RESOLUTION OF THE PLANNING COMMISSION OF THE COUNTY OF SANTA CLARA CERTIFYING THE ENVIRONMENTAL IMPACT REPORT, MAKING RELATED FINDINGS, ADOPTING THE MITIGATION MONITORING AND REPORTING PROGRAM, AND APPROVING THE AMENDMENT TO THE 1985 RECLAMATION PLAN FOR LEHIGH SOUTHWEST CEMENT COMPANY PERMANENTE QUARRY
(File No. 2250-13-66-10P(M1)-10EIR)

WHEREAS, in July 2011 the current mine operator of the Permanente Quarry, Lehigh Southwest Cement Company and its parent company Heidelberg Cement Incorporated (the "Applicant"), filed an application with the County of Santa Clara (the "County") to amend the 1985 Permanente Quarry Reclamation Plan for approximately 1,238 acres of a 3,510 acre site at 24001 Stevens Creek Boulevard, Cupertino, located at the westerly terminus of Stevens Creek Boulevard (the "Project");

WHEREAS, the Project proposes amending the previously approved 1985 Permanente Quarry Reclamation Plan to reclaim mined lands of the Permanente Quarry in a manner suitable for future open space uses, over an estimated 20-year period, and in accordance with the reclamation requirements of the Surface Mining and Reclamation Act of 1975 (SMARA), its implementing regulations, and the County's surface mining ordinance and Surface Mining and Land Reclamation Standards;

WHEREAS, the County of Santa Clara's Department of Planning and Development has reviewed the application and recommends approval of the Project, subject to conditions of approval set forth in Exhibit 1 attached hereto;

WHEREAS, the County is the lead agency for the Project under the California Environmental Quality Act ("CEQA"), Public Resources Code § 21000 *et seq*. The County issued a Notice of Preparation ("NOP") of an environmental impact report ("EIR") for the Project on August 18, 2011. The NOP was sent to all responsible agencies, trustee agencies, adjacent property owners, and members of the public who had previously requested notice, in compliance with Public Resources Code § 21080.4. The NOP comment period ended September 26, 2011. All comments received during the scoping process were considered in preparing the EIR;

WHEREAS, a Draft Environmental Impact Report ("DEIR") was prepared for the Project (State Clearinghouse No. 2010042063) and published for public review and comment on December 23, 2011 for a 60-day public review period ending February 21, 2012. Copies of the DEIR were provided to all responsible agencies, trustee agencies, and members of the public who had previously requested a copy. On February 2, 2012, the County Planning Commission accepted comments on the DEIR at its duly noticed regular meeting. Several agencies, interest groups and individuals submitted written comments on the DEIR and oral comments were also submitted at the public meeting on February 2, 2012;

WHEREAS, a Final Environmental Impact Report ("FEIR") was prepared for the Project and published on May 11, 2012. The FEIR contains, among other things, responses to all oral and written comments received on the DEIR and text changes to the DEIR. The FEIR was provided to the public and all public agencies that commented on the Project, in accordance with CEQA;

WHEREAS, the County Planning Commission convened a duly noticed public hearing on May 24, 2012 and May 31, 2012 and considered the EIR, Mitigation Monitoring and Reporting Program, and the Reclamation Plan Amendment.

THE PLANNING COMMISSION HEREBY MAKES THE FOLLOWING FINDINGS WITH RESPECT TO CEQA:

A. The EIR for the Project consists of the DEIR, dated December 23, 2011, and the FEIR, dated May 11, 2012. Both documents are collectively referred to as the "EIR" in this Resolution. The EIR is incorporated in this Resolution by reference.

B. The EIR was prepared by County staff and consultants to the County. The EIR reflects the County's independent judgment and analysis regarding all matters stated therein and was prepared and completed in compliance with all applicable provisions of CEQA.

C. The EIR has been presented to the Planning Commission and the Planning Commission has reviewed and considered the information contained therein.

D. The information contained in the FEIR dated May 11, 2012 does not constitute significant new information requiring recirculation of the EIR because it did not change the EIR in a way that deprived the public of a meaningful opportunity to comment on any substantial adverse environmental effects of the project or feasible ways to mitigate or avoid such effects. The information in the FEIR merely clarified and amplified the impact analyses and mitigation measures previously discussed in the DEIR. The information in the FEIR did not identify any new significant environmental impacts or a substantial increase in the severity of any previously identified environmental impacts. Nor did the FEIR identify any feasible project alternatives or mitigation measures considerably different from those previously analyzed, and not accepted by the Applicant, that would clearly lessen the Project's significant environmental impacts.

E. In taking action on the Project, the Planning Commission fully reviewed and considered the information contained in the EIR, staff reports, oral and written testimony received from members of the public and other public agencies, and additional information contained in reports, correspondence, studies, proceedings, and other matters of record included or referenced in the administrative record of these proceedings.

F. The Planning Commission has read and considered the EIR prepared for the Project, has considered each potential environmental impact of the Project, and has considered each mitigation measure and alternative evaluated in the EIR. In accordance with the requirements of CEQA and the Guidelines promulgated thereunder, the Planning Commission makes the following findings based upon substantial evidence in the record:

1. Potentially Significant Environmental Impacts. The EIR analyzes and discloses all of the Project's potentially significant environmental impacts. The Project has the potential to significantly impact the following environmental resources: aesthetics/visual quality; air quality; biological resources; cultural resources; geology, soils, and seismicity; greenhouse gas emissions; hydrology and water quality; noise; and cumulative aesthetics/visual quality. The Project's potentially significant impacts are identified in DEIR Table ES-3, pages ES-13 through ES-19, and FEIR, pages 4-1 through 4-2, which are attached hereto as Exhibit 2, and are more thoroughly discussed in the DEIR and text amendments in the FEIR. Based on information in the EIR and other documents in the record, the Planning Commission finds that the Project does not have the potential to cause any significant environmental impacts other than the impacts identified in the EIR as summarized in Exhibit 2 and listed below:

- Interim visual quality impacts to the scenic vista associated with Project construction (Impact 4.1-1);
- Impacts to scenic resources within a state- or County-designated scenic highway or route during reclamation activities (Impact 4.1-3);
- Impacts to existing visual character of the Project area during reclamation activities (Impact 4.1-5);
- Impacts to daytime or nighttime views associated with Project lighting (Impact 4.1-7);
- Impacts associated with increased levels of toxic air contaminants to people (Impact 4.3-3);
- Impacts to increase emissions of PM2.5 (Impact 4.3-5);
- Impacts to special-status bats (Impact 4.4-2);
- Impacts to aquatic habitats, including organisms and prey base, from Project activities potentially resulting in selenium-burdened runoff (Impact 4.4-5);

- Impacts to the loss of native oak woodlands (Impact 4.4-7);

- Impacts to wetlands and jurisdictional waters associated with Permanente Creek through direct removal, hydrological interruption, or other means (Impact 4.4-8);

- Impacts to historical resources (Impact 4.5-1);

- Impacts to archaeological resources (Impact 4.5-2);

- Impacts to unique paleontological resources or site (Impact 4.5-3);

- Impacts to disturbance of human remains, including those interred outside of formal cemeteries (Impact 4.5-4);

- Impacts to rock and soil slopes of the East Materials Storage Area ("EMSA"), Quarry pit, and West Materials Storage Area ("WMSA") (Impact 4.7-1);

- Increase in greenhouse gas emission and contribution to climate change impacts (Impact 4.8-1);

- Post-reclamation impacts of increased selenium concentrations in in Permanente Creek (Impact 4.10-1);

- Interim hydrology and water quality impacts associated with contributions of selenium, Total Dissolved Solids (TDS), and sediment in Permanente Creek (Impact 4.10-2);

- Impacts to existing drainage patterns which could result in increased storm water runoff rates and on- or offside flooding (Impact 4.10-4);

- Impacts to existing drainage pattern of the site, which could result in increased stormwater ponding, accumulation of selenium, and flooding (Impact 4.10-6);

- Noise impacts associated with reclamation activities during Phase 1 (Impact 4.13-1);

- Cumulatively considerable impacts to visual resources (Impact 6-1);

Except for Impacts 4.1-1; 4.1-3; 4.1-5; 4.4-5; 4.5-1; 4.10-2; and, 6-1, all of the Project's potentially significant environmental impacts can and will be mitigated to less-than-significant levels through adoption and implementation of mitigation measures. The adopted mitigation measures are set forth in the attached Mitigation Monitoring and Reporting Program (Exhibit 3). The post-mitigation level of each of the Project's environmental impacts is set forth in Table ES-3 of the DEIR, pages ES-13 through ES-19, and pages 4-1 through 4-2 of the FEIR.

With respect to Impacts 4.1-1; 4.1-3; 4.1-5; 4.4-5; 4.5-1; 4.10-2; and, 6-1, the impacts would be significant and unavoidable even after implementation of applicable mitigation measures identified in the EIR or, in other cases, no feasible mitigation measures are available to reduce the significance of these impacts. The impacts identified as significant and unavoidable are discussed as follows:

A. Impact 4.1-1 (scenic vista); Impact 4.1-3 (views from scenic highways); Impact 4.1-5 (degradation of existing visual character):

1. Impact 4.1-1: The Anza Knoll scenic vista is located atop a hillside and provides 360-degree panoramic views. The Project contrast at this location would be strong given the close proximity of the Project area (approximately 1 mile to the southwest of the vista), and the strong industrial quality of the Project area in a generally distinct viewshed, as illustrated on page 4.1-6 of the DEIR, Figure 4.1-2c, Photo 10. Project construction would demand the viewer's attention and could not be overlooked. Due to the large size of the Project area and its geographic relation to the scenic vista, it would be impossible to screen views of the Project Area. In conjunction with the long duration of construction of approximately 10 years at the EMSA, impacts at the Anza Knoll would be significant.

The significant impact cannot be mitigated to a level less-than-significant because of the large size of the Project and its geographic relation to the scenic vista on the hillside, it would be impossible to screen views of the Project. Interim artificial screening such as fencing would be incapable of obscuring views of the large Project area, given the viewers' elevated perspective. A more aggressive planting plan to establish mature vegetation (e.g., oak trees, other evergreens) immediately on the EMSA would reduce visual contrast in the period between initial planting, hydroseeding, and eventual maturation under the normal revegetation plan; however, mature trees could not be planted on the intervening slopes, only benches. Furthermore, such an aggressive planting plan would not address visual contrast that would exist during construction of the overburden pile, particularly the dominant presence of construction equipment and activity. As such, based on the EIR and the entire record, this significant impact cannot be mitigated to a level of less-than-significant and no feasible mitigation measures are available to reduce the significance of this impact.

2. Impact 4.1-3: For motorists on I-280, the re-contoured hillsides during construction would result in a moderate visual contrast in that the Project elements begin to attract attention and begin to dominate the characteristic landscape. The changes to the visual character of the site itself would include, during construction of the EMSA, an increased prominence and extent of disturbed areas, and the creation of a new, distinctly unnatural landform. This would be particularly noticeable immediately following the completion of construction but before the vegetation has time to establish and mature, a time period of up to ten years and as such this impact would be significant..

Artificial screening such as fencing would be incapable of obscuring views of the Project Area, because of the extensive height of the EMSA. A more aggressive planting plan to establish mature vegetation (e.g., oak trees, other evergreens) immediately on the EMSA would reduce visual contrast in the period between initial planting, hydroseeding, and eventual maturation under the normal vegetation plan; however, mature trees could not be planted on the intervening slopes, only the benches. Furthermore, such an aggressive planting plan would not address visual contrast that would exist during construction of the overburden pile, particularly the dominant presence of construction equipment and activity. As such, based on the EIR and the entire record, this significant impact cannot be mitigated to a level of less-than-significant and no feasible mitigation measures have been identified to reduce the significance of this impact.

3. Impact 4.1-5: Viewpoints from the Hammond-Snyder Loop Trail, adjacent to Cristo Rey Drive, in the Rancho San Antonio ("RSA") Preserve/Park is one of the most visually sensitive locations within the RSA Preserve/Park, and the Quarry is a very prominent feature within the existing landscape. The increased prominence and extent of disturbed areas, and the creation of a new distinctly unnatural landform resulting from the Project would be particularly noticeable immediately following the completion of construction but before the vegetation has time to establish and mature, a period of up to ten years. Other viewsheds within the RSA Preserve/Park would also be impacted by Project construction. The PG&E Trail offers views of the upper elevations of the EMSA overburden deposits. Although the existing overburden deposits are not a dominant feature in the landscape, the substantial increase in the height of the overburden deposit during construction could block views of the scenic mountains behind the EMSA. In conjunction with the presence of construction equipment in an otherwise natural setting, construction activities would begin to attract attention and begin to dominate the characteristic landscape. The overall visual change to hikers on the PG&E trail would be moderate to high. This would result in a significant impact.

Artificial screening such as fencing would be incapable of obscuring the views of the Project Area, because of the extensive height of the EMSA. A more aggressive planting plan to establish mature vegetation (e.g., oak trees, other evergreens) immediately on the EMSA would reduce visual contrast in the period between initial planting, hydroseeding, and eventual maturation under the normal revegetation plan; however, nature trees could not be planted on the intervening slopes, only the benches.

Furthermore, such an aggressive planting plan would not address visual contrast that would exist during construction of the overburden pile, particularly the dominant presence of construction equipment and activity. As such, based on the EIR and the entire record, this significant impact cannot be mitigated to a level of less-than-significant and no feasible mitigation measures have been identified to reduce the significance of this impact.

B. Impact 4.4-5 and Impact 4.10-2: The EIR identifies potential environmental impacts relating to: (1) interim project activities contributing concentrations of selenium, Total Dissolved Solids (TDS), and sediment in Permanente Creek (Impact 4.10-2; FEIR pg. 4.10-43—50) and (2) interim project activities that could result in selenium-burdened runoff reaching aquatic habitats and, thus, affecting aquatic organisms and their prey base (Impact 4.4-5; DEIR pg. 4.4-37—38). The time period for when these impacts could occur is limited to an estimated 20 years until final reclamation is complete. The EIR concludes that final reclamation will ultimately result in an overall decrease to selenium concentrations discharged to Permanente Creek expected to meet the *San Francisco Bay Basin (Region 2) Water Quality Control Plan* ("*Basin Plan*"), which has a standard of 5 μg/L (micrograms per liter) for aquatic life protection. (FEIR, pages 4.10-33 through 4.10-40.) Interim reclamation activities during a 20-year period, could, result in significant impacts related to selenium burdened runoff entering Permanente Creek.

The DEIR identified mitigation measure 4.10-2a that requires the use of Interim Stormwater Control and Sediment Management to minimize the potential for selenium burdened runoff to enter Permanente Creek. However, due to the lack of empirical evidence supporting the effectiveness of this mitigation, the DEIR concluded that the mitigation would not reduce the impact to a less than significant level. (DEIR, pages 4.10-44 through 4.10-47.)

As an additional mitigation measure, the DEIR discussed commercially available treatment systems to remove selenium and reduce selenium levels in stormwater runoff below the *Basin Plan* level of 5 μg/L (micrograms per liter) for aquatic life protection. The DEIR identified the treatment system to have a total installed cost of approximately $86 million and an annual operation and maintenance of approximately $2.8 million per year. The DEIR concluded that due to the high estimated cost for a selenium treatment system it was not a feasible mitigation measure. (DEIR, pages 4.10-46 through 47.)

Following DEIR publication, the County of Santa Clara, Department of Planning and Development, hired CH2M Hill ("Consultant") to further evaluate the feasibility of installing a treatment system to reduce selenium concentrations in storm water runoff below applicable water quality standards. The Consultant prepared a *Feasibility Assessment* ("*Assessment*"), which is attached hereto and incorporated herein as Exhibit 4. The *Assessment* considered a range of treatment methods and determined that a fluidized bed reactor system ("FBR") appeared to be the most promising technology for

further study and pilot testing. The *Assessment* concluded that although from an engineering perspective an FBR system could be installed onsite to treat discharge from the Quarry Pit and WMSA, it was contingent upon subsequent studies evaluating the treatment facility that would be disclosed as part of further engineering studies. Based on the information available in the *Assessment*, and all other information available at this time, the Planning Commission finds that a mitigation measure requiring the installation and operation of a treatment facility to treat selenium runoff during reclamation activities is not feasible, at this time, for the following reasons:

- The Project site is subject to highly variable stormwater flows because of the rain season in the area, thus runoff can range from zero for many months of the year to tens of thousands of gallons per minute at other months of the year. An FBR system presents unique challenges relating to variable flows because treatment goals are not achieved when flows are at zero since the system must be shut down and restarted. Once the system is restarted, it can take several days before performance can be re-established. Further studies are needed to determine if a treatment system can be designed and installed that accommodates the storage of stormwater to allow equalized flows into the FBR system. (*Assessment*, pg. 1-2—1-13.)

- The *Assessment* does not identify any examples of an FBR system in the United States that has been installed or operating on a site similar to the Project site, where runoff from highly disturbed areas occurs at variable levels. Although the *Assessment* identifies five North American coal industry projects where FBR systems targeting selenium were designed or are in construction, none of the systems are fully operational and do not appear to involve the specific technical challenges identified in the *Assessment* for the Project site. Therefore, at this time, there is uncertainty as to the application of the FBR technology to the Project site because the effectiveness of such a system at a similarly situated site has not been proven. (*Assessment*, Appx. A, p. 7; *Assessment*, p. 1-2—1-6.)

- Reclamation activities that potentially cause interim increases in concentrations of selenium in stormwater runoff will occur for an approximately 20-year period. Following final reclamation, the EIR concludes that selenium concentrations in stormwater runoff are not expected to exceed applicable water quality standards in the *Basin Plan* level of 5 μg/L (micrograms per liter) for aquatic life protection. The 20-year interim period is divided into two ten-year periods. The first 10-year period when interim impacts to concentrations in water runoff potentially exist is when reclamation activities occur at the East Materials Storage Area ("EMSA"). (FEIR, pages 4.10-43 through 4.10-44.) The second 10-year period is when reclamation

activities occur at the West Materials Storage Area and Quarry pit ("WMSA/Pit"). (FEIR, page 4.10-44.)

- The *Assessment* did not provide specific costs or design parameters for an FBR to treat stormwater flows from the EMSA during the first ten-year period. Therefore, at this time, there is insufficient information to determine the cost and specific design parameters for an FBR system to treat flows from the EMSA and further work is necessary to determine the feasibility, costs and design parameters to install such a system.

- The *Assessment* did evaluate an FBR system to treat flows from the WMSA/Pit during the second ten-year period. The Assesment concluded that the estimated cost for installation would be approximately $63.6 million, with a range of $31.8 million (-50%) to $127 million (+100%) and the estimated cost for operation and maintenance would be $6.5 million with a total initial estimated cost of $101 million, based on a 10-year life cycle cost and an 8 percent annual interest rate of return. Therefore, the total cost to install and operate an FBR system to treat stormwater flows from the WMSA/Pit for ten years during Phase 2 and 3 would be approximately $228 million. (*Assessment*, pg. 1-13—15.) The financial burden of approximately $228 million for the installation and operation of an FBR system for the WMSA/Pit for the limited term of ten years is economically disproportionate, considering the limited duration of the impact and the finding that selenium concentrations in stormwater runoff are not expected to exceed applicable water quality standards following final reclamation of the Project site.

- Mitigation Measures 4.10-2c; 4.10-2d; and, 4.10-2e in the FEIR require continued study to determine the feasibility of installing a treatment facility or alternative treatment method to address stormwater runoff during the 20-year interim reclamation period. (FEIR, pages 4.10-47 through 4.10-49.) Together these mitigation measures will require the installation of a selenium treatment facility if later studies determine its feasibility and ongoing testing shows that interim reclamation activities causes increased concentrations of selenium in stormwater runoff. In accordance with the mitigation measures, the Planning Commission shall hold a public hearing to determine the feasibility of the treatment facility or alternative, as specified in the mitigation measure. In addition, Mitigation Measures 4.10-2a and 4.10-2b require the implementation of Best Management Practices (BMPs) in accordance with the drainage plan and Storm Water Pollution Prevention Plan (SWPPP). Because the BMPs are specific to the site conditions and rainfall and have not been installed yet,

there is insufficient empirical data supporting a conclusion that the BMPs alone will mitigate the interim impact. Therefore, the implementation of Mitigation Measures 4.10-2a and 4.10-2b will not reduce the impact to less than significant and Impact 4.4-5 and 4.10-2 remain significant and unavoidable.

Based on the above, there is insufficient evidence to support a finding that the requirement to install a selenium treatment facility, using FBR technology, or an alternative technology, is a feasible mitigation measure. Therefore, no feasible mitigation measure exists to reduce the potentially significant impacts identified in Impact 4.4-5 and Impact 4.10-2 to less-than-significant levels and the impacts remain significant and unavoidable.

C. Impact 4.5-1 (loss of known historic resources): The Project area is located within the boundaries of a potential Kaiser Permanente Quarry Mining District. Because the potential District is eligible for listing in the California Register, it is considered an historical resource pursuant to CEQA Section 15064.5. The Project proposes to demolish the following contributing features of the potential District; the existing Permanente Quarry Conveyor System and related tunnel, powerhouse, and structures including the remains of the early 1940s crusher. The loss of the Permanente Quarry Conveyor System and related tunnel, powerhouse, and structures including the remains of the early 1940s crusher would cause a substantial adverse change to a historic resource because it would demolish in an adverse manner those physical characteristics that convey the District's historical significance and that justify its eligibility for inclusion in the California Register.

The EIR identifies Mitigation Measures 4.5-1a, 4.5-1b, and 4.5-1c that will require documentation and salvage of the Conveyor System and related tunnel, powerhouse, and structures including the remains of the early 1940s crusher. (DEIR, page 4.5-26.) While these mitigation measures would reduce the extent of the significant impact, it would not mitigate for the ultimate loss of these historic resources. There is no feasible way to move or avoid these features and implement the Project and this impact would be significant and unavoidable.

E. Impact 6-1: The Project would have a significant impact to views from the Anza Knoll and trails within the RSA Preserve/Park, including the PG&E and Hammond-Snyder Loop trails. Construction of the Permanente Creek Flood Protection Project would occur concurrent with construction of Phase 1 of the Project, and would result in temporary visual disruption related to grading for the flood basin, and would create views of construction debris, construction staging and material storage areas, soil stockpiles, and construction vehicles and equipment. The Project would cumulatively contribute to the impacts caused by the Permanente Creek Flood Protection Project, resulting in a significant cumulative impact to visual resources.

No mitigation measures or Project alternatives have been identified to reduce the cumulative impact to a less-than-significant level and, thus, it remains significant and unavoidable.

2. Alternatives. The EIR analyzes a reasonable range of alternatives to the Project sufficient to foster public and informed decision-making and to permit a reasoned choice, and the EIR adequately discusses and evaluates the comparative merits of the alternatives. An EIR must identify the "environmentally superior alternative" among all of the alternatives considered that feasibly implements the objectives of the proposed project (CEQA Guidelines Section 15126.6). For the proposed Project, the EIR analyzed which alternative was superior based on the analysis of the proposed Project and alternatives to it. None of the alternatives identified would provide a material lessening of significant adverse impacts compared with the proposed Project. Therefore, the EIR concluded that the Project was the environmentally superior alternative. The Planning

The EIR analyzed three alternatives to the proposed Project, including the Complete Backfill Alternative (Alternative 1), Central Materials Storage area Alternative (Alternative 2), and the No Project Alternative (Alternative 3). (See, EIR Chapter 3 and Chapter 5.) The Planning Commission finds that the EIR presents a reasonable range of alternatives with respect to the Project as required under CEQA. For the reasons set forth below and considering the entire record of proceedings, the Planning Commission approves the proposed Project rather than any of the alternatives. Each alternative is summarized below and the reason why the Planning Commission rejected it.

A. Complete Backfill Alternative (Alternative 1)

i. Description of the Alternative

The Complete Backfill Alternative would be similar to the Project in all respects except that overburden materials stored in the EMSA would be backfilled into the Quarry pit upon the conclusion of mineral extraction activities. The EMSA was designed to accept total overburden placement of approximately 6.5 million tons (approximately 4.8 million cubic yards) and to provide overburden storage for the surface mining operation until approximately 2015, when final contouring and revegetation would occur. Under Alternative 1, the approximately 4.8 million cubic yards of overburden stored in the EMSA would be returned to the Quarry pit as backfill during reclamation Phase 2.

ii. Reasons for Rejecting the Alternative

This alternative would not avoid any of the significant and unavoidable impacts identified for the Project and would result in the following increased severity of impacts as compared to the Project:

- Greater impacts to scenic vista, scenic and major roadways and the visual character or quality of the Project as a result of lowering the height of the EMSA that provides visual buffering of the Project site.

- Greater impact to air quality and health risk.,energy conservation, and greenhouse gas emission due to a longer duration of construction required to excavate and move the EMSA materials and thereafter to contour the area.

- Impacts to energy conservation would be greater than the Project, as more fossil fuel would be required to excavate and move the EMSA materials and thereafter to contour the area.

- Implementation of Alternative 1 would cause a greater impact to greenhouse gas emissions.

- Impacts related to long term selenium leaching to surface water would be less than under the Project; however, the larger area and higher slopes would result in more severe drainage and flooding impacts, and the longer interim period before WMSA and EMSA reclamation could result in more severe interim impacts to water quality.

- Impacts from noise would be greater than the Project due to the additional heavy equipment activity required to excavate and remove the EMSA, combined with removal of the feature that would help shield nearby residences from equipment noise.

The Complete Backfill Alternative (Alternative 1) does not avoid any of the significant and unavoidable impacts identified in the EIR and could result in increased severity of environmental impacts in several areas. Therefore, it is not environmentally superior to the Project and thus is not adopted by the Planning Commission.

B. Central Materials Storage Area Alternative (Alternative 2)

i. Description of the Alternative

The Central Materials Storage Area (CMSA) Alternative would be similar to the Project in all respects except that reclamation of the eastern and central portions of the EMSA (as it exists as of reclamation plan amendment approval) would begin immediately, and overburden generated by continued mining in the Quarry pit would be stored in an area further to the west, farther removed from the closest viewers and air quality- and noise-sensitive receptors, as indicated on Figures 3-1 and 3-2 of the DEIR (pages 3-11 through 3-12). Reclamation activities in the EMSA would be the same as under the Project (including installation of a "cap" to prevent selenium-containing

surface runoff from reaching Permanente Creek) except that such activities would begin immediately upon reclamation plan amendment approval and no new materials would be stockpiled in that area. Mitigation measures recommended to address interim Project impacts (i.e., impacts that could occur while reclamation activities are underway) for the EMSA also would be implemented to avoid or reduce impacts associated with the CMSA before final reclamation of the CMSA begins, which would occur upon the conclusion of mineral extraction in the Quarry pit during reclamation Phase 2.

ii. Reasons for Rejecting the Alternative

This alternative would not avoid any of the significant and unavoidable impacts identified for the Project and would result in the following increased severity of impacts as compared to the Project:

- Greater impacts to scenic vista, scenic and major roadways and the visual character or quality of the Project as a result of lowering the height of the EMSA that provides visual buffering of the Project site.

- Implementation of Alternative 2 would cause greater impact to natural habitat than the Project because it would result in the conversion of native habitats such as oak woodlands and chaparral.

- Impacts to energy conservation would be greater than the Project, as more fossil fuel would be required to implement this alternative based on increased surface area.

- Impacts to geology and soils would be similar to slightly greater than the Project due to the combined height of the EMSA/Central Materials Storage Area and slightly reduced factors of safety.

- Implementation of Alternative 2 would cause a greater impact to greenhouse gas emissions.

As the Central Materials Storage Area Alternative (Alternative 2) does not avoid any of the significant and unavoidable impacts identified in the EIR and could result in increased severity of environmental impacts in several areas, it is not environmentally superior to the Project and thus is not adopted by the Planning Commission.

C. No Project Alternative (Alternative 3)

i. Description of the Alternative

Under the No Project Alternative, it is expected that mining would continue at the Quarry at the baseline rate of 2,600,000 metric tons. However, SMARA mandates that the Project Area be reclaimed in compliance with all regulatory criteria. The Project is intended to fulfill this legal requirement and abate the issues related to Orders to comply/Notices of Violation (NOVs) issued by the County in 2006 and 2008 related to deviations from the 1985 Reclamation Plan (i.e., engaging in mining activities outside the approved reclamation boundary). Under the No Project Alternative, the proposed Reclamation Plan would not be approved, these NOVs would not be abated, and the Applicant would remain in violation of SMARA and County requirements because an approved reclamation plan would not encompass all mining-related operations and disturbance. This would result in no additional placement of overburden at the EMSA. Ultimately, however, in order to address the existing NOVs, a SMARA-compliant reclamation plan would have to be developed, approved following its evaluation under CEQA, and implemented by the Applicant. It is expected that such a reclamation plan would be substantially similar in scope and level of activity to that proposed as the Project, including reclamation of the EMSA to address the existing overburden material at that location. Under the No Project Alternative, the principal difference compared to the Project is not whether reclamation would begin, but rather when reclamation would begin.

ii. Reasons for Rejecting the Alternative

This alternative would not avoid any of the significant and unavoidable impacts identified for the Project and would result in the following increased severity of impacts as compared to the Project:

- Greater impacts to scenic vista, scenic and major roadways and the visual character or quality of the Project as a result of lowering the height of the EMSA that provides visual buffering of the Project site.

- Impacts to geology and soils would be greater, because baseline conditions of marginal slope stability would continue for a longer period of time.

- The interim period before reclamation would be longer than for the Project; the extended timeframe would result a longer period of selenium-related water quality impacts, also affecting aquatic habitat in Permanente Creek.

As the No Project Alternative (Alternative 3) does not avoid any of the significant and unavoidable impacts identified in the EIR and could result in increased severity of environmental impacts in several areas, it is not environmentally superior to the Project and thus is not adopted by the Planning Commission.

3. Finding Regarding Mitigation or Avoidance of Impacts and Adoption of Mitigation Monitoring and Reporting Program. Based on the adopted mitigation measures, changes or alterations have been required in, or incorporated into, the Project which mitigate or avoid all of the Project's potentially significant environmental effects with the exception of Impacts 4.1-1; 4.1-3; 4.1-5; 4.4-5; 4.5-1; 4.10-2; and, 6-1. In addition, a Mitigation Monitoring and Reporting Program ("MMRP") has been prepared pursuant to Public Resources Code § 21081.6 that provides for implementation, monitoring, reporting, and enforcement of all conditions and mitigation measures adopted to mitigate and/or avoid the Project's significant environmental impacts. The MMRP is attached to this resolution as Exhibit 3 and incorporated herein.

4. Statement of Overriding Considerations. Regarding Impacts 4.1-1; 4.1-3; 4.1-5; 4.4-5; 4.5-1; 4.10-2; and, 6-1, the Planning Commission finds that all feasible mitigation measures and alternatives have been adopted; however, these impacts are still significant and unavoidable. There are no feasible mitigation measures or alternatives to the Project that could reduce the impacts to a level less than significant. Pursuant to Public Resources Code section 21081(b), there are specific overriding economic, social and other benefits of the proposed Project that outweigh this impact. These benefits, which will accrue to the general public, warrant approval of the Project notwithstanding the Project's remaining significant impact, and include the following:

- Under SMARA, every person or entity who operates a surface mining operation must receive approval of a reclamation plan. The objective of the reclamation plan must be to restore the mined lands to a useable condition which is readily adaptable for alternative land uses, to minimize effects on the environment, and to protect public health and safety. (Pub. Res. Code §§ 2700; 2711-12.) The County's Zoning Code also requires approval of a reclamation plan for any surface mining operation. (County Zoning Code § 4.10.370.) Therefore, approval of the Project fulfills the state law mandate and Zoning Ordinance Code requirement that a surface mining operation receive approval of a reclamation plan.

- The 1985 Reclamation Plan is inadequate and does not include sufficient mechanisms to protect the public health, safety, and welfare. The Project is superior to the 1985 Reclamation Plan because the 1985 Reclamation Plan covers approximately 330-acres and today the mined lands comprise approximately 1,238 acres. The Project would cover the 1,238 acres currently mined and apply SMARA reclamation standards.

- The Project would result in the stabilization of the site, improvement to long term water quality issues in Permanente Creek, and facilitation in the restoration of Permanente Creek.

- The Project would result in the rehabilitation and restoration of highly disturbed areas and otherwise smooth the transition to future open space uses that would be more compatible with surrounding areas.

- The Project would ensure that a sufficient Financial Assurance is posted by the Applicant and updated annually. The Financial Assurance provides financial resources to the County in the event the Applicant is incapable of performing reclamation in accordance with its approved reclamation plan or abandons the surface mining operation without commencing or completing reclamation. The Financial Assurance posted for the 1985 Reclamation Plan is $11.4 million. The Financial Assurance posted for the Project is over $47.7 million.

- The Planning Commission finds that further detail regarding the Project benefits and information to support the determination that specific overriding economic, legal, social, technological, or other benefits of the Project outweigh the significant and unavoidable impacts on the environment are included in a statement of overriding considerations prepared by the Applicant, attached as Exhibit 5 to this resolution and incorporated herein. The reports and other documents supporting the Applicant's statement of overriding considerations is on file at the County Planning Office, 70 W. Hedding Street, 7th Floor, East Wing, San Jose, CA 95110.

5. Absence of Significant New Information. CEQA Guidelines section 15088.5 requires a lead agency to recirculate an EIR for further review and comment when significant new information is added to the EIR after public notice is given on the availability of the Draft EIR but before certification of the Final EIR. New information added to an EIR is not "significant" unless the EIR is changed in a way that deprives the public of a meaningful opportunity to comment upon a substantial adverse environmental effect of the project or a feasible way to mitigate or avoid such an effect that the project proponent declines to implement. The Guidelines provide examples of significant new information under this standard. Recirculation is not required where the new information added to the EIR merely clarifies or amplifies or makes insignificant modification in an adequate EIR. The Planning Commission recognizes that the Final EIR contains additional information in response to comments and question from agencies and the public. The Planning Commission finds that this additional information does not constitute significant new information requiring recirculation, but rather that the additional information merely clarifies or amplifies the information in, or makes insignificant modifications to, the legally adequate DEIR.

G. The administrative record upon which the Planning Commission's decision is based includes, but is not limited to, the following:

1. The EIR (Draft EIR dated December 2011 & Final EIR dated May 2012);

2. The reports and other documents cited as reference in the EIR;

3. All oral, written and electronic evidence submitted to the County prior to the close of the Planning Commission's hearing on the Project;

4. All documents constituting the record pursuant to Public Resources Code section 21167.6; and

5. All matters of common knowledge to this Planning Commission including, but not limited to, state and federal laws and regulations and County policies, ordinances, guidelines and regulations and the General Plan.

The administrative record is located in the Office of the Clerk of the Board of Supervisors and in the County Planning Office. The custodian of documents for the administrative record is: Clerk of the Board, 70 W. Hedding Street, 10th Floor, East Wing, San Jose, CA 95110.

THE PLANNING COMMISSION HEREBY MAKES THE FOLLOWING FINDINGS REGARDING THE PROPOSED RECLAMATION PLAN AMENDMENT:

A. The Permanente Quarry is a single large pit where limestone and aggregate are quarried. West of the Quarry Pit (the "Pit") is a stockpile area where overburden has historically been placed identified as the West Materials Storage Area (the "WMSA"). Mining overburden is currently being placed in a permanent location east of the Quarry Pit identified as the East Materials Storage Area (the "EMSA").

B. The State Mining and Reclamation Act of 1975 ("SMARA," Cal. Pub. Res. Code §§ 2710 *et seq.*), as amended, and its implementing regulations (Title 14 of the California Code of Regulations §§ 3500 *et seq.*) require all active surface mine quarries to have an adopted Reclamation Plan in compliance with SMARA standards that demonstrates how the quarry site will be reclaimed following the conclusion of mining.

C. The County is a lead agency under SMARA and has the principal responsibility for approval of a reclamation plan in accordance with SMARA and Section 4.10.370 of the Zoning Ordinance of the County of Santa Clara. As a SMARA lead agency the County is responsible for reviewing applications for reclamation plans and in accordance with the County's Zoning Ordinance, the Planning Commission is responsible for approving a reclamation plan and amendments thereto.

D. The proposed Reclamation Plan Amendment (the "RPA") modifies a previously approved 1985 Reclamation Plan, which covers approximately 330-acres. Today, the disturbed areas associated with surface mining comprise approximately 1,238 acres and the RPA will cover these lands. The primary objective for the Applicant's RPA is to amend the 1985 Reclamation Plan to comply with SMARA and County regulations. Other objectives for the proposed RPA include:

1. Maintain a local, reliable, and economic source of Portland cement-grade limestone and construction aggregate to serve market demands in Santa Clara County, the San Francisco Bay Area and northern California.

2. Continue operations at an existing limestone quarry that is uniquely situated to provide for regional needs and that lies in a state-classified MRZ-2 resource area meeting the requirements of SMARA and County Code Section 4.10.370.

3. Reclaim existing mining disturbance to conform to the surrounding topography in contour and vegetation, to achieve long-term slope stability, protect water quality, and permit alternative post-mining uses.

4. Apply reclamation standards under SMARA to areas disturbed by mining operations within the Permanente Quarry.

5. Reclaim existing mining disturbance to avoid or eliminate residual hazards to the environment and public health and safety.

E. In October 2006, the County issued a Notice of Violation ("NOV") and Order to Comply to the Applicant due to the identification of areas disturbed by mining located outside the boundary of the 1985 Reclamation Plan. In 2008, the County issued a second NOV to the Applicant for placing additional overburden materials outside the Reclamation Plan boundary in the EMSA. The RPA application submitted by the Applicant will effectively abate these prior violations and encompass all disturbed mined lands into the RPA.

F. On February 8, 2011, the County Board of Supervisors held a public hearing and made a determination that the mining operations at the Permanente Quarry are a legal nonconforming use (i.e., a vested right) in the area that is subject to the RPA. As such, continued surface mining within the RPA does not require a user permit. However, SMARA and the County's Ordinance Code require all surface mining operations to have an approved reclamation plan.

G. In accordance with SMARA and the County's Ordinance Code, the Applicant has posted a Financial Assurance ("FA") in the amount of more than $47.7 million to reflect the cost to reclaim the area identified in the RPA. The FA provides financial resources to the County in the event the Applicant is incapable of performing reclamation

in accordance with an approved reclamation plan or has abandoned its surface mining operation without commencing or completing reclamation. The FA posted for the 1985 Reclamation Plan is $11.4 million. If the RPA is approved, the Applicant is required to update and adjust the FA annually to changes to the actual reclamation costs.

H. The RPA is consistent with the standards stipulated under SMARA and the County's Ordinance Code. The RPA fulfills the legal requirement that the Applicant has an approved reclamation plan consistent with SMARA and abates the NOVs issued by the County related to deviations from the 1985 Reclamation Plan. In accordance with SMARA, the State Office of Mine Reclamation (OMR) provided a review of the RPA. All pertinent requirements stipulated by OMR and required pursuant to SMARA are contained in the recommended conditions of approval, Exhibit 1, attached hereto and incorporated herein.

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NOW, THEREFORE, BE IT RESOLVED by the Planning Commission of the County of Santa Clara, based upon all of the oral and documentary evidence received, that the Environmental Impact Report is certified, the Statement of Overriding Considerations adopted, the Mitigation Monitoring and Reporting Program is adopted, and the proposed Reclamation Plan Amendment, subject to conditions of approval, is approved.

PASSED AND ADOPTED by the Planning Commission of the County of Santa Clara, State of California on _____ by the following vote:

AYES:
NOES:
ABSENT:
ABSTAIN:

_____
Scott Lefaver, Chair
Planning Commission

Attest:

_____
Michele Napier
Board Clerk

APPROVED AS TO FORM AND LEGALITY:

_____
Nancy Clark
Deputy County Counsel

Exhibits to this Resolution—

1—Reclamation Plan Amendment Conditions of Approval
2—Table of Impacts (DEIR Table ES-3, pages ES-13 through ES-19; FEIR, pages 4-1 through 4-2)
3—Mitigation Monitoring and Reporting Program
4—*Feasibility Assessment*
5—Statement of Overriding Considerations Submitted by Applicant

EXHIBIT 1
CONDITIONS OF APPROVAL

MEETING DATE: May 24, 2012

FILE NUMBER 2250-13-66-10P-10EIR (M1)

NAME (Mine Operator): Hanson Permanente Cement, Inc. (Lehigh Southwest Cement)

PROJECT DESCRIPTION:

Reclamation Plan Amendment (RPA) for Lehigh Permanente Quarry, located at 24001 Stevens Creek Boulevard, in unincorporated Santa Clara County. The RPA amends and supersedes the previously approved 1985 Permanente Quarry Reclamation Plan for a 20-year period to satisfy the reclamation requirements of the Surface Mining and Reclamation Act of 1975. The RPA encompasses 1,238.7 acres within the Mine Operator's 3,510-acre ownership. The reclamation activities will be implemented in three phases over an estimated 20-year period. Phase I is approximately nine years, and involves reclamation activities in the EMSA and continuation of existing mining activities in the WMSA and Quarry Pit. Phase II is approximately five years, and includes reclamation activities within the WMSA and Quarry Pit. During Phase II, the WMSA overburden stockpile will be moved via a conveyor system to use as backfill of the Quarry Pit. The EMSA will be reclaimed during Phase II or sooner. Phase III is approximately 5 years, and involves removing the equipment, buildings and unnecessary roads from the Project area. Reclamation activities in the Permanente Creek Reclamation Area will occur during all three phases described above.

APPLICATION APPROVED SUBJECT TO CONDITIONS STATED BELOW BASED ON PLANS AS SUBMITTED.

GENERAL REQUIREMENTS:

1. The conditions of approval contained herein shall supersede and replace all previous conditions of approval from the 1985 Reclamation Plan approval.

2. All development, operations, and reclamation that occur under this RPA shall be consistent with the approved plans, unless modified per these conditions. The approved plans include maps, drawings, tables, and a narrative description within the RPA prepared by EnviroMINE Incorporated, including Attachments A through J, dated December 13, 2011 and received by the County on December 15, 2011. Plans also include engineered drawings prepared by Chang Consultants, dated December 12, 2011 (appended to the RPA), and Reclamation Water Quality prepared by Strategic Engineering & Science, Inc., dated December 2011 (RPA, Attachment G), and replacement Sheet 7 of 13 for Basin 40A by Chang Consultants, received by the County on March 13, 2012.

3. Within 60 days of approval of the RPA, Mine Operator shall submit six (6) copies plus one electronic copy of a "Final" RPA, incorporating changes required per the conditions of approval for the RPA, Mitigation Monitoring and Reporting Program, and Final Environmental Impact Report.

4. Within 60 days following approval of the RPA, the Mine Operator shall submit to the Planning Manager or the Manager's designee (hereinafter referred to as Planning Manager), legal descriptions for all affected parcels of real property. Pursuant to Section 2772.7 of the Public Resources Code, specifically referred to as SMARA, the County will record a Notice of Reclamation Plan Approval with the County Recorder's Office covering those parcels affected by the approved RPA. The notice shall read: *"Mining Operations conducted on the hereinafter described real property are subject to a RPA approval by the County of Santa Clara Planning Commission. A copy of said approved RPA is on file with the Department of Planning and Development, located the Santa Clara County Government Center, East Wing, 7th Floor, 70 W. Hedding Street, San Jose, CA 95110."* The Mine Operator shall be responsible for all the reasonable costs associated with recording said notice.

5. If reclamation is not complete on or before June 30, 2032, the Mine Operator shall file an application for an amendment to the reclamation plan prior to that date.

6. The proposed end use following reclamation is hillside open space.

7. The Mine Operator shall be responsible for paying all reasonable costs associated with work by the Department of Planning and Development, or with work conducted under the supervision of the Department of Planning and Development, in conjunction with, or in any way related to the conditions of approval identified in this RPA, the mitigations contained in the Mitigation Monitoring and Reporting Program, and the annual SMARA inspections and annual review of financial assurance cost estimates. This includes but is not limited to costs for staff time, attorney's fees, consultant fees, and direct costs associated with report production and distribution.

8. An Annual Report shall be prepared by the County each year that summarizes compliance with the RPA and conditions of approval, Mitigation Monitoring and Reporting Program, and annual SMARA inspections and review of financial assurance cost estimates.

    a. Annual Report shall be presented to the Planning Commission at a public meeting by December of each year, starting in 2013.

    b. Mine Operator shall provide a reasonable amount of funding to the Department of Planning and Development for all aspects of report preparation, including but not limited to reimbursement for staff time, consultant fees, attorney's fees, and direct costs associated with report production and distribution.

c. Mine Operator shall provide by October 1 of each year, the information requested by the Planning Manager that is needed for the preparation of the Annual Report.

9. If at any time the Director of Planning and Development determines that the Quarry is not in compliance with the RPA, Mitigation Monitoring and Reporting Program, or any condition of approval, and as such is in violation of the RPA, the Director may take any and all actions necessary to ensure compliance with the Plan in accordance with applicable laws and regulations.

10. Copies of the RPA Mitigation Monitoring and Reporting Program, approved plans, conditions of approval shall be maintained at the premises of the Permanente Quarry, 24001 Stevens Creek Boulevard, at all times: one copy of all the documents shall be stored in the administration building at this location and one copy of all the documents shall be stored in the mine operations office.

11. By October 1 of each year, starting in 2012, the Mine Operator shall provide to the Planning Manager a report summarizing the date of the annual training, topics reviewed, and list of all employees attending the training. The Mine Operator shall annually train all mining staff, including outside vendors, contractors, or consultants who are responsible for implementation of any part of the mine operations or reclamation at Permanente Quarry, on the requirements and provisions of the RPA, the conditions of approval, and the MMRP.

12. Within 60 days following approval of the RPA, the Mine Operator shall submit to the Planning Manager a copy of its Storm Water Pollution Prevention Plan (SWPPP) of the approved RPA, which is hereby appended to the RPA by reference. The Mine Operator is responsible for providing the Department of Planning and Development with any and all updates to the SWPPP.

13. All mitigation measures contained within the Mitigation Monitoring and Reporting Program (MMRP) prepared for the project are adopted as conditions of approval and noted as such. The language contained within the MMRP shall be the guiding language for implementation of the condition or measure unless as modified within these conditions of approval.

14. By August 1st of each year, or as required by the Santa Clara County SMARA Inspection Program, the Mine Operator shall submit annually Financial Assurance Cost Estimates (FACE) to the Planning Manager for review and approval, which shall serve as the basis for the amount of financial assurances required of the Mine Operator, account for disturbed and those lands to be disturbed in the following year by the surface mining operations, inflation, and reclamation of lands accomplished in accordance with the approved RPA. Cost estimates shall utilize the most up to date cost figures for the San Francisco Bay Area and shall include appropriate costs for all materials to be utilized, labor rates, and equipment rates utilized in calculating the FACE. Upon approval of the FACE by the County and review by the State Office of Mine Reclamation (OMR), the Mine

Operator shall post an acceptable Financial Assurance mechanism with the Department of Planning and Development prior to commencing any disturbance in areas not previously disturbed by the mining operation. .

OTHER AGENCIES/JURISDICTIONS CORRESPONDENCE

15. If requested by the County, copies of all violations or abatement notices, requests for reports or information related to this RPA and its authorized uses by federal, state, or local jurisdictions/agencies, or subsequent modification of another agency's permit or submission of an application for any permit to another agency shall be provided to the Planning Manager within 10 business days of the County's request.

SEVERABILITY

16. If any of the RPA conditions of approval, or RPA approval, are held to be invalid, that holding shall not invalidate any of the remaining conditions or limitations set forth.

17. If any condition(s) of approval is invalidated by a court of law, and said invalidation would change the findings and/or mitigation measures associated with the approval of this RPA, the amendment may be reviewed, at the discretion of the Planning Commission, and substitute feasible condition(s)/mitigation measures may be imposed to adequately address the subject matter of the invalidated condition(s).

DUTY TO DEFEND AND INDEMNIFY

18. As a condition of RPA approval, including adjustment, modification or renewal, the Mine Operator agrees to:

    a. Defend, at the Mine Operator's sole expense, any action brought against the County by a third party challenging either its decision to approve the RPA or the manner in which the County is interpreting or enforcing the conditions of the RPA; and

    b. Indemnify the County against any settlements, awards, or judgments, including attorney's fees, arising out of or resulting from any such action.

19. Upon demand from the County, the Mine Operator shall reimburse the County for any court costs and or attorney's fees which the County may be required by a court to pay as a result of any such action the Mine Operator defended or which it had control of the defense. The County may, at its sole discretion, participate in the defense of any such action, but such participation shall not relieve the Mine Operator of its obligations under this condition.

20. The Mine Operator agrees to defend, indemnify and hold harmless the County, its agents, officers and employees, from any claim, action or proceeding against the

County, to challenge any portions of the EIR certification, reclamation plan process or approval. In addition to damages, indemnification includes reimbursing the County for staff and consultant cost, and attorney's fees (including claims for private Attorney General fees).

21. Neither the approval of the RPA or compliance with conditions of approval shall relieve the Mine Operator from any responsibility otherwise imposed by law for damage to persons or property, nor shall the issuance of any RPA or related permit serve to impose any liability upon the County of Santa Clara, its officers, employees or agents for injury or damage to persons or property.

RECLAMATION REQUIREMENTS

22. Within 60 days of RPA approval, the RPA limit of disturbed area surrounding the northern and eastern edges of the EMSA, the northern and western edges of the WMSA, and the perimeter of the Rock Plant area shall be clearly demarcated in the field and shall remain in place until final reclamation has been completed. On an annual basis, demarcation shall be modified to encompass the RPA boundaries nearest the areas subject to surface mining and reclamation, as shown on aerials submitted per Condition #23. Demarcated areas shall be located and marked in the field by a licensed land surveyor or registered civil engineer authorized to practice land surveying. Demarcation shall use orange construction fencing or other brightly colored material acceptable to the Planning Manager.

23. At the same time as the proposed Annual Report each year, the operator shall submit to the Planning Manager a surveyed coordinate list file obtained by Global Positioning System (GPS), prepared by a licensed land surveyor or registered civil engineer authorized to practice land surveying, to be reviewed and approved by the County Surveyor, identifying the limits of reclamation, with aerial photographs of the RPA area, annotated to illustrate (a) where surface mining and reclamation activity occurred within the prior 24 months and (b) areas where mining and reclamation activities will occur in the next 24 months. The aerial photographs must be flown and taken biannually between June 1 and June 30 starting with June 2013.

24. Reclamation of finished slopes and benches shall commence at the earliest feasible date once the slopes and benches are established, as set forth in the RPA.

25. Rockfills, where used, should be spread in lifts not exceeding five-feet in thickness by tracked equipment, and compacted by track-walking or wheel-rolling using heavy dozers (Caterpillar D-9 or larger) and/or fully loaded rubber-tired hauling equipment, respectively. A minimum of three passes should be performed for each lift.

26. Within 60 days of RPA approval, Mine Operator shall submit a site plan identifying area(s) where topsoil, dirt, soil amendments shall be retained and used

in the reclamation and re-vegetation process. Soil stored for reclamation purposes shall be clearly identified and marked in the field.

27. The Mine Operator shall safeguard stockpiles of topsoil or overburden to be used for reclamation from wind and erosion by using controls including, but not limited to, hydroseeding, erosion control mats, and coir wattles (aka "straw wattles").

28. The Mine Operator shall use soil amendments to improve the effectiveness of the soils used for re-vegetation of final slopes. Re-vegetation shall satisfy the criteria identified in the RPA. Reporting of the test plots for the re-vegetation criteria identified in the RPA shall be submitted to the County as part of the Mine Operator's annual report. Re-vegetation shall include only plant materials identified in the re-vegetation palette contained in the approved RPA. The Mine Operator shall follow the "test plot" program in the RPA to determine the appropriateness and success rates of the proposed re-vegetation palette identified in the RPA. Reporting on the test plot program shall be part of the Mine Operator's annual report submitted by the County and shall be prepared by a qualified biologist.

29. Re-vegetation of all reclaimed slopes within the RPA Boundary shall meet the minimum success criteria listed in the approved RPA before any completed phase of reclamation may be deemed reclaimed by the County and Office of Mine Reclamation (OMR).

30. The Planning Manager shall have authority to administratively review and approve minor revisions to the re-vegetation palette contained in the approved RPA.

31. Equipment, structures, nonessential roads, as identified in the RPA, shall be removed from the project area prior to that area being deemed reclaimed by the County and OMR.

32. Construction or demolition waste or any other foreign materials are prohibited from being stored in overburden or used in reclamation. Overburden shall be compacted, tested, and documented to demonstrate it will support post-mining uses. Documentation shall be submitted to the Planning Manager.

33. Stilling basins shall be maintained in good conditions and cleaned of silt and debris as necessary. A report shall be submitted to the Planning Manager as part of the Annual Report, fully depicting total quantities of silt removed from the basins (reported in cubic yards or tons) and where such silt is placed on the site or off the site.

34. The Mine Operator shall comply with the conditions of permits and plans required by and issued from the Regional Water Quality Control Board (RWQCB), including but not limited to approval of the Permanente Creek Restoration Plan and water discharge permits. The Mine Operator shall provide copies of all

permits to the Planning Manager within 10 business days of issuance by RWQCB.

35. Reclamation shall be deemed complete by the County and State Office of Mine Reclamation (OMR) once reclamation has been performed to the terms of the approved RPA, and required monitoring and inspections have demonstrated compliance with the reclamation performance standards and mitigation measures as prescribed in the Mitigation, Monitoring and Reporting Program, including compliance with all pertinent permits or other requirements for reclamation issued by non-Santa Clara County public agencies, including but not limited to the RWQCB and the State Department of Fish and Game.

36. The Mine Operator shall comply with the conditions of permits required by and issued from the Bay Area Air Quality Management District (BAAQMD). Upon request by the County, the Mine Operator shall provide copies of all permits, and amendments to the Planning Manager within 10 business days of the request.

37. The Mine Operator shall obtain and comply with all applicable permits required by the Santa Clara County Hazardous Materials Division of the Department of Environmental Health. The Mine Operator shall provide copies of all permits to the Planning Manager within 10 business days of issuance.

Permanente Creek Restoration Area (PCRA)

38. Within 30 days of final RPA approval, submit to the Planning Manager a detailed schedule describing the implementation actions to control sedimentation, remove limestone boulders, and stabilize slopes within the Permanente Creek Restoration Area in the Summer and Fall of 2012, consistent with the RPA.

39. **Limestone Boulder Removal**. By October 15, 2012, per the RPA, identified limestone boulders in the PCRA shall be removed. Submit to the Planning Manager by August 1, 2012, a report and map summarizing the field inspection and identification of all limestone boulders in the PCRA. Submit to the Planning Manager by December 15, 2012, a report and summarizing the actions to remove all limestone boulders in the PRCA, consistent with the "Best Management Practice for Removal of Limestone Boulders from Permanente Creek" (Attachment J to the RPA).

40. **Permanente Creek Restoration**. Prior to the start of Permanente Creek restoration activities in Phase III for PCRA subareas 3, 4, 5 and 7, as identified in the RPA, the Mine Operator shall submit to the Planning Manager a Permanente Creek Restoration Plan. The Restoration Plan shall include the elements of the Permanente Creek Long Term Restoration Plan (URS, March 11, 2011) to the extent set forth in the RPA. The Restoration Plan shall include, at minimum, engineered drawings for creek restoration, a riparian re-vegetation plan, hydrology / hydro-geomorphology studies supporting concepts to be used in creek restoration, and a long term monitoring and reporting program. The Creek

Restoration Plan shall be reviewed and approved by the County prior to implementation. The Mine Operator shall obtain all necessary permits and approvals from the Regional Water Quality Control Board, Department of Fish and Game, and U.S. Army Corps of Engineers to implement the work.

41. Prior to the start of any grading or any grading activity that affects jurisdictional resources of the California Department of Fish and Game, Regional Water Quality Control Board, or U.S. Army Corps of Engineers, the Mine Operator must provide to the Planning Manager proof of permits / clearances (or documentation that a permit is not needed).

ENVIRONMENTAL CONDITIONS AND EIR MITIGATION MEASURES

Light and Glare:

42. No night lighting shall be allowed or permitted on the east-facing slope of the EMSA or any other location within the EMSA that would be visible from public locations on the Santa Clara Valley floor including roadways. *(Implements Mitigation Measure 4.1-7)*

Air Quality – Health Hazards Risk:

43. Within 90 days of final RPA approval, the Mine Operator shall submit to the County and BAAQMD a comprehensive inventory of all RPA-related off-road construction equipment expected to be used during any portion of the RPA period. The inventory shall include the horsepower rating, engine production year, and projected hours of use or fuel throughout for each piece of equipment. The inventory shall be updated and submitted annually to the Planning with the Annual Report, throughout the duration of the RPA. *(Implements Mitigation Measure 4.3-3a)*.

44. Within 90 days of final RPA approval, the Mine Operator shall provide a plan for approval by the Planning Manager and BAAQMD demonstrating that off-road equipment to be used for Reclamation of the EMSA would achieve an average 35 percent reduction in Diesel Particulate Matter (DPM) emissions compared to the proposed fleet described in the ALG report (Ashworth Leininger Group, December 13, 2011) during RPA Phase I. The plan shall be updated and submitted annually to the Planning Manager, with the Annual Report each year throughout the duration of the RPA. Options for reducing emissions may include, but are not limited to:

    a. Using newer model engines (e.g. engines that met US EPA interim/final Tier 4 engine standards).

    b. Use of Retrofit Emission Control Devices that consist of diesel oxidation catalysts, diesel particulate filters, or similar retrofit equipment control technology verified by CARB (www.arb.ca.gov/diesel/verdev/verdev.htm)

    c. Use of low emissions diesel products or alternative fuels;

d. Use of alternative material handling options (e.g. conveyor system); or other options as may become commercially available and verifiable. *(Implements Mitigation Measure 4.3-3b).*

45. In lieu of Condition No. 42 and No. 43 (Mitigation Measures 4.3-3a and 4.3-3b), the Mine Operator may submit within 90 days of the RPA approval evidence establishing to the Planning Manager's satisfaction that there are legally binding restrictions precluding any occupancy of the caretaker's residence located at 2961 Stevens Creek Boulevard, Cupertino (APN 342-63-003) during the entirety of Phase I of the Project. *(Implements Mitigation Measure 4.3-3c)*

Biological Resources- Avian Species

46. **Avian Species - Preconstruction Surveys.** Ground disturbance into undisturbed areas and vegetation (tree and shrub) removal should occur between September 1 and January 30, outside of the breeding season for most bird species. If ground disturbance or tree and shrub removal occurs between February 1 and June 15, preconstruction surveys will be performed within 14 days prior to such activities to determine the presence and location of nesting bird species. If ground disturbance or removal of vegetation occurs between June 16 and August 31, pre-construction surveys will be performed within 30 days prior to such activities.

    Thirty (30) days prior to the start of any ground disturbance into undisturbed areas or vegetation removal, the Mine Operator shall submit to the Planning Manager a copy of a contract with a qualified ornithologist to conduct pre-activity surveys.

    The pre-construction surveys shall be submitted to the Planning Manager no later than five (5) business days prior to the start of such activities. If the tree removal or vegetation clearing shall occur during the non-nesting season, submit documentation both before and after tree removal / vegetation clearing confirmation completion of work within this time frame.

47. **Avian Species - Use of Buffers for to Avoid Nests**. If preconstruction surveys determine that active nests are found close enough to the land clearing and tree removal area to be disturbed by these activities, the ornithologist, in consultation with CDFG, will determine the extent of a construction-free buffer zone (typically 250 feet) to be established around the nest to prevent nest abandonment and direct mortality during construction. *(Implements Mitigation Measure 4.2-2a).*

Biological Resources- Bat Species

48. **Bat Species - Non-Roosting Season**. Removal of potential bat roost habitat (buildings, large trees, snags, vertical rock faces with interstitial crevices) or construction activities within 250 feet of potential bat roost habitat should occur in September and October to avoid impacts to bat maternity or hibernation roosts. *(Implements Mitigation Measure 4.4-2a).*

49. **Bat Species – Maternity Roosting Season.** If removal of potential bat roost habitat cannot occur during September and October, bat roost surveys will be conducted to determine if bats are occupying roosts.

    Nighttime evening emergence surveys and/or internal searches within large tree cavities shall be conducted by a qualified biologist during the maternity season (April 1 to August 31) to determine presence/absence of bat maternity roosts within 100 feet of wooded Project boundaries. All active roosts identified during surveys shall be protected by a minimum buffer determined by a qualified bat biologist, in consultation with California Department of Fish and Game (CDFG). The buffer shall be determined by the type of bat observed, topography, slope aspect, surrounding vegetation, sensitivity of roost, type of potential disturbance. Each exclusion zone shall remain in place until the end of the maternity roosting season. If no active roosts are identified, then work may commence as planned. Survey results are valid for 30 days from the survey date. Should work commence later than 30 days from the survey date surveys shall be repeated. Operations may continue for many years. Surveys do not need to be repeated annually unless additional clearing of potential roosting or hibernation habitat could occur outside of the non-roosting season.

    Thirty days prior to the removal of potential bat roost habitat, the Mine Operator shall submit to the Planning Manager a copy of a contract with a qualified biologist to conduct pre-activity surveys. The pre-construction surveys shall be submitted to the Planning Manager no later than five (5) business days prior to the removal of any potential habitat. *(Implements Mitigation Measure 4.4-2b).*

50. **Special Status Bat Species- Hibernation Season**. During the November 1 to March 31 hibernation season, work shall not be conducted within 100 feet of any woodland habitat (as identified in the Draft EIR Figures 4.4-1 through 4.4-4), unless a qualified bat biologist determines that woodland areas do not provide suitable hibernating conditions for bats and they are unlikely to be present in the area.

    Submit a report by a qualified bat biologist to the Planning Manager verifying the absence of suitable habitat as described above if work is proposed within 100 feet of woodland habitat between November 1 and March 31. *(Implements Mitigation Measure 4.4-2a)*

51. **Special Status Bat Species - Maternity Season Emergence.** Any trees felled during vegetation removal will not be chipped or otherwise disturbed for a period of 48 hours to allow any undetected bats potentially occupying these trees to escape. *(Implements Mitigation Measure 4.4-2b).*

52. **Bat Roost Replacement.** All special-status bat roosts destroyed by the Project shall be replaced by the Mine Operator at a 1:1 ratio onsite with a roost suitable for the displaced species (e.g., bat houses for colonial roosters). The design of such replacement habitat shall be in consultation with CDFG. The new roost shall

be in place prior to the time that the bats are expected to use the roost (e.g., prior to April 1 if the roost destroyed by the Project was used by a maternity colony), and shall be monitored periodically for 5 years to ensure proper roosting habitat characteristics (e.g., suitable temperature and no leaks). The roost shall be modified as necessary to provide a suitable roosting environment for the target bat species. *(Implements Mitigation Measure 4.4-2c)*

Biological Resources- Dusky Footed Woodrat

53. **San Francisco Dusky Footed Woodrat.** Within 30 days prior to initial ground disturbance in woodland or scrub/chaparral communities, (as identified in the Draft EIR Figures 4.4-1 through 4.4-4), conduct pre-construction surveys for active woodrat stick nests that could be directly impacted. Surveys should take place in all suitable habitat types within the Project Area. Any stick nests within active work areas will be flagged and dismantled under the supervision of a biologist. If young are encountered during the dismantling process, the material shall be placed back on the nest and remain unmolested for three (3) weeks in order to give the young enough time to mature and leave of their own accord. After that period, the nest dismantling process may begin again. Nest material shall be moved to suitable adjacent areas (oak woodland, scrub, or chaparral) that will not be disturbed. If construction does not occur within 30 days of the pre-construction survey, surveys shall be repeated.

    Sixty (60) days prior to initial ground disturbance within woodland or scrub / chaparral communities, the Mine Operator shall submit to the Planning Manager a copy of a contract with a qualified biologist to conduct pre-activity surveys. The pre-construction surveys shall be submitted to the Planning Manager no later than five business days prior to the start of initial ground disturbance.

54. To reduce indirect impacts on San Francisco dusky-footed woodrat by attracting urban-adapted predators, trash and food waste shall be disposed of in proper waste receptacles and emptied on a regular basis. Additionally, quarry personnel, contractors, and visitors shall not feed wildlife within the Permanente Property and appropriate site signage and employee education shall facilitate this condition.

Biological Resources- Invasive Plants, Sudden Oak Death

55. **Introduction of Invasive Plants or Pathogens**. If regulated or restricted plant materials are to be transported between the Project Area and a location in a non-infested county or state, the spread of the Sudden Oak Death pathogen shall be avoided by obtaining the necessary certificates of transport pursuant to the regulations described in the Biological Resources Assessment prepared for the Lehigh Permanente Quarry by WRA Environmental Consultants, dated December 2011.

56. **Sudden Oak Death.** To reduce the possibility of spreading Sudden Oak Death to oak woodlands in the Study Area, the Mine Operator shall implement the following measures:

    a. Prior to any reclamation work within the Project Area, equipment shall be sanitized, including shoes, pruning equipment, trucks, and heavy equipment such as earthmoving, tree trimming, chipping, or mowing equipment. Except for trucks, this equipment shall remain onsite for the duration of Project activities and shall not be transferred between this and other worksites, as doing so increases the potential of transferring infected spores to or from another site.

    b. After the completion of work activities, any accumulation of plant debris (especially leaves), soil, and mud shall be washed off of equipment or otherwise removed onsite, and air filters shall be blown out.

    c. All contractors shall have sanitation kits onsite for cleaning equipment. Sanitation kits should contain chlorine bleach (10/90 mixture bleach to water) or Clorox Clean-Up or Lysol, scrub brush, metal scraper, boot brush, and plastic gloves.

    d. All organic material imported for mixing with Quarry pit backfill shall have been composted at a facility that meets the standards of Title 14 California Code of Regulations, Division 7, Chapter 3.1; alternative sources of organic material may be used if approved by the County of Santa Clara Agricultural Commissioner as being as effective as the composting process to sanitize SOD-infected materials.

    e. All other imported fill material, soil amendments, gravel, etc. required for construction and/or restoration activities to be placed within the upper 12 inches of the ground surface shall be free of vegetation or plant material. *(Implements Mitigation Measure 4.4-7)*

Biological Resources- Wetlands

57. **Wetland Identification and Avoidance.** A qualified wetland biologist shall physically delineate all federal and state waters and wetland features identified in the 2008 wetland delineation (WRA, 2008) before any Permanente Creek Reclamation Area (PCRA) activities begin, and when feasible, reclamation activities shall avoid filling these areas. Silt fence shall be installed between jurisdictional waters or wetlands and areas sprayed with hydroseed to prevent filling of wetlands with tackifier or other hydroseed material; alternatively, the use of hand-seeding or working with hand tools may be utilized to avoid filling wetlands. *(Implements Mitigation Measure 4.4-8a)*

    Prior to the start of PCRA activities, the wetland biologist shall submit a report to the Planning Manager showing the wetland areas delineated and the installation of all fencing and barriers (photos and map).

This condition shall not apply to Phase III Permanente Creek Restoration Activities in subareas 3, 4, 5 and 7, as identified in the RPA. Such Activities are expected to require an independent review and permitting process, as described in the RPA.

58. **Wetland Mitigation Plan.** If filling of jurisdictional waters or wetlands is not feasible, the following measures shall be implemented:

    a. A qualified wetland biologist shall prepare a wetland Mitigation and Monitoring Plan (MMP) for impacts to wetlands and waters under state or federal jurisdiction. The MMP shall be submitted for review and approval by the Planning Manager, and as required by law by the Regional Water Quality Control Board and US Army Corps of Engineers. The MMP shall outline any anticipated mitigation obligations for temporary and permanent impacts to waters of the state and/or U.S., including wetlands, resulting from PCRA activities. The MMP shall include:

        i. Baseline information;

        ii. Anticipated habitat enhancements to be achieved through compensatory actions, including whether mitigation will occur within the Project Area along Permanente Creek or at an offsite location, as well as including mitigation site location and hydrology;

        iii. When possible, a preference for mitigation within the Permanente Quarry property, for impacts to both jurisdictional waters and wetlands;

        iv. Performance and success criteria for habitat enhancement of Permanente Creek or other waterways to compensate for impacts to Other Waters, including:

            1. A replanting plan for appropriate native riparian woody vegetation, including but not limited to arroyo willow, white alder, California wild rose, and snowberry, bigleaf maple, western creek dogwood, and Oregon ash;

            2. An 80% overall re-vegetation planting success for all mitigation areas over a ten-year period;

            3. A minimum overall mitigation ratio of 1.1:1 acres for permanent impacts and 1:1 acres for temporary impacts;

            4. Plantings that are self-reliant, exhibit average or better health and vigor and have observable growth in stems and leaves at least two years prior to the end of the ten-year monitoring period;

            5. Visual inspection of all re-vegetation sites during each growing season, with qualitative and quantitative measures of plant cover and performance;

6. Observations of total percent plant cover in the planting area, natural recruitment of native species, and establishment of new non-native species; and

7. Annual monitoring reports submitted to CDFG and RWQCB documenting re-vegetation conditions, including recommendations to adapt maintenance and replacement of failed plantings.

b. Performance and success criteria for wetland creation or enhancement including, but not limited to, the following:

i. At least 70 percent survival of installed plants for each of the first three years following planting.

ii. Performance criteria for vegetation percent cover in Years 1-4 as follows:

1. at least 10 percent cover of installed plants in Year 1;

2. at least 20 percent cover in Year 2;

3. at least 30 percent cover in Year 3;

4. at least 40 percent cover in Year 4.

c. A performance criteria for hydrology in Years 1-5 as follows:

i. Fourteen or more consecutive days of flooding, ponding, or a water table 12 inches or less below the soil surface during the growing season at a minimum frequency of three of the five monitoring years; OR establishment of a prevalence of wetland obligate plant species.

ii. Invasive plant species that threaten the success of created or enhanced wetlands should shall not be allowed to contribute relative cover greater than 35 percent in year 1, 20 percent in years 2 and 3, 15 percent in year 4, and 10 percent in year 5.

d. MMP monitoring reports shall be submitted to the Planning Manager and responsible permitting agencies. *(Implements Mitigation Measure 4.4-8b)*

Biological Resources- California Red Legged Frog (CRLF)

59. To minimize disturbance to dispersing or foraging CRLF, all grading activity within PCRA subareas 4 through 7 shall be conducted during the dry season, generally between May 1 and October 15, or before the onset of the rainy season, whichever occurs first, unless exclusion fencing is utilized. Construction that commences in the dry season may continue into the rainy season if exclusion fencing is placed around the construction zone to keep the frog from entering the construction area.

60. Pre-construction surveys for CRLF shall be conducted prior to construction activities within PCRA subareas 4 through 7. If CRLF are observed in the construction area or access areas, they shall be removed from the area by a USFWS permitted biologist and temporarily relocated to nearby suitable aquatic habitat.

61. Because dusk and dawn are often the times when CRLF are most actively foraging, all restoration activities within PCRA subareas 4 through 7 shall cease one half hour before sunset and shall not begin prior to one half hour after sunrise. Additionally, restoration activities shall not occur during rain events, as CRLF are most likely to disperse during periods of precipitation.

Cultural Resources

62. The Mine Operator shall document the physical characteristics and their historic context of the contributing features of the Kaiser Permanente Quarry Mining District, including archival photo-documentation, mapping, and recording of historical and engineering information including measured drawings about the property according to the standards of the Historic American Building Survey/Historic American Engineer Record/Historic American Landscapes Survey (HABS/HAER/HALS), to be placed in a local public archive such as the Archives of the County of Santa Clara.

    Verification of documentation as described above shall be submitted to the Planning Manager within sixty (60) days prior to removal of the Permanente Quarry Conveyor System as described under Condition #63. *(Implements Mitigation Measure 4.5-1a)*

63. Prior to any of the following: modification, relocation, removal, or demolition of the Permanente Quarry Conveyor System, the Mine Operator shall salvage and/or relocate a representative portion of the Permanente Quarry Conveyor System and the remains of the early 1940s crusher, which constitute character-defining features that otherwise would be lost as a part of implementation of the Project.

    Verification of salvage / relocation as described above shall be submitted to the Planning Manager within thirty (30) days prior to start of mining / reclamation activities in the existing Conveyor System and 1940's crusher area. Conveyor is located west of the EMSA and southeast of the Quarry Pit, the crusher is located south of the Quarry Pit adjacent to Permanente Creek (reference Historic Resource Evaluation, Permanente Quarry Facility Comprehensive Reclamation Plan Project – Lehigh Southwest Cement Company, prepared by Archives and Architecture, LLC, October 2011). *(Implements Mitigation Measure 4.5-1b)*

64. At least sixty (60) days prior to commencement of any work as described above Condition #63, the Mine Operator shall prepare public information programs to educate the general public on the historic nature of the potential Kaiser Permanente Quarry Mining District, including but not limited to exhibits at the

Quarry office, publications available at the Quarry office, and an online presentation available on the their website (currently, www.lehighpermanente.com). Verification of documentation as described shall be submitted to the Planning Manager. *(Implements Mitigation Measure 4.5-1c)*

65. If cultural resources are encountered during Project implementation the Mine Operator shall notify the Planning Manager and all activity within 100 feet of the find shall stop until the cultural resource is evaluated by a qualified archaeologist and a Native American representative. Prehistoric archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; and stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); and battered stone tools, such as hammerstones and pitted stones. Historic-period materials might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and/or ceramic refuse.

    If the archaeologist and Native American representative determine that the resources may be significant and cannot be avoided, they shall notify the Planning Manager and an appropriate treatment plan for the resources shall be developed by the Mine Operator in consultation with the Planning Manager, and the archaeologist. Measures in the treatment plan could include preservation in place (capping) and/or data recovery. The archaeologist shall consult with Native American representatives in determining appropriate treatment for prehistoric or Native American cultural resources. Ground disturbance shall not resume within 100 feet of the find until an agreement has been reached as to the appropriate treatment of the find. *(Implements Mitigation Measure 4.5-2)*

66. If a paleontological resource is encountered during implementation of the RPA the Mine Operator shall notify the Planning Manager, and all activity within 100 feet of the find shall stop until it can be evaluated by a qualified paleontologist as defined by the Society of Vertebrate Paleontology Guidelines (SVP, 1995). The paleontologist shall evaluate the resource and determine its significance. If significant, the paleontologist shall notify the Planning Manager. The Mine Operator, in consultation with the County and the paleontologist, shall prepare a treatment plan such that the fossil would be recovered and scientific information preserved. The paleontologist shall implement the treatment plan in consultation with the Planning Manager and Mine Operator, prior to allowing work in the 100-foot radius to resume. *(Implements Mitigation Measure 4.5-3)*

67. In the event that human skeletal remains are encountered, the Mine Operator is required by Health and Safety Code Section 7050.5, Public Resources Code Section 5097.98, Title 14 California Code of Regulations Section 15064.5(e), and County Ordinance No. B6-18 to immediately notify the County Coroner. Upon determination by the County Coroner that the remains are Native American, the coroner shall contact the California Native American Heritage Commission, pursuant to subdivision (c) of §7050.5 of the Health and Safety Code and the

County Coordinator of Indian affairs. No further disturbance of the site shall be made except as authorized by the County Coordinator of Indian Affairs in accordance with the provisions of state law and the County Ordinance. If artifacts are found on the site, a qualified archaeologist shall be contacted along with the Planning Manager. No further disturbance of the artifacts shall be made except as authorized by the Planning Manager. *(Implements Mitigation Measure 4.5-4)*

Geological and Soils

68. **Avoidance and containment of shallow slumps and/or fall-back of overburden material.** In all areas requiring the use of excavators for grading within the Permanente Creek Reclamation Area (PCRA) (e.g., access road in-sloping, installation/repair of sedimentation basins, and removal of slide debris), the Mine Operator and/or its contractor shall begin excavations from the top of slope and proceed downward. The Mine Operator and/or its contractor shall not undercut sloped materials unless no other option is feasible as determined by a registered geotechnical engineer (e.g., excessively sloped or otherwise inaccessible terrain). In all areas of the PCRA where excavations would occur in sloped materials, the Mine Operator and/or its contractor shall install barriers immediately downslope of the activity. Downslope barriers shall be designed and installed in a manner that would be adequate to prevent overburden and/or native materials from falling, sloughing or sliding further downslope, or into Permanente Creek. Such measures may consist of temporary interlocking soldier piles, wooden shoring systems, wire mesh or other containment measures(s). The Mine Operator and/or its contractor shall not be permitted to conduct excavation or grading activities downgradient of the barrier, or prior to its installation. The ultimate location, design and installation method of such measures shall be prepared and certified, or reviewed and approved by a California State registered civil geotechnical engineer.

    Thirty days (30) prior to the start of all excavation / grading activities as described above, submit to Planning Manager a plan showing the installation of all downslope barriers as described above. *(Implements Mitigation Measure 4.7-1)*

69. Within thirty (30) days following approval of the RPA, submit a Geotechnical Engineer's Plan Review letter that confirms the RPA, as modified by other conditions of approval, conforms with the recommendations presented in Golder's Report (RPA Appendix C, dated November 2011). In regards to the EMSA, specifically, the letter must verify that the plans indicate where the native slope is steeper than 2.5H:1V, the topsoil and colluvium will be over-excavated within the area extending inward 100 feet from the toe of the outer slope.

70. The geotechnical design recommendations provided by Golder Associates (RPA Appendix C, November 2011) are being implemented as part of the ongoing stockpiling activities within the EMSA and as a condition of approval Project. The measures are identified below:

a. Foundation preparation should be completed prior to fill placement of the outer 50 feet beneath the EMSA fill. Foundation preparation should consist of over-excavation of outer 50 feet of topsoil, organic materials (trees, brush, grasses), fine-grained colluvium with a Plastic Index greater than 25, or other unsuitable soils until firm bedrock, granular soils, or clay soils with a Plastic Index less than 25 are exposed. If the exposed foundation surface is inclined at 5H:1V or steeper, the over-excavation distance from the outer slope should be extended from 50 feet to 100 feet. Furthermore, the fill placed on slopes of 5H:1V or steeper should be benched into the slope with individual bench heights of at least 2 feet and up to approximately 5 feet.

b. A qualified California Registered Professional Geologist, Certified Engineering Geologist, or a California Registered Civil Engineer with geotechnical experience should inspect the foundation preparation to ensure all unsuitable materials are removed prior to placement of the outer 50 to 100 feet of EMSA fill.

c. If seepage or wet zones are observed in the foundation, suitable drainage provisions should be incorporated into the foundation prior to fill placement. Suitable drainage provisions include the placement of a blanket of free-draining sand or gravel over the seepage/wet zone in conjunction with a perforated, polyvinyl (PVC) or high-density polyethylene (HDPE) drain pipe that drains positively toward and daylights at the slope face. The sand or gravel drainage material should be fully covered with a minimum 8-oz/square yard, non-woven, geotextile filter to provide separation from the EMSA materials.

d. The fine waste materials shall be placed in lifts not to exceed 8-feet, and offset a minimum of 30 feet from the final slope face. Each lift of fine waste should be allowed to dry before being covered by overburden material. Each lift shall be overlain by a minimum 25-foot thick lift of overburden.

e. Any modification to the EMSA fill geometry including increases to the maximum overall slope inclination, maximum inter-bench slope inclination, slope height, or footprint shall require an additional or revised slope stability analysis.

Greenhouse Gas Emissions (GHG)

71. **Develop Annual GHG Inventory.** The Mine Operator shall become a reporting member of The Climate Registry. Beginning with the first year of the Project and continuing for the duration of the Project, the Mine Operator shall conduct an annual inventory of GHG emissions and shall report those emissions to The Climate Registry. The annual inventory shall be conducted according to The Climate Registry protocols and third-party verified by a verification body accredited through The Climate Registry.

Within 90 days of approval of the RPA, the Mine Operator shall submit documentation verifying registration with The Climate Registry to the Planning Manager. Copies of annual reporting to Climate Registry shall be submitted to the Planning Manager by October 1 of each year. *(Implements Mitigation Measure 4.8-1a)*

72. **Greenhouse Gas Emissions Reduction Plan.** The Mine Operator shall prepare, submit for County and BAAQMD approval, make available to the public, and implement a Greenhouse Gas Emissions Reduction Plan (GHG Plan) containing quantifiable strategies to ensure that the Project-related incremental increase of GHG emissions does not exceed 1,100 MT Co2e per year. The GHG Plan shall include, but not be limited to, the following measures:

    a. Replacement of on-road and off-road vehicles and construction equipment with lower GHG-emitting engines, such as electric or hybrid.

    b. Use of the Overland Conveyor System, powered by electric motors, to move more than 75 percent of the waste rock from the WMSA to reclaim the Quarry pit.

    The Greenhouse Gas Emissions Reduction Plan shall be submitted to the Planning Manager within 90 days of final RPA Approval. *(Implements Mitigation Measure 4.8-1b)*

73. **Greenhouse Gas Offsets.** If the Mine Operator is unable to reduce the Project-related incremental increase of GHG emissions to below 1,100 MT Co2e per year per Condition #72, the Mine Operator shall offset all remaining Project incremental emissions above that threshold. Any offset of emissions related to the RPA shall be demonstrated to be real, permanent, verifiable, and enforceable. To the maximum extent feasible, as determined by the County in coordination with the BAAQMD, offsets shall be implemented locally. Offsets may include but are not limited to, the following (in order of preference):

    a. Onsite offset of Project emissions, for example through development of a renewable energy generation facility or a carbon sequestration project (such as a forestry or wetlands project for which inventory and reporting protocols have been adopted). If the Mine Operator develops an offset project, it must be registered with the Climate Action Reserve or otherwise approved by the BAAQMD in order to be used to offset Project emissions. The number of offset credits produced would then be included in the annual inventory, and the net (emissions minus offsets) calculated.

    b. Funding of local projects, subject to review and approval by the BAAQMD, that would result in real, permanent, verifiable, enforceable, and additional reduction in GHG emissions. If the BAAQMD or County of Santa Clara develops a GHG mitigation fund, the Mine Operator may instead pay into this fund to offset Project incremental GHG emissions in excess of the significance threshold.

c. Purchase of carbon credits to offset Project incremental emissions to below the significance threshold. Carbon offset credits must be verified and registered with The Climate Registry, the Climate Action Reserve, or other source that is approved by the California Air Resources Board as being consistent with the policies and guidelines of the California Global Warming Solution Act of 2006 (AB 32), or available through a County- or BAAQMD-approved local GHG mitigation bank or fund.

Documentation verifying that offsets have been accomplished, if required, must be submitted for review and approval to the Planning Manager and BAAQMD within 90 days of final RPA Approval. *(Implements Mitigation Measure 4.8-1b)*

Hydrology and Water Quality:

74. **Certified Geologist Verification of Non-Limestone-Containing Material Use.** A California Certified Engineering Geologist shall be onsite during reclamation to verify that non-limestone run-of-mine rock is used as cover on the EMSA and WMSA. In addition, the Geologist shall observe and document activities associated with placing the final overburden on the Quarry Pit (i.e., ensuring that organic material is mixed to specifications). Using visual and field testing methods, with occasional bulk sampling and laboratory analysis, the geologist shall observe and document the type of rock placed over the limestone-containing material during reclamation activities. The geologist shall inspect and document whether limestone is present at the source area (Quarry Pit and WMSA), whether limestone rock is transported from the source area to segregation stockpiles, and whether limestone is present within the lifts of the proposed 1-foot layer of run-of-mine cover rock (in the EMSA, WMSA, and Quarry Pit). Inspection involves observing the excavation, hauling, stockpiling, and placement of the non-limestone cover material, performing a visual assessment of the rock, and conducting random spot sampling and field testing of suspect rock fragments. If observation, field-testing, or laboratory analysis indicates that significant amounts of limestone are intermixed with the supposed non-limestone cover material, the geologist shall document its presence, temporarily halt fill operations, and notify the Planning Manager and field superintendent. Once notified, the Mine Operator shall remove the limestone-containing materials and then perform verification field sampling in addition to laboratory verification. *(Implements Mitigation Measure 4.10-1a)*

    Within ninety (90) days of final RPA Approval, the Mine Operator shall submit to the Planning Manager a copy of a contract or an employee resume employed by the Mine Operation that is a California-certified Engineering Geologist responsible to conduct monitoring as described above. Quarterly reports shall be submitted from the Geologist to the Planning Manager describing effectiveness of mitigation and monitoring during final reclamation as described above.

75. The County reserves the right to retain, if it deems necessary, at the expense of the Mine Operator, a third-party California-certified Engineering Geologist, to provide independent oversight or monitoring to implement Condition #74.

76. **Verification and Water Quality Monitoring**. Within ninety (90) days of RPA approval, the Mine Operator shall begin and continue throughout the backfilling and reclamation phases and for 5 years following completion of reclamation and for 5 years following the start of groundwater discharge from the Quarry Pit into Permanente Creek as described on page 4.10-39 of the Final Environmental Impact Report, a Verification and Water Quality Monitoring Program. The Mine Operator shall implement the following:

    a. Collect quarterly Quarry pit water samples and analyze for general water chemistry and dissolved and total metals, including selenium.

    b. Perform quarterly electrical conductivity and pH measurements of the Quarry water.

    c. Measure and record daily volume of any water that is pumped from the pit area.

    d. Conduct annual seep surveys in March or April of each year within the Quarry pit. Any seeps identified shall be sampled for general water chemistry and minerals and dissolved metals, and the seep flow rate shall be estimated.

    e. Perform routine testing of each of the various rock types that comprise the overburden to further characterize bulk and leachable concentrations of key metal constituents (selenium in particular). Such testing shall be performed until the average concentrations and the variability within a rock type is no longer changing significantly as new data are gathered.

    f. Sample and test runoff from the EMSA and WMSA throughout and following reclamation to confirm the concepts and closure plans (i.e., that cover with non-limestone material and re-vegetation results in runoff water quality that meets Basin Plan Benchmarks and all other applicable water quality standards). Stormwater runoff monitoring and sampling shall be conducted following the placement and final grading of the 1-foot run-of-mine non-limestone cover material to ensure that surface water discharging from this cover does not contain selenium at concentrations exceeding Basin Plan Benchmark values. Three rounds of representative surface water samples shall be collected and analyzed to verify rock cover performance prior to the placement of the vegetative growth layer.

    g. Sample and test groundwater discharge from the Quarry Pit into Permanente Creek following reclamation as described on page 4.10-39 of the Final Environmental Impact Report to confirm that water quality in discharge meets Basin Plan Benchmarks and all other applicable water quality standards.

    h. The data obtained through this mitigation measure shall be used to reevaluate the water balance components such as runoff and groundwater inflow and the water quality associated with these within the last five years of active mining. Based on the results of any refined water balance and water quality projections, the Mine Operator shall also review and

refine the water management procedures. *(Implements Mitigation Measures 4.4-5 and 4.10-1b.)*

All testing data shall be submitted to the Planning Office with the Annual Report by October 1 of each year.

77. Reclamation of the Quarry Pit, EMSA, and WMSA areas shall not be considered complete until 5 years of water quality testing as described above demonstrate to the satisfaction of the Planning Manager that selenium in surface water runoff and any point source discharges has been reduced below all applicable water quality standards, including Basin Plan Benchmarks.

78. Within 90 days of RPA approval, the Mine Operator shall implement the following stormwater and sediment management controls in addition to general BMPs required by the SWPPP in active and inactive reclamation areas throughout Phase I, II, and III of the RPA. The Mine Operator shall:

    a. Segregate limestone materials from the non-limestone materials (breccia, graywacke, chert, and greenstone) by way of operational phasing to ensure that non-limestone materials are placed beneath and are covered by non-limestone materials. A California Professional Geologist shall oversee stockpiling, segregation, and placement of non-limestone materials.

    b. Stabilize inactive areas, such as temporary stockpiles or dormant excavations that drain directly or indirectly to Permanente Creek using an appropriate combination of BMPs to cover the exposed rock material, intercept runoff, reduce its flow velocity, release runoff as sheet flow, and provide a sediment control mechanism (such as silt fencing, fiber rolls, or hydroseeded vegetation). Standard soil stabilization BMPs include geotextiles, mats, erosion control blankets, vegetation, silt fence surrounding the stockpile perimeter, and fiber rolls at the base and on side slopes.

    c. Temporarily stabilize active, disturbed reclamation areas undergoing fill placement before and during qualifying rain events expected to produce site runoff. Stabilization methods include combined BMPs that protect materials from rain, manage runoff, and reduce erosion. Reclamation activities involving grading, hauling, and placement of backfill materials cannot take place during periods of rain.

    d. In areas such as the WMSA where fill slopes are steep and composed of loose material, controls shall be in place to prevent material from sloughing off into the PCRA and Permanente Creek. These controls shall include debris/silt fencing placed on outer edge of grading and excavation operations back-sloping excavations to prevent grade slope towards the creek, operations buffer areas that require the use of smaller grading equipment, temporary berms along the outer extent of operations closest to the creek, Mine Operator training regarding the prevention of triggering debris slides.

e. Cover active haul roads with non-limestone materials where exposed limestone surfaces are present. Roads that undergo dust control by watering must have fiber rolls or equivalent runoff protection installed along the road side to reduce runoff and avoid drainage to Permanente Creek.

f. Divert all runoff generated from disturbed active and inactive reclamation areas to temporary basins, the Quarry pit, or temporary vegetated infiltration basins and kept away from drainage pathways entering Permanent Creek. To the extent possible, drainage of the non-limestone materials shall be diverted directly to sediment control facilities and natural surface drainages.

g. Install up-gradient berms where limestone fines or stockpiles are placed, to protect against stormwater run-on, and install ditches and down-gradient berms to promote infiltration rather than run-off.

h. Replace the limestone rock and materials that are currently used in the existing BMP ditches and cover or otherwise separate runoff from limestone rock in the existing sediment pond embankments.

i. Cover large limestone surfaces that would remain exposed during the rainy season with interim covers composed of non-limestone rock types.

j. Inspect and maintain BMPs after each qualifying rain event to ensure their integrity.

k. Reconstruct or reline all existing stormwater conveyances and check dam structures that are constructed or lined with limestone rock using non-limestone material (greenstone, breccias, greywacke, metabasalt), available at the Quarry.

l. Regularly inspect all stormwater and erosion controls, especially before and following qualifying rain events. Inspections shall be documented and periodically reported. Any violations shall be corrected immediately.

m. Provide adequate erosion control training to all equipment and mine operators, site superintendants, and managers to ensure that stormwater and erosion controls are maintained and remain effective.

n. Use only jute netting or other suitable replacement for erosion control in the PCRA; no plastic monofilament shall be used for erosion control or other purposes, as California Red Legged Frogs and other wildlife may become entangled in it.

o. Ensure that all stormwater, erosion, and sediment control BMPs are installed, inspected, maintained, and repaired under the direction of either a California certified engineer, geologist, or landscape architect, a registered professional hydrologist, or a certified erosion control specialist.

Implementation of the Best Management Practices described above shall begin within 30 days of final RPA Approval. Prior to October 1, 2012, the Operator shall provide a report, with photos, documenting and demonstrating that the

aforementioned BMP's are being implemented in all areas as described above. Prior to October 15 of each year, a County Inspector shall verify installation of the aforementioned BMP's. Inspection of BMP's by a County Inspector shall occur monthly between October 15 and April 15 for each year when interim reclamation activities occur. *(Implements Mitigation Measures 4.4-5 and 4.10-2a)*

79. **Interim Stormwater Monitoring Plan.** Prior to the start of reclamation activities, the Mine Operator shall develop a Stormwater Monitoring Plan for sampling and testing stormwater, that would supplement preexisting surface water monitoring required by General Industrial Storm Water and Sand and Gravel NPDES Permit and designed to specifically monitor surface water during reclamation activities in active and inactive excavation and backfill areas, and locations where water discharges to Permanente Creek. The purpose of this plan is to evaluate performance of temporary BMPs and completed reclamation phases and to identify areas that are sources of selenium (measured on recoverable basis), sediment, or high TDS. At a minimum, the plan shall require the Mine Operator to inspect BMPs and collect water samples for analysis of TDS and metals, including selenium, within 24 hours after a qualifying rain event and sample non-stormwater discharges when they occur. If elevated selenium, sediment, or TDS is identified through sample analysis, the Mine Operator shall identify the source and apply any new or modified standard BMPs available. BMPs that show sign of failure or inadequate performance shall be repaired or replaced with a more suitable alternative. Following implementation, the Mine Operator shall retest surface water to determine the effectiveness of such modifications, and determine whether additional BMPs are necessary. *(Implements Mitigation Measures 4.4-5 and 4.10-2b)*

    For Phase I, submit the Stormwater Monitoring Plan for Phase I to the Planning Manager for review and approval prior to October 1, 2012.

    For Phase II and III, submit a Monitoring Plan to the Planning Manager for review and approval sixty (60) days prior to the start of Phase II.

    Stormwater testing results shall be submitted to Planning Manager on a monthly basis between October 15 and April 15 of each year. If a qualifying rain event did not occur during any month during this period (and stormwater testing was not conducted), notification shall be submitted to the Planning Manager in lieu of testing results.

80. **Monitoring and Determination of BMP Effectiveness for the EMSA**:

    a. Within 30 days of RPA approval, sampling and testing shall occur within 24 hours after a qualifying rain event. If no qualifying rain event occurs within 30 days of RPA approval, then testing shall begin at the first qualifying rain event. Testing shall be conducted in accordance with the Interim Stormwater Monitoring Plan developed and approved in accordance with Condition #79.

b. If test results for two consecutive years show that stormwater discharging from the EMSA into Permanente Creek exceeds total recoverable selenium of Basin Plan Water Quality Objective, currently 5 μg/L (micrograms per liter), or other applicable discharge requirement as determined by the RWQCB, then the County shall schedule a public hearing before the Planning Commission to determine whether the Mine Operator is complying with stormwater discharge requirements. For purposes of triggering Planning Commission review, the sampling shall occur at locations where water discharges to Permanente Creek.

c. If the Planning Commission determines that the Mine Operator is not complying with discharge requirements, then the operator shall install a treatment system (or alternative) as described in Condition #82. *(Implements Mitigation Measures 4.4-5 and 4.10-2c)*

81. **Monitoring and Determination of BMP Effectiveness for the WMSA and Quarry Pit**

a. Within 30 days of the start of reclamation activities for Phase II, the Mine Operator shall conduct monthly water sampling and testing results in compliance with the Interim Stormwater Monitoring Plan, as described under Condition #79.

b. If test results for two consecutive years show that selenium levels are higher than base levels, then the County shall schedule a public hearing before the Planning Commission to determine whether the reclamation activities are causing an increase in total selenium above the base levels. "Base levels" shall be defined as water testing results for an average for two years immediately prior to start of Phase II reclamation for discharge into Permanente Creek from the WMSA and Quarry Pit. For purposes of triggering Planning Commission review, the sampling shall occur at locations where water discharges to Permanente Creek.

c. If the Planning Commission finds that reclamation activities are causing an increase in selenium over base levels, then the Mine Operator shall install a treatment system (or alternative) as described under Condition #82. *(Implements Mitigation Measures 4.4-5 and 4.10-2d.)*

82. **Design, Pilot Testing, and Implementation of Selenium Treatment Facility or Alternative for the EMSA and/or WMSA and Quarry Pit.**

a. Within 30 days of RPA approval, the Mine Operator shall begin designing a treatment facility (or alternative) and pilot system for discharge into Permanente Creek. The treatment shall be designed to achieve the Basin Plan Water Quality Objective for selenium (total recoverable selenium of 5 μg/L) for discharge from the EMSA as defined in Condition #80, and/or to achieve the "base level" standard for the WMSA and Quarry Pit as defined in Condition #81 *(reference to Mitigation Measures 4.10-2d).*

b. The Mine Operator shall complete design, pilot testing, and feasibility analysis for a treatment facility within 24 months of RPA approval or by such other time as may be prescribed by the RWQCB.

c. The Planning Commission shall hold a public hearing no later than 30 months after RPA approval to determine feasibility of the treatment facility (or alternative). The Planning Commission may defer the public hearing if the RWQCB determines that additional time is necessary to complete the design, pilot testing, and feasibility analysis. If the Planning Commission determines that a treatment facility is feasible, the Planning Commission shall also establish a timeline for implementing the treatment facility.

d. Construction, installation, and operation of a treatment facility (or alternative) shall be required if discharge requirements are not met as described under Conditions # 80 and # 81 based on a determination of the Planning Commission, and if it has been determined feasible by the Planning Commission following a public hearing. *(Implements Mitigation Measures 4.4-5 and 4.10-2e.)*

Downstream Flood Protection

83. **Construction of Onsite Detention Facility.** The Mine Operator shall design and construct detention facilities that would 1) manage increased runoff caused by the reclaimed Quarry pit, 2) reduce excessive discharges to Permanente Creek, and 3) develop the capacity to detain and release the 100-year flow using onsite detention pond basins while optimizing groundwater infiltration. The final drainage design shall ensure that offsite, downstream flows would not cause an increased flooding potential or lead to hydro-modification effects. Design considerations for onsite detention basins shall include the following performance standards:

    a. Maintain turbidity of receiving water outflows within discharge limitations for Permanente Creek, as set forth by the San Francisco Bay Regional Water Quality Control Board Basin Plan or other more stringent, site-specific limitations set forth by the RWQCB.

    b. Effectively drain between storm events within the period of time specified by the Santa Clara County 2007 Drainage Manual.

    c. Enhance the settlement of fine sediment while limiting the potential for sediment-laden water to be discharged to Permanente Creek.

    d. Incorporate appropriate sediment traps (i.e., low areas that promote sediment settlement) in areas away from outflow structures to limit discharge of sediment at high flow periods.

    e. Control surface water inflows to the detention facility using energy reduction features (i.e., rip-rap aprons, vegetated swales) to reduce inflow velocity and agitation of sediment within the basin.

f. Infiltrate surface water, to the extent practicable and consistent with the water-quality recommendations for the backfill material as described in the RPA, while accounting for and protecting the local groundwater condition and water quality.

g. In addition to the detention facilities for the Quarry pit, the Mine Operator shall ensure that the desiltation ponds proposed in other smaller project areas such as the EMSA, are engineered to function as detention basins and attenuate stormwater flows to the extent practical. The Mine Operator shall also consider a broader watershed approach and consult with Santa Clara Valley Water District (SCVWD) on ways to detain peak flows offsite in relation to areas of existing flooding and to the current SCVWD flood control improvement project. *(Implements Mitigation Measure 4.10-4)*

84. **Stormwater Control to Avoid Ponded Water and Selenium Accumulation**. The Mine Operator shall incorporate drainage features into the final drainage design for the Quarry pit area to eliminate the potential for surface ponding on the floor of the Quarry pit once it has reached its final elevation (990 amsl). The drainage design for the finished Quarry pit fill shall include engineered elements (e.g., conveyance channels, infiltration galleries) that facilitate groundwater recharge and percolation from limestone area to groundwater in the Quarry backfill with the objective of accommodating high groundwater elevation without creating surface water bodies that may contain elevated levels of selenium. These measures shall be incorporated into the design of the proposed basin for the floor of the Quarry pit once the floor is raised to its final elevation. (*Implements Mitigation Measure 4.10-6*)

    Prior to the start of Phase III, submit final drainage design demonstrating compliance with the standards described above.

85. Any body of water created during the operation of the quarry, both during excavation and processing the material, shall be maintained to provide for mosquito control and to prevent creation of any health hazards or public nuisance.

86. Sixty (60) days following RPA approval, the Mine Operator shall provide to the Planning Manager revised plans that show redesigned rip-rap energy dissipaters per the Association of Bay Area Governments (ABAG) standard for the 25 year storm for all discharge points on the reclamation plans.

Noise

87. The Mine Operator shall prohibit all heavy equipment operations in the northeasterly 11.5 acres of the EMSA (as shown in Draft EIR, Figure 4.13-8) during nighttime hours (i.e., between 10:00 p.m. to 7:00 a.m.). *(Implements Mitigation Measure 4.13-1a)*

88. The Mine Operator shall either: (1) limit all operations in the EMSA within 1,600 feet of the caretaker's residence (as shown in Figure 4.13-8) to no more than one

8-hour shift per day, or (2) submit evidence establishing to the County's satisfaction that there are legally-binding restrictions precluding any occupancy of the caretaker's residence during the entirety of Phase 1 of the RPA. *(Implements Mitigation Measure 4.13-1b)*

EMSA Equipment

89. Within thirty (30) days of the RPA Approval, the Mine Operator shall post a sign inside all mine equipment operating in the EMSA area with the text from Condition #42 (Light and Glare) and Conditions # 87 and # 88 (Noise). The sign shall be posted prominently within view of the vehicle operator. Within 30 days of the RPA approval, the Mine Operator shall submit to the Planning Manager photo documentation demonstrating compliance of this.

Table of Impacts

EXHIBIT 2

TABLE ES-3
SUMMARY OF IMPACTS AND MITIGATION MEASURES FOR THE PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Environmental Impact	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Aesthetics, Visual Quality, and Light and Glare			
4.1-1: Construction of the Project would have a substantially adverse effect on a scenic vista during an interim period.	Significant	None feasible	Significant and unavoidable
4.1-2: Monitoring and Maintenance of the Project would not have a substantially adverse long term effect on a scenic vista.	Less than significant	None required	Less than significant
4.1-3: Construction of the Project would substantially damage scenic resources within a state- or County-designated scenic highway or route during the period of time when active reclamation activities are occurring.	Significant	None feasible	Significant and unavoidable
4.1-4: Neither active reclamation activities nor monitoring and maintenance of the Project would result in long term substantial damage to scenic resources within a state- or County-designated scenic highway or route.	Less than significant	None required	Less than significant
4.1-5: The Project would alter and substantially degrade the existing visual character or quality of the Project Area during the period of time when active reclamation activities are occurring.	Significant	None feasible	Significant and unavoidable
4.1-6: The implementation of active reclamation activities would alter, but not permanently substantially degrade, the existing visual character or quality of the Project Area.	Less than significant	None required	Less than significant
4.1-7: Lighting required for the Project would not adversely affect daytime or nighttime views in the Project Area.	Significant	**4.1-7:** No night lighting in the EMSA.	Less than significant
4.1-8: The Project would not create new permanent sources of light or glare that would affect daytime or nighttime views in the area.	Less than significant	None required	Less than significant
6-1: Project construction activities could make a cumulatively considerable contribution a substantial adverse effect on a scenic vista and degradation of the existing visual character or quality of the Project Area.	Significant	None feasible	Significant and unavoidable

TABLE ES-3 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES FOR THE PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Environmental Impact	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Agriculture and Forestry Resources			
(No impact)			
Air Quality			
4.3-1: The Project would generate emissions of criteria air pollutants which could contribute to existing nonattainment conditions and further degrade air quality.	Less than significant	None required	Less than significant
4.3-2: Project traffic associated with operational and reclamation activities would generate localized CO emissions on roadways and at intersections in the Project vicinity.	Less than significant	None required	Less than significant
4.3-3: The Project would expose people to increased levels of toxic air contaminants, which could lead to an increase in the risk of cancer.	Significant	**4.3-3a:** Submit to the County and the BAAQMD a comprehensive inventory of all Project-related off-road construction equipment expected to be used during any portion of the Project; and **4.3-3b:** Provide a plan demonstrating that Project-related off-road equipment would achieve a Project (EMSA-specific) wide fleet-average 35 percent reduction in DPM emissions compared to the proposed fleet in the ALG report; or **4.3-3c:** Submit evidence establishing that there are legally-binding restrictions precluding any occupancy of the caretaker's residence during Phase 1.	Less than significant
4.3-4: The Project would expose people to increased levels of toxic air contaminants, which could increase acute and chronic health risks.	Less than significant	None required	Less than significant
4.3-5: The Project would increase emissions of PM2.5, which could adversely affect human health.	Significant	**4.3-5:** Implement Mitigation Measures 4.3-3a and 4.3-3b (or, alternatively, implement Mitigation Measure 4.3-3c).	Less than Significant
Biological Resources			
4.4-1: Project activities could result in adverse effects on special-status and migratory birds.	Less than significant	None required	Less than significant
4.4-2: Project activities could result in adverse effects on special-status bats.	Significant	**4.4-2a:** Use of Buffers near Active Roosts. **4.4-2b:** Roosting Bats, Maternity Roosting Season. **4.4-2c:** Bat Roost Replacement.	Less than significant
4.4-3: Project activities could result in adverse effects on the San Francisco dusky-footed woodrat.	Less than significant	None required	Less than significant

TABLE ES-3 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES FOR THE PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Environmental Impact	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Biological Resources (cont.)			
4.4-4: Project activities could result adverse effects on special status aquatic organisms.	Less than significant	None required	Less than significant
4.4-5: Project activities could result in selenium-burdened runoff reaching aquatic habitats and, thereby, in deleterious effects to aquatic organisms and their prey base.	Significant	**4.4-5:** Selenium-related Impacts to Aquatic Habitat.	Significant and unavoidable
4.4-6: Project activities could result in the loss or degradation of riparian habitat associated with Permanente Creek.	Less than significant	None required	Less than significant
4.4-7: Project activities could result in the loss of native oak woodland as defined by Oak Woodlands Conservation Law.	Significant	**4.4-7:** Sudden Oak Death Minimization Measures.	Less than significant
4.4-8: Project activities could result in substantial adverse effects on wetlands and jurisdictional waters associated with Permanente Creek through direct removal, filling, hydrological interruption, or other means.	Significant	**4.4-8a:** Wetland Identification and Avoidance. **4.4-8b:** Wetland Mitigation Plan.	Less than significant
Cultural and Paleontological Resources			
4.5-1: Project activities could cause an adverse change in the significance of an historical resource pursuant to §15064.5 of the CEQA Guidelines and the County's Historic Preservation Ordinance.	Significant	**4.5-1a:** Document the physical characteristics and their historic context of the contributing features of the Kaiser Permanente Quarry Mining District; **4.5-1b:** Salvage and/or relocate a representative portion of the Permanente Quarry Conveyor System and the remains of the early 1940s crusher; and **4.5-1c:** Prepare public information programs to educate the general public on the historic nature of the potential Kaiser Permanente Quarry Mining District.	Significant and unavoidable
4.5-2: Project activities could cause an adverse change in the significance of an archaeological resource as defined in §15064.5 of the CEQA Guidelines.	Significant	**4.5-2:** Notify the County if cultural resources are encountered during Project implementation.	Less than significant
4.5-3: Project activities could directly or indirectly destroy a unique paleontological resource or site.	Significant	**4.5-3:** Notify the County if a paleontological resource is encountered during implementation of the RPA.	Less than significant
4.5-4: Project activities could disturb human remains, including those interred outside of formal cemeteries.	Significant	**4.5-4:** Notify the County Coroner if human skeletal remains are encountered.	Less than significant

TABLE ES-3 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES FOR THE PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Environmental Impact	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Energy Conservation			
4.6-1: The Project would include means for avoiding or reducing wasteful and/or unnecessary consumption of energy.	Less than significant	None required	Less than significant
Geology, Soils, and Seismicity			
4.7-1: Rock and soil slopes constructed as part of the proposed reclamation of the EMSA, Quarry pit, and WMSA could fail under static or seismic forces if not properly engineered and constructed.	Significant	**4.7-1:** Avoidance and containment of shallow slumps and/or fall-back of overburden material.	Less than significant
4.7-2: In the event of a major earthquake in the region, seismic ground shaking could result in injury to site workers, damage to Quarry equipment and structures, or trigger slope failures. In addition, a large earthquake on the San Andreas Fault could result in minor ground deformation along traces of the Berrocal or Monte Vista Fault Zones.	Less than significant	None required	Less than significant
4.7.3: Earthmoving and other ground disturbance associated with the phased reclamation of the site could temporarily promote accelerated erosion and soil loss.	Less than significant	None required	Less than significant
Greenhouse Gas Emissions			
4.8-1: The Project could result in an increase in greenhouse gas emissions and contribute to climate change.	Significant	**4.8-1a:** Develop Annual GHG Inventory. **4.8-1b:** Greenhouse Gas Emissions Reduction Plan.	Less than significant
4.8-2: The Project could conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHG.	Less than significant	None required	Less than significant
Hazards and Hazardous Materials			
4.9-1: The Project could create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.	Less than significant	None required	Less than significant

TABLE ES-3 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES FOR THE PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Environmental Impact	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Hazards and Hazardous Materials (cont.)			
4.9-2: The Project could create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.	Less than significant	None required	Less than significant
4.9-3: Sedimentation basins planned for erosion control at the Project site could provide breeding grounds for vectors.	Less than significant	None required	Less than significant
Hydrology and Water Quality			
4.10-1: Post-reclamation conditions in the EMSA, WMSA, and Quarry pit would increase selenium concentrations in Permanente Creek to levels exceeding baseline conditions and RWQCB Basin Plan objectives.	Significant	**4.10-1a:** Professional Geologist Verification of Non-Limestone-Containing Material Use. **4.10-1b:** Verification Water Quality Monitoring.	Less than significant
4.10-2: Interim reclamation activities within the Project Area would contribute concentrations of selenium, Total Dissolved Solids (TDS), and sediment in Permanente Creek.	Significant	**4.10-2a:** Interim Stormwater Control and Sediment Management. **4.10-2b:** EMSA Interim Stormwater Monitoring Plan.	Significant and unavoidable
4.10-3: The Permanente Creek Reclamation Area (PCRA) reclamation activities would contribute concentrations of selenium, Total Dissolved Solids (TDS), and sediment in Permanente Creek.	Less than significant	None required	Less than significant
4.10-4: The Project would alter the existing drainage pattern of the site, which could result increased storm water runoff rates and on- or offsite flooding.	Significant	**4.10-4:** Construction of Onsite Detention Facility.	Significant and unavoidable
4.10-5: Groundwater discharge from the Quarry pit after backfilling and reclamation is complete would adversely alter surface water flows to Permanente Creek.	Less than significant	None required	Less than significant
4.10-6: The Project would alter the existing drainage pattern of the site, which could result in increased stormwater ponding, accumulation of selenium, and flooding.	Significant	**4.10-6:** Stormwater Control to Avoid Ponded Water and Selenium Accumulation.	Less than significant

TABLE ES-3 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES FOR THE PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Environmental Impact	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Hydrology and Water Quality (cont.)			
Impact 6-2: Incremental Project-specific activities could contribute to downstream flooding.	Significant	**6-2:** Construction of Onsite Detention Facility.	Significant and unavoidable
Land Use and Planning			
4.11-1: The Project would be incompatible with adjacent land uses.	Less than significant	None required	Less than significant
Mineral Resources			
4.12-1: The planned backfill of the Quarry pit would hinder further extraction of cement-grade limestone and aggregate resources from the Quarry pit, thereby resulting in the loss of availability of a mineral resource of state, regional, and local significance.	Less than significant	None required	Less than significant
Noise			
4.13-1: Operations associated with reclamation during Phase 1 would exceed County noise standards and increase ambient noise levels at noise-sensitive uses in the vicinity.	Significant	**4.13-1a:** Prohibition of heavy equipment operations during nighttime hours. **4.13-1b:** Limiting of operations in the EMSA or submittal of evidence establishing that there are legally-binding restrictions precluding any occupancy of the caretaker's residence during the entirety of Phase 1 of the Project.	Less than significant
4.13-2: Operations associated with reclamation during Phase 2 would increase ambient noise levels at noise-sensitive uses in the vicinity.	Less than significant	None required	Less than significant
4.13-3: Operations associated with reclamation Phase 3 may be audible at noise-sensitive uses in the vicinity.	Less than significant	None required	Less than significant
4.13-4: Operations within the Permanente Creek Reclamation Area may be audible at noise-sensitive uses in the vicinity.	Less than significant	None required	Less than significant
Population and Housing			
(No impact)			

TABLE ES-3 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES FOR THE PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Environmental Impact	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Public Services			
(No impact)			
Recreation			
4.16-1: The Project would be near a public park and trail and could affect existing or future recreational opportunities.	Less than significant	None required	Less than significant
Transportation/Traffic			
4.17-1: The Project would cause increases in traffic volumes on area roadways, but would not conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system.	Less than significant	None required	Less than significant
4.17-2: Traffic generated by Project activities could affect traffic safety of pedestrians and bicyclists.	Less than significant	None required	Less than significant
4.17-3: The Project would provide safe access, and would not obstruct access to nearby uses or fail to provide for future street right-of-way.	Less than significant	None required	Less than significant
4.17-4: Traffic generated by the Project would contribute to pavement wear-and-tear on area roadways.	Less than significant	None required	Less than significant
Utilities and Service Systems			
4.18-1: The Project would require and result in the construction of new storm water drainage facilities, the construction of which could cause environmental effects.	Less than significant	None required	Less than significant
4.18-2: The Project may not be able to be served by a landfill with sufficient permitted capacity to accommodate the Project's solid waste disposal needs.	Less than significant	None required	Less than significant

TABLE ES-4
PROPOSED PROJECT VS. ALTERNATIVES
SUMMARY OF ENVIRONMENTAL IMPACT CONCLUSIONS

Resource Area	Proposed Project	Complete Backfill Alternative (Alternative 1)	Central Materials Storage Area Alternative (Alternative 2)	No Project Alternative
Aesthetics, Visual Quality, and Light and Glare	Impacts determined to be significant and unavoidable relating to a scenic vista (Anza Knoll), a scenic roadway (I-280) and the alteration or substantial degradation of the existing visual character or quality of the Project Area. All other impacts determined to be less than significant or no impact. **Preferred.**	Implementation of Alternative 1 would cause greater impacts to a scenic vista, scenic and major roadways, and the visual character or quality of the Project Site, than the Project, due to the lower height of the EMSA. **Least Preferred.**	Implementation of Alternative 2 would be less environmentally advantageous than the Project relative to a scenic vista, scenic and major roadways, and the visual character or quality of the Project Site, due to the lower height of the EMSA. **Not Preferred.**	Implementation of the No Project Alternative would be less environmentally advantageous than the Project relative a scenic vista, scenic and major roadways, and the visual character or quality of the Project Site, due to the lower height of the EMSA. **Not Preferred.**
Agriculture and Forest Resources	Implementation of the Project would cause no impact to agriculture and forestry resources. **No Preference.**	Implementation of Alternative 1 would cause the same impact (no impact) to agriculture and forestry resources as the Project. **No Preference.**	Implementation of Alternative 2 would cause a greater impact to forestry resources than the Project because it would result in the conversion of forest land to a non-forest use. **Not Preferred.**	Implementation of the No Project Alternative would cause the same impact (no impact) to agriculture and forestry resources as the Project. **No Preference.**
Air Quality	Impacts to air quality and health risk would be less than significant or less than significant with mitigation. **Slight Preferred.**	Implementation of Alternative 1 would cause a greater impact to air quality and health risk than the Project. **Not Preferred.**	Implementation of Alternative 1 would cause a greater impact to air quality than the Project and the same impact to health risk. **Not Preferred.**	The No Project Alternative would result in a similar or lesser impact for air quality than the Project, and less impact to health risk. **Most Preferred.**
Biological Resources	Impacts to biological resources would be less than significant or less than significant with mitigation for all significance criteria except selenium-related impacts to aquatic habitats, which would be significant and unavoidable until final reclamation is complete. **No Preference.**	Implementation of Alternative 1 would cause similar impacts as the Project except for selenium-related impacts to Permanente Creek, which would be essentially the same until final reclamation is complete and slightly less post-reclamation. **No Preference.**	Implementation of Alternative 2 would cause similar impacts as the Project except for selenium-related impacts to Permanente Creek, which would be slightly less than the Project both pre- and post-reclamation. **Preferred.**	Implementation of the No Project Alternative would cause similar impacts as the Project for all areas except selenium-related impacts to Permanente Creek. Because the interim period before reclamation would be longer than for the proposed Project, the extended timeframe would result in a longer period of selenium-related impacts to aquatic habitat. **Not Preferred.**

CHAPTER 4
Revisions to the Draft EIR

4.1 Introduction

The following changes have been made to the previously published text of the Draft EIR. These changes include: minor corrections made to improve writing clarity, grammar, and consistency; clarifications, additions, or deletions resulting from specific responses to comments; and text changes to update information in the Draft EIR. These text revisions are organized by the chapter and page number (provided on the left-hand side of the page, below) that appear in the Draft EIR. An explanation of the change, including identification of where it would be made, is presented in *italics*. The specific additions and deletions use the following conventions:

- Text deleted from the EIR is shown in ~~strike out text~~.
- Text added to the EIR is shown in <u>underline text</u>.

4.2 Text Changes

4.2.1 Executive Summary

ES-17 *The following text changes have been made to Table ES-3, starting on page ES-17:*

4.9-3: Sedimentation <u>and detention</u> basins planned for erosion <u>and flood</u> control at the Project site could provide breeding grounds for vectors.	Less than significant	None required	Less than significant

ES-17

4.10-1: Post-reclamation conditions in the <u>East Materials Storage Area (EMSA)</u>, <u>West Materials Storage Area (WMSA)</u>, and Quarry pit would increase selenium concentrations in Permanente Creek to levels exceeding baseline conditions and RWQCB Basin Plan objectives.	Significant	**4.10-1a:** Professional Geologist Verification of Non-Limestone-Containing Material Use. **4.10-1b:** Verification Water Quality Monitoring.	Less than significant

ES-17

4.10-2: Interim reclamation activities within the Project Area would contribute concentrations of selenium, Total Dissolved Solids (TDS), and selenium in Permanente Creek.	Significant	**4.10-2a:** Interim Stormwater Control and Sediment Management. **4.10-2b:** EMSA Interim Stormwater Monitoring Plan. **4.10-2c:** Monitoring and Determination of BMP Effectiveness for the EMSA. **4.10-2d:** Monitoring and Determination of BMP Effectiveness for the WMSA and Quarry Pit. 4.10-2e: Design, Pilot Testing and Implementation of Selenium Treatment Facility or Alternative for the EMSA and/or the WMSA and Quarry Pit.	Significant and Unavoidable

ES-17

4.10-4: The Project would alter the existing drainage pattern of the site, which could cause ~~result~~ increased storm water runoff rates and on- or offsite flooding.	Significant	**4.10-4:** Construction of Onsite Detention Facility.	Less than s~~S~~ignificant ~~and unavoidable~~

ES-18

~~**Impact 6-2:** Incremental Project-specific activities could contribute to downstream flooding.~~	~~Significant~~	~~**6-2:** Construction of Onsite Detention Facility.~~	~~Significant and unavoidable~~

ES-21 *The following text changes have been made to Table ES-4:*

Hydrology and Water Quality	Impacts related to water quality would be less than significant with mitigation except for selenium-related impacts to water quality in Permanente Creek, which would be significant and unavoidable until final reclamation is complete. ~~Drainage and flooding impact would be significant and would be unavoidable if adequate detention facility is not feasible.~~ Groundwater impacts would be less than significant. **Preferred.**	Impacts related to long term selenium leaching to surface water would be less than under the Project; however, ~~the larger area and higher slopes would result in more severe drainage and flooding impacts, and~~ the longer interim period before WMSA and EMSA reclamation could result in more severe interim impacts to water quality. **Not Preferred.**	Impacts to hydrology and water quality would be similar to or slightly less than the Project. **Preferred.**	The interim period before reclamation would be longer than for the proposed Project; the extended timeframe would result a longer period of selenium-related water quality impacts. ~~Downstream flooding impacts resulting from backfilling the Quarry pit would be similar to the proposed Project but would occur several years later.~~ **Not Preferred.**

LEHIGH PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Mitigation Monitoring, Reporting, and Compliance Program

This document describes the mitigation monitoring, reporting, and compliance program (MMRCP) for ensuring the effective implementation of the mitigation measures required by the County of Santa Clara Planning Office (County) pursuant to its approval of the Reclamation Plan Amendment proposed by Lehigh Southwest Cement Company (Applicant)[1] for the Permanente Quarry (Project). The mitigation measures recommended in Environmental Impact Report (EIR) are presented in Table 1. If and when the Project is approved, the County will prepare a final MMRCP based on Table 1 that reflects the certified mitigation measures.

1. Authority

To ensure that the mitigation measures and project revisions identified in a certified environmental impact report are implemented following project approval, the California Environmental Quality Act (CEQA) requires a public agency to adopt a program for monitoring or reporting on the revisions that it has required and the measures it has imposed to mitigate or avoid significant environmental effects (Pub. Res. Code §21081.6; CEQA Guidelines §15097). The MMRCP set forth herein serves this purpose for the Project.

2. Overview

The attached EIR analyzes potential short- and long-term environmental impacts that would result from implementation of the Project, and recommends mitigation measures for impacts determined to be significant. Based on the EIR, approval of the Project would have no impact or a less-than-significant impact in the following areas:

- Agriculture and Forestry Resources
- Energy Conservation
- Hazards and Hazardous Materials
- Land Use and Planning
- Mineral Resources
- Population and Housing
- Public Services
- Recreation
- Traffic and Transportation
- Utilities and Service Systems

[1] The Permanente Quarry (Mine ID No. 91-43-0004) is owned by Hanson Permanente Cement, Inc. and operated by Lehigh Southwest Cement Company. Lehigh and Hanson both are part of the Heidelberg Cement Group, a worldwide producer of construction materials (Lehigh Cement Company, 2011; Hanson, 2011).

The EIR indicates that County approval of the Project would result in potentially significant impacts in the following areas:

- Aesthetics, Visual Quality, and Light and Glare
- Air Quality
- Biological Resources
- Cultural and Paleontological Resources
- Geology, Soils, and Seismicity
- Greenhouse Gas Emissions
- Hydrology and Water Quality
- Noise

3. Roles and Responsibilities

3.1 The Applicant

Unless otherwise specified, the Applicant will be responsible for taking all action necessary to implement the MMRCP according to the specifications provided for each mitigation measure and to demonstrate to the County that the action required by the mitigation measure has been completed successfully. The Applicant will identify appropriate personnel who will be responsible for coordination with the County concerning the MMRCP. The Applicant also will be responsible for the costs of mitigation monitoring.

3.2 The County

The County shall be responsible for overall administration of the MMRCP and for verification of compliance with its terms. The County has the authority to halt any activity associated with the Project if the activity is determined to be an unauthorized deviation from the approved Project or adopted mitigation measures.

The Santa Clara County Department of Planning and Development Director will designate a project manager to oversee the MMRCP. Duties of the project manager shall include:

- Conduct routine inspections, plan checking, and reporting activities.
- Serve as a liaison between the County and the Applicant regarding mitigation monitoring issues.
- Coordinate with agencies having mitigation monitoring responsibilities.
- Complete forms and checklists and maintain reports and other records and documents generated by the MMRCP.
- Coordinate and assure corrective actions or enforcement measures are taken, if necessary.

The County will ensure that any variance or deviation from the procedures identified under the MMRCP is consistent with CEQA requirements: neither a variance nor a deviation will be approved by the County if it creates a new significant environmental impact or an impact that is more intense than those analyzed in the certified EIR unless and until subsequent environmental review is conducted as required by CEQA. For purposes of this MMRCP, the term “variance” is strictly limited to minor changes that would not trigger other permit requirements, clearly and

strictly comply with the intent of the mitigation measure, and may be approved by the County in its discretion. The County will evaluate any proposed change that could create new or more intense environmental effects than those evaluated in the Final EIR to determine whether supplemental CEQA review is required. Any proposed variance or deviation from the approved Project and certified mitigation measures shall be reported to the County for its review as soon as practicable and in any event before the variance or deviation is implemented. In some cases, a variance also may require approval by a CEQA responsible agency.

In order to fulfill its statutory mandates to mitigate or avoid significant effects on the environment and to design a MMRCP to ensure compliance during project implementation (Pub. Res. Code §21081.6), the County may conduct a comprehensive review of conditions that are not effectively mitigating impacts at any time it deems appropriate. If the County determines that any condition is not adequately mitigating significant environmental impacts caused by the Project, or that recent proven technological advances could provide more effective mitigation, then it may impose reasonable additional or replacement conditions to effectively mitigate these impacts.

4. General Monitoring and Reporting Procedures

The Applicant shall submit to inspections by the County and other responsible agencies to determine if the Project is in compliance with State and federal regulations. As part of this MMRCP, the Applicant shall prepare an annual monitoring report on the compliance of the Project with the required mitigation measures. Information from the County regarding the inspections shall be compiled and explained in the annual report, as well as supplementary information on each of the long-term environmental mitigation monitoring items. The narrative report also will include supporting statistical information, where necessary. The report shall be designed to simply and clearly identify whether required mitigation measures are being, or have been, implemented adequately. At a minimum, each report shall identify the mitigation measure or measures to be monitored for implementation, whether compliance with the mitigation measure or measures has occurred, the procedures and standards used in assessment of compliance, times and dates of monitoring, name(s) of monitor(s), and whether further action is required. The reports shall be submitted to the County for review and approval.

In addition to specific reporting requirements for monitoring of individual mitigation measures, the overall progress, completion, or violation of the MMRCP shall be reported annually by the Applicant to the County. Reports that identify successful progress on implementation of the MMRCP or successful completion of the MMRCP shall be reviewed and filed by the County. These reports shall be available for public inspection.

If a report identifies one or more violations of the MMRCP, the County will take one of the following actions within 10 working days of the receipt of such report:

1. Directly notify the Applicant by telephone of the violation and attempt to obtain voluntary compliance.
2. Notify the Applicant of the violation in writing and request voluntary compliance.

3. Conduct a field inspection.

4. Initiate enforcement action.

The County must review the annual report and provide a written response to the Applicant indicating whether the report is complete and satisfactory. If the report is found to be incomplete, the Applicant will submit the requested additional information within 30 days of notification by the County. If the report's conclusions or data are found to be unsatisfactory, the County will inform the Applicant whether or not technical peer review will be necessary. The County will specify the type of additional work to be done and whether this can be accomplished by the Applicant or will require outside consultants.

5. Specific MMRCP Requirements

Table 1 presents a compilation of the mitigation measures in the EIR. The purpose of the table is to provide a single comprehensive list of impacts, mitigation measures, monitoring and reporting requirements, and timing.

TABLE 1
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEHIGH PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
Aesthetics, Visual Quality, Light and Glare					
4.1-1: Construction of the Project would have a substantially adverse effect on a scenic vista during an interim period.	**Mitigation:** None feasible. Because of the large size of the Project Area and its geographic relation to the scenic vista on the hillside, it would be impossible to screen views of the Project Area. Artificial screening such as fencing would be incapable of obscuring views of the large Project Area, given the viewers' elevated perspective. A more aggressive planting plan to establish mature vegetation (e.g., oak trees, other evergreens) immediately on the EMSA would reduce visual contrast between initial planting, hydroseeding, and eventual maturation under the normal revegetation plan; however, mature trees could not be planted on the intervening slopes, only the benches. Furthermore, such an aggressive planting plan would not address visual contrast that would exist during construction of the overburden pile, particularly the dominant presence of construction equipment and activity.	Not Applicable (N/A)	N/A	N/A	N/A
4.1-3: Construction of the Project would substantially damage scenic resources within a state- or County-designated scenic highway or route during the period of time when active reclamation activities are occurring.	**Mitigation:** No feasible mitigation measures have been identified to reduce the significance of this impact. Artificial screening such as fencing would be incapable of obscuring views of the Project Area, because of the extensive height of the EMSA. A more aggressive planting plan to establish mature vegetation (e.g., oak trees, other evergreens) immediately on the EMSA would reduce visual contrast between initial planting, hydroseeding, and eventual maturation under the normal revegetation plan; however, mature trees could not be planted on the intervening slopes, only the benches. Furthermore, such an aggressive planting plan would not address visual contrast that would exist during construction of the overburden pile, particularly the dominant presence of construction equipment and activity.	N/A	N/A	N/A	N/A
4.1-5: The Project would alter and substantially degrade the existing visual character or quality of the Project Area during the period of time when active reclamation activities are occurring.	**Mitigation:** No feasible mitigation measures have been identified to reduce the significance of this impact. Artificial screening such as fencing would be incapable of obscuring views of the Project Area, because of the extensive height of the EMSA. A more aggressive planting plan to establish mature vegetation (e.g., oak trees, other evergreens) immediately on the EMSA would reduce visual contrast between initial planting, hydroseeding, and eventual maturation under the normal revegetation plan; however, mature trees could not be planted on the intervening slopes, only the benches. Furthermore, such an aggressive planting plan would not address visual contrast that would exist during construction of the overburden pile, particularly the dominant presence of construction equipment and activity.	N/A	N/A	N/A	N/A

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEIGH PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
4.1-7: Lighting required for the Project would not adversely affect daytime or nighttime views in the Project Area.	**Mitigation Measure 4.1-7:** No night lighting shall be allowed permitted on the east-facing slope of the EMSA or any other location within the EMSA that would be visible from public locations on the Santa Clara Valley floor including roadways.	Mine equipment operating in the EMSA area shall have a sign prohibiting the use of lighting per this mitigation.	During Reclamation Activities on the EMSA. Submit documentation within 30 days of RPA approval.	Planning Office	
Agriculture and Forestry Resources					
No Impacts	No Mitigations	N/A	N/A	N/A	N/A
Air Quality					
4.3-3: The Project would expose people to increased levels of toxic air contaminants, which could lead to an increase in the risk of cancer.	**Mitigation Measure 4.3-3a:** Within **90 days** of Project approval, the Applicant shall submit to the County and the BAAQMD a comprehensive inventory of all Project-related off-road construction equipment expected to be used during any portion of the Project. The inventory shall include the horsepower rating, engine production year, and projected hours of use or fuel throughput for each piece of equipment. The inventory shall be updated and submitted annually throughout the duration of the Project.	Submit a comprehensive inventory of off-road construction equipment to be used during project construction; or Implement Mitigation Measure 4.3-3c.	Within 90 days of Project approval and updated annually by October 1 of each year.	Planning Office Bay Area Air Quality Management District	
	Mitigation Measure 4.3-3b: Within **90 days** of Project approval, the Applicant shall provide a plan for approval by the County and the BAAQMD demonstrating that Project-related off-road equipment would achieve a Project (EMSA-specific) wide fleet-average 35 percent reduction in DPM emissions compared to the proposed fleet in the ALG report (ALG, 2011a) during Phase 1 of the Project. The plan shall be updated and submitted annually throughout the duration of the Project. Options for reducing emissions may include, but are not limited to: • Using newer model engines (e.g., engines that meet U.S. EPA interim/final Tier 4 engine standards); • Use of Retrofit Emission Control Devices that consist of diesel oxidation catalysts, diesel particulate filters, or similar retrofit equipment control technology verified by CARB (http://www.arb.ca.gov/diesel/verdev/verdev.htm); • Use of low-emissions diesel products or alternative fuels; • Use of alternative material handling options (e.g., conveyor system); or	Submit a plan demonstrating off-road construction equipment achieves a 35 percent reduction in DPM emissions compared to the proposed fleet in the ALG report; or Implement Mitigation Measure 4.3-3c.	Within 90 days of Project approval and updated annually by October 1 of each year.	Planning Office Bay Area Air Quality Management District	

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEHIGH PERMANENTE QUARRY RELCMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	• Other options as may become commercially available and verifiable. Alternatively, in lieu of Mitigation Measures 4.3-3a and 4.3-3b, the Applicant may implement Mitigation Measure 4.3-3c:				
	Mitigation Measure 4.3-3c: The Applicant shall submit evidence establishing to the County's satisfaction that there are legally-binding restrictions precluding any occupancy of the caretaker's residence during the entirety of Phase 1 of the Project.	Submit evidence that there are legally-binding restrictions precluding any occupancy of the caretaker's residence during the entirety of Phase 1	Within 90 days of RPA approval	Planning Office	
4.3-5: The Project would increase emissions of PM2.5, which could adversely affect human health.	**Mitigation Measure 4.3-5:** Implement Mitigation Measures 4.3-3a and 4.3-3b (or, alternatively, implement Mitigation Measure 4.3-3c).	See MM 4.3-3.	See MM 4.3-3.	See MM 4.3-3.	
Biological Resources					
4.4-2: Project activities could result in adverse effects on special-status bats.	**Mitigation Measure 4.4-2a: Use of Buffers near Active Roosts.** During the November 1 to March 31 hibernation season, work shall not be conducted within 100 feet of woodland habitat that provides suitable bat roosting habitat. Bat presence is difficult to detect using emergence surveys during this period due to decreased flight and foraging behavior. If a qualified bat biologist determines that woodland areas do not provide suitable hibernating conditions for bats and they are unlikely to be present in the area, work may commence as planned.	Submit a report by a qualified bat biologist to the Planning Manager verifying the absence of suitable habitat as described above if work is proposed within 100 feet of woodland habitat between November 1 and March 31.	Prior to construction during the November 1 to March 31 bat hibernation season	Planning Office	
	Mitigation Measure 4.4-2b: Roosting Bats, Maternity Roosting Season. Nighttime evening emergence surveys and/or internal searches within large tree cavities shall be conducted by a qualified biologist during the maternity season (April 1 to August 31) to determine presence/absence of bat maternity roosts within 100 feet of wooded Project boundaries. All active roosts identified during surveys shall be protected by a buffer to be determined by a qualified bat biologist. The buffer shall be determined by the type of bat observed, topography, slope, aspect, surrounding vegetation, sensitivity of roost, type of potential disturbance, etc. Each exclusion zone shall remain in place until the end of the maternity roosting season. If no active roosts are identified, then work may commence as planned. Survey results are valid for 30	Thirty days prior to the removal of potential bat roost habitat, the Mine Operator shall submit to the Planning Manager a copy of a contract with a qualified biologist to conduct pre-activity surveys. The pre-construction surveys shall be submitted to the Planning Manager	Prior to construction between April 1 to August 31	Planning Office	

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEIGH PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	days from the survey date. Should work commence later than 30 days from the survey date, surveys shall be repeated. Operations may continue for many years. Surveys do not need to be repeated annually unless additional clearing of potential roosting or hibernation habitat could occur outside of the non-roosting season.	no later than five (5) business days prior to the removal of any potential habitat.			
	Mitigation Measure 4.4-2c: Bat Roost Replacement. All special-status bat roosts destroyed by the Project shall be replaced by the Applicant at a 1:1 ratio onsite with a roost suitable for the displaced species (e.g., bat houses for colonial roosters). The design of such replacement habitat shall be coordinated with CDFG. The new roost shall be in place prior to the time that the bats are expected to use the roost (e.g., prior to April 1 if the roost destroyed by the Project was used by a maternity colony), and shall be monitored periodically for 5 years to ensure proper roosting habitat characteristics (e.g., suitable temperature and no leaks). The roost shall be modified as necessary to provide a suitable roosting environment for the target bat species.	In coordination with CDFG, replace any destroyed special-status bat roosts at a 1:1 ratio and monitor and modify/repair, as necessary, for 5 years.	Prior to the time bats are expected to use the replaced roosts. Monitoring shall be conducted annually.	Planning Office CDFG	
Impact 4.4-5: Project activities could result in selenium-burdened runoff reaching aquatic habitats and, thereby, in deleterious effects to aquatic organisms and their prey base.	**Mitigation Measure 4.4-5: Selenium-related Impacts to Aquatic Habitat.** Implement Mitigation Measure 4.10-2a: Interim Stormwater Control and Sediment Management; Mitigation Measure 4.10-2b: EMSA Interim Stormwater Monitoring Plan; Mitigation Measure 4.10-2c: Monitoring and Determination of BMP Effectiveness for the EMSA; Mitigation Measure 4.10-2d: Monitoring and Determination of BMP Effectiveness for the WMSA and Quarry Pit; and Mitigation Measure 4.10-2e: Design, Pilot Testing, and Implementation of Selenium Treatment Facility or Alternative for the EMSA and/or the WMSA and Quarry Pit.	See MM 4.10-2	See MM 4.10-2	See MM 4.10-2	
Impact 4.4-7: Project activities could result in the loss of native oak woodland as defined by Oak Woodlands Conservation Law.	**Mitigation Measure 4.4-7: Sudden Oak Death Minimization Measures.** To reduce the possibility of spreading Sudden Oak Death to oak woodlands in the Study Area, the Applicant shall implement the following measures: • Prior to any reclamation work within the Project Area, equipment shall be sanitized, including shoes, pruning gear, trucks, and heavy equipment such as earthmoving, tree trimming, chipping, or mowing equipment. Except for trucks, this equipment shall remain onsite for the duration of Project activities and shall not be transferred between this and other worksites, as doing so increases the potential of transferring infected spores to or from another site.	Sanitize construction equipment (personal and heavy equipment) and control imported and exported soil and plant materials, to prevent spreading of Sudden Oak Death.	Prior to any reclamation work and after the completion of work activities.	Planning Office	

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEHIGH PERMANENTE QUARRY RELCMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	• After the completion of work activities, any accumulation of plant debris (especially leaves), soil, and mud shall be washed off of equipment or otherwise removed onsite, and air filters shall be blown out. • All contractors shall have sanitation kits onsite for cleaning equipment. Sanitation kits should contain chlorine bleach (10/90 mixture bleach to water) or Clorox Clean-Up or Lysol, scrub brush, metal scraper, boot brush, and plastic gloves. • All organic material imported for mixing with Quarry pit backfill shall have been composted at a facility that meets the standards of Title 14 California Code of Regulations, Division 7, Chapter 3.1; alternative sources of organic material may be used if approved by the County of Santa Clara Agricultural Commissioner as being as effective as the composting process to sanitize SOD-infected materials. • All other imported fill material, soil amendments, gravel, etc. required for construction and/or restoration activities to be placed within the upper 12 inches of the ground surface shall be free of vegetation or plant material.				
Impact 4.4-8: Project activities could result in substantial adverse effects on wetlands and jurisdictional waters associated with Permanente Creek through direct removal, filling, hydrological interruption, or other means.	**Mitigation Measure 4.4-8a:** Wetland Identification and Avoidance. A qualified wetland biologist shall physically delineate all federal and state waters and wetland features mentioned above and indentified in the 2008 wetland delineation (WRA, 2008). This shall occur before any Permanente Creek Reclamation Area (PCRA) activities begin, and when feasible, reclamation activities shall completely avoid these areas. Silt fence shall be installed between jurisdictional waters or wetlands and areas sprayed with hydroseed to prevent filling of wetlands with tackifier or other hydroseed material. Use of hand-seeding or working with hand tools may be required to avoid equipment impacting wetlands.	Prior to the start of PCRA activities, the wetland biologist shall submit a report to the Planning Manager showing the wetland areas delineated and the installation of all fencing and barriers (photos and map). This condition shall not apply to Phase III Permanente Creek Restoration Activities in subareas 3, 4, 5 and 7, as identified in the RPA	Before any Permanente Creek Reclamation Area (PCRA) activities begin	Planning Office	
	Mitigation Measure 4.4-8b: Wetland Mitigation Plan. If avoidance of jurisdictional waters or wetlands is not feasible,	If avoidance of jurisdictional waters	Before any Permanente Creek	Planning Office	

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEIGH PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	the following measures shall be implemented: A qualified wetland biologist shall prepare a Mitigation and Monitoring Plan (MMP) for impacts to wetlands and waters under state or federal jurisdiction. The MMP shall outline the anticipated mitigation obligations for temporary and permanent impacts to waters of the U.S., including wetlands, resulting from PCRA activities. The MMP shall include: • Baseline information; • Anticipated habitat enhancements to be achieved through compensatory actions, including whether mitigation will occur within the Project Area along Permanente Creek or at an offsite location, as well as mitigation site location and hydrology; • When possible, a preference for mitigation within the Permanente Quarry property, for impacts to both jurisdictional waters and wetlands; • Performance and success criteria for habitat enhancement of Permanente Creek or other waterways to compensate for impacts to Other Waters, including: – A replanting plan for appropriate native riparian woody vegetation, including but not limited to arroyo willow, white alder, California wild rose, and snowberry, bigleaf maple, western creek dogwood, and Oregon ash; – An 80% overall revegetation planting success for all mitigation areas over a ten-year period; – A minimum overall mitigation ratio of 1.1:1 acres for permanent impacts and 1:1 acres for temporary impacts; – Plantings that are self-reliant, exhibit average or better health and vigor and have observable growth in stems and leaves at least two years prior to the end of the ten-year monitoring period; – Visual inspection of all revegetation sites during each growing season, with qualitative and quantitative measures of plant cover and performance; – Observations of total percent plant cover in the planting area, natural recruitment of native species, and establishment of new non-native species; and	or wetlands is not feasible, prepare a MMP, based upon criteria in MM 4.4-8b, for impacts to wetlands and waters under state or federal jurisdiction	Reclamation Area (PCRA) activities begin (Wetland Mitigation Plan) Wetland mitigation shall be implemented per performance standards listed in mitigation, with annual monitoring and reporting to the Planning Office and other regulatory agencies. Verification of wetland installation shall occur 5 years after creation.		

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEHIGH PERMANENTE QUARRY RELCMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	– Annual monitoring reports submitted to CDFG and RWQCB documenting revegetation conditions, including recommendations to adapt maintenance and replacement of failed plantings. • Performance and success criteria for wetland creation or enhancement including, but not limited to, the following: – At least 70 percent survival of installed plants for each of the first three years following planting. – Performance criteria for vegetation percent cover in Years 1-4 as follows: at least 10 percent cover of installed plants in Year 1; at least 20 percent cover in Year 2; at least 30 percent cover in Year 3; at least 40 percent cover in Year 4. – Performance criteria for hydrology in Years 1-5 as follows: Fourteen or more consecutive days of flooding, ponding, or a water table 12 inches or less below the soil surface during the growing season at a minimum frequency of three of the five monitoring years; OR establishment of a prevalence of wetland obligate plant species. – Invasive plant species that threaten the success of created or enhanced wetlands shall not be allowed to contribute relative cover greater than 35 percent in year 1, 20 percent in years 2 and 3, 15 percent in year 4, and 10 percent in year 5. – If necessary, supplemental water shall be provided by a water truck for the first two years following installation. Any supplemental water must be removed or turned off for a minimum of two consecutive years prior to the end of the monitoring period, and the wetland must meet all other criteria during this period. At the end of the five year monitoring period, the wetland must be self sufficient and capable of persistence without supplemental water. – At least 75 percent cover by hydrophytic vegetation at the end of the five-year monitoring period. In addition, wetland hydrology and hydric soils as defined by the Corps (ACOE, 2008) must be present and defined as follows: ▪ *Hydrophytic vegetation* – A plant community occurring in areas where the frequency and duration of inundation or soil saturation produce				

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEIGH PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present. ▪ *Wetland hydrology* – Identified by indicators such as sediment deposits, water stains on vegetation, and oxidized rhizospheres along living roots in the upper 12 inches of the soil, or satisfaction of the hydrology performance criteria listed above. ▪ *Hydric soils* – Soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions, which are often characterized by features such as redox concentrations, which form by the reduction, translocation, and/or oxidation of iron and manganese oxides. Hydric soils may lack hydric indicators for a number of reasons. In such cases, the same standard used to determine wetland hydrology when indicators are lacking can be used. – Five years after any wetland creation, a wetland delineation shall be performed to determine whether created wetlands are developing as planned. If they are not, remedial measures shall be taken to ensure that the Project's mitigation obligations are met. • Monitoring and reporting requirements. The MMP would also include conceptual site specific plans to compensate for wetland losses resulting from the project. These may include, but are not be limited to, the provision of onsite mitigation through wetland creation or enhancement of existing jurisdictional features; additional onsite wetland creation or enhancement; or off-site mitigation.				
Cultural Resources					
Impact 4.5-1: Project activities could cause an adverse change in the significance of an historical resource pursuant to §15064.5 of the CEQA Guidelines and the County's Historic Preservation Ordinance.	**Mitigation Measure 4.5-1a:** The Applicant shall document the physical characteristics and their historic context of the contributing features of the Kaiser Permanente Quarry Mining District, including archival photo-documentation, mapping, and recording of historical and engineering information including measured drawings about the property according to the standards of the Historic American Building Survey/Historic American Engineer Record/Historic American Landscapes Survey (HABS/HAER/HALS), to be placed in a local public archive such as the Archives of the County of Santa Clara;	Document the physical characteristics and historic context of contributing features of the Kaiser Permanente Quarry Mining District	Within sixty (60) days prior to removal of the Permanente Quarry Conveyor System	Planning Office	
	Mitigation Measure 4.5-1b: The Applicant shall salvage	Salvage the early	Thirty days (30) prior	Planning Office	

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEHIGH PERMANENTE QUARRY RELCMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	and/or relocate a representative portion of the Permanente Quarry Conveyor System and the remains of the early 1940s crusher, which constitute character-defining features that otherwise would be lost as a part of implementation of the Project; and	1940s crusher, per criteria in 4.5-1b	to construction activities impacting the Permanente Quarry Conveyor System and the remains of the early 1940s crusher		
	Mitigation Measure 4.5-1c: The Applicant shall prepare public information programs to educate the general public on the historic nature of the potential Kaiser Permanente Quarry Mining District, including but not limited to exhibits at the Quarry office, publications available at the Quarry office, and an online presentation available on the Applicant's website (www.lehighpermanente.com).	Prepare public information programs on the historic nature of the potential Kaiser Permanente Quarry Mining District	At least sixty (60) days prior to commencement of any construction activities impacting the Permanente Quarry Conveyor System and the remains of the early 1940s crusher	Planning Office	
Impact 4.5-2: Project activities could cause an adverse change in the significance of an archaeological resource as defined in §15064.5 of the CEQA Guidelines.	**Mitigation Measure 4.5-2:** If cultural resources are encountered during Project implementation, the Applicant shall notify the County and all activity within 100 feet of the find shall halt until it can be evaluated by a qualified archaeologist and a Native American representative. Prehistoric archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; and stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); and battered stone tools, such as hammerstones and pitted stones. Historic-period materials might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and/or ceramic refuse. If the archaeologist and Native American representative determine that the resources may be significant and cannot be avoided, they shall notify the County and an appropriate treatment plan for the resources shall be developed by the Applicant in consultation with the County and the archaeologist. Measures in the treatment plan could include preservation in place (capping) and/or data recovery. The archaeologist shall consult with Native American representatives in determining appropriate treatment for prehistoric or Native American cultural resources. Ground disturbance shall not resume within 100 feet of the find until an agreement has been reached as to the appropriate treatment of the find.	Implement discovery measures if cultural resources are encountered.	Ongoing during project operation	Planning Office	

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEIGH PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
Impact 4.5-3: Project activities could directly or indirectly destroy a unique paleontological resource or site.	**Mitigation Measure 4.5-3:** If a paleontological resource is encountered during implementation of the RPA, the Applicant shall notify the County and all activity within 100 feet of the find shall halt until it can be evaluated by a qualified paleontologist as defined by the Society of Vertebrate Paleontology Guidelines (SVP, 1995). The paleontologist shall evaluate the resource and determine its significance. If significant, the paleontologist shall notify the County and the Applicant, in consultation with the County and the paleontologist, shall prepare a treatment plan such that the fossil would be recovered and scientific information preserved. The paleontologist shall implement the treatment plan in consultation with the County and Applicant prior to allowing work in the 100-foot radius to resume.	Implement discovery measures if paleontological resources are encountered.	Ongoing during project operation	Planning Office	
Impact 4.5-4: Project activities could disturb human remains, including those interred outside of formal cemeteries.	**Mitigation Measure 4.5-4:** In the event that human skeletal remains are encountered, the Applicant is required by Health and Safety Code Section 7050.5, Public Resources Code Section 5097.98, Title 14 California Code of Regulations Section 15064.5(e), and County Ordinance No. B6-18 to immediately notify the County Coroner. Upon determination by the County Coroner that the remains are Native American, the coroner shall contact the California Native American Heritage Commission, pursuant to subdivision (c) of §7050.5 of the Health and Safety Code and the County Coordinator of Indian affairs. No further disturbance of the site shall be made except as authorized by the County Coordinator of Indian Affairs in accordance with the provisions of state law and the County Ordinance. If artifacts are found on the site, a qualified archaeologist shall be contacted along with the County Planning Office. No further disturbance of the artifacts shall be made except as authorized by the County Planning Office.	Implement discovery measures if human remains are encountered.	Ongoing during project operation	Planning Office	
Energy Conservation					
Less than Significant Impacts	No Mitigations	N/A	N/A	N/A	N/A
Geology and Soils					
Impact 4.7-1: Rock and soil slopes constructed as part of the proposed reclamation of the EMSA, Quarry pit, and WMSA could fail under static or seismic forces if not properly engineered and constructed.	**Mitigation Measure 4.7-1: Avoidance and containment of shallow slumps and/or fall-back of overburden material.** In all areas requiring the use of excavators for grading within the PCRA (e.g., access road in-sloping, installation/repair of sedimentation basins, and removal of slide debris), the Applicant and/or its contractor shall begin excavations from the top of slope and proceed downward. The Applicant and/or its contractor shall not undercut sloped materials unless no	Conduct excavation activities and install downslope barriers as specified.	Thirty days (30) prior to the start of all excavation / grading activities, submit to Planning Manager a plan showing the installation of all downslope barriers as	Planning Office, County Geologist	

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEHIGH PERMANENTE QUARRY RELCMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	other option is feasible as determined by a registered geotechnical engineer (e.g., excessively sloped or otherwise inaccessible terrain). In all areas of the PCRA where excavations would occur in sloped materials, the Applicant and/or its contractor shall install barriers immediately downslope of the activity. Downslope barriers shall be designed and installed in a manner that would be adequate to prevent overburden and/or native materials from falling, sloughing or sliding further downslope, or into Permanente Creek. Such measures may consist of temporary interlocking soldier piles, wooden shoring systems, wire mesh or other containment measures(s), and the Applicant and/or its contractor shall not be permitted to conduct excavation or grading activities downgradient of the barrier, or prior to its installation. The ultimate location, design and installation method of such measures shall be prepared and certified, or reviewed and approved by a California State registered geotechnical engineer.		described above. Barriers shall be maintained during excavation / construction activities.		
Greenhouse Gas Emissions					
Impact 4.8-1: The Project could result in an increase in greenhouse gas emissions and contribute to climate change.	**Mitigation Measure 4.8-1a: Develop Annual GHG Inventory.** The Applicant shall become a reporting member of The Climate Registry. Beginning with the first year of the Project and continuing for the duration of the Project, the Applicant shall conduct an annual inventory of GHG emissions and shall report those emissions to The Climate Registry. The annual inventory shall be conducted according to The Climate Registry protocols and third-party verified by a verification body accredited through The Climate Registry.	Become a reporting member of the Climate Registry and conduct an annual inventory of GHG emissions and report emissions .	Within 90 days of approval of the RPA, the Mine Operator shall submit documentation verifying registration with The Climate Registry to the Planning Manager. Copies of annual reporting to Climate Registry shall be submitted to the Planning Manager by October 1 of each year.	Planning Office	
	Mitigation Measure 4.8-1b: Greenhouse Gas Emissions Reduction Plan. The Applicant shall prepare, submit for County and BAAQMD approval, make available to the public, and implement a Greenhouse Gas Emissions Reduction Plan (GHG Plan) containing quantifiable strategies to ensure that the Project-related incremental increase of GHG emissions does not exceed 1,100 MT CO2e per year. The GHG Plan shall include, but not be limited to, the following measures:	Prepare, submit, and implement a Greenhouse Gas Emissions Reduction Plan per criteria in MM 4.8-1b	The Greenhouse Gas Emissions Reduction Plan shall be submitted to the Planning Manager within 90 days of final RPA Approval.	Planning Office, Bay Area Air Quality Management District	

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEIGH PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	1. Replacement of on-road and off-road vehicles and construction equipment with lower GHG-emitting engines, such as electric or hybrid. 2. Use of the Overland Conveyor System, powered by electric motors, to move more than 75 percent of the waste rock from the West Materials Storage Area (WMSA) to reclaim the Quarry pit. If the Applicant is unable to reduce the Project-related incremental increase of GHG emissions to below 1,100 MT CO2e per year using the above measures, the Applicant shall offset all remaining Project incremental emissions above that threshold. Any offset of Project emissions shall be demonstrated to be real, permanent, verifiable, enforceable, and additional. To the maximum extent feasible, as determined by the County in coordination with the BAAQMD, offsets shall be implemented locally. Offsets may include but are not limited to, the following (in order of preference): 1. Onsite offset of Project emissions, for example through development of a renewable energy generation facility or a carbon sequestration project (such as a forestry or wetlands project for which inventory and reporting protocols have been adopted). If the Applicant develops an offset project, it must be registered with the Climate Action Reserve or otherwise approved by the BAAQMD in order to be used to offset Project emissions. The number of offset credits produced would then be included in the annual inventory, and the net (emissions minus offsets) calculated. 2. Funding of local projects, subject to review and approval by the BAAQMD that would result in real, permanent, verifiable, enforceable, and additional reduction in GHG emissions. If the BAAQMD or County of Santa Clara develops a GHG mitigation fund, the Applicant may instead pay into this fund to offset Project incremental GHG emissions in excess of the significance threshold. 3. Purchase of carbon credits to offset Project incremental emissions to below the significance threshold. Carbon offset credits must be verified and registered with The Climate Registry, the Climate Action Reserve, or other source that is approved by the California Air Resources Board as being		If offsets are to be purchased, documentation must be submitted for review and approval to the Planning Manager and BAAQMD within 90 days of final RPA Approval.		

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEHIGH PERMANENTE QUARRY RELCMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	consistent with the policies and guidelines of the California Global Warming Solution Act of 2006 (AB 32), or available through a County- or BAAQMD-approved local GHG mitigation bank or fund.				
Hazards and Hazardous Materials					
Less than Significant Impacts	No Mitigations	N/A	N/A	N/A	N/A
Hydrology and Water Quality					
Impact 4.10-1: Post-reclamation conditions in the East Materials Storage Area (EMSA), West Materials Storage Area (WMSA), and Quarry pit would increase selenium concentrations in Permanente Creek to levels exceeding baseline conditions and RWQCB Basin Plan objectives.	**Mitigation Measure 4.10-1a: Professional Geologist Verification of Non-Limestone-Containing Material Use.** A California-certified Professional Geologist shall be onsite during reclamation to verify that non-limestone run-of-mine rock is used as cover on the EMSA and WMSA. In addition, the Geologist shall observe and document activities associated with placing the final overburden on the Quarry pit (i.e., ensuring that organic material is mixed to specifications). Using visual and field testing methods, with occasional bulk sampling and laboratory analysis, the geologist shall observe and document the type of rock placed over the limestone-containing material during reclamation activities. The geologist shall inspect and document whether limestone is present at the source area (Quarry pit and WMSA), whether limestone rock is transported from the source area to segregation stockpiles, and whether limestone is present within the lifts of the proposed 1-foot layer of run-of-mine cover rock (in the EMSA, WMSA, and Quarry pit). Inspection involves observing the excavation, hauling, stockpiling, and placement of the non-limestone cover material, performing a visual assessment of the rock, and conducting random spot sampling and field testing of suspect rock fragments. If observation, field testing, or laboratory analysis indicates that significant amounts of limestone are intermixed with the supposed non-limestone cover material, the geologist shall document its presence, temporarily halt fill operations, and notify the County Planning Office and field superintendent. Once notified, the Applicant shall remove the limestone-containing materials and then perform verification field sampling in addition to laboratory verification.	Employ a California-certified Professional Geologist to verify, through use of visual and field testing methods, that non-limestone run-of-mine rock is used as cover on the EMSA and WMSA	Within ninety (90) days of final RPA Approval, the Mine Operator shall submit to the Planning Manager a copy of a contract or an employee resume employed by the Mine Operation that is a California-certified Professional Geologist responsible to conduct monitoring as described above. Quarterly reports shall be submitted from the Geologist to the Planning Manager describing effectiveness of mitigation and monitoring during final reclamation as described above.	Planning Office, County Geologist	
	Mitigation Measure 4.10-1b: Verification and Water Quality Monitoring. The Applicant shall implement the following water monitoring and verification program within 90 days of Project approval and continue the program throughout the backfilling and reclamation phases and for 5 years following completion	Implement the water monitoring and verification program per MM 4.10-1b	Within 90 days of Project approval; throughout the backfilling and reclamation phases; and for 5 years	Planning Office	

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEIGH PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	of reclamation. As part of this program, the Applicant shall: • Collect quarterly Quarry pit water samples and analyze for general water chemistry and dissolved and total metals, including selenium. • Perform quarterly electrical conductivity and pH measurements of the Quarry water. • Measure and record daily volumes of any water that is pumped from the pit area. • Conduct annual seep surveys in March or April of each year within the Quarry pit. Any seeps identified shall be sampled for general water chemistry and minerals and dissolved metals, and the seep flow rate shall be estimated. • Perform routine testing of each of the various rock types that comprise the overburden to further characterize bulk and leachable concentrations of key metal constituents (selenium in particular). Such testing shall be performed until the average concentrations and the variability within a rock type is no longer changing significantly as new data are gathered. • Sample and test runoff from the EMSA and WMSA throughout and following reclamation to confirm the concepts and closure plans (i.e., that cover with non-limestone material and revegetation results in runoff water quality that meets Basin Plan Water Quality Objectives and all other applicable water quality standards). Stormwater runoff monitoring and sampling shall be conducted following the placement and final grading of the 1-foot run-of-mine non-limestone cover material to ensure that surface water discharging from this cover does not contain selenium at concentrations exceeding Basin Plan Water Quality Objectives. Three rounds of representative surface water samples shall be collected and analyzed to verify rock cover performance prior to the placement of the vegetative growth layer. • Sample and test groundwater discharge from the Quarry Pit into Permanente creek following reclamation as described on page 4.10-39 of the Final Environmental Impact Report to confirm that water quality in discharge meets Basin Plan Benchmarks and all other applicable water quality standards.		following completion of reclamation and for 5 years following the start of groundwater discharge from the Quarry Pit into Permanente Creek as described on page 4.10-39 of the Final Environmental Impact Report All testing data shall be submitted to the Planning Office with the Annual Report by October 1 of each year. Reclamation shall not be considered complete until water quality testing demonstrates compliance with applicable standards.		

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEHIGH PERMANENTE QUARRY RELCMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	• The data obtained through this mitigation measure shall be used to reevaluate the water balance components such as runoff and groundwater inflow and the water quality associated with these within the last five years of active mining. Based on the results of any refined water balance and water quality projections, the Applicant shall also review and refine the water management procedures. • Reclamation of the Quarry Pit, EMSA, and WMSA areas shall not be considered complete until 5 years of water quality testing as described above demonstrate, to the satisfaction of the Director of Planning and Development, that selenium in surface water runoff and any point source discharges has been reduced below all applicable water quality standards, including Basin Plan Water Quality Objectives.				
Impact 4.10-2: Interim reclamation activities within the Project Area would contribute concentrations of selenium, Total Dissolved Solids (TDS), and sediment in Permanente Creek.	**Mitigation Measure 4.10-2a: Interim Stormwater Control and Sediment Management.** To minimize the discharge of sedimentation and metal constituents, particularly selenium, to watercourses, the Applicant shall implement the following stormwater and sediment management controls in addition to general BMPs required by the SWPPP in active and inactive reclamation areas throughout Phases 1, 2, and 3 of the Project. The Applicant shall: • Segregate limestone materials from the non-limestone materials (breccia, graywacke, chert, and greenstone) by way of operational phasing to ensure that limestone materials are placed beneath and are covered by non-limestone materials. A California Professional Geologist shall oversee stockpiling, segregation, and placement of non-limestone materials. • Stabilize inactive areas, such as temporary stockpiles or dormant excavations that drain directly or indirectly to Permanente Creek using an appropriate combination of BMPs to cover the exposed rock material, intercept runoff, reduce its flow velocity, release runoff as sheet flow, and provide a sediment control mechanism (such as silt fencing, fiber rolls, or hydroseeded vegetation). Standard soil stabilization BMPs include geotextiles, mats, erosion control blankets, vegetation, silt fence surrounding the stockpile perimeter, and fiber rolls at the base and on side slopes. • Temporarily stabilize active, disturbed reclamation areas undergoing fill placement before and during qualifying rain	In active and inactive reclamation areas, implement stormwater and sediment management controls per MM 4.10-2a, in addition to general BMPs required by the SWPPP	Implementation of the Best Management Practices shall begin within 30 days of final RPA Approval. Prior to October 1, 2012, the Operator shall provide a report, with photos, documenting and demonstrating that the aforementioned BMP's are being implemented in all areas as described. Prior to October 15 of each year, a County Inspector shall verify installation of the aforementioned BMP's. Inspection of BMP's by a County Inspector shall occur monthly between October 15 and April 15 for each year when interim reclamation activities	Planning Office Land Development Engineering	

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEIGH PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	events expected to produce site runoff. Stabilization methods include combined BMPs that protect materials from rain, manage runoff, and reduce erosion. Reclamation activities involving grading, hauling, and placement of backfill materials cannot take place during periods of rain. • In areas such as the WMSA where fill slopes are steep and composed of loose material, controls shall be in place to prevent material from sloughing off into the PCRA and Permanente Creek. These controls shall include debris/silt fencing placed on outer edge of grading and excavation operations back-sloping excavations to prevent grade slope towards the creek, operations buffer areas that require the use of smaller grading equipment, temporary berms along the outer extent of operations closest to the creek, operator training regarding the prevention of triggering debris slides. • Cover active haul roads with non-limestone materials where exposed limestone surfaces are present. Roads that undergo dust control by watering must have fiber rolls or equivalent runoff protection installed along the road side to reduce runoff and avoid drainage to Permanente Creek. • Divert all runoff generated from disturbed active and inactive reclamation areas to temporary basins, the Quarry pit, or temporary vegetated infiltration basins and kept away from drainage pathways entering Permanent Creek. To the extent possible, drainage of the non-limestone materials shall be diverted directly to sediment control facilities and natural surface drainages. • Install up-gradient berms where limestone fines or stockpiles are placed, to protect against stormwater run-on, and install ditches and down-gradient berms to promote infiltration rather than run-off. • Replace the limestone rock and materials that are currently used in the existing BMP ditches and cover or otherwise separate runoff from limestone rock in the existing sediment pond embankments. • Cover large limestone surfaces that would remain exposed during the rainy season with interim covers composed of non-limestone rock types. • Inspect and maintain BMPs after each qualifying rain		occur.		

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEHIGH PERMANENTE QUARRY RELCMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	event to ensure their integrity. • Reconstruct or reline all existing stormwater conveyances and check dam structures that are constructed or lined with limestone rock using non-limestone material (greenstone, breccias, greywacke, metabasalt), available at the Quarry. • Regularly inspect all stormwater and erosion controls, especially before and following qualifying rain events. Inspections shall be documented and periodically reported. Any violations shall be corrected immediately. • Provide adequate erosion control training to all equipment operators, site superintendants, and managers to ensure that stormwater and erosion controls are maintained and remain effective. • Use only jute netting or other suitable replacement for erosion control in the PCRA; no plastic monofilament shall be used for erosion control or other purposes, as California Red Legged Frogs and other wildlife may become entangled in it. • Ensure that all stormwater, erosion, and sediment control BMPs are installed, inspected, maintained, and repaired under the direction of either a California certified engineer, geologist, or landscape architect, an American Institute of Hydrology registered professional hydrologist, or a certified erosion control specialist.				
	Mitigation Measure 4.10-2b: EMSA Interim Stormwater Monitoring Plan. The Applicant shall develop a stormwater sampling plan that would supplement preexisting surface water monitoring required by General Industrial Storm Water and Sand and Gravel NPDES Permit and be designed specifically to monitor surface water during reclamation activities in active and inactive excavation and backfill areas. The purpose of this plan is to evaluate performance of temporary BMPs and completed reclamation phases at the EMSA and to identify areas that are sources of selenium (measured on total recoverable basis), sediment, or high TDS. At a minimum, the plan shall require the Applicant to inspect BMPs and collect water samples for analysis of TDS and metals, including selenium, within 24 hours after a qualifying rain event and sample non-stormwater discharges when they occur. If elevated selenium, sediment, or TDS is identified through sample analysis, the Applicant shall identify the	Develop a stormwater sampling plan per MM 4.10-2b to evaluate performance of temporary BMPs and completed reclamation phases	Prior to October 1st 2012, submit the Stormwater Monitoring Plan to the Planning Manager for review and approval Stormwater testing results shall be submitted to Planning Manager on a monthly basis between October 15 and April 15 of each year. If a qualifying	Planning Office	

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEIGH PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	source and apply any new or modified standard BMPs available. BMPs that show sign of failure or inadequate performance shall be repaired or replaced with a more suitable alternative. Following implementation, the Applicant shall re-test surface water to determine the effectiveness of such modifications, and determine whether additional BMPs are necessary.		rain event did not occur during any month during this period (and stormwater testing was not conducted), notification shall be submitted to the Planning Manager in lieu of test results.		
	Mitigation Measure 4.10-2c: Monitoring and Determination of BMP Effectiveness for the EMSA. • Within 30 days of Reclamation Plan Amendment approval, sampling and testing shall occur within 24 hours after a rain event. If no qualifying rain event occurs within 30 days of Reclamation Plan approval, then testing shall begin at the first qualifying event. Testing shall be conducted in accordance with the Stormwater Sampling Plan developed and approved in accordance with Mitigation Measure 4.10-2b. • If test results for two consecutive years show that stormwater discharging from the EMSA into Permanente Creek exceeds total recoverable selenium of 5 µg/L, or other applicable discharge requirement as determined by the RWQCB, then the County shall schedule a public hearing before the Planning Commission to determine whether the Applicant is complying with the stormwater discharge requirements. For purposes of triggering Planning Commission review, the sampling shall occur at locations where water discharges to Permanente Creek. • If the Planning Commission determines that the Applicant is not complying with discharge requirements, then the Applicant shall install a treatment system (or alternative) as described under Mitigation Measure 4.10-2e.	Conduct water sampling and testing	Testing shall occur within 24 hours of a rain event. Testing results shall be submitted to the Planning Office as outlined under Mitigation Measure 4.10-2b. Planning Manager shall schedule public hearing before Planning Commission if performance measures not met, as described. Testing results shall be reviewed by Planning Manager at end of each rainy season (October 15 to April 15).	Planning Office Planning Commission	
	Mitigation Measure 4.10-2d: Monitoring and Determination of BMP Effectiveness for the WMSA and Quarry Pit. • Within 30 days of the start of reclamation activities for Phase 2, the Applicant shall conduct monthly water sampling and testing results as described in Mitigation Measure 4.10-1b.	Conduct monthly water sampling and testing	Within 30 days of the start of reclamation activities for Phase 2 For Phase II and III, submit a Monitoring Plan to the Planning	Planning Office	

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEHIGH PERMANENTE QUARRY RELCMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	• If test results for two consecutive years show that selenium levels are higher than base levels, then the County shall schedule a public hearing before the Planning Commission to determine whether the reclamation activities are causing an increase in total selenium above the base levels. "Base levels" shall be defined as water testing results for an average for two years immediately prior to start of Phase 2 reclamation for discharge into Permanente Creek from the WMSA and Quarry pit. For purposes of triggering Planning Commission review, the sampling shall occur at locations where water discharges to Permanente Creek. • If the Planning Commission finds that reclamation activities are causing an increase in selenium over base levels, then the Applicant shall install a treatment system (or alternative) as described under Mitigation Measure 4.10-2e.		Manager for review and approval sixty (60) days prior to the start of Phase II, Testing results shall be submitted to the Planning Office as outlined under Mitigation Measure 4.10-2b. Planning Manager shall schedule public hearing before Planning Commission if performance measures not met, as described.		
	Mitigation Measure 4.10-2e: Design, Pilot Testing, and Implementation of Selenium Treatment Facility or Alternative for the EMSA and/or the WMSA and Quarry Pit. • Within 30 days of Reclamation Plan Amendment approval, the Applicant shall begin designing a treatment facility (or alternative) and pilot system for discharge into Permanente Creek. The treatment shall be designed to achieve the Basin Plan Water Quality Objective for selenium (total recoverable selenium of 5 µg/L) for discharge from the EMSA, and/or to achieve the "base level" standard for the WMSA and Quarry pit as defined under Mitigation Measure 4.10-2d. • The Applicant shall complete design, pilot testing, and feasibility analysis for a treatment facility within 24 months of Reclamation Plan Amendment approval or by such other time as may be prescribed by the RWQCB. • The Planning Commission shall hold a public hearing no later than 30 months after Reclamation Plan Amendment approval to determine feasibility of the treatment facility (or alternative). The Planning Commission may defer the public hearing if the Regional Water Quality Control Board determines that additional time is necessary to complete the design, pilot testing, and feasibility analysis. If the Planning Commission determines that a treatment facility	Begin designing a treatment facility (or alternative) and pilot system for discharge into Permanente Creek	Within 30 days of Reclamation Plan Amendment approval Submit all feasibility analysis and studies to the Planning Manager within 24 months of Reclamation Plan Approval	Planning Office	

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEIGH PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	is feasible, the Planning Commission shall also establish a timeline for implementing the treatment facility. • Construction, installation, and operation of a treatment facility (or alternative) shall be required if discharge requirements are not met as described under Mitigation Measures 4.10-2c and 4.10-2d, based on a determination of the Planning Commission, and if it has been determined feasible by the Planning Commission following a public hearing.				
Impact 4.10-4: The Project would alter the existing drainage pattern of the site, which could result increased storm water runoff rates and on- or offsite flooding.	**Mitigation Measure 4.10-4: Construction of Onsite Detention Facility.** The Applicant shall design and construct detention facilities that would 1) manage increased runoff caused by the reclaimed Quarry pit, 2) reduce excessive discharges to Permanente Creek, and 3) develop the capacity to detain and release the 100-year flow using onsite detention basins while optimizing groundwater infiltration. The final drainage design shall ensure that offsite, downstream flows would not cause an increased flooding potential or lead to hydromodification effects. Design considerations for onsite detention basins shall include the following performance standards. The basin shall be designed to: • Maintain turbidity of receiving water outflows within discharge limitations for Permanente Creek, as set forth by the San Francisco Bay Regional Water Quality Control Board Basin Plan or other more stringent, site-specific limitations set forth by the RWQCB. • Effectively drain between storm events within the period of time specified by the Santa Clara County 2007 Drainage Manual. • Enhance the settlement of fine sediment while limiting the potential for sedimentladen water to be discharged to Permanente Creek. • Incorporate appropriate sediment traps (i.e., low areas that promote sediment settlement) in areas away from outflow structures to limit discharge of sediment at high flow periods. • Control surface water inflows to the detention facility using energy reduction features (i.e., rip-rap aprons, vegetated swales) to reduce inflow velocity and agitation of sediment within the basin. • Infiltrate surface water to the extent practicable while	Design and construct on-site stormwater detention facilities to ensure that offsite, downstream flows would not cause an increased flooding potential or lead to hydromodification effects	Prior to commencement of reclamation activities	Planning Office Land Development Engineering Office	

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEHIGH PERMANENTE QUARRY RELCMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
	accounting for and protecting the local groundwater condition and water quality.				
Impact 4.10-6: The Project would alter the existing drainage pattern of the site, which could result in increased stormwater ponding, accumulation of selenium, and flooding.	**Mitigation Measure 4.10-6: Stormwater Control to Avoid Ponded Water and Selenium Accumulation.** The Applicant shall incorporate drainage features into the final drainage design for the Quarry pit area to eliminate the potential for surface ponding on the floor of the Quarry pit once it has reached its final elevation (990 amsl). The drainage design for the finished Quarry pit fill shall include engineered elements (e.g. conveyance channels, infiltration galleries) that facilitate groundwater recharge and percolation from limestone areas to groundwater in the Quarry backfill with the objective of accommodating high groundwater elevation without creating surface water bodies that may contain elevated levels of selenium. These measures shall be incorporated into the design of the proposed basin proposed for the floor of the Quarry pit once the floor is raised to its final elevation.	Design the Quarry pit area to eliminate the potential for surface ponding on the floor of the Quarry pit once it has reached its final elevation	Prior to the start of Phase III, submit final drainage design demonstrating compliance with the standards described above. .	Planning Office	
Land Use and Planning					
Less than Significant Impacts	No Mitigations	N/A	N/A	N/A	N/A
Mineral Resources					
Less than Significant Impacts	No Mitigations	N/A	N/A	N/A	N/A
Noise					
Impact 4.13-1: Operations associated with reclamation during Phase 1 would exceed County noise standards and increase ambient noise levels at noise-sensitive uses in the vicinity.	**Mitigation Measure 4.13-1a:** The Applicant shall prohibit all heavy equipment operations in the northeasterly 11.5 acres of the EMSA (as shown in Figure 4.13-8) during nighttime hours (i.e., between 10:00 p.m. to 7:00 a.m.).	Prohibit heavy equipment operations in northeasterly 11.5 acres of the EMSA during nighttime hours	Within thirty (30) days of the RPA Approval, the Mine Operator shall post a sign inside all mine equipment operating in the EMSA area The sign shall be posted prominently within view of the vehicle operator. Within 30 days of the RPA approval, the Mine Operator shall submit to the Planning Manager photo documentation demonstrating	Planning Office	

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEIGH PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
			compliance of this		
	Mitigation Measure 4.13-1b: The Applicant shall either: (1) limit all operations in the EMSA within 1,600 feet of the caretaker's residence (as shown in Figure 4.13-8) to no more than one 8-hour shift per day, or (2) submit evidence establishing to the County's satisfaction that there are legally-binding restrictions precluding any occupancy of the caretaker's residence during the entirety of Phase 1 of the Project.	Reduce potential noise at caretaker's residence per MM 4.13-1b	Within thirty (30) days of the RPA Approval, the Mine Operator shall post a sign inside all mine equipment operating in the EMSA area The sign shall be posted prominently within view of the vehicle operator. Within 30 days of the RPA approval, the Mine Operator shall submit to the Planning Manager photo documentation demonstrating compliance of this	Planning Office	
Population and Housing					
No Impacts	No Mitigations	N/A	N/A	N/A	N/A
Public Services					
No Impacts	No Mitigations	N/A	N/A	N/A	N/A
Recreation					
Less than Significant Impacts	No Mitigations	N/A	N/A	N/A	N/A
Traffic/Transportation					
Less than Significant Impacts	No Mitigations	N/A	N/A	N/A	N/A
Utilities and Service Systems					
Less than Significant Impacts	No Mitigations	N/A	N/A	N/A	N/A
Cumulative Impacts					
Impact 6-1: Project construction activities could make a cumulatively considerable contribution a substantial adverse effect on a scenic vista and degradation of the	**Mitigation:** None feasible.	N/A	N/A	N/A	N/A

TABLE 1 (Continued)
MITIGATION MONITORING, REPORTING, AND COMPLIANCE PROGRAM FOR THE LEHIGH PERMANENTE QUARRY RELCMATION PLAN AMENDMENT

Potentially Significant Impact	Mitigation Measures	Implementing Action	Timing of Implementation	Responsible Department or Agency	Compliance Verification
existing visual character or quality of the Project Area.					

Feasibility Assessment

Lehigh Permanente Quarry Selenium Treatment

Prepared for

County of Santa Clara

On Behalf of

Environmental Science Associates

April 2012

CH2MHILL®

155 Grand Avenue
Suite 800
Oakland, CA 94612

Contents

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Figures

Acronyms and Abbreviations

°C	degree Celsius
°F	degree Fahreinheit
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
ABMet	Advanced Biological Metals Removal
acre-ft	acre-foot
amsl	above mean sea level
BAT	best available technology
BFD	block flow diagram
BOD	biochemical oxygen demand
CAPEX	capital cost
CCR	coarse coal reject bioreactor
cfs	cubic feet per second
$CBOD_5$	carbonaceous biochemical oxygen demand
COD	chemical oxygen demand
DO	dissolved oxygen
EMSA	East Material Storage Area
ESA	Environmental Science Associates
FBR	fluidized bed reactor
ft^3	cubic foot
GAC	granular activated carbon
gpm	gallons per minute
hp	horsepower
HRT	hydraulic retention time
ICB	immobilized cell bioreactor
kW-hr	kilowatt-hour
MBBR	moving bed bioreactor
MCC	motor control center
mg/L	milligram per liter
OPEX	operation and maintenance costs
ORP	oxidation/reduction potential
NOAA	National Oceanic and Atmospheric Administration
RCRA	Resource Conservation and Recovery Act of 1976

Quarry	Lehigh Permanente Quarry
SES	Strategic Engineering & Science, Inc.
TDS	total dissolved solids
TEC	Total Equipment Cost
TIC	Total Installed Cost
TM	technical memorandum
TOC	total organic carbon
TSS	total suspended solids
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WMSA	West Material Storage Area
ZVI	zero valent iron

SECTION 1

Project Background

Lehigh Permanente Quarry (Quarry) operates a limestone quarry in Santa Clara County, California, that will be closed in approximately 20 years. The Quarry recently submitted a closure and reclamation plan amendment with some portions of the reclamation to be implemented within the next 3 years. Water discharged from the Quarry to Permanente Creek has unacceptably high concentrations of selenium (approximately 80 micrograms per liter [µg/L]).

CH2M HILL was contracted by the Santa Clara County through Environmental Science Associates (ESA) to develop a technical memorandum (TM) identifying available technologies for treating selenium under comparable water quality to the Quarry and a peer review of the Lehigh Selenium Treatment Mitigation strategy (CH2M HILL, 2012). The TM provided an overview of selenium treatment options currently available, the challenges in selenium treatment, selenium chemistry, a summary of full-scale technologies to meet a 5-µg/L level, the steps for selecting an appropriate technology for the Quarry, and a review of Lehigh's brief Selenium Treatment Mitigation technical memorandum (Appendix A). Responses to the County of Santa Clara's comments on the Draft Feasibility Assessment are provided in Appendix B.

The objectives of this report are to assess feasibility for selenium treatment at the Quarry and provide a conceptual, estimated order of magnitude of total installed cost for a biological treatment system at Lehigh Permanente Quarry for treating selenium in the water to an effluent quality of 5 µg/L. Also included in the assessment are recommendations of further studies to reduce uncertainty in the design basis and runoff management and schedules for developing design criteria. The estimates would be based on cost curves developed by CH2M HILL for comparative purposes, and would have an accuracy of +100%, -50%.

1.1 Overview of Selenium Treatment for Stringent Discharge Regulation

The Quarry contains full-scale systems that have not been attaining a discharge quality of 5 µg/L. Treatment of the water pumped from the Quarry is feasible but not necessarily inexpensive. A variety of physical, chemical and biological treatment technologies have been shown to remove selenium from water. There are challenges and uncertainty in some of the design parameters, such as water quality/quantity, the scale factor, permit limits, and the costs of types of treatment systems. Treatment technology must be configured as a "system" that includes primary, tertiary, and residual treatment processes.

Many large-scale treatment plants being designed to treat contaminated water require piloting to develop detailed design specification for the full-scale design. There is usually a site-specific component to water quality, effluent requirements, or space that will require modifications to proven technologies. For the Quarry, the main issues relate to the length of time required to develop design data and reduce uncertainty in the flows, equalization volumes, stormwater management, and water quality inputs to the treatment plant.

Primary treatment to remove suspended solids and/or inorganic scale (e.g., calcium carbonate) may be required for certain of the core selenium treatment technologies. Tertiary treatment generally will be required to meet both the selenium and other conventional surface water discharge parameter guidelines or criteria. Residuals or by-product treatment will be required for most systems. The residuals will contain concentrated levels of selenium that, if disposed of as a solid or liquid waste, will need to comply with other disposal regulations (e.g., U.S. Environmental Protection Agency [USEPA] Resource Conservation and Recovery Act of 1976 [RCRA] Hazardous Waste). By-products might require further treatment to ultimately reduce the selenium to a less hazardous form.

1.2 Core Selenium Treatment

A biological-based system for the Lehigh Permanente Quarry could reach 5 µg/L after data collection and piloting. Also essential to optimize the treatment flows would be the completion of a water management strategy for runoff entering the pit from the West Material Storage Area (WMSA) that would target runoff that could be segregated and managed without treatment. This water management strategy would minimize the pumped flows from the Quarry, which will improve the economic picture for any treatment that is ultimately selected. This Feasibility Assessment provides information related to our conceptual design, rough costs to treat the water quality and flows currently estimated for the Quarry, and the schedule of activities to proceed from further characterization through final design.

Consistent with the *Review of Available Technologies for the Removal of Selenium from Water for the North American Metals Council* (CH2M HILL, 2010), attached growth biological (e.g., fluidized bed reactor [FBR], Advanced Biological Metals Removal [ABMet], course coal reject bioreactor [CCR], and immobilized cell bioreactor [ICB]), evaporation/crystallization, ion exchange, passive (e.g., biochemical reactor and constructed wetlands), and zero valent iron (ZVI) are technologies that have provided the most consistent treatment of selenium down to 5-µg/L levels. Significant attention has been directed to biological systems for selenium removal. On the basis of CH2M HILL's experience, biological-based active and passive treatment systems generally provide the lowest cost and most effective treatment. Passive systems generally require a much larger footprint than active systems. CH2M HILL is in various stages of design and construction of selenium reduction systems for the coal mining industry in North America, as summarized in Appendix A. For the Feasibility Assessment, we have selected the FBR system as the core technology for selenium removal.

1.3 Design Basis for the Fluidized Bed Reactor System

Achieving selenium levels less than 5 µg/L in surface water discharges from the Quarry poses a challenge because selenium removal is limited by the following:

- The minimum and maximum feasible ranges of design flows that can vary greatly over time
- Concentrations that are relatively dilute (e.g., less than 500 µg/L)
- Water that is confounded by the water matrix (e.g., temperature, pH, sulfate, and other chemicals)
- Treatment that generally results in a concentrated by-product or residual (re-release from the residuals can occur)

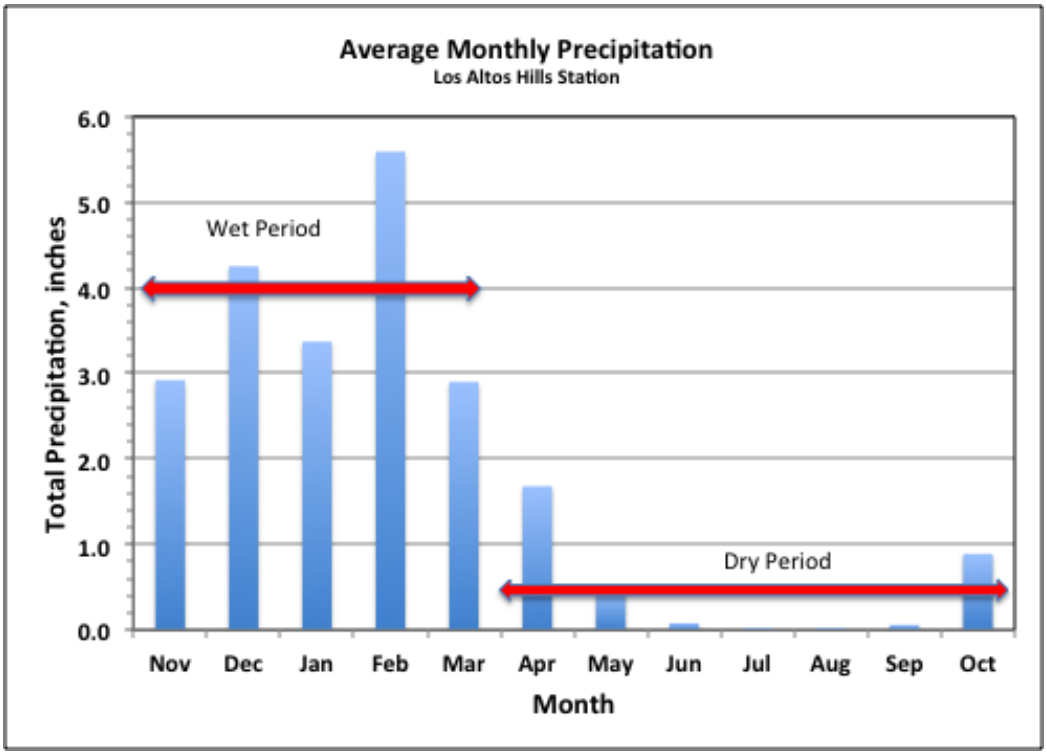
Significant variation in selenium levels and flows increases the complexity of where to target treatment of selenium. Generally, all the selenium treatment technologies are hydraulic dependent versus selenium mass dependent; therefore, up-front water flow equalization and diversion maybe required to reduce the sizing of the selenium treatment plant and stabilize influent flow rate. In addition, the collection and treatment of stormwater runoff for excessive storm recurrence intervals, if needed, must be considered in the design flow rate.

1.3.1 Influent Flow rate Determination and Seasonal Variability

Water distributed to Pond 4A is a combination of stormwater from the Quarry slopes, hillsides, and the WMSA adjacent storage area and groundwater that seeps into the Quarry. The water, collected at the Quarry bottom, is pumped to a holding pond, referred to as Pond 4A. Water in Pond 4A is allowed to settle to remove suspended particulates, and discharged to Permanente Creek via gravity.

Precipitation measured in the area at the Los Altos Hills Station, approximately 3.3 miles NW of the North Quarry, illustrates that the majority of the precipitation occurs during the wetter periods of the year (November through March) (Figure 1). Annual precipitation for 1999-2009 averaged 22.2 inches with 86 percent of that occurring during the wetter period and only 14 percent occurring from April through October.

Figure 1. Monthly Precipitation near the Lehigh Quarry



As part of the Permanente Quarry Reclamation Plan Update (Golder Associates, 2011), a hydrologic investigation was conducted to examine the water balance for the North Quarry. The information for this report was based on 9 months of data for which the groundwater inflow based on surface runoff estimates was calculated. Evaporation and precipitation onto the pit water was also incorporated in the water balance. This information was for a groundwater assessment for future reclamation conditions, not for treatment plant sizing. However, in the absence of a detailed study for establishing a water balance useful for full-scale design purposes, the data were used by CH2M HILL to examine a potential design flow. The water balance, developed in the hydrologic report (Golder Associates, 2011) using data from the Quarry to determine the groundwater flow into the North Quarry, was determined from Equation 1:

$$V_{GW} = V_{PIT} + V_{PUMPED} + V_{EVAP} + V_{PRECIP} - V_{RUNOFF} \quad (1)$$

Where:

V_{GW} = volume of groundwater entering the pit

V_{PIT} = change in volume of the water in the pit

V_{PUMPED} = volume of water pumped out of the pit

V_{PRECIP} = volume of water from direct precipitation into the pit

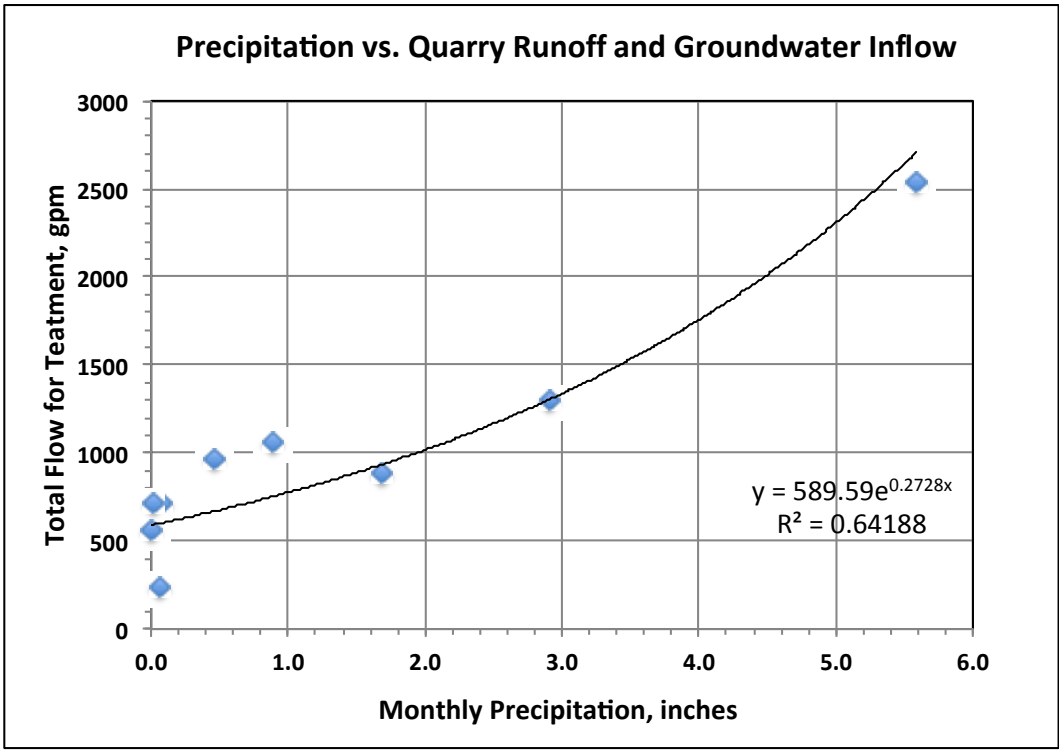
V_{EVAP} = volume of water lost to evaporation (surface area of the pit water)

V_{RUNOFF} = volume of water from runoff using the catchment area of the North Quarry and a runoff coefficient of 0.3

Our analysis, conducted using data from February through October 2009, determined that the total inflow (groundwater and runoff) into the Quarry was 37,400,000 cubic feet (ft^3) (858 acre feet [acre-ft])[1]. While data for November 2008 to January 2009 were not available, the total inflow likely results from precipitation; monthly precipitation contributes to both runoff and groundwater inflow into the Quarry. The analysis indicated that the direct precipitation into the pit and evaporation from the pit water was a small component of the water balance (up to 2.5 percent of the sum of the surface runoff and groundwater inflow). For this report, the volume of water to be treated is estimated by using the sum of the surface runoff and the groundwater inflow.

Using the data from the hydrologic investigation for February through October 2009, an exponential regression equation was developed to fill in the missing data for November 2008 through January 2009. Adding these months is important because of the rainfall associated with the wet period and the corresponding influence on the total potential pumping rate (Figure 2). From this analysis, the November-January period represents 35 percent of the total inflow to the Quarry (Table 1 and Figure 3). The annual inflows and resulting pumped quantities were 1,100 gallons per minute (gpm) (2.94 cubic feet per second [cfs]) while the wet period average flow was 1,700 gpm (4.55 cfs) and the dry period average flow was 750 gpm (2.01 cfs). The average pumping rate from the Quarry from March through August was 1,100 gpm (2.45 cfs). The estimated annual inflow over 12 months is approximately 80,000,000 ft^3 (1,840 acre-ft) (Table 1).

Figure 2. The Relationship Between Precipitation and Surface Runoff and Groundwater Inflow into the North Quarry

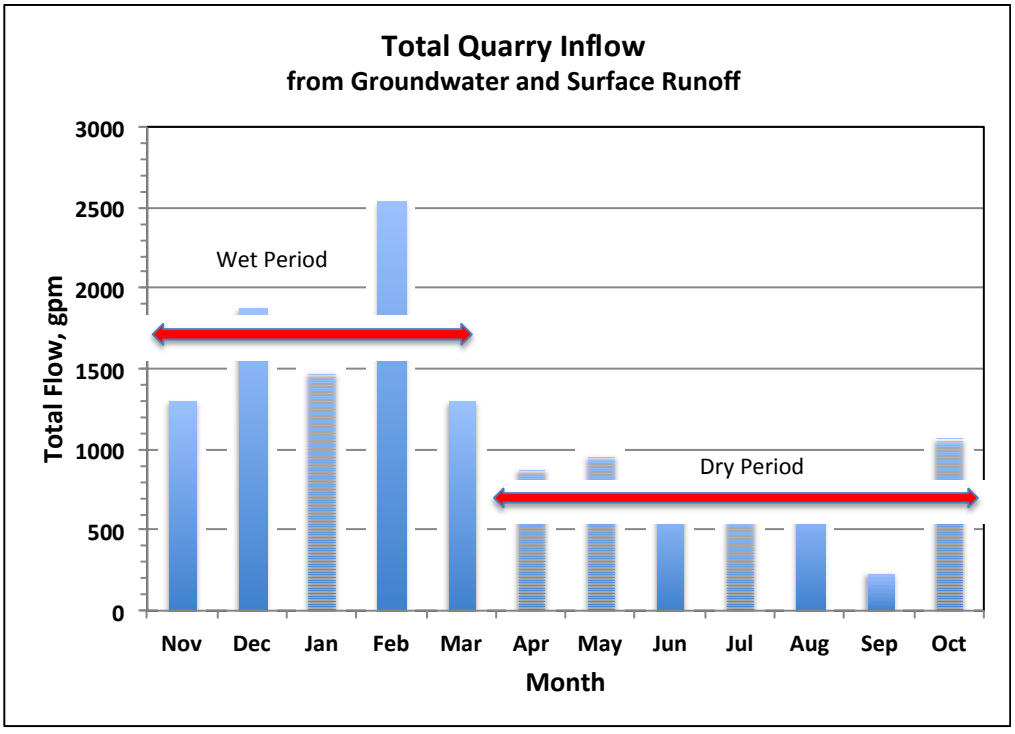


[1] The inflow calculated included 16 days of February, 5 days of August, 19 days of September, and 20 days of October (Golder, 2011).

TABLE 1
Projected Monthly Quarry Inflows for 2009

Period	Month	Projected Monthly Flows	
		Average Monthly Precipitation (inches)	Total Quarry Inflow (gpm)
Wet Period	Nov	2.92	1,308
	Dec	4.25	1,880
	Jan	3.37	1,478
	Feb	5.59	2,542
	Mar	2.9	1,303
Dry Period	Apr	1.68	883
	May	0.46	967
	Jun	0.08	712
	Jul	0.00	566
	Aug	0.01	714
	Sep	0.06	239
	Oct	0.89	1,069
Annual	Average	22.2	1,138
Wet Period	Average	3.81	1,702
Dry Period	Average	0.45	736

Figure 3. Monthly Quarry Inflows for the Wet and Dry Periods



The hydrologic investigation analysis (Golder Associates, 2011) identified that during the mid-February to mid-March 2009 period, excessive precipitation (nearly 13 inches) resulted in a 39-foot increase in the water level in the North Quarry pit to 776 feet above mean sea level (amsl). Subsequent to this time period, total precipitation was 1.2 inches from mid-March to mid-August, and the pit water level was lowered to 737 feet amsl through pumping at the 1,100-gpm flow rate. Another storm event in October 2009 resulted in the rise of water

level in the North Quarry from 738 feet amsl to 745 feet amsl due to 4.2 inches of precipitation. The analysis of the water balance for this storm suggested a total inflow due to surface water runoff and groundwater inflow of 1,800,000 ft^3 (approximately 41 acre-ft). At present, excessive precipitation events that lead to localized runoff in excess of pumping capacity is accumulated in the pit and results in increased water levels. Management of the runoff into the Quarry and the subsequent required treatment plant flow rate will involve additional quantitative analyses of a combination of activities, including runoff segregation in the WMSA, possible direct discharge (through siltation basins) of excessive storms without treatment, and storage in the Quarry through accepted elevation changes for the operational period for the Quarry. It must be emphasized that the water quality has not been determined for extreme events and may preclude direct discharge prior to treatment, but it is anticipated that some reduction of treatment plant flows could be achieved through a thoughtful water management system.

The average statistics for the annual, wet, and dry periods (Table 2) indicate that the design basis for the treatment plant would be 1,750 gpm based on the average and one standard deviation of the annual average monthly flow. Currently, flows into the Quarry above the pumping capacity are handled by allowing a rise in the water level within the pit. We believe that this is a suitable means for managing the wet weather flows, but decisions on the treatment capacity must consider operational requirements for the Quarry. As previously mentioned, optimization of the water management for the facility, particularly the WMSA, could lead to lower treatment flow rates, and a smaller treatment plant. In addition, North Quarry inflows above a design treatment flow rate could be handled by using water storage within the pit, allowing for an increase in water level if inflows of surface water runoff and groundwater inflow exceed the design capacity, a management strategy currently employed.

TABLE 2
Quarry Inflow Statistics for the Annual Wet and Dry Periods

Period	Parameter	Flow, gpm	Rounded Q, gpm
Annual	Average	1,138	
	St. Dev	624	
	Average + 1 SD	1,763	**1,750**
Wet Period	Average	1,702	
Oct-Mar	St. Dev	525	
	Average + 1 SD	2,227	**2,200**
Dry Period	Average	736	
Apr-Sep	St. Dev	278	
	Average + 1 SD	1,013	**900**

Results of this analysis indicate the following:

- Flows are high and variable
- Flows need to be managed with some equalization/diversion strategy
- We have a conceptual level of understanding of design flows

1.3.2 Estimated Water Quality of the Treatment Plant Influent

The water quality for the influent to the treatment plant would be best determined from a long-term monitoring of the water pumped from the North Quarry. However, this information is not available for this report. Data presented in several recent reports was selected to estimate the influent water quality for major ions, nutrients and trace metals, including selenium (Table 3). The projected water quality was determined from a consideration of a North Quarry sample, a sample from the WMSA runoff, and the water quality of the monitoring location below the North Quarry discharge at location SW-2, particularly during the dry period from April to October. The location PER070 is downstream on Permanente Creek below the East Material Storage Area (EMSA) was is shown in the Table 3 for comparative purposes (Figure 4). Runoff from the EMSA area (ESA, 2011), collected during

February and March 2011, indicated similar levels of selenium as observed at the North Quarry, WMSA runoff, and SW-2 in Table 3. Selenium concentrations in the EMSA runoff ranged from 19 to 36 µg/L during February and 7 to 13 µg/L during March and constitute the lower area runoff.

TABLE 3
Projected Water Quality Data for the Treatment Plant Influent Along with Relevant Samples for Comparison

Parameter	Units	Projected Treatment Plant Influent	North Quarry (Water Sample)	Wall Runoff (WMSA Runoff Sample)	SW-2								PER070		
					SW-2	SW-2 Dup	SW-2	SW-2 Dup	SW-2	SW-2 Dup	SW-2	SW-2 Dup	Dry	Spring	Wet
			13-Jan-10	13-Jan-10	4-Feb-09	4-Feb-09	2-Apr-09	2-Apr-09	22-Sep-09	22-Sep-09	10-Jan-10	10-Jan-10	Jun 2002	April 2002	Jan 2003
Calcium	mq/L	210	210	160	200	200	210	200	200 B	210 B	84	79			
Magnesium	mq/L	36	36	42	38	37	46	46	53	55	28	26			
Sodium	mq/L	22	22	24	25 B	25	30	30	24	24	13	12			
Potassium	mg/L	1	0.85 J	2	1.1	1.1	1.4 B	1.4 B	1.1	0.89 J	2.2	2.1			
Sulfate	mg/L	550	550	550	560 B	560	600	610	550	560	160 B	160 B	336	326	379
Total Alkalinity (as CaCO3)	mg/L	170	170	58	150	150	150	150	190	190	140	140	202	189	185
Bicarbonate	mg/L	200	200	71	190		180	180	240	230	170	170			
Carbonate	mg/L	2.5	<5.0	<5.0	<5.0		<2.5	<2.5	<5.0	<5.0	<2.5	<2.5			
Chloride	mg/L	15	13	25	14 B	14	12 B	12 B	18 B	18 B	10 B	10 B	55.8	49.7	42.3
Electrical Conductivity	µmhos/cm	1130	1,130	1,090	1,240	1,210	1,210	1,210	1,270	1,250	602	605	1,020	1,010	1,140
Fluoride	mg/L	0.15	0.14	0.22	0.15	0.14	0.085	0.1	0.17	0.17	0.13	0.13			
Ammonia as N	mg/L	0.012	<0.025	0.095 J	<0.025 B	<0.025	<0.025	<0.025	<0.025	<0.025	0.15 BJ	0.07 BJ	0.07	0.07	ND
Nitrate as N	mg/L-N	1.0	0.73	7.6	0.65	0.67	2.3	2.3	0.48	0.51	1.4	1.4		1.54	2.11
Nitrite as N	mg/L-N	0.004	<0.0081	<0.0081	<0.0081	<0.0081	<0.0081	<0.0081	<0.0081	<0.0081	<0.0081	<0.0081	0.007	0.007	0.0207
Total Phosphorus	mg/L	0.01	<0.016	1.8 B	<0.012	<0.012	0.025 J	0.012 J	<0.016	<0.016	0.29	0.59	0.04	0.04	0.056
pH	s.u.	8.0	7.94	7.9	8.3	8.29	8.15	8.28	8.24	8.16	7.49	7.55	8.18	8.33	7.5
Hardness (as CaCO3)	mg/L	675	673	580	650	750	740	690	710	750	320	300	424	498	533
Total Dissolved Solids	mg/L	800	790	900	1100	970	1100	1000	1000	1000	410	400	720	724	850
Total Suspended Solids	mg/L	18	18	3,600	<2.5	2.2	2.0	2.2	5.2	4	200.0	190.0	3.5	1.5	9.7
Dissolved Aluminum	µg/L	20	<38	<38	<38	<38	<38	<38	<38	<38	<38	<38			
Dissolved Antimony	µg/L	8	8.2	0.86 J	6.3	6.1	3.8	4.0	2.4	3.0	0.98 J	0.99 J			
Dissolved Arsenic	µg/L	4	4.5 J	1.3 J	4.5	4.8	2.8	3.4	1.5 J	2.2	1.5 J	1.5 J	0.86	1.04	1.94
Dissolved Cadmium	µg/L	1	0.53 J	<0.13	0.098 J	0.14 J	0.055 BJ	0.057 BJ	<0.13	<0.13	<0.13	<0.13	0.071	0.37	1
Dissolved Copper	µg/L	2	1.5 J	1.2 J	1.3 BJ	1.0 J	1.3 BJ	1.3 BJ	3.3	4.8	1.8 J	2	1.74	1.55	1.68
Dissolved Iron	µg/L	5	<9.3	<9.3	<7.2	<7.2	18 BJ	<7.2 B	<9.3 B	<9.3 B	<9.3	<9.3			
Dissolved Manganese	µg/L	20	21	14	2.2	2.1	3.0	3.0	2.1 J	2.8 J	3.9	4.2			
Dissolved Molybdenum	µg/L	500	540	120	750 B	740	460	490	470	470	83	84			
Dissolved Nickel	µg/L	150	160	3.4	70		110	110	44	47	27	27	1.6	7.86	30.9

TABLE 3
Projected Water Quality Data for the Treatment Plant Influent Along with Relevant Samples for Comparison

Parameter	Units	Projected Treatment Plant Influent	North Quarry (Water Sample)	Wall Runoff (WMSA Runoff Sample)	SW-2								PER070		
					SW-2	SW-2 Dup	SW-2	SW-2 Dup	SW-2	SW-2 Dup	SW-2	SW-2 Dup	Dry	Spring	Wet
			13-Jan-10	13-Jan-10	4-Feb-09	4-Feb-09	2-Apr-09	2-Apr-09	22-Sep-09	22-Sep-09	10-Jan-10	10-Jan-10	Jun 2002	April 2002	Jan 2003
Dissolved Selenium	µg/L	80	82	29	80	79	74	76	81	90	13	13	5.84	5.09	18.8
Dissolved Zinc	µg/L	100	120	28	12 J		61 BJ	71 BJ	3.1 J	4 J	4.1 BJ	4.4 BJ	1.25	1.11	2.64

Notes:
µg/L = microgram per liter
µmhos/cm = micromho per centimeter
mg/L = milligram per liter
ND = not detected

Source: Golder Associates, 2011: Appendix D, Tables D-1 and D-2 (J and B qualifiers refer to analytical issues requiring an estimated qualifier [J], or minor issue with the blank [B]). North Quarry represents the water pumped from the quarry.
Wall runoff (WMSA) represents a runoff sample collected on the west side entering the quarry.
SW-2, Surface water sample collected below Pond 4A and the discharge from the quarry. During low flow periods, and in particular during April- September, closely resembles the quarry discharge. PER070, sample collected in Permanente Creek on the east side of the facility.

Figure 4. Water Quality Monitoring Locations On Permanente Creek and the EMSA

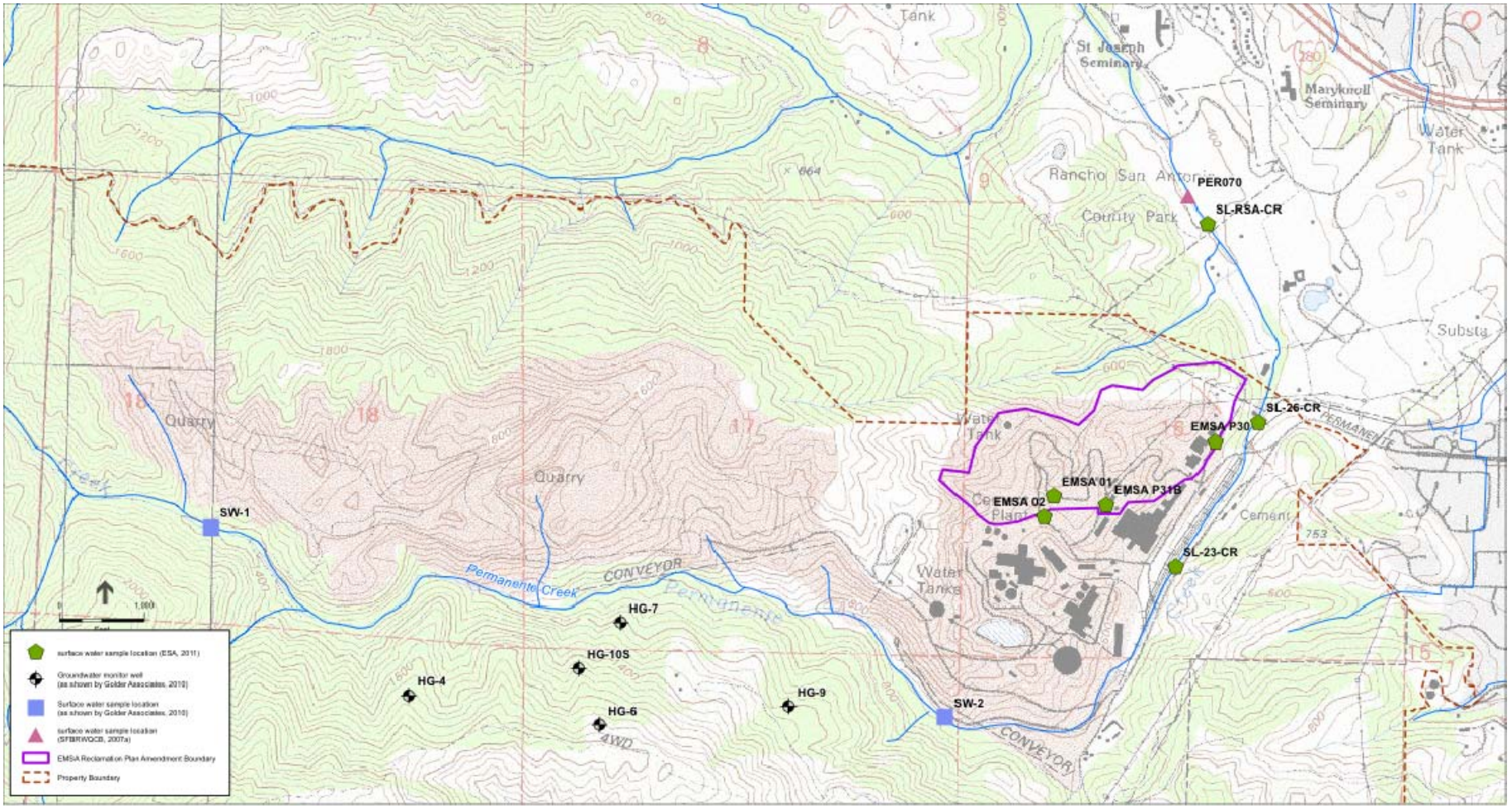


Figure NJ-2
Project Area Monitoring and Sampling Locations

1.4 Fluidized Bed Reactor System for Selenium Removal

1.4.1 Overview of Biological Selenium Treatment

Biological treatment is centered on the growth of microorganisms. By controlling the environment in which the microorganisms grow, the resulting chemicals and byproducts of their growth can subsequently be controlled. Much like chemical treatment, to use biological treatment to remove selenium from the wastewater, it is paramount to control the environment (e.g., through wastewater and reactor characteristics) so that the organisms that reduce selenium flourish.

Biological treatment can be discussed in terms of biological oxidation and reduction. Following is an example of a balanced reaction using the combustion of methane as the reaction:

$$\underset{\text{electron donor}}{CH_4} + \underset{\text{electron acceptor}}{2O_2} \rightarrow \underset{\text{oxidized donor}}{CO_2} + \underset{\text{reduced acceptor}}{2H_2O}$$

To further elaborate, the electron donor is essentially the food for the microorganism, and the electron acceptor is the microorganism's means of respiration. For heterotrophic microorganisms, typically organic matter serves as the source of electron donor. The organic matter in the wastewater is typically expressed in terms of carbonaceous biochemical oxygen demand ($CBOD_5$), chemical oxygen demand (COD), or total organic carbon (TOC). The products of the oxidation of the electron donor are carbon dioxide and biomass.

There are several electron acceptors available to oxidize the electron donor. Oxygen is the most favorable electron acceptor for heterotrophic microorganisms. When oxygen is present, the environment is referred to as aerobic. Water is formed when oxygen is reduced by accepting the electrons from the donor.

In biological selenium treatment, this reaction is carried out by heterotrophic bacteria that use organic carbon as the electron donor and ions, such as nitrates, selenate, and selenite as electron acceptors under anoxic (e.g., no dissolved oxygen) or anaerobic conditions. The normal order by which the heterotrophic bacteria will pick their electron acceptor when oxygen is not present is as follows: nitrates, nitrites, selenite, selenate, chlorates, perchlorates, and sulfates. Nitrates are biologically reduced to nitrogen gas first and then selenate and selenite are reduced to elemental selenium. Organic carbon is biologically oxidized to carbon dioxide.

The key for biological system is to grow sufficient biomass for selenium treatment. At low concentrations of selenium, this is best accomplished with an attached growth system, such as a biological filter through which static media supports growth of heterotrophic bacteria, or biological fluidized bed in which heterotrophic bacteria attach to moving media or a bed. If significant amount of nitrate is present in the water, then sufficient amount of organic carbon needs to be added to reduce the nitrates first, as well as selenium. Therefore the ratio, or stoichiometry of the carbon (e.g., electron donor) to nitrates and selenium (e.g., electron acceptor) is important to successfully reduce selenium.

Another challenge with this biological treatment is when the nitrate and/or selenium (e.g., electron acceptors) concentrations are low or absent. These conditions will result in little to no growth of heterotrophic bacteria, which can lead to washout or potential loss of the microorganisms to reduce the selenium. If an electron donor (e.g., organic carbon source) is added in the absence of these electron acceptors (e.g., nitrate and selenate) the system could promote sulfate reduction.

Like chemical treatment the temperature will also affect the biological reaction kinetics. Generally, temperatures of less than 10 degrees Celsius (°C) will result in substantial reduction of biological reaction kinetics.

1.4.2 Technology Overview

FBR treatment technology is proven for nitrate and perchlorate removal from contaminated groundwater and industrial wastewaters under anoxic (e.g., absence of dissolved oxygen [DO]) conditions. Under anoxic/anaerobic conditions, heterotrophic facultative denitrifying bacteria use nitrates, selenate, and selenite as electron acceptors as means of respiration, thereby reducing the dissolved selenium species to elemental selenium.

In an FBR system, wastewater is passed through a granular solid media at high enough velocities to suspend the media and cause it to behave as though it were a fluid. Fluidization keeps the media with attached biomass in suspension and expanded in depth to provide good contact of contaminated water with biomass for effective treatment. This results in a significantly lower hydraulic retention time (HRT) required for treatment when compared to other attached growth configurations, such as down-flow and up-flow filters. Lower HRTs drive the size of FBR vessels smaller, resulting in a smaller footprint and potentially lower overall costs.

In the FBR, the selenate and selenite in the influent water are reduced to elemental selenium, which in turn can be removed as insoluble solids along with bacterial solids. The FBR is seeded with these bacteria that use the oxygen in the nitrate and selenate as the electron acceptor for respiration and an organic carbon source to meet their food/energy requirements. Microbes cultured in the bioreactor media beds create an ion-reducing environment (anoxic/anaerobic condition) for selenate and selenite reduction.

To remove total suspended solids (TSS), including particulate selenium from the FBR effluent, a liquid-solids separation system, such as a ballasted sand clarifier, is used. To remove some residual dissolved biochemical oxygen demand (BOD), typically a moving bed bioreactor (MBBR) is used after the liquid-solids separation unit. A polishing continuous backwash sand filter will be used for TSS removal prior to final discharge.

1.4.3 Process Description

CH2M HILL has developed an FBR-based conceptual process design to treat the discharge from the Quarry to Permanente Creek for selenium. A process block flow diagram (BFD) is shown on Figure 5. Preliminary equipment information for FBR based treatment plant is outlined as follows:

- Pumps and intake structure will be installed to pump water from Pond A equalization pond to the proposed treatment plant location. The flow will be pumped through a mechanical screen to remove solids.
- The next step in the process is a FBR system, consisting of two (2) columns in a parallel configuration. Each FBR unit will be a lined carbon steel column approximately 18 feet in diameter and 30 feet high providing a HRT of 45 minutes. The FBR columns will have granular activated carbon (GAC) as media.
- The FBR system will include multiple chemical feed systems as shown on the BFD for carbon source supply and nutrient feeds to the biological system.
- The FBR treated water will flow to a ballasted sand clarification system to remove solids from the FBR stream, including biological solids and reduced elemental (particulate) selenium in the colloidal form. This system will include a multi-compartment tank with ballasts, mixing, and a clarifier.
- The effluent from the ballasted sand clarifier will be sent to a MBBR to remove any residual dissolved BOD prior to discharge. The MBBR system will be designed for a HRT of 60 minutes and will consist of two 24-foot-diameter by 20-foot-high tanks in parallel with media to support biological growth and blowers for aeration.
- The MBBR effluent will then be pumped to a continuous backwashing filtration system (sand filtration) for removal of suspended solids prior to gravity discharge to the final effluent tank. The sand filtration system will consist of six 10-foot-diameter by 23-foot-high units.
- The sand filtration effluent will be pumped from the final effluent tank to where the treated effluent will be discharged to a new outfall through a monitoring station.
- The solids from the ballasted sand clarification system, which are a combination of biological and ferric hydroxide solids, will be pumped to a gravity thickener (35 feet in diameter by 18 feet high) for solids thickening and then on to a 180-ft^3 solids conditioning tank to which polymer will be added with mixing prior to being dewatered in the filter press unit. Two recessed plate and frame filter press units, each with 175-ft^3 capacity, will be used to dewater the solids. The cake solids generated at the filter press will be sent offsite for disposal. The filter press filtrate will be sent to the thickener.
- The thickener supernatant will be sent to the filtrate tank which will also receive the sand filtration backwash. The combined filtrate will be recycled and blended back with the untreated influent for further treatment.

1.4.4 Potential Operational/Performance Risks

Some of the major potential risks associated with the operation of FBR for selenium treatment as follows:

- Higher influent heavier solids can result in solids buildup in the bed resulting in loss of fluidization and settling of the bed. This could result in loss of performance in the FBR with regards to selenium treatment. However, this condition has not observed in the previous FBR pilot studies. Also, in the full-scale FBR design, an automatic in-bed cleaning system is provided to mitigate this problem.
- Using air in the biomass separator may potentially reoxidize some of the reduced elemental selenium; although, it is unlikely because low airflow and low negative oxidation/reduction potential (ORP) were used. However, if necessary, nitrogen can be used in the full-scale FBR plant instead of air in the biomass separator.

1.4.5 CAPEX Estimate

CH2M HILL developed a Class 5 total installed capital cost (CAPEX) estimate (-50%/ +100%) for this FBR-based selenium treatment system. The Total Installed Cost (TIC) for this system was estimated at **$63.6 million USD**, with a range from **$31.8 million USD** (-50%) to **$127 million USD** (+100%). Total Equipment Cost (TEC) for this treatment is $13.4 million USD. Table 4 provides a summary of the capital costs.

TABLE 4
CAPEX Summary

Purchased Equipment Cost		$13,400,000
Equipment Installation		$3,400,000
Piping		$2,700,000
Instrumentation and Controls		$2,000,000
Electrical		$3,400,000
Buildings		$2,000,000
Yard Improvements		$2,400,000
Service Facilities		$200,000
Heat Tracing		$2,200,000
Utilities/ Misc.		$900,000
Indirect cost		$14,800,000
Total Probable Construction Cost		$**47,400,000**
Engineering/Construction		$6,500,000
	Totals	$**53,900,000**
Contingency at 25%		$9,700,000
	Totals	$**63,600,000**

The estimate includes equipment cost, freight, labor, contractor overhead and markup, engineering and construction management, and contingency. The costs are based on quotations from vendors, published unit costs for labor and commodities, and CH2M HILL's experience with similar facilities. The actual construction cost will vary within the +100%, -50% range depending on the procurement strategy, final design details, and economic conditions at the time of the bid. Additionally, costs for startup, commissioning, and engineering services during construction are included in the TIC estimate. The TIC estimate does not include costs for technology confirmation or pilot testing.

The major assumptions used in calculating these estimated costs are as follows:

- Conceptual equipment layout assumes that all equipment will be located outdoors. A pre-engineered building will be provided to house the filter presses, motor control center (MCC) and local control panels, for office space, shower/washrooms, and an onsite laboratory.
- Due to the uncertainty with the design storm event, costs have not been included for an equalization basis to hold and treat runoff during storm events.
- It is assumed that the FBR influent will be ≥10 degrees Fahrenheit (°F) throughout the year. No costs have been included for a boiler and heat exchanger system to heat the FBR influent.
- A 5 percent escalation factor with 2013 midpoint and 25 percent bottom line contingency for undefined scope is included.
- The new system will be supplied with a motor control center (MCC) and local control panels for the FBR based system. These will be tied into a main DCS or SCADA system that will be installed in the treatment plant control room.
- Chemical feed systems will be installed with proper spill containment measures. Chemical totes will be supplied with spill containment kits. Chemical tanks will be supplied with a secondary containment system.
- Chemical storage tanks including carbon substrate tank, ferric chloride tank, and other chemical totes will be located outdoors with both insulation and heat tracing.

1.4.6 Operation and Maintenance Cost Estimate

Table 5 summarizes the operation and maintenance costs (OPEX) for this treatment system over the yearly operation of the system and also shows present worth costs.

TABLE 5
OPEX Summary and Present Worth Costs

OPEX			
Chemicals		$	1,800,000
Energy		$	800,000
Labor		$	1,200,000
Equipment Maintenance/Replacement		$	600,000
Residuals Disposal		$	1,000,000
Contingency		$	1,100,000
	Totals	**$**	**6,500,000**
Present Worth Costs			
	Totals	**$**	**101,000,000**

The major assumptions used in calculating these estimated costs are as follows:

- The treatment system will operate continuously with a connected load of approximately 1,300 horsepower (hp). It is assumed that electricity costs are $0.070 per kilowatt-hour (kW-hr).
- The treatment system will run continuously 24 hours per day, 7 days per week. It is projected that eight full-time operators will be needed for continuous operations, including sludge dewatering. The standard labor rate for plant operations is assumed to be a fully burdened rate of $70.00 per hour.
- OPEX includes annual chemical costs based on chemical usage rates.
- OPEX includes equipment replacement allowance of 2.5 percent of the total equipment capital cost to cover items such as preventative maintenance, spare parts replacement, and replacement resulting from minor equipment failure.

- OPEX includes cost for replacement of GAC media, which may need to be added to the FBR periodically, as required, if any GAC goes out in the FBR effluent.
- OPEX includes costs for residuals handling and disposal. It is assumed that selenium containing caked solids will need to be sent offsite for disposal of in a solid waste landfill.
- Present worth costs are based on 10-year life cycle cost and 8 percent annual interest rate of return.

1.4.7 Footprint of the FBR Treatment Plant

Table 6 shows the approximate dimensions and area required to house the major equipment and facilities for the selenium treatment plant. This is based on preliminary equipment sizing and the exact configuration and size would depend on the area available at the site and modifications to any equipment based on further evaluation.

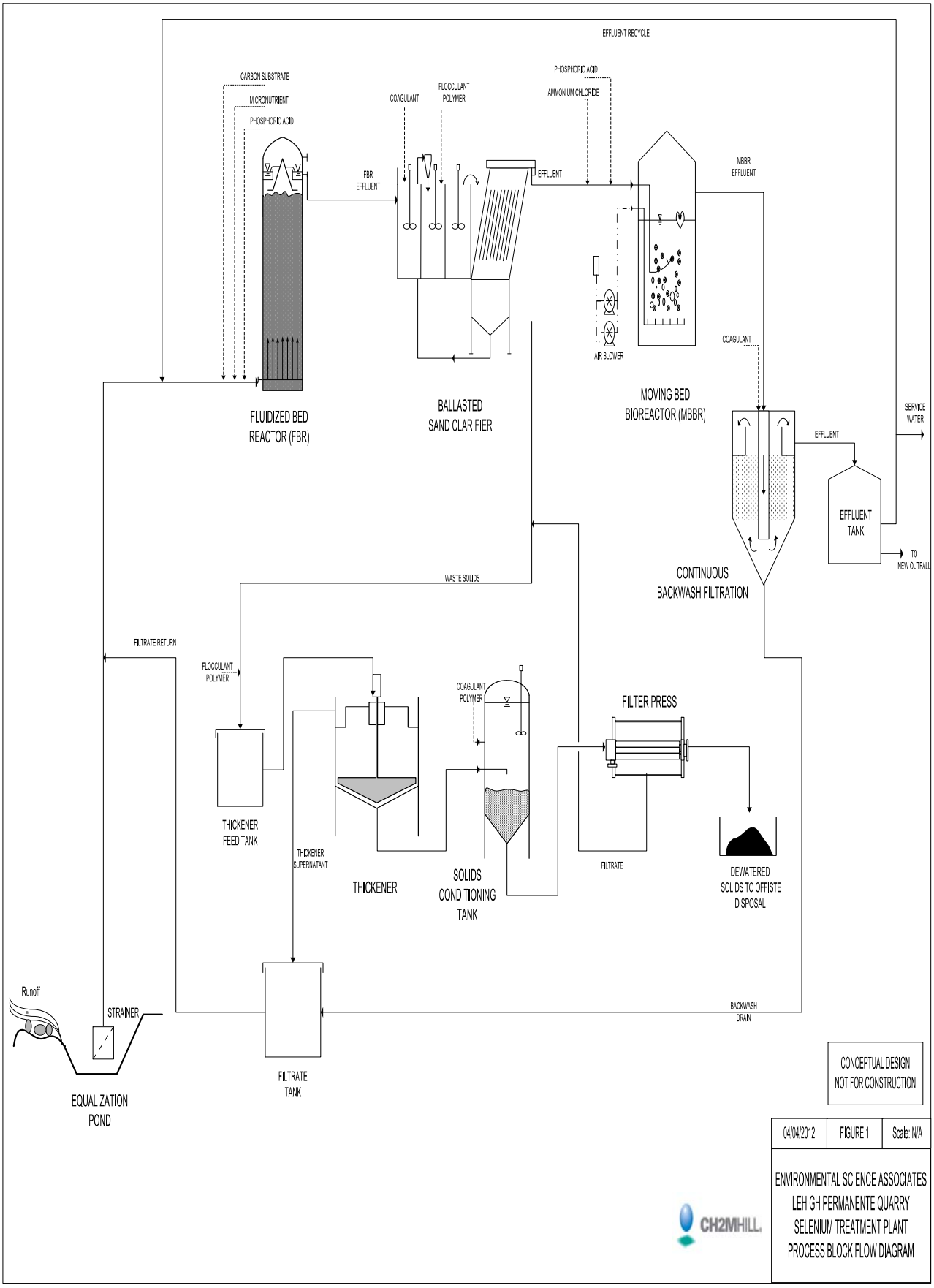
TABLE 6
Preliminary Footprint

Item	Equipment	Location	Length (feet)	Width (feet)	Area (square feet)
Treatment System	FBR, Ballasted Sand Clarifier, MBBR, thickener, tanks	Outside	350	100	35,000
Solids Handling Building	Filter Press	Inside	60	100	6,000
Admin Building	Office space, MCC room, control panels, showers/restrooms, laboratory	Inside	60	100	6,000
Total			**470**	**100**	**47,000**

Note:

Does not include the footprint of any siltation basins or equalization ponds prior to treatment.

Figure 5. Selenium Treatment Plant Process Flow Diagram for the Lehigh Permanente Quarry for Selenium Mitigation



SECTION 2

Conceptual Path Forward and Schedule for Implementing Selenium Treatment and Mitigation

In parallel with preliminary engineering, the following three engineering studies will be conducted at the Lehigh Permanente Quarry to refine the conceptual design basis presented in this report:

- Water Quality Monitoring Study
- WMSA Water Management
- FBR Pilot Study

2.1 Water Quality Monitoring Study

The purpose of the Water Quality Monitoring Study is to expand the current dataset for the composition of the pumped North Quarry water. In addition to a continued monitoring of flow and water elevation of the pit, water quality measurements for a complete list of parameters shown in Table 3 should be completed at least monthly to aid in defining the treatment plant influent characteristics. The goal is to confirm the water quality and flow basis for the design prior to initiating final engineering and procurement of long-lead equipment.

Adequate characterization of targeted water discharges from the Quarry should capture seasonal variation, and speciation should be performed to establish a basis of design for the applicable technology for removal. Understanding not only the selenium concentrations but the competing and interfering water chemistry is key to designing the treatment system for selenium removal. Selecting the dry weather base flow as a basis of design will limit the mass that can be treated annually. Selecting a portion, if not all, of the wet weather flow will increase the mass that can be treated annually; however, this will lead on an increased treatment plant capacity as well as areal requirements for plant location. The selenium treatment technologies have a limited capacity for increased flows. However, for the low-flow conditions the selenium treatment technologies can be more easily designed to operate without impact on performance. Because the performance of each technology is flow based, the system may require flow equalization infrastructure. However, the Quarry site is constrained by geography that would limit installation of large impoundments or in-ground basins for equalization or diversion at present. The end result is a treatment plant that can have significant total installed and operations and maintenance costs.

For this report, and based on current understanding, we have assumed that the major form of selenium in the pumped Quarry discharge is selenate. Assuming selenate is the dominant form of selenium, we have recommended a FBR treatment approach. If selenate is not the dominant form, alternative approaches would need to be considered. Monitoring data have also indicated that the selenium is primarily dissolved at various monitoring location for surface waters in the area, with the exception of higher-flow runoff events. The water quality monitoring would establish the form through implementation of selenium speciation along with a review of appropriate methods for the analysis of samples to maintain precision and accuracy of the selenium analyses. It is important that methods distinguish between dissolved and any colloidal forms and verify the selenate contribution to total selenium concentrations.

2.2 Runoff Water Management Study

The purpose of the additional WMSA Water Management Study is to evaluate remaining technical issues not addressed in recent reports prepared as part of the Reclamation Plan (Strategic Engineering & Science, Inc. [SES], 2011; Golder Associates, 2011; and Enviromine, 2011), including evaluating existing surface runoff characteristics for the WMSA and EMSA, assessing potential diversion of runoff from areas contributing to high selenium concentrations in the runoff, and segregating runoff flows in the WMSA to isolate and divert water meeting the discharge criteria to Permanente Creek rather than into the North Quarry. Each of these steps would be evaluated to determine if significant flow reduction for treatment could be achieved and result in overall decreased treatment costs.

Recent sampling has been conducted for both the EMSA and WMSA to evaluate the runoff concentrations for metals at various locations. Selenium concentrations varied depending on location but were typically in the range of 5 to 40 µg/L. Sampling at the WMSA in January 2012 (ESA, 2012)[2] shows that dissolved and total selenium are comparable, leading to the observation that the majority of selenium in the runoff was present as dissolved selenium (Table 7) . The locations in which samples were collected were distributed in natural drainages and were designed for a passive collection (unattended) of runoff during the actual storm. The stated objective of the sampling was to collect samples best representative of flow running down slopes prior to mixing with limestone-lined drainages along roads (Figure 6).

TABLE 7
Surface Water Runoff Sampling from the WMSA during January 24, 2012

				Se		
Sample Number	**Sample Collector**	**Sample Date**	**TDS (mg/L)**	**Total (µg/L)**	**Dissolved (µg/L)**	**Sulfate (mg/L)**
036	SES	1/24/2012	2,320	45.3	35.3	1,460
036	ESA	1/24/2012	2,070	41	43	1,100
038	SES	1/24/2012	1,830	37.7	36.6	1,200
038	ESA	1/24/2012	1,840	32	34	1,100
040	SES	1/24/2012	560	--	20.9	360
040	ESA	1/24/2012	534	--	22	320
041	SES	1/24/2012	350	--	8.3	230
041	ESA	1/24/2012	327	--	9.5	190
042	SES	1/24/2012	290	5.7	5.8	170
042	ESA	1/24/2012	234	5.6	5.4	140
043	SES	1/24/2012	320	4.8	4.4	187
043	ESA	1/24/2012	329	4.5	4.6	160

Notes:
TDS = Total Dissolve Solids
Se = Selenium = sample collected by SES -- = no data collected
ND (<5.0) = not detected at or above stated laboratory detection limit

Table prepared by SES for Lehigh Southwest Cement Company, 2012.

[2] Sampling conducted by SES for Lehigh and split sampling by ESA at the WMSA results provided as laboratory data sheets from ESA, and as a summary table. The data have not been reviewed for QA/QC results and analytical accuracy and precision by CH2M HILL. Split sample report sent to ESA by McCampbell Analytical, Inc., WorkOrder: 1201653 was reviewed.

Figure 6. Stormwater Monitoring Locations in the West Material Storage Area (January 2012)

While this was not a high-flow runoff event from WMSA (no runoff observed at the EMSA), the results nevertheless illustrate the potential for the segregation of runoff for potential water management to reduce the overall selenium-contaminated flows that ultimately enter the quarry pit for subsequent pumping and selenium treatment. Concentrations listed in Table 7 show that sample locations (036, 038) on the western side of the WMSA have high sulfate (1,100 to 1,460 mg/L) and high selenium (34 to 43 µg/L), while some samples collected at lower locations (041, 042, 043) to the east side of the WMSA have significantly lower sulfate (140 to 230 mg/L) and selenium (4.4 to 9.5 µg/L). Ideally, the WMSA would be subdivided into subareas, characterized with respect to both runoff and water quality, and mitigation applied as feasible to reduce the amount of selenium-contaminated water for treatment. Information from the study should be used to develop a water balance for the WMSA and the EMSA. Further development of a water management strategy and possible segregation of flows would aid in reducing the peak flows, total volume for treatment, and the design capacity of the treatment plant.

2.3 Fluidized Bed Reactor Pilot Study for Selenium Treatment Demonstration

Currently, it is proposed that the FBR would be a suitable means for treating the selenium discharge from the Quarry. The technologies to forward into bench testing would be determined after a completion of a technology assessment. Results of bench testing would lead to the preparation of a technology evaluation report that would be the foundation for the subsequent pilot testing. On the basis of our current recommendation, the FBR is the selected technology. The FBR pilot study would be conducted to verify treatability of the water based on the treatment operations proposed in this report. Those primary goals include treating selenium to 5 µg/L and evaluating waste or residual management. The disposal and reoxidation of selenium in the aerobic treatment component of the process would be determined as part of the study.

USEPA has published regulatory guidelines regarding selection of an appropriate treatment technology in their approach to determining best available technology (BAT). Under the Clean Water Act (33 U.S.C. §§1251-1387),

USEPA establishes effluent limitation guidelines, including BAT. BAT is defined by USEPA (http://cfpub.epa.gov/npdes/glossary.cfm#B) as the most appropriate means available for controlling the direct discharge of toxic and nonconventional pollutants. BAT effluent limitation guidelines, in general, represent the best existing performance of treatment technologies that are economically achievable. The Clean Water Act specifies that these guidelines are to be technology-based. However, in deciding which technologies are appropriate, costs and effluent reduction benefits are taken into account. Section 304(b)(2) of the Clean Water Act requires that USEPA take into account at least the following factors in determining BAT:

- Cost of achieving effluent reduction
- Age of equipment and facilities involved
- Engineering aspects of control techniques
- Process changes
- Non-water-quality environmental impact
- Process employed

Following selection of a technology, this pilot testing is required for design to prove that the treatment concept will work, demonstrate effluent quality will comply with permit limits, and to develop sizing criteria for detailed design.

2.4 Design Flow Study and Assessment of Regulatory Issues

One of the tasks associated with the FBR design and piloting would be evaluating regulatory issues associated with possibly developing ponds to provide equalization for the FBR treatment system as part of the preliminary engineering work. Preliminary engineering for the FBR treatment system includes preliminary engineering for the equalization system. This will necessarily include a consideration of high precipitation runoff events and their associated water quality. While runoff events measured to date have determined that selenium levels would require treatment, there is uncertainty concerning the magnitude of the events that would lead to significant dilution and the potential for the release of runoff rather than the retention and treatment. For example, higher flow events, such as the 10-year, 25-year, and 100-year events may require detention basin(s) to reduce peak downstream flow rate and removal of total suspended solids (TSS), it is undetermined if the selenium concentrations are such that retention and subsequent treatment would be required. The results of the current regulatory analysis and equalization preliminary design will help determine if flow diversion can be practically incorporated into the project.

While the hydrologic investigation (Golder Associates, 2011) and the drainage study (Chang Consultants, 2011) have aided in this conceptual Feasibility Assessment, there are sufficient uncertainties in the level of detail used for the water balance and the estimation of 25-year and 100-year flow event. Additional detailed study of the runoff from the WMSA and North Quarry is necessary to firm up the design flow estimate. We would typically design for stormwater/groundwater flows based on examining defined rain events (e.g., 1 year or 24 hours) by the U.S. Geological Survey (USGS) or National Oceanic and Atmospheric Administration (NOAA); establishment of base or dry weather flows; and projections of runoff accounting for infiltration, evaporation, transpiration using either simple runoff calculation methods or a more complex hydrology model. A more rigorous analysis is recommended for the Quarry. National Pollutant Discharge Elimination System (NPDES) permitting agencies would mandate this type analyses based on defined rain events and the use of historical data, where applicable.

2.5 Additional Considerations for the Selenium Treatment Project

The following additional areas would need to be considered as part of the overall project:

- **Existing site conditions** – Due to the need to potential capture water from the EMSA and transport to the treatment plant, it would be desirable to locate the treatment plant at the downstream end of the facility near the EMSA. The footprint of the treatment plant and supporting functions requires approximately an acre

of space. The locations and sizing of equalization basins or retention basin to support the treatment plant or overall surface runoff management at the facility have not been sized nor located due to size requirements and design uncertainties that will be addressed as part of the front-end studies.

- **Secondary impacts of the project** – Because this is an operating facility, it is not expected that significant secondary impacts would be significant. Following the completion of the construction of the treatment plant and associated detention basins, the impacts would be associated with the disposal of waste solids from the treatment and the chemical supply to the treatment plant. The supply and disposal would require relatively infrequent truck trips relative to the operation of the Quarry and associated traffic.
- **Energy recovery from pumped system** – In addition, depending on the need to preserve flows in the upper Permanente Creek, it may be possible to recover some energy costs by using a hydroelectric turbine at the downstream end of the discharge (total head loss from the top of the Quarry to a potential location to the east-southeast of the East Material Storage Area; if a treatment plant were to be located there). However, this benefit has not been evaluated at this stage, but energy recovery could offset part of the costs for energy consumption by the plant.
- **Quarry water storage** – As part of the water management strategy for the project, the use of the Quarry for storage of excess storm flows by permitting changes in the water elevation within the Quarry should be considered. The impacts of the variable level on the operating facility must be considered as part of the evaluation of water management.

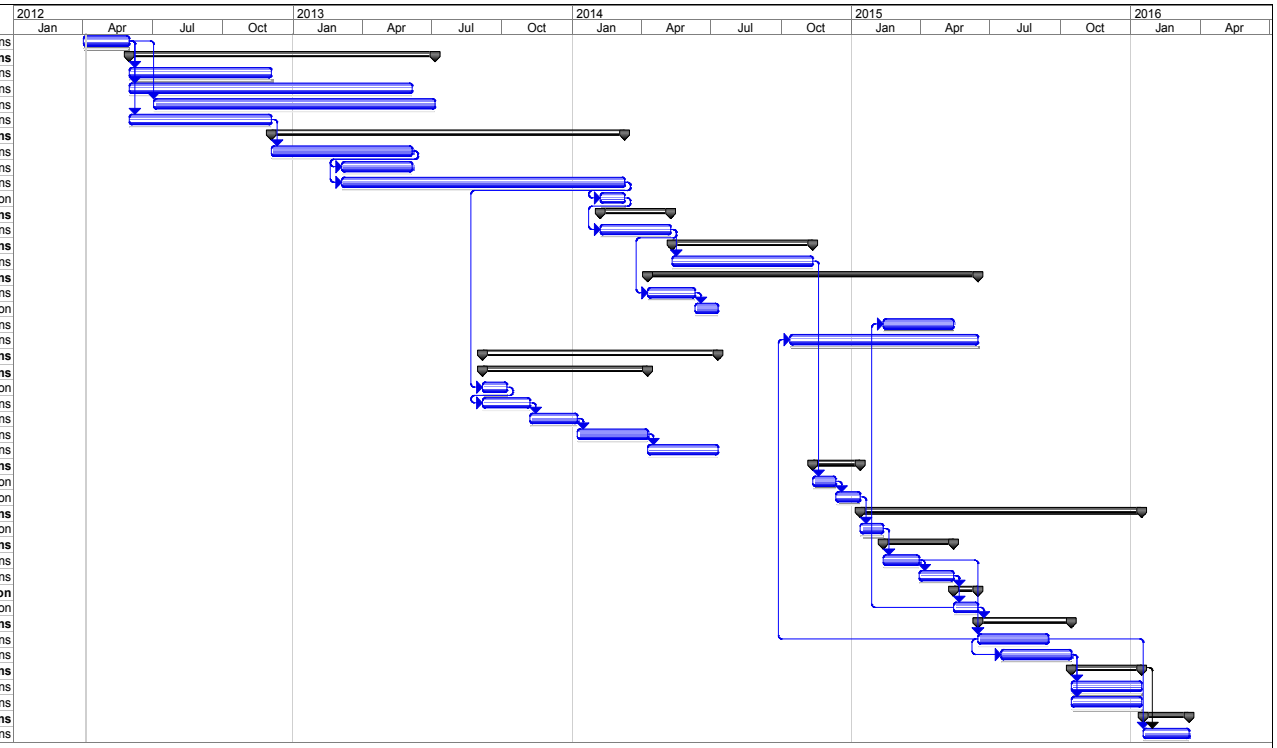
The schedule for implementation of selenium treatment at the Lehigh Permanente Quarry includes pre-design tasks designed to gather necessary information to carry forward into the final selection of technology, including an analysis of water management at the facility, water quality for runoff and projected treatment plant influent, and design flows taking into account regulatory issues. The schedule (Figure 7) is broken down into the following tasks:

- Characterization and Design Studies
- Technology Determination
- Preliminary Engineering Design
- Detailed Engineering Design
- Preengineered Building and Equipment Procurement
- Permitting
- Construction Contracting
- Construction/Installation
- Commissioning and Startup

From the schedule, the time to operation is approximately 4 years. If the front end studies are initiated and completed in 12 months, it is possible to fast-track the engineering to a total of 24 months and reducing the overall schedule to approximately 3 years.

Figure 7. Schedule Forward for the Selenium Mitigation Project

ID	Task Name	Duration
1	Select Contractor	2 mons
2	**Characterization and Design Studies**	**13 mons**
3	Water Quality Monitoring Study	6 mons
4	Runoff Water Management Study	12 mons
5	Design Flow Study	12 mons
6	Bench-Scale Studies	6 mons
7	**Technology Determination**	**15 mons**
8	Technology Evaluation	6 mons
9	Selection of Preferred System	3 mons
10	Perferred System Pilot	12 mons
11	Selection of Full-scale System	1 mon
12	**Preliminary Engineering Design**	**3 mons**
13	Preliminary Engineering Design	3 mons
14	**Detailed Engineering Design**	**6 mons**
15	Detailed Engineering Design	6 mons
16	**Preengineered Building and Equipment Procurement**	**14 mons**
17	Develop Procurement Pkg.	2 mons
18	Bid and Award	1 mon
19	Preengineered Building - Delivery	3 mons
20	Process Equipment - Delivery	8 mons
21	**Permitting**	**10 mons**
22	**Environmental Permit**	**7 mons**
23	Data Collection	1 mon
24	Application	2 mons
25	Modifications to the Application	2 mons
26	Approval	3 mons
27	Construction Permit	3 mons
28	**Construction Contracting**	**2 mons**
29	Bid	1 mon
30	Award and Contracting	1 mon
31	**Construction / Installation**	**12 mons**
32	Mobilization	1 mon
33	**Civil**	**3 mons**
34	Site Work	1.5 mons
35	Foundations	1.5 mons
36	**Mechanical**	**1 mon**
37	Building	1 mon
38	**Process**	**4 mons**
39	Process Equipment	3 mons
40	Piping/ Misc. Equipment	3 mons
41	**I & E**	**3 mons**
42	Electrical	3 mons
43	Instrumentation	3 mons
44	**Commissioning and Startup**	**2 mons**
45	Commissioning and Startup	2 mons



Project Execution Schedule
Lehigh Permanente Quarry Selenium Treatment
04/05/12

Sub-Task Task

Page 1

SECTION 3

Conclusions and Recommendations

From our analysis of the feasibility of selenium treatment of the Quarry pumped flows, the conclusions and recommendations are as follows:

1. Results of our analysis of flow information and a water balance prepared for Lehigh Southwest Cement Company established that flows are high and variable, flows need to be managed with some equalization/diversion strategy, and there currently is a range of flows for wet and dry periods. The design flow of 1,750 gpm was based on annual average monthly flows estimated from existing data, while average flow during the wet period was 2,200 gpm and during the dry period was 900 gpm.
2. It is recommended that the water quality for the influent to the treatment plant be best determined from a long-term monitoring of the water pumped from the North Quarry. However, data presented in several recent reports were selected to estimate the influent water quality for major ions, nutrients, and trace metals, including selenium. Further refinement is necessary regarding selenium speciation for runoff and North Quarry pumped water.
3. CH2M HILL developed an FBR-based conceptual process design to treat for selenium removal. In an FBR system, wastewater is passed through a granular solid media at high enough velocities to suspend the media and cause it to behave as though it were a fluid. Fluidization keeps the media with attached biomass in suspension and expanded in depth to provide good contact of contaminated water with biomass for effective treatment. This results in a significantly lower HRT when compared to other attached growth configurations such as down-flow and up-flow filters. Lower HRTs drive the size of FBR vessels smaller, resulting in a smaller footprint and potentially lower overall costs.
4. CH2M HILL developed a Class 5 total installed CAPEX estimate (-50%/ +100%) for this FBR-based selenium treatment system. The TIC for this system was estimated at **$63.6 million USD**, with a range from **$31.8 million USD** (-50%) to **$127 million USD** (+100%).
5. In parallel with preliminary engineering, three engineering studies are recommended to be conducted at the Quarry to refine the conceptual design basis presented in this report: a Water Quality Monitoring Study, a WMSA Water Management, and an FBR Pilot Study. These studies will better define the flow rates, water quality, and total volume needing treatment for selenium removal. An optimized water management approach at the Quarry will minimize treatment requirements, and have direct impacts on total costs.
6. From the schedule, the time to operation is approximately four years. If the front end studies are initiated and completed in 12 months, it is possible to fast-track the engineering to a total of 24 months and reducing the overall schedule to approximately 3 years.

SECTION 4

Works Cited

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Appendix A
Technical Memorandum: Selenium Treatment Mitigation

Lehigh Permanente Quarry Selenium Treatment

PREPARED FOR: Environmental Science Associates

COPY TO: Santa Clara County Planning Department

PREPARED BY: CH2M HILL, Inc.

DATE: March 28, 2012

PROJECT NUMBER: 427698.PR.04

Introduction

Lehigh Permanente Quarry (Quarry) operates a limestone quarry in Santa Clara County, California that will be closed in about 15 years. They currently have submitted a closure and reclamation plan amendment for the Quarry, with some portions of the reclamation to be implemented within the next 3 years. Water discharged from the Quarry to Permanente Creek has unacceptably high concentrations of selenium (approximately 80 micrograms per liter [µg/L]).

CH2M HILL was contracted by the Santa Clara County through Environmental Science Associates (ESA) to develop a technical memorandum (TM) identifying available technologies for treating selenium under comparable water quality to the Quarry and peer review of the Lehigh Selenium Treatment Mitigation strategy.

Selenium Discharge Criteria

The San Francisco Bay Regional Water Quality Control Board (RWQCB) regulates water quality based on the intended uses of water through the San Francisco Basin (Region 2) Water Quality Control Plan (Basin Plan) (RWQCB, 2007). These uses, known as beneficial uses, guide which water quality standards apply to a given water body. The most stringent water quality objective for selenium in surface water at the site is for the protection of aquatic organisms. The Basin Plan objectives for selenium derived for the protection of aquatic life are a 4-day average of 5 µg/L and a 1-hour maximum of 20 µg/L, both measured on total recoverable basis.

These objectives for fresh water are the same as the California Toxics Rule (CTR; for selenium, the CTR deferred to the National Toxics Rule) promulgated by the U.S. Environmental Protection Agency (USEPA, 2000), and the chronic value (5 µg/L) is the same as the National Recommend Water Quality Criteria (USEPA, 2012). It is anticipated that USEPA will publish a revised draft criteria document for selenium within the next year, and preliminary information suggests the agency is leaning toward the use of a two-part criterion that includes selenium concentrations in fish egg/ovary along with a screening value that is likely to be lower than 5 µg/L. However, timing of that criterion document is somewhat uncertain and it is likely that 5 µg/L will continue to be an important target concentration for treatment.

The existing conditions at the Quarry, and the background on the natural occurrence of selenium is described in a Technical Memorandum prepared by CH2M HILL.[1] Two of the important aspects from that report are:

> "The effect of the ongoing quarry dewatering discharges on existing Permanente Creek water quality is indicated by the samples collected at SW-2 (the downstream location in Permanente Creek), where dissolved selenium concentrations ranged from 13 to 81 µg/L. A North Quarry water sample in January 2010 had a dissolved selenium concentration of 82 µg/L (Golder, 2010),

[1] CH2M HILL 2011. Peer Review of Reclamation Water Quality Report and Recommended Mitigation Measures. Prepared for ESA by Harry Ohlendorf, Project 427698.PR.01, December 15.

indicating that dewatering is a significant factor with respect to selenium concentrations in the creek,

> "Selenate is the most water-soluble form of selenium and moves readily with water when present in oxidizing environments (such as flowing surface water). This is the chemical form of selenium that is typically released from rock surfaces,"
>
> "Similar to the surface water selenium concentrations from Monte Bello Creek, selenium concentrations in groundwater from the five wells south of Permanente Creek were relatively low and are considered to represent background for groundwater. Selenium was not detected in two of the wells (<0.38 µg/L), and average concentrations were 1.5 µg/L or less in the three others (0.503, 1.40, and 1.50 µg/L). Ground water quality in this area is considered representative of natural pre-mine conditions. Groundwater quality meets the Benchmarks for selenium and mercury,"
>
> "Selenium is released from rock through biogeochemical processes when the rock surface is exposed to water and oxygen. This process has been observed to occur at many locations where waste rock from mining has been exposed to the atmosphere as a result of disposal practices (see, for example, BLM, USFS, and IDEQ, 2007; Park, 2008; SAPSM, 2010; ITRC, 2011; Kirk, 2011)."

Water that reports to Pond 4A is represented by storm water from the Quarry slopes, hillsides and the West Material Storage Area (WMSA) adjacent storage area and ground water that seeps into the Quarry. The water, collected at the Quarry bottom, is pumped to a holding pond, referred to as Pond 4A. Water in Pond 4A is allowed to settle to remove suspended particulates, and discharged to Permanente Creek via gravity. The average selenium in at various upland runoff and Permanente Creek locations in the vicinity of the Quarry ranged from 15 to 62 ug/L. The water quality represented by SW-2[2] is assumed for the influent for the treatment plant options discussed in this report:

Parameter	**Average**	**Range**
Total Dissolved Solids, mg/L	1,067	1,000 - 1,100
Sulfate, mg/L	570	550 – 600
Iron, mg/L	8	<9.3 – 18.0
Manganese, mg/L	3	2.1 – 3.9
Selenium, µg/L	62	13 - 81

Previously, the discharges from the operations to Permanente Creek were previously "regulated by the State Water Resources Control Board's General National Pollutant Discharge Elimination System (NPDES) Permit for Storm Water Associated with Industrial Activity (Water Quality Order No. 97-03-DWQ) ("General Industrial Storm Water NPDES Permit")."[3] At present, the facility and the Regional Water Quality Control Board (RWQCB) are engaged in a plan to further address the discharges to comply the water quality standards for selenium. The potential discharge criteria that will result from the Lehigh - RWQCB discussions and the resulting NPDES permit are unknown. Regardless, it is expected that the permit requirement will proceed on a path to achieving water quality criteria for selenium in the 5 ug/L range in waters discharge to the South Bay. It is also uncertain how EPA's forthcoming guidelines on fish tissue and reproduction will enter into the RWQCB decisions and NPDES permit requirements now or in the future.

[2] County of Santa Clara, 2012, Draft Environmental Impact Report for the Permanente Quarry Reclamation Plan, Chapter 4, Hydrology and Water Quality, Table 4.10-2, Monitored Pollutant Conentrations in Project Area.

[3] Lehigh Southwest Cement Company, 2012. Selenium Treatment Mitigation.

Overview of Selenium Treatment

Compliance with the selenium limit may be achieved through either treatment and one or more, or a combination of the following water management approaches:

- Development of site-specific criteria
- Flow augmentation
- Underground injection control and replenishment
- Discharge relocation (to a larger receiving stream) and replenishment
- Water reuse (eliminating the discharge) and replenishment, although there are concerns with impacts to nearby supply wells.

Water treatment alternatives that CH2M HILL has experience with and has further developed that can treat to or below 5.0 µg/L on average are as follow:

- Biological reduction
- Passive biological treatment
- Zero Valent Iron
- Ion exchange

There are a variety of ways to manage selenium treatment.

Treatment Challenges

Achieving selenium levels less than 5 µg/L in surface water discharges from the Permanente Quarry poses a challenge given that selenium:

- Removal is limited by the minimum and maximum feasible ranges of design flows that can vary greatly over time;
- Predominantly exists in the selenate form;
- Is relatively dilute in concentration (e.g., less than 500 µg/L);
- Removal from water is confounded by the water matrix (e.g., temperature, pH, sulfate, and other chemicals);
- Treatment generally results in a concentrated by-product or residual; and
- Re-release from the residuals can occur.

If significant variation in selenium levels and flows exists, this increases the complexity of where to target treatment of selenium. Generally, all the selenium treatment technologies are hydraulic dependent versus selenium mass dependent; therefore, some form of up-front water flow equalization and diversion maybe required to reduce the sizing of the selenium treatment plant, and stabilize influent flow rate.

Basis of Design

Adequate characterization of targeted water discharges from the Quarry should capture seasonal variation, and speciation should be performed to establish a basis of design for the applicable technology for removal. Understanding not only the selenium concentrations but the competing and interfering water chemistry is key to designing the treatment system for selenium removal. Selecting the dry weather base flow as a basis of design will limit the mass that can be treated annually. Selecting a portion, if not all, of the wet weather flow will increase the mass that can be treated annually, however, this will lead on an increased treatment plant capacity as well as areal requirements for plant location. The selenium treatment technologies have a very limited capacity for increased flows. However, for the low-flow conditions the selenium treatment technologies can be more easily designed to operate without impact on performance. Because the performance of each technology is flow based, the system may require flow equalization infrastructure. However, the Quarry site is constrained by geography that would limit installation of large impoundments or in-ground basins for

equalization/diversion at present. The end result is a treatment plant that can have significant total installed and operations and maintenance costs.

Selenium Chemistry

An overview of the environmental chemistry is needed to understand the issues related to selenium treatment technologies. Selenium behaves differently than other base metals and is recognized to exist in several oxidation states in the environment, including the following:

- Selenate Se(VI)
- Selenite Se(IV)
- Elemental Se(0)
- Selenide Se(-II).

Se(IV) and Se(VI) are the most dominant forms under oxidizing conditions while Se(-II) would predominate under reducing conditions. Se(0) is rarely observed in natural systems. Additionally, as with other metals such as mercury and arsenic, selenium can be found in organic forms, particularly methylated selenium compounds. The stability of inorganic selenium as a function of pH and Eh (redox, ORP) illustrates the relationship among selenium oxidation states and aqueous species (Figure 1).

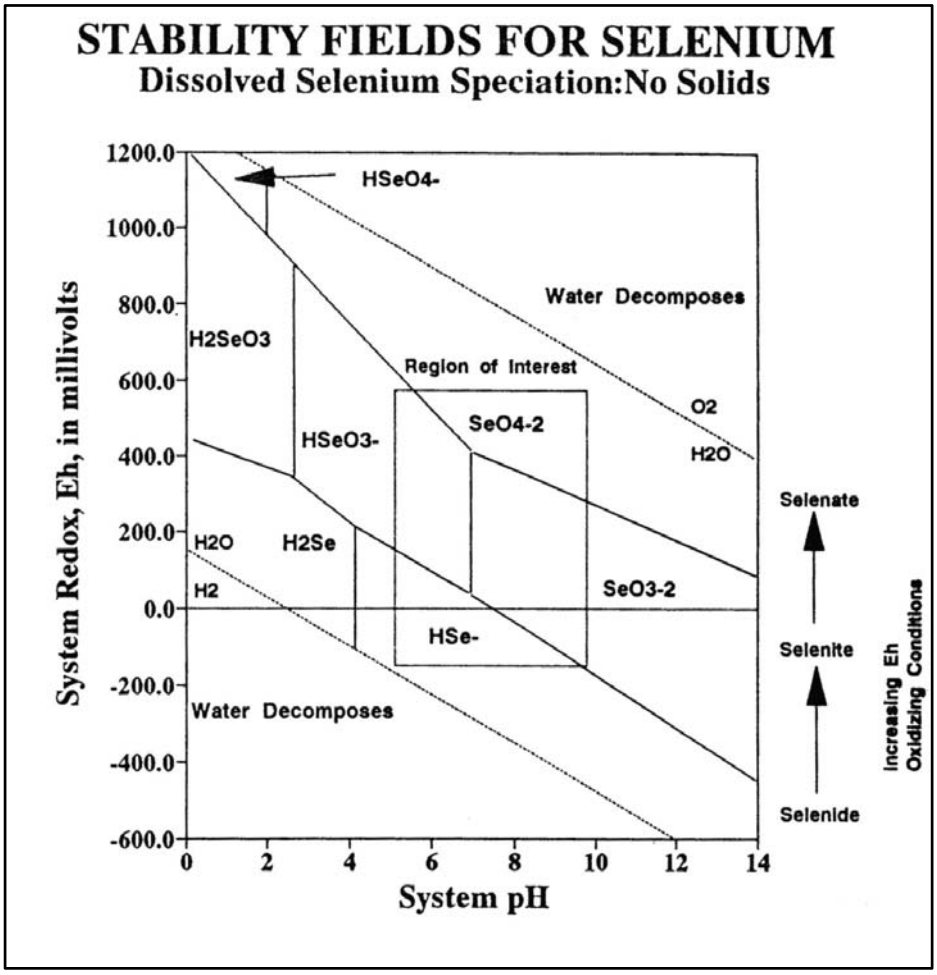
Additionally, toxicity of selenium has been observed to vary depending upon the chemical state and speciation of the element. Selenium in the Se(IV) state, selenite, is generally regarded as the most toxic form. This form is also the most stable form in most environmental systems, except under highly oxidizing or highly reducing conditions. It is expected that the predominant forms of selenium in the quarry are selenite and selenite, although the ratio and presence is not available.

Chemical Transformations

Chemical transformations are important in assessing the migration potential under a wide range of environmental conditions. Inorganic chemical reactions, often mediated by biological processes, are regulated by water quality conditions such as pH and Eh as well as concentrations of other chemicals which may affect reactions or the overall water quality (Fe, Mn, NO_3^-, organics). An additional transformation process includes the microbial methylation of selenium and subsequent volatilization from environmental systems. Selenium transport in the environment and removal in treatment systems as controlled by a variety of important factors such as:

- Forms of Se (selenate, selenite, selenide)
- Environmental conditions affecting solubility (pH, Eh, temperature)
- Formation of Se solid phases such as elemental selenium (Se, hex black or amorphous), ferroselite, FeSe or other forms
- Partitioning to other solids through adsorption or coprecipitation (Fe and Al oxides, clays, organic material, metal sulfides)
- Uptake by organisms

Figure 1. The Stability Fields for Selenium Species



Dissolved metal chemistry and solubility is governed by inorganic complexation and speciation including a potential for significant complexation with organic compounds.

Effects of pH on Selenium Speciation

System pH affects not only the form of selenium species but may also affect the conversion of selenate to selenite and selenite to selenide (Figure 1). Under mildly oxidizing conditions, the effect of pH on the distribution of selenite species will affect sorption efficiency and potential toxicity. The effects of pH change will also alter the distribution and redox state of other substances which may affect the migration and fate of selenium.

Effects of Redox on Speciation

Assuming that the dominant form of selenium at the quarry is selenite, significant changes in the redox potential would be required to convert these forms to selenite or selenide for certain treatment systems. The potential for conversion selenate to selenite to selenide in treatment systems utilizing redox chemistry requires significant organic carbon to develop reducing conditions. Other water quality variables within the water to be treated would

In a similar manner as observed with pH effects on other dissolved materials, redox would also be affected and/or regulate the development of appropriate redox condition, including ferrous/ferric iron, manganese forms, nitrate/ammonia/nitrogen gas and sulfate/sulfide. Redox conditions in natural environments depend on the reactions and concentrations of a variety of dissolved and solid-phase chemicals, including oxygen, nitrate, iron, manganese, organic matter (including dissolved organic carbon [DOC]), sulfate and their reduced forms. Biological mediation is often required for these reactions.

Selenium Sorption

Sorption of selenium species, particularly selenate and selenite species, has been shown to occur. Sorption surfaces, such as iron and manganese oxyhydroxides, naturally occurring clays, organic matter). Sorption of selenate species is not a favored process, sorption of selenate and selenite to iron and aluminum oxides follows a very typical anion sorption process. Sorption generally is very site-specific in the observed efficiency and depends on sorbate concentration (selenium), sorbent concentration (surface), competing ions and pH. Selenite sorption has been shown to be more efficient under ambient environmental conditions than sorption of selenate. The sorption of selenite is optimal at any pH below about 7.5 while sorption of selenate is only significant below pH=5. Under the anticipated conditions in any treatment system, the removal of dissolved selenium from water through sorption processes would be enhanced by maintaining selenium in the selenite form (or shifting selenite to selenite).

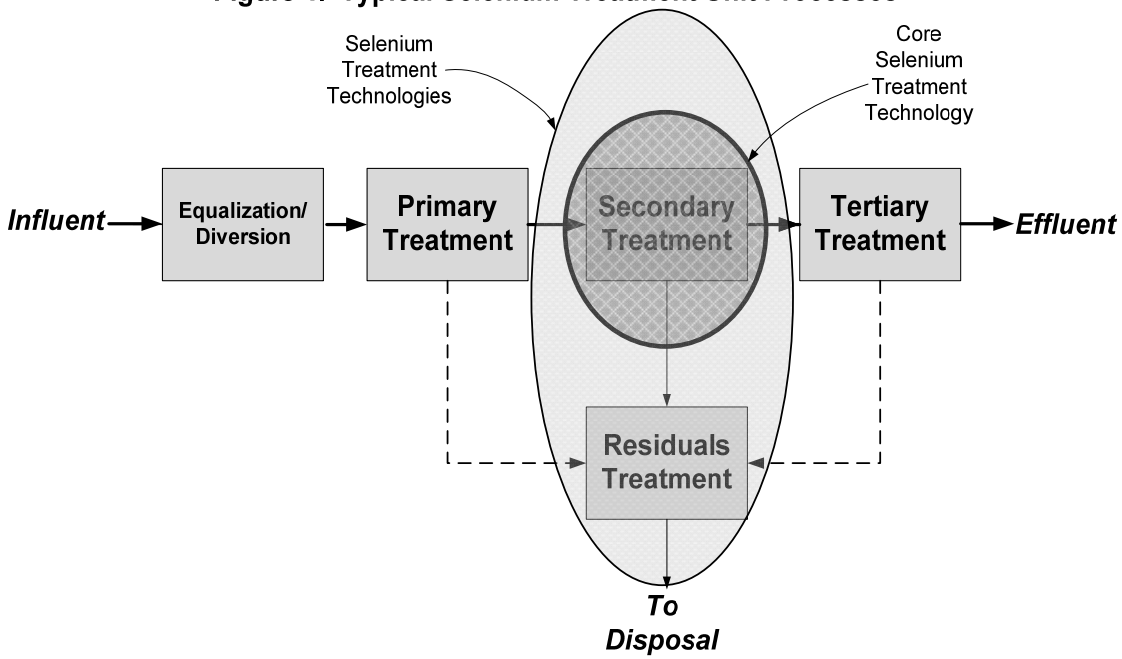
Chemical Precipitation. Based on typical water quality (major ions, pH, Eh) representative of the groundwater and quarry water quality, a variety of potential solids phases could be favored as part of an overall treatment strategy: elemental selenium (Se, hex black or amorphous), ferroselite, FeSe or other forms.

Systems Approach for Selenium Removal at the Quarry

A variety of physical, chemical and biological treatment technologies have been shown to remove selenium from water. Applying these treatment technologies must consider the aforementioned challenges. This typically means that the treatment technology must be configured as a “system” that includes primary, tertiary and residual treatment processes in addition to the core treatment technology process. Figure 1 provides an overview of the elements of a typical selenium treatment system.

Primary treatment to remove suspended solids and/or inorganic scale (e.g., calcium carbonate) may be required for certain of the core selenium treatment technologies. Tertiary treatment generally will be required to meet both the selenium and other conventional surface water discharge parameter guidelines or criteria. Residuals or by-product treatment will be required for most systems. The residuals will contain concentrated levels of selenium that, if disposed of as a solid or liquid waste, will need to comply with other disposal regulations (e.g., USEPA RCRA Hazardous Waste). By-products may require further treatment to ultimately reduce the selenium to a less hazardous form.

Figure 1. Typical Selenium Treatment Unit Processes



Core Selenium Treatment

Significant attention has been directed to biological systems for selenium removal. Biologically-based active and passive treatment systems generally provide the lowest cost and most effective treatment based on CH2M HILL's experience. Passive systems generally require a much larger footprint than active systems. CH2M HILL is in various stages of design and construction of selenium reduction systems for the coal mining industry in North America. The following provides a summary of our experience with core selenium treatment:

- Designed, and currently completing the construction of a 2,000 gallons per minute (gpm) active Fluidized Bed Reactor (FBR) based selenium reduction system. Startup will be in late fall 2012. System designed to meet 4.6 µg/L and 8.2 µg/L average month and maximum daily limitation
- Designed a 100 gpm passive biological treatment system that is currently operating (started up in Summer 2011) and meeting 4.6 µg/L and 8.2 µg/L average month and maximum daily discharge limits
- Completing the design of a 2,800 gpm active-FBR based selenium reduction system to be fully operational in 2014. System designed to treat selenium from >500 µg/L to <10 µg/L.
- Completing the design concurrently of two-first-of-the-kind basin-based, attached growth active biological treatment systems to treat 2,500 and 400 gpm, respectively, with startup anticipated in 2014. System designed to meet 4.6 µg/L and 8.2 µg/L average month and maximum daily limitation.
- Completing the design concurrently of two passive treatment systems with startup anticipated in 2014. System designed for 100 and 200 gpm and to comply with 4.6 µg/L and 8.2 µg/L average month and maximum daily limitation.

While the most common full-scale systems for selenium removal have involved chemical processes, advances in membrane processes and biological processes have extended the options to reduce selenium in contaminated water. The options included in a recent evaluation (Microbial Technologies, 2007) of treatment technologies suitable for the removal of selenium down to a discharge requirement of 5 ug/L, included:

- Physical: Reverse Osmosis, Nanofiltration, Ion Exchange, and Deep Injection/Evaporation
- Chemical: Zinc or Iron Reduction, Iron Precipitation, Cementation
- Biological: Volatilization, “inSitu Treatment, Bioreactor, Passive Systems, Treatment Wetlands

Each of these systems was evaluated against criteria such as costs, treatability, operations issues, reliability and achieving a 5 ug/L effluent limit. The evaluation concluded that reverse osmosis, nanofiltration, and biological treatment could meet the discharge requirement. A report prepared for the North American Metals Council (CH2M HILL 2010) evaluated both full-scale and pilot-scale operations currently treating selenium to less than 5 ug/L. Each of the systems was described in detail with respect to technology description, key design considerations, advantages, disadvantages, and capital and operating costs as a function of treatment flow rate in Table 1. Those full-scale systems that could consistently achieve the 5 ug/L goal (along with the Section number from the report) included:

- ABMet bioreactor Section 4.4.2.2 Costs: see Figure 4-28 to 4-29
- Reverse osmosis Section 4.2.1.2 Costs: see Figure 4-7 to 4-8

Several full-scale systems, while showing very good selenium removals, were considered have uncertainty with respect to maintaining less than 5 ug/L but showed promise. Those treatment systems included (along with the Section number from the report) included:

- Constructed wetland Section 4.4.3.1 Costs: see Figure 4-38 to 4-39
- Ferrihydrite Adsorption or Iron Co-precipitation Section 4.3.2.2 Costs: see Figure 4-18 to 4-19
- Ferrous hydroxide precipitation Section 4.3.3.3 Costs: see Figure 4-23 to 4-26
- Passive biochemical reactor Section 4.4.3.2 Costs: see Page 4-83
- Permeable reactive barrier with zero valent iron. Section 4.4.3.3 Costs: see Page 4-85

TABLE 1

Technologies Used in Full-Scale Treatment for Selenium Removal (CH2M HILL, 2010)

Lehigh Permanente Quarry Selenium Treatment

Technology	Technology Description	Key Design Considerations	Advantages[1]	Disadvantages[1]	Capital and Operating Costs[2]
ABMet®	The ABMet® system is a bioreactor that is an attached growth (comprised of a biofilm, or a layer of microorganisms that grow on the surface of a solid phase media) downflow granular activated carbon bed filter (Section 4.4.2.2 in CH2M HILL, 2010).	1. Flow equalization/diversion required as part of the treatment train. 2. Pretreatment a. pH adjustment may be required. b. Suspended solids to be removed to prevent clogging of granular activated carbon media. 3. Core Technology a. Competing ions and oxyanions. b. Addition of carbon in proportion to oxyanions to prevent sulfate reduction. c. Temperature in mesophilic range (15ºC to 40ºC). d. Addition of other macronutrients and micronutrients as well. e. Mass transfer driven technology. f. Hydraulic retention time is an important design parameter as selenium removal can be limited by kinetics. 4. Post-Treatment a. Possibly pH adjustment. b. Re-aeration to increase dissolved oxygen and remove biochemical oxygen demand. c. Media filtration for suspended solids and particulate selenium removal. 5. Residuals Treatment a. Treatment of backwash. b. Sludge generated that will require handling and disposal.	• Commercially available technology that has been demonstrated to remove selenium to low levels (e.g., less than 5 µg/L) in pilot-scale and full-scale applications. • Process uses naturally occurring microbes and molasses-based nutrient feed to maintain biomass. • Biologically reduced elemental selenium is in an insoluble form as nanoparticles integral to the biological solids.	• Potential need for pre-treatment to remove suspended solids. • Backwash water required to periodically slough off excess microbial growth, prevent short-circuiting of flow and for de-gassing. • Large footprint required given the low hydraulic loading rate (e.g., 2-4 gpm/ft^2 or 81-162 Lpm/m^2) requirements and high minimum hydraulic residence requirements (4-6 hours). • Presence of an excessive amount of nitrates will require proportional amount of carbon or energy source. This excess carbon source will also generate some additional biomass. • External carbon source is required if soluble influent organic content or COD is insufficient. • Wasted biomass residuals contain elemental selenium that may be hazardous depending upon the TCLP results. • Media replacement may be required over the life of the system. • Biological residuals will need to be thickened and dewatered for landfill disposal.	• Section 4.4.2.2 contains parametric cost curves for capital and operating costs, process flow diagram and assumptions for development of costs. • Total installed cost for 1 million U.S. gallons per day system is estimated as $30 million (2010 USD) (+100%/-50%). • Annual operation and maintenance cost for 1 U.S. million gallons per day system is estimated as $3 million (2010 USD) (+100%/-50%).

TABLE 1
Technologies Used in Full-Scale Treatment for Selenium Removal (CH2M HILL, 2010)
Lehigh Permanente Quarry Selenium Treatment

Technology	Technology Description	Key Design Considerations	Advantages[1]	Disadvantages[1]	Capital and Operating Costs[2]
Permeable Reactive Barriers	Permeable reactive barriers are a type of passive, *in situ* treatment for shallow groundwater (generally employed at depths less than 50-70 feet) (EPA, 1998) and can be employed for source zone treatment (Section 4.4.3.3 in CH2M HILL, 2010).	Zero valent iron is often used as the reactive media in implementation of permeable reactive barriers. The corrosion of zero valent iron causes an increase in pH values and a decrease in oxidation state. Monitoring of pH and oxidation reduction potential can be used to help evaluate the performance of permeable reactive barriers.	• Lower cost alternative than other technologies. • Low maintenance. • Can be used as a source control measure to mitigate exposure to downgradient receptors.	• Finite life span. • Potential to be clogged due to precipitation of secondary metals. • Has not been fully demonstrated to achieve low µg/L levels in the effluent (less than 5 µg/L).	$24 per 1,000 U.S. gallons (2004 USD) (USDOE, 2004).
Constructed Wetlands	Engineered wetlands are designed and constructed to use vegetation, soil, rock and other civil structures to promote the appropriate microbial and plant activity to provide selenium treatment. They can be designed in vertical upflow, subsurface horizontal and surface flow configurations depending upon selenium ecological requirements (Section 4.4.3.1 in CH2M HILL, 2010)	1. Flow equalization/diversion required as part of the treatment train. 2. Pretreatment a. pH adjustment may be required. b. Service water addition may be required if concentrations of other parameters such as chlorides or boron could cause adverse effects in the wetlands plants. c. Suspended solids removal required. 3. Core Technology a. Control of stoichiometry is limited because it is a natural treatment process. b. The rate of flow, strength of influent, and target effluent criteria influence the design size of the wetland. c. Typical retention times for passive treatment systems can be several days or more. d. Due to the large retention time required, the footprint of constructed wetlands is generally large and can be several acres. e. The performance of a wetland can be affected by the density of plant growth. Plant detritus is used as organic substrate for microbial reduction of selenium. If there is insufficient plant cover within a wetland, an additional organic substrate may be used to improve selenium removal.	• Basic technology is reasonably demonstrated to remove selenium at low concentrations. • Process requires minimal operator supervision. • Process can operate passively without energy or chemicals. • Subsurface flow wetlands can operate in cold climates with installations in Northern Europe and Canada. • Able to treat large volumes of water.	• Potential for long residence time. • Large and flat footprint is required. • Uncertainties relating to consistently meeting very low selenium discharge limits (less than 5 µg/L). • Performance of surface flow wetlands is affected by temperature. Selenium removal is greater in summer months during warmer period. • Monitoring may be required to assess ecological risk from bioaccumulation of selenium, including toxicity to aquatic life and animals (nesting birds); if significant, exclusion measures may be required. • Potential for groundwater contamination.	• Section 4.4.3.1 contains parametric cost curves for capital and operating costs, process flow diagram and assumptions for development of costs for subsurface flow wetland. • Total installed cost for 1 million U.S. gallons per day system is estimated as $17 million (2010 USD) (+100%/-50%). • Annual operation and maintenance cost for 1 million U.S. gallons per day system is estimated as $150,000 (2010 USD) (+100%/-50%).
Ferrous Hydroxide	A two step reduction oxidation and physical adsorption process where	Similar design considerations for ferrihydrite adsorption or iron co-	• Widely implemented at full-scale throughout	• Selenium removal not proven to low µg/L (less	Costs were reported for a 300 U.S. gpm FGD water treatment

TABLE 1
Technologies Used in Full-Scale Treatment for Selenium Removal (CH2M HILL, 2010)
Lehigh Permanente Quarry Selenium Treatment

Technology	Technology Description	Key Design Considerations	Advantages[1]	Disadvantages[1]	Capital and Operating Costs[2]
	ferrous iron is added resulting in the reduction of selenate to selenite and the subsequent physical adsorption or co-precipitation of selenite by ferrihydrite or ferric hydroxide (Section 4.3.3.3 in CH2M HILL, 2010.	precipitation. Reduction and subsequent adsorption are best accomplished under reducing conditions at a pH of approximately 8-9 (Twidwell et al., 2009).	the industry. • Relatively simple and low cost reduction oxidation and physical adsorption technology.	than 5 µg/L). • Large quantities of sludge may need to be disposed as a hazardous waste. • Reduction and subsequent adsorption is pH dependent with optimal conditions in the range of pH 8 to 9. • Not as effective at the reduction of selenate to selenite as zero valent iron.	plant as $15 million (2000 USD); annual O&M cost of $1.5 to $2 million (2000 USD).
Ferrihydrite Adsorption or Iron Co-Precipitation	Ferrihydrite adsorption is a two step physical adsorption process in which a ferric salt is added to the water source at proper conditions such that a ferric hydroxide and ferrihydrite precipitate results in concurrent adsorption of selenium on the surface; also known as iron co-precipitation (Section 4.3.2.2 in CH2M HILL, 2010.	1. Flow equalization/diversion required as part of the treatment train. 2. Pretreatment a. pH adjustment may be required, optimal pH for treatment is between 4 to 6. 3. Core Technology a. Only applicable for selenite, very little selenate removal. b. Staged mixing generally required for coagulation and flocculation of iron precipitation solids. c. Gravity sedimentation required to separate iron solids and adsorbed selenium from water matrix. 4. Tertiary Treatment a. Media filtration and pH adjustment may be required. 5. Residuals Management a. Iron residuals with adsorbed selenium will require thickening and dewatering for disposal as solid waste in a landfill. b. Will require toxicity characteristic leaching procedure (TCLP) testing to determine whether sludge should be	• Widely implemented at full-scale throughout the industry • Established by US EPA as best demonstrated available technology for selenium (e.g., selenite) removal. • Relatively simple and low cost chemical adsorption technology.	• Selenium removal not proven to low µg/L (less than 5 µg/L). • Produces relatively large quantities of sludge that may need to be disposed as a hazardous waste depending upon outcome of TCLP testing. • Iron co-precipitation is pH dependent with optimal conditions in the range of pH 4 to 6. • Not able to remove selenate. Requires oxidation of selenocyanate to selenite prior to removal. • Potential release of selenium from ferrihydrite residuals.	• Section 4.3.2.2 contains parametric cost curves for capital and operating costs, process flow diagram and assumptions for development of costs. • Total installed cost for 1 million U.S. gallons per day system is estimated as $11 million (2010 USD) (+100%/-50%). • Annual operation and maintenance cost for 1 million U.S. gallons per day system is estimated as $4 million (2010 USD) (+100%/-50%).

TABLE 1
Technologies Used in Full-Scale Treatment for Selenium Removal (CH2M HILL, 2010)
Lehigh Permanente Quarry Selenium Treatment

Technology	Technology Description	Key Design Considerations	Advantages[1]	Disadvantages[1]	Capital and Operating Costs[2]
		disposed as hazardous waste.			
Passive biochemical reactor	Passive biochemical reactors consist of an excavated lined area that has been filled with an organic substrate. They are generally operated in a gravity down-flow mode, although up-flow mode is also a possible configuration (Section 4.4.3.2 in CH2M HILL, 2010).	1. Flow equalization/diversion can be part of treatment train. 2. Pretreatment a. Suspended solids removal as pretreatment can increase lifespan of passive biochemical reactor. 3. Core Technology a. Hydraulic retention time is a key design parameter.	• Low capital and operations and maintenance costs, including low cost of organic substrate; local materials can be used for organic substrate. • Process requires minimal operator supervision. • Process can operate passively without energy or chemicals. • Subsurface design means that system can operate in cold climates.	• Uncertainty regarding potential re-mobilization of selenium. • Large footprint required. • Uncertainty in consistently meeting very low selenium discharge limits (less than 5 µg/L). • Organic substrate degrades over time and may require replacement.	The design and construction cost of the first module of the Montana gold mine passive treatment system was approximately $200,000 (2007 USD). A total of three modules are planned to treat a total of 20 US gpm (75 Lpm), with annual operating costs estimated at $0.95 per thousand gallons (Golder, 2009a).
Permeable Reactive Barriers	Permeable reactive barriers are a type of passive, *in situ* treatment for shallow groundwater (generally employed at depths less than 50-70 feet) (EPA, 1998), can be employed for source zone control (Section 4.4.3.3 in CH2M HILL, 2010).	Zero valent iron is often used as the reactive media in implementation of permeable reactive barriers. The corrosion of zero valent iron causes an increase in pH values and a decrease in oxidation state. Monitoring of pH and oxidation reduction potential can be used to help evaluate the performance of permeable reactive barriers.	• Lower cost alternative than other technologies. • Low maintenance. • Can be used as a source control measure to mitigate exposure to downgradient receptors.	• Finite life span. • Potential to be clogged due to precipitation of secondary metals. • Has not been fully demonstrated to achieve low µg/L levels in the effluent (less than 5 µg/L).	$24 per 1,000 U.S. gallons (2004 USD) (USDOE, 2004).
Reverse Osmosis	Reverse osmosis is a membrane separation process that uses high pressure to force a solution through a membrane that retains the soluble selenium (e.g., selenite and selenate) and other dissolved salts less than 0.001 microns on the reject side of the membrane and allows the purified water pass to the permeate side (Section 4.2.1.2 in CH2M HILL, 2010).	1. Flow equalization/ diversion required as part of the treatment train. 2. Pretreatment a. Suspended solids removal to reduce fouling potential of membrane to a silt density index of less than 5. b. May require temperature control at low and high temperatures to minimize viscosity effects. c. pH adjustment may be required. d. Antiscalant addition to prevent membrane fouling may be required.	• Demonstrated at full scale to remove selenium (selenite or selenate) to less than 5 µg/L. • Can remove high levels of TDS, approximately 90 to 98% removal. • Produces a high water quality with relatively high recoveries as a function of scale	• Higher capital cost to purchase, install, and operate than other membrane separation processes. • Requirements for pretreatment and chemical addition (microfilter, mixed media filter) to reduce scaling/fouling. • Pressure, temperature,	• Section 4.2.1.2 contains parametric cost curves for capital and operating costs, process flow diagram and assumptions for development of costs. • Total installed cost for 1 million U.S. gallons per day system is estimated as $40 million (2010 USD) (+100%/-50%). • Annual operation and

TABLE 1
Technologies Used in Full-Scale Treatment for Selenium Removal (CH2M HILL, 2010)
Lehigh Permanente Quarry Selenium Treatment

Technology	Technology Description	Key Design Considerations	Advantages[1]	Disadvantages[1]	Capital and Operating Costs[2]
		3. Core Technology a. Can remove high levels of TDS, but not practical above 10,000 mg/L TDS. b. Scale-forming ions will irreversibly foul the membranes and create selenium removal issues by allowing leakage. c. A heuristic approach for osmotic pressure requirements is to assume that 10 pounds per square inch gauge of osmotic pressure is exerted for every 1,000 mg/L TDS. 4. Tertiary Treatment a. Effluent blending of the reverse osmosis and the crystallizer distillate. b. Effluent may need to be re-constituted as ions may need to be added to discharge prior to receiving water. 5. Residuals Management a. Brine concentrates require treatment with core selenium removal technology and/ or further concentrated for disposal.	treatment. • Small space requirements, modular type construction and easy expansion. • Concentrates the selenium reducing the volume for ultimate reduction treatment.	and pH requirements to meet membrane tolerances. • Frequent membrane monitoring and maintenance. • Requires treatment and disposal of the brine (reverse osmosis reject stream). • Reverse osmosis permeate stream will require treatment (pH and TDS buffering) prior to discharge to receiving waters to meet aquatic toxicity test. Operating issues will result from viscosity changes at extreme low and high temperatures.	maintenance cost for 1 million U.S. gallons per day system is estimated as $3 million (2010 USD) (+100%/-50%).

Notes:
[1]Advantages and disadvantages are not presented within this table for technologies that have been demonstrated at laboratory-scale only, because further research and optimization are needed to determine the feasibility in applications to remove selenium from water.
[2]Capital and operations and maintenance cost assumptions associated with costs developed as part of this document are provided within the section text for specific technologies. Costs developed for this document are defined by the American Association of Cost Engineers International as Class 5 with an accuracy of +100% and -50%. This estimate is prepared based on limited information, where little more than proposed plant type and the capacity are known. These estimates were prepared to provide guidance in evaluation of each of the technologies. They are based solely on the information available at the time of the estimate. Actual final costs will depend on the actual labor and material costs, competitive market conditions, location and site conditions, final project scope, implementation schedule, and other variable factors. As a result, the final total installed cost will vary from the total installed cost and operations and maintenance costs prepared.

Selection of a System

EPA has published regulatory guidelines regarding selection of an appropriate treatment technology in their approach to determining Best Available Technology (BAT). Under the Clean Water Act (33 U.S.C. §§1251-1387), USEPA establishes effluent limitation guidelines, including BAT. BAT is defined by USEPA (http://cfpub.epa.gov/npdes/glossary.cfm#B) as the most appropriate means available for controlling the direct discharge of toxic and nonconventional pollutants. BAT effluent limitation guidelines, in general, represent the best existing performance of treatment technologies that are economically achievable. The Clean Water Act specifies that these guidelines are to be technology-based. However, in deciding which technologies are appropriate, costs and effluent reduction benefits are taken into account. Section 304(b)(2) of the Clean Water Act requires that USEPA take into account at least the following factors in determining BAT:

- Cost of achieving effluent reduction
- Age of equipment and facilities involved
- Engineering aspects of control techniques
- Process changes
- Non-water-quality environmental impact
- Process employed

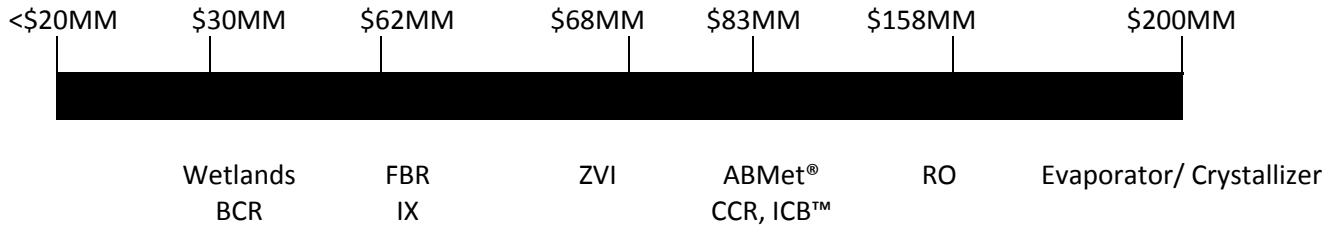
BAT is applied in a regulatory setting to effluent guidelines or technology based limits, not water quality based limits. In the absence of BAT, CH2M HILL's approach typically includes reviewing available technologies, and identifying applicable treatment technologies. Applicable technologies include those that are commercially available and have been proven to work on similar wastestreams or for removal of the target compounds. Process flow diagrams are developed for each option, followed by sizing of equipment, and development of an order of magnitude total installed and operating costs. The treatment alternatives are compared to identify the least cost option. Non-cost advantages and disadvantages are also considered and may impact final selection (like operating labor, schedule to implement, testing required prior to implementation). Typically the client's objectives, preferences and critical success factors become the criteria by which we will score the options to determine the best alternative. In some cases where there are large amounts of criteria for complex system we may utilize some in house decision science tools to assist with the selection.

Following selection of a technology, testing required for design is identified. Testing may be required to prove that the treatment concept will work, demonstrate effluent quality will comply with permit limits, and to develop sizing criteria for design.

Consistent with the ***Final Report Review of Available Technologies for the Removal of Selenium from Water for the North American Metals Council*, June 2010**, attached growth biological (e.g., fluidized bed reactor (FBR), ABMet®, CCR and ICB™), evaporation/crystallization, ion exchange, passive (e.g., BCR and constructed wetlands), and zero valent iron (ZVI) are the technologies that have been shown to provide the most consistent treatment of selenium down to the 5 µg/L levels. Figure 3 provides a relative comparison of these technologies for a 2,000 gpm selenium treatment system. As further knowledge is gained regarding the full-scale applications of these technologies, the cost figures estimated below will be refined and modified. There are many factors (e.g., sustainability, safety, business impacts, etc.) beyond these key indicators that must be considered when selecting the ultimate treatment system for selenium removal. The relative size for treatment technologies and their overall selenium removal performance is shown in Figure 4.

Figure 3. Relative Comparison of Technologies

Total Installed Costs



Operation and Maintenance Costs

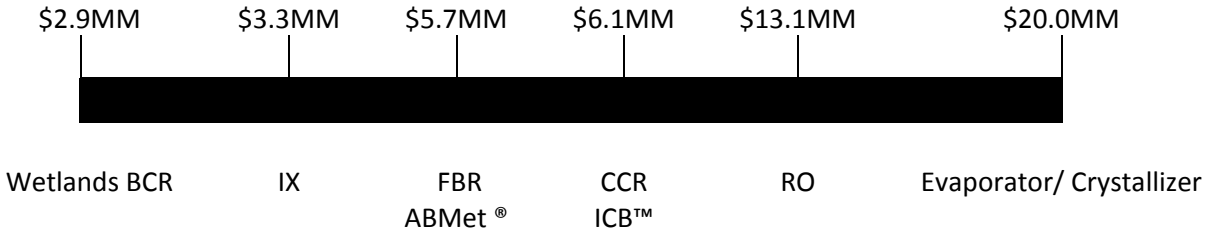
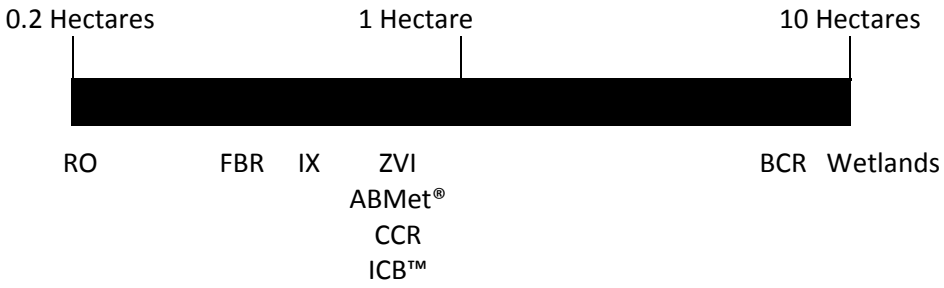
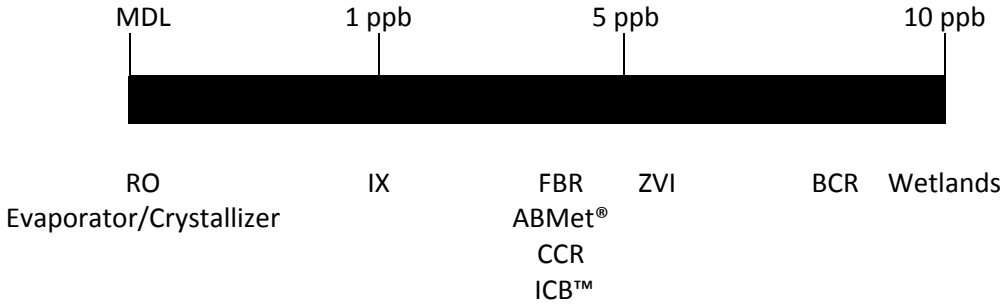


Figure 4. Relative Comparison of Technologies

Foot Print



Discharge Selenium Treatment Performance



Review and Evaluation of Lehigh's Selenium Treatment Mitigation

Lehigh provided a discussion of *Selenium Treatment Mitigation* (provided as Attachment 1 in March 16, 2012 email from the County) for the discharge from the Permanente Quarry in the period prior to reclamation. As evident from the previous discussion on selenium treatment of industrial waters from mining operations, there is a significant effort on a full-scale basis into cost-effective methods for removal of selenium using biological, chemical and physical methods. Flow rates of these systems range from 10 gpm to 2,000 gpm with selenium concentrations in the range of 20 to 100 ug/L, although several treatment systems are handling concentrations as high as 500 to 1,500 ug/L. Lehigh is aware of the development of microbial approaches for removal of selenium and also the difficulty in attaining discharge quality in the 5 ug/L range, or lower. Lehigh is also cognizant that effective removal of selenium and meeting discharge requirements for selenium and other parameters, as part of overall discharge regulation, would require a core technology for selenium and additional processes on the front (pre-treatment) or back end (tertiary treatment) to meet the effluent goals.

While Lehigh is correct that no one approach has been established and proven to work for Lehigh's treatment requirements, the water quality anticipated to be subjected to treatment (major ions, solids and selenium) is not all that unusual relative to the current full-scale activities directed at selenium removal. The treatment options available to Lehigh are also dependent on the RWQCB permit requirements. It is because the selenium removal options are not proven for a wide-range of conditions that Lehigh's multi-step approach to determine the suitable treatment approach at the facility fits within a logical progression. The main questions are related to the steps and the schedule in the progression from in-depth research to implementing full-scale design.

Within the description, there are several items that remain unclear or undefined including:

- The schedule shown in Figure 5 appears to be long if they are contemplating a physical and chemical treatment for selenium removal. While biological system for should be examined over seasonal extremes, it is not understood why two rainy seasons are needed to determine feasibility, especially if operation begins in the 3Q of 2013.
- In-Depth research and analysis is mentioned but not scheduled. Has this been completed?
- The low volume and mid volume flowrates are not indicated. Depending on the technology or technologies selected for low the volume, it might be better to pick an intermediate flow rate system (between low and mid) for piloting and compress the analysis time into mid-2014, if results are to lead to a full scale design within three years rather than four. The need for a low volume and mid volume pilot appears unnecessary for physical, chemical or biological treatment.
- The construction of the low volume system, if outdoors, should be commenced in late 3rd quarter to prevent rain in November and December from delaying completion until spring.
- Apparently they are considering a biological system and operational concerns over the winter rainy seasons.
- There is no indication of reporting and input from others into any decision-making regarding the outcome of research and analysis of potential treatment technologies, and results from low volume and mid volume piloting.

Figure 5. Mitigation Schedule for Selection of Full-Scale Design

	2012				2013				2014				2015			
TASK	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Select Contractor																
Bench Studies																
Low Volume Pilot Design																
Low Volume Construction/Operation																
Mid Volume Design																
Mid Volume Construction/Operation																
Selection of Full Scale system																
Reports																

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Appendix B
Response to Comments from the County of Santa Clara

Response to Comments on the
Technical Memorandum Dated March 28, 2012 and
Feasibility Assessment Lehigh Permanente Quarry Selenium Treatment, Dated April 4, 2012
From
County of Santa Clara Planning Office

No.	Comments	Responses
Comments on the Technical Memorandum dated March 30, 2012		
	At this point in time (effective today), is your conclusion that an effective selenium treatment technology can be feasibly installed to work at Lehigh required, based on the specific circumstances at the site, including the flow levels known and water quality standards or instead is additional time necessary, using the process Lehigh describes, to make this determination regarding implementation, especially given that other treatment facilities that treat selenium at the flow rates and water quality levels required here are not yet online – but soon will be.	There are systems that can treat to 5ug/L, they just might have uncertainty in some of the design parameters, such as water quality/quantity, the scale factor, permit limits, and in the economics, but, is it feasible? I would say, yes, it is feasible. It is feasible but not necessarily inexpensive. While I can envision a biologically-based system for Lehigh that could reach 5ug/L, the best approach would include some level of piloting, although not necessarily 3 years as described by Lehigh. I also believe that the water balance, particularly surface runoff that enters the pit, needs to be optimized to minimize the pumped flows from the Quarry, which will improve the economic picture for any treatment that is ultimately selected. In addition, depending on the need to preserve flows in the upper Permanente Creek, it may be possible to recover some energy costs by using a hydroelectric turbine at the downstrean end of the discharge (total head loss from the top of the Quarry to a potential location to the east-sourtheast of the East Material Storage Area; if a treatment plant were to be located there). Our analysis conducted for the Feasibility Assessment will really get to the heart of the "feasibility discussion", and provide information related to our conceptual design, and rough costs to treat the water quality and flows established for the Quarry. Many large-scale treatment plant being designed to treat a contaminated water require piloting of some form to develop detailied design specification for the full-scale design. There is usually a site-specific component to water quality, effluent requirements, space, etc. that will require modifications to proven-technologies. It is no different in this situation. The main qurestion gets to the length of time required to develop that design data. Lehigh's process, as laid out in the Mitigation Plan, is a reasonable approach, although I would recommend the piloting of a flow rate somewhere between a low-volume and mid-volume system. One winter period for evaluating a biological process is sufficient, assuming the system begins operation in the late fall. This would lead to the compression of the piloting phase to the end of 2013, including the preparation of the design report. Full-scale design could then proceed.
Comments on the Draft Feasibility Assessment dated April 10, 2012		
1	East Materials Storage Area (EMSA): It appears that this portion of the quarry was not included in the feasibility assessment, please confirm if the runoff from this area would be included in the treatment for selenium. If not, please address how this area would / should be treated.	The EMSA flows are relatively small compared to the WMSA and North Quarry. The EMSA flows, being <5% were not considered in deciding the conceptual treatment flows. Locating the treatment plant near the EMSA would facilitate gravity capture of some flows and minor pumping of other EMSA flows to the treatment plant, as needed depending on selenium levels. The area of the EMSA is approximately 17% of the sum of the WMSA and the North Quarry (NQ). In addition, while the runoff from the WMSA enters the NQ and contributes to the runoff from the NQ and groundwater influx to determine the total pumping rate, the groundwater is not

Response to Comments on the
Technical Memorandum Dated March 28, 2012 and
Feasibility Assessment Lehigh Permanente Quarry Selenium Treatment, Dated April 4, 2012
From
County of Santa Clara Planning Office

No.	Comments	Responses
		a component of the EMSA, in terms of any flow requiring treatment. Based on the drainage report prepared by Chang (2011-Attachment F), the runoff volumes from a 25-year event was 23 cfs and that from a 100-year event was 28 cfs. This is contrasted with the runoff from the WMSA and NQ combined of 356 cfs for the 25-year and 435 cfs for the 100-year events, respectively, using the rational method analysis. The runoff from the EMSA is estimated at 6.5% of the runoff from the WMSA/NQ combined. If we then include the groundwater influx, the relative runoff from the EMSA would be less than the 6.5% of the total flow being pumped from the Quarry, even for storms of lesser magnitudes than the extreme storms above. Based on this information, the runoff from the EMSA would not lead to significant changes in the required treatment flows and volume, and was not implicitly considered in the conceptual design capacity of 1,750 gpm. Water quality of the runoff from the EMSA is comparable to the WMSA based on table 4.10-2 from the DEIS (range 7.1 ug/L to 38 ug/L) and sampling on February 16, 2011 (Se = 35 ug/L) and March 24, 2011 (Se = 16 ug/L). The EMSA should be subjected to further data collection for development of water quality inputs and water management strategies for reducing runoff.
2	During the field visit, Allen had discussed the theory of segregating the runoff water from the overburden pile(s) from the quarry pit water that is pumped. The discussion was that the runoff has lower selenium levels and may be able to have a different treatment than the water from the pit; possibly a series of plants rather than one large one. However, in the report, the segregation approach was not addressed. Please clarify which is the best and/or most cost effective approach.	Segregation would be viable if it could be done such that the runoff water would be in compliance with the selenium discharge requirements. With source control/segregation alternatives there are generally some incremental increase in cost and operational complexity that would have to be compared and contrasted with combined water end of pipe treatment. Evaluation of this would best done in the conceptual alternatives evaluation where comparative costs could be used to determine whether this is cost effective nor not, otherwise it would be hard to say what is the most cost effective approach.
3	If the treatment plant went idle for 6 months during the dry season, what would be required to start it up again?	Generally, while biological treatment systems are very forgiving processes, they can't be turned on and off very quickly. They can be idled relatively easily for 1 to 2 weeks, but longer than that you would need to recommission the system. If the plant went idle for six months we would shut it down and clean it up such that it could be restarted when appropriate. These systems generally will take 2 to 4 weeks to acclimate at startup. We typically would use sodium nitrate as an electron acceptor to start up the biological system and acclimate it.
4	How does this cost estimate compare to treatment plants that are operating and have similar water flows and successfully achieve selenium reduction levels to 5 µg/l?	We developed the parametric cost estimates in the report from other similar systems we are currently engineering and/or constructing. Some of these systems are designed from more extreme weather conditions (e.g., more robust building infrastructure to house the treatment equipment) and others are not, but on balance our parametric approach to extrapolate the estimate provided in the report provides what we would think is a fair class 5 TIC estimate for a system for the Quarry. The actual costs could be as low as the low end of the accuracy range (e.g., ~$30MM) associated with the estimate, which would be best case.

Response to Comments on the
Technical Memorandum Dated March 28, 2012 and
Feasibility Assessment Lehigh Permanente Quarry Selenium Treatment, Dated April 4, 2012
From
County of Santa Clara Planning Office

No.	Comments	Responses
Comments on the Draft Feasibility Assessment dated April 16, 2012		
1	The report states that with a water management strategy the WMSA flows could be diverted away from the pit and managed without treatment. Could you clarify what you mean by "managed without treatment?" I assume you are referring to BMPs, but could you provide more specifics?	Assuming the WMSA flows are surface runoff with selenium concentrations below the compliance limit then they would be able to be segregated such that you would not have to treat the water. It may be possible to develop handling, capping or cover solutions for management of the materials such that we could minimize water infiltration and leaching/oxidation of selenium resulting in runoff that would comply with the limits and not require treatment. These would be best management practices (BMPs), and/or source control alternatives that could minimize the wastewater that requires treatment.
2	The report states that there will be residuals or by products, and they will have to be disposed of in accordance with USEPA regulations. And the by-products might require further treatment to ultimately reduce the selenium to a less hazardous form. I can't tell from the report what this would consist of in terms of volume, frequency, and how do the by-products get "further treated?"	The end result of biological treatment is biological residuals with reduced selenium solids. Selenium is a RCRA regulated characteristic hazardous waste when the toxicity characteristic leach procedure (TCLP) results in a selenium concentration of 1 mg/L and a non-RCRA California hazardous waste when the total threshold limit concentration (TTLC) exceeds 100 mg/Kg on a wet weight basis, and the soluble threshold limit concentration (STLC) from the wet extraction test (WET) exceeds 1 mg/L. Above these thresholds the selenium residuals from biological treatment would have to be managed to meet RCRA and/or non-RCRA California hazardous waste requirements. Based on TCLP work we have performed on biological solids from pilot tests we have performed we have not exceeded the TCLP RCRA toxicity concentration of 1 mg/L. Beyond characterizing the residuals to ensure they do not meet this criteria or can be disposed of as non hazardous materials, careful management of the residuals is important to prevent release back into the environment through landfill leachate and/or reoxidation and release through leachate from the ultimate disposal site.

STATEMENT OF OVERRIDING CONSIDERATIONS

I. Introduction

1.01 In approving the Proposed Project, which is the proposed reclamation plan amendment ("RPA") evaluated in the Final EIR, the Planning Commission makes the following Statement of Overriding Considerations pursuant to Public Resources Code section 21081 and State CEQA Guidelines section 15093 in support of its findings. The Planning Commission has considered the information contained in the Final EIR and has fully reviewed and considered all of the public testimony, documentation, exhibits, reports, and presentations included in the record of these proceedings. The Planning Commission specifically finds and determines that this Statement of Overriding Considerations is based upon and supported by substantial evidence in the record, including but not limited to the specific information identified in this Statement.

1.02 The Planning Commission has carefully weighed the benefits of the Proposed Project against any adverse impacts identified in the Final EIR that could not be feasibly mitigated to a level of insignificance. As more fully set forth in the Final EIR, the significant impacts of the Proposed Project that arguably cannot be mitigated to levels of insignificance occur in the following areas:

a. Aesthetics, Visual Quality, Light and Glare

b. Biological Resources

c. Cultural and Historic Resources

d. Hydrology and Water Quality

While the Planning Commission has required all feasible mitigation measures, such impacts remain significant for purposes of adopting this Statement of Overriding Considerations.

1.03 Notwithstanding the identification and analysis of the impacts identified in the Final EIR as being significant, or potentially significant which arguably may not be avoided, lessened, or mitigated to a level of insignificance, the Planning Commission, acting pursuant to Public Resources Code Section 21081 and Section 15093 of the State CEQA Guidelines, hereby determines that specific economic, legal, social, technological and other benefits of the Proposed Project outweigh any unavoidable, adverse impacts and that the Proposed Project should be approved.

1.04 This statement of overriding considerations applies specifically to those impacts found to be significant and unavoidable as set forth in the Final EIR and the record of these proceedings. In addition, this Statement of Overriding Considerations applies to those impacts which have been lessened to a level of insignificance.

1.05 Based upon the objectives identified in the Proposed Project and the Final EIR, and the detailed conditions of approval imposed upon the Proposed Project and following extensive

public participation and testimony, the Planning Commission has determined that the Proposed Project should be approved as conditioned and that any remaining unmitigated environmental impacts attributable to the Proposed Project are outweighed by the following specific economic, fiscal, social, environmental, land use and other overriding considerations, any one of which is sufficient, in the Planning Commission's view, to approve the Proposed Project.

II. Project Approval Ensures Continuing Local Supplies of Construction Materials

2.01 Santa Clara County and the San Francisco Bay Area ("Bay Area") contain heavily urbanized areas that require essential construction materials such as cement and aggregates for roads and infrastructure, new construction and redevelopment, public works projects, and myriad other forms of building. In the South San Francisco Bay Area, the average person consumes an estimated 5.7 tons of aggregate annually for these purposes. This information is in a May 21, 2012 letter from Harrison, Temblador, Hungerford & Johnson (HTHJ), part of the record before the Planning Commission. The County and Bay Area benefit from having a local supply of these materials, which allows the construction materials markets to function efficiently and avoids adverse economic, environmental and other effects that result from importing these materials from long distances.

2.02 The Quarry represents the largest local supplier of construction aggregates and cement-grade limestone within the Bay Area. The Quarry is a unique and important resource in light of its close proximity to projects that require these materials. The Quarry supplies the local building and construction materials markets with two similar but distinctly important materials: construction aggregates, and cement-grade limestone. This information is in a May 21, 2012 letter from HTHJ.

a. Construction Aggregates: The need for aggregate resources is driven largely by population growth and the corresponding need for infrastructure construction and maintenance. The California Department of Conservation has identified Santa Clara County as part of the South San Francisco Bay Production-Consumption ("P-C") Region, as among those with the greatest projected need for aggregate resources in the state. The amount of permitted aggregate resources in this region is approximately 37% of the projected 50-year demand, a shortfall of approximately 786 million tons. Adjacent P-C regions are also facing significant shortages. The North San Francisco Bay Region has only approximately eight percent of the 50-year demand for construction aggregates, and the South San Francisco Bay Region already imports material from the Monterey Bay Region to meet current demands. The Quarry produces, on average, more than 1.2 million tons annually of construction aggregates annually, serving to alleviate the regional shortage of available resources. Because aggregate from the Quarry is produced locally and serves end-users near the Quarry, local construction projects can obtain material from shorter distances at less cost. The foregoing information is in a May 21, 2012 letter from HTHJ, which is part of the record.

b. Limestone: Limestone is the primary component of Portland cement, a critical building material for most construction projects. The County, Bay Area and northern California are, combined, projected to require approximately 87 million tons of Portland cement over the next 20 years to maintain infrastructure and support conservative growth. This, in turn, will

require approximately 130 million tons of limestone within the same period, an average of over 6.5 million tons per year. The Quarry is a major source of cement-grade limestone for these markets. The specific types of limestone found at the Quarry allow cement produced from these materials to meet the highest industry specifications (specifically, Permanente cement displays optimal alkali-silica characteristics, and satisfies CalTrans' compression tests required for use in public infrastructure projects). The foregoing information is in a May 18, 2012 letter from Kari Saragusa and a May 21, 2012 letter from HTHJ, which are part of the record.

2.03 The Quarry's limestone is the raw material for an estimated 65% of all cement used in Santa Clara County, 55% of cement in the Bay Area, and 18% of the cement used in Northern California. This information is in the May 2010 Project Description within the application materials submitted by the operator, which is part of the record. The Proposed Project would enable the Quarry to continue providing up to 2.2 million tons of cement-grade limestone annually, in line with the Quarry's existing contributions, recorded in Attachment H of the proposed RPA. In the absence of this supply, substitute limestone supplies would need to be trucked, railed or barged into the region at greater cost; accordingly, the availability of the Quarry's supply avoids the increased cement prices that would result from longer travel routes, and emissions associated with importing alternative supplies. This information is in a May 18, 2012 letter from Kari Saragusa and a May 18, 2012 letter from Dr. John Husing, which are part of the record. To illustrate the widespread use of the Quarry's materials, the following is a partial list of public projects that are using or have recently used the Quarry's materials in the County, Bay Area and northern California region, based on a May 18, 2012 letter from Kari Saragusa:

- CalTrans Interstate 680 lean base paving (San Jose)
- CalTrans Interstate 680 structures and concrete paving (Livermore)
- CalTrans Interstate 580 structures and concrete paving (Danville)
- CalTrans Interstate 80 concrete paving (Emigrant Gap)
- BART – Warm Springs Station (Fremont)
- San Francisco General Hospital new construction
- San Francisco Trans-Bay Terminal
- Rincon Center high rise buildings (San Francisco)
- San Francisco Public Utilities Commission (SFPUC) new building
- San Francisco PUC Hetch Hetchy Water Delivery System reconstruction
- Stanford Hospital and Parking Garage (Palo Alto)
- CalTrans Doyle Drive (Golden Gate Bridge) retrofit
- Golden Gate Bridge Seismic upgrade
- San Francisco Mission Bay development
- CalTrans San Francisco – Oakland Bay Bridge new construction
- San Jose Mineta International Airport expansion
- Oakland International Airport expansion
- Highway 17 reconstruction
- CalTrans Highway 880 reconstruction and expansion (Oakland)
- CalTrans Highway 101 reconstruction and expansion (Marin/Sonoma)
- Oakland 12th Street Lake Merritt Bridge reconstruction +

- Contra Costa Water Los Vaqueros Dam reconstruction (Byron)
- CalTrain San Bruno Grade Separation (San Bruno)
- SFPUC Bay Division Tunnel (Palo Alto)
- CalTrans Hwy 1 Bridge (Lucia)
- SFPUC San Joaquin Pipeline (Tracy)
- SFPUC New Irvington Tunnel (Newark)
- SFPUC Crystal Springs Reservoir (San Mateo)
- CalTrans Highway 4 Structures (Antioch)
- SFPUC Lake Merced

2.04 The County's approval of the Proposed Project ensures that this important material supply remains available. Approval of the RPA ensures that the Quarry remains in compliance with the Surface Mining and Reclamation Act (SMARA) (Pub. Resources Code, § 2710 *et seq*.), and the County's surface mining ordinance (S.C.C. Ord., § 4.10.370 *et seq*.). If the project were not approved, the Quarry could be deemed out of compliance with these laws and ordinances, and as a result, potentially removed by the Department of Conservation from the "AB 3098 List" which in turn would prevent the Quarry from supplying state and local public construction projects such as the projects above. Project approval, accordingly, allows the County to preserve this important construction materials supply, and avoid the delays and disruption if projects were required to find alternative sources.

III. Project Approval Minimizes the Adverse Effects of Importing Construction Materials

3.01 Between 2000 and 2010, the Quarry produced up to approximately 2.2 million tons annually of cement-grade limestone, and on average over 1.6 million tons of this material each year. The quarried limestone was processed at an adjacent cement plant and the resulting cement products were distributed within Santa Clara County and the broader regional market. This information is in a May 21, 2012 letter from HTHJ, which is part of the record.

3.02 If the Proposed Project is not approved, and the Quarry became unavailable to supply these raw materials, the market would replace the lost supply from other facilities. Other facilities capable of supplying replacement material are not local and are significantly farther away. Currently, the nearest alternative source for the Bay Area market is in Redding, California, which is approximately 250 miles away from Santa Clara County. The next closest alternative supplier is outside the state of California in Fernley, Nevada which is approximately 280 miles away. The foregoing information is in a May 18, 2012 letter from Kari Saragusa and a May 18, 2012 letter from Dr. John Husing, which are part of the record.

3.03 The incremental costs associated with obtaining replacement supplies from distant sources are substantial. Replacing the Quarry's market supply of these materials from alternative facilities in either Redding or Fernley (or any combination of them) would require millions of additional on-highway truck miles annual using heavy duty trucks. This translates into marked increases in diesel emissions, increased the wear and tear on local and regional highways, and additional transportation related costs, when compared to the location the Quarry. The foregoing

information is in a May 18, 2012 letter from Kari Saragusa and a May 18, 2012 letter from Dr. John Husing, which are part of the record.

IV. Project Approval Ensures that Significant Economic and Fiscal Benefits are Retained Locally

4.01 Keeping this economic activity local benefits Santa Clara County. There is substantial evidence that the Quarry provides significant economic benefits to the County and region that would be lost if the Proposed Project were not approved and the Quarry's ability to supply construction materials is restricted.

4.02 The Quarry currently generates approximately two million four hundred sixty-five thousand two hundred fifty-nine dollars ($2,465,259) in annual property taxes to the County and approximately one hundred thirty-five thousand four hundred forty-one ($135,441) in total sales tax collections in the County. These are tax revenues paid directly by the Project Applicant and do not include taxes collected from local retail firms that use the Quarry's products. These are important contributions to the County's tax revenues. The foregoing information is in a May 18, 2012 letter from Dr. John Husing, which is part of the record.

4.03 Additionally, based on the Quarry's average production volumes for cement and aggregate products, the Quarry's annual sales generate direct and indirect ("secondary" or "multiplier") effects through the County and the region. This includes direct materials sales within the County, amounts injected into the County through external investment (i.e. out-of-county sales), and additional amounts in "secondary" economic activity, including the indirect and induced economic impact of funds reaching local suppliers of goods and services and funds changing hands as local firms and people re-spend the money with other local companies. Applying established economic principles, the beneficial economic impact of the Quarry in the County and region can be reasonably projected to equal tens of millions of dollars or more on an annualized basis. The foregoing information is in a May 18, 2012 letter from Dr. John Husing, which is part of the record.

4.04 The County's approval of the Proposed Project preserves these economic and fiscal benefits by ensuring that the supply of construction materials from the Quarry remains available, and that a sizeable business of this type remains within the County. In the event that the Quarry was restricted in its ability to supply construction materials, local and regional public projects would likely be required to obtain a substitute source of comparable materials from sources that are outside of the County, and would not provide the County and the local economy with the same economic and fiscal benefits. The foregoing information is in a May 18, 2012 letter from Dr. John Husing, which is part of the record.

V. Project Approval Preserves Local Employment

5.01 The Quarry directly and indirectly provides employment for many that could be lost if the Proposed Project were not approved. The Quarry directly employs approximately one hundred fifty-one (151) workers. These are skilled workers, including engineers, geologists, chemists, environmental scientists, managers, salesmen, and other professionals. Further, when all direct

and indirect employment activity attributable to the Quarry is considered, the Quarry supports an estimated one thousand seventeen (1,017) jobs throughout the County and Bay Area. These jobs include those at affiliate firms, as well as those at service and supply firms that are directly associated with the Quarry's daily operations. In addition, the total employment impact of the Quarry includes jobs associated with the induced economic activity that results from monies generated by the Quarry moving through the local and regional economy. These are important jobs at this time in the local economy, in light of the fact that from 2007-2010, the local economy experienced an economic downturn with local employment reduced by 6.4%, dropping from 900,300 jobs to 843,100. The foregoing information is in a May 18, 2012 letter from Kari Saragusa and a May 18, 2012 letter from Dr. John Husing, which are part of the record.

5.02 If the Proposed Project is not approved and the Quarry's ability to supply materials to state and local projects was limited as a result, Quarry production would be significantly reduced. The Project Applicant has stated the Quarry could be required to cease operations altogether in these circumstances in the event that the current weak levels of private demand for construction materials is not be sufficient to sustain Quarry operations. Lehigh would endeavour to retain its employees, but any prolonged reduction in operation could make furloughs and layoffs unavoidable for direct employees, and a possibility for the many more whose employment is indirectly supported by the Quarry's operations.

VI. Conclusion

6.01 The Planning Commission finds that the Proposed Project has been carefully reviewed and that the Conditions of Approval have been imposed to implement the mitigation measures identified in the Final EIR, and to address numerous other issues. Nonetheless, the Proposed Project may have certain environmental effects which cannot be avoided or substantially lessened. The Planning Commission has carefully considered all of the environmental impacts which have not been mitigated to an insignificant level. The Planning Commission has carefully considered the fiscal, economic, social, environmental, and land use benefits of the Proposed Project. The Planning Commission has balanced the fiscal, economic, social, environmental, and land use benefits of the Proposed Project against its unavoidable and unmitigated adverse environmental impacts and, based upon substantial evidence in the record, has determined that the benefits of the Proposed Project outweigh the adverse environmental effects.

6.02 Based on the foregoing and pursuant to Public Resources Code section 210 81 and State CEQA Guidelines section 15093, the Planning Commission finds that the remaining significant unavoidable impacts of the Proposed Project are acceptable in light of the economic, fiscal, social, environmental and land use benefits of the Proposed Project. Such benefits outweigh such significant and unavoidable impacts of the Proposed Project and provide the substantive and legal basis for this Statement of Overriding Considerations.

6.03 Lastly, the Planning Commission finds that, to the extent that any impacts identified in the Final EIR remain unmitigated, such impacts are limited and generally represent a conservative approach to the CEQA analysis:

a. Aesthetics, Visual Quality, Light and Glare: Aesthetic and visual impacts are associated primarily with the EMSA development and reclamation. These impacts are limited in scope because the visual appearance of the EMSA development reflects, to some extent, an existing condition which results from the vested, ongoing surface mining operation, rather than a consequence of the Proposed Project. Additionally, the adverse visual impacts associated with the EMSA are temporary because the EMSA (and other areas) will be replanted and revegetated as the RPA is implemented.

b. Biological Resources: The Final EIR identifies significant and unavoidable impacts on biological resources based on the potential for discharges of selenium under the RPA. However, the conclusion that impacts are significant and unavoidable is based on a presumption that, even with mitigation, there is no guarantee that implementation of the RPA will not result in some additional contribution of selenium into surface waters, despite several best management practices designed to protect water quality. As a result, the County adopted a conservative approach which assumes that such contributions will occur, and treats them as significant and unavoidable. Further, elevated concentrations of selenium in surface waters are part of the existing condition, and biological communities currently exist in Permanente Creek. In short, these impacts are presumed, but they are not certain to occur.

c. Cultural and Historic Resources: The Final EIR concludes that there are significant and unavoidable cultural resources impacts based on the removal of a conveyor line that originally was installed in the 1940s. However, the Project Applicant has indicated that the conveyor may not be composed of original equipment because the equipment has been upgraded and replaced as a matter of regular maintenance. Thus, the historic value associated with preserving this equipment may be considered marginal.

d. Hydrology and Water Quality: As with biological resources, significant and unavoidable water quality impacts are based on the presumption that, even with mitigation, there is no guarantee that implementation of the RPA will not result in some contribution of additional selenium to surface waters in the interim period prior to final reclamation. It is entirely possible, however, that selenium contributions will not increase during the interim period but actually may be reduced, as a result of the array of new best management practices described in the RPA and the Final EIR for the site. In short, significant and unavoidable water quality impacts are presumed but they are not certain to occur.

6.04 Accordingly, as part of its decision to approve the Proposed Project, the Planning Commission has been faced with unmitigated impacts that are limited in nature and extent, or are presumed because they might actually not occur. When considering the significant benefits outlined in this Statement of Overriding Consideration against limited impacts, the balance of weight clearly falls in favor of the merits of the Project and its benefits.