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C.H. HUCKELBERRY
County Administrator

March 21, 2014

Robert Scalamera, Project Manager
Arizona Department of Environmental Quality
Surface Water Section, MC5415A-1
1110 West Washington Street
Phoenix, Arizona 85007

Re: **Arizona Department of Environmental Quality ADEQ Clean Water Action Section 401 certification for Rosemont Copper, Public Notice 27-14AZ LTF 55425**

Dear Mr. Scalamera:

This letter presents the combined comments of the Pima County Regional Flood Control District (RFCD) and Pima County regarding the proposed 401 certification for the Section 404 permit for the Rosemont Copper Project, Public Notice/Application No.: SPL-2008-00816-MB. The corresponding address is provided above.

Pima County and the Regional Flood Control RFCD have previously commented on the Clean Water Act (CWA) Section 404 application for this project and participated as a Cooperating Agency in the development of the Final Environmental Impact Statement (FEIS). We appealed the Aquifer Protection Permit (APP) for this project; and in view of the need for future significant modifications of that permit to conform to new mine designs, we negotiated with the applicant several provisions that addressed our concerns with that version of the APP.

In addition, the County and RFCD are affected parties by virtue of our downstream location (see Figure 1 below). The County and RFCD own the land and water rights in the Outstanding Waters reach of Davidson Canyon and the Outstanding Waters reach of Cienega Creek downstream of the Davidson Canyon that would be affected by this project. Further, the County and RFCD manage the Bar V Ranch and Cienega Creek Natural Preserve for wildlife and recreation purposes and oversee ranching at the Bar V Ranch.

The CWA Section 401 certification for this project is an important test of the meaning of the anti-degradation provisions of the Outstanding Waters program. We proposed or supported the original state designations for Davidson Canyon and Cienega Creek as Outstanding Waters based on the belief that this designation would prevent ADEQ from issuing permits that would degrade the water quality of these streams.

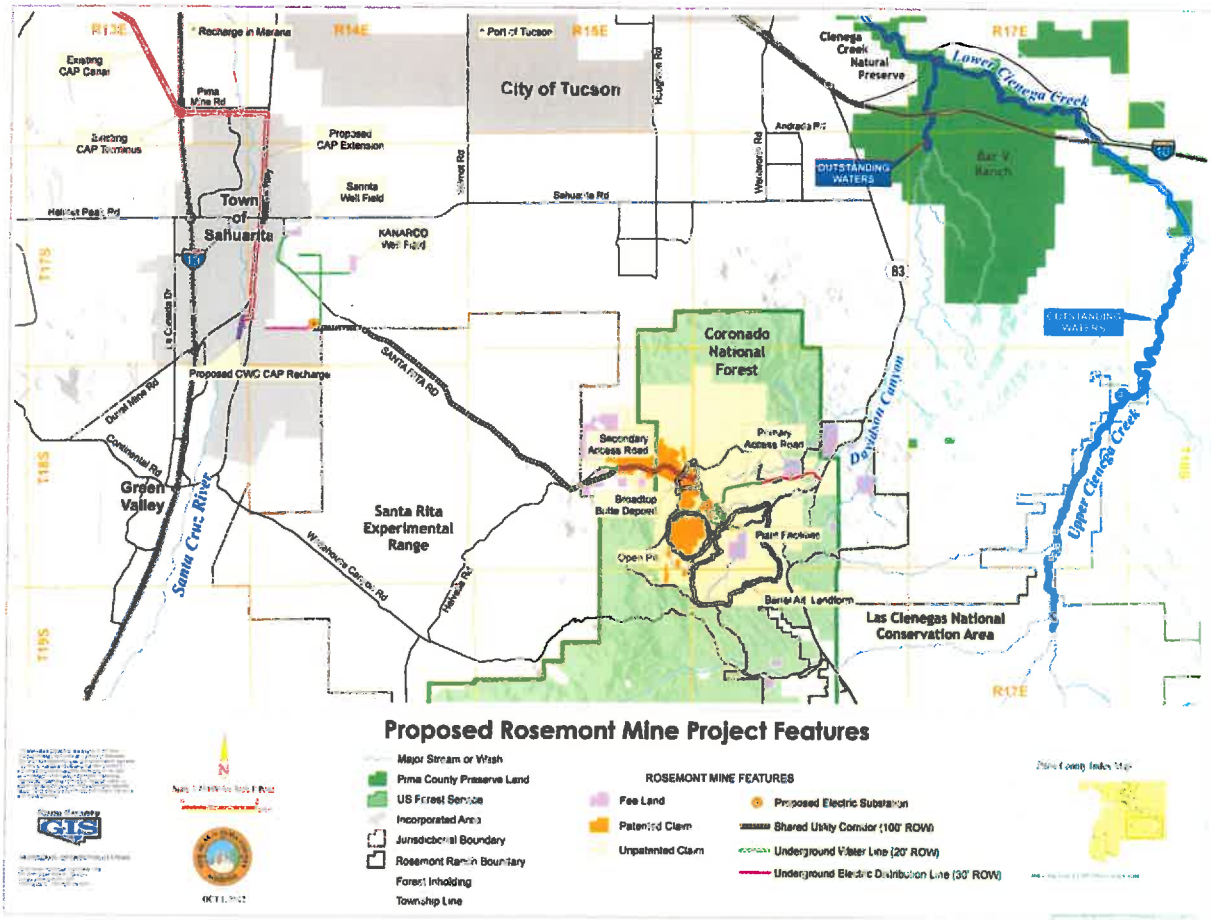

Figure 1. The Outstanding Arizona Waters reaches of Cienega Creek and Davidson Canyon, which will be impacted to the Rosemont Mine, flow through Pima County properties (Bar V Ranch and Cienega Creek Natural Preserve).

ADEQ's certification process is a grave responsibility. Residents of eastern Pima County have historically suffered contamination of groundwater from surficial discharges from mines and other industries. These events were seminal in the development of your agency.

This particular certificate is important to residents of eastern Pima County because the Rosemont mine is in the contributing watershed and groundwater basin of Tucson's aquifers, which still provide water supply to Vail and other areas. Studies by The University of Arizona have found isotopic evidence that a considerable areal extent of Tucson's aquifer originates from the Cienega Basin and extends from Vail as far as The University of Arizona itself (see Figure 2 below and Attachment 1).

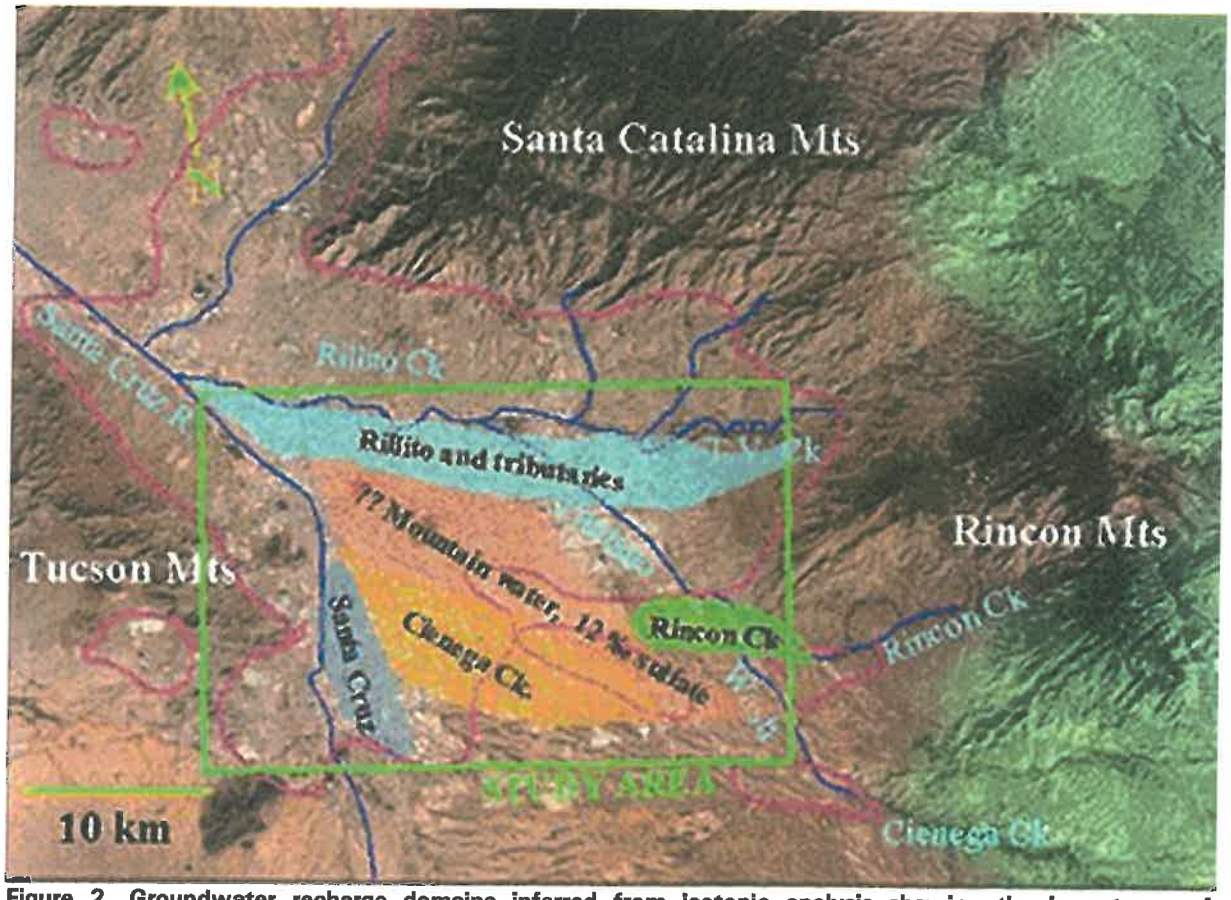

Figure 2. Groundwater recharge domains inferred from isotopic analysis showing the importance of Cienega Creek on the Tucson Basin Aquifer (Eastoe and others, 2003; Attachment 1).

ADEQ proposes to conditionally certify that this mine will not exceed water quality standards. However, we recommend the certification be denied for the following reasons:

1. The certification is based on an evaluation of inconsistent descriptions of activities provided by the applicant, all relating to differing mine designs;
2. Insufficient information has been provided to ADEQ by the applicant to certify the proposal or demonstrate compliance;

3. There is no reasonable assurance the activity can be conducted in a manner that will not violate applicable water quality standards;
4. ADEQ has not certified that the project will not degrade Outstanding Arizona Waters;
5. Pima County believes the project will cause or contribute to degradation of water quality and violate State Water Quality standards;
6. There are practical alternatives that would reduce impacts on water quality and the watercourse ecosystems;
7. The certification is inconsistent with the Arizona Governor's Executive Order No. 89-15 on riparian resources and No. 91-6 on protection of riparian areas, which declare the importance of riparian areas and direct that "all state agencies shall rigorously enforce their existing authorities to assure riparian protection, maintenance, and restoration" (Executive Order 91.6); and
8. The design of the Forest Service's preferred alternative is at odds in several respects with the proposed conditions of this permit, and therefore the mine cannot meet the terms of the certification.

Overall, the proposed conditions appear to be largely a boilerplate imposed on a hopeless muddle of mine designs. There is little evidence of specific conditions that refer to the particular risks this mine presents. The language of this permit shows lack of coordination with the terms of the Forest Service approvals. In the event this mine is approved, it is essential that ADEQ's permits hew closely to what would be approved by the Forest Service.

We request that ADEQ deny the CWA Section 401 certification for Rosemont Copper based on the reasons summarized above and the detailed comments attached to this letter.

Sincerely,

C.H. Huckelberry
County Administrator

CHH/mjk

Attachments

c: Colonel Kimberly Colloton, Los Angeles District Engineer, US Army Corps of Engineers
Jared Blumenfeld, Region IX Administrator, US Environmental Protection Agency

Pima County Staff Review of the Draft Arizona Department of Environmental Quality 401 Certification for Rosemont Copper (Public Notice 27-14AZ LTF 55425)

Pima County staff offer the following comments on the proposed certification:

Part 1.0 AUTHORIZATION

1. This certification states that the proposed activities "*will not violate applicable water quality standards in the subject waterbodies….all ephemeral tributaries to Davidson Canyon…..*" In order to make this certification, the Arizona Department of Environmental Quality (ADEQ) should complete the anti-degradation review, but there is no evidence that such a review has been completed. Until such has been completed, this authorization is premature.
2. This certification is based on applicable water quality standards for the subject waterbodies, but ADEQ has not demonstrated that the project activities will not violate the standards.
3. With reference to the "ephemeral" nature of the subject waterbodies, please note that applicant did not assert that the waterbodies are all ephemeral. Some of the waterbodies are intermittent springs and streams. The water table under many of the APP-regulated facilities is 20 feet or less (Rosemont APP-Regulated Facility Depth to Groundwater, Tetra Tech 2010; Attachment 2) and even less along portions of Barrel, Wasp and McCleary Canyons. Major recharge events in the project area have the potential to bring the water table to the surface.

Part 2.0: DESCRIPTION OF ACTIVITIES BEING CERTIFIED

4. The draft permit certification language describing the activities is too vague to be enforceable. This is a permit that has impact areas distributed in various small locations scattered over two watersheds—it will be unclear to contractors what is in the permit and what is not. This is complicated by the fact that during the past several years, Rosemont has changed the mine design, and thus the activities that occur within the Waters of the United States (WUS).
5. The permit makes unexplained reference to changes made during the development of the FEIS. Are we to understand that this certification is based on one of the alternatives as proposed in the FEIS? (If so, please state which one.) Or is the certification based on the mine as designed in the original 404 application?
6. Even the FEIS is internally inconsistent. For instance, the compliance point dam referenced on p. 46 of the FEIS is not described in figure 9 of the 404(b)(1) analysis, but

the sediment control dam on Trail Canyon (shown in figure 9 of the Corps alternative analysis) is not mentioned elsewhere. The original 404 application references only one dam. Please state which structures were included for the purpose of your review.

7. The application from Rosemont indicates a total of 101.6 acres of impacts to jurisdictional waters, but the certification indicates 38.6 acres. Furthermore, the 38.6 described in the 404 Public Notice (Application SPL-2008-00816-MB) is for a mine configuration that is no longer being proposed. For example, the heap leach pad is not in the FEIS, but was included in application SPL-2008-00816-MB.
8. The points of discharge authorized to the WUS should be described in this permit.

Part 3.0: INFORMATION REVIEWED

9. The January 12, 2012 certification package cited for this proposal was for a different mine design than is currently proposed as the Barrel alternative in the FEIS. On July 10, 2012, Rosemont Copper informed U. S. Forest Service that they would not "complete the leaching process and fully recover the copper from the oxide ore materials". Does this certification reference the mine that includes the heap leach as proposed in the 404 and 401 applications? If so, please clarify. Does it include flow-through drains referenced in the 401 application or not?
10. Within draft 401 certification Section 3.0, there is no reference to a review of the draft or final Stormwater Pollution Prevention Plan (SWPPP) for AZPDES MSGP – 2010 (Permit No. AZMSG2010 – 003). ADEQ has authority under ARS 49-202 to request this supplemental information. ADEQ had been scheduled to provide Rosemont Copper review comments on the July 2013 draft of this document in February, 2014. The July 2013 draft SWPPP contained incomplete descriptions and information, and a number of missing figures. ADEQ should review the final SWPPP for the site—hopefully prepared in conjunction with facility design and operations described in the final MPO—prior to issuing a 401 certification, which states that discharges from the mine complex will not result in a violation of State surface water quality standards.
11. The public should be provided an opportunity to review the SWPPP document in its entirety prior to finalization.
12. The listing of information reviewed does not include the *Preliminary Site Water Management Plan for the Barrel Alternative (*Rosemont Copper Project, Tetra Tech, July 2012). Although not known or available to the public, a "final Site Water Management Plan" might be included within the final MPO.
13. ADEQ did not cite the 2010 Site Water Management Update and the "Site Water Volume [X] April 2010" referenced by the applicant's 401 application. What did ADEQ use as the basis for the description of measures to be taken to control discharge of pollutants?

14. The document: "Rosemont Conceptual Barrel Alternative Stormwater Control Alternatives" (January 31, 2012) by Ronson Chee of TetraTech, is cited by ADEQ as a supporting document. This document predates many adjustments to the mine design that the company proposed later that year. If ADEQ's relied on this outdated document, then it clouds the ability of the public, contractors or any other parties to understand the activities being certified, particularly given that the application itself references a different set of documents.
15. Within Section 3.0 of the draft 401 certification, there is no reference to a review of the *Final Mine Plan of Operations* (final MPO) referenced in the draft Record of Decision, which is also to include the *Final Reclamation and Closure Plan*. This document, which may now be available, apparently incorporates all modifications made to the proposed facility design, operations, and compliance as a result of the culmination of the entire EIS process, including federal, state, cooperating agency and public input. For this massive industrial complex, how can ADEQ certify that the discharge will not result in a violation of State surface water quality standards in McCleary, Scholefield, Wasp and Barrel Canyons without a review of the final MPO document? The permit should be denied on the basis of the inconsistent information provided by the applicant and reviewed by ADEQ.
16. ADEQ has no relief from the licensing timeframes imposed by the applicant's decision to request a permit; however we request to have a public hearing on the anti-degradation review prior to finalization of this permit. In the event that ADEQ finalizes the permit without further public review, we request a public hearing be provided when the permit is amended.
17. SWCA (2013; memorandum from Chris Garrett entitled "Revised Analysis of Surface Water Quality"; cited in the FEIS) has provided information that stormwater flows on Barrel Canyon do not meet all applicable water quality standards. No further degradation of existing water quality is permitted in a surface water where the existing water quality does not been applicable water quality standards. Thus, this certification is premature and needs to be coordinated with additional baseline characterization for Barrel Canyon, and potentially a 303(d) listing.
18. No relevant documents provide a basis for determining the source of the observed metals. While there are ore deposits at or near the surface to contribute to natural levels of metals in runoff, it may also be that there are point or non-point sources in the numerous small mine pits, shafts, adits, or mine wastes and tailings from previous mining activities.
19. The relevant documents should include Rosemont APP-Regulated Facility Depth to Groundwater (Tetra Tech 2010; Attachment 2). This document shows that the water table under many of the APP-regulated facilities is 20 feet or less. There is a substantial

potential for interchange between the aquifer and WUS at these locations and other areas where dredge and fill activities occur.

Part 5.0: CONDITIONS FOR STATE 401 WATER QUALITY CERTIFICATION

20. This certification requires that native material be free of pollutants, but this has not been demonstrated. In fact, SWCA (2013) provides evidence that sediment transported in flood flows is not free of pollutants. The source sites for these pollutants are unknown. We would like this to be demonstrated by the applicant, or know ADEQ's basis for such a determination.
21. If this condition would permit use of truck tires for revetments in WUS, please specify the conditions under which this would be considered.
22. The FEIS (page 470) states that "inert or acid-neutralizing waste rock shall be used to build haul roads and buttresses around waste rock and tailings facilities to provide a buffer zone that would isolate potentially acid-generating materials from water infiltration and storage". Furthermore, the mine would segregate any acid-generated rock as required by the APP. The FEIS is built around the assumption that the metals are mobilized only from acid-generating rock, but this assumption has not been proven.
23. Like Rosemont, the Oracle Ridge mine is a copper skarn with abundant limestone. At Oracle Ridge, the stormwater monitoring program has provided evidence of mobilization of metals in stormwater runoff and spring water from the mine, despite the fact that the host rock is limestone, the pH is alkaline, the hardness is very high. Dissolved copper often exceeds the applicable standard in base flows and stormwater, and total arsenic, beryllium, cadmium, copper, lead have exceeded standards in stormwater runoff.
24. The original 404 application states that "mine haul road will be constructed using material excavated from the open pit, typically consisting of limestone, skarn, arkose, andesite and quartz monzonite rock types." The FEIS says the road will be constructed of "inert or acid-neutralizing rock." The waste rock for the Barrel Alternative includes 65 million tons that were defined (at the time of the 2011 404 application) as oxide ores of copper (FEIS, page 33). This oxide material is located near the surface of the deposit (FEIS, page 32), and would need to be moved during the early years of the operation. It is therefore logical to require a demonstration that pollutants will not be discharged when waste rock is placed into road beds, dams and berms and discharged into WUS. We see elevated levels of metals, primarily copper, in runoff from the Oracle Ridge mine area, despite the abundance of limestone. If ambient runoff from the Rosemont area already exceeds standards for certain metals, then pollutant discharge cannot be avoided when soil and vegetation is removed, flows paths are shortened, and the waste

rock is further crushed and discharged into WUS at roadway crossings and other facilities.

Part 5.1: GENERAL CONDITIONS

25. "*If monitoring, by ADEQ or others, indicates that water quality is adversely affected by the activities certified herein, ADEQ will notify the CoE and request suspension of the CWA 404 permit*" (p. 4 of 9). Per this draft 401 certification statement, ADEQ should formally request the CoE suspend mining operations until such time that water quality non-compliance issue(s) have been remedied by Rosemont Copper.
26. Per the draft 401 certification at condition #1, contractors and subcontractors will receive a copy of the 401 Certification. A legible copy will also be available at the construction site "*where it may be seen by workers*". These stated actions are wholly insufficient to ensure compliance with 401 Certification general and specific conditions. Similar to SWPP requirements, each and every worker employed by Rosemont Copper or contracted by Rosemont Copper should be trained regarding the 401 Certification general and specific conditions, provided a personal copy of the certification, and systematically monitored by designated individuals to ensure day-to-day compliance.
27. Per the draft 401 certification condition #2, "*The applicant shall notify ADEQ of project completion within 30 days following project completion*" (p. 5 of 9). Does "project completion" coincide with the final placement by Rosemont Copper of fill, waste rock or tailings in the permanent impact zones of WUS? This may require 10 or more years of mine operations. ADEQ should evaluate site conditions on a regular basis during each year of mine development, mining operations, and during the reclamation and post-closure period for compliance with CWA 401 certification conditions. Because many mining projects can be put on hold for long periods of time, it is important that provisions be put in place for stoppages of a significant amount of time.
28. With reference to condition #4, "the application and supporting documents" are for a variety of mine design alternatives. If all of these designs are the basis for this certification, then it is impossible to determine what ADEQ considered the covered activities in its review. If not all of the different designs were used in the review, it is entirely obscure and unclear. Either way, the permit must clearly provide reference for what the covered activities are or are not; otherwise the certification in 5.1 is meaningless.
29. With regard to condition #4, the certification "*does not authorize the discharge of mining, construction,….except as specified in the application and supporting documents…"*. This should not explicitly exclude the heap leach discharges described in the FEIS and original 404 application.

30. ADEQ should consider a mitigation plan that reduces the need to permanently place mine waste materials in WUS. ADEQ should require a closure design that places a significant amount of overburden and waste rock back into the mine pit. This would constitute one of the "…practicable alternatives to the proposed discharge, that is, not discharging into the waters of the U.S…" in accordance with 40 CFR 230(5)(c). Furthermore, the placement of mine waste in WUS may conflict with state surface water quality regulation found in A.A.C. R18-108(D) stating, "A surface water shall not contain solid waste such as refuse, rubbish, demolition or construction debris, trash, garbage, motor vehicles, appliances, or tires." The restrictions on discharge expressed in 40 CFR 230(10)(b)(1) would seem to discourage alternatives that may violate state water quality standards.
31. Backfill of the pit is technically practicable and may be economically feasible, since it has been practiced at other mine sites. This closure design is more frequently being incorporated into mine plans of operation because of more stringent regulations regarding mine pit lakes and water quality impacts, such as in California. Backfill of the pit is a reasonable measure because it offers a rational method to significantly reduce the amount of waste that must be disposed at surface facilities at the proposed mine site. It logically follows that such an approach would lessen impacts in specifically identified areas of concern in the 404B.1 Alternatives analysis and USFS Rosemont FEIS, such as recreation and wilderness, cultural resources, livestock grazing, surface water quantity and quality, and visual resources.
32. Backfilling would reduce the impact to the WUS to an acreage that is much less than the suggested preferred alternative-Barrel Canyon, allow for less impacts to Class IV and V riparian habitat and total riparian habitat, have significantly less reduction in annual down-gradient stormwater flow, and reduce significant environmental impacts overall.
33. With reference to condition #6, ADEQ should participate in the permit coordination committee as envisioned by the Forest Service.

Part 5.2: SPECIFIC CONDITIONS

The following two excerpts are from the draft 401 certification, section 5.2, condition #1. The comments that follow address these two excerpts:

> "*Within 180 days of the effective date of the CWA 404 permit, the applicant shall submit to ADEQ, for review and approval, a surface water mitigation program designed to maintain aquatic and riparian resources at pre-project levels in Davidson Canyon and Lower Cienega Creek. The program shall include, but is not limited to, a description of measures that will be taken to offset predicted reductions in surface water flow, in response to the project, along with a proposed schedule for implementation. The Final Environmental Impact Statement (FEIS) predicts a 17.2%*

reduction in average annual post-closure stormwater runoff volume as a result of the proposed activities. The surface water mitigation program shall describe measures that will offset the reduced runoff volume should it occur." (p. 5 of 9).

"*Within 30 days of ADEQ approval of the program, the applicant shall implement the approved mitigation program in accordance with the schedule set forth in the approved program. Should the results of required monitoring and /or revised hydrologic modeling (FEIS Mitigation Measures FS-BR-22, FS-BR-27, FS-GW-02, FS-SR-05) indicate that water quality in Davidson Canyon or Lower Cienega Creek is adversely affected by the activities certified herein, ADEQ may request that the COE suspend the CWA 404 Permit and require additional mitigation."*

34. We agree that there is a need for a surface water mitigation program to reduce riparian impacts.
35. However, the timeframe provided in condition #1 is too long and sets no expectation for a timeframe for implementation. Please provide a schedule for implementation to lessen the damage caused by the reduced volume.
36. The statement "*should it occur*" should be deleted from condition #1. It is unreasonable to require a demonstration that this impact has occurred before requiring the mitigation. The FEIS analysis predicts with some certainty that it will occur, and Pima County Regional Flood Control District believes the impacts will be greater than predicted in the FEIS. If ADEQ makes the mitigation conditional on proof that harm has occurred, then resource base will diminish for many years unabated before any mitigation begins. This approach would be inconsistent with the Governor's Executive Orders No. 89-15 on riparian resources and No. 91-6 on protection of riparian areas.
37. The mitigation should consider use of water derived from pit dewatering wells to offset the reduction in annual stormwater runoff during mine operation. The water should be tested for Arizona Surface water quality standards.
38. Regarding water quality, what modeling would prompt suspension of the permit? For water quality, direct monitoring should be required. Also, there needs to be thresholds for water quality that is "adversely affected" in the language of the permit. Cite relevant standards.
39. As written, the intent of the condition #1 seems to be focused on avoiding the 17.2% predicted reduction in post-closure conditions, but the reductions in flow volumes will be greater during the decades of operation. In addition, Pima County has disputed that the FEIS accurately describes the losses in runoff and recharge. Thus, the reference to the 17.2% reduction should be deleted.

40. The public and/or Cooperating Agencies must have an opportunity to review and comment on the draft Surface Water Mitigation Program.
41. We predict that if proof of damage must occur prior to the mitigation, Rosemont Copper's consultants will determine an observed reduction in average annual stormwater runoff volume is due to non-mining effects such as "natural variability" or "prolonged drought conditions", and thereby conclude there is no justification to implement "measures that will be taken to offset predicted reductions in surface water flow". Cooperating Agencies should be provided with an opportunity to review and comment on the monitoring, assessments and hydrologic modeling data which are used to justify these conclusions. We suggest a technical review team of individuals who are not invested in the outcome of such an analysis. Better yet, we recommend making conservative (i.e., erring on the side of caution) assumptions about the amount of water being withheld by the mine and require that amount to be compensated. This makes far more sense than trying to monitor and account for the many factors that can contribute to changes in runoff.
42. If the Surface Water Mitigation Program is to be prepared in response to a predicted reduction in average annual stormwater runoff volume during the post-closure period, then ADEQ should be prepared to specify for what period of time would Rosemont Copper be required to implement "*measures that will be taken to offset predicted reductions in surface water flow"* as part of ADEQ CWA 401 certification requirements. Should a persistent 20% reduction in average annual stormwater runoff volume be observed at the end of a 25-year mining operation (in contrast to the pre-mining average annual stormwater runoff volume), for what period of time would the mitigation measure be in effect?
43. Regarding long-term effects on Davidson Canyon and Lower Cienega Creek due to 401 certified mining activities, please specify whether or how any of the mitigation measures listed below will be utilized to quantify impacts to future downstream water quality specifically attributable to the filling of approximately 40 acres of WUS with tailings, waste rock and miscellaneous fill. As opposed to potential adverse impacts to surface water quality attributable to the entire mine complex related to discharges downstream into Barrel Canyon?
    a. FS-BR-22: Monitoring to determine impacts from pit dewatering on downstream sites (monitor geomorphic changes to Davidson Canyon; surface and ground water monitoring in Davidson Canyon and Lower Cienega Creek);
    b. FS-BR-27: Validation and rerunning of the groundwater model (every 5 years from pre-mining to five years after closure);
    c. FS-GW-02: Water quality monitoring beyond point-of-compliance wells (groundwater sampling from wells and springs);

d. FS-SR-05: Sediment transport modeling upstream of State Route 83 bridge (elevation changes to the channel bed between mine site and bridge).

Part 5.2: STORMWATER MANAGEMENT

44. The Mining MSGP coverage described in conditions #2 and #3 is not applicable. The MSGP specifically states that it has no applicability to discharges to Outstanding Arizona Waters (OAW), such as Davidson Canyon, and that "w*ater quality cannot be lowered in OAWs".* To quote the MSGP:

    "The MSGP Discharging into Outstanding Arizona Waters (Part 1.1.4.6). Per the antidegradation rules, coverage under the MSGP 2010 is not available for new discharges directly to waters designated as outstanding Arizona waters (OAW). …The applicant must prepare a SWPPP that demonstrates the discharge will not degrade water quality in the OAW and outline basic information that must be included with the SWPP, including a sampling and analysis plan (SAP) for required water quality monitoring". (p.12 of the MSGP fact sheet).
45. Given the presence of an OAW "*exceedance of an Arizona Surface Water Quality Standard*" is not an adequate standard to evaluate whether water quality has been lowered. For example, total dissolved solids (TDS) have relevance for the character of the riparian vegetation and macroinvertebrate communities. Excessive salinities in particular can be damaging and encourage the growth of tamarisk. TDS levels at Oracle Ridge mine monitoring wells and tailings seep have been as high as 1200 mg/l. The Oracle Ridge mine is a skarn deposit similar to the Rosemont mine.
46. Given the presence of an OAW, and the requirement for an SWPP and SAP, Pima County requests that ADEQ exercise their authority under ARS 49-202 to request this supplemental information as part of the 401 Certification process.
47. With reference to condition #4, please specify what monitoring will be in place to determine if unimpacted stormwater has—or has not—come in contact with mine operations.

Part 5.2: EROSION PREVENTION AND HYDRAULIC ALTERATIONS

48. With reference to minimizing exposure of erodible surfaces (Condition #5), this is a very general and unspecific condition. Specifics are needed to prescribe how clearing, grubbing, scraping and erodible surface exposure will be minimized.
49. Please define "*excessive erosion.*" It is good to have examples (as noted), but standards are far better; what is considered excessive to one party may not match what excessive means to another. Best to avoid confusion and designate standards.
50. We agree with the intent of condition #5. Please work with U. S. Forest Service to reduce the removal of soil from WUS and other erodible surfaces. The Forest Service's

proposed decision would allow clearing, grubbing, scraping and otherwise exposing erodible surfaces during the "soil salvage" process, a process we believe will remove material that would otherwise attenuate pollutants emanating from the rock surfaces. Their approach is at odds with minimizing exposure of erodible surfaces. By destroying soil integrity and relocating the material onto loose waste rock surfaces, the erodibility of the material will be enhanced.

51. The 401 application also references that "*the ground will be cleared and grubbed in an upgradient, or westerly direction, generally followed by placement of the finger drains and other flow-through drains*". This approach is also at odds with condition #5.
52. Condition #6 needs to describe measures that can and will be used to control erosion, including rock weirs, waddles, straw bales, and other tools.
53. Harmful or toxic substances need definition as per Arizona State Revised Statutes. For example: as per ARS49-301.38.
54. With reference to condition #6, the referenced documents would support a conclusion that harmful or toxic substances would be discharged into streams. This certification cannot be offered until and unless the applicant offers a basis for meeting this condition.
55. Condition #7: Which "*erosion control, sediment control and/or bank protections measures*" are being referenced? Those in which FEIS alternative or permit application? They all differ.
56. Condition #8: please specify who shall re-evaluate the effectiveness of pollution control measures, and by when. Pima County suggests that the permittee provide ADEQ with a quarterly report of its evaluations and repairs/modifications in response to this condition.
57. Condition #8: The language: "*The effectiveness of all pollution control measures, including those preventing erosion and affecting sedimentation, shall be reevaluated after each flow event and repaired/modified as needed*" needs to be modified. Per information contained in the draft 2013 SWPPP, there are now three Compliance Point Dams (Sediment Control Structures) which "will serve as the final sediment traps for stormwater runoff from the Project and where stormwater quality will be monitored and tested, i.e. outfalls." This is another example of inconsistent information provided by the applicant. This certification is premature and should be denied.
58. Also, as described within the Record of Decision (ROD) and the FEIS, stormwater runoff from large storm events may regularly overtop and destroy the compliance point dams due to their relatively small capacity of 2 acre-feet. These "large" storm events would likely also be carrying the most amount of sediment from the mine site for discharge into downstream drainages. Will sediment releases due to overtopping and/or failure of

the Compliance Point Dams continue until such time ADEQ determines "subsequent discharges will meet Arizona Surface Water Quality Standards" (draft ROD, p. A-13)?

59. Condition #10 is very general. Specificity is needed such as: Fill used to support vegetation rooting shall be protected from erosion by anchoring with materials such as straw, mulch, hydro-seed and other material. Slopes shall be reduced to impede runoff and erosion.
60. Condition #12: Pima County has a number of concerns about the adequacy of the compliance point dam. Cooperating agencies have commented on the potential for unregulated discharge of stormwater that has been in contact with ore bodies and mine processing facilities in the event that the compliance point dam is overtopped and destroyed, which could happen with some frequency. The stormwater reaching the compliance point dam is not halted or permanently retained by the dam in any way and will flow downstream in any case. The dam allows for some settling of sediment, detains stormwater temporarily, and allows for a convenient location to collect stormwater samples. The dam does not, however, prevent stormwater from flowing downstream.
61. Conditions #11 & 12 reference the need for detention/retention structures. These are required to 'cause no significant change to the hydraulic conditions downstream…' However, the very purpose of detention/retention structures is to change hydraulic conditions downstream. Instead, we recommend they be built to mimic pre-mine hydrology, hydraulics and sediment transport regimes.
62. On denuded areas, revegetation efforts need a performance standard to be met. Stating revegetation gives the applicant no standards to meet. Baseline vegetation needs density evaluation in the proposed denuded areas and at a minimum a performance standard is needed to meet for density and time to restore.
63. Condition #15 is at odds with the applicant's intention that compliance dams will be unstabilized. The dams will induce sedimentation and will be repeatedly eroded and rebuilt. The areas around the compliance dams will not be vegetated.
64. Condition #15: If there can be no alteration of flow in the impacted WUS, this would require that Rosemont provide greater details about the chronology and location of impacts to WUS on the project site. We have not seen such a document. This is important, because especially early in the mine's development there will be impacted areas that will be severely altered because any erosion control structures are in place. (At least this is all we can infer from the documents from Rosemont.)
65. In order to ensure that there is no adverse change in stability with respect to stream hydraulics, ADEQ must require the applicant to establish and document pre-project conditions on the WUS for stream slopes, meander values, roughness, hydraulic radii, and other baseline values, otherwise condition #17 is meaningless.

Part 5.2: SEDIMENT LOADS

66. Condition #17 says that "*the applicant shall ensure no adverse change, due to the subject project, has occurred in the stability with respect to stream hydraulics, erosion and sediment load, of any WUS including downstream from the project*." How will stability be defined and how will erosion and sediment load be monitored? We suggest including very specific thresholds.
67. We agree with the need to monitor sediment load, but believe conditions #18 to #20 require further specificity to be enforceable. In addition, a monitoring frequency and protocol should be referenced.
68. Condition #18 describing "*flow in any WUS is sufficient to erode, carry or deposit material*" should be modified to a specified flow (peak discharge or erosive velocity). Sediment movement and deposition occur in virtually all channels (even concrete lined ones).
69. Condition #19 references a comparison with "*natural background levels of sediment*." Have these measures of silt content or turbidity been determined? If so, they should be cited. If not, there should be a requirement to provide a method to determine what these are.

Part 5.2: POLLUTION PREVENTION

70. With regard to the protection of Outstanding Waters of Arizona (OAWs), the FEIS (page 548) states that Rosemont Copper has not completed its demonstration to the State of Arizona that discharges from the proposed Rosemont Mine will not degrade existing water quality in the downstream OAWs. No analysis is presented in that document for the degradation of water quality for the OAWs, only Barrel Canyon.
71. ADEQ should evaluate of the assimilative capacity of Barrel Canyon or Davidson Canyon to absorb the pollutants emitted from the mine.
72. Has ADEQ independently concluded that the OAWs will not be affected? If so, what is the basis?
73. The FEIS offers contradictory statements about the effects to Barrel Canyon. In one place (page 663) that there will be no "exceedances of surface water quality standards that are not already exceeded in natural runoff in Barrel Canyon are expected from the proposed mine operations". In another place (page 474), the FEIS says that "predicted runoff water quality from waste rock and soil cover meets surface water quality standards in Barrel Canyon".
74. The baseline characterization of water quality in both Barrel Canyon and Davidson Canyon, as described in the SWCA (2013) report, is inadequate for the purposes of this certification. The water quality data presented in the FEIS provide evidence that ambient stormwater runoff in Barrel Canyon is elevated in metals. Pima County does

not understand how activities proposed can meet condition #21 of this permit. Total loading will be increased by dredging of top soil and filling with waste rock contemplated under this permit.

75. Furthermore, there is a likelihood of harm because the facility design relies on methods of stormwater control that direct surface waters into fractured bedrock aquifers that discharge to springs and seeps in the area. Also, the waste rock and tailings facilities will be placed on a surface from which topsoil and surficial rock (regolith) has been stripped for later use in reclamation. The removal of soil and regolith reduces opportunities for pollutant attenuation. The mixture of runoff and mine drainage will flow over a fractured bedrock surface. There is no liner to prevent infiltration into the fracture bedrock aquifer and there is no evaporation once the water infiltrates.
76. Subsurface discharge from the mine can enter a fractured bedrock aquifer that has springs and seeps as its surface discharge points. Springflow that supports aquatic and wildlife use is a down-gradient use in Barrel Canyon and at other area streams and springs. A.A.C. R18-11-405(B) states, "A discharge shall not cause or contribute to a violation of a water quality standard established for a navigable water of the state." Therefore, include in this permit a requirement to monitor at the aquifer points of compliance (POCs) for selenium, copper, arsenic, and mercury; set alert levels based on surface water quality standards for aquatic and wildlife (warm water).
77. There is also a likelihood of harm because the 404 application allows waste rock on top of Rosemont Spring and tailings near McCleary Spring. Both of these are located in WUS. Existing surface water uses and standards will be impaired at these sites, both physically and chemically.
78. The boilerplate language in condition #22 does not appear to be developed with reference to this mine proposal.
79. Condition #22 appears to be internally inconsistent as it prohibits pollutants in fill, but allows uses of mining residues including waste rock, gangue and tailings which, on the basis of referenced documents, contain pollutants that will contribute to degradation of water quality.
80. For condition #23, it is not clear what materials and techniques Rosemont is employing while they are working in WUS. This should be made clear. This permit should be conditioned on a sampling of source waters from the temporary and permanent water bodies created by the discharge of dredge or fill. Characterization of the water in these waterbodies is needed in order for ADEQ to know what constituents to sample for in downstream waters. Source sampling must be completed to characterize the potential pollutants associated with mine runoff.
81. The purpose of some of the proposed fill is to create new ponds to detain or retain stormwater. The permit should be conditioned upon monitoring to assure these water

bodies meet narrative and quantitative surface water standards. Some of these new water bodies will be in contact with tailings and wasterock, therefore are surface water impoundments that must be regulated through application of state surface water quality standards. Therefore, include periodic monitoring of narrative and quantitative water quality at planned surface waters.

82. We would predict that the waste and tailings will inadvertently create unplanned surface water bodies around the perimeter of the site where natural flows are blocked or where drainage collects. The permit should be conditioned upon quarterly or more frequent visual surveys for unplanned surface water bodies.
83. Therefore, please include conditions for monitoring narrative and quantitative surface water quality standards for Aquatic and Wildlife at the locations of unplanned surface water bodies, to include arsenic, selenium, copper and mercury.
84. Include annual reporting of the location of new surface water bodies, and observed conditions to ADEQ and share this information with the interagency permitting committee proposed by the Forest Service.
85. The pit lake that would be created by this permit would have a volume of 96,000 acre-feet, making it one of the largest water bodies in southern Arizona. The pit lake would be accessible to wildlife. The APP provides no monitoring for the pit lake. This permit should be conditioned upon post-mining surface water quality monitoring to assess potential toxicity to wildlife. The pit lake must meet water quality standards for Aquatic and Wildlife (warm water or cold water as temperature dictates) for arsenic, selenium, copper and mercury.
86. We agree with SWCA's (2013; memorandum from Chris Garrett entitled "Revised Analysis of Surface Water Quality"; cited in the FEIS) conclusion that "*stormwater quality appears never to have been sampled in Davidson Canyon*". Such would require special sampling equipment to be installed.
87. This permit should require baseflows in the Davidson Canyon OAW reach to be monitored for aquatic and wildlife standards, not just stormwater. Base flow volume and quality are critical parameters to wildlife.
88. The OAWs are located on County and District lands. We ask that ADEQ recognize our authority to permit and condition access to our lands and waters. Recently, Rosemont submitted to ASLD an application to site groundwater and surface water quality sampling devices on State Trust land at Davidson Canyon; we advise ADEQ that this sampling site is not located on the Davidson OAW.

Part 5.2: TEMPORARY AND PERMANENT STRUCTURES

89. Permanent structures should be sized to accommodate at least the 100-yr flow. Condition #29 states that 'Permanent pipes, temporary pipes, and culvert crossings be

adequately sized to handle the expected flow.' Rosemont is left to estimate what 'adequate' is, and the people of Arizona are left to accept this assessment. Standard engineering practice is to identify a flow and design accordingly. Without specifying what this flow is, there is no assurance it can handle flows of concern to the people of Arizona. Pima County has determined that the methods used to determine flows in the FEIS are not adequately conservative or accurate to be used to size structures.

ATTACHMENT 1

Stable Isotope Tracers Reveal Flow Paths of Tucson Basin Groundwater

By Christopher Eastoe, Research Scientist, Ailiang Gu, Graduate Student, and Austin Long, Emeritus Professor

For many years, Tucson depended entirely on groundwater pumped from the regional aquifer in the Tucson basin and neighboring Avra Valley for a water supply. The Tucson basin is typical of the Basin and Range province in containing thousands of meters of sediment derived from the surrounding hard-rock ranges. Predominantly sand and gravel in the upper few hundred meters of the basin have been the principal source of water. The basin groundwater is replenished from streams that drain areas of high rainfall (relative to rainfall in the basin itself) in the mountains to the north and east, and in the uplands towards the Mexican border.

Colorado River water now supplements the city's water supply, and the pumping of groundwater is now greatly reduced under central Tucson. The city is growing unabated, nonetheless, and groundwater will continue to be a crucial water resource. Future exploitation of the aquifer will necessitate a better understanding of the ages, origins, and flow paths of the groundwater as basic information for the construction of groundwater flow models. It is difficult to locate zones of recharge at the surface, and even more difficult to track the movement of concealed groundwater. An essential first step towards understanding water movement is the construction of a map of static water levels. Using data from the hundreds of wells in the Tucson basin, such a map was assembled in the late 1990s (see www.ag.arizona.edu/AZWATER/publications/sustainability/index.html, Fig. 3.2).

Isotope studies provide additional information revealing the complexity of the recharge process. Stable oxygen and hydrogen isotopes label the water molecule itself, and their ratios vary as a function of condensation temperature during precipitation, evaporation, and water-rock interaction. These ratios can be used to distinguish waters of different origin — in the Tucson basin, for example, rain or snow from the surrounding high mountains can be distinguished from rain at the basin floor — and to detect mixing between waters of different origin. Isotopes in sulfate and bicarbonate ions provide information on sources of solutes. In Tucson, sulfur isotopes are useful because of the isotopic contrast between Permian (~250 million years ago) marine gypsum that is present to the southeast, and other sulfate sources in soil or sediment that represent a combination of sulfur from igneous rocks and dust. Natural radioactive isotopes such as tritium and radiocarbon provide information about the age of groundwater.

Over the last 20 years, the Laboratory of Isotope Geochemistry has assembled an isotope data set for hundreds of sample sites in Tucson, and for almost every measurable rain event. Past graduate students – notably Bob Kalin, Sofie Pasilis, Joy Gillick, John Lindquist, David Esposito, and Erin Cunningham – have constructed portions of the maps of O, H, S, and C isotopes. Recently, we have completed coverage of the central part of the basin. Much of the work was supported by our publicly-funded Laboratory as a service to the community; more recently, the University and the SAHRA Science and Technology Center have supported us.

In this brief article, we present an interpretation of our S and O isotope results in the central part of the basin (Fig. 1).

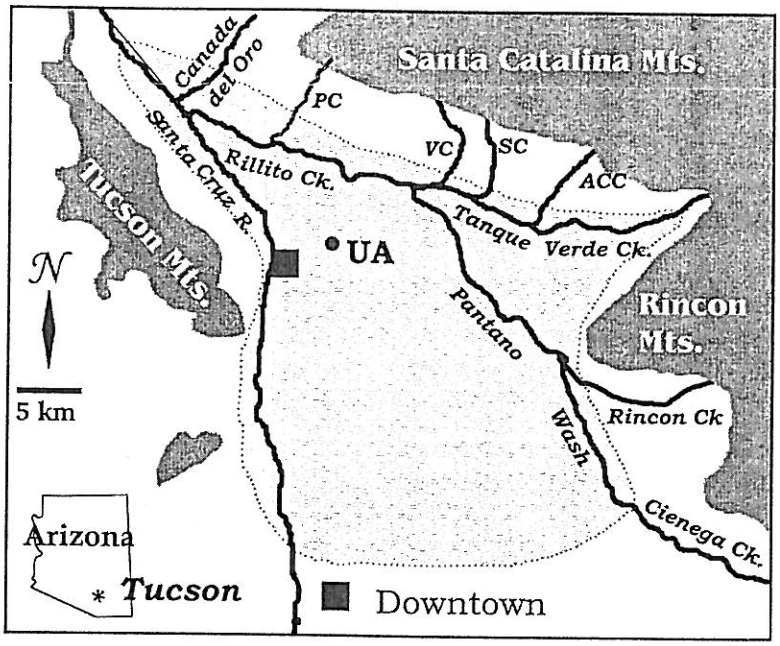

Figure 1. Location map of study area (patterned), showing major streams of the Tucson basin: PC = Pima Creek, VC = Ventana Creek, SC = Sabino Creek, ACC = Agua Caliente Creek.

Delta Notation and Isotope Fractionation

Using mass spectrometers, we measure isotope ratios R, *e.g.*

$$R = {}^{18}O/{}^{16}O, \text{ or } {}^{34}S/{}^{32}S$$

Using R values for samples, and for standard materials (VSMOW, a seawater standard, for O; and CDT, a meteoritic sulfide standard, for S), we define delta values as follows:

$$\delta^{18}O = [(R_{sample}/R_{standard}) - 1)] \times 1000 \text{ ‰ (per mil); likewise } \delta^{34}S.$$

Evaporation of water enriches ^{16}O in the vapor relative to the composition of the liquid water. Such a separation of isotopes is termed fractionation. Condensation does not generally reverse this process completely, so that average rain in most places is enriched in ^{16}O relative to 0‰ seawater. Average rainwater and groundwater therefore have negative $\delta^{18}O$ values.

Isotopes in Tucson Basin Groundwater

We possess $\delta^{18}O$ data for groundwater from more than 300 sites, and $\delta^{34}S$ data for dissolved sulfate from 137 sample sites. A complete list of the data and isotope ...cont'd page 8

distribution maps can be found on the Internet at www.geo.arizona.edu/researchers/mbaker/AustinLong/.

As a working hypothesis, we proposed that most water in the upper part of the regional aquifer derives ultimately from the major streams that enter the basin. If the water in each stream has a characteristic isotope signature, and if a similar distinctive signature is found in part of the aquifer, then we may be able to infer that the stream is the main water source for that area.

Stream water could be sampled at the surface during flow events, but this approach yields a broad range of $\delta^{18}O$ values reflecting the isotopic variability of rainwater. A better estimate of the average isotopic content of water available to replenish the regional aquifer from each stream is obtained from shallow wells in the flood plain. Fig. 2 shows $\delta^{34}S$ and $\delta^{18}O$ data of flood plain ground-water. Several distinctions can be made — between Cienega Creek and the other streams on the basis of $\delta^{34}S$, and between Rincon Creek and the Santa Cruz River on the basis of $\delta^{18}O$. The empty ellipse corresponds to a water composition not known from the major flood plains.

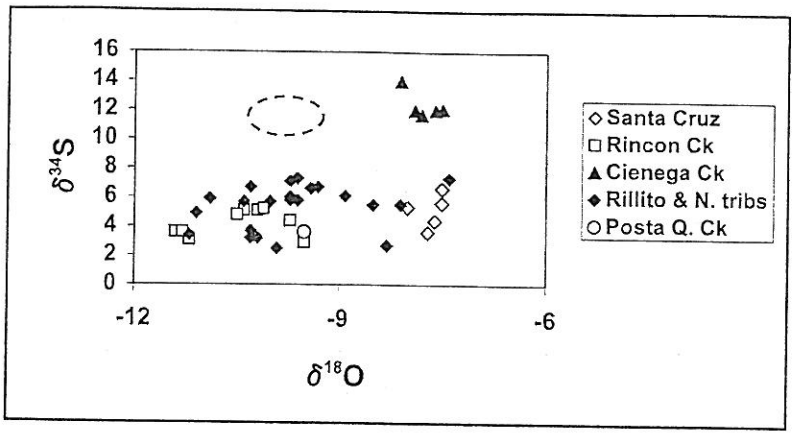

Figure 2. Plot of $\delta^{34}S$ vs. $\delta^{18}O$ in flood plain groundwater. The empty ellipse corresponds to groundwater compositions not represented in flood-plain groundwater.

The $\delta^{18}O$ and $\delta^{34}S$ distribution maps (see website) show basin-scale features with boundaries that do not coincide. The existence of large map features argues for the importance of recharge from basin-scale sources such as the major streams. The major feature of the $\delta^{18}O$ map is a boundary, near Interstate 10, between mountain-derived water with $\delta^{18}O < -9‰$ to the northeast, and basin-derived water with $\delta^{18}O > -8‰$ to the southwest. On the $\delta^{34}S$ map, the major feature is a plume of sulfate-rich water with $\delta^{34}S > 10‰$, derived ultimately from Permian gypsum, that extends across the basin from southeast to northwest. Surrounding water contains sulfate with $\delta^{34}S < 10‰$.

We can divide the basin map into domains using the $\delta^{18}O$ and $\delta^{34}S$ boundaries together (Fig. 3). Each domain contains water with a characteristic combination of $\delta^{18}O$ and $\delta^{34}S$. Between domains C and D, the boundary is defined by a change in $\delta^{18}O$; between domains B and C, the boundary is defined by changes in $\delta^{34}S$. The domains match the major streams as follows:

Domain A, *with $\delta^{18}O < -9‰$ and $\delta^{34}S < 10‰$, corresponds to water from Rillito and Tanque Verde Creeks and their northern tributaries.*

Domain B, *with $\delta^{18}O > -8‰$ and $\delta^{34}S < 10‰$, corresponds to water from the Santa Cruz River.*

Domain C, *with $\delta^{18}O > -8‰$ and $\delta^{34}S > 10‰$, contains water that matches flood plain groundwater from Cienega Creek.*

Domain D, *with $\delta^{18}O < -9‰$ and $\delta^{34}S > 10‰$, matches the empty ellipse in Fig. 2.*

Domain E, *with $\delta^{18}O < -10‰$ and $\delta^{34}S < 10‰$, corresponds to Rincon Creek.*

Domain F *has $\delta^{18}O > -8‰$ and $\delta^{34}S < 10‰$ like domain B, but is remote from the Santa Cruz River.*

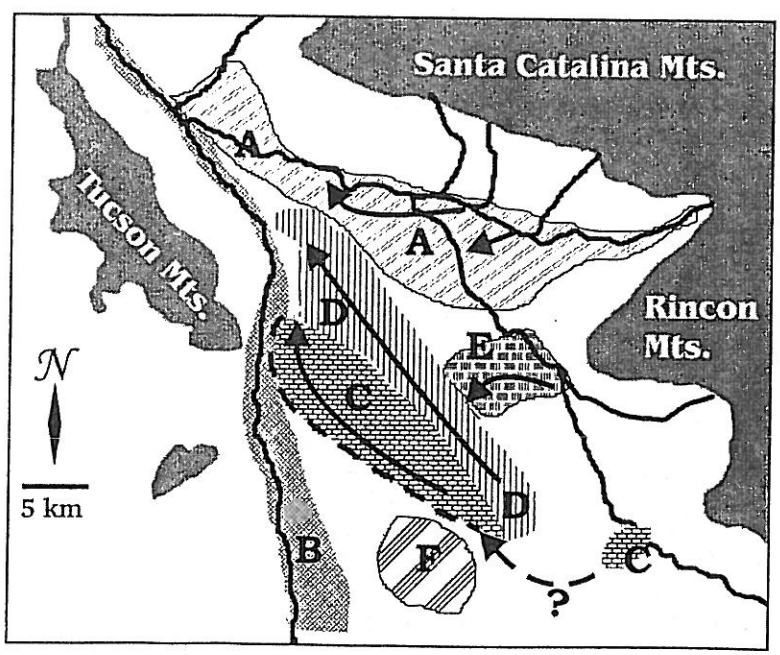

Figure 3. Map of Tucson basin showing groundwater isotope domains and flow directions. Domain designations are explained in the text.

The domain map tells us a great deal about the origin of groundwater in different areas of the Tucson basin. For a domain having clear geographic and isotopic relationships with a specific stream, we deduce that the stream is the source of the groundwater. Domain C does not appear to be continuous at the southeastern end; all attempts to find samples to bridge the gap have failed so far. The water in this domain is following one or more Pleistocene courses of Cienega Creek, which has not always followed the present course into Pantano Wash. The water in Domain D must have originated at high elevation, probably in the Rincon Mountains, but has a Permian sulfate S-isotope signature. It appears to be upwelling in the southeastern corner of the basin, possibly dissolving gypsum at depth in the basin-fill sediments. Oligocene lacustrine gypsum, reworked from Permian strata, crops out in sediment closer to the southeastern edge of the basin.

Isotope maps showing the distribution of tritium and radiocarbon in groundwater (see website) help to confirm the domain boundaries established by S and O isotopes, and provide much additional information about the age of the groundwater. But that is a story for another time!

ATTACHMENT 2

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www.tetratech.com

Technical Memorandum

To:	Kathy Arnold	**From:**	David Krizek
Company:	Rosemont Copper Company	**Date:**	August 23, 2010
Re:	Rosemont APP-Regulated Facility Depth to Groundwater	**Doc #:**	228/10-320877-5.3
CC:	Karen Schwab (Kimberlite)		

1.0 Introduction

This Technical Memorandum provides estimated depth to groundwater from existing ground and/or facility bottom elevations based on the updated locations (July 2010) of those facilities regulated under the Aquifer Protection Permit (APP) program at the proposed Rosemont Copper Project (Project) in Pima County, Arizona. Updated APP-regulated facilities were highlighted in the Technical Memorandum titled *Rosemont APP-Regulated Facility* Locations dated August 18, 2010 (Tetra Tech, 2010). Depth to groundwater estimated were based on well locations shown on a figure titled Well and Spring Locations - Rosemont Area by Errol L. Montgomery & Associates, Inc. dated May 19, 2009 and a summary excel table of groundwater level measurements titled *RosemontManualDataMaster_Jun 2010_Grazing Area* provided by Rosemont Copper Company (Rosemont).

This information is provided in response to the April 14, 2010 Comprehensive Request for Additional Information from the Arizona Department of Environmental Quality (ADEQ) to Rosemont Copper Company (Rosemont). Specifically, this Technical Memorandum answers item no. 34 on page 14 of 18.

- *Please develop a table of groundwater elevation and elevation (bottom) of the above-lying APP facility indicating estimated depth to groundwater at or in the vicinity of the facility footprint.*

2.0 APP-Regulated Facility Locations (updated locations)

Figures 04A and 05A in Attachment 1 show the current locations of the APP-regulated facilities as of the end of July 2010. These figures are from the August 18, 2010 Technical Memorandum and highlight the APP-regulated facilities (generally permitted and area-wide permitted) along with the non-discharging and other exempt facilities. Table 1 provides coordinates for the APP-regulated facilities. Figures 04A and 05A also show existing ground contours (50' contour interval shown).

Table 1 Updated Location of APP Regulated Facilities (revised Table 2.01 from February 2009 APP application)

Facility Name	Facility Type (A.R.S. §49-241(B))	Latitude (UTM NAD 83 Northing - ft)	Longitude (UTM NAD 83 Easting - ft)	Cadastral		
				T	R	S
General Permit Facilities (not included in Area-wide APP)						
Coarse Ore Stockpile	Intermediate Ore Stockpile	31° 50' 24.91" (11,557,577.22)	110° 44' 56.31" (1,718,342.14)	18S	16E	30
Temporary Run-of-Mine (ROM) Ore Stockpiles	Intermediate Ore Stockpile	31° 49' 57.59" (11,554,817.82)	110° 44' 52.69" (1,718,660.91)	18S	16E	30
Sewage Treatment Facilities	Septic Tanks and Leach Fields	Various locations in Plant Site	Various locations in Plant Site	18S	16E	30
Area-wide APP Facilities						
Dry Stack Tailings Facilities	Tailings	31° 50' 18.52" (11,556,944.78)	110° 43' 51.40" (1,723,940.74)	18S	16E	29
Process Water Temporary Storage Pond (TS Pond)	Non-Stormwater Pond	31° 50' 9.80" (11,556,056.78)	110° 44' 27.39" (1,720,839.83)	18S	16E	30
Primary Settling Basin	Non-Stormwater Pond	31° 50' 23.78" (11,557,468.36)	110° 44' 28.51" (1,720,739.47)	18S	16E	30
Raffinate Pond	Process Solution Pond	31° 50' 15.09" (11,556,589.72)	110° 44' 35.99" (1,720,096.29)	18S	16E	30
Heap Leach Pad	Heap Leach Pad	31° 49' 23.93" (11,551,418.85)	110° 44' 48.37" (1,719,041.03)	18S	16E	31, 32
PLS Pond	Process Solution Pond	31° 49' 32.20" (11,552,261.31)	110° 44' 12.44" (1,722,137.55)	18S	16E	32
Stormwater Pond	Non-Stormwater Pond	31° 49' 35.98" (11,552,644.27)	110° 44' 9.32" (1,722,406.21)	18S	16E	32
Open Pit	Open Pit Mine	31° 49' 56.84" (11,554,736.44)	110° 45' 22.91" (1,716,054.54)	18S	16E, 15E	30, 31 25, 36
Waste Rock Storage Area	Waste Rock Dump	31° 48' 56.20" (11,548,622.88)	110° 44' 26.22" (1,720,958.50)	18S 19S	16E 16E	31, 32 05, 06
Waste Management Area	Solid Waste Facility	31° 50' 34.13" (11,558,506.91)	110° 45' 4.04" (1,717,673.68)	18S	16E	30

Note: Partial sections may not be shown for Dry Stack Tailings Facility and Waste Rock Storage Area.

There will be several sewage treatment facilities within the Plant Site area (generally permitted). These treatment facility locations are anticipated to be the following:

- **ND-PS-04**: Septic leach field by the Primary Crusher (ND-PS-01)
- **ND-PS-04**: Septic leach field by the SX-EW Building (ND-PS-13)
- **ND-PS-04**: Septic leach field by the Mine Truck Shop (ND-PS-15)
- **ND-PS-04**: Septic leach field by the Change House (ND-PS-20)
- **ND-PS-04**: Septic leach field by the Main Warehouse (ND-PS-21)
- **ND-PS-04**: Septic leach field by the Analytical Laboratory (ND-PS-22)
- **ND-PS-04**: Septic leach field by the Administration Building (ND-PS-23)

The assumed coordinates of these sewage treatment facilities are shown in Table 2.

Table 2 Updated Location of Sewage Treatment Facilities

Facility Name	Facility Type (A.R.S. §49-241(B))	Latitude (UTM NAD 83 Northing - ft)	Longitude (UTM NAD 83 Easting - ft)	Cadastral		
				T	R	S
General Permit Facilities (not included in Area-wide APP)						
Primary Crusher location	Septic Tanks and Leach Fields	31° 49' 57.30" (11,554,790.76)	110° 44' 45.17" (1,719,309.46)	18S	16E	30
SX-EW Building location	Septic Tanks and Leach Fields	31° 50' 16.58" (11,556,739.44)	110° 44' 40.64" (1,719,695.14)	18S	16E	30
Mine Truck Shop location	Septic Tanks and Leach Fields	31° 50' 6.97" (11,555,767.92)	110° 44' 41.86" (1,719,592.07)	18S	16E	30
Change House location	Septic Tanks and Leach Fields	31° 50' 37.35" (11,558,836.95)	110° 44' 41.91" (1,719,581.20)	18S	16E	30
Main Warehouse location	Septic Tanks and Leach Fields	31° 50' 26.09" (11,557,699.94)	110° 44' 39.87" (1,719,759.35)	18S	16E	30
Analytical Laboratory location	Septic Tanks and Leach Fields	31° 50' 23.97" (11,557,483.58)	110° 44' 52.04" (1,718,710.90)	18S	16E	30
Administration Building location	Septic Tanks and Leach Fields	31° 50' 31.83" (11,558,281.97)	110° 44' 28.64" (1,720,726.81)	18S	16E	30

3.0 Depth to Groundwater (APP-Regulated Facilities)

Table 3 provides the estimated depth to groundwater in the area of each APP-regulated facility. The estimated depths to groundwater shown in Table 3 were interpolated from the well data indicated in Section 1.0 based on the depth to groundwater at the nearest well location to a APP-regulated facility. The basis of the estimated depth to groundwater, i.e., the well name, is also shown in Table 3.

Table 3 Estimated Depth to Groundwater

Facility Number	APP-Regulated Facility Name	Estimated Existing Ground/Facility Bottom/Pad Elevation (ft amsl)	Estimated Groundwater Elevation Range (ft)	Approximate Estimated (Est.) Depth to Groundwater (ft)
AR-GP-01	Coarse Ore Stockpile	5,120' (ground) 5,100' (pad)	4,785' – 5,149' (Plant Site area)	20' (est.)
AR-GP-02	Temporary ROM Ore Stockpile	5,100' (ground) 5,050' (pad)	4,785' – 5,149' (Plant Site area)	20' (est.)
AR-GP-03	Sewage Treatment Facilities			
	Primary Crusher	5,020' (ground) 5,050' (pad)	4,785' – 5,149' (Plant Site area)	20' (est.)
	SX-EW Building	5,020' (ground) 5,039' (lower pad)	4,785' – 5,149' (Plant Site area)	20' (est.)
	Mine Truck Shop	5,030' (ground) 5,020' (pad)	4,785' – 5,149' (Plant Site Area)	20 (est.)
	Change House	5,020' (ground) 4989 (pad)	4,785' – 5,149' (Plant Site Area	20' (est.)
	Main Warehouse	4,980' (ground) 4,995' (pad)	4,785' – 5,149' (Plant Site Area)	20' (est.)
	Analytical Laboratory	5,100' (ground) 5,090' (pad)	4,785' – 5,149' (Plant Site area)	20' (est.)
	Administration Building	4,980' (ground) 4,980' (pad)	4,785' – 5,149' (Plant Site area)	20' (est.)

Facility Number	APP-Regulated Facility Name	Estimated Existing Ground/Facility Bottom/Pad Elevation (ft amsl)	Estimated Groundwater Elevation Range (ft)	Approximate Estimated (Est.) Depth to Groundwater (ft)
AR-TF-01	Dry Stack Tailings Facility	4,770' (ground at center coordinate)	4,499' – 4,816'	30' at center coordinate point (est.)
AR-PS-01	PWTS Pond (PW Pond)	4,900' (ground) 4,892' (bottom)	4,785' – 5,149' (Plant Site area)	20' (est.)
AR-PS-02	Waste Management Area	5,280' (ground)	4,785' – 5,149' (Plant Site area)	130' (est.)
AR-PS-03	Primary Settling Basin	4,920' (ground) 4,913' (bottom)	4,785' – 5,149' (Plant Site area)	20' (est.)
AR-HL-01	Raffinate Pond	4,900' (ground at center coordinate) 4962' (bottom)[1] (4,969' new location)[2]	4,785' – 5,149' (Plant Site area)	160' (est.)
AR-HL-02	Heap Leach Pads	5,150' (ground at center coordinate) 5,143 (pad at center coordinate)[1]	4,730' – 5,057'	100' at center coordinate point (est.)
AR-HL-03	PLS Pond	4880 (ground at center coordinate) 4,870' (bottom)[1]	4,730' – 4,818' 4,795' (ave)	45' (est.)
AR-HL-04	Stormwater Pond	4870 (ground at center coordinate) 4,870' (bottom)[1]	4,730' – 4,818' 4,795' (ave)	45' (est.)
AR-OP-01	Open Pit	5,140' (ground at center coordinate)	5,046' – 5,196'	45' at center coordinate point (est.)
AR-WR-01	Waste Rock Storage Area	4,990' (ground at center coordinate)	4,730' – 5,034'	45' at center coordinate point (est.)

[1]Based on May 2009 permit level design of Heap Leach Facility

[2]Location shown on Figures 04A and 05A

REFERENCES

Tetra Tech (2009). *Aquifer Protection Permit (APP) Application*. Prepared for Rosemont Copper Company. Report dated February 2009.

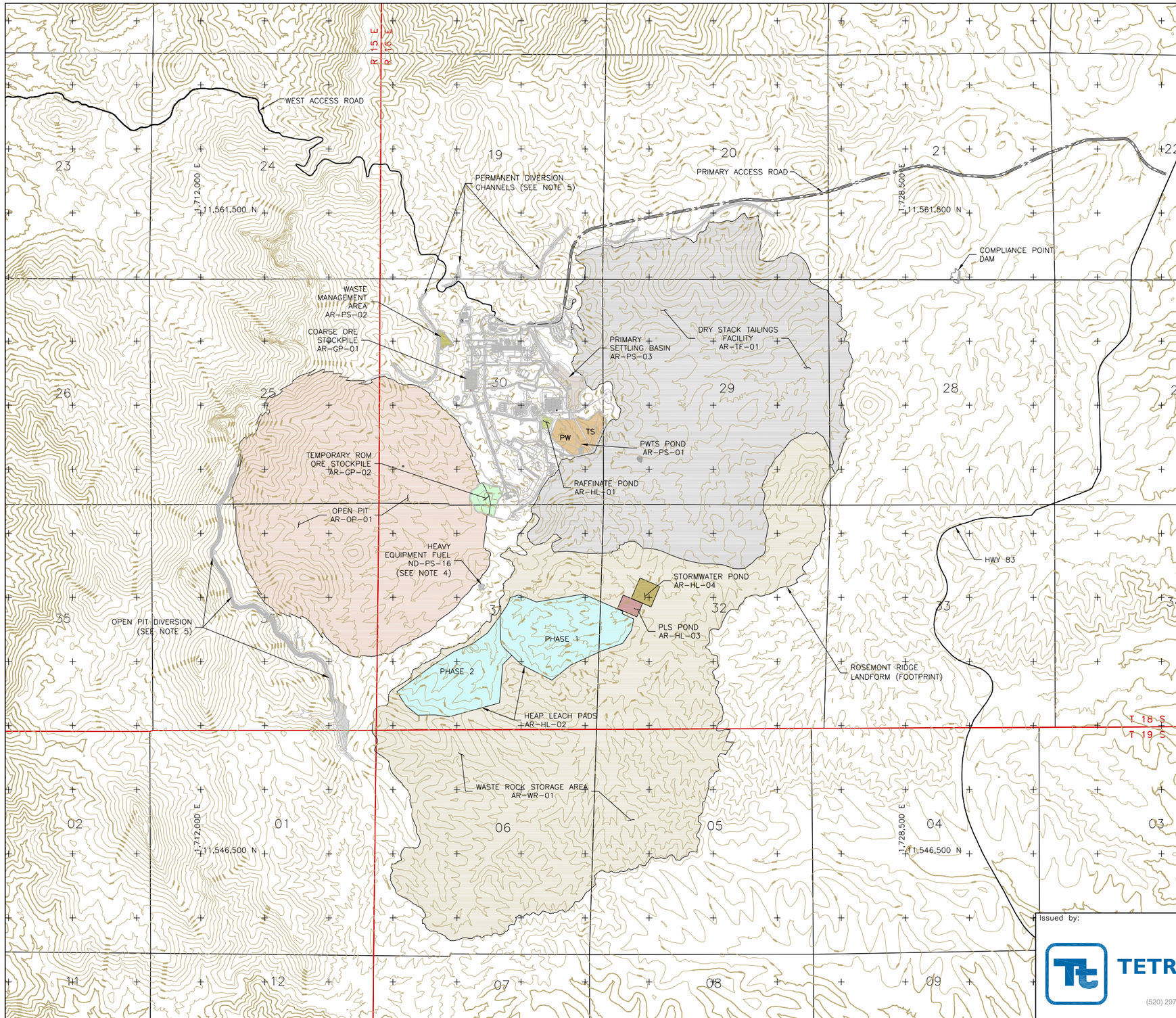
Tetra Tech, Barrios, F.; Chee, R. (2010). *Rosemont APP-Regulated Facility Locations*. Technical Memorandum to Kathy Arnold (Rosemont Copper Company). Technical Memorandum dated August 18, 2010.

Errol L. Montgomery & Associates, Inc. (2009). *Well Spring Locations Rosemont Area*. Figure 1 to Rosemont Copper dated (May 19, 2009).

Rosemont Copper Company, (2010). *RosemontManualDataMaster_Jun2010_Grazing Area*. Excel Table to Tetra Tech dated June, 2010.

ATTACHMENT 1

Updated APP-Regulated Facility Locations
Figure 04A
Figure 05A



LEGEND

= = =	PROPOSED ROAD
	EXISTING PAVED ROAD
	SECTION BOUNDARIES
	TOWNSHIP & RANGE BOUNDARIES
+	UTM NAD 83 GRID COORDINATES

APP REGULATED FACILITIES

AR-TF-01	Dry Stack Tailings Facility (Phase 1 & Phase 2)
AR-PS-01	Process Water Temporary Storage – PWTS Pond (PW Pond only)
AR-HL-01	Raffinate Pond
AR-HL-02	Heap Leach Pads
AR-HL-03	PLS Pond
AR-HL-04	Stormwater Pond
AR-OP-01	Open Pit
AR-WR-01	Waste Rock Storage Area
AR-PS-02	Waste Management Area
AR-PS-03	Primary Settling Basin
AR-GP-01	Coarse Ore Stockpile
AR-GP-02	Temporary ROM Ore Stockpile
AR-GP-03	Sewage Treatment Facilities (See note 1)

AR – APP Regulated Facilities
CF – Closed Facilities
EX – Exempt Facilites
GP – Generally Permitted
HL – Heap Leach
ND – Non-Discharging
OP – Open Pit
PS – Plant Site
SW – Stormwater
TF – Tailings Facility
WR – Waste Rock

NOTES:

1. ALL APP REGULATED FACILITIES, EXCEPT THE SEWAGE TREATMENT FACILITIES LOCATED AT THE PLANT SITE, ARE INDICATED ON THIS FIGURE. THE PLANT SITE FACILITIES ARE SHOWN ON FIGURE 05A.
2. TEMPORARY DIVERSIONS (GP-SW-07) WILL BE UTILIZED ON AS A NEEDED BASIS AS DETERMINED BY FIELD CONDITIONS IN ORDER TO PROTECT FACILITIES.
3. LAYOUT BASED ON JULY 2010 PLANT SITE FACILITY LOCATIONS AND PHASED TAILINGS ALTERNATIVE FOR ROSEMONT RIDGE LANDFORM.
4. THE HEAVY EQUIPMENT FUEL STORAGE AND DISPENSING FACILITY (NON-DISCHARGING/NON-APP REGULATED) IS ALSO SHOWN ON THIS FIGURE FOR CLARITY.
5. SEE FIGURE 04B AND 04A FOR STORMWATER MANAGEMENT FEATURES.

N

SCALE
1200' 0 1200' 2400'
CONTOUR INTERVAL 50'
(EXISTING GROUND)

Issued by:

TETRA TECH
3031 West Ina Road
Tucson, Arizona 85741
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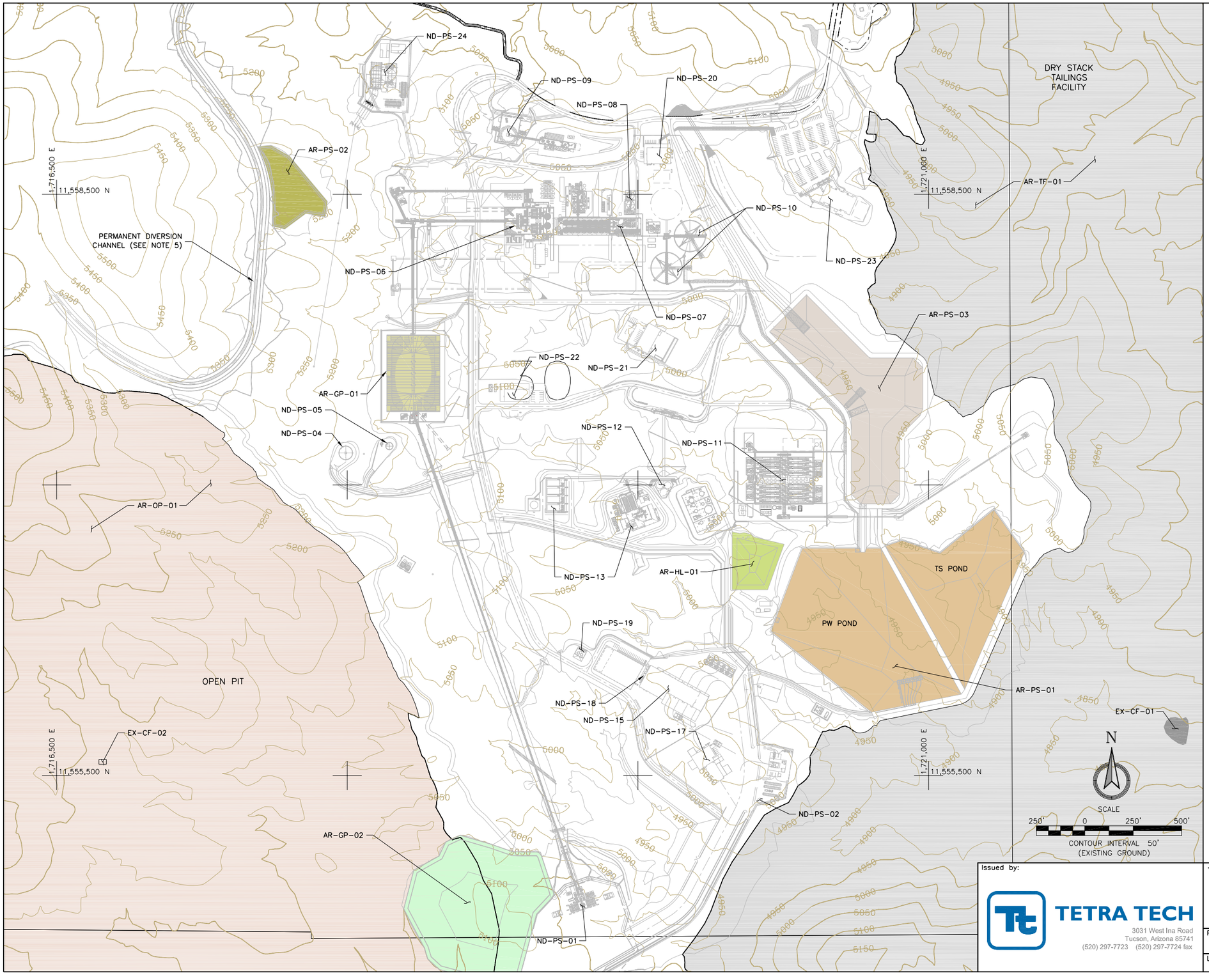
Title:

APP REGULATED FACILITY LOCATIONS

B
REVISION

Project: ROSEMONT COPPER PROJECT	Project no.: 320877	Figure no.: 04A
Location: PIMA COUNTY, ARIZONA	Date: 08/10	



Non-Discharging Exempt Facilities	
ND-PS-01	Primary Crusher
ND-PS-02	Mine Water Tank
ND-PS-03	Santa Cruz Fresh Water Pipeline and Booster Stations (See Note 1)
ND-PS-04	Fresh / Fire Water Tank
ND-PS-05	Process Water Tank
ND-PS-06	Grinding and Classification Circuit
ND-PS-07	Copper-Molybdenum Flotation and Regrind Circuit
ND-PS-08	Copper-Molybdenum Concentrate Thickening and Filtration
ND-PS-09	Copper Concentrate Product Storage
ND-PS-10	Tailings Thickeners
ND-PS-11	Tailings Filter Plant
ND-PS-12	Sulfuric Acid Storage
ND-PS-13	Solvent Extraction - Electro-Winning (SX-EW)
ND-PS-14	Explosive Storage Magazines and Ammonium Nitrate Storage (See Note 2)
ND-PS-15	Mine Truck Shop
ND-PS-16	Heavy Equipment Fuel Storage and Dispensing (See Figure 04A)
ND-PS-17	Mine Truck Wash
ND-PS-18	Lube Bay
ND-PS-19	Light Vehicle Fuel Station
ND-PS-20	Change House
ND-PS-21	Main Warehouse
ND-PS-22	Analytical Laboratory
ND-PS-23	Administration Building
ND-PS-24	Electrical Substation

Other Exempt Facilities	
EX-TS-01	Topsoil Stockpile - Location Variable (See Note 3)
EX-CF-01	Slag Pile
EX-CF-02	Former Ore Leaching Building

APP Regulated Facilities	
AR-GP-01	Coarse Ore Stockpile
AR-GP-02	Temporary ROM Ore Stockpile - Location Variable (See Note 4)
AR-GP-03	Sewage Treatment Facilities • Primary Crusher (ND-PS-01) • SX-EW Building (ND-PS-13) • Mine Truck Shop (ND-PS-15) • Change House (ND-PS-20) • Main Warehouse (ND-PS-21) • Analytical Laboratory (ND-PS-22) • Administration Building (ND-PS-23)
AR-TF-01	Dry Stack Tailings Facilities
AR-PS-01	Process Water Temporary Storage (PWTS) Pond (PW Pond only)
AR-PS-02	Waste Management Area
AR-PS-03	Primary Settling Basin
AR-HL-01	Raffinate Pond
AR-HL-02	Heap Leach Pad (Shown on Figure 04A)
AR-HL-03	PLS Pond (Shown on Figure 04A)
AR-HL-04	Stormwater Pond (Shown on Figure 04A)
AR-OP-01	Open Pit
AR-WR-01	Waste Rock Storage Area (Shown on Figure 04A)

NOTES:

1. FACILITY ND-PS-03, THE SANTA CRUZ FRESH WATER PIPELINE AND BOOSTER STATIONS, ARE LOCATED ALONG THE WEST ACCESS ROAD.
2. THE LOCATION OF THE EXPLOSIVE STORAGE MAGAZINES, FACILITY ND-PS-14, IS NOT SHOWN DUE TO CODE RESTRICTIONS.
3. TOPSOIL STOCKPILE, FACILITY EX-TS-01, WILL BE PLACED AS NEEDED THROUGHOUT THE PROJECT SITE.
4. THE LOCATION OF THE TEMPORARY ORE STOCKPILE, FACILITY AR-GP-02, HAS BEEN GENERALIZED.
5. SEE FIGURES 04B AND 04A FOR STORMWATER MANAGEMENT FEATURES.

AR – APP Regulated Facilities
CF – Closed Facilities
EX – Exempt Facilites
GP – Generally Permitted
HL – Heap Leach
ND – Non-Discharging
OP – Open Pit
PS – Plant Site
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PLANT SITE FACILITY LOCATIONS

B
REVISION

Project: ROSEMONT COPPER PROJECT	Project no.: 320877	Figure no.: 05A
Location: PIMA COUNTY, ARIZONA	Date: 08/10	