STATE MINING AND GEOLOGY BOARD

Geohazards Committee

Robert Tepel, Chair; Erin Garner, Julian C. Isham

EXECUTIVE OFFICER'S REPORT

ARNOLD SCHWARZENEGGER
GOVERNOR

For Meeting Date: February 5, 2009

Agenda Item No. 2: Review of Strategy to Stabilize Existing Cutslope and Implement Revegetation Measures for Richmond (Chevron) Quarry (California Mine ID # 91-07-0006), Dutra Materials (Operator), Mr. Harry Stewart (Agent), City of Richmond.

INTRODUCTION: The State Mining and Geology Board (SMGB) is the lead agency for all surface mine operations in the City of Richmond that are subject to the Surface Mining and Reclamation Act (SMARA, Public Resources Code Section 2710 et seq.). The Richmond (Chevron) Quarry is located in the City of Richmond, and encompasses approximately 126 acres and includes a processing and recycling plant, and significant volumes of imported stockpiles of landscape debris and construction debris, and asphalt and soil, which is used for reuse and recycling. In response to the need to evaluate the overall stability of an existing cutslope, geotechnical studies have been performed by both Dutra Materials (Operator) and the Chevron Energy and Technology Company (subject property and adjacent property landowner).

REGULATORY AUTHORITY: In regards to cut slopes, and final highwalls and quarry faces, performance standards provided in the SMGB's regulations, California Code of Regulations (CCR) 3704(f) state:

> "*Cut slopes, including final highwalls and quarry faces, shall have a minimum slope stability factor of safety that is suitable for the proposed end use and conform with the surrounding topography and/or approved end use*."

CCR Section 3502(b)(3) states, in part:

> "*The designed steepness and proposed treatment of the mined lands' final slopes shall take into consideration the physical properties of the slope material, its probable maximum water content, landscaping requirements, and other factors. In all cases, reclamation plans shall specify slope angles flatter than the critical gradient for the type of material involved.*"

CCR Section 3501 defines Critical Gradient as:

> "*The maximum stable inclination of an unsupported slope under the most adverse conditions that it will likely experience, as determined by current engineering technology.*"

CCR Section 3700(b) states:

> "*Where an applicant demonstrates to the satisfaction of the lead agency that an exception to the standards specified in this article is necessary based upon the approved end use, the lead agency may approve a different standard for inclusion in the approved reclamation plan. Where the lead agency allows such an exception, the approved reclamation plan shall specify verifiable, site-specific standards for reclamation. The lead agency may set standards which are more stringent than the standards set forth in this Article; however, in no case may the lead agency approve a reclamation plan which sets any standard which is less stringent than the comparable standard specified in this Article.*"

BACKGROUND: The Richmond (Chevron) Quarry is located in the City of Richmond, and encompasses approximately 126 acres. The site is characterized by a flat quarry floor, a hide wall constructed from fill material, and quarry cut slopes with vertical dimensions of up to approximately 350 feet.

Surface mining operations include a processing and recycling plant, significant volumes of imported stockpiles of landscape and construction debris, and imported asphalt material and soil, which is reprocessed on site and recycled. In response to the need to evaluate the overall stability of an existing cutslope, geotechnical studies were completed by both Dutra Materials (Operator) and the Chevron Energy and Technology Company (land owner). These studies were reviewed by the Department of Conservation's Office of Mine Reclamation (OMR) and SMGB staff, and comments and recommendations were provided for the Geohazards Committee's (Committee) consideration at its May 8, 2008 meeting.

Previous Administrative Enforcement Actions: Following conduct of the 2005 SMARA mine inspection, several violations and corrective measures were noted. The operator is currently under an Order to Comply to provide: 1) a proposed workplan to mitigate an unstable cutslope; 2) a proposed revegetation plan; 3) a re-evaluation of the financial assurance cost estimate to reflect mitigative and stabilization efforts, and current labor and equipment rates; and 4) an amended reclamation plan. A Notice of Violation was issued on December 12, 2005. An Order to Comply was issued on March 14, 2006. An Administrative Penalty for the amount of $10,000 was issued on September 14, 2006. An additional Administrative Penalty

of $90,000 was issued on November 9, 2006, for failure to adequately correct violations pursuant to SMARA. A proposed schedule was provided by the operator dated January 4, 2007, and revised in correspondence dated January 31, 2007. At its February 8, 2007, regular business meeting, the SMGB deferred payment of the Administrative Penalty of $90,000 pending formal receipt of professional reports to be provided in accordance with the timeline and schedule previously provided by representatives of Dutra Materials. Since January 2007, progress reports have been provided on a monthly basis, and revisions to the proposed schedule have been made, as appropriate.

SMGB February 8, 2007, Regular Business Meeting: As noted above, at its meeting held on February 8, 2007, the SMGB deferred a previously issued administrative penalty of $90,000, but did require that the operator adhere to a schedule for completion of required tasks to provide an adequate amended reclamation plan and financial assurance cost estimate.

SMGB June 14, 2007, Regular Business Meeting: At its June 14, 2007 meeting, the SMGB heard from Dutra's and Chevron's consultants regarding the geotechnical work that has been performed to date, preliminary analysis, and possible mechanisms for slope failure. The SMGB moved to forward further geotechnical discussions of slope failure mechanisms, and proposed mitigation alternatives, to the Geohazards Committee (Committee), prior to the SMGB considering action on an amended reclamation plan and financial assurance amount.

Previous Geohazards Committee Activities: The Geohazards Committee reviewed geotechnical documents and held meetings to discuss geotechnical issues associated with the subject site on September 7, 2007, and January 9, March 9, May 8 and July 10, 2008. In April of 2008 SMGB staff requested a summary of proposed mitigation alternatives, which was subsequently provided in ENGEO's report titled: "*Discussion of Conceptual Slope Mitigation Options*," dated April 24, 2008. This report provided more information on the conceptual slope mitigation options previously presented in ENGEO's October 18, 2007 report, and provided preliminary estimates of construction quantities, costs, and impacts for each alternative, which collectively were meant to represent a range of typical mitigation measures for stabilization of rock slopes. The discussion of each alternative relied on an approach of comparing "conceptual advantages," "conceptual impacts," and estimated costs to make conclusions about the feasibility of a particular measure. Table 5 of their report summarized the results of this exercise with the following options discussed:

Alternative 1 – Imported Fill Buttress

Alternative 2 – Ridge Cut\Fill Buttress Balanced on Site

Alternative 3 – Cut\Fill Buttress Balanced on Site with Retained Slope

Alternative 4 – Structural Slope Stabilization

Alternative 5 – Slope Setback, Monitoring, and Maintenance

Alternative 5 was the least costly by an order of magnitude, and ENGEO and Dutra also favored this alternative because it presumably would have the least impact on the environment and infrastructure of the mine site and surrounding area. In fact, ENGEO's report indicated that Alternative 5 would have no impacts. However, the report did not carefully and adequately consider all advantages and impacts of each mitigation alternative.

The April 24, 2008 discussion of the preferred alternative as presented by ENGEO was framed as a preliminary assessment of possible alternatives for consideration, but was considered inadequate for conduct of a comprehensive analysis of mitigation alternatives. Essentially, the approach proposed was to conduct ongoing monitoring while leaving an unstable slope that would continue to fail and potentially degrade into an eyesore and hazard to the public and the environment. The approach also only focused on the next movement and did not consider the long-term effects on the slope and the safety of nearby petroleum storage tanks. The assessed feasibility of each alternative did not recognize the importance of the requirements of SMARA, which states that final mined slopes should be stable and properly revegetated. Stable slopes and successful revegetation were noted as conceptual advantages for Alternatives 1 through 4, but these advantages were downplayed in the discussion by narrowly interpreting that the end use would be industrial for the entire site. The industrial end use and appropriate SMGB-defined factor of safety were used to inflate the stated impacts and estimated costs for Alternatives 1 through 4 rather than providing other, possibly more practical solutions to the problem.

Based on the above considerations, at their May 8, 2008 meeting, the Committee requested that additional evaluation and reconsideration of potential slope mitigation alternatives be presented which meet the requirements of SMARA and the SMGBs regulations. At the Committee's July 10, 2008, meeting, the operator indicated that their consultant had not completed their re-evaluation of the cut slope. It was recommended by the Executive Officer that this matter be deferred and rescheduled for the Committee's upcoming September 2008 meeting. After an additional time extension was granted in order to complete further slope stability analysis by both the operator and the landowner, and for each to conduct peer reviews, a revised report prepared by ENGEO titled "*Analysis of Slope Mitigation Alternatives, Richmond Quarry, Richmond, California*", dated November 24, 2008, was received by the SMGB on November 26, 2008.

DISCUSSION: In addition to previously submitted geotechnical reports for the subject site, as discussed in the May 8, 2008, and July 10, 2008 Executive Officer's Reports, OMR and SMGB staff have reviewed the following recently submitted reports and letters:

a) "*Analysis of Slope Mitigation Alternatives, Richmond Quarry, Richmond California*," prepared for Dutra Materials by ENGEO Incorporated, dated November 24, 2008, and received November 26, 2008.

b) "*Richmond Quarry: Joint MMI-ENGEO Commentary on SMGB Executive Officer's Reports Regarding Analyses of Chevron Tank 1799*," letter to the SMGB and OMR prepared by MMI Engineering, Inc., dated December 4, 2008, and received January 12, 2009.

c) "*Quarry Floor End Use Evaluation, Rockfall Hazard Analysis, Richmond Quarry, Richmond, California*," prepared for Chevron Energy and Technology Company by MMI Engineering, Inc., dated December 8, 2008, and received January 13, 2009.

d) "*Peer Review, Geologic/Geotechnical Documentation, Quarry Slope and Portion of Main Tank Field, Richmond, California*," letter to SMGB prepared by URS Corporation, dated December 10, 2008, and received January 15, 2009.

Mitigation Alternatives and Conclusions: ENGEO's November 24, 2008, report describes the following slope mitigation alternatives to address the stability of the failed cutslope:

- Alternative 1 – Imported Fill Buttress
- Alternative 2 – Ridge Cut\Fill Buttress Balanced on Site
- Alternative 3 – Cut\Fill Buttress Balanced on Site with Retained Slope
- Alternative 4 – Structural Slope Stabilization; and
- Alternative 5 – End Use Restriction, Setback, Berm Placement, and Monitoring and Maintenance.

These mitigation alternatives are similar to those presented in ENGEO's April 24, 2008 report titled "*Discussion of Conceptual Slope Mitigation Options,*" however, the proposed end use of the quarry slope and a portion of the quarry floor at the toe of the slope has been clarified to be open space, and costs for Alternatives 1 through 4 have been revised. Based on ENGEO's revised analysis, it appears that implementation of any one of Alternatives 1 through 4 would result in a stable quarry slope that would be consistent with SMGB regulations.

ENGEO's November 24, 2008, report presents a new Alternative 5 that contemplates a combination of 1) a deed-restricted open space end use designation for the quarry slope and

100-foot setback area at the toe of the slope, 2) construction of a rock fall catchment structure within the setback area, 3) long-term (30 years) geotechnical and revegetation monitoring of the slope, and 4) periodic maintenance of the slope and catchment structure as needed. It is noted that, in support of Alternative 5, ENGEO specifically refers to the SMGB's Special Publication 117, "*Guidelines for Evaluating and Mitigating Seismic Hazards in California*," (SP-117) as revised and re-adopted on September 11, 2008. Although it appears that implementation of Alternative 5 would result in a safe industrial end use for a large portion of the quarry floor, it is not compatible with SMGB regulations requiring final cut slopes to be stable.

As noted above, SMGB regulations state that in all cases, reclamation plans shall specify slope angles flatter than the critical gradient of the type of material involved. As reiterated by ENGEO in their November 24, 2008 report, the 'critical gradient' is defined as the maximum stable inclination of an unsupported slope under the most adverse conditions that it will likely experience, as determined by current engineering technology. Cut slopes, including final highwalls and quarry faces, shall have a minimum slope stability factor of safety that is suitable for the proposed end use. In other words, the cut slope should be stable as determined by current engineering technology. Current engineering technology indicates that the cutslope is not stable. Additionally, Alternative 5, as presented, includes no costs for construction of the rockfall containment berm that is mentioned in ENGEO's report and recommended by MMI.

A key issue with respect to the unstable mined cut slope is the safety of nearby petroleum storage tanks and more specifically tank T-1799. The geologic and geotechnical studies undertaken by Dutra and Chevron conclude that the tank T-1799 is not threatened or that the threat is very low from the mining-related landsliding. The recently submitted documents attempt to clarify and provide additional assurances that there is no need to consider the long-term effects on tanks and mention that the only relevant tank is T-1799.

Once again, it is noted that the conclusion that the landslide shear plane does not extend beneath Tank T-1799 appears to be based solely on professional judgment, not geotechnical data that conclusively demonstrates such conditions. Given the available information, OMR and SMGB staff remain concerned about the impact of continued slope deformation on the existing tank T-1799.

EXECUTIVE OFFICER'S RECOMMENDATIONS: It is the Executive Officer's opinion that any reclamation mitigation alternative that does not improve the gross stability of an unstable mined slope should not be considered feasible with respect to existing surface mining law in California.

It is therefore recommended that the Committee reject Alternative 5 as acceptable slope mitigation, as it does not meet the requirements of the SMGBs regulations. The Executive Officer further recommends that the Committee direct the operator to prepare an amended reclamation plan for the site that describes how the slope will be reclaimed to a stable condition with a factor of safety appropriate for the proposed end use(s), and adjust the financial assurance, as appropriate.

SUGGESTED MOTION LANGUAGE: The SMGB may consider the following motion language:

To reject Alternative 5:

> *Mr. Chairman, I move that the Geohazards Committee, in light of the evidence presented before the Committee today, reject Alternative 5, and approve Alternative 1, 2, 3 or 4, or any combination thereof, as adequate to meet the requirements of SMARA and the Board's regulations, and direct the operator to adjust the financial assurance amount, as appropriate.*

Respectfully submitted:

_____
Stephen M. Testa
Executive Officer