

Selection Panel Review Summary

Proposal No.: 028

Proposal Title: Corona and Twin Peaks Mine Drainage Treatment Project

Principal Investigator: Bob Schneider, Tuleyome

Amount Requested: \$1,422,469

Recommended Amount: \$1,422,469 (Proposition 13)

Summary: This project proposes to clean up drainage from three mine sites on private property using semi-passive techniques, serving as a model for successfully cleaning up abandoned mines for public benefit. The current owner would donate the property to the Napa County Regional Park and Open Space District (and the District would accept it if legal liability issues could be resolved, i.e, the county would not be liable as long as they demonstrated that they were making reasonable attempts to reduce the site and discharge contamination risks). This project proposes to document the effectiveness of semi-passive biogeochemical treatment technology to remediate the impacts of discharge from remote inactive legacy mercury mine sites. The project area is in the James Creek subwatershed, tributary to Pope Creek, a major tributary to Lake Berryessa. Discharges from Lake Berryessa pass through Putah Creek to the Yolo Bypass in the northern Delta. Approximately 40 more abandoned mines exist in this region (known as the East Mayacmas Mining District) lie within the Putah Creek Watershed. Cache Creek is estimated to contribute almost half of the mercury load to the Delta from the Sacramento River watershed.

Assessment: Positive aspects of the proposal are the need for resolution of the two issues that are addressed (1 - solving the legal issues surrounding transfer of the property and liabilities to the new owners and 2- treating the toxic mine drainage that is now flowing into James Creek). It is a good demonstration project which has the potential to deliver improved methods to facilitate mine remediation. This proposal is valuable if the proponents scale back to more achievable goals, namely 1) investigating the legal issues, to make progress on how land transfers of this type can be achieved without undue liability to the people trying to do a clean-up/habitat restoration, but acknowledging that there may or may not be complete resolution at this time, and a Plan B should be developed and 2) investigating the details of specific setups of passive biogeochemical treatment in a rigorous way, which would undoubtedly add useful knowledge. This would slow the installation at full scale, but is more realistic in the time frame of this project. The qualifications of team were good and the independent reviewers all rated the project adequate to above average.

Concerns with this proposal include 1) vagueness in budgeting details, 2) lack of information about the long term maintenance of whatever treatment system might be put in place, 3) lack of a model integrating the pieces of the treatment system as it is designed and operated, and 4) lack of information on "passive biogeochemical treatment". There was no background from other studies or projects indicating that the proposed semi-passive approach would work. Additionally, there is concern that the length of the post-implementation monitoring period would not be long enough to assess effects of remediation on receiving waters and biota.

**CALFED Ecosystem Restoration Program
External Scientific Review Form**

Proposal Number: 028

Proposal Title: Corona and Twin Peaks Mine Drainage Treatment Project

Reviewer: #1

Conflict of Interest Statements:

I have no financial interest in this proposal (please mark correct response).

- Correct

~~Incorrect~~

General Review Questions:

Along with your written observations in response to the questions below, please rate each using the following criteria:

- Excellent: Outstanding in all respects
- Very Good: High quality in nearly all aspects
- Good: Quality work, but with some deficiencies
- Fair: Lacking in one or more critical aspects
- Poor: Serious deficiencies

1. **Problem/Goals.** Is the problem that the project is designed to address adequately described? Are the goals, objectives, and hypotheses clearly stated and internally consistent? Does the proposal describe the ecosystem goals it is designed to address (link to ERP goals)?

Comments:

The problem that the project is designed to address is adequately described, and the goals, objectives, and hypotheses are clearly stated and internally consistent. The proposal explicitly states the ecosystem ERP goals it is designed to address. The problem is addressed only at a conceptual level, however, and the proposal lacks quantitative and qualitative information to support a strong purpose and need statement. Toxic mine drainage from abandoned mercury mines is a long-term, persistent problem to the Bay-Delta ecosystem. Legal liability, funding, access, and technical feasibility have limited attempts to treat mine drainage to date. The proposal offers a conceptual approach that appears to offer promise: working under “Good Samaritan” legal liability shields, coordinate efforts with a willing landowner to conduct low-cost, low-technology treatments of mine drainage to benefit downstream aquatic and wetland ecosystem health. As an indirect benefit, clean up of toxic mine drainage will facilitate the transfer of ownership of mine parcels to public ownership for perpetual conservation and public access to open space.

The proposal does not offer an explicit, testable hypothesis: the specific legal framework intended to resolve liability issues that have prevented mine clean up is not explained, and the proposal states that more research needs to be done. As stated on p. 14, “The project will

examine this issue in detail and attempt to identify a model for minimizing such liability.” Similarly, the physical modifications, including grading, treatment system design, and revegetation, are all described at a broad conceptual level. The proposal offer does not offer data from similar projects that underscore a probability of success, or the appropriate scale or design for the site.

Rating: **Good**. The proposal is a good conceptual plan, does not offer sufficiently detailed work plan at a project level.

2. **Approach**. Does the proposal clearly describe its approach (including study design and methods, if appropriate)? Is the approach well designed and appropriate for meeting the objectives of the project as described in the proposal? Will the proposal contribute to our knowledge base?

Comments:

The proposal offers a brief conceptual model of the work plan. For a project level proposal, however, several key elements are missing: sampling and monitoring methodology (dates, techniques); conceptual site plan; construction methods (e.g., heavy equipment, grading, or hand tools?), success criteria for water quality and revegetation; revegetation techniques; estimated area of ground disturbance (less than 1 acre stated). Without a sufficiently detailed work plan, it is hard to know how the proposal’s work would contribute to our knowledge base.

In terms of revegetation it is not known how new plant material would be established with irrigation and weed removal; if irrigation water sources or contaminated spoils are problematic at the site for plant establishment; or if specific species or mixes of species are more desirable or effective in the polishing treatment wetland, spoils pile, or other disturbed areas in terms of establishment or toxin removal. A revegetation schedule is not provided, but presumably planting would occur after year 2 construction (Figure C-6), leaving a single growing year under the 3-year contract. Typically, revegetation requires a 3-year plant establishment period with active maintenance such as supplemental irrigation, weeding, replanting, and browse protection.

The project proposes to be a low-maintenance but long-term solution. It is not clear what entity after 3 years would assume legal or financial responsibility for the project. Even at a very low level of maintenance with a semi-passive treatment system, additional maintenance liabilities – planned or otherwise due to vandalism, breakage, or storm events – may be very difficult for a County agency to undertake due to limited resources available to meet existing maintenance liabilities.

Rating: **Fair**. The proposal lacks a sufficiently detailed work plan to determine if the approach is well designed and appropriate for meeting the objectives of the project and if the proposal would contribute to our knowledge base. Long-term maintenance and performance issues require resolution.

3. **Feasibility**. Is the proposed project’s approach fully documented and technically feasible? Can the project be completed within reasonably foreseeable constraints (e.g., acquiring permits, construction, weather, etc...)? Does the proposal thoroughly address requirements such as environmental compliance and permitting? Is the scale of the project consistent with the objectives?

Comments:

The proposed project's approach is described only at a conceptual level and not documented at a project specific level, and therefore it is not possible to determine if the project is technically feasible. Based on the conceptual approach briefly described, it is feasible that the project could be completed within reasonably foreseeable constraints (with the exception of plant establishment) due to the relatively low technology approach and relative small scale of the project. The proposal only provides a brief overview of the environmental compliance and permitting needs for the Project. Given the nature of the project, its location, and its size, the proposal would be strengthened with more detailed information to support the environmental compliance needs.

The property access agreement in Appendix A is limited to pre-proposal site inspections, and does not cover site access upon award of the project. The proposal states that part of the need to move quickly on the project is that the current landowner would like the properties conveyed to public trust before his death, but that public agencies do not want to accept the property until the mines are cleaned up and liability issues addressed. It seems reasonable that if this is the intent, that an easement and MOU could be developed today with the property owner and land agencies, granting perpetual access for clean up purposes, and conveying ownership or easements after standards being met for clean up. Based on the information presented, there is no verification that such as transfer of ownership to public domain would occur because of the project. Similarly, if the project is implemented, but water quality or public safety standards are not met, the disposition of the properties is unclear. At this stage in the project, draft or sample MOUs with stakeholder agencies and landowners, and relevant information sufficient for draft permit applications could have been prepared or made available for review.

It is not clear how the project would meet a stated objective to meet Napa County trails plans. The proposal does not cite specific planning documents or policies, or show the properties on the map, to demonstrate how it would meet this broader objective for conserving open space, public access, and recreation lands.

Rating: **Fair**. The scale of the project appears to be consistent with the main objective of demonstrating a relatively low cost, low technology method to clean up toxic mine discharge from the numerous abandoned mercury mines in the region. The proposed approach, however, lacks sufficient information to determine if it is technically feasible, capable of being completed within reasonably foreseeable constraints, and does not thoroughly address requirements such as environmental compliance and permitting.

4. **Conceptual Model**. Does the proposal provide a conceptual model that describes the interconnections among the key ecosystem components relevant to the action(s) being proposed? Does the conceptual model clearly explain the hypotheses it is testing?

Comments:

The project's conceptual model describes the interconnections among the key ecosystem components relevant to the action(s) being proposed, but it does not clearly explain the hypotheses it is testing. The proposal offers an overview of the baseline hydrology and water quality data to be collected, and an overview of the sampling frame (prior to project; 20 times during project; and intake, discharge, and receiving waters). It does not describe specific data

that would be collected, detailed sampling methodology, how the data would be interpreted, and success criteria.

The model and approach is simple and straightforward, but lacks sufficient detail to clearly explain the hypotheses being tested. The following types of information have not been provided for the proposed site or other analogous sites where similar methods have proven effective: stream discharge, capacity of the treatment system, capacity to remove targeted pollutants, maintenance practices, disposal or handling requirements for contaminated sediments, revegetation methods on mine spoils. Water quality sampling protocols are not provided, success criteria are not stated, and the proposed legal framework

Rating: **Fair**. The conceptual model appears sound, but the proposal lacks sufficient detail to clearly explain the hypotheses it is testing.

5. **Performance Evaluation Plan (Monitoring Plan and Performance Measures)**. Does the proposal include a plan for project performance evaluation (monitoring to assess results and evaluate assumptions and hypotheses)? Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Will future studies or restoration projects be able to incorporate the information from this project?

Comments:

The proposal does not include a specific or detailed plan for project performance evaluation. The proposal provides an overview of monitoring that would occur, but existing information has not yet been gathered to determine the most appropriate treatment system for each mine or formulate a site specific monitoring plan, success criteria, or performance measures. While the quality of the project team lends confidence that future studies or restoration projects would be able to incorporate the information from this project, it is not clear what type or quantity of information that would become available. Other than a final report stated in Section 4 deliverables, it is not clear where the information would be available, or if the studies and analysis would be published in peer reviewed journals. The proposal estimates that more than 80 other abandoned mines occur in the region, but no information is provided as to how many of these would be potential customers of the information and knowledge generated by the project, and the relative magnitude of the problem that would be addressed with the project or at analogous mines.

Rating: **Fair**. The first stage of the project is to collect background information and develop conceptual models for treatment.

6. **Expected Products/Outcomes**. Are products of value likely from the project? Are products of value also likely from the individual components of the project? Will the results of this study be readily accessible?

Comments:

At a conceptual level, the project would have potential to result in several valuable products: legal precedents that resolve liability issues with "Good Samaritan" clean up projects; demonstrated technologies to remediate toxic mine drainage; and restoration techniques for mine tailings. It is unclear, however, what legal agreements would be made between the principal stakeholders, and the data and analysis that would become available. Other than a final report to

CalFed, there is no stated intention to seek peer review publication or other wider publication of the data and findings from the project that would be accessible to interested individuals and agencies.

Rating: **Fair**. The proposal does not have a detailed data collection or sampling plan, stated success criteria, and a publication of distribution plan for project findings. While the expected outcome holds promise, the proposal lacks detail to formulate expectations and a list of specific deliverables.

7. **Previous Related Work**. Does the proposed project continue past work or include any work that could be considered a duplication of work previously done or currently being done by others?

Comments:

The proposal does not present information to determine if the proposed project continues past work or include any work that could be considered a duplication of work previously done or currently being done by others. Several team members have experience with work on analogous sites. Consequently, the proposal would be strengthened if there were some discussion of the potential issues of these three sites compared to water quality treatment and revegetation at other abandoned mines in the region. It is unknown of the tailings, landscape, or quantity or quality of mine discharge compares to sites where team members have experience. Therefore, it is not known the extent to which lessons learned elsewhere could be brought to bear on the project, or if this project may present special technical issues that need to be addressed.

Rating: **Poor**. The proposal would be strengthened by a brief review of the methods and successes of work at analogous sites that are expected to bring success to the project.

8. **Qualifications**. What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project? Do they have working knowledge of California streams and rivers?

Comments:

The project team appears to have excellent skills and experience, including technical expertise, regulatory knowledge, and capacity to coordinate stakeholders. I have confidence that the proposed team could accomplish the proposed tasks.

Rating: **Excellent**.

9. **Cost/Benefit Comments**. Is the budget reasonable and adequate for the work proposed? If the budget is considered to be excessive or inadequate for the work proposed, please highlight areas of the budget that may be of concern.

Comments:

It is not possible to determine if the budget is reasonable and adequate for the work proposed because the work plan is presented at primarily a conceptual level. The extent and type of grading, erosion, control, trail building, and revegetation are not yet fully known. The scale and

type of water treatment systems are not yet fully known. The legal liability issues require further research.

The stream restoration and erosion aspects of the project are budgeted at \$59,130 for labor and equipment. At a total project disturbance area expected to be less than 1 acre, the cost is reasonable and within industry restoration standards to restore and revegetate 1 acre of bare ground across three sites. However, unknown is what would be delivered, standards of success (e.g., percent cover of native vegetation), adaptive management plans (assuming tailing piles and steep slopes would be problematic work environments), or how restoration could be completed with potential for only a single growing season with the project.

Rating: **Fair.** It is not possible to determine if the budget is reasonable and adequate for the work proposed because the work plan is presented at primarily a conceptual level. For one acre of restoration, at a generic level the cost is reasonable, but there are many unknowns as what, exactly, the project would accomplish with the funding.

Additional comments:

The proposal offers a competent, experienced team with a compelling and worthwhile conceptual approach to address a long-term, persistent problem associated with:

- Legal liability for treating mine drainage;
- Ecosystem impacts from untreated toxic mine drainage;
- Public health and safety impacts due to consumption of contaminated fish and structural hazards at mine sites; and,
- Transfer of private lands to preserved open space.

If the project is awarded funding, I recommend that the applicant provide a more detailed work plan, a clear purpose and need statement related to the priority of the project area in relation to other abandoned mines in the region, a description of legal agreements that would be made among the principal parties, a description of where information and analysis would be available to the public, and a project-specific quantitative conceptual model and hypothesis. A contracted project such as this should have quantitative objectives for treatment and restoration success, and an adaptive management process in place to evaluate monitoring data against success criteria. Due to the potentially long-life of the proposed treatment plan and the multi-year restoration element, there should be assurances provided that the current or future land owner and project manager would have capacity to assume anticipated project operation and maintenance responsibilities after the three-year funding period.

Overall Evaluation Summary Rating

In the space below, please provide an overall rating of the proposal using one of the following categories:

- **Superior:** Outstanding in all respects with superior technical and scientific value and no significant concerns. Expected to add substantial new thinking/concepts to our knowledge/understanding of the topic proposed.
- **Above Average:** A very good proposal with at least high technical and scientific value and no significant concerns. Will add solid basic knowledge/understanding of the topic proposed.

- **Adequate:** A reasonable proposal without serious technical deficiencies and at least adequate value scientifically. Will add some useful knowledge to the topic proposed.
- **Inadequate:** A technically deficient proposal and/or one with low value, serious impediments or concerns. Will not likely change our basic knowledge/understanding of the topic proposed.

Rating: **Adequate.** A reasonable proposal without serious technical deficiencies and at least adequate value scientifically. Will add some useful knowledge to the topic proposed.

Please provide a brief explanation of your summary rating:

The proposed project is compelling and enticing in its approach to address a persistent legal and environmental problem in the region. As written, the proposal does not offer a work plan with detailed, quantitative deliverables or a specific, testable hypothesis. The first year would involve collecting background information and formulating a specific work plan. The proposal would be stronger if it documented the relevant magnitude of the site in terms of contributing to the problem of toxic mine drainage, or if it presented information on the number of abandoned mines, out of the 80 or so stated, that hold promise for implementation of analogous treatment systems developed by the project. Consequently, the proposal lacks information to comment on the priority of the project as opposed to other toxic mine discharge sites in the Bay-Delta watershed.

CALFED Ecosystem Restoration Program External Scientific Review Form

Proposal Number: 028

Proposal Title: Corona and Twin Peaks Mine Drainage Treatment Project

Reviewer: #2

Conflict of Interest Statements:

I have no financial interest in this proposal (please mark correct response).

- Correct X
- Incorrect

General Review Questions:

Along with your written observations in response to the questions below, please rate each using the following criteria:

- Excellent: Outstanding in all respects
- Very Good: High quality in nearly all aspects
- Good: Quality work, but with some deficiencies

Fair: Lacking in one or more critical aspects

Poor: Serious deficiencies

1. **Problem/Goals.** Is the problem that the project is designed to address adequately described? Are the goals, objectives, and hypotheses clearly stated and internally consistent? Does the proposal describe the ecosystem goals it is designed to address (link to ERP goals)?

Comments:

Project goals, objectives and hypotheses are clearly stated and consistent. The problem that the project is designed to address, treating toxic mine adit drainage discharge in the Bay-Delta watershed, is described in good detail. The hypothesis to be tested is that long-term, semi-passive treatment of toxic discharges (*from historic mercury mine sites*) is feasible and will benefit the downstream ecosystem. Objectives are: 1) to characterize and clean up a mine site negatively impacting the Bay-Delta watershed; 2) to facilitate transfer of ownership of critical space to the Napa County Open Space District by satisfactorily resolving mine site discharge contamination risks; 3) to demonstrate effective governance structure for mine site clean-up involving numerous stakeholders and beneficiaries, the current private landowner and the future public landowner; 4) to investigate and resolve liability issues--particularly those related to Clean Water Act third-party lawsuits and Good Samaritan activities; and 5) to demonstrate the viability of innovative mine discharge clean-up technology involving long-term semi-passive treatment of mine site discharges. The proposal links to the ERP goal to "Improve and/or maintain water and sediment quality conditions that fully support healthy and diverse aquatic ecosystems in the Bay-Delta estuary and watershed; and eliminate, to the extent possible, toxic impacts to aquatic organisms, wildlife, and people."

Rating: Excellent

2. **Approach.** Does the proposal clearly describe its approach (including study design and methods, if appropriate)? Is the approach well designed and appropriate for meeting the objectives of the project as described in the proposal? Will the proposal contribute to our knowledge base?

Comments:

The project approach and tasks are listed on page 7. The 6 individual project tasks (coordinate stakeholders; establish baseline conditions and monitor effectiveness (*mine site and drainage water*); research, address and summarize liability issues; construct landscape controls, construct semi-passive mine drainage treatment systems; and report results) are discussed in detail on pages 7 through 12. The project tasks are briefly summarized and commented on as follows.

The number of stakeholders directly involved or interested in the activities and results of this proposed project is large and impressive. The project team will coordinate with stakeholders through a listserv providing approximately monthly status updates, quarterly open meetings and informal individual communications regarding specific issues. Stakeholder groups may provide input to project planning, monitoring, treatment system design and reporting. Critical stakeholders, the current mine site owner and the future public landowner, as well as a number of Federal and State regulatory agencies, water managers and local stakeholders are stakeholders in

this project as it aims to treat contaminated water to improve downstream water quality and associated habitat.

Mine site and mine drainage water characterization studies, the proposed treatment system effectiveness monitoring plan, and the biosentinal aquatic organisms monitoring plan are comprehensive and well thought out. The details of the proposed treatment system are briefly outlined in narrative on page 12 with representative figures on Appendix pages 4-7 of the proposal. An unfortunate and significant omission in the proposal narrative is any mention of the estimated life-span, routine maintenance requirements and estimated maintenance costs for the treatment system.

Proposed project activities to research, address and summarize liability issues appear thorough and well planned. They include the project team working with the Napa County Regional Park and Open Space District, the lead CEQA agency, to evaluate the project site environmental setting and implement appropriate mitigation measures. The project team will work with USEPA to address the issue of Clean Water Act third-party lawsuits and the Federal Good Samaritan Administrative Order. Public safety measures related to mine features, buildings and potential mercury vapor exposure will be will be assessed and implemented as necessary during this project.

Site appropriate landscape cover controls will be identified and site revegetation activities will be conducted with the goal of producing self-sustaining plantings, high plant cover, increased soil stabilization, habitat improvement and revegetated areas that mimic adjacent undisturbed sites. Rainfall runoff will be diverted around mine drainage systems by minor ditches and culverts.

After site preparation activities, three discharge treatment systems will be constructed, an iron precipitate management system, a nickel infiltration system and a semi-passive treatment system to provide bio-chemical and physical control of iron, mercury, nickel and sulfate in mine drainage. Drainage treatment system construction is anticipated to occur early within year 2 of the project.

The project final report will describe the design and construction of the mine drainage treatment systems and their maintenance protocols, quantify the effectiveness of the treatment systems to improve downstream water quality, describe the design and construction of landscape controls, summarize legal liability issues and state how they were successfully resolved, and include information on permitting documents. This report should be a valuable reference resource for others trying to implement similar historic mine-site clean-up projects elsewhere in California

The project proponents are to be commended for a comprehensive and well designed project plan. Each task has persons with the appropriate expertise and experience assigned to it. An amazing number of stakeholders will be directly involved with or kept informed of the activities of this project.

Rating: Very Good

3. **Feasibility.** Is the proposed project's approach fully documented and technically feasible? Can the project be completed within reasonably foreseeable constraints (e.g., acquiring permits, construction, weather, etc...)? Does the proposal thoroughly address requirements

such as environmental compliance and permitting? Is the scale of the project consistent with the objectives?

Comments:

The project's approach is well documented and technically feasible. The three year time frame appears reasonable for completion of the project. A copy of the signed Provisional Landowner Access Agreement is included as Appendix A in the project proposal granting Tuleyome and project team members, DFG, NOAA Fisheries Service, and USFWS representatives permission for property access to perform pre-project evaluation activities. The proposal points out that weather, high intensity short duration storm events, or wildfires could negatively impact site access and construction activities and delay the project. Project proponents will attempt to minimize these impacts by scheduling construction work during late spring. Once initiated, construction of drainage treatment systems is anticipated to be completed within 30 days.

A list of permits known to be needed to complete this project is included on page 3 of the proposal. As pointed out in the proposal, a prolonged permitting process is a potential significant impediment to the project. Given the permitting and compliance knowledge and experience of the project proponents, the fact that information about this project has apparently already been provided to permitting agencies (county, state and federal agencies) and the project's stakeholder connections, it would seem less likely that permitting and compliance processes will prevent the completion of this project within its 3 year time frame.

In addition to permitting, inability to resolve liability issues is another potential significant impediment to project success identified in the proposal. This could be the most difficult hurdle for the proposed project to get past. Liability issues will have to be addressed during the project and the project has a subcontractor with appropriate legal expertise and experience to work on this task. If successful resolution of legal liability issues is achieved, the approach used for this project could have wide application to future similar historic mine remediation projects in California.

The scale of the project is consistent with the objectives.

Rating: Very Good

4. **Conceptual Model.** Does the proposal provide a conceptual model that describes the interconnections among the key ecosystem components relevant to the action(s) being proposed? Does the conceptual model clearly explain the hypotheses it is testing?

Comments:

The proposal provides a brief narrative of background information for the project and key ecosystem components relevant to the project's proposed actions. Legacy mining activity has contributed to the state's impaired listing of James Creek for nickel and mercury, Lake Berryessa for mercury, and lower Putah Creek for mercury and boron. James Creek has been identified as prime trout habitat. A fish consumption advisory is posted for Lake Berryessa and lower Putah Creek for mercury. Lower Putah Creek is a Wild Trout stream that drains into the Yolo Bypass, a nationally recognized fish rearing, wildlife habitat, farming and flood control area with some of the highest mercury concentrations in the Bay-Delta. Key ecosystem components addressed by

the project are watershed water quality, which will be improved by project activities to treat mine drainage, site seepage and runoff; habitat restoration and improvement; and restricting access to mine site features that could injure people and wildlife.

The project conceptual model hypothesis being testing is not directly stated in the Background and Conceptual Models section on pages 6-7 of the proposal but on page 5 under the Detailed Project Description. From page 5, “The hypothesis to be tested by this project is that long-term, semi-passive treatment of toxic discharges is feasible and will benefit the downstream ecosystem.”

Rating: Good

5. **Performance Evaluation Plan (Monitoring Plan and Performance Measures)**. Does the proposal include a plan for project performance evaluation (monitoring to assess results and evaluate assumptions and hypotheses)? Does the project include appropriate performance measures to measure success relative to the project’s goals and objectives? Will future studies or restoration projects be able to incorporate the information from this project?

Comments:

The project will collect quantitative and qualitative data on drainage water quality and mine site materials before construction of the treatment system. Effectiveness of the treatment system to reduce concentrations and loads of pollutants in mine drainage will be evaluated by monitoring influent, effluent and receiving water quality. The treatment system will be monitored approximately 20 times spanning the operation of the treatment system.

Mercury in biosentinel aquatic organisms was previously assessed in the project area in 1998. This project will use the same research team to perform a similar analysis specifically in the project area, as well as in downstream receiving waters before mine site cleanup and treatment installation for baseline data and afterwards to assess effectiveness. One concern is that if the treatment system is installed in year 2 or delays cause it to be installed in year 3, would there be sufficient time to see associated improvements in biosentinel aquatic organisms? Longer-duration monitoring may be needed to properly assess whether or not there has been an improvement in the mercury levels in biosentinel aquatic organisms at the project site and downstream.

Rating: Very Good

6. **Expected Products/Outcomes**. Are products of value likely from the project? Are products of value also likely from the individual components of the project? Will the results of this study be readily accessible?

Comments:

A number of products of value are likely from this project. Product deliverables include: three semi-passive adit drainage treatment systems (designed and constructed); treatment system operation, maintenance, and monitoring plans; site contouring for erosion and drainage control (design and site work); environmental documentation; minutes from stakeholder meetings; and a final report detailing project activities, monitoring data and resolution of liability issues. These deliverables are products of value from individual components of the project. Additionally, the

timing of this project would likely result in a unique opportunity for project coordination with the mine site owner and the Napa County Regional Park and Open Space District that could ultimately lead to donation of the two land parcels with the three mine sites (after mitigation) to the District or to another group who would preserve the land. Also, this is an optimal project to use to address the potential long-term liability issue because this project interconnects the mine site property owner, project personnel with mine site remediation, water quality and ecosystem assessment and restoration, and legal knowledge and experience, numerous stakeholder groups, and county, state and federal regulatory agencies.

Results of this study will be readily accessible in the final report which will detail project activities, monitoring data and resolution of liability issues. Opportunities for the project team to communicate interim project results to stakeholders will occur through a listserve with approximately monthly project status updates, quarterly open meetings, and informal individual communications regarding specific issues.

Rating: Very Good

7. **Previous Related Work.** Does the proposed project continue past work or include any work that could be considered a duplication of work previously done or currently being done by others?

Comments:

I am not aware that this proposed project is a continuation of previous work in at the proposed project site. Although there have been other remediation projects for historic mercury mine sites in the northern Coast Ranges (e.g., Gambinini, Abbot-Turkey Run, Sulphur Bank), this project should not be considered duplication of that work because this site has site characteristics and clean-up/restoration requirements that are somewhat different from other recently remediated mercury mine sites in the northern Coast Ranges.

Rating: Very Good

8. **Qualifications.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project? Do they have working knowledge of California streams and rivers?

Comments:

The project leadership and members of the drainage treatment design and monitoring team, mine site remediation and monitoring team, project support team, and the person responsible for liability issues have excellent credentials. They bring to this project a vast amount of knowledge and experience regarding characterizing and remediating mercury mine site environmental impacts, site wetland and rangeland restoration, permitting requirements for these activities, watershed RWQCB TMDL goals and mine site related legal liability issues. Several project members are very familiar with CALFED Bay-Delta watershed issues and goals related to mercury mines and mercury loads and several have previously worked on significant research projects related to watershed mercury issues. Members of the project team are well qualified to efficiently and effectively implement the proposed project and appear to have the infrastructure

and necessary support to accomplish this project. Several project team members are very knowledgeable about California streams and rivers.

Rating: Excellent

9. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed? If the budget is considered to be excessive or inadequate for the work proposed, please highlight areas of the budget that may be of concern.

Comments:

The budget amount requested appears reasonable and adequate for the work proposed. The costs of individual budget activities are broken out in good detail but I could not find any mention of the source of the \$103,000 in cost share funds listed on the budget sheet in the proposal narrative.

Rating: Very Good

Additional comments:

See summary rating explanation below.

Overall Evaluation Summary Rating

In the space below, please provide an overall rating of the proposal using one of the following categories:

- **Superior:** Outstanding in all respects with superior technical and scientific value and no significant concerns. Expected to add substantial new thinking/concepts to our knowledge/understanding of the topic proposed.
- **Above Average:** A very good proposal with at least high technical and scientific value and no significant concerns. Will add solid basic knowledge/understanding of the topic proposed.
- **Adequate:** A reasonable proposal without serious technical deficiencies and at least adequate value scientifically. Will add some useful knowledge to the topic proposed.
- **Inadequate:** A technically deficient proposal and/or one with low value, serious impediments or concerns. Will not likely change our basic knowledge/understanding of the topic proposed.

Rating: **Between Above Average and Superior**

Please provide a brief explanation of your summary rating:

This is a very good proposed project that should produce products of high technical and scientific value. If funded, it will mitigate water quality problems and physical hazards at a historical mine site within an important Bay-Delta watershed and test several semi-passive mine drainage treatment systems. If successful, similar treatment systems could likely be beneficially employed at a number of other mine sites in California and other states.

The project has the potential to develop a model approach to limit historic mine site clean-up liability for non-profit organizations desiring to undertake such projects to improve water quality and promote ecosystem health and restoration. Such a model could facilitate remediation projects a number of historic mine sites within California as well as in other states that have been stymied to this point because of potential Good Samaritan clean-up liability problems. Project proponents should be commended for tackling this problematic legal issue.

The proposal did not achieve a superior rating because it lacked information about the estimated life-span, routine maintenance requirements and estimated maintenance costs for the adit discharge treatment systems, limited information was provided regarding the conceptual model, it lacked information about the source and nature of cost share monies shown in the budget, and other minor information omissions.

CALFED Ecosystem Restoration Program External Scientific Review Form

Proposal Number: 028

Proposal Title: Corona and Twin Peaks Mine Drainage Treatment Project

Reviewer: #3

Conflict of Interest Statements:

I have no financial interest in this proposal (please mark correct response).

- **Correct**
- Incorrect

General Review Questions:

Along with your written observations in response to the questions below, please rate each using the following criteria:

- Excellent: Outstanding in all respects
- Very Good: High quality in nearly all aspects
- Good: Quality work, but with some deficiencies
- Fair: Lacking in one or more critical aspects
- Poor: Serious deficiencies

1. **Problem/Goals.** Is the problem that the project is designed to address adequately described? Are the goals, objectives, and hypotheses clearly stated and internally consistent? Does the proposal describe the ecosystem goals it is designed to address (link to ERP goals)?

Comments:

The proposed project is consistent with the overall ERP goal to "... improve and increase aquatic and terrestrial habitats, and to improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species." The proposal is within the area designated in the Proposal Solicitation Package (PSP): Sacramento and San Joaquin River watersheds and the San Francisco Bay and Estuary, and is consistent with the following PSP priorities:

- Restoration projects that restore or enhance aquatic habitat in the Sacramento-San Joaquin Delta and Suisun Marsh and Bay;
- Projects that include construction of facilities to ... 2) control drainage from abandoned mines that adversely affect water quality in the Bay-Delta.

The proposal clearly identifies the problem: A need to reduce ongoing releases of iron, sulfate, nickel and mercury from the inactive Corona and Twin Peaks mercury mines to the James Creek Watershed. The proposal also notes existing problems with liability issues. The County is said to be interested in obtaining the property to open five miles of the Oat Hill Mine Road to public use, along with eight miles of the road reestablished as a public trail in 2007. Apparently the property would be donated by the owner to the Land Trust of Napa County but the Trust is concerned about taking on liabilities associated with the toxic chemicals on the property.

The proposal states the goal of "cleaning up a mine site on private property, serving as a model for successfully cleaning up abandoned mines for public benefit". Section 3 of the proposal states that the project is designed to:

- Characterize the mine-impacted sites through mapping and characterize adit discharges through sampling and laboratory analysis
- Design and implement innovative technologies for toxic mine drainage seepage and semi-passive treatment
- Develop and demonstrate an effective approach for toxic site cleanup involving private land owners, non-profit organizations, regulators, and interested stakeholders and "Good Samaritan" participants
- Investigate and resolve liability issues to facilitate transfer of land comprising a critical open space and wildlife linkage from private to public ownership

One concern, discussed further below, is whether goal of the project is to make use of existing proven remediation technology or instead to develop such a technology to remove mercury from site discharges.

Rating: **Good**

2. **Approach.** Does the proposal clearly describe its approach (including study design and methods, if appropriate)? Is the approach well designed and appropriate for meeting the objectives of the project as described in the proposal? Will the proposal contribute to our knowledge base?

Comments:

In principle the integrated approach to site remediation, addressing technological issues, liability, and stakeholder involvement is commendable. It is not clear however from the material provided whether the semi-passive treatment system has (1) been demonstrated to effectively remove mercury and just needs customization for the Lower Corona adit, or (2) the technology is unproven and needs fundamental development for mercury. Section 4, part 3 of the proposal states “*Use of semi-passive biogeochemical technology to address mine drainage is documented to significantly improve quality of receiving waters, and reduce or eliminate toxicity effects in receiving waters (USEPA, 2006). Much of this earlier work has focused on addressing the impacts of coalmine drainage, and drainage from hard rock copper and precious metals mines. This project proposes to document the effectiveness of semi-passive biogeochemical treatment technology to remediate the impacts of discharge from remote inactive historical mercury mine sites.*” Statements in the proposal suggest that significant developmental work is still needed for the semi-passive treatment system to remove mercury: Section 3 on page 7 indicates that innovative technologies will be developed and implemented. Page 12, 3rd paragraph indicates that lab testing and design recommendations are needed. This is an important issue for the review of the overall proposal. Does it make sense to proceed with several other tasks in the proposal if the basic technology has not been demonstrated to work for mercury? Would a phased approach be warranted, first demonstrating the technology, then proceeding with other tasks? If the technology is already developed for mercury, the proponents should be asked to better demonstrate that as a condition for approval of the full proposal.

Rating: Difficult to provide a rating based on the above uncertainty. If the Hg removal technology exists, the approach is very good. If not, the approach is deficient in the sense that a phased approach might be more appropriate, first demonstrating the remedial technology, then proceeding with the full set of proposed tasks.

3. **Feasibility.** Is the proposed project’s approach fully documented and technically feasible? Can the project be completed within reasonably foreseeable constraints (e.g., acquiring permits, construction, weather, etc...)? Does the proposal thoroughly address requirements such as environmental compliance and permitting? Is the scale of the project consistent with the objectives?

Comments:

Project feasibility is affected by the issue raised above regarding the extent to which the proposed remediation technology is proven or at least demonstrated at a scale which provides confidence that the approach will work for the proposed project. If the mercury removal technology already exists, then its feasibility is not an issue if the proponent can provide additional confirming information. If the technology is not proven, the proposal does not clearly indicate the expectation that it will work for this case study. Section 1 (ERP Project type) indicates that the project is primarily a full scale implementation and secondarily research, suggesting that the proponent has information indicating that the passive treatment system has been shown to effectively remove mercury. Is that the case? Beyond that concern, the proposed

approach will summarize liability issues (Task 3) and “...document work to obtain Good Samaritan protections and a USEPA Action Memo.”. This reviewer has no legal expertise and cannot comment on the likelihood of solving liability issues, but it is not clear whether this issue is readily solvable or not. At the same time, an effort to surmount these obstacles is worthy of consideration.

Rating: **Good**

4. **Conceptual Model.** Does the proposal provide a conceptual model that describes the interconnections among the key ecosystem components relevant to the action(s) being proposed? Does the conceptual model clearly explain the hypotheses it is testing?

Comments:

The proposal states that “*The hypothesis to be tested by this project is that long-term, semi-passive treatment of toxic discharges is feasible and will benefit the downstream ecosystem*”. To the extent that additional development of the semi-passive treatment system is still needed for mercury, the proposal lacks information regarding mechanisms and hypotheses by which the proposed type of remedial system would achieve its goals. Information is needed to describe why the system should (or does) effectively remove mercury. Also, anoxic conditions and wetlands are components of the proposed treatment that have widely been documented to produce conditions conducive to methylmercury production. Would some components of the system remove inorganic mercury but produce methylmercury (anoxic reactor, wetland)? As mentioned above, if the technology is proven to remove both inorganic Hg and methylmercury, the proponents should demonstrate this.

Rating: Good

5. **Performance Evaluation Plan (Monitoring Plan and Performance Measures).** Does the proposal include a plan for project performance evaluation (monitoring to assess results and evaluate assumptions and hypotheses)? Does the project include appropriate performance measures to measure success relative to the project’s goals and objectives? Will future studies or restoration projects be able to incorporate the information from this project?

Comments:

The proposal does include a performance evaluation plan that includes monitoring pre and post remediation. It includes mercury sampling in water in the influent, effluent and receiving waters. Mercury species sampled in water include total and methylmercury. In the opinion of this reviewer it is also important that samples be analyzed for filtered and particulate Hg concentrations, and if relevant, the solids form of Hg (cinnabar, etc.)? Clarification should be obtained whether the budget includes these measurements.

Proposed site characterization studies state that “*Samples of the waste rock and tailings will also be collected to evaluate their metal contents, metal mobility, and mineralogy. This information will also inform treatment system design by documenting the locations of mined materials that should not be disturbed during the remediation system construction or operation and by allowing evaluation of the attenuation capacity of site soils.*” Mercury mobility and bioavailability for key reactions such as methylation, is very important, but no information is given regarding the methods used to determine mobility. If, for example, the treatment system

removed much of the solid phase Hg, but not a large portion of the bioavailable fraction of Hg, the benefits could be less than anticipated in terms of the ultimate production and bioaccumulation of methylmercury. Monitoring includes methylmercury concentrations in water and fish, but information on bioavailability would help understand why the monitored results occur. Additional information should be obtained from the proponent on the topic of how mobility will be estimated prior to approving the overall proposal. Finally, the frequency of sampling in water and biota is not described, but would be useful.

Rating: Good

6. **Expected Products/Outcomes.** Are products of value likely from the project? Are products of value also likely from the individual components of the project? Will the results of this study be readily accessible?

Comments:

If the product achieves its goals, the results would be very useful and serve as a template for similar remediation efforts elsewhere. The results would be most useful in combination, but the individual components have standalone value. For example, demonstration of effective removal of Hg with the passive system would be valuable (assuming this has not already been demonstrated) in its own right. A stated objective is to develop a successful case study for others to follow, so the results will presumably be readily accessible.

Rating: Very Good

7. **Previous Related Work.** Does the proposed project continue past work or include any work that could be considered a duplication of work previously done or currently being done by others?

Comments:

See comments above about the need to better describe the extent to which semi-passive treatment has been shown to remove mercury and the extent to which additional method development is needed.

Rating: Fair to Good

8. **Qualifications.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project? Do they have working knowledge of California streams and rivers?

Comments:

The proposal suggests that the study team has a good awareness of California streams and rivers, and least in the region of interest. The proposed team has strong credentials.

Rating: Very Good to Excellent

9. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed? If the budget is considered to be excessive or inadequate for the work proposed, please highlight areas of the budget that may be of concern.

Comments:

The total budget is \$1,422,469. This reviewer does not know if this amount is in the range of proposal costs being considered. Cost sharing is (\$103,000) represents 7-8% of the budget. How this compares to other proposals is not known. Overhead costs are reasonable. The proposal states that the costs are itemized to the extent practical, but many items are in the \$10K to \$100K range without any breakout within that amount. Some additional information would have been useful to break out costs. For example the Lower Corona Treatment system is assigned a cost of \$100K in the equipment section of the budget. The exact cost is presumably not known because the final design is not known. Nevertheless, how did the proponent arrive at \$100K? What type of equipment is expected to be needed (even approximately)? The Lower Corona Treatment system is also assigned a cost of \$89,400 in the materials section of operating expenses. How was that amount estimated, and what is the distinction between materials costs and equipment costs for the Lower Corona Treatment system? The Environmental Review and Permitting cost is significant, \$140K, but no information is provided to support that number.

No hourly rates are provided for subcontractors.

Rating: Fair to Adequate in terms of providing enough information to evaluate whether costs are appropriate.

Additional comments:

None.

Overall Evaluation Summary Rating

In the space below, please provide an overall rating of the proposal using one of the following categories:

- **Superior:** Outstanding in all respects with superior technical and scientific value and no significant concerns. Expected to add substantial new thinking/concepts to our knowledge/understanding of the topic proposed.
- **Above Average:** A very good proposal with at least high technical and scientific value and no significant concerns. Will add solid basic knowledge/understanding of the topic proposed.
- **Adequate:** A reasonable proposal without serious technical deficiencies and at least adequate value scientifically. Will add some useful knowledge to the topic proposed.
- **Inadequate:** A technically deficient proposal and/or one with low value, serious impediments or concerns. Will not likely change our basic knowledge/understanding of the topic proposed.

Rating: Currently **Adequate**, potentially Above Average

In principle, the proposed project is an excellent idea and could help to move forward with site remediation of abandoned mercury mines in the Sacramento River watershed. This reviewer is in favor of such efforts. Concerns expressed in the review are more associated with the proposal itself, which leaves some important issues open to questions. The tasks and schedule seem based on the premise that the semi-passive treatment system for mercury will work, but what is the likelihood and basis for that? Additional information supporting the position taken should be provided. If basic development and testing is needed, then the proposal is lacking in terms of hypotheses and mechanisms describing why the treatment system to remove mercury should work. Also, would some components of the system remove inorganic mercury but produce methylmercury (anoxic reactor, wetland)? This reviewer is not disputing that the treatment system could work, but additional information supporting the proposed system should be provided. Another consideration for the project feasibility is liability. What is the basis for assuming that liability issues will successfully be resolved? Costs are also vague in some cases. These concerns are seen by the reviewer as impediments to its approval in its current form. If these concerns can be addressed within the review process (e.g. if opportunities exist to supply additional information upon request), the proposal could be considered further. If work is needed to demonstrate the effectiveness of the treatment technology to remove mercury, would a phased project be more logical, first demonstrating the technology, then carrying out other tasks relating to the overall implementation of the project. Due to the age of the land owner, time is identified as an important consideration, but it still seems risky to proceed on all fronts simultaneously unless until the basic technology is known to work.