Prepared for:

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General Industrial Stormwater Permit
Report of Potential Exceedance of Water Quality Standards, Review of Current Best Management Practices, and Additional BMPs to be Developed and Implemented

Lehigh Southwest Cement Company Permanente Plant
Cupertino, California

Prepared by:

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Project Number: HR1204

17 March 2010

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By Overnight Mail

March 18, 2010

Mr. Brian Wines
San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Re: Lehigh Southwest Cement Company, Cupertino, California-—General Industrial Stormwater Permit (Order No. 97-03-DWQ)--Report of Potential Exceedance of Water Quality Standards, Review of Current Best Management Practices and Additional BMPs to be Developed and Implemented to Control Naturally Occurring Selenium

Dear Mr. Wines:

Enclosed please find a report submitted to the Regional Water Quality Control Board pursuant to Condition C.3 of the General Industrial Stormwater Permit. This report describes the results of voluntary additional sampling Lehigh conducted for the presence of selenium during the January 2010 regular stormwater monitoring event.

Lehigh has been reviewing its stormwater management practices for the Permanente site since the submission of its 2009 Stormwater Annual Report, and Lehigh recently updated its Stormwater Pollution Prevention Control Plan. As you know, the Regional Board adopted a proposal in 2009 to list Permanente Creek as water quality impaired by selenium under Clean Water Act Section 303(d). Out of concern that water managed under the SWPPP may be coming into contact with selenium that occurs naturally in and around the quarry, Lehigh added sampling in two locations for selenium and other metals to the regular stormwater monitoring for the constituents specifically identified in the General Permit.

The sampling results identified elevated concentrations of selenium in the two additional water samples collected at the site. In light of the results of this preliminary analysis, Lehigh engaged Geosyntec Consultants to prepare the enclosed report. As required by the General Permit, the report summarizes the results of the initial selenium sampling and relevant site conditions, as well as a plan for further evaluation of selenium at the Permanente site. The Report includes an evaluation of the effectiveness of current Best Management Practices in controlling selenium and proposes an iterative and adaptive management plan for enhancing existing BMPs and developing and implementing

additional BMPs as needed. Finally, the Report proposes an implementation schedule for the plan. Upon approval by the Regional Board, Lehigh will implement the plan described in the Report.

Lehigh would like to meet with Regional Board staff as soon as possible to discuss this report and work with the Regional Board to implement this plan for controlling selenium at the Permanente site. We will be in contact to arrange a meeting in the next few days.

Very truly yours,

H. Wessl 3-18-2010

Henrik Wesseling
Plant Manager
Lehigh Southwest Cement Company - Permanente Plant

Cc: Dale Bowyer
Scott A. Renfrew
Brian Petty
Wayne Whitlock

Enclosure

Report: Lehigh Southwest Cement Company, Cupertino, California----General Industrial Stormwater Permit (Order No. 97-03-DWQ)--Report of Potential Exceedance of Water Quality Standards, Review of Current Best Management Practices and Additional BMPs to be Developed and Implemented to Control Naturally Occurring Selenium

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LIST OF ABBREVIATIONS

BAT	-	best available technology
BMPs	-	best management practices
EPA	-	Environmental Protection Agency
O&G	-	oil and grease
RUSLE	-	Revised Universal Soil Loss Equation
RWQCB	-	Regional Water Quality Control Board
SWPPP	-	Stormwater Pollution Prevention Plan
SWRCB	-	State Water Resources Control Board
TMDL	-	total maximum daily loads
TOC	-	total organic carbon
TSS	-	total suspended solids

EXECUTIVE SUMMARY

Lehigh Southwest Cement Company (Lehigh) manages stormwater associated with its operations pursuant to the California General Stormwater Permit for Industrial Activities (General Permit) and its Stormwater Pollution Prevention Plan (SWPPP). Lehigh has been conducting additional review of its stormwater management practices and its monitoring program since submission of its 2009 Stormwater Annual Report. One factor Lehigh considered in that review was the 2009 Regional Water Quality Control Board (RWQCB) adoption of a proposal to list Permanente Creek as water quality impaired by selenium under Clean Water Act Section 303(d). Lehigh became concerned that water that is collected and held in the quarry and eventually routed to Permanente Creek may be exposed to selenium that occurs naturally in the geology in and around the quarry. Therefore, Lehigh determined that it would conduct further evaluation of this potential issue in advance of the RWQCB's Total Maximum Daily Load (TMDL) process for selenium. Specifically, Lehigh determined that, during the next storm event selected for stormwater monitoring, it would conduct preliminary sampling of water collected in the quarry for selenium and other metals—in addition to the regular monitoring for constituents expressly called for by the General Permit.

Preliminary analysis of the additional samples taken voluntarily during the January 2010 stormwater runoff sampling event indicates that wet weather discharges from the Permanente Quarry area (the Site), pursuant to the General Permit may be contributing to exceedances of selenium water quality standards for the receiving water, Permanente Creek. In light of this result, Lehigh engaged Geosyntec Consultants (Geosyntec) to prepare this Report as required by the General Permit, Condition C.3.

Pursuant to the General Permit, this Report describes additional studies and monitoring that will be performed to confirm the selenium exceedance and, if confirmed, evaluate potential onsite source(s) of selenium. In addition, this Report describes existing Best Management Practices (BMPs) that are currently being implemented and discusses their potential effectiveness in controlling selenium. The Report goes on to discuss additional BMPs that, if necessary, may be developed and implemented at the Site to prevent or reduce concentrations of selenium that may be contributing to a water quality standard exceedance in Permanente Creek. Finally, this Report includes an implementation schedule.

Following RWQCB approval of this Report, Lehigh will revise its Stormwater Pollution Prevention Plan (SWPPP) and monitoring program as required by General Permit Section C.3.a, and will implement the tasks included in this Report, including:

- Sampling to confirm presence of selenium in Permanente Creek and water that is collected and held in the quarry for eventual routing to Permanente Creek;
- Investigating potential selenium sources and potential selenium loading;
- Assessing the effectiveness of existing BMPs at controlling selenium;
- Screening additional BMPs in relation to sampling and investigation results;
- Enhancing existing BMPs and implementing additional BMPs to control selenium as needed;
- Testing effectiveness of BMPs at meeting the requirements of the General Permit and controlling selenium; and
- Revising the existing SWPPP and developing long-term selenium monitoring program to be added to the Stormwater and Authorized Non-Stormwater Discharge Monitoring Plan.

These general tasks are described in detail in this Report. In the event elevated concentrations of selenium are not found in confirmation samples taken from the quarry discharge as part of this investigation, some of the latter activities will likely not be necessary.

1. INTRODUCTION

1.1 Terms of Reference

On behalf of Lehigh Southwest Cement Company (Lehigh), Geosyntec Consultants (Geosyntec) prepared this Report of Potential Exceedance of Water Quality Standards, Review of Current Best Management Practices (BMPs), and Additional BMPs to be Developed and Implemented (the Report) for the Permanente Quarry (the Site) owned by Lehigh, located in Cupertino, California. This Report was prepared pursuant to Section C.3 of the General Stormwater Permit for Industrial Activities (the General Permit) and issued by the State Water Resources Control Board (SWRCB).

1.2 Background and Purpose of the Report

Lehigh manages stormwater associated with its operations pursuant to the General Permit, the Stormwater Pollution Prevention Plan (SWPPP) for the site, and Cleanup and Abatement Order CAO 99-018. In addition to stormwater discharges, three sources of authorized non-stormwater discharges, including quarry dewatering, are managed and monitored pursuant to the General Permit, Section D, Special Conditions, and the SWPPP Sections 3.2, 4.4 and 5.3. The quarry dewatering system collects rainwater, stormwater that is routed into the quarry and groundwater that seeps into the quarry. The water in the quarry is held during significant storm events before eventual discharge after settling of sediments. As required by General Permit Sections D.1.b.v and vi, those discharges are reported in the 2009 Annual Report and quarterly monitoring is described in the Storm Water and Non-Storm Water Discharge Monitoring Plan.

The water in the quarry is pumped out by a dewatering pump, through an aboveground pipe to a turbidity monitoring station that de-activates the pump in cases of elevated turbidity measurements. The water continues through the pipe to Pond 4 for further settling, after which the water is passively discharged via gravity to Permanente Creek.

Lehigh has been conducting additional review of its stormwater management practices and its monitoring program since submission of its 2009 Stormwater Annual Report in June of 2009. In recent years, the principal focus of Lehigh's stormwater management efforts has been on monitoring and controlling sediment in its stormwater discharges.[1] Lehigh has regularly sampled stormwater at numerous onsite locations for the standard constituents covered by the General Permit – total suspended solids (TSS), oil and

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[1] Storm Water and Non-Storm Water Discharge Monitoring Plan (June 2009)

grease, chemical oxygen demand, and pH.[2] However, in 2009, the Regional Water Quality Control Board (RWQCB) adopted a proposal to place Permanente Creek on the list of impaired water bodies pursuant to Clean Water Act Section 303(d). Among other things, the RWQCB determined that Permanente Creek is impaired by selenium, based on water sample data that indicated Permanente Creek selenium concentrations are above the RWQCB Basin Plan water quality objectives (meaning that the aquatic life beneficial uses may be threatened due to elevated levels of this constituent). The RWQCB decision will become effective upon approval by the SWRCB and the United States Environmental Protection Agency (EPA), which will be followed by the development of a total maximum daily load (TMDL). Assuming SWRCB and EPA approval, the estimated TMDL will begin the process of developing a TMDL for Permanente Creek, with an estimated completion date of 2021.

During its stormwater review, Lehigh became concerned that water being collected and held in the quarry may be exposed to selenium that occurs naturally in the geology in and around the quarry. As part of the facility's Monitoring Program, the General Permit calls for additional sampling for toxic chemicals and other pollutants that are likely to be present in discharges subject to the Permit. In light of these circumstances, Lehigh determined to conduct the evaluation described herein in advance of the upcoming Section 303(d)/TMDL process. Specifically, Lehigh determined that during the next storm event selected for stormwater monitoring, Lehigh would not only conduct the regular sampling and analysis called for in the current monitoring plan, but also would voluntarily conduct preliminary sampling of water collected in the quarry from two locations and analyze those samples for metals, including selenium.[3]

Accordingly, after a monitored storm event beginning on 12 January 2010 and lasting for approximately 24 hours, Lehigh conducted the regular stormwater sampling and analysis at the locations outlined in the current Monitoring Plan. In addition, Lehigh collected samples during the morning of 13 January 2010 from the quarry settlement

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[2] Section B.5.c. of the General Permit indicates the storm water samples that must be collected and analyzed for:

> i. Total suspended solids (TSS), pH, specific conductance, and total organic carbon (TOC). Oil and grease (O&G) may be substituted for TOC; and
>
> ii. Toxic chemicals and other pollutants that are likely to be present in storm water discharges in significant quantities. If these pollutants are not detected in significant quantities after two consecutive sampling events, the facility operator may eliminate the pollutant from future sample analysis until the pollutant is likely to be present again.

[3] It had not been necessary to analyze for metals in previous years based on prior experience. However, Lehigh determined it appropriate to analyze the quarry sample for selenium and other metals in light of the circumstances described herein.

pond (sample NQS-1) and from the runoff that was migrating into the quarry from a nearby haul road (sample NQS-2).

This Report describes the analytical results of these additional samples taken voluntarily on 13 January 2010. These sample results suggested that water being discharged from the quarry area to Permanente Creek pursuant to the General Permit may be contributing to an exceedance of applicable selenium water quality standards.

Lehigh proposes to work with the RWQCB to investigate the potential source(s) of selenium, further sample the water being collected in the quarry area and Permanente Creek and, if further analysis confirms that quarry dewatering holding area discharges are contributing to exceedances of water quality standards, enhance existing BMPs and develop and implement BMPs to control selenium in these discharges. Accordingly, this Report is being submitted pursuant to Section C.3 of the General Permit.

As required by this provision, the Report describes the BMPs currently being implemented and their potential effectiveness with respect to controlling selenium concentrations. This Report also discusses additional studies and monitoring that will be carried out to test the water quality and, if warranted, evaluate potential source(s) of selenium. In addition, the Report discusses additional BMPs that, if necessary, would be developed and implemented to further prevent or reduce concentrations of selenium that may be contained in this water and that may be contributing to the exceedance. Finally, this Report includes an implementation schedule as required by Section C.3.a.

Following Regional Board approval of this Report, Lehigh will revise its SWPPP and monitoring program as required by Section C.3.b of the General Permit, and will implement the tasks included in this Report.[4]

1.3 Problem Statement

Existing BMPs are effective at controlling the stormwater-related sources of the standard constituents addressed in the General Permit. Selenium, a pollutant not specifically listed in the General Permit, has been detected during sampling of Permanente Creek that led to the proposal for inclusion on the 303(d) list. Selenium was found in both the water being collected in the quarry that discharges to Permanente Creek and surface runoff leading to the collection area. The selenium is believed to be naturally-occurring and originating from the surrounding geology. Further sampling and analysis are needed to evaluate whether selenium is being transported into the water in the quarry via contact with site soils and, if so, the source(s) of that selenium.

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[4] The current SWPPP (SWPPP 15) was submitted to the RWQCB on 4 March 2010.

This Report describes a preliminary evaluation of the potential effectiveness of existing BMPs to control selenium; a complete evaluation is dependent on the actual source and extent of this constituent. As described herein, additional data and analysis are required to fully evaluate BMP performance, which will vary depending on the nature and concentration of the selenium in the site soils and water. If additional sampling confirms that selenium is being mobilized and transported by water contacting on-site soils, then the BMPs currently in use will be enhanced to improve their control of selenium mobilization and transport. For example, if selenium is present primarily as a component of suspended sediment, then sediment control BMPs would be expected to be effective at controlling selenium by decreasing the amount of total suspended solids. Conversely, if the selenium is present primarily as a dissolved species, then sediment control BMPs may not be as effective and may actually be prolonging the contact time between water and selenium-laden sediment. Thus, further evaluation will be undertaken to select enhancements or additions to the existing stormwater BMPs that are effective at controlling selenium.

1.4 Organization of this Document

This remainder of this Report is organized into the following sections:

- Section 2, Site Information and Analytical Results of Sampling;
- Section 3, Best Management Practices, qualitatively evaluates existing BMPs and discusses potential additional BMPs to be evaluated if existing BMPs prove to require supplementing;
- Section 4, Additional Investigation and Monitoring, describes the proposed process for screening and testing potential selenium BMPs;
- Section 5, Additional BMP Development and Implementation, summarizes the proposed future activities intended to reduce uncertainty and select a technology(ies) for further review;
- Section 6, SWPPP Modification and Long-Term Monitoring Program (Post-BMP Implementation), describes the screening and sampling process proposed to be implemented once appropriate BMPs are selected;
- Section 7, Implementation Schedule, describes the proposed schedule for the activities described within this Report; and
- Section 8, Conclusions and Limitations, summarizes the findings of this Report.

References, tables, figures, and appendices follow the body of the Report.

2. SITE INFORMATION AND ANALYTICAL RESULTS OF SAMPLING

2.1 Site Description

Lehigh operates a cement manufacturing facility, a quarry, and an aggregates processing facility just west of Cupertino, California, in the Permanente Creek Watershed (Figure 2-1). Its operations include a conveyor system to transport rock and raw materials to the cement plant, several crushers and mills, a pre-calcining tower and a rotary cement kiln.

Based on the Geologic Map of the San Francisco Bay Region [USGS 2006], the site is situated at the foot of the Black Mountain over Franciscan Complex mélange rocks (late Cretaceous) and Franciscan Complex volcanic rocks (early Cretaceous). The San Andreas Fault runs along the base of the Monte Bello Ridge west of the Site, while the site itself is situated over the Calera Limestone member of the Franciscan Complex. The Calera Limestone is approximately 210 feet in thickness and is part of the Permanente Terrane. The Calera Limestone Member consists mostly of a dark gray, fine-grained limestone locally recrystallized to crystalline calcite masses and contains interbedded nodular layers of chert. The Calera Limestone is also locally cut by greenstone dikes and, in the southeast section of the quarry and the bluff, by Greywacke.

Based on microfossils found in the limestone, the Calera Limestone was formed by the metamorphic alteration of lime ooze sediments (planktonic forams and coccoliths) deposited on the ocean floor. The presence of chert indicates periodic terrageneous silica influx during deposition and reducing depositional environment. The depositional environment for the Calera Limestone is consistent with organic carbon enriched marine sediment accumulation that could yield elevated selenium content in a manner similar to Monterey Formation shale deposits. The Monterey Formation is associated with elevated selenium content, with concentrations reaching as much as 70 parts per million [Isaacs, 2009]. The Greywacke interspersed with the Calera Limestone also shares similar characteristics with the Monterey Formation, but is generally considered a much older deposit.

2.2 Sampling Results

Two samples were collected on 13 January 2010 from the locations shown on Figure 2-2. The samples were filtered in the field by using a 0.45 micrometer pore size filter and submitted to the analytical laboratory for testing. The samples were analyzed for several cations and anions as well as other general chemistry parameters. In addition, the samples were analyzed for a suite of metals, including selenium. The results are

summarized in Table 2-1, with the full reports included as Appendix A. Sample locations are shown on Figure 2-2.

The results of the metals analyses indicate that water being collected in the quarry may contain concentrations of selenium that exceed water quality standards, and, when discharged through the quarry dewatering system pursuant to the SWPPP, could be contributing to exceedances of the water quality standards for selenium in Permanente Creek. Further, it should also be noted that selenium concentrations in Permanente Creek may be naturally elevated due to the surrounding geology through the creek meanders. Based on a preliminary evaluation, it appears that elevated selenium levels in the water being collected in the quarry may result from the stormwater and groundwater coming in contact with naturally occurring selenium in the soils and/or sediments located in the quarry and surrounding area.

2.3 Selenium Transport

Mobilization of selenium from the natural geology is dependent upon its chemical speciation, which plays an important role in its presence in water. Selenium is a naturally occurring compound found in four primary oxidation states: -2, 0, +4 and +6. Numerous organic and inorganic complexes can be formed, with the dominant oxyanions formed under aerobic (oxidized) conditions being selenate (SeO_4^{2-}), selenite (SeO_3^{2-}) or biselenite ($HSeO_3^-$). Elemental selenium (Se^0) and selenide (Se^{2-}) exist under more anaerobic (reduced) conditions. In general, as selenium becomes more reduced, it becomes less soluble. Thus, selenate is the most soluble (and therefore most mobile) form of selenium, with selenite mostly forming sorbed ions. However, selenite is the most toxic aquatic form and generally a greater concern than selenate.

The dominant speciation of selenium present in the quarry waters is not clear. Although the analyzed samples were field-filtered, resulting in a measurement of the dissolved fraction of selenium, it is unknown how much, if any, is present as suspended particulate material. Given the known water inputs into the quarry (rain, runoff from nearby drainage courses, and groundwater seepage), several selenium sources or combinations of sources appear plausible:

- Elevated background concentrations of selenium may be naturally occurring in local surface waters (likely selenate or selenite species);
- Stormwater may contact large surface areas of soils containing elevated concentrations of selenium via overland flow or prolonged contact time in ponded water (likely selenate or selenite species);

- Stormwater may transport particulate selenium through sediment transport and erosion mechanisms; and
- Oxidized groundwater originating off-site and containing selenium leached from surrounding local geologic formations may migrate onto the site (likely selenate or selenite species).

Based on the information available at this time, atmospheric deposition of selenium onto the Site is not believed to be a contributing source. Preliminary analysis suggests the selenium concentrations present in samples NQS-1 and NQS-2 are consistent with the hypothesis that contact of the water being collected in the quarry with geologic materials results in increased selenium concentrations in some on-site waters.

3. BEST MANAGEMENT PRACTICES

3.1 Background

Lehigh currently has a robust, flexible system of BMPs designed to meet the requirements of the General Permit. Since the potential for selenium mobilization has only recently been identified, the original adoption of these BMPs at the Permanente site did not take into account selenium as a possible discharge constituent of concern. However, many of the BMPs already employed at the Site are expected to also be effective at limiting selenium mobilization by controlling stormwater contact with disturbed soils. This section describes existing and potential BMPs and their possible applicability for controlling selenium.

3.2 Existing BMPs

3.2.1 Introduction

The SWPPP organizes the existing BMPs into: (1) baseline BMPs instituted Site-wide; and (2) Site-specific BMPs for the major industrial activities at the Site (e.g., quarry and plant). In addition, sediment and erosion control BMPs are also specifically described in the SWPPP.

3.2.2 Baseline BMPs

Existing baseline BMPs instituted at the site to control sources of pollutants, limit erosion and sediment movement, and decrease overall stormwater runoff are summarized in the updated SWPPP and include:

- Covering of trash dumpsters;
- Preventative maintenance of vehicles and equipment;
- Spill prevention and response;
- Storm water management practices (e.g., source control, detention and retention ponds, and discharge reduction through storage and reuse);
- Erosion control and sediment control (e.g., slope stabilization; revegetation, and road construction/grading practices);
- Training; and
- Inspections.

Of these existing baseline BMPs, improvements to existing stormwater management practices and erosion and sediment control appear promising for improving control of exposure to and transport of selenium. Regarding the existing stormwater management BMPs, the water diversion activities, slope stabilization procedures, and loose soil removals will likely assist with controlling selenium, but may need to be enhanced to further decrease water contact quantity and/or duration time with site soils. Regarding the existing erosion and sediment control practices, stabilization of the Former Overburden Stockpile, maintenance of existing settlement ponds, and grading of disturbed areas will likely assist with controlling selenium but may need to be enhanced to further decrease the time and amount of contact between stormwater and site soils.

3.2.3 Site-Specific BMPs

As described in the SWPPP, several site-specific BMPs are being utilized in the quarry area to control water from the following activities:

- Dust control;
- Rain water collection; and
- Truck and support equipment storage.

Depending on the source(s) of selenium in on-site soils, the BMPs for dust control and rain water collection activities may be effective at controlling selenium. Existing dust control BMPs such as paving, vegetating, and stabilizing access roads may be particularly effective if the road material proves to be a significant source of selenium. While existing rain water collection BMPs such as the settlement ponds may be particularly effective at controlling the selenium present in suspended solids; it is less likely that these ponds are effective at controlling dissolved-phase selenium because water in the ponds continues to contact site soils. Truck and support equipment storage BMPs are not applicable for controlling sediment and/or selenium.

The site already has a program for stormwater capture and reuse for dust control measures, and this practice would be maintained and possibly expanded. A primary stormwater management strategy for additional consideration could be to further limit stormwater discharges by use of hydrologic source control measures. This could be attempted through several different approaches, such as increasing infiltration, particularly on the eastern portions of the site underlain by relatively permeable sands and gravels. Additional hydrologic source control measures could be to utilize revegetation efforts to increase evapotranspiration of stormwater.

3.2.4 Erosion and Sediment Control BMPs

As described in the SWPPP, several on-going BMPs are being utilized as erosion and sediment controls, including:

- Sediment catchment rock berms along roads;
- Re-grading of roads as needed to direct runoff to drainage basins or cross drains;
- Pond clean-outs (i.e., ponds are cleaned to protect against loss of storage capacity and pond overflow); and
- Creek and embankment maintenance (e.g., embankment slope stabilization measures to control erosion).

Depending on the source(s) of selenium in on-site soils, the BMPs for each of these activities may be effective at controlling selenium. Each of these BMPs may currently be effective at controlling selenium by decreasing the quantity and duration of contact with site soils and decreasing the amount of sediment mobilization into the water.

On-going erosion and sediment control BMPs are aimed at controlling stormwater contact with overburden stockpiles and limiting sediment transport by re-grading roads and drainages. Potential enhancements of these BMPs, such as additional revegetation of overburden stockpiles, would likely assist in further stabilizing and controlling these potential sources of sediment. In the case of former overburden stockpiles, revegetation and inspection/maintenance of drainage improvements could potentially result in decreases in selenium mobilization. At active overburden stockpiles, maintaining stormwater BMPs during development provides a significant opportunity for reducing selenium mobilization if these stockpiles are associated with elevated selenium concentrations.

3.3 Best Available Technology Economically Achievable (BAT)

To our knowledge, there are no official EPA or SWRCB determinations related to BAT for selenium associated with stormwater in this industrial category. Therefore, the studies, BMP enhancements, and potential BMP additions that are proposed herein have been developed after reviewing professional experience, existing data, and available literature on selenium control with the goal of achieving compliance.

3.4 Potential Additional BMPs

As described previously in the section on selenium transport, selenium mobilization from the native geology into water will tend to increase when the quantity and duration of contact increases. Thus, potential modifications of the existing BMPs are being considered and additional BMPs are being evaluated. Although a final list of BMP modifications and additions will be based on the results of this evaluation, a preliminary list of potential additional BMPs targeted at controlling the source of selenium may be considered for implementation, including:

- Segregating and stabilizing/capping of materials with elevated selenium concentrations;
- Selecting fills for roads and facilities to avoid seleniferous materials. Non-pavement road surface upgrades may also be considered provided that they will sustain construction traffic;
- Isolating seleniferous materials – materials suspected of elevated selenium concentrations may be capped using appropriate materials;
- Lining of the main detention ponds to decrease water-soil contact;
- Infiltrating enhancements to decrease the amount of water entering the quarry
- Controlling run-on/off collection (control of surface water) – construct drainage and diversion channels (possibly lined);
- Avoiding perennial drainage channels – avoid placement of seleniferous materials near perennial drainage channels;
- Avoiding ephemeral drainage channels – avoid placement of seleniferous materials near ephemeral drainage channels;
- Modifying or eliminating low permeability foundation material – avoid placement of low permeability materials under areas of suspected seleniferous material storage;
- Installing permanent drainage channels over overburden – line permanent drainage channels running through or near suspected seleniferous materials; and
- Installing sediment controls around overburden disposal Site – avoid placing quarry water collection and sediment control ponds near or on suspected seleniferous materials.

The BMP selection process will follow an adaptive management approach and the proposed methodology described in Section 4.

3.5 Study Areas to Focus Evaluation of BMPs for Controlling Selenium

The existing BMPs are generally effective at addressing the general stormwater constituents from the General Permit and have the potential to control selenium concentrations as well. However, additional testing and evaluation are needed to determine the actual effectiveness of these BMPs at preventing selenium from entering the water. Areas for further study currently exist for estimating the effectiveness of existing BMPs and prioritizing proposed BMPs based on estimated selenium reduction benefits. These study areas will be focused on evaluating the major pathways of selenium loading from the numerous potential pathways. The study areas include:

- The prevalent selenium phase (dissolved or particulate) within stormwater runoff;
- Observed performance of existing BMPs at interrupting/controlling transport pathways (focus on decreasing contact time and volume versus detention);
- Estimation of selenium loads based on surface runoff volume estimates and measurement of selenium concentrations for relevant sources of water (if selenium exists predominantly in dissolved phase);
- Estimation of selenium loads based on surface-soil erosion estimates and measurements of selenium concentrations for relevant soil sources (if selenium exists predominantly in particulate phase); and
- Permanente Creek flow-rates and water quality concentrations, including natural background levels and fluctuations due to storms. This should provide key information related to ambient concentrations and selenium loads in the receiving water.

Based on the data from these studies, relative selenium load estimates may be determined for key portions of the Site. The methodology for these areas of further study is addressed in the following section.

4. ADDITIONAL INVESTIGATION AND MONITORING

4.1 Objectives

The three primary objectives for the additional investigation and monitoring activities proposed within this Report are as follows:

1. Confirm whether water being collected in the quarry is being exposed to and is carrying selenium and, if so, evaluate the source(s) of the selenium;

2. Evaluate the performance of existing BMPs at controlling selenium; and

3. To the extent practical, systemically review, investigate, and eliminate transport pathways.

These objectives will be achieved by using the process described in the following section at locations where potential exceedances were observed during the sampling on 13 January 2010 (in particular the quarry dewatering holding basin) and additional locations where stormwater is routed into the dewatering holding basin. Samples taken from Permanente Creek upstream location(s) would be used for assessing background selenium concentrations, while samples taken from downstream would be used for assessing BMP effectiveness in meeting effluent limits. Additional evaluation of sediments in and around the quarry that are exposed to stormwater and/or groundwater could be used to evaluate if contact with the material significantly contributes to potential exceedances of selenium water quality standards.

Once the initial assessment of further areas of study is complete, an iterative approach is proposed whereby BMP modifications (if applicable) are selected and then assessed during both a significant precipitation event and a dry-weather event. This cycle may be repeated several times and at the end of the investigating and monitoring period, a final BMP configuration and strategy will be proposed. Using the final BMP configuration, site performance will be projected (with respect to control of selenium discharge concentrations) and a recommendation made on feasible stormwater BMPs. If excessive concentrations of selenium persist in the water being collected in the quarry and discharges to Permanente Creek after feasible stormwater BMPs are implemented, additional BMPs will be utilized until the objectives are met. Several additional BMPs may be considered, including treatment.

4.2 Sampling and Monitoring Plan for Conceptual Site Model Development and Refinement

4.2.1 Introduction

An overall Site-wide loading evaluation will be constructed using the data generated by relative flow rate estimates and chemical analyses of selenium concentrations at several Site locations. If the qualitative flow rate estimates are unable to effectively identify significant potential selenium loading pathways, more quantitative techniques, such as water balance or sediment loading evaluations may be performed. The water balance evaluation approach has proven useful in instances when the precise measure of surface run-off and seepage flows is difficult as a result of large surface areas and the variable nature of each type of flow. When combined with chemical concentration data, this approach permits the evaluation and prioritization of localized areas with potentially greater inputs of selenium.

4.2.2 Hydraulic Evaluation

An evaluation of the location and rates of stormwater flows is useful for assessing potential selenium loading pathways. Given the dynamic nature of the quarry topography as a result of normal facility operations, qualitative (e.g., visual) estimates are proposed for the initial hydraulic assessments. Specific features of interest useful in assessing for the hydraulic evaluation may include (but are not limited to):

- Large flow rate tributaries;
- Transport pathways with steep slopes;
- Areas of ponding;
- Areas with evidence of rill or gully formation; and
- Areas with evidence of significant sediment deposition.

If, in conjunction with the selenium concentration assessments described below, these qualitative estimates prove unable to achieve the overall data need of determining significant potential pathways of selenium loading, then more quantitative approaches may be necessary and will be utilized. These could potentially include water balance evaluations using watershed modeling, or estimates of erosion potential using the Revised Universal Soil Loss Equation (RUSLE). Draft and refined water balance evaluations were done previously for the purpose of evaluating on-site water usage and potential stormwater reuse options [Radian; URS, 2009]. Results from these previous studies will be consulted for assisting in the initial qualitative assessments.

4.2.3 Selenium Concentration Assessment

Complementing the hydraulic assessment will be an assessment of selenium concentrations and speciations. Selenium concentrations will be used to assess which areas (if any) contribute elevated selenium loads. A limited number of soil and/or overburden samples may be screened for selenium concentrations if deemed prudent during the iterative evaluation process.

Analyzing selenium speciation may be important for assessing the potential effectiveness of BMPs, as more highly reduced selenium (e.g., elemental selenium or selenide complexes) generally forms particulates or precipitates, while oxidized species (selenate and selenite) remain dissolved in solution. However, speciation analysis will generally not be necessary for each sample, and will likely be performed on select samples at later iterations of the approach described in Section 4.2.

4.2.4 Sampling Locations

Sampling under the current SWPPP occurs at numerous locations throughout the Site. While several of those specific locations may prove useful for assessing existing BMP performance on reducing selenium concentrations, several additional locations likely exist that require investigation. Specific locations will need to be determined based on the initial visual evaluations performed at the Site; however, the following general areas are proposed for sampling:

1. Significant sources of surrounding stormwater runoff migrating into the quarry;
2. Stormwater erosion of quarry materials;
3. Dewatering discharge holding area in the quarry and at Settling Pond 4;
4. Upstream location in Permanente Creek;
5. Downstream (e.g., past Settling Pond 4) locations in Permanente Creek; and
6. Significant groundwater seeps within quarry (based on Site personnel experience and field observations).

After feasible source control BMPs have been implemented and their effectiveness evaluated, additional sampling may be needed to assist in the evaluation of potential treatment BMP data needs. A sampling plan would be developed; if necessary the plan could include sampling from the dewatering holding area within the quarry, and analyzed for constituents required for both the selection and conceptual design of an appropriate treatment technology.

4.3 Process for Evaluating Site Conditions, Selenium Transport, and Associated BMP Performance Given the Site Information

After confirming the presence of selenium and evaluating its source, the proposed process for evaluating potential exposure of water to selenium and then evaluating the performance of existing BMPs to control selenium is presented in the following section and in the flowchart in Figure 4-1. The proposed evaluation process is iterative, with modifications or the implementation of additional BMPs occurring after each round of data gathering and assessment.

The performance evaluation process is composed of the following steps:

1. Determining general selenium speciation for evaluating if dissolved or attached to solids;
2. Qualitatively evaluating existing BMPs in dry and wet conditions;
3. Implementing potential changes/enhancements to target selenium control (if identified);
4. Qualitatively evaluating BMPs performances after modifications;
5. Collecting representative samples from each transport pathway;
6. Qualitatively (or quantitatively, if appropriate) assessing hydraulic routes and flow rates;
7. Developing selenium load estimates based on hydraulics and selenium concentrations from samples;
8. Prioritizing BMPs based on identification of high selenium concentrations and/or loading locations;
9. Pilot-testing source control BMPs at high selenium concentrations and/or loading locations;
10. Re-calculating estimated projected site performance using data acquired during pilot testing;
11. Assessing need for adoption of additional source control BMPs;
12. Assessing options at feasibility study-level; and
13. Selecting and implementing final BMPs.

The assessment of individual BMPs using this process may proceed concurrently, generally using a progression of the steps outlined above for each BMP. Modifications to this iterative approach may be necessary based on data collected through this process. It is also important to note that the goal of this process is not to identify every possible

source of selenium, but rather to evaluate which sources are potentially contributing significant selenium loads to the discharge waters so that a final site BMP strategy for effective control can be developed and implemented.

5. ADDITIONAL BMP DEVELOPMENT AND IMPLEMENTATION

The iterative process described in Section 4 will provide data for assessing the effectiveness of existing BMPs. The data generated through this process may suggest a need for additional BMPs, such as those listed in Section 3.5. The development and implementation of additional BMPs will be iterative, with adaptive site management used throughout the process. The iterative approach for relevant additional BMPs is as follows:

1. Review of BMP;
2. Update of BMP at pilot-test location;
3. Evaluation/Sampling of BMP during storm and dry weather events;
4. Assessment of BMP effectiveness; and
5. Modification of BMP as indicated.

The final selection, development and implementation of additional BMPs will be performed in consultation with the RWQCB through reports that follow and are patterned after this Report.

If, after source control BMPs are refined, elevated selenium concentrations persist, then treatment BMP options will be evaluated. Research into selenium treatment BMPs is occurring at several locations that have problems with naturally-occurring selenium.

Based on the current regulatory framework, available performance data, and supporting technology-specific evidence, an initial review suggests there are treatment technologies that could be evaluated for use as treatment BMPs under the General Permit, if needed and if feasible. An initial review of available technologies indicates that treatment BMP options might include gravel media bed biological treatment, the GE ABMet® biological treatment system, and activated alumina.

If treatment technologies are analyzed further, evaluation would necessarily include the identification and collection of technology-specific data needs, column-treatability testing, extended pilot-scale testing and feasibility evaluation and (if appropriate) full-scale implementation. As with other additional BMPs, the selection of a treatment BMP will be performed in consultation with the RWQCB.

6. SWPPP MODIFICATION AND LONG-TERM MONITORING PROGRAM (POST-BMP IMPLEMENTATION)

6.1 Introduction

The long-term monitoring program is expected to commence once the initial screening and evaluation tasks described in the previous sections are completed. The long-term monitoring program for selenium is designed to fit within the existing framework and comply with the General Permit. Several of the specifics for the long-term monitoring program, such as specific sampling locations, will be determined as a result of the screening and evaluation process being proposed within this document. An initial approach is contained in the following sections.

6.2 SWPPP Modification

The final BMP recommendations that result from the iterative assessment proposed in Sections 4 and 5 will be incorporated into the SWPPP as needed. These would include information pertinent to the long-term monitoring program, such as location, additional analytes and frequency. The amendment or update will be consistent with the requirements as laid out in the General Permit.

6.3 Locations

It is anticipated that monitoring would include the quarry dewatering holding area and upstream and downstream Permanente Creek locations. Other locations may include those pathways (if applicable) that provide larger proportions of potential selenium loading to the quarry discharge water. Additional sampling locations might also be identified based on specific selected BMPs. An assessment of required BMP-specific sampling locations will be included during the BMP evaluation process.

6.4 Analytes

The General Permit, as implemented through the SWPPP, currently requires analysis of pH, TSS, specific conductance and TOC (or oil and grease). Additionally, nonconventional chemicals and other pollutants that are likely to be present in stormwater discharges in significant quantities are to be screened until they are not detected in significant quantities for two consecutive sampling events. If selenium is found to fit these criteria, total selenium would be added to the list of analytes screened. Additional analytes may be required for monitoring based on selected BMPs.

6.5 Frequency

The sampling frequency for the General Permit requires two sampling events per year. If selenium is found to be a persistent component of discharge, total selenium sampling at this frequency would be included. Specific BMPs could necessitate more frequent sampling (e.g., weekly or monthly) either initially or permanently and, if so, that frequency would be specified in the monitoring program as it is modified. If regular compliance is demonstrated, a decrease in the routine frequency of monitoring for selenium would be incorporated in the monitoring program. Per the General Permit, if selenium is controlled by BMPs and not detected at a significant concentration in two successive monitoring events, it will be eliminated from the monitoring program.

7. IMPLEMENTATION SCHEDULE

7.1 Introduction

This section provides a proposed schedule for the implementation of the activities described within this document. However, many of the activities described are dependent upon qualifying storm events and are subject to delays if no qualifying storm events occur (such as in the 2008-2009 wet season). It is proposed that this schedule be followed if at least two qualifying storm events occur. This would be consistent with stormwater sampling laid out in the General Permit.

7.2 General Schedule

The proposed schedule of activities described above would last for a period of two years before final BMP implementation occurs, and the corresponding update to the SWPPP describing those changes is performed. As appropriate, investigation and BMP assessments would be performed during dry and wet seasons for each of the two years. Ideally, the iterative process described in Section 4.2 would be repeated for every significant storm event. However, insufficient time for properly assessing the previous data may result from closely spaced storm events.

7.3 Additional Investigation

The iterative process described in Section 4.2 and designed to assess existing and potential additional BMP performance, would occur during the 2010-2011 wet and dry seasons. Investigation activities would include, but are not limited to, dewatering holding area sampling, background stream sampling, and potentially up-gradient groundwater sampling.

7.4 BMP Implementation, Assessment and Modification

Modification of existing BMPs and implementation of new BMPs would be performed during the wet season in 2011, unless multiple qualifying storm events occur in 2010. If multiple qualifying 2010 storm events occur, then efforts will be made to begin the iterative process during this time period. It is expected that the first qualifying storm event of the 2010 wet season will be used for an initial baseline assessment of the effectiveness of existing BMPs for reducing selenium concentrations.

7.5 Long-Term Monitoring

Long-term monitoring of selenium is proposed to begin, assuming a two-year BMP evaluation and enhancement process, after the BMP evaluation. In the event that less than two qualifying storm events occur during each of the 2010 and 2011 wet seasons, it is proposed that long-term selenium monitoring begin at a later date dependent upon the number of storm events.

8. CONCLUSION AND LIMITATIONS

This Report addresses the requirements of General Permit Section C.3. The measures described in this Report are being implemented to evaluate mechanisms for selenium transport and then developing methods for controlling selenium in discharges from the quarry dewatering system, which may currently exceed water quality standards for selenium in Permanente Creek. The final BMP configuration will be designed to allow Lehigh's operations to be managed to protect water quality given the recent data. Lehigh will implement the actions described in the Report as described in the implementation schedule upon receipt of Regional Water Board approval.

REFERENCES

1. State Water Resources Control Board Water Quality Order No. 97-03-DWQ National Pollutant Discharge Elimination System (NPDES) General Permit No. Cas000001 (General Permit) Waste Discharge Requirements (WDRs) For Discharges Of Storm Water Associated With Industrial Activities Excluding Construction Activities
2. Harden, Deborah, 2003. California Geology, 2nd Edition. Prentice Hall, Saddle River, New Jersey.
3. Isaacs, C.M., Keller, M.A. and K.J. Bird, 2009. Potentially Hazardous Trace Elements in the Monterey Formation, California. Environmental Geosciences, Volume 6, Issue 3.
4. Lehigh Southwest Cement Company, 2009. 2008-2009 Annual Report for Storm Water Discharges Associated with Industrial Activities. Prepared for the State of California State Water Resources Control Board.
5. Radian. Draft Kaiser Cement Corporation, Permanente Facility Report of Waste Discharge Water Balance Study.
6. Sloan, Doris, 2006. Geology of the San Francisco Bay Region. University of California Press, Berkeley and Los Angeles, California.
7. URS, 2000. Refined Hanson Cement Corporation Water Balance Study.
8. URS, 2009. Storm Water and Non-Storm Water Discharge Monitoring Plan for Lehigh Southwest Cement Company.
9. URS, 2009. Stormwater Pollution Prevention Plan and 2009 Annual Storm Water Report for Lehigh Southwest Cement Company.
10. USGS, 2006. Geologic Map of the San Francisco Bay Region. http://geomaps.wr.usgs.gov/sfgeo/geologic /downloads.html.

TABLE

TABLE 2-1: ANALYTICAL DATA FROM 13 JANUARY 2010 SAMPLING EVENT
PERMANENTE QUARRY
CUPERTINO, CALIFORNIA

ANALYTE	UNITS	SAMPLE	
		NQS-01	NQS-02
METALS			
Aluminum	µg/L	*< 38*	*< 38*
Antimony	µg/L	8.2	0.86 J
Arsenic	µg/L	4.5	1.3 J
Hexavalent Chromium	µg/L	2.0	*n.m.*
Barium	µg/L	41	24
Berylium	µg/L	*< 0.18*	*< 0.18*
Boron	µg/L	69 J	31 J
Cadmium	µg/L	0.53 J	*< 0.13*
Chromium	µg/L	*< 0.55*	*< 0.55*
Copper	µg/L	1.5 J	1.2 J
Iron	µg/L	*< 9.3*	*< 9.3*
Lead	µg/L	*< 0.054*	*< 0.054*
Manganese	µg/L	21	14
Nickel	µg/L	160	3.4
Selenium	µg/L	82	29
Silicon as SiO2	µg/L	12,000	7,400
Silver	µg/L	*< 0.065*	*< 0.065*
Thallium	µg/L	0.39 J	*< 0.11*
Vanadium	µg/L	400	2.6 J
Zinc	µg/L	*120*	28
Total Recoverable Aluminum	µg/L	720	87,000
Total Recoverable Boron	µg/L	70 J	52 J
Total Recoverable Iron	µg/L	1,200	160,000
Total Recoverable Mercury	µg/L	*< 0.016*	1.5

ANALYTE	UNITS	SAMPLE	
		NQS-01	NQS-02
GENERAL CHEMISTRY			
Total Recoverable Calcium	µg/L	230,000	1,000,000
Total Recoverable Magnesium	µg/L	40,000	160,000
Total Recoverable Sodium	µg/L	23,000	25,000
Total Recoverable Potassium	µg/L	1000	8,200
Chloride	µg/L	13,000	25,000
Fluoride	µg/L	140	220
Nitrate as N	µg/L	730	7,600
Sulfate	µg/L	550,000	*n.m.*
pH	standard units	7.94	7.90
Electrical Conductivity @ 25 °C	umhos/cm	1,130	1,090
Total Dissolved Solids @ 180 °C	µg/L	790,000	900,000
Total Suspended Solids (Glass Fiber)	µg/L	18,000	3,600,000
Residual Chlorine	µg/L	*< 100*	*< 100*
Total Cyanide	µg/L	*< 2.8*	*n.m.*
Ammonia as N	µg/L	*< 25*	95
Nitrite as N	µg/L	*< 8.1*	*< 8.1*
Total Phosphorus	µg/L	*< 16*	1,800
Total Sulfide	µg/L	*< 50*	*n.m.*

ABBREVIATIONS

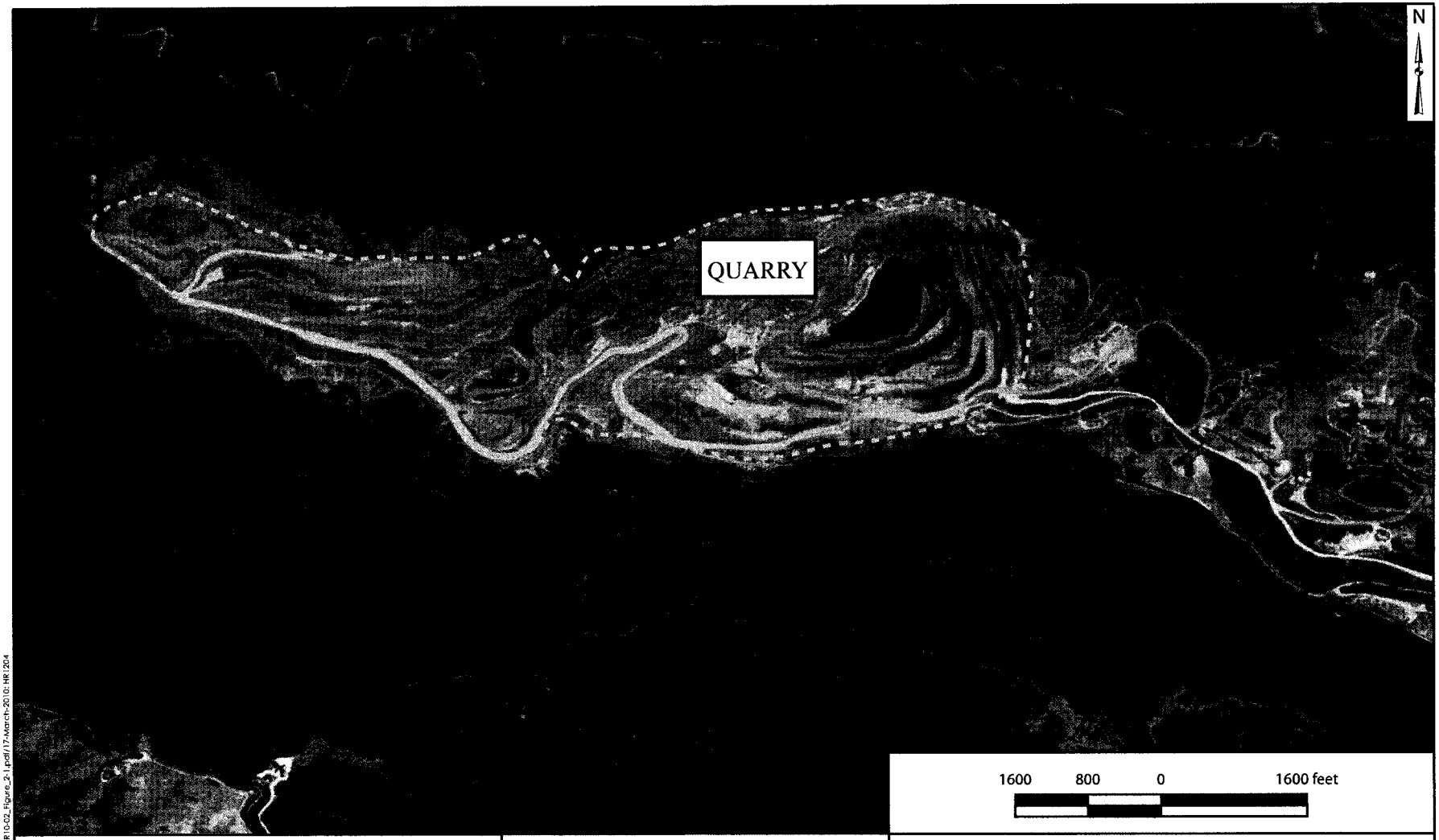
umhos/cm - micromhos per centimeter

µg/L - micrograms per liter

NOTES

Values indicated by "< *MDL*" indicate constituent not detected above analytical Method Detection Limits.

FIGURES



Legend

Approximate Area of Drainage Captured by the Quarry

Permanente Creek (approximate location)

Notes

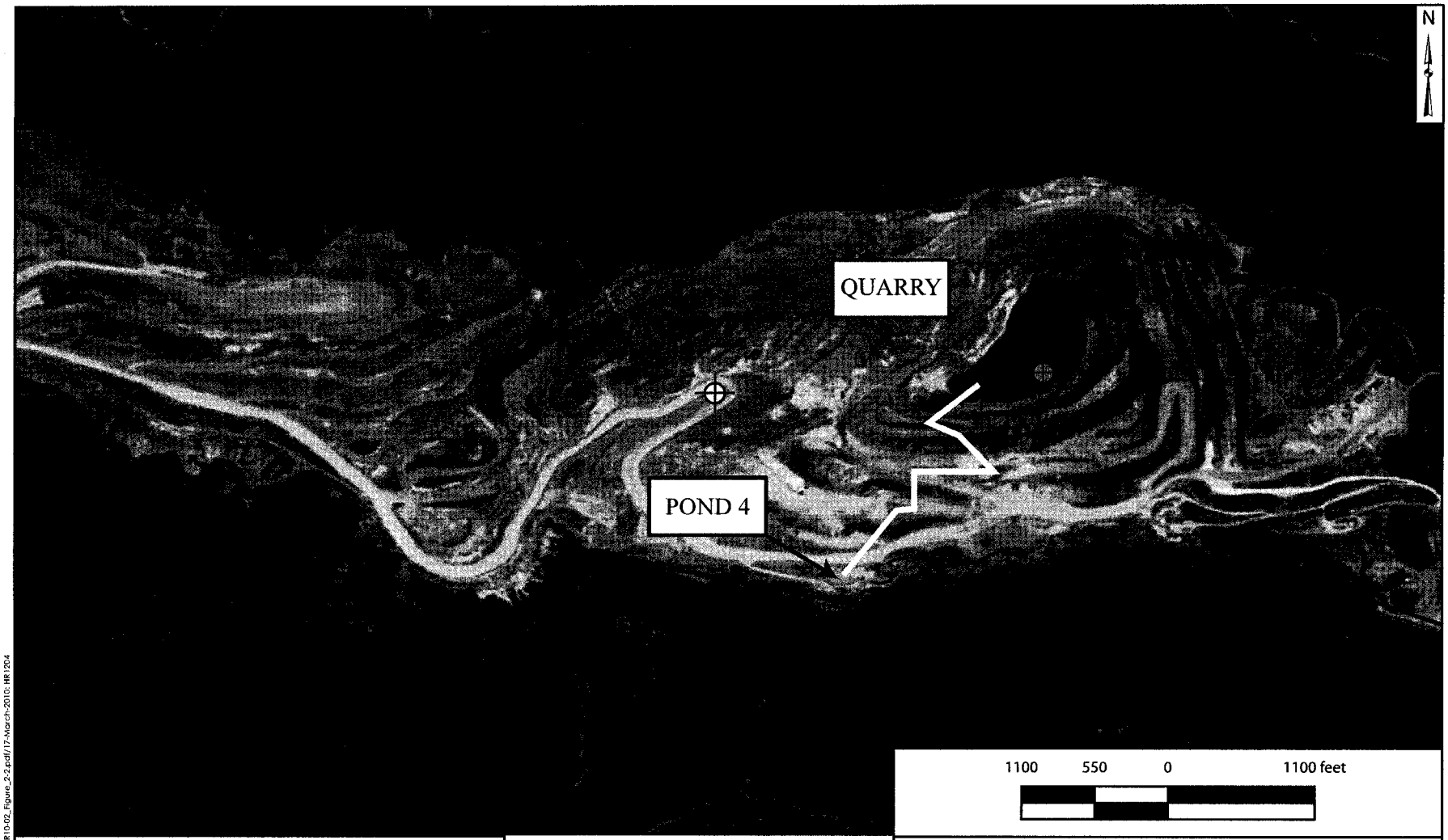
Aerial Photo Base Source: © 2009 Microsoft Corporation.

Site Overview Map

Lehigh Southwest Cement Company
Cupertino, California

Geosyntec consultants	LEHIGH HEIDELBERGCEMENT Group	Figure 2-1
Huntington Beach	17 March 2010	

Path: cbwalker: Lehigh - Cupertino\06 Stormwater Report\PER10-02_Figure_2-1.pdf/17-March-2010: HR 204



Legend

- NQS-1 Sampling Location
- NQS-2 Sampling Location
- Dewatering Pipeline
- Permanente Creek

Notes

Sampling locations and dewatering pipeline locations are approximate.

Aerial Photo Base Source: © 2009 Microsoft Corporation.

Permanente Quarry 13 January 2010 Stormwater Sampling Locations

Lehigh Southwest Cement Company
Cupertino, California

Geosyntec consultants

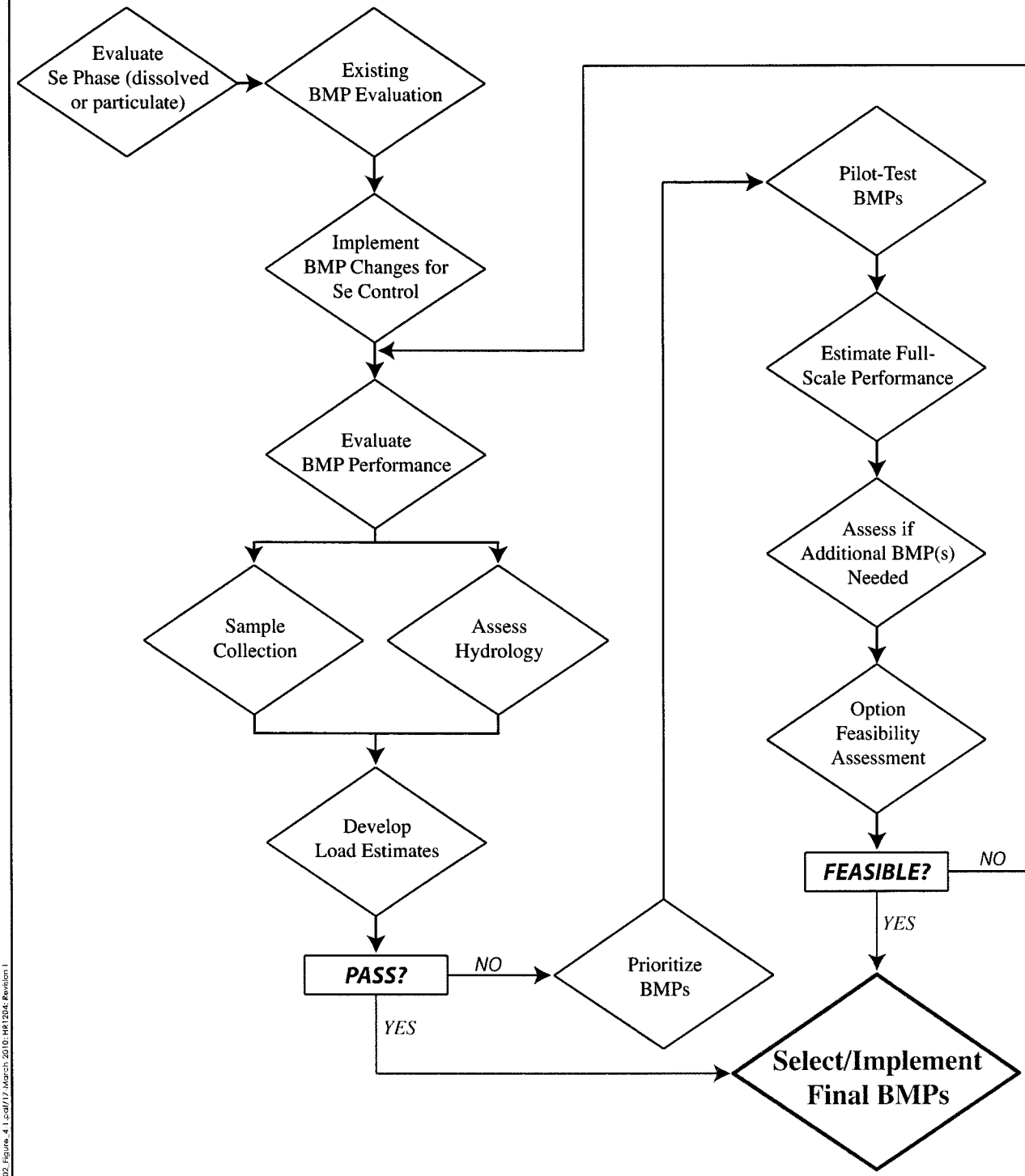
Huntington Beach

LEHIGH HEIDELBERGCEMENT Group

17 March 2010

Figure 2-2

Path: cbwalker: Lehigh - Cupertino\06 Stormwater Report\PER10-02_Figure_2-2.pdf/17-March-2010: HR1204



Best Management Practice Performance Evaluation Flowchart

Lehigh Southwest Cement Company
Cupertino, California

Notes

BMPs - Best Management Practices
Se - selenium

Geosyntec consultants

LEHIGH HEIDELBERGCEMENT Group

Huntington Beach

17 March 2010

Figure 4-1

Path: cbwalker: Lehigh - Cupertino\04 Stormwater Report\FE810-02_Figure_4-1.cdr/17 March 2010: HR1204 Revision 1

Geosyntec
consultants

APPENDIX A
LABORATORY RESULTS FROM 13 JANUARY 2010 SAMPLING EVENT

DISCUSSION OF ANALYTICAL RESULTS

Selenium concentrations in the following analytical laboratory reports are above the Freshwater Aquatic Life water quality limit (from the Basin Plan and California Toxics Rule) for a chronic exposure objective. In addition, arsenic and hexavalent chromium were detected, but below applicable Freshwater Aquatic Life water quality limits. Nickel and zinc were also detected; however, unlike the other metals, the Freshwater Aquatic Life water quality limits from the Basin Plan and California Toxics Rule are linked to the hardness of the receiving waters (Permanente Creek). Samples were not collected from Permanente Creek during this sampling event, and therefore estimated hardness values are not available. Water hardness is largely dependent on the total calcium and magnesium concentrations present in the water, although alkalinity can play a significant role depending upon water temperature. The presence of large concentrations of other cations or anions may also affect water hardness. In general, higher hardness values correlate with higher nickel water quality limits.

BC Laboratories, Inc.
Environmental Testing Laboratory Since 1949

Date of Report: 01/21/2010

Sean K. Hungerford

Diepenbrock Harrison
400 Capital Mall, Suite 1800
Sacramento, CA 95814

RE: Hanson
BC Work Order: 1000613
Invoice ID:

Enclosed are the results of analyses for samples received by the laboratory on 1/14/2010. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: Linda Phoudamneun
Client Service Rep

Authorized Signature

Diepenbrock Harrison 400 Capital Mall, Suite 1800 Sacramento, CA 95814	Project: Hanson Project Number: 0637109 500 phase 9 task1 Project Manager: Sean K. Hungerford	**Reported:** 01/21/2010 9:28

Laboratory / Client Sample Cross Reference

Laboratory	Client Sample Information				
1000613-01	**COC Number:**	---	**Receive Date:**	01/14/2010 08:45	Metal Analysis: 1-Field Filtered and Acidified
	Project Number:	---	**Sampling Date:**	01/13/2010 20:10	
	Sampling Location:	---	**Sample Depth:**	---	
	Sampling Point:	NQS-01	**Sample Matrix:**	Water	
	Sampled By:	---			

BC Laboratories, Inc.
Environmental Testing Laboratory Since 1949

Diepenbrock Harrison
400 Capital Mall, Suite 1800
Sacramento, CA 95814

Project: Hanson
Project Number: 0637109 500 phase 9 task1
Project Manager: Sean K. Hungerford

Reported: 01/21/2010 9:28

Draft: Water Analysis (General Chemistry)

BCL Sample ID: 1000613-01 | **Client Sample Name:** NQS-01, 1/13/2010 8:10:00PM

Constituent	Result	Units	PQL	MDL	Method	Prep Date	Run Date/Time	Analyst	Instrument ID	Dilution	QC Batch ID	MB Bias	Lab Quals
Total Recoverable Calcium	**230**	**mg/L**	**0.10**	**0.036**	**EPA-200.7**	**01/18/10**	**01/19/10 18:47**	**JRG**	**PE-OP1**	**1**	**BTA0926**	**ND**	
Total Recoverable Magnesium	**40**	**mg/L**	**0.050**	**0.038**	**EPA-200.7**	**01/18/10**	**01/19/10 18:47**	**JRG**	**PE-OP1**	**1**	**BTA0926**	**ND**	
Total Recoverable Sodium	**23**	**mg/L**	**0.50**	**0.070**	**EPA-200.7**	**01/18/10**	**01/19/10 18:47**	**JRG**	**PE-OP1**	**1**	**BTA0926**	**ND**	
Total Recoverable Potassium	**1.0**	**mg/L**	**1.0**	**0.092**	**EPA-200.7**	**01/18/10**	**01/19/10 18:47**	**JRG**	**PE-OP1**	**1**	**BTA0926**	**ND**	
Chloride	**13**	**mg/L**	**0.50**	**0.059**	**EPA-300.0**	**01/14/10**	**01/14/10 19:25**	**CRR**	**IC2**	**1**	**BTA0905**	**ND**	
Fluoride	**0.14**	**mg/L**	**0.050**	**0.010**	**EPA-300.0**	**01/14/10**	**01/14/10 19:25**	**CRR**	**IC2**	**1**	**BTA0905**	**ND**	
Nitrate as N	**0.73**	**mg/L**	**0.10**	**0.026**	**EPA-300.0**	**01/14/10**	**01/14/10 19:25**	**CRR**	**IC2**	**1**	**BTA0905**	**ND**	
Sulfate	**550**	**mg/L**	**2.0**	**0.42**	**EPA-300.0**	**01/14/10**	**01/15/10 12:56**	**CRR**	**IC2**	**2**	**BTA0905**	**ND**	**A01**
pH	**7.94**	**pH Units**	**0.05**	**0.05**	**EPA-150.1**	**01/18/10**	**01/18/10 15:25**	**RLP**	**MET-1**	**1**	**BTA1006**		**S05**
Electrical Conductivity @ 25 C	**1130**	**umhos/cm**	**1.00**	**1.00**	**EPA-120.1**	**01/18/10**	**01/18/10 15:25**	**RLP**	**MET-1**	**1**	**BTA1006**		
Total Dissolved Solids @ 180 C	**790**	**mg/L**	**50**	**50**	**EPA-160.1**	**01/19/10**	**01/19/10 07:10**	**JLR**	**MANUAL**	**5**	**BTA1138**	**ND**	
Total Suspended Solids (Glass Fiber)	**18**	**mg/L**	**4.0**	**4.0**	**EPA-160.2**	**01/15/10**	**01/15/10 08:45**	**MRM**	**MANUAL**	**8**	**BTA0862**	**ND**	
Residual Chlorine	ND	mg/L	0.10	0.10	EPA-330.4	01/14/10	01/14/10 09:30	MRM	MANUAL	1	BTA0737	ND	S05
Total Cyanide	ND	mg/L	0.0050	0.0028	EPA-335.4	01/18/10	01/19/10 17:13	TDC	KONE-1	1	BTA1096	ND	
Ammonia as N	ND	mg/L	0.050	0.025	EPA-350.1	01/19/10	01/19/10 17:44	JSM	SC-1	1	BTA1160	ND	
Nitrite as N	ND	mg/L	0.050	0.0081	EPA-353.2	01/14/10	01/14/10 13:26	TDC	KONE-1	1	BTA1072	ND	
Total Phosphorus	ND	mg/L	0.050	0.016	EPA-365.4	01/18/10	01/20/10 11:31	JSM	SC-1	1	BTA0950	0.037	
Total Sulfide	ND	mg/L	0.10	0.050	EPA-376.2	01/15/10	01/15/10 09:15	MRM	SPEC05	1	BTA0859	ND	

Diepenbrock Harrison
400 Capital Mall, Suite 1800
Sacramento, CA 95814

Project: Hanson
Project Number: 0637109 500 phase 9 task1
Project Manager: Sean K. Hungerford

Reported: 01/21/2010 9:28

Draft: Water Analysis (Metals)

BCL Sample ID: 1000613-01 | **Client Sample Name:** NQS-01, 1/13/2010 8:10:00PM

Constituent	Result	Units	PQL	MDL	Method	Prep Date	Run Date/Time	Analyst	Instrument ID	Dilution	QC Batch ID	MB Bias	Lab Quals
Aluminum	ND	ug/L	50	38	EPA-200.7	01/13/10	01/19/10 14:31	JRG	PE-OP1	1	BTA0897	ND	
Antimony	**8.2**	**ug/L**	**2.0**	**0.17**	**EPA-200.8**	**01/13/10**	**01/19/10 16:33**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	
Arsenic	**4.5**	**ug/L**	**2.0**	**0.52**	**EPA-200.8**	**01/13/10**	**01/19/10 16:33**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	
Hexavalent Chromium	**2.0**	**ug/L**	**2.0**	**0.70**	**EPA-7196**	**01/14/10**	**01/14/10 08:00**	**TDC**	**KONE-1**	**1**	**BTA1015**	**ND**	
Barium	**41**	**ug/L**	**1.0**	**0.12**	**EPA-200.8**	**01/13/10**	**01/19/10 16:33**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	
Beryllium	ND	ug/L	1.0	0.18	EPA-200.8	01/13/10	01/19/10 16:33	JDC	PE-EL1	1	BTA0943	ND	
Boron	**69**	**ug/L**	**100**	**9.7**	**EPA-200.7**	**01/13/10**	**01/19/10 14:31**	**JRG**	**PE-OP1**	**1**	**BTA0897**	**ND**	**J**
Cadmium	**0.53**	**ug/L**	**1.0**	**0.13**	**EPA-200.8**	**01/13/10**	**01/19/10 16:33**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	**J**
Chromium	ND	ug/L	3.0	0.55	EPA-200.8	01/13/10	01/19/10 16:33	JDC	PE-EL1	1	BTA0943	ND	
Copper	**1.5**	**ug/L**	**2.0**	**0.68**	**EPA-200.8**	**01/13/10**	**01/19/10 16:33**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	**J**
Iron	ND	ug/L	50	9.3	EPA-200.7	01/13/10	01/19/10 14:31	JRG	PE-OP1	1	BTA0897	ND	
Lead	ND	ug/L	1.0	0.054	EPA-200.8	01/13/10	01/19/10 16:33	JDC	PE-EL1	1	BTA0943	ND	
Manganese	**21**	**ug/L**	**1.0**	**0.11**	**EPA-200.8**	**01/13/10**	**01/19/10 16:33**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	
Nickel	**160**	**ug/L**	**2.0**	**0.15**	**EPA-200.8**	**01/13/10**	**01/19/10 16:33**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	
Selenium	**82**	**ug/L**	**2.0**	**0.38**	**EPA-200.8**	**01/13/10**	**01/19/10 16:33**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	
Silicon as SiO2	**12000**	**ug/L**	**200**	**65**	**EPA-200.7**	**01/13/10**	**01/19/10 14:31**	**JRG**	**PE-OP1**	**1**	**BTA0897**	**ND**	
Silver	ND	ug/L	1.0	0.065	EPA-200.8	01/13/10	01/19/10 16:33	JDC	PE-EL1	1	BTA0943	ND	
Thallium	**0.39**	**ug/L**	**1.0**	**0.11**	**EPA-200.8**	**01/13/10**	**01/19/10 16:33**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	**J**
Vanadium	**400**	**ug/L**	**3.0**	**1.2**	**EPA-200.8**	**01/13/10**	**01/19/10 16:33**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	
Zinc	**120**	**ug/L**	**5.0**	**1.9**	**EPA-200.8**	**01/13/10**	**01/19/10 16:33**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	
Total Recoverable Aluminum	**720**	**ug/L**	**50**	**38**	**EPA-200.7**	**01/18/10**	**01/19/10 18:47**	**JRG**	**PE-OP1**	**1**	**BTA0926**	**ND**	
Total Recoverable Boron	**70**	**ug/L**	**100**	**12**	**EPA-200.7**	**01/18/10**	**01/19/10 18:47**	**JRG**	**PE-OP1**	**1**	**BTA0926**	**ND**	**J**
Total Recoverable Iron	**1200**	**ug/L**	**50**	**30**	**EPA-200.7**	**01/18/10**	**01/19/10 18:47**	**JRG**	**PE-OP1**	**1**	**BTA0926**	**ND**	

Diepenbrock Harrison 400 Capital Mall, Suite 1800 Sacramento, CA 95814	Project: Hanson Project Number: 0637109 500 phase 9 task1 Project Manager: Sean K. Hungerford	**Reported:** 01/21/2010 9:28

Draft: Water Analysis (Metals)

BCL Sample ID: 1000613-01 | **Client Sample Name:** NQS-01, 1/13/2010 8:10:00PM

Constituent	Result	Units	PQL	MDL	Method	Prep Date	Run Date/Time	Analyst	Instrument ID	Dilution	QC Batch ID	MB Bias	Lab Quals
Total Recoverable Mercury	ND	ug/L	0.20	0.016	EPA-245.1	01/18/10	01/19/10 10:56	MEV	CETAC1	1	BTA0920	ND	

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Project: Hanson
Project Number: 0637109 500 phase 9 task1
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Reported: 01/21/2010 9:28

Draft: Water Analysis (General Chemistry)

Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits RPD	Control Limits Percent Recovery	Lab Quals
Residual Chlorine	BTA0737	Duplicate	1000613-01	ND	ND		mg/L			10		
Total Sulfide	BTA0859	Duplicate	1000613-01	ND	ND		mg/L			10		
		Matrix Spike	1000613-01	ND	0.48256	0.50000	mg/L		96.5		80 - 120	
		Matrix Spike Duplicate	1000613-01	ND	0.48538	0.50000	mg/L	0.6	97.1	10	80 - 120	
Total Suspended Solids (Glass Fiber)	BTA0862	Duplicate	1000613-01	17.600	16.000		mg/L	9.5		10		
Chloride	BTA0905	Duplicate	1000668-01	69.320	69.418		mg/L	0.1		10		
		Matrix Spike	1000668-01	69.320	188.93	101.01	mg/L		118		80 - 120	
		Matrix Spike Duplicate	1000668-01	69.320	188.36	101.01	mg/L	0.5	118	10	80 - 120	
Fluoride	BTA0905	Duplicate	1000668-01	0.40800	0.45500		mg/L	10.9		10		A02
		Matrix Spike	1000668-01	0.40800	1.6000	1.0101	mg/L		118		80 - 120	
		Matrix Spike Duplicate	1000668-01	0.40800	1.5636	1.0101	mg/L	3.1	114	10	80 - 120	
Nitrate as N	BTA0905	Duplicate	1000668-01	ND	ND		mg/L			10		
		Matrix Spike	1000668-01	ND	5.5283	5.0505	mg/L		109		80 - 120	
		Matrix Spike Duplicate	1000668-01	ND	5.5414	5.0505	mg/L	0.2	110	10	80 - 120	
Sulfate	BTA0905	Duplicate	1000668-01	34.730	34.692		mg/L	0.1		10		
		Matrix Spike	1000668-01	34.730	153.97	101.01	mg/L		118		80 - 120	
		Matrix Spike Duplicate	1000668-01	34.730	153.53	101.01	mg/L	0.4	118	10	80 - 120	
Total Recoverable Calcium	BTA0926	Duplicate	1000551-01	14.030	13.492		mg/L	3.9		20		
		Matrix Spike	1000551-01	14.030	23.606	10.000	mg/L		95.8		75 - 125	
		Matrix Spike Duplicate	1000551-01	14.030	23.851	10.000	mg/L	2.5	98.2	20	75 - 125	
Total Recoverable Magnesium	BTA0926	Duplicate	1000551-01	3.7475	3.6803		mg/L	1.8		20		
		Matrix Spike	1000551-01	3.7475	14.400	10.000	mg/L		107		75 - 125	
		Matrix Spike Duplicate	1000551-01	3.7475	14.456	10.000	mg/L	0.5	107	20	75 - 125	
Total Recoverable Sodium	BTA0926	Duplicate	1000551-01	3.5714	3.4758		mg/L	2.7		20		
		Matrix Spike	1000551-01	3.5714	13.581	10.000	mg/L		100		75 - 125	
		Matrix Spike Duplicate	1000551-01	3.5714	13.587	10.000	mg/L	0.1	100	20	75 - 125	

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Draft: Water Analysis (General Chemistry)

Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits RPD	Control Limits Percent Recovery	Lab Quals
Total Recoverable Potassium	BTA0926	Duplicate	1000551-01	1.1553	1.1185		mg/L	3.2		20		
		Matrix Spike	1000551-01	1.1553	11.177	10.000	mg/L		100		75 - 125	
		Matrix Spike Duplicate	1000551-01	1.1553	11.163	10.000	mg/L	0.1	100	20	75 - 125	
Total Phosphorus	BTA0950	Duplicate	1000710-01	ND	0.052700		mg/L			20		
		Matrix Spike	1000710-01	ND	1.0322	1.0000	mg/L		103		80 - 120	
		Matrix Spike Duplicate	1000710-01	ND	1.0497	1.0000	mg/L	1.7	105	20	80 - 120	
pH	BTA1006	Duplicate	1000479-01	7.9900	8.1600		pH Units	2.1		20		
Electrical Conductivity @ 25 C	BTA1006	Duplicate	1000479-01	429.40	431.50		umhos/cm	0.5		10		
Nitrite as N	BTA1072	Duplicate	1000558-01	ND	ND		mg/L			10		
		Matrix Spike	1000558-01	ND	0.48376	0.50000	mg/L		96.8		90 - 110	
		Matrix Spike Duplicate	1000558-01	ND	0.48110	0.50000	mg/L	0.6	96.2	10	90 - 110	
Total Cyanide	BTA1096	Duplicate	1000595-01	ND	ND		mg/L			10		
		Matrix Spike	1000595-01	ND	0.047282	0.050000	mg/L		94.6		90 - 110	
		Matrix Spike Duplicate	1000595-01	ND	0.046186	0.050000	mg/L	2.3	92.4	20	90 - 110	
Total Dissolved Solids @ 180 C	BTA1138	Duplicate	1000613-01	790.00	800.00		mg/L	1.3		10		
Ammonia as N	BTA1160	Duplicate	1000613-01	ND	ND		mg/L			10		
		Matrix Spike	1000613-01	ND	1.1118	1.1111	mg/L		100		90 - 110	
		Matrix Spike Duplicate	1000613-01	ND	1.1170	1.1111	mg/L	0.5	101	10	90 - 110	

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Draft: Water Analysis (Metals)

Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits RPD	Control Limits Percent Recovery	Lab Quals
Aluminum	BTA0897	Duplicate	1000614-01	ND	ND		ug/L			20		
		Matrix Spike	1000614-01	ND	1055.2	1020.4	ug/L		103		85 - 115	
		Matrix Spike Duplicate	1000614-01	ND	1087.3	1020.4	ug/L	3.0	107	20	85 - 115	
Boron	BTA0897	Duplicate	1000614-01	30.821	28.307		ug/L	8.5		20		J
		Matrix Spike	1000614-01	30.821	1136.9	1020.4	ug/L		108		85 - 115	
		Matrix Spike Duplicate	1000614-01	30.821	1161.6	1020.4	ug/L	2.2	111	20	85 - 115	
Iron	BTA0897	Duplicate	1000614-01	ND	ND		ug/L			20		
		Matrix Spike	1000614-01	ND	1087.8	1020.4	ug/L		107		85 - 115	
		Matrix Spike Duplicate	1000614-01	ND	1129.3	1020.4	ug/L	3.7	111	20	85 - 115	
Silicon as SiO2	BTA0897	Duplicate	1000614-01	7395.8	7320.2		ug/L	1.0		20		
		Matrix Spike	1000614-01	7395.8	28647	21829	ug/L		97.4		85 - 115	
		Matrix Spike Duplicate	1000614-01	7395.8	29543	21829	ug/L	4.1	101	20	85 - 115	
Total Recoverable Mercury	BTA0920	Duplicate	1000558-01	ND	ND		ug/L			20		
		Matrix Spike	1000558-01	ND	1.0075	1.0000	ug/L		101		70 - 130	
		Matrix Spike Duplicate	1000558-01	ND	1.0575	1.0000	ug/L	4.8	106	20	70 - 130	
Total Recoverable Aluminum	BTA0926	Duplicate	1000551-01	4850.3	4736.9		ug/L	2.4		20		
		Matrix Spike	1000551-01	4850.3	7142.3	1000.0	ug/L		229		75 - 125	A03
		Matrix Spike Duplicate	1000551-01	4850.3	7375.2	1000.0	ug/L	9.7	252	20	75 - 125	A03
Total Recoverable Boron	BTA0926	Duplicate	1000551-01	14.400	13.875		ug/L	3.7		20		J
		Matrix Spike	1000551-01	14.400	1044.5	1000.0	ug/L		103		75 - 125	
		Matrix Spike Duplicate	1000551-01	14.400	1025.4	1000.0	ug/L	1.9	101	20	75 - 125	
Total Recoverable Iron	BTA0926	Duplicate	1000551-01	4935.3	4769.5		ug/L	3.4		20		
		Matrix Spike	1000551-01	4935.3	6349.9	1000.0	ug/L		141		75 - 125	A03
		Matrix Spike Duplicate	1000551-01	4935.3	6586.0	1000.0	ug/L	15.4	165	20	75 - 125	A03
Antimony	BTA0943	Duplicate	1000613-01	8.1910	8.2440		ug/L	0.6		20		
		Matrix Spike	1000613-01	8.1910	52.652	40.816	ug/L		109		70 - 130	
		Matrix Spike Duplicate	1000613-01	8.1910	52.298	40.816	ug/L	0.8	108	20	70 - 130	

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Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits RPD	Control Limits Percent Recovery	Lab Quals
Arsenic	BTA0943	Duplicate	1000613-01	4.5260	4.5420		ug/L	0.4		20		
		Matrix Spike	1000613-01	4.5260	127.13	102.04	ug/L		120		70 - 130	
		Matrix Spike Duplicate	1000613-01	4.5260	126.26	102.04	ug/L	0.7	119	20	70 - 130	
Barium	BTA0943	Duplicate	1000613-01	41.084	40.261		ug/L	2.0		20		
		Matrix Spike	1000613-01	41.084	82.658	40.816	ug/L		102		70 - 130	
		Matrix Spike Duplicate	1000613-01	41.084	82.543	40.816	ug/L	0.3	102	20	70 - 130	
Beryllium	BTA0943	Duplicate	1000613-01	ND	ND		ug/L			20		
		Matrix Spike	1000613-01	ND	47.550	40.816	ug/L		116		70 - 130	
		Matrix Spike Duplicate	1000613-01	ND	48.552	40.816	ug/L	2.1	119	20	70 - 130	
Cadmium	BTA0943	Duplicate	1000613-01	0.53200	0.46500		ug/L	13.4		20		J
		Matrix Spike	1000613-01	0.53200	44.802	40.816	ug/L		108		70 - 130	
		Matrix Spike Duplicate	1000613-01	0.53200	43.947	40.816	ug/L	2.0	106	20	70 - 130	
Chromium	BTA0943	Duplicate	1000613-01	ND	ND		ug/L			20		
		Matrix Spike	1000613-01	ND	40.609	40.816	ug/L		99.5		70 - 130	
		Matrix Spike Duplicate	1000613-01	ND	40.842	40.816	ug/L	0.6	100	20	70 - 130	
Copper	BTA0943	Duplicate	1000613-01	1.4680	1.3890		ug/L	5.5		20		J
		Matrix Spike	1000613-01	1.4680	97.997	102.04	ug/L		94.6		70 - 130	
		Matrix Spike Duplicate	1000613-01	1.4680	98.134	102.04	ug/L	0.1	94.7	20	70 - 130	
Lead	BTA0943	Duplicate	1000613-01	ND	ND		ug/L			20		
		Matrix Spike	1000613-01	ND	100.05	102.04	ug/L		98.0		70 - 130	
		Matrix Spike Duplicate	1000613-01	ND	100.89	102.04	ug/L	0.8	98.9	20	70 - 130	
Manganese	BTA0943	Duplicate	1000613-01	20.636	20.124		ug/L	2.5		20		
		Matrix Spike	1000613-01	20.636	121.18	102.04	ug/L		98.5		70 - 130	
		Matrix Spike Duplicate	1000613-01	20.636	122.86	102.04	ug/L	1.7	100	20	70 - 130	
Nickel	BTA0943	Duplicate	1000613-01	163.08	156.82		ug/L	3.9		20		
		Matrix Spike	1000613-01	163.08	253.13	102.04	ug/L		88.2		70 - 130	
		Matrix Spike Duplicate	1000613-01	163.08	256.06	102.04	ug/L	3.2	91.1	20	70 - 130	

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Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits RPD	Control Limits Percent Recovery	Lab Quals
Selenium	BTA0943	Duplicate	1000613-01	82.195	82.095		ug/L	0.1		20		
		Matrix Spike	1000613-01	82.195	215.62	102.04	ug/L		131		70 - 130	Q03
		Matrix Spike Duplicate	1000613-01	82.195	214.36	102.04	ug/L	1.0	130	20	70 - 130	
Silver	BTA0943	Duplicate	1000613-01	ND	ND		ug/L			20		
		Matrix Spike	1000613-01	ND	40.951	40.816	ug/L		100		70 - 130	
		Matrix Spike Duplicate	1000613-01	ND	40.830	40.816	ug/L	0.3	100	20	70 - 130	
Thallium	BTA0943	Duplicate	1000613-01	0.39400	0.21500		ug/L	58.8		20		J,A02
		Matrix Spike	1000613-01	0.39400	35.763	40.816	ug/L		86.7		70 - 130	
		Matrix Spike Duplicate	1000613-01	0.39400	35.626	40.816	ug/L	0.4	86.3	20	70 - 130	
Vanadium	BTA0943	Duplicate	1000613-01	399.37	389.53		ug/L	2.5		20		
		Matrix Spike	1000613-01	399.37	428.87	40.816	ug/L		72.3		70 - 130	
		Matrix Spike Duplicate	1000613-01	399.37	433.01	40.816	ug/L	13.1	82.4	20	70 - 130	
Zinc	BTA0943	Duplicate	1000613-01	122.64	120.66		ug/L	1.6		20		
		Matrix Spike	1000613-01	122.64	229.46	102.04	ug/L		105		70 - 130	
		Matrix Spike Duplicate	1000613-01	122.64	230.50	102.04	ug/L	1.0	106	20	70 - 130	
Hexavalent Chromium	BTA1015	Duplicate	1000612-01	0.78000	0.73000		ug/L	6.6		10		J
		Matrix Spike	1000612-01	0.78000	54.863	52.632	ug/L		103		85 - 115	
		Matrix Spike Duplicate	1000612-01	0.78000	54.411	52.632	ug/L	0.8	102	10	85 - 115	

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Draft: Water Analysis (General Chemistry)

Quality Control Report - Laboratory Control Sample

Constituent	Batch ID	QC Sample ID	QC Type	Result	Spike Level	PQL	Units	Percent Recovery	RPD	Control Limits Percent Recovery	Control Limits RPD	Lab Quals
Total Sulfide	BTA0859	BTA0859-BS1	LCS	0.50228	0.50000	0.10	mg/L	100		90 - 110		
Chloride	BTA0905	BTA0905-BS1	LCS	107.85	100.00	0.50	mg/L	108		90 - 110		
Fluoride	BTA0905	BTA0905-BS1	LCS	0.99700	1.0000	0.050	mg/L	99.7		90 - 110		
Nitrate as N	BTA0905	BTA0905-BS1	LCS	5.1590	5.0000	0.10	mg/L	103		90 - 110		
Sulfate	BTA0905	BTA0905-BS1	LCS	104.67	100.00	1.0	mg/L	105		90 - 110		
Total Recoverable Calcium	BTA0926	BTA0926-BS1	LCS	11.092	10.000	0.10	mg/L	111		85 - 115		
Total Recoverable Magnesium	BTA0926	BTA0926-BS1	LCS	11.297	10.000	0.050	mg/L	113		85 - 115		
Total Recoverable Sodium	BTA0926	BTA0926-BS1	LCS	10.461	10.000	0.50	mg/L	105		85 - 115		
Total Recoverable Potassium	BTA0926	BTA0926-BS1	LCS	10.301	10.000	1.0	mg/L	103		85 - 115		
Total Phosphorus	BTA0950	BTA0950-BS1	LCS	1.0049	1.0000	0.050	mg/L	100		85 - 115		
pH	BTA1006	BTA1006-BS2	LCS	7.0000	7.0000	0.05	pH Units	100		95 - 105		
Electrical Conductivity @ 25 C	BTA1006	BTA1006-BS1	LCS	311.70	303.00	1.00	umhos/cm	103		90 - 110		
Nitrite as N	BTA1072	BTA1072-BS1	LCS	0.49461	0.50000	0.050	mg/L	98.9		90 - 110		
Total Cyanide	BTA1096	BTA1096-BS1	LCS	0.14780	0.15000	0.0050	mg/L	98.5		90 - 110		
Total Dissolved Solids @ 180 C	BTA1138	BTA1138-BS1	LCS	545.00	586.00	50	mg/L	93.0		90 - 110		
Ammonia as N	BTA1160	BTA1160-BS1	LCS	0.99010	1.0000	0.050	mg/L	99.0		90 - 110		

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Quality Control Report - Laboratory Control Sample

Constituent	Batch ID	QC Sample ID	QC Type	Result	Spike Level	PQL	Units	Percent Recovery	RPD	Control Limits Percent Recovery	Control Limits RPD	Lab Quals
Aluminum	BTA0897	BTA0897-BS1	LCS	993.68	1000.0	50	ug/L	99.4		85 - 115		
Boron	BTA0897	BTA0897-BS1	LCS	1018.6	1000.0	100	ug/L	102		85 - 115		
Iron	BTA0897	BTA0897-BS1	LCS	1050.1	1000.0	50	ug/L	105		85 - 115		
Silicon as SiO2	BTA0897	BTA0897-BS1	LCS	20659	21392	200	ug/L	96.6		85 - 115		
Total Recoverable Mercury	BTA0920	BTA0920-BS1	LCS	1.0250	1.0000	0.20	ug/L	102		85 - 115		
Total Recoverable Aluminum	BTA0926	BTA0926-BS1	LCS	1065.2	1000.0	50	ug/L	107		85 - 115		
Total Recoverable Boron	BTA0926	BTA0926-BS1	LCS	1064.6	1000.0	100	ug/L	106		85 - 115		
Total Recoverable Iron	BTA0926	BTA0926-BS1	LCS	1132.5	1000.0	50	ug/L	113		85 - 115		
Antimony	BTA0943	BTA0943-BS1	LCS	39.850	40.000	2.0	ug/L	99.6		85 - 115		
Arsenic	BTA0943	BTA0943-BS1	LCS	98.102	100.00	2.0	ug/L	98.1		85 - 115		
Barium	BTA0943	BTA0943-BS1	LCS	39.991	40.000	1.0	ug/L	100		85 - 115		
Beryllium	BTA0943	BTA0943-BS1	LCS	38.472	40.000	1.0	ug/L	96.2		85 - 115		
Cadmium	BTA0943	BTA0943-BS1	LCS	40.475	40.000	1.0	ug/L	101		85 - 115		
Chromium	BTA0943	BTA0943-BS1	LCS	40.326	40.000	3.0	ug/L	101		85 - 115		
Copper	BTA0943	BTA0943-BS1	LCS	103.50	100.00	2.0	ug/L	103		85 - 115		
Lead	BTA0943	BTA0943-BS1	LCS	97.171	100.00	1.0	ug/L	97.2		85 - 115		
Manganese	BTA0943	BTA0943-BS1	LCS	101.34	100.00	1.0	ug/L	101		85 - 115		
Nickel	BTA0943	BTA0943-BS1	LCS	101.60	100.00	2.0	ug/L	102		85 - 115		
Selenium	BTA0943	BTA0943-BS1	LCS	99.191	100.00	2.0	ug/L	99.2		85 - 115		
Silver	BTA0943	BTA0943-BS1	LCS	40.304	40.000	1.0	ug/L	101		85 - 115		
Thallium	BTA0943	BTA0943-BS1	LCS	40.517	40.000	1.0	ug/L	101		85 - 115		
Vanadium	BTA0943	BTA0943-BS1	LCS	39.728	40.000	3.0	ug/L	99.3		85 - 115		
Zinc	BTA0943	BTA0943-BS1	LCS	103.82	100.00	5.0	ug/L	104		85 - 115		

Diepenbrock Harrison	Project: Hanson	Reported: 01/21/2010 9:28
400 Capital Mall, Suite 1800	Project Number: 0637109 500 phase 9 task1	
Sacramento, CA 95814	Project Manager: Sean K. Hungerford	

Draft: Water Analysis (Metals)

Quality Control Report - Laboratory Control Sample

Constituent	Batch ID	QC Sample ID	QC Type	Result	Spike Level	PQL	Units	Percent Recovery	RPD	Control Limits Percent Recovery	Control Limits RPD	Lab Quals
Hexavalent Chromium	BTA1015	BTA1015-BS1	LCS	51.590	50.000	2.0	ug/L	103		85 - 115		

Diepenbrock Harrison
400 Capital Mall, Suite 1800
Sacramento, CA 95814

Project: Hanson
Project Number: 0637109 500 phase 9 task1
Project Manager: Sean K. Hungerford

Reported: 01/21/2010 9:28

Draft: Water Analysis (General Chemistry)

Quality Control Report - Method Blank Analysis

Constituent	Batch ID	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
Residual Chlorine	BTA0737	BTA0737-BLK1	ND	mg/L	0.10	0.10	
Total Sulfide	BTA0859	BTA0859-BLK1	ND	mg/L	0.10	0.050	
Total Suspended Solids (Glass Fiber)	BTA0862	BTA0862-BLK1	ND	mg/L	0.50	0.50	
Chloride	BTA0905	BTA0905-BLK1	ND	mg/L	0.50	0.059	
Fluoride	BTA0905	BTA0905-BLK1	ND	mg/L	0.050	0.010	
Nitrate as N	BTA0905	BTA0905-BLK1	ND	mg/L	0.10	0.026	
Sulfate	BTA0905	BTA0905-BLK1	ND	mg/L	1.0	0.21	
Total Recoverable Calcium	BTA0926	BTA0926-BLK1	ND	mg/L	0.10	0.036	
Total Recoverable Magnesium	BTA0926	BTA0926-BLK1	ND	mg/L	0.050	0.038	
Total Recoverable Sodium	BTA0926	BTA0926-BLK1	ND	mg/L	0.50	0.070	
Total Recoverable Potassium	BTA0926	BTA0926-BLK1	ND	mg/L	1.0	0.092	
Total Phosphorus	BTA0950	BTA0950-BLK1	0.037200	mg/L	0.050	0.016	J
Nitrite as N	BTA1072	BTA1072-BLK1	ND	mg/L	0.050	0.0081	
Total Cyanide	BTA1096	BTA1096-BLK1	ND	mg/L	0.0050	0.0028	
Total Dissolved Solids @ 180 C	BTA1138	BTA1138-BLK1	ND	mg/L	6.7	6.7	
Ammonia as N	BTA1160	BTA1160-BLK1	ND	mg/L	0.050	0.025	

Diepenbrock Harrison
400 Capital Mall, Suite 1800
Sacramento, CA 95814

Project: Hanson
Project Number: 0637109 500 phase 9 task1
Project Manager: Sean K. Hungerford

Reported: 01/21/2010 9:28

Draft: Water Analysis (Metals)

Quality Control Report - Method Blank Analysis

Constituent	Batch ID	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
Aluminum	BTA0897	BTA0897-BLK1	ND	ug/L	50	38	
Boron	BTA0897	BTA0897-BLK1	ND	ug/L	100	9.7	
Iron	BTA0897	BTA0897-BLK1	ND	ug/L	50	9.3	
Silicon as SiO2	BTA0897	BTA0897-BLK1	ND	ug/L	200	65	
Total Recoverable Mercury	BTA0920	BTA0920-BLK1	ND	ug/L	0.20	0.016	
Total Recoverable Aluminum	BTA0926	BTA0926-BLK1	ND	ug/L	50	38	
Total Recoverable Boron	BTA0926	BTA0926-BLK1	ND	ug/L	100	12	
Total Recoverable Iron	BTA0926	BTA0926-BLK1	ND	ug/L	50	30	
Antimony	BTA0943	BTA0943-BLK1	ND	ug/L	2.0	0.17	
Arsenic	BTA0943	BTA0943-BLK1	ND	ug/L	2.0	0.52	
Barium	BTA0943	BTA0943-BLK1	ND	ug/L	1.0	0.12	
Beryllium	BTA0943	BTA0943-BLK1	ND	ug/L	1.0	0.18	
Cadmium	BTA0943	BTA0943-BLK1	ND	ug/L	1.0	0.13	
Chromium	BTA0943	BTA0943-BLK1	ND	ug/L	3.0	0.55	
Copper	BTA0943	BTA0943-BLK1	ND	ug/L	2.0	0.68	
Lead	BTA0943	BTA0943-BLK1	ND	ug/L	1.0	0.054	
Manganese	BTA0943	BTA0943-BLK1	ND	ug/L	1.0	0.11	
Nickel	BTA0943	BTA0943-BLK1	ND	ug/L	2.0	0.15	
Selenium	BTA0943	BTA0943-BLK1	ND	ug/L	2.0	0.38	
Silver	BTA0943	BTA0943-BLK1	ND	ug/L	1.0	0.065	
Thallium	BTA0943	BTA0943-BLK1	ND	ug/L	1.0	0.11	
Vanadium	BTA0943	BTA0943-BLK1	ND	ug/L	3.0	1.2	
Zinc	BTA0943	BTA0943-BLK1	ND	ug/L	5.0	1.9	
Hexavalent Chromium	BTA1015	BTA1015-BLK1	ND	ug/L	2.0	0.70	

Diepenbrock Harrison	Project: Hanson	**Reported:** 01/21/2010 9:28
400 Capital Mall, Suite 1800	Project Number: 0637109 500 phase 9 task1	
Sacramento, CA 95814	Project Manager: Sean K. Hungerford	

Notes And Definitions

J	Estimated Value (CLP Flag)
MDL	Method Detection Limit
ND	Analyte Not Detected at or above the reporting limit
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
A01	PQL's and MDL's are raised due to sample dilution.
A02	The difference between duplicate readings is less than the PQL.
A03	The sample concentration is more than 4 times the spike level.
Q03	Matrix spike recovery(s) is(are) not within the control limits.
S05	The sample holding time was exceeded.

BC Laboratories, Inc.
Environmental Testing Laboratory Since 1949

Date of Report: 01/21/2010

Sean K. Hungerford

Diepenbrock Harrison
400 Capital Mall, Suite 1800
Sacramento, CA 95814

RE: Hanson
BC Work Order: 1000614
Invoice ID:

Enclosed are the results of analyses for samples received by the laboratory on 1/14/2010. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: Linda Phoudamneun
Client Service Rep

Authorized Signature

Diepenbrock Harrison	Project: Hanson	**Reported:** 01/21/2010 9:30
400 Capital Mall, Suite 1800	Project Number: 0637109 500 phase 9	
Sacramento, CA 95814	Project Manager: Sean K. Hungerford	

Laboratory / Client Sample Cross Reference

Laboratory	Client Sample Information				
1000614-01	**COC Number:**	---	**Receive Date:**	01/14/2010 08:45	Metal Analysis: 1-Field Filtered and
	Project Number:	---	**Sampling Date:**	01/13/2010 08:31	Acidified
	Sampling Location:	---	**Sample Depth:**	---	
	Sampling Point:	NQS-02	**Sample Matrix:**	Water	
	Sampled By:	---			

Diepenbrock Harrison
400 Capital Mall, Suite 1800
Sacramento, CA 95814

Project: Hanson
Project Number: 0637109 500 phase 9
Project Manager: Sean K. Hungerford

Reported: 01/21/2010 9:30

Draft: Water Analysis (General Chemistry)

BCL Sample ID: 1000614-01 | **Client Sample Name:** NQS-02, 1/13/2010 8:31:00AM

Constituent	Result	Units	PQL	MDL	Method	Prep Date	Run Date/Time	Analyst	Instrument ID	Dilution	QC Batch ID	MB Bias	Lab Quals
Total Recoverable Calcium	1000	mg/L	0.10	0.036	EPA-200.7	01/18/10	01/19/10 18:50	JRG	PE-OP1	1	BTA0926	ND	
Total Recoverable Magnesium	160	mg/L	0.050	0.038	EPA-200.7	01/18/10	01/19/10 18:50	JRG	PE-OP1	1	BTA0926	ND	
Total Recoverable Sodium	25	mg/L	0.50	0.070	EPA-200.7	01/18/10	01/19/10 18:50	JRG	PE-OP1	1	BTA0926	ND	
Total Recoverable Potassium	8.2	mg/L	1.0	0.092	EPA-200.7	01/18/10	01/19/10 18:50	JRG	PE-OP1	1	BTA0926	ND	
Chloride	25	mg/L	0.50	0.059	EPA-300.0	01/14/10	01/14/10 19:38	CRR	IC2	1	BTA0905	ND	
Fluoride	0.22	mg/L	0.050	0.010	EPA-300.0	01/14/10	01/14/10 19:38	CRR	IC2	1	BTA0905	ND	
Nitrate as N	7.6	mg/L	0.10	0.026	EPA-300.0	01/14/10	01/14/10 19:38	CRR	IC2	1	BTA0905	ND	
pH	7.90	pH Units	0.05	0.05	EPA-150.1	01/18/10	01/18/10 15:29	RLP	MET-1	1	BTA1006		S05
Electrical Conductivity @ 25 C	1090	umhos/cm	1.00	1.00	EPA-120.1	01/18/10	01/18/10 15:29	RLP	MET-1	1	BTA1006		
Total Dissolved Solids @ 180 C	900	mg/L	50	50	EPA-160.1	01/19/10	01/19/10 07:10	JLR	MANUAL	5	BTA1138	ND	
Total Suspended Solids (Glass Fiber)	3600	mg/L	50	50	EPA-160.2	01/15/10	01/15/10 08:45	MRM	MANUAL	100	BTA0862	ND	
Residual Chlorine	ND	mg/L	0.10	0.10	EPA-330.4	01/14/10	01/14/10 09:30	MRM	MANUAL	1	BTA0737	ND	S05
Ammonia as N	0.095	mg/L	0.050	0.025	EPA-350.1	01/18/10	01/18/10 12:29	JSM	SC-1	1	BTA1073	ND	
Nitrite as N	ND	mg/L	0.050	0.0081	EPA-353.2	01/14/10	01/14/10 13:26	TDC	KONE-1	1	BTA1072	ND	
Total Phosphorus	1.8	mg/L	0.050	0.016	EPA-365.4	01/18/10	01/20/10 11:32	JSM	SC-1	1	BTA0950	0.037	

Diepenbrock Harrison
400 Capital Mall, Suite 1800
Sacramento, CA 95814

Project: Hanson
Project Number: 0637109 500 phase 9
Project Manager: Sean K. Hungerford

Reported: 01/21/2010 9:30

Draft: Water Analysis (Metals)

BCL Sample ID: 1000614-01 | **Client Sample Name:** NQS-02, 1/13/2010 8:31:00AM

Constituent	Result	Units	PQL	MDL	Method	Prep Date	Run Date/Time	Analyst	Instrument ID	Dilution	QC Batch ID	MB Bias	Lab Quals
Aluminum	ND	ug/L	50	38	EPA-200.7	01/14/10	01/19/10 13:48	JRG	PE-OP1	1	BTA0897	ND	
Antimony	**0.86**	**ug/L**	**2.0**	**0.17**	**EPA-200.8**	**01/14/10**	**01/19/10 17:08**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	**J**
Arsenic	**1.3**	**ug/L**	**2.0**	**0.52**	**EPA-200.8**	**01/14/10**	**01/19/10 17:08**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	**J**
Barium	**24**	**ug/L**	**1.0**	**0.12**	**EPA-200.8**	**01/14/10**	**01/19/10 17:08**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	
Beryllium	ND	ug/L	1.0	0.18	EPA-200.8	01/14/10	01/19/10 17:08	JDC	PE-EL1	1	BTA0943	ND	
Boron	**31**	**ug/L**	**100**	**9.7**	**EPA-200.7**	**01/14/10**	**01/19/10 13:48**	**JRG**	**PE-OP1**	**1**	**BTA0897**	**ND**	**J**
Cadmium	ND	ug/L	1.0	0.13	EPA-200.8	01/14/10	01/19/10 17:08	JDC	PE-EL1	1	BTA0943	ND	
Chromium	ND	ug/L	3.0	0.55	EPA-200.8	01/14/10	01/19/10 17:08	JDC	PE-EL1	1	BTA0943	ND	
Copper	**1.2**	**ug/L**	**2.0**	**0.68**	**EPA-200.8**	**01/14/10**	**01/19/10 17:08**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	**J**
Iron	ND	ug/L	50	9.3	EPA-200.7	01/14/10	01/19/10 13:48	JRG	PE-OP1	1	BTA0897	ND	
Lead	ND	ug/L	1.0	0.054	EPA-200.8	01/14/10	01/19/10 17:08	JDC	PE-EL1	1	BTA0943	ND	
Manganese	**14**	**ug/L**	**1.0**	**0.11**	**EPA-200.8**	**01/14/10**	**01/19/10 17:08**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	
Nickel	**3.4**	**ug/L**	**2.0**	**0.15**	**EPA-200.8**	**01/14/10**	**01/19/10 17:08**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	
Selenium	**29**	**ug/L**	**2.0**	**0.38**	**EPA-200.8**	**01/14/10**	**01/19/10 17:08**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	
Silicon as SiO2	**7400**	**ug/L**	**200**	**65**	**EPA-200.7**	**01/14/10**	**01/19/10 13:48**	**JRG**	**PE-OP1**	**1**	**BTA0897**	**ND**	
Silver	ND	ug/L	1.0	0.065	EPA-200.8	01/14/10	01/19/10 17:08	JDC	PE-EL1	1	BTA0943	ND	
Thallium	ND	ug/L	1.0	0.11	EPA-200.8	01/14/10	01/19/10 17:08	JDC	PE-EL1	1	BTA0943	ND	
Vanadium	**2.6**	**ug/L**	**3.0**	**1.2**	**EPA-200.8**	**01/14/10**	**01/19/10 17:08**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	**J**
Zinc	**28**	**ug/L**	**5.0**	**1.9**	**EPA-200.8**	**01/14/10**	**01/19/10 17:08**	**JDC**	**PE-EL1**	**1**	**BTA0943**	**ND**	
Total Recoverable Aluminum	**87000**	**ug/L**	**50**	**38**	**EPA-200.7**	**01/18/10**	**01/19/10 18:50**	**JRG**	**PE-OP1**	**1**	**BTA0926**	**ND**	
Total Recoverable Boron	**52**	**ug/L**	**100**	**12**	**EPA-200.7**	**01/18/10**	**01/19/10 18:50**	**JRG**	**PE-OP1**	**1**	**BTA0926**	**ND**	**J**
Total Recoverable Iron	**160000**	**ug/L**	**50**	**30**	**EPA-200.7**	**01/18/10**	**01/19/10 18:50**	**JRG**	**PE-OP1**	**1**	**BTA0926**	**ND**	
Total Recoverable Mercury	**1.5**	**ug/L**	**0.20**	**0.016**	**EPA-245.1**	**01/18/10**	**01/19/10 10:58**	**MEV**	**CETAC1**	**1**	**BTA0920**	**ND**	

Diepenbrock Harrison
400 Capital Mall, Suite 1800
Sacramento, CA 95814

Project: Hanson
Project Number: 0637109 500 phase 9
Project Manager: Sean K. Hungerford

Reported: 01/21/2010 9:30

Draft: Water Analysis (General Chemistry)

Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits RPD	Control Limits Percent Recovery	Lab Quals
Residual Chlorine	BTA0737	Duplicate	1000613-01	ND	ND		mg/L			10		
Total Suspended Solids (Glass Fiber)	BTA0862	Duplicate	1000613-01	17.600	16.000		mg/L	9.5		10		
Chloride	BTA0905	Duplicate	1000668-01	69.320	69.418		mg/L	0.1		10		
		Matrix Spike	1000668-01	69.320	188.93	101.01	mg/L		118		80 - 120	
		Matrix Spike Duplicate	1000668-01	69.320	188.36	101.01	mg/L	0.5	118	10	80 - 120	
Fluoride	BTA0905	Duplicate	1000668-01	0.40800	0.45500		mg/L	10.9		10		A02
		Matrix Spike	1000668-01	0.40800	1.6000	1.0101	mg/L		118		80 - 120	
		Matrix Spike Duplicate	1000668-01	0.40800	1.5636	1.0101	mg/L	3.1	114	10	80 - 120	
Nitrate as N	BTA0905	Duplicate	1000668-01	ND	ND		mg/L			10		
		Matrix Spike	1000668-01	ND	5.5283	5.0505	mg/L		109		80 - 120	
		Matrix Spike Duplicate	1000668-01	ND	5.5414	5.0505	mg/L	0.2	110	10	80 - 120	
Total Recoverable Calcium	BTA0926	Duplicate	1000551-01	14.030	13.492		mg/L	3.9		20		
		Matrix Spike	1000551-01	14.030	23.606	10.000	mg/L		95.8		75 - 125	
		Matrix Spike Duplicate	1000551-01	14.030	23.851	10.000	mg/L	2.5	98.2	20	75 - 125	
Total Recoverable Magnesium	BTA0926	Duplicate	1000551-01	3.7475	3.6803		mg/L	1.8		20		
		Matrix Spike	1000551-01	3.7475	14.400	10.000	mg/L		107		75 - 125	
		Matrix Spike Duplicate	1000551-01	3.7475	14.456	10.000	mg/L	0.5	107	20	75 - 125	
Total Recoverable Sodium	BTA0926	Duplicate	1000551-01	3.5714	3.4758		mg/L	2.7		20		
		Matrix Spike	1000551-01	3.5714	13.581	10.000	mg/L		100		75 - 125	
		Matrix Spike Duplicate	1000551-01	3.5714	13.587	10.000	mg/L	0.1	100	20	75 - 125	
Total Recoverable Potassium	BTA0926	Duplicate	1000551-01	1.1553	1.1185		mg/L	3.2		20		
		Matrix Spike	1000551-01	1.1553	11.177	10.000	mg/L		100		75 - 125	
		Matrix Spike Duplicate	1000551-01	1.1553	11.163	10.000	mg/L	0.1	100	20	75 - 125	
Total Phosphorus	BTA0950	Duplicate	1000710-01	ND	0.052700		mg/L			20		
		Matrix Spike	1000710-01	ND	1.0322	1.0000	mg/L		103		80 - 120	
		Matrix Spike Duplicate	1000710-01	ND	1.0497	1.0000	mg/L	1.7	105	20	80 - 120	
pH	BTA1006	Duplicate	1000479-01	7.9900	8.1600		pH Units	2.1		20		

Diepenbrock Harrison	Project: Hanson	Reported: 01/21/2010 9:30
400 Capital Mall, Suite 1800	Project Number: 0637109 500 phase 9	
Sacramento, CA 95814	Project Manager: Sean K. Hungerford	

Draft: Water Analysis (General Chemistry)

Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits RPD	Control Limits Percent Recovery	Lab Quals
Electrical Conductivity @ 25 C	BTA1006	Duplicate	1000479-01	429.40	431.50		umhos/cm	0.5		10		
Nitrite as N	BTA1072	Duplicate	1000558-01	ND	ND		mg/L			10		
		Matrix Spike	1000558-01	ND	0.48376	0.50000	mg/L		96.8		90 - 110	
		Matrix Spike Duplicate	1000558-01	ND	0.48110	0.50000	mg/L	0.6	96.2	10	90 - 110	
Ammonia as N	BTA1073	Duplicate	1000548-02	0.065500	0.053600		mg/L	20.0		10		A02
		Matrix Spike	1000548-02	0.065500	1.1236	1.1111	mg/L		95.2		90 - 110	
		Matrix Spike Duplicate	1000548-02	0.065500	1.1633	1.1111	mg/L	3.7	98.8	10	90 - 110	
Total Dissolved Solids @ 180 C	BTA1138	Duplicate	1000613-01	790.00	800.00		mg/L	1.3		10		

Diepenbrock Harrison
400 Capital Mall, Suite 1800
Sacramento, CA 95814

Project: Hanson
Project Number: 0637109 500 phase 9
Project Manager: Sean K. Hungerford

Reported: 01/21/2010 9:30

Draft: Water Analysis (Metals)

Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits RPD	Control Limits Percent Recovery	Lab Quals
Aluminum	BTA0897	Duplicate	1000614-01	ND	ND		ug/L			20		
		Matrix Spike	1000614-01	ND	1055.2	1020.4	ug/L		103		85 - 115	
		Matrix Spike Duplicate	1000614-01	ND	1087.3	1020.4	ug/L	3.0	107	20	85 - 115	
Boron	BTA0897	Duplicate	1000614-01	30.821	28.307		ug/L	8.5		20		J
		Matrix Spike	1000614-01	30.821	1136.9	1020.4	ug/L		108		85 - 115	
		Matrix Spike Duplicate	1000614-01	30.821	1161.6	1020.4	ug/L	2.2	111	20	85 - 115	
Iron	BTA0897	Duplicate	1000614-01	ND	ND		ug/L			20		
		Matrix Spike	1000614-01	ND	1087.8	1020.4	ug/L		107		85 - 115	
		Matrix Spike Duplicate	1000614-01	ND	1129.3	1020.4	ug/L	3.7	111	20	85 - 115	
Silicon as SiO2	BTA0897	Duplicate	1000614-01	7395.8	7320.2		ug/L	1.0		20		
		Matrix Spike	1000614-01	7395.8	28647	21829	ug/L		97.4		85 - 115	
		Matrix Spike Duplicate	1000614-01	7395.8	29543	21829	ug/L	4.1	101	20	85 - 115	
Total Recoverable Mercury	BTA0920	Duplicate	1000558-01	ND	ND		ug/L			20		
		Matrix Spike	1000558-01	ND	1.0075	1.0000	ug/L		101		70 - 130	
		Matrix Spike Duplicate	1000558-01	ND	1.0575	1.0000	ug/L	4.8	106	20	70 - 130	
Total Recoverable Aluminum	BTA0926	Duplicate	1000551-01	4850.3	4736.9		ug/L	2.4		20		
		Matrix Spike	1000551-01	4850.3	7142.3	1000.0	ug/L		229		75 - 125	A03
		Matrix Spike Duplicate	1000551-01	4850.3	7375.2	1000.0	ug/L	9.7	252	20	75 - 125	A03
Total Recoverable Boron	BTA0926	Duplicate	1000551-01	14.400	13.875		ug/L	3.7		20		J
		Matrix Spike	1000551-01	14.400	1044.5	1000.0	ug/L		103		75 - 125	
		Matrix Spike Duplicate	1000551-01	14.400	1025.4	1000.0	ug/L	1.9	101	20	75 - 125	
Total Recoverable Iron	BTA0926	Duplicate	1000551-01	4935.3	4769.5		ug/L	3.4		20		
		Matrix Spike	1000551-01	4935.3	6349.9	1000.0	ug/L		141		75 - 125	A03
		Matrix Spike Duplicate	1000551-01	4935.3	6586.0	1000.0	ug/L	15.4	165	20	75 - 125	A03
Antimony	BTA0943	Duplicate	1000613-01	8.1910	8.2440		ug/L	0.6		20		
		Matrix Spike	1000613-01	8.1910	52.652	40.816	ug/L		109		70 - 130	
		Matrix Spike Duplicate	1000613-01	8.1910	52.298	40.816	ug/L	0.8	108	20	70 - 130	

Diepenbrock Harrison 400 Capital Mall, Suite 1800 Sacramento, CA 95814	Project: Hanson Project Number: 0637109 500 phase 9 Project Manager: Sean K. Hungerford	**Reported:** 01/21/2010 9:30

Draft: Water Analysis (Metals)

Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits RPD	Control Limits Percent Recovery	Lab Quals
Arsenic	BTA0943	Duplicate	1000613-01	4.5260	4.5420		ug/L	0.4		20		
		Matrix Spike	1000613-01	4.5260	127.13	102.04	ug/L		120		70 - 130	
		Matrix Spike Duplicate	1000613-01	4.5260	126.26	102.04	ug/L	0.7	119	20	70 - 130	
Barium	BTA0943	Duplicate	1000613-01	41.084	40.261		ug/L	2.0		20		
		Matrix Spike	1000613-01	41.084	82.658	40.816	ug/L		102		70 - 130	
		Matrix Spike Duplicate	1000613-01	41.084	82.543	40.816	ug/L	0.3	102	20	70 - 130	
Beryllium	BTA0943	Duplicate	1000613-01	ND	ND		ug/L			20		
		Matrix Spike	1000613-01	ND	47.550	40.816	ug/L		116		70 - 130	
		Matrix Spike Duplicate	1000613-01	ND	48.552	40.816	ug/L	2.1	119	20	70 - 130	
Cadmium	BTA0943	Duplicate	1000613-01	0.53200	0.46500		ug/L	13.4		20		J
		Matrix Spike	1000613-01	0.53200	44.802	40.816	ug/L		108		70 - 130	
		Matrix Spike Duplicate	1000613-01	0.53200	43.947	40.816	ug/L	2.0	106	20	70 - 130	
Chromium	BTA0943	Duplicate	1000613-01	ND	ND		ug/L			20		
		Matrix Spike	1000613-01	ND	40.609	40.816	ug/L		99.5		70 - 130	
		Matrix Spike Duplicate	1000613-01	ND	40.842	40.816	ug/L	0.6	100	20	70 - 130	
Copper	BTA0943	Duplicate	1000613-01	1.4680	1.3890		ug/L	5.5		20		J
		Matrix Spike	1000613-01	1.4680	97.997	102.04	ug/L		94.6		70 - 130	
		Matrix Spike Duplicate	1000613-01	1.4680	98.134	102.04	ug/L	0.1	94.7	20	70 - 130	
Lead	BTA0943	Duplicate	1000613-01	ND	ND		ug/L			20		
		Matrix Spike	1000613-01	ND	100.05	102.04	ug/L		98.0		70 - 130	
		Matrix Spike Duplicate	1000613-01	ND	100.89	102.04	ug/L	0.8	98.9	20	70 - 130	
Manganese	BTA0943	Duplicate	1000613-01	20.636	20.124		ug/L	2.5		20		
		Matrix Spike	1000613-01	20.636	121.18	102.04	ug/L		98.5		70 - 130	
		Matrix Spike Duplicate	1000613-01	20.636	122.86	102.04	ug/L	1.7	100	20	70 - 130	
Nickel	BTA0943	Duplicate	1000613-01	163.08	156.82		ug/L	3.9		20		
		Matrix Spike	1000613-01	163.08	253.13	102.04	ug/L		88.2		70 - 130	
		Matrix Spike Duplicate	1000613-01	163.08	256.06	102.04	ug/L	3.2	91.1	20	70 - 130	

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Project Manager: Sean K. Hungerford

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Draft: Water Analysis (Metals)

Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits RPD	Control Limits Percent Recovery	Lab Quals
Selenium	BTA0943	Duplicate	1000613-01	82.195	82.095		ug/L	0.1		20		
		Matrix Spike	1000613-01	82.195	215.62	102.04	ug/L		131		70 - 130	Q03
		Matrix Spike Duplicate	1000613-01	82.195	214.36	102.04	ug/L	1.0	130	20	70 - 130	
Silver	BTA0943	Duplicate	1000613-01	ND	ND		ug/L			20		
		Matrix Spike	1000613-01	ND	40.951	40.816	ug/L		100		70 - 130	
		Matrix Spike Duplicate	1000613-01	ND	40.830	40.816	ug/L	0.3	100	20	70 - 130	
Thallium	BTA0943	Duplicate	1000613-01	0.39400	0.21500		ug/L	58.8		20		J,A02
		Matrix Spike	1000613-01	0.39400	35.763	40.816	ug/L		86.7		70 - 130	
		Matrix Spike Duplicate	1000613-01	0.39400	35.626	40.816	ug/L	0.4	86.3	20	70 - 130	
Vanadium	BTA0943	Duplicate	1000613-01	399.37	389.53		ug/L	2.5		20		
		Matrix Spike	1000613-01	399.37	428.87	40.816	ug/L		72.3		70 - 130	
		Matrix Spike Duplicate	1000613-01	399.37	433.01	40.816	ug/L	13.1	82.4	20	70 - 130	
Zinc	BTA0943	Duplicate	1000613-01	122.64	120.66		ug/L	1.6		20		
		Matrix Spike	1000613-01	122.64	229.46	102.04	ug/L		105		70 - 130	
		Matrix Spike Duplicate	1000613-01	122.64	230.50	102.04	ug/L	1.0	106	20	70 - 130	

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Draft: Water Analysis (General Chemistry)

Quality Control Report - Laboratory Control Sample

Constituent	Batch ID	QC Sample ID	QC Type	Result	Spike Level	PQL	Units	Percent Recovery	RPD	Control Limits Percent Recovery	Control Limits RPD	Lab Quals
Chloride	BTA0905	BTA0905-BS1	LCS	107.85	100.00	0.50	mg/L	108		90 - 110		
Fluoride	BTA0905	BTA0905-BS1	LCS	0.99700	1.0000	0.050	mg/L	99.7		90 - 110		
Nitrate as N	BTA0905	BTA0905-BS1	LCS	5.1590	5.0000	0.10	mg/L	103		90 - 110		
Total Recoverable Calcium	BTA0926	BTA0926-BS1	LCS	11.092	10.000	0.10	mg/L	111		85 - 115		
Total Recoverable Magnesium	BTA0926	BTA0926-BS1	LCS	11.297	10.000	0.050	mg/L	113		85 - 115		
Total Recoverable Sodium	BTA0926	BTA0926-BS1	LCS	10.461	10.000	0.50	mg/L	105		85 - 115		
Total Recoverable Potassium	BTA0926	BTA0926-BS1	LCS	10.301	10.000	1.0	mg/L	103		85 - 115		
Total Phosphorus	BTA0950	BTA0950-BS1	LCS	1.0049	1.0000	0.050	mg/L	100		85 - 115		
pH	BTA1006	BTA1006-BS2	LCS	7.0000	7.0000	0.05	pH Units	100		95 - 105		
Electrical Conductivity @ 25 C	BTA1006	BTA1006-BS1	LCS	311.70	303.00	1.00	umhos/cm	103		90 - 110		
Nitrite as N	BTA1072	BTA1072-BS1	LCS	0.49461	0.50000	0.050	mg/L	98.9		90 - 110		
Ammonia as N	BTA1073	BTA1073-BS1	LCS	0.98330	1.0000	0.050	mg/L	98.3		90 - 110		
Total Dissolved Solids @ 180 C	BTA1138	BTA1138-BS1	LCS	545.00	586.00	50	mg/L	93.0		90 - 110		

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Project: Hanson
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Project Manager: Sean K. Hungerford

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Draft: Water Analysis (Metals)

Quality Control Report - Laboratory Control Sample

Constituent	Batch ID	QC Sample ID	QC Type	Result	Spike Level	PQL	Units	Percent Recovery	RPD	Control Limits Percent Recovery	Control Limits RPD	Lab Quals
Aluminum	BTA0897	BTA0897-BS1	LCS	993.68	1000.0	50	ug/L	99.4		85 - 115		
Boron	BTA0897	BTA0897-BS1	LCS	1018.6	1000.0	100	ug/L	102		85 - 115		
Iron	BTA0897	BTA0897-BS1	LCS	1050.1	1000.0	50	ug/L	105		85 - 115		
Silicon as SiO2	BTA0897	BTA0897-BS1	LCS	20659	21392	200	ug/L	96.6		85 - 115		
Total Recoverable Mercury	BTA0920	BTA0920-BS1	LCS	1.0250	1.0000	0.20	ug/L	102		85 - 115		
Total Recoverable Aluminum	BTA0926	BTA0926-BS1	LCS	1065.2	1000.0	50	ug/L	107		85 - 115		
Total Recoverable Boron	BTA0926	BTA0926-BS1	LCS	1064.6	1000.0	100	ug/L	106		85 - 115		
Total Recoverable Iron	BTA0926	BTA0926-BS1	LCS	1132.5	1000.0	50	ug/L	113		85 - 115		
Antimony	BTA0943	BTA0943-BS1	LCS	39.850	40.000	2.0	ug/L	99.6		85 - 115		
Arsenic	BTA0943	BTA0943-BS1	LCS	98.102	100.00	2.0	ug/L	98.1		85 - 115		
Barium	BTA0943	BTA0943-BS1	LCS	39.991	40.000	1.0	ug/L	100		85 - 115		
Beryllium	BTA0943	BTA0943-BS1	LCS	38.472	40.000	1.0	ug/L	96.2		85 - 115		
Cadmium	BTA0943	BTA0943-BS1	LCS	40.475	40.000	1.0	ug/L	101		85 - 115		
Chromium	BTA0943	BTA0943-BS1	LCS	40.326	40.000	3.0	ug/L	101		85 - 115		
Copper	BTA0943	BTA0943-BS1	LCS	103.50	100.00	2.0	ug/L	103		85 - 115		
Lead	BTA0943	BTA0943-BS1	LCS	97.171	100.00	1.0	ug/L	97.2		85 - 115		
Manganese	BTA0943	BTA0943-BS1	LCS	101.34	100.00	1.0	ug/L	101		85 - 115		
Nickel	BTA0943	BTA0943-BS1	LCS	101.60	100.00	2.0	ug/L	102		85 - 115		
Selenium	BTA0943	BTA0943-BS1	LCS	99.191	100.00	2.0	ug/L	99.2		85 - 115		
Silver	BTA0943	BTA0943-BS1	LCS	40.304	40.000	1.0	ug/L	101		85 - 115		
Thallium	BTA0943	BTA0943-BS1	LCS	40.517	40.000	1.0	ug/L	101		85 - 115		
Vanadium	BTA0943	BTA0943-BS1	LCS	39.728	40.000	3.0	ug/L	99.3		85 - 115		
Zinc	BTA0943	BTA0943-BS1	LCS	103.82	100.00	5.0	ug/L	104		85 - 115		

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Draft: Water Analysis (General Chemistry)

Quality Control Report - Method Blank Analysis

Constituent	Batch ID	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
Residual Chlorine	BTA0737	BTA0737-BLK1	ND	mg/L	0.10	0.10	
Total Suspended Solids (Glass Fiber)	BTA0862	BTA0862-BLK1	ND	mg/L	0.50	0.50	
Chloride	BTA0905	BTA0905-BLK1	ND	mg/L	0.50	0.059	
Fluoride	BTA0905	BTA0905-BLK1	ND	mg/L	0.050	0.010	
Nitrate as N	BTA0905	BTA0905-BLK1	ND	mg/L	0.10	0.026	
Total Recoverable Calcium	BTA0926	BTA0926-BLK1	ND	mg/L	0.10	0.036	
Total Recoverable Magnesium	BTA0926	BTA0926-BLK1	ND	mg/L	0.050	0.038	
Total Recoverable Sodium	BTA0926	BTA0926-BLK1	ND	mg/L	0.50	0.070	
Total Recoverable Potassium	BTA0926	BTA0926-BLK1	ND	mg/L	1.0	0.092	
Total Phosphorus	BTA0950	BTA0950-BLK1	0.037200	mg/L	0.050	0.016	J
Nitrite as N	BTA1072	BTA1072-BLK1	ND	mg/L	0.050	0.0081	
Ammonia as N	BTA1073	BTA1073-BLK1	ND	mg/L	0.050	0.025	
Total Dissolved Solids @ 180 C	BTA1138	BTA1138-BLK1	ND	mg/L	6.7	6.7	

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Draft: Water Analysis (Metals)

Quality Control Report - Method Blank Analysis

Constituent	Batch ID	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
Aluminum	BTA0897	BTA0897-BLK1	ND	ug/L	50	38	
Boron	BTA0897	BTA0897-BLK1	ND	ug/L	100	9.7	
Iron	BTA0897	BTA0897-BLK1	ND	ug/L	50	9.3	
Silicon as SiO2	BTA0897	BTA0897-BLK1	ND	ug/L	200	65	
Total Recoverable Mercury	BTA0920	BTA0920-BLK1	ND	ug/L	0.20	0.016	
Total Recoverable Aluminum	BTA0926	BTA0926-BLK1	ND	ug/L	50	38	
Total Recoverable Boron	BTA0926	BTA0926-BLK1	ND	ug/L	100	12	
Total Recoverable Iron	BTA0926	BTA0926-BLK1	ND	ug/L	50	30	
Antimony	BTA0943	BTA0943-BLK1	ND	ug/L	2.0	0.17	
Arsenic	BTA0943	BTA0943-BLK1	ND	ug/L	2.0	0.52	
Barium	BTA0943	BTA0943-BLK1	ND	ug/L	1.0	0.12	
Beryllium	BTA0943	BTA0943-BLK1	ND	ug/L	1.0	0.18	
Cadmium	BTA0943	BTA0943-BLK1	ND	ug/L	1.0	0.13	
Chromium	BTA0943	BTA0943-BLK1	ND	ug/L	3.0	0.55	
Copper	BTA0943	BTA0943-BLK1	ND	ug/L	2.0	0.68	
Lead	BTA0943	BTA0943-BLK1	ND	ug/L	1.0	0.054	
Manganese	BTA0943	BTA0943-BLK1	ND	ug/L	1.0	0.11	
Nickel	BTA0943	BTA0943-BLK1	ND	ug/L	2.0	0.15	
Selenium	BTA0943	BTA0943-BLK1	ND	ug/L	2.0	0.38	
Silver	BTA0943	BTA0943-BLK1	ND	ug/L	1.0	0.065	
Thallium	BTA0943	BTA0943-BLK1	ND	ug/L	1.0	0.11	
Vanadium	BTA0943	BTA0943-BLK1	ND	ug/L	3.0	1.2	
Zinc	BTA0943	BTA0943-BLK1	ND	ug/L	5.0	1.9	

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Notes And Definitions

J	Estimated Value (CLP Flag)
MDL	Method Detection Limit
ND	Analyte Not Detected at or above the reporting limit
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
A02	The difference between duplicate readings is less than the PQL.
A03	The sample concentration is more than 4 times the spike level.
Q03	Matrix spike recovery(s) is(are) not within the control limits.
S05	The sample holding time was exceeded.