existing stormwater quality appears to have never been sampled in Davidson Canyon, this analysis simply cannot be taken any further than to raise and acknowledge these concerns.”

The objection concerning the screening analysis focuses specifically on detection limits. There is no question that detection limits for some of the geochemical tests are above applicable standards, particularly for surface water, and that this complicates the analysis. The handling of detection limits and the effect this has on the analysis is clearly laid out in the record [PR 045677].

BADCT: Although mining must occur in compliance with applicable state and Federal law, the Forest Service is not the final arbiter of a miner's compliance with all applicable laws. It does not have the legal authority to enforce the variety of environmental laws entrusted to other regulatory

agencies such as EPA, ADEQ, and ACOE. The statutory requirement that mineral operators comply with other laws is interpreted to place the burden of compliance on the mining operator. See Forest Service Form 2800-5, para. VII.D and California Coastal Comm'n v. Granite Rock, 107 S.Ct. at 1427 (noting Forest Service position that compliance with other laws is the operator's responsibility). Compliance with other laws may be recognized as meeting Forest Service surface resource protection standards. See 228.8(h). Furthermore for purposes of NEPA analysis, it is reasonable for the Forest Service to rely on the expertise of the primary agency with jurisdiction over a regulatory issue in determining likely impacts. See Navajo Nation v. U.S. Forest Serv., 408 F.Supp.2d 866 at 876 (D.Ariz.2006). (USFS properly relied, in part, on ADEQ's determination that snowmaking is an acceptable and safe use of reclaimed water). Therefore, the Forest Service defers to ADEQ's legal determinations of BADCT and compliance with applicable APP requirements but also separately discusses water quality impacts. As to the likely impacts on water quality, those impacts are discussed and disclosed in accordance with NEPA.

Response to objection issues concerning water supply: 0045-1, 0084-120, 0084-126, 0084-122, 0084-125, 0084-121, 0084-127, 0091-20, 0091-18, 0100-17, 0084-123, 0016-7, and 0084-129

Impacts to individual wells: The potential impact of reduced water supply to well owners on the east side and west side of the Santa Rita Mountains is acknowledged in the FEIS as an issue [PR 047511_2, pp. 16- 17], and analyzed [PR 047511_3, pp. 288-362]. The economic effects from groundwater impacts and Environmental Justice issues are also covered in the FEIS [PR 047511_4, pp. 1107-1124].

The Forest reviewed available data sources and determined that insufficient information was available to assess impacts on individual wells [PR 047511_3, p. 293]. Information such as current water level, pump settings, and well efficiency data, which is normally needed for an evaluation, is generally missing. In general, it is not necessary to evaluate effects on individual wells. A comparison of the well's location with the drawdown contours generated by the groundwater models gives an approximation of expected head loss at any given well [see Table 66, PR 047511_3, p. 353]. However, without knowing the depth of the well, it is not possible to know the relative impact to it. The FEIS discloses that there are limitations to the analysis of impacts to individual wells [PR 047511_3, pp. 291, 293-294]. "The geological information needed to assess this connection for an individual well is largely unavailable, although driller logs are available for some wells detailing the hydrologic units encountered during drilling. The Coronado remains unable to assess impacts to individual wells; therefore, the analysis essentially remains as it was presented in the DEIS, although it is presented with greater details of the progression of potential impacts in space and time."

Cumulative impacts deficiency: In Appendix G [PR 047511_7, p. G-15] it is given that the "Council of Environmental Quality regulations define cumulative impacts: "Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7). NEPA does not require consideration of every conceivable impact. The Forest

Service relies on the “reasonably foreseeable” element to determine what future actions are included in cumulative effects analysis, and to exclude future actions that are speculative or remote. In order to analyze the impacts of a future action, there must be some reasonable assurance that the action will take place and is not a speculative concept; and that enough details exist about the action to enable meaningful impact analysis. The Forest has reviewed known and suggested past, present and reasonably foreseeable actions and screened them to identify (1) those that could incrementally contribute to impacts resulting from the Rosemont Proposed Action or alternatives; and (2) future actions that are reasonably foreseeable. Past, present and reasonably foreseeable actions that meet these criteria have been compiled into a list and addressed as appropriate in the cumulative effects analyses that are described and disclosed in Chapter 3 of the FEIS.”

The list of reasonably foreseeable actions and cumulative analysis has been updated throughout the FEIS [PR 047497]. The resource sections in the FEIS have been reviewed to ensure that the consideration of foreseeable actions is consistent and appropriate.

Regional effects neglected: The objection primarily centers around the inadequacy of the chosen time “snapshots” of 20, 50, 150, and 1000 years after reclamation and closure. The modeling documents from Montgomery and Associates [PR 013310], and from Tetra Tech [PR 013794] have numerous head versus time diagrams that show the total recovery curve at any given time. The interpolation can be easily applied to the aerial extent of the cone of depression and based on Darcy’s law, is very predictable. The CEQ regulations at 40 CFR 1500.1 state that “NEPA’s purpose is not to generate paperwork—even excellent paperwork—but to foster excellent action,” and that “NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail.”

Other development neglected: The objection is made that “Nowhere in the FEIS is there response to Myers' conclusion that mine excavation could "lower the regional water table by up to 1500 feet (0084-SSSR, p. 180).” However, in Myers’ own modeling document, the 10-foot drawdown contour never extends much more than a mile from the mine pit [PR 013258, figs. A1 to A11a] . How that is extrapolated to 1500 feet of drawdown in the Sonoita plain is difficult to determine. He states correctly that the mine pit lake will behave as a pumping well (0084-SSSR, p. 179). However, he forecasts catastrophic effects in the Sonoita plain from the permanent cone of depression, while neglecting that the pit lake evaporation rate of 660 acre-feet per year is the most it will ever be, albeit permanent [PR 013310, p. 99]. Therefore, the cone of depression may only grow until it captures 660 acre-feet per year of natural discharge, which includes evapotranspiration and all natural discharge to surface water. Dr. Myers implies (0084-SSSR, letter to Jeanine Derby, 9/7/2007, p. 2) that the pit “. . . may intercept about 650 acre feet per year of flow to the Davidson Wash or approximately 0.8 cubic feet per second,” or the entire quantity evaporated from the ultimate pit lake. This capture would in reality be distributed across the entire footprint of the cone of depression.

The objector specifically raises the work of Drs. Osterkamp and Winters, which was submitted as part of DEIS comments. This work was reviewed and the concepts assessed in the “Scientific Uncertainty and Professional Disagreement” subsection of the “Groundwater Quantity” section of Chapter 3 [PR 047511_3, pp. 296-301]. The specific issue raised by the objector is addressed

as such: “These alternative viewpoints were considered by the Coronado, and the issues raised were investigated through the process previously described. The Coronado found that these concerns are not substantiated by available data and do not rise to a level to suggest that the modeling assumptions and modeling techniques used in this analysis are inappropriate. The first argument arises from an oversimplification of a complex hydrogeologic system. The assumption that groundwater would automatically drain away to a lower elevation may be correct in close proximity with no hydrologic complications, but it cannot be applied regionally as it ignores real world data. Specifically, it ignores the geology between the mine pit and distant waters that has been verified through drilling and seismic investigation; actual groundwater elevations and flow patterns as measured in the field since the 1940s; the conductivity of various hydrologic units as established by aquifer testing throughout the basin; and, most of all, it ignores the element of time. The groundwater flow models are tools that are able to take all of these complexities into account and are the most appropriate tools to apply to the analysis.”

“Rubber stamped” permit issued: . The Arizona Division of Water Resources has granted Rosemont rights to extract and use up to 6,000 acre-feet of groundwater per year from the Santa Cruz Basin [PR 047511_3, pp 320- 321]. This is water that will be used for mineral extraction and processing. Rosemont plans to use up to 5,400 acre-feet per year for the first 8 years of active mining and 4,700 acre-feet per year for the remaining active mine life. For that area, Rosemont cannot exceed the permit amount. For the pit area, it could be a different matter, as the dewatering must be sufficient to keep the mine dry. However, the rocks in the pit area are not very porous and have low hydraulic conductivities and storage coefficients, from less than 0.0001 ft/d to 0.01 ft/d near the pit, and the maximum modeled dewatering rates are 1027 acre-feet per year for the Montgomery and Associates model [PR 013310, Table 6], 766 acre-feet per year for the Tetra Tech model [PR 013794, p. 68], and 967 acre-feet per year for the Myers model [PR 013258, p. 14]. However, the future is uncertain in the modeling world, and it is possible that a higher or lower rate of dewatering will be utilized, depending on actual conditions. If Rosemont needs more water for the operation, they can apply and be granted the permit, as discussed in the FEIS [PR 047511_3, p. 319]. The FEIS only addresses the proposals before the Forest Service. If changes are made to the preferred alternative and its effects, the project will fall into a NEPA review process and could potentially trigger additional NEPA in the future.

Extended temporal analysis insufficient: One objector indicates that temporal bounds of analysis used for the groundwater analysis were insufficient or insufficiently analyzed. The temporal bounds of analysis for both the west side (140 years) and east side (1,000 years) are described in the Groundwater Quantity section under “Temporal Bounds of Analysis and Analysis Area” [PR 047511_3, p. 293]. The potential drawdown impacts on both the west and east side are presented for these time frames. With respect to riparian impacts, the temporal bounds (also 1,000 years) are described [PR 047511_3, p. 488], and the potential impacts to riparian areas are presented for this time frame. The uncertainties resulting from these long time frames with respect to the groundwater models are discussed in multiple places [PR 047511_3, pp. 290, 293, 294, 300, 310, and 314]. The uncertainty resulting from these long time frames with respect to applying the groundwater models to riparian or streamflow impacts are also discussed [PR 047511_3, pp. 503, 524, 528, 530, 533, 537, and 555]. The temporal bounds of analysis were selected to encompass

the entirety of potential hydrologic changes, including the post-closure period, and the analysis as presented in the FEIS utilized the selected time frames appropriately.

Reduced recharge not analyzed: Recharge in the models was a calibration parameter, since it can never be as well known as approximate hydraulic conductivity, the position of the water table, evapotranspiration rates, water levels in monitoring wells, or discharge from natural springs. Therefore, recharge is varied in the steady-state model until the better known parameters are being matched [PR 013794, pp. 18-19; PR 013310, p. 86; PR 013258, p. 10 (implied)]. If recharge is reduced, the model would have to be matched to lower water levels and less natural discharge, which would lead to a lower dewatering rate because of less available water.

Small changes in groundwater levels neglected and impacts to springs underestimated: The objection was made that the 5-foot drawdown contour underestimates impacts, and that the 1-foot contour should be used (0091-Pima County, p. 5). They object to the explanation of why the five-foot contour was appropriate in the FEIS [PR 047511_3, pp. 294-295]. The objector says that there is a precedent for using the 1-foot contour, but they do not offer a reference. In a SRK Consulting memo, Hydrogeologists Dr. Vladimir Ugorets, Larry Cope, and Corolla Hoag [PR 018927, p. 5], offer the opinion that the 5-foot and 10-foot contours represent the limit of precision in models on the scale and resolution of those prepared for the Rosemont project. It should be noted that for the analysis of impacts to perennial streams and riparian areas [PR 047511_3, pp. 485-570] the model results were used down to a precision of 0.1 feet.

Impacts to Tribal water resources: The contention is that the FEIS does not adequately address the impacts to Nation water resources. As shown in the FEIS [PR 047511_3, p. 326], the West side pumping cone of depression at 20 years will produce 10 feet of drawdown at the Desert Diamond casino. Ultimately, greater than 10 feet of drawdown will occur from mine pumping at the casino [PR 047511_3, p. 331]. The legal requirements concerning groundwater drawdown and the Tohono O’odham Nation are described in the FEIS and analyzed [PR 047511_3, p. 319, 339]: “Under these statutes, the ADWR in general may not approve a well that results in a drawdown of more than 10 feet after 5 years of pumping at the Tohono O’odham reservation boundary. When applying for well drilling permits, Rosemont Copper would need to provide sufficient demonstration to the ADWR of compliance with these restrictions. However, based on modeling conducted to support the FEIS and described in this section, it does not appear that the Rosemont Copper water supply would violate these statutory restrictions. Further, the groundwater wells already drilled by Rosemont Copper in the Sahuarita area were reviewed and approved by the ADWR.”

The effect is described in the FEIS [PR 047511_3, p. 339]. Sacred spring impacts were raised as a significant issue in the FEIS [Issue 6C.1 and 6C.2, PR 047511_2, p. 22]. The number of sacred springs potentially impacted is identified in the FEIS [PR 047511_4, p. 1022]. The Forest Supervisor has chosen the alternative that impacts the lowest number of sacred springs [PR 047504, p. 19]. There is also provision for visiting the potentially affected springs before mining operations begin [PR 047511_6, p. D-9].

Spring impacts on the Tohono O’odham Nation were not analyzed, and the reasons for this are addressed specifically in the FEIS [PR 047511_3, p. 486]: “Some comments suggested that the

analysis of riparian resources or springs in the Upper Santa Cruz Subbasin, where the mine water supply would be withdrawn, was deficient. The regional water table in this area has historically been high enough to be hydraulically connected to such features but at present is more than 100 feet below the ground surface along the Santa Cruz River and in the vicinity of the pumping wells, and it does not support any riparian or spring resources. Given the amount of groundwater withdrawal from this aquifer for domestic, agricultural, industrial, and commercial uses and given the projections for population growth in the future, it is unlikely that the water table will recover to the point that it would support riparian or spring resources. Therefore, analysis of riparian resources or springs in the Upper Santa Cruz Subbasin remains absent from the FEIS...”

Response to objection issues concerning analytical deficiencies: 0052-1, 0052-2, 0052-4, 0084-135, 0084-136, 0084-139, 0084-133, 0052-3, 0052-5, and 0084-137

Test grain size information was not revealed: The state of Arizona has authority for control of discharges to the aquifer, and has specific expertise pertinent to analyzing leach tests and characterizing waste rock; ADEQ requirements are codified in the BADCT manual [PR 012173]. Grain size analysis of humidity cells is not generally required, nor was it specifically required for the aquifer protection permit issued by ADEQ [PR 016928].

ADEQ has jurisdiction over discharges to aquifers, and issued an aquifer protection permit to the applicant [PR 016928]. The aquifer protection permit was appealed through the administrative procedures put in place by the State of Arizona. The appeal involved issues and supporting testimony mirroring the objections raised to the Forest Service. The outcome of the appeal upheld the agency’s decision to issue the permit. According to ADEQ’s Final Permit Decision and Response to Comments [PR 016929, p. 46]: “The preponderance of the evidence shows that Rosemont followed industry standards and the BADCT Manual in conducting the leach testing...The preponderance of the evidence shows that the leach testing samples were of an appropriate grain size and that these samples were not abiotic.”

No cumulative values as required by ASTM D5744-07: In general, ASTM standards do not require adherence to their procedures. In their own words: “ASTM standards are ‘voluntary’ in the sense that their use is not mandated by ASTM. However, government regulators often give voluntary standards the force of law by citing them in laws, regulations, and codes. (www.astm.org).”

Lack of leach test data on oxide ore: Several objectors raised the issue that oxide ore is no longer being leached, and therefore will be placed in the waste rock pile without proper characterization. The acknowledgement that oxide ore will be placed in the waste rock pile is throughout the FEIS, and the analyses of groundwater and surface water quality take into account this disposition of waste rock. The geology of the Rosemont deposit is in the Geology, Minerals, and Paleontology section [PR 047511_2, pp. 154-156], and defined as oxide or sulfide [PR 047511_2, p. 173]. A summary of all geochemistry tests relied upon for the FEIS, broken out by rock type, is in the Groundwater Quality and Geochemistry section [PR 047511_3, pp. 374-376]. With respect to acid rock drainage, a comparison of the Rosemont deposit to other Arizona mines with respect to the potential for acid rock drainage is in the FEIS [PR 047511_3, p. 383], and the overall potential for acid rock drainage is discussed explicitly in the “Surface

Water Quality” section [PR 047511_3, pp. 468-471]. Key documents in the record reflect the change in the acid generation potential of the waste rock facility due to heap leach removal [PR 016798, PR 018879, and PR 044892], which was carried forward into the FEIS as described above.

Response to objection issues concerning the pit lake: 0026-4, 0026-6, 0026-1

Windblown sand would blanket acid-neutralizing carbonates: It is possible that the bottom of the pit lake could be blanketed by windblown sand, but the pit rocks are predominantly carbonates, including the pit walls, and the pit lake modeling document states several times that carbonate minerals are abundant [PR 012105, pp. 1, 4, 13, 31]; and that the local groundwater will be oversaturated with respect to calcium carbonate [PR 012105, p. 28].

Fate of heavy metal ions in the pit lake: Ions cannot accumulate indefinitely in the pit lake. Ultimately they may reach a concentration which will result in precipitation of mineral phases. According to the pit water study: “To the extent that chemical concentrations in the projected pit lake water significantly increase, mineral phases may precipitate from solution. This precipitation removes chemical mass from the pit lake and establishes a limit on the maximum dissolved concentration for the associated components of that mineral [PR 012105, p. 25].”

Draft EIS showed pit lake pH of 4.7: Table 68 in the DEIS [PR 015781, p. 293] has four modeled scenarios. In all, the ultimate pH is 8.0 to 8.1. In the FEIS [PR 047511_3, pp. 388-389], the pit lake modeling study [PR 012105, p. 27] shows pit lake pH at 8.06 to 8.09, regardless of scenario. There is no mention of an acid pit lake in either the DEIS or the FEIS.

Response to objection issue 0105-2

Information was ignored: The issues concerning the groundwater modeling, geologic framework, and alternative interpretations of site hydrology are specifically addressed in the Groundwater Quantity section, in the “Scientific Uncertainty and Professional Disagreement” section [PR 047511_3, pp. 296-301]. The objector and associates are not mentioned by name, but their viewpoints are discussed primarily under the “Misunderstanding of Hydrogeologic Framework” on p. 296-297 (ibid.), and “Need for Additional Hydrologic Investigation” on p. 301. Responses to these specific comments are primarily in Appendix G, Public Concern Statements 797 and 578 [PR 047511_7, CD].

Recommended Remedy by Review Team Member (if any): The remedies suggested by the objectors are not warranted. No remedies required.

Review Team Member: Roger D. Congdon, Ph.D., hydrogeologist; Washington Office, Centralized National Operation.

Rosemont Copper Mine

Objection Review

Objection # (s): 0039-JFisher; 0084-SSSR; 0091-PimaCounty; 0103-HHuth

Resource Area(s): Groundwater Resources – Modeling (GWR-6)

Objection Issue:

- 0084-128: The same approach (assuming that there will be an impact when there is insufficient data to determine effects) should be applied when discussing the scope of impacts related to groundwater drawdown, given that the results from the groundwater modeling contain uncertainty.
- 0091-22: The FEIS includes results from modeling of precipitation seepage through waste rock that are unreasonably low; and, if incorrect, could result in underestimates of groundwater quality impacts.
- 0091-21: The FEIS relies on inappropriate groundwater modeling boundary conditions, specifically models that do not recognize an impervious boundary on the west along the ridgeline. Without this boundary, the model underestimates impacts over the long term to Davidson Canyon and other downstream areas.
- 0103-1: Tetra Tech model needs to be explained) is provided in the FEIS, rather, it points to model significant model uncertainty. How can the Forest Service claim that "speculative" models are acceptable to predict impacts thus supporting your decision to approve the mine, particularly as it relates to a system that is at an "ecological tipping point" as stated in Chapter 3?
- 0103-3: The Forest Service considers a sensitive analysis of the (groundwater quantity) modeled results, but that analysis only confirms the significant uncertainty associated with the modeling; appropriate data collection to better inform the models in question is not pursued. Instead, the Forest Service makes broad assumptions about expected impacts based on uncertain model results as they currently stand.
- 0103-2: Based on that assumption (that lower Davidson Canyon is not hydraulically connected to the regional aquifer that would be impacted by the pit dewatering), impacts to Davidson Canyon and the lower Cienega Creek are assumed to result only from loss of stormwater; groundwater is isolated from the analysis. This does not demonstrate due diligence by the Forest Service in trying to understand the connection. This similarly impacts any analysis by the Forest Service regarding its own "hard look" on potential impacts on Outstanding Waters of Arizona.
- 0039-23: The FEIS discussion of modeling of Upper Cienega Creek lacks credibility because the time horizon chosen is too long.

- 0103-4: Proposals to refine groundwater models after the mine has been approved and is in operation may not be effective at informing mitigation measures, particularly after the damage has already been done.

Remedy Supplied by Objector (if any):

0091-21: Models should be re-run using the County's recommended boundary conditions.

0103-1, 2, 3, 4: Improve understanding of groundwater resources by collecting additional data to better inform the groundwater models.

0039-23: Issue a new DEIS or Supplement EIS subject to public comment.

Law, Regulation and/or Policy: Council on Environmental Quality (CEQ) Regulations at 40 CFR 1500-1508; Forest Service Manual FSM 2500, Watershed and Air Management; Forest Service Manual FSM 2560, Groundwater Resource Management; Forest Service Technical Guide for Managing Groundwater Resources FS-881, Arizona Revised Statutes ARS 45-513, Dewatering permit; ARS 45-514, Mineral extraction and metallurgical processing permit;

Review Team Member Response:

Response to objection issues 0039-23, 0084-128, 0091-22, and 0103-1, 2, 3, and 4

The objectors raise a variety of concerns about modeling of groundwater drawdown. Objection issues include technical criticisms of the models and concern over uncertainty.

The Forest Service has a responsibility for proper disclosure of impacts under NEPA. According to 40 CFR 1500.22, the agency will include within the environmental impact statement:

- (1) incomplete or unavailable information,
- (2) the relevance of the incomplete or unavailable information to evaluating significant adverse impacts, and
- (3) a summary of credible scientific evidence that is relevant to evaluating such impacts, and the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community.

40 CFR 1502.24 states agencies should:

- (1) assure the scientific integrity of the analyses and discussion,
- (2) describe methodologies used, and
- (3) cite references or sources used.

The Forest Service approach to groundwater resources is also guided by Forest Service policy (FSM 2560). Objectives include requirements for analysis and disclosure: "To gather and make available information on NFS groundwater resources and their uses to provide for informed decisions during Forest Service planning and development and implementation of Forest Service projects," as well as mitigation: "consider the effects on NFS groundwater resources of all

proposed activities on and uses of NFS lands and to avoid, minimize, or mitigate adverse effects to the extent practical or as required by law.” FSM 2560 also makes clear that the Forest Service must coordinate with states having jurisdiction over water resources: “require written authorization holders operating on NFS lands to obtain water rights in compliance with applicable State law, FSM 2540, and the terms and conditions of their authorization.” FS-881 Technical Guide to Managing Groundwater Resources outlines groundwater modeling steps including the modeling process, types of computer models, and data needs for the models.

The State of Arizona has such authority with respect to the groundwater supply for the mine. The water supply has been authorized under ARS 45-514, Mineral extraction and metallurgical processing permit.

Modeling in terrain as complex as the Santa Rita mountains area is always an ambitious undertaking. However, there are data that are useful in constructing such a model; such as precipitation, stream and spring discharges, and water levels recorded in monitoring wells. Because some factors, such as hydraulic conductivity, storage, and the significance played by fractures and faults are imprecisely known, predicting effects may be uncertain. For this reason, the Montgomery and Associates and Tetra Tech models used conservative values for such parameters as vertical conductivity below Cienega Creek, aquifer recharge, and aquifer storage parameters [PR 013794; PR 013310]. As the project develops, continued monitoring will reveal what portions of the models have incorrect parameters, and they will be adjusted in the recalibration process. However, future predictions will remain uncertain simply because it is still in the future.

Temporal simulations of up to 1000 years show that the western boundary, which is the closest to the mine, are not significantly influenced by the boundary, with the exception of some minor change in the 1000 year simulation. The hydraulic conductivities given for the Precambrian rocks of the Santa Rita Mountains to the immediate west of the project area are given as at least two orders of magnitude lower than the rocks in the vicinity of the mine. In groundwater modeling, a two order of magnitude contrast in conductivities is routinely considered to be an impermeable boundary. The Myers model [PR 012179] which was incorporated into the FEIS does treat the Santa Rita Mountains as an impermeable boundary. The impacts projected by the Myers model are of a lesser magnitude than those of either the Montgomery and Associates model [PR 012071] or the Tetra Tech model [PR 013794] and the comparison is shown in figures and tables in the FEIS [PR 047511_3, pp. 341-350]. It should be noted that the remedy proposed by objector 0091, “Models should be re-run using the County’s recommended boundary conditions,” has already been applied by incorporation of the Myer’s model in the FEIS.

The timeline was chosen based on the desire to assess long term effects to Cienega Creek and other resources, such as wells; and to be able to simulate the water level of the ultimate pit lake, which should be very close to equilibrium conditions [PR 047511_3, p. 293]. When equilibrium is achieved the solution becomes more stable, as it does not depend on the aquifers’ storage characteristics, and should be less prone to error than the temporal solutions which do depend on

storage parameters. Shorter range projections were also made, essentially extracted from the models at various time steps. Specifically, conditions were reported for 20, 50, 150, and 1,000 years after final reclamation and closure [PR 047511_3, p, 293].

Refining models, also known as recalibration or “updating,” as it is referred to in the FEIS (PR 047511_3, p. 296), is a process routinely done in groundwater modeling, and is generally part of the mitigation plan. In the FEIS [PR 047511_3, p. 302], uncertainty is acknowledged and outlines the beginnings of a monitoring plan that would be used to update models. Invariably, models are shown to have some inaccuracies before knowledge is more complete. It is commonly done for mine dewatering models because only the mine dewatering itself can supply sufficient stress on the local aquifers to have any clear idea of their exact hydraulic properties. Uncertainty, again, is inevitable in any means of future prediction. A memo from SWCA to the case file [PR 047009, p. 6] shows that the Forest Service requires, and Rosemont agrees that the models would be periodically validated and updated based on improved hydrogeologic information.

Modeling could always be better, but in most cases this involves a lot of costly and time-consuming data collection, which does not always guarantee a better model. The information used in a NEPA analysis should be of “high quality” (40 CFR 1500.1), and any methodologies and data used should be identified by explicit reference (40 CFR 1502.24). The models cannot be expected to be perfect, but rather give an indication of what to expect. Part of the “high quality” data will be what is gathered after the project begins and will be used to recalibrate and refine the models.

It should be noted that the remedy noted by objector 0103-1, 2, 3, 4: “Improve understanding of groundwater resources by collecting additional data to better inform the groundwater models,” has no bounding limit. Additional data can always be collected. However, collection of new data is not a requirement of NEPA and unknown information is allowed in the disclosure. The important distinction is whether or not site specific real world data was used to develop and test the models utilized. Best available data for the groundwater modeling in this project included site specific aquifer data, site specific evaporation data, and site specific precipitation data, etc.

The Forest Service responsibility to disclose impacts includes requirements that “the agency’s evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community,” as well as to “assure the scientific integrity of the analyses and discussion.” The project record [PR 047009] demonstrates that the Forest Service endeavored to consider and incorporate into the analysis a wide variety of scientific opinions, voices, and modeling approaches, and that this information was available to make an informed decision. This demonstrates that the Forest met the scientific rigor required in 40 CFR 1502.22 and 1502.24, as well as expected under FSM 2560.

Response for objection issue 0091-22

This objector indicates that the seepage modeling was not conservative enough.

Seepage through waste rock piles was simulated under varied conditions [PR 017310, p. 38], even including ponding of water on the waste rock surface. The same concern was raised during DEIS comments resulting in substantial additional modeling, which is directly addressed in the FEIS [PR 047511_3, p. 362]: “In direct response to these concerns, the Coronado requested that additional modeling scenarios be conducted by Rosemont Copper for more conservative precipitation conditions. Rosemont Copper responded by conducting modeling under seven different reclamation scenarios—including a scenario in which ponding occurs on the surface of the waste rock and tailings facilities—and under four different climatic scenarios.” Hydraulic conductivities for the waste rock material used were based on laboratory testing of on-site materials [PR 017310, p. 23]. The 24-hour, 100-year storm event, as well as the multi-day storm event was modeled [PR 017310]. Initial moisture content of 18 percent was modeled as a conservative initial condition, since it would give the maximum amount of gravity drainage [PR 017310, p. 22]. In spite of many conservative initial model inputs, the only significant drainage comes from the dry stack tailings facility. It is greatest at the initial time of the simulation, because of the 18 percent initial moisture assumption (8.3 gallons per minute), and declines to zero in 500 years [PR 017310, Figure 6.8]. Every attempt was made to be conservative and reasonable with the analyses. This demonstrates that the Forest met the scientific rigor required in 40 C.F.R. 1502.22 and 1502.24, as well as expected under FSM 2560.

Recommended Remedy by Review Team Member (if any): The remedies suggested by the objectors are unwarranted. No remedy required.

Review Team Member: Roger D. Congdon, Ph.D., hydrogeologist; Washington Office, Centralized National Operation.