# City of Woodland

300 First Street
Woodland, CA 95695

530-661-5820

## Meeting Agenda - Final

## Planning Commission

**Thursday, September 5, 2013** | **6:30 PM** | **Council Chambers**

### 1. Call to Order

### 2. Roll Call

### 3. Directors Report

*This an opportunity for the Community Development Department's Director or designee to provide the Commission with information on any items other than those listed on the Agenda.*

### 4. Public Comment

*This is an opportunity for the public to speak to the Commission on any item other than those listed on the Agenda. The Chairman may impose a time limit on any speaker.*

### 5. Communications

*Commission Statements and Requests: This is an opportunity for the Commission members to make comments and announcements to express concerns or to request Commission's consideration of any items a Commission member would like to have discussed at a future Commission meeting.*

### 6. Public Hearing

*This is the continuation Public Hearing from the July 18, 2013 Planning Commission Meeting*

13-202 Subject: Golden State Reclamation Conditional Use Permit (Continued From July 18, 2013)

Staff Contact
Paul Hanson, AICP, Senior Planner, 530-661-5814,
paul.hanson@cityofwoodland.org

***Attachments:*** Attachements A thru E.pdf

Attachment F.pdf

Public Comment From Golden State Reclamation - 82913 PGPI Comment Lette

### 7. Adjournment

**8. The Planning Commission of the City of Woodland encourages all parties interested in a matter scheduled to be reviewed, discussed and acted on at a meeting, to participate in the public discourse, which may include the submission of written comments and materials. The Planning Commission notifies the public that those materials received less than 24 hours before a meeting date and time may not be able to be considered completely. Further, the Planning Commission encourages interested parties to attend the meeting to discuss any matter of concern and to explain their comments more fully.**

# Legislation Details (With Text)

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| **File #:** | 13-202 | **Version:** | 1 | **Name:** | |
| **Type:** | Public Hearing Item | | | **Status:** | Agenda Ready |
| **File created:** | 8/27/2013 | | | **In control:** | Planning Commission |
| **On agenda:** | 9/5/2013 | | | **Final action:** | |
| **Title:** | Subject: Golden State Reclamation Conditional Use Permit (Continued From July 18, 2013)<br>Staff Contact<br>Paul Hanson, AICP, Senior Planner, 530-661-5814, paul.hanson@cityofwoodland.org | | | | |
| **Sponsors:** | | | | | |
| **Indexes:** | | | | | |
| **Code sections:** | | | | | |
| **Attachments:** | Attachements A thru E.pdf<br>Attachment F.pdf<br>Public Comment From Golden State Reclamation - 82913 PGPI Comment Letter-v1.PDF | | | | |

| Date | Ver. | Action By | Action | Result |
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City of Woodland

Community Development Department 300 First Street Woodland CA 95695 (530) 661-5820 (530) 406-0832 Fax

# MEMORANDUM

Date: September 5, 2013

To: Woodland Planning Commission

From: Paul Hanson, AICP, Senior Planner
Cindy Gnos, AICP, Contract Planner

Subject: Golden State Reclamation Conditional Use Permit (Continued From July 18, 2013)

Staff Contact
Paul Hanson, AICP, Senior Planner, 530-661-5814, paul.hanson@cityofwoodland.org

On July 18, 2013, Planning Commission held a public hearing regarding the proposed Golden State Reclamation Conditional Use Permit project proposed for Hanson Way **(Attachment F - Staff Report July 18, 2013)**. The Planning Commission continued the item and public hearing in order to allow PGP International Inc (neighbor to the south) and the applicant to have microbiologists test the soil and water at the existing ponds in Nevada to determine if pathogens exist.

An attorney representing PGP International Inc sent a letter **(Attachment A - letter dated August 1, 2913)** requesting background information prior to testing. The applicant responded with a letter **(Attachment B - letter dated August 20, 2013)** noting that the information requested by PGP International Inc is not available and that he would be moving forward with the testing.

The applicant also provided a report prepared for Caltrans that tested the slurry removed from their project sites (testing from the trucks leaving the site, not from ponds). The conclusions of this report are provided in **Attachment C - State-Wide Portland Cement Concrete Waste Supplement Study)**. The applicant hired Dr. Douglas Nelson, a UC Davis professor of microbiology to analyze the Caltrans report to determine if the slurry could contain the pathogens of concern to PGP International Inc. To confirm the conditions in the pond are similar to those of the Caltrans report, the applicant had the soil and slurry tested from the site in Nevada. The lab results are provided in **Attachment D - dated August 14, 2013.** Dr. Nelson's letter **(Attachment E - dated August 2013)** notes that the pH values would not allow the pathogens to exist.
At the July 18, 2013, Planning Commission hearing, staff had recommended Condition #24 be modified to change the word could to shall and recommended adding a wheel washing condition.

24. During construction and operations, the applicant shall implement adequate dust control measures sufficient to retain dust emissions on-site. The Community Development Department may require operations to stop should dust affect adjacent sites. Dust control measures ~~**could**~~ **shall** include, but would not be limited to, the following:

    1 All disturbed areas and unpaved roads shall be effectively stabilized for dust emissions using water, chemical stabilizers, dust suppressants, tarps, or other suitable material such as vegetative ground cover;

    2 Apply water to disturbed soils as necessary to retain dust emissions on-site (minimum of twice a day);

    3 Required effective minimum soil moisture for earthmoving by use of a moveable sprinkler system or a water truck. Moisture content could be verified by lab sample or moisture probe;

    4 Limit on-site vehicle speeds on unpaved roads sufficient to retain dust emissions on-site (maximum of 15 mph);

    5 Use a gravel apron, 25 feet long by road width, to reduce mud/dirt trackout from unpaved truck exit routes;

    6 All transport of materials shall be completely covered with a fabric cover and maintain a freeboard height of 12 inches;

    7 Water any storage piles by hand at a rate sufficient to retain dust emissions on-site, or apply cover when wind events are declared;

    8 Apply chemical soil stabilizers on inactive construction areas (disturbed lands that are unused for at least four consecutive days);

    9 Plant tree windbreaks on the windward perimeter of construction area;

    10 Plant vegetative ground cover in disturbed areas as soon as possible; and

11 All trackout or carryout shall be cleaned at the end of each workday or immediately when mud or dirt extends a cumulative distance of 50 linear feet or more onto a paved road.

12 A publicly visible sign shall be posted with the telephone number and person to contact at the City regarding dust complaints. This person shall respond and take corrective action within 48 hours. The YSAQMD's phone number shall also be visible to ensure compliance with applicable regulations.

13 Install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site;

The Planning Commission also discussed the possibility of increased monitoring of the pond lining for leaks the first year, as well as adding a condition related to testing procedures for trucks entering the site that are from outside sources. Planning Commission also discussed the possibility of a condition prohibiting the use of chemical accelerators at the site.

Staff recommends the Planning Commission approve the proposed project based upon the findings of fact and subject to the conditions of approval in the July 18, 2013 staff report.

**Attachments:**

A - Letter from PGPI attorney (August 1, 2013)
B - Letter from Applicant (August 20, 2013)
C - Caltrans Slurry Testing Conclusions
D - Nevada Testing Lab Results
E - Letter from Douglas Nelson, applicant's microbiologist
F - July 18, 2013, Planning Commission staff report with attachments
G - Public Comment (PGPI)

# ATTACHMENT A

BRYAN CAVE

Thomas S. Lee
Direct: 415-675-3447
tom.lee@bryancave.com

August 1, 2013

**VIA U.S. MAIL**

Mr. Paul Hanson
City of Woodland,
Planning Commission
300 First Street
Woodland, CA 95695

Re: Pathogens Testing and Sampling Related to the Golden State Reclamation Project (the "Project")

Dear Mr. Hanson:

PGPI appreciates your continued involvement in the testing and evaluation of the Project proposed by Diversified Concrete Cutting ("DCC"). As the parties conduct testing and discuss solutions to address PGPI's concerns, we would like to include you in all communications between the parties so that your department is fully appraised of how the discussions between DCC and PGPI are proceeding, and to ensure that these discussions remain focused on a scientific analysis of the threats posed by the Project.

To that end, as you are aware, at the July 18th hearing the Woodland Planning Commission strongly suggested that PGPI – and DCC – conduct testing at DCC's concrete slurry reclamation facility in Nevada. PGPI is concerned that pathogen data from the Nevada facility may not be conclusive or demonstrative of the conditions that will exist at the Woodland facility. Nevertheless, PGPI is willing to conduct the testing, and has retained Dr. Virginia Deibel to do so.

In order for her tests to be productive, Dr. Deibel has requested the following information from DCC:

- Log books for the month leading up to the test showing the pH of the ponds.
- Business records demonstrating activity at the site in the month leading up to the test. This would include records showing any concrete slurry deliveries, any dredging, any alterations to the ponds, any addition or removal of water to the ponds, and any chemicals, pathogens, biological elements, organic elements, or biocidal agents added to or removed from the ponds in the month leading up to the test.

**Bryan Cave LLP**
560 Mission Street, 25th Floor
San Francisco, CA 94105-2994
Tel (415) 268-2000
Fax (415) 268-1999
www.bryancave.com

- Business records showing whether the ponds have been covered in any way in the month leading up to the test, and if so, what times they were covered and uncovered.

- Log books or business records showing whether the temperature in the ponds has been raised or lowered by any causes other than ambient air temperature.

Please understand that the purpose of these requests is to make Dr. Deibel's tests as comprehensive and effective as possible, and to reduce the need for future testing.

With regards to scheduling, we look forward to receiving a list of dates when Dr. Deibel can visit the Nevada facility to conduct her testing from DCC. In addition, we request that your office or DCC provide PGPI with a list of dates when PGPI's testing staff can conduct testing on the Project site.

Sincerely,

Thomas Lee

cc: Travis Brandt

# ATTACHMENT B

DIVERSIFIED CONCRETE CUTTING

August 20th, 2013

Mr. Paul Hanson
City of Woodland,
Planning Commission

RE: Response to PGP letter, dated August 1st, 2013

Dear Mr. Hanson:

We've received PGP's letter requesting log books and/or records of our slurry deliveries, temperatures, pH Levels, etc. While I would like to supply PGP with this information, we do not keep such records, as we are not required to.

That being said, per the Planning Commission's request, we have move forward with testing the material, and we have received detailed feedback from a Microbiologist in regards to the material and it's effect on pathogens. This has been forwarded onto you, and will be presented at the hearing on September 5th.

**Travis Brandt**
**Division Manager**
**Diversified Concrete Cutting**

# ATTACHMENT C

# REPORT OF FINDINGS

## State-Wide Portland Cement Concrete Waste Supplemental Study

April 29, 2005

Prepared By:

Greg Acosta, P.E.
Director, Environmental Services Division

Prepared For:

CALIFORNIA DEPARTMENT OF TRANSPORTATION
Division of Environmental Analysis
1120 "N" Street
Sacramento, California 95814

Prepared By:

BRYAN A. STIRRAT & ASSOCIATES, INC.
1360 Valley Vista Drive, Suite 200
Diamond Bar, California 91765
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BAS JN: 2004.0074

# CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS)
# STATE-WIDE PORTLAND CEMENT CONCRETE WASTE SUPPLEMENTAL STUDY
# REPORT OF FINDINGS

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# SECTION 1.0

# INTRODUCTION

# 1.0 INTRODUCTION

Bryan A. Stirrat & Associates, Inc. (BAS) has been retained by the California Department of Transportation (Department) to perform an investigation to identify the typical characteristics of Portland Cement Concrete (PCC) wastes generated from Department projects. In the past years, it has become increasingly difficult to find appropriate and logistically feasible disposal locations for PCC waste products. In particular, the Department wished to address specifically the waste generated from pavement grinding, grooving, and saw cutting operations. The waste stream generated from these operations includes both slurry and liquid components.

In order to address these issues, the Department has asked BAS to conduct a field program in order to collect samples for chemical and physical analysis, and to perform statistical data analysis associated with the field program necessary to reasonably characterize the waste stream described above. The field program was conducted in accordance with the *Waste Characterization Work Plan* (BAS, October 13, 2004) and the associated Health and Safety Plan (HSP), both of which were approved by the Department.

## 1.1 PROJECT BACKGROUND

The Department performs a myriad of construction and repair projects throughout the State of California. Working with PCC in some fashion is almost always a part of these projects, and as a result, PCC related wastes are generated. The type and quantity of waste generated depends on the scale of the project and the activities being performed, such as new concrete pours, surface grinding operations, and saw cutting. However, in general, the wastes are comprised of a slurry component (a solid waste containing fine powder from grinding and saw cutting operations) and a liquid component (potentially high pH water with suspended solids from these same operations).

In the past, the need for disposal of the liquid component of these wastes was mitigated through either evaporation or infiltration into underlying soils in unlined washout pits. However, current practice on Department projects is to line washout pits with plastic sheeting, thereby eliminating infiltration and resulting in a net increase in the quantity of PCC liquid waste generated, unless prior approval to allow infiltration has been obtained from the appropriate Regional Water Quality Control Board. Although it has been the contractors' responsibility on these projects to dispose of both slurry and liquid PCC wastes that are generated, it has become

difficult to find appropriate and logistically feasible disposal locations for PCC waste products associated with construction activities. In addition, certain RWQCBs have expressed[1] concern regarding the potential presence of hexavalent chromium ($Cr^{+6}$) in PCC wastes.

In 2003, the Department issued Task Order #1 to BAS to evaluate, through identification and review of available published studies and documents, typical PCC waste product constituent levels and identify disposal sites and methods to meet the needs of construction projects within the Department right of way. Results of that Task Order were summarized in two technical memoranda, the first of which made the following findings and conclusions regarding the characteristics of PCC wastes.

Although there are emerging concerns regarding $Cr^{+6}$ in Portland Cement and PCC wastes, there are no existing studies that have shown either material to contain $Cr^{+6}$ at concentrations above currently established State or federal hazardous waste levels. As a result, for disposal outside of the right of way, at this time there is no need to consider PCC wastes to be comprised of anything other than:

- Solid PCC Wastes: Typical solid inert PCC construction/demolition debris (e.g., concrete with typical mix additives) free of rebar, wood or other debris, and free of any other outside contamination, which can be re-used, sent to a Class III disposal site or concrete recycling facility;
- Liquid PCC Waste: A high pH, non-hazardous liquid waste, which can be neutralized on-site under DTSC[2] and RWQCB approvals; be disposed of at a Class II off-site disposal facility, or be treated at an off-site recycling/treatment facility. (This material could also be sent to a Class I facility, however this is not recommended due to the fact that the waste is not considered either a State or Federally defined hazardous waste and disposal at a Class I facility would result in an unnecessary increase in future liability). If on-site treatment is being considered, appropriate NPDES permits and/or site specific waste discharge requirements (WDRs) would have to be negotiated with the local RWQCB on a case by case basis before discharging treated water.
- Slurry PCC Waste: A combination of solid and liquid PCC waste but considered a solid waste, which can be neutralized on-site (if necessary) under DTSC and RWQCB approvals; disposed of at Class II off-site disposal facility, or sent to a permitted recycling facility, which accepts this waste stream. (This material could also be sent to a Class I facility, however this is not recommended due to the fact that the waste is not considered either a State or Federally defined hazardous waste and disposal at a Class I facility would result in an unnecessary increase in future liability). If on-site treatment or disposal is being considered,

[1] Regional Water Quality Control Board
[2] Department of Toxic Substances Control

site specific WDRs would need to be established with the local RWQCB on a case by case basis. The WDRs would likely include requirements and restrictions on the type and quantity of waste discharged, the drying of the waste prior to disposal, the lining of the disposal pit(s), and the capping of the disposal pit. Because the primary concern with regard to the waste material is pH level, long term monitoring is not likely to be required. However, a long term post-closure maintenance program for the disposal pit will likely need to be developed to ensure its integrity.

The second memorandum prepared under that Task Order identified potential disposal sites for slurry and liquid PCC wastes throughout the state.

Subsequent to completion of Task Order #1, the Department determined that more specific information was required regarding the typical characteristics of both slurry and liquid PCC wastes being generated through concrete grinding operations. As such, under the scope of work outlined in Task Order #8, the Department authorized BAS to proceed with this portion of the project, objectives of which are summarized below.

## 1.2 PROJECT GOALS

The purpose of this investigation is to determine the typical characteristics of PCC waste from the Department PCC grinding projects through the task specific objectives:

- To collect samples of PCC grinding waste for analysis,
- To perform chemical analyses,
- To perform statistical analysis on the data generated, and
- To report the findings which shall be used as a representative waste characterization for future PCC grinding projects.

## 1.3 SITE LOCATIONS AND DESCRIPTIONS

In order to achieve the project goals as delineated in Section 1.2 a total of six sampling events were conducted at the following Department right of way locations and dates:

- District 8, on the southbound lanes of Interstate 15, north of Interstate 210 and south of Interstate 215, near the cities of Fontana and Rancho Cucamonga on October 26, 2004. (EA 08-0A4224)
- District 3, on northbound Interstate 5, between State Highway 91 and Interstate 605 in the City of Norwalk, on November 1, 2004. (EA 07-226204)

- District 3, on the northbound lanes of Interstate 5, between Florin Road and Franklin Road in the City of Sacramento, on November 5, 2004. (EA 03-2M0804)
- District 7, on the northbound lanes of State Route 101 between Ventura and Santa Barbara, on November 18, 2004. (EA 07-193004)
- District 7, on the southbound lanes of State Route 101 between Ventura and Santa Barbara, on December 21, 2004. (EA 07-193004)
- District 8, on the westbound lanes of Interstate 10, just west of the intersection of Interstate 15, and Interstate 10, in the City of Ontario, on January 19, 2005. (EA 08-0A1803)

Figures 1 through 6 shows each of the above listed sampling locations. Additional site specific information and observations are included in Section 2.0.

# SECTION 2.0

# FIELD ACTIVITIES

# 2.0 FIELD ACTIVITIES

The goal of the field activities was to collect representative PCC grinding residue samples from representative construction sites within Department rights-of-way where pavement rehabilitation and installation projects were ongoing. To determine typical characteristics of waste generated during PCC grinding operations within Department rights-of-way, BAS collected grab samples of typical liquid and slurry waste from six different PCC grinding operations within three Department Districts (Districts 3, 7, and 8) as directed by the Department. Photographs illustrating typical sampling areas, waste material, and other project related activities are included in Appendix A.

Based on site availability and construction scheduling, the Department directed BAS to conduct one sampling event in District 3, three sampling events in District 7, and two events in District 8. Sampling occurred within these Districts on different construction projects with one exception. Two sampling events were conducted along Route 101 in District 7 during the same construction activity, and samples were collected from the same fixed processing facility used for the entire construction. However, sampling events were conducted over one month apart to allow for progression of the grinding operation to an area of potentially different characteristics. To the greatest extent possible, the sites were selected to represent a variety of PCC sources and mix designs throughout the state. During sample collection, both slurry and liquid samples were collected directly from vacuum trucks that collected the waste at the site. As described in further detail below, it was necessary to collect the samples from the discharge of the trucks at the disposal locations and not during waste generation at the sites.

Typical PCC grinding and waste collection machinery is shown in Photograph 1. This orientation, the PCC grinder leading the vacuum truck, was observed at each of the sampling sites. The PCC grinders observed were computer operated and typically guided by a technician who walked with the grinder during operation. The technician makes any necessary adjustments to ensure proper equipment operations and is responsible for any related safety issues. A large water tank, which acts as ballast, is part of the grinder but does not contribute water to the operation. All water required for the grinding operation is provided by the vacuum truck. As the grinder levels the PCC surface, the spent water and PCC waste are pumped into the vacuum truck. This water is reused for grinding operations by recycling it from inside the vacuum truck's holding tank. The water is separated from the solids by passing it through screens and/or bevels separating the internal compartments

within the truck. Fresh water is typically located in the front compartments of the truck prior to grinding and the waste generated is pumped into the rear of the truck via two separate hoses (inlet and outlet) connected from the grinder to the tanker (Photograph 3). The PCC grinding operation continues until the water within the truck becomes too turbid to allow for spraying onto the working surface. One truck is typically capable of approximately two hours of operation before being taken off-line. One to two standby trucks are typically available at the site to ensure that the grinding operation is uninterrupted. Once taken off-line, the trucks typically leave the construction site immediately and transport the waste to a designated disposal or recycling facility.

Initially, attempts were made to collect samples of the waste material directly from the trucks at the construction sites. However, it was determined early in the project that this resulted in undo delays for the transporters, created health and safety concerns at the construction site, and did not result in the collection of truly representative samples. Subsequent attempts to collect the liquid and slurry waste samples from the trucks as they discharged their loads at the designated disposal sites proved to be a more efficient sample collection strategy.

The majority of the sampling activities occurred during night-time hours and in the presence of active operating equipment at often remote disposal sites. Consequently, all sampling activities were conducted by a team of two field personnel. One team member collected the samples while the other took notes and acted as a look-out, monitoring the surrounding field activities to ensure the safety of the sampler. The following sections outline further specifics regarding the protocol that was implemented during field activities. Arrangements for access and sampling were made with the Department's Resident Engineer on each project being sampled prior to arrival at each designated site.

## 2.1 OVERALL FIELD OBSERVATIONS

Upon arrival at a designated site, BAS field personnel performed a preliminary site survey to determine whether any conditions existed at the site or in the surrounding area that may impact sample collection and/or the analytical results. In particular, BAS field personnel identified on-site or nearby potential contaminant sources (if any) which may have affected the results of the proposed sampling and analyses. In performing each initial site survey and reconnaissance, observations were made regarding the overall site conditions, and the specific waste generation activities being conducted. This information was recorded on preprinted field sampling logs (Appendix B). At a minimum, the following information was noted regarding each sites activities:

- Site location (highway number)
- Project EA
- Department Project Description and Contact Person
- Department Site Construction Manager
- Construction activity generating PCC waste
- Contractor(s) performing this construction activity
- Equipment used to generate PCC waste (make/model/ID#)
- Condition of equipment
- Other activities being performed at the site
- Time of day, temperature, and weather conditions when waste-generating construction activities occurred
- Original PCC source(s), if known
- Original aggregate and cement sources, if known
- Original PCC mix specification(s), if known
- On-site location from which PCC waste was generated
- Type of PCC waste being generated
- Method of PCC waste storage/stockpiling
- On-site location of PCC waste storage and/or stockpiling
- Identification of any on-site or nearby potential contaminant sources
- Estimated rate of water usage (gal/meter$^2$) in the grooving, grinding, or saw-cutting process

## 2.2 SAMPLE COLLECTION

During the period from October 2004 through January 2005, a total of 27 liquid samples and 27 slurry samples were collected for chemical and physical analyses. The objectives of the analyses were to determine composition of typical PCC grinding liquid and slurry waste. With the exception of the initial sampling event during which sample collection procedures were refined, five (5) liquid and five (5) slurry samples were collected during each sampling event. Slurry and liquid samples were collected from either the discharge piping (Photograph 4) of the truck, or from the top hatch covers of the trucks (Photograph 5) prior to discharge. All sampling equipment was decontaminated prior to use and between samples and sampling events. Decontamination procedures included washing with a non-phosphate detergent

solution followed by a double rinse with de-ionized water. The sampling equipment was allowed to air dry prior to use.

All samples were labeled, placed in zip-lock bags, and stored on ice in coolers immediately upon collection. All sample labels included the following information: sample ID, laboratory analysis, date, project ID, and sample collector name as required by EPA sampling protocol. Chain-of-Custody (COC) forms were filled out for each sampling event and accompanied all samples during transport to the laboratory (Appendix C).

### 2.2.1 Slurry Sample Collection

In general, slurry samples were collected by placing a clean five-gallon plastic bucket into the discharge stream from the truck outlet piping and then digging directly into the slurry material with a stainless steel and/or disposable polyethylene sampling trowel and transferring the material directly into new clean glass sample jars and/or plastic containers with Teflon lined lids. If liquid samples were collected from the same bucket, solid material was allowed to settle to the bottom of the buckets prior to liquid sample collection. The setting time for each sample collected varied based on field conditions and visual observations.

In order to collect material that was representative of the waste produced, BAS personnel collected approximately 15-gallons of waste material discharge from each truck. Prior to discharge, the truck operator, as part of standard practice, typically "stirred" the tank with pressurized air to ensure the PCC grindings became entrained in solution and to prevent clogging of the discharge piping.

Photograph 6 in Appendix A shows a typical discharge pipe from a vacuum truck used to collect and transport the PCC waste. Photographs 7 and 8 show a typical off-site disposal site where the PCC waste was discharged into lined pits. Photograph 9 shows typical sample collection taking place.

### 2.2.2 Liquid Sample Collection

Liquid samples were collected prior to slurry samples by submerging the clean, laboratory supplied containers with appropriate preservative(s) below the surface of the liquid waste within the five-gallon buckets. All containers were immediately

labeled and placed in field coolers containing ice. All sample containers were filled completely with no head space to the best extent possible. Most samples were collected with little or no problem. However, in some instances the sample reacted with the preservatives resulting in the unavoidable presence of head space in some containers. This reaction was not determined by the analytical laboratory to have affected or compromised the samples. Samples were transported to the testing laboratory under COC protocol as described above.

## 2.3 SPECIFIC SITE SAMPLING

In order to accurately characterize the PCC waste, five liquid and five slurry samples were collected from five of the Department designated sites and two liquid and two slurry samples were collected from the sixth site. Frequency of sample collection for any particular site was determined in the field based on the quantity of PCC waste being generated, the disposal/recycling facility conditions, discharge procedures at the disposal/recycling facility, and input from the Department Task Order Manager. In general, sampling procedures were selected to represent the greatest amount of PCC waste being generated at the site. Whenever possible, each truck was sampled from the top entryways prior to discharge. If necessary, samples were collected from the discharge piping.

Site-specific relevant observations for each sample collection site for this study are provided below. Field logs included in Appendix B provide pertinent data taken for each site.

### 2.3.1 Interstate 15, District 8 – 10/26/2004

This sampling event was the initial field event for this project and knowledge gained was applied to later sampling activities. Specifically, it was determined, through consultation with the Department, that the initial sample collection strategy of collecting samples at the grinding site was not feasible due to the nature of the material. After repeated unsuccessful attempts to collect a representative slurry sample it was decided that sample collection at the grinding site was resulting in undo delays in the transport of the material to the disposal site and that these delays could impact the completion of the grinding project. As a result, a revised sampling strategy was developed where samples were collected from the discharge of the truck at the disposal site. This technique proved more successful. However,

because of the time that was expended in developing this sampling strategy only two samples could be collected during this event.

According to the Department representative on-site, the PCC pavement being ground during the sampling event was approximately twenty-five years old. No nearby potential contamination sources were identified at this location. The PCC grinder emitted some notable steam during the grinding process (Photograph 10) but the roadway was never saturated with water. Photograph 11 illustrates the typical depth and width of the grooves created by the grinding process at this site and is typical of all of the sites.

The slurry waste samples generated at this location were grey in color, slightly viscous, and warm (approximately 70° F). The slurry appeared slightly foamy and resembled dirty water. Sample material was obtained from the rear and side discharge piping from the trucks at the disposal site. Three five-gallon buckets of material were obtained for each sample collected. The liquid samples were collected from the decant of the bucket prior to collection of the slurry samples.

### 2.3.2 Interstate 5, District 3 – 11/01/2004

According to the Department representative on-site, the PCC pavement being ground at this location was approximately twenty years old. Concrete slab removal work was occurring adjacent to the grinding operation at the time waste was being generated. There were no indications that this work in any way impacted the sample collection efforts and/or could potentially impact the quality of the material being generated or the samples being collected.

The slurry waste samples generated at this location were grey-dark grey color,[1] slightly viscous, and warm (approximately 75° F). Sample material was obtained at the disposal site from hatch covers on the trucks transporting the material. Samples were collected by lowering new clean five-gallon buckets into the truck's holding tanks. The liquid samples were obtained first from the decant water from the bucket. Slurry samples were collected from the material remaining in the bucket following collection of liquid samples.

[1] Note: All color references were made in the field based on the observations of the on-site engineer/geologist and are subjective.

### 2.3.3 Interstate 5, District 7 – 11/05/2004

According to the contractor's representative on-site, the PCC pavement at this location was approximately 20 years old. No site conditions were observed that would be considered potential contaminant sources. The slurry waste samples generated at this location were grey-dark grey color, slightly viscous, and warm (approximately 80° F). Sample material was obtained from hatch covers on the trucks transporting the material to the disposal site. Three five-gallon buckets were used to obtain representative waste material by lowering the buckets into the holding tanks. The liquid samples were collected from the decant water within the bucket. Slurry samples were collected from the residual material within the bucket.

### 2.3.4 Route 101, District 7 – 11/18/2004 and 12/21/2004

According to the Department representative on-site, the PCC pavement at this location was approximately ten years old. This site had a fixed (for the duration of the job) on-site PCC waste disposal/recycling unit. Trucks collected waste material and discharged it directly to the unit which was equipped with a large centrifuge that separated the solid and liquid material. The liquid material was then filtered and reused on-site. The solid material was sent through a shaker machine (King Cobra Shaker) to separate the fine and coarse materials. The fine, medium, and coarse material was discharged directly into plastic-lined 20-yard metal open bins. Once the bins were full, they were dumped into piles on-site and spread to accelerate the drying process. The dried material was later collected and used in new concrete batches.

The slurry waste samples generated at this location were light-grey color, semi-viscous, and warmer than other sites (approximately 85-90° F). Sample material was obtained from a truck discharge hose prior to connection to the recycling equipment. Three five-gallon buckets of material were obtained from each truck and samples were pulled from this material. Liquid samples were collected first from the decant water within the buckets. Slurry samples were collected from the residual material within the buckets. Froth and foam was noted in the material being discharged from the trucks. According to the contractor, this was due to additives put into the system to prevent the centrifuge from clogging. When obtaining the liquid samples at this site, it was noted by field personnel that the samples reacted

with preservatives in some of the containers. It is speculated that the clogging prevention additive was the cause for this reaction.

The samples obtained for grain size analysis at this location came from the three soil bins holding the fine, medium, and coarse material. The finer material was soft, gelatinous, plastic-like, and almost dry to the touch. The medium and coarse material was more clayey with a larger grain size.

### 2.3.5 Interstate 10, District 8 – 1/19/2005

This site represented the final sampling event for the project. According to the Department representative on-site, the PCC pavement at this location was well over 10 years old. The grinding occurred in the High Occupancy Vehicle (HOV) lane of the westbound Interstate 10. No site conditions were noted that may have impacted the quality of the PCC waste or the samples collected. The PCC waste was transported to the Cemex Facility in Riverside, California where it was unloaded into a large plastic lined open pit (Photographs 12, 13, and 14). The PCC waste samples were collected from the trucks prior to dumping into the pit.

The slurry waste samples generated at this location were grey color, and slightly warm (approximately 65° F). Sample material was obtained from the first flush of discharge from the trucks at the disposal site. Three five-gallon buckets of material were obtained and samples were obtained from this material. Liquid samples were collected first from the decant water within the buckets. Slurry samples were collected from the residual material within the buckets.

## 2.4 ANALYTICAL TESTING

All collected samples were sent to Amerisci Labs of Los Angeles, California, a State certified laboratory, for analytical testing. All testing methods, sample names, sampling dates, and analytes tested for are illustrated in Table 1 for all samples. The testing results and COCs for all analyte testing performed are found within Appendix C. The first slurry and liquid samples at each site location were also analyzed for a supplemental list of analytes.

Representative samples of the liquid PCC waste were analyzed for:

**Analytical Testing for Liquid PCC Waste Samples**

| Standard Analyte List (All Liquid Samples) | Supplemental Analyte List (First Liquid Sample From Each Site) |
|---|---|
| CAM 17 Metals (EPA 6010/7000) | Pesticides/PCBs (EPA 8081/8082) |
| Chrome VI (EPA 218.6) | Fish Bio-Assay - Haz Waste Screen |
| pH (EPA 150.1) | Total Organic Halides (EPA 9020B) |
| TDS (EPA 160.1) | Total Organic Carbon (EPA 415.1) |
| Hardness (EPA 130.1) | Phenols (EPA 420.1) |
| Alkalinity (EPA 310.1) | Chloride (EPA 300.0) |
| TPH Carbon Chain (EPA 8015M) | Nitrate/nitrite (EPA 300) |
| Oil & Grease (EPA 413.1) | Sulfate (EPA 300) |
| VOCs (EPA 8260B) | Sulfide (EPA 376.2) |
| SVOCs (EPA 8270) | COD (EPA 410.4) |
| | TSS (EPA 160.2) |
| | Electrical Conductivity (EPA 120.1) |
| | Calcium (EPA 6010/200.7) |
| | Iron (EPA 6010/200.7) |
| | Phosphate (EPA 365.2) |
| | Phosphorus (EPA 365.2) |
| | Manganese, Magnesium, Potassium, Sodium, and Boron (EPA 6010) |

Representative samples of the solid PCC waste were analyzed for:

**Analytical Testing for Slurry PCC Waste Samples**

| Standard Analyte List (All Slurry/Solid Samples) | Supplemental Analyte List (First Slurry/Solid Sample From Each Site) |
|---|---|
| CAM 17 Metals (EPA 6010/7000) | Pesticides/PCBs (EPA 8081/8082) |
| Chrome VI (EPA 7196) | Chloride (EPA 300.0) |
| pH (EPA 150.1) | Nitrate/nitrite (EPA 300) |
| TPH Carbon Chain (EPA 8015M) | Sulfate (EPA 300) |
| Oil & Grease (EPA 9071B) | Iron (6010/200.7) |
| VOCs (EPA 8260B) | Phosphate (EPA 365.2) |
| SVOCs (EPA 8270) | Aluminum (EPA 6010) |
| | Grain Size Analysis (Gravel - Clay, w/ Hydrometer -ASTM D 422) |

When necessary, given holding time restrictions, certain samples were analyzed by other state-certified laboratories. In addition to the analytical testing listed above, if a total concentration analytical result yielded a total concentration numerically in excess of ten times its established Soluble Threshold Limit Concentration (STLC)

and/or Toxicity Characteristic Leaching Potential (TCLP), leachability testing was performed. Results of analytical testing are included in Appendix C, and discussed in detail in Section 3.0.

All slurry samples were sent to GeoLogic Associates Laboratory of Diamond Bar, California for grain size analyses using ASTM D 422. Twelve (12) approximately 10-pound bags of solid grinding waste were sent to an independent lab, two (2) bags per sampling site location. All samples obtained for these analyses were obtained as composite samples from all available sources at each site location. Analyses and graphs from these data are included in Appendix E.

# SECTION 3.0

# SAMPLING RESULTS

# 3.0 SAMPLING RESULTS

The following sections present the results of the sampling and analysis activities described in Section 2.0. The discussions focus on the results obtained through laboratory analysis of the liquid and slurry samples and statistical analysis of the testing results.

## 3.1 ANALYTICAL TESTING RESULTS

Chemical laboratory analyses of liquid and slurry samples collected for this study were performed primarily by AmeriSci, a state-certified analytical laboratory, located in Los Angeles, California. In addition, certain analyses were also performed by Sequoia Analytical of Sacramento; Aquatic Bioassay and Consulting Laboratories, Inc. of Ventura; Advanced Technologies Laboratories of Signal Hill; and Associated Laboratories of Orange, California. All of these laboratories are state-certified analytical laboratories. Copies of the chemical analyses laboratory reports are included in Appendix C. Results of chemical analytical testing of the collected samples are summarized in Tables 1, 2 (A and B), and 3 (A and B).

Grain size analyses for slurry samples were performed by GeoLogic Associates, Inc. (GLA). Results of physical analytical testing of composited slurry samples are summarized in Table 4, with complete GLA laboratory reports included in Appendix D.

### 3.1.1 Liquid Analytical Testing Results

As presented in Table 1, all 27 liquid samples were analyzed for four general chemistry parameters, CAM 17 Metals, hexavalent chromium, petroleum hydrocarbons, and volatile and semi-volatile organics. Results of these primary analyses are presented in Table 2A. In addition, one sample from each sampling event was analyzed for supplemental general chemistry parameters, pesticides and PCBs. Results of the supplemental analyses only are presented in Table 2B.

Primary General Chemistry Parameters

As presented in Table 2A, pH of collected liquid samples ranged from 9.4 to 12.1. Only minor variations in pH levels were measured between samples collected during different sampling events, as well as in between samples collected from the same event. Within samples collected during the same sampling event, the most variation in pH level was measured in the samples collected from District 7, Highway 101, on December 21, 2004. The least variability was observed in samples collected in District 8 on Interstate 15 on October 26, 2004, and in District 3 on Interstate 5 on November 1, 2004.

Hardness of collected liquid samples ranged from 240 mg/L to 2,000 mg/L. Greater variations were observed in hardness levels than in pH levels, both between and within events. Hardness levels calculated for samples collected from District 7 on Highway 101 on December 21, 2004, were significantly elevated compared to levels for other sampling sites, although not statistically[1] different from results of sampling at the same location on November 18, 2004.

It should be noted that results of hardness testing could be greatly affected by the source water used in the grinding process.

Levels of total dissolved solids (TDS) in the collected liquid samples varied from 440 mg/L to 5,400 mg/L. Similar to hardness, significant variations in concentrations were observed, especially for samples collected from different sampling events. TDS levels for samples collected from District 3 on Interstate 5 on November 1, 2004, and District 8 on Interstate 10 on January 10, 2005, are significantly lower than concentrations measured for the rest of the samples.

Among the collected liquid samples, alkalinity concentrations ranged from 48 mg/L to 30,000 mg/L. Even more so than the TDS levels, alkalinity varied greatly between samples collected on the same day, as well as samples collected from different sampling events. Nonetheless, alkalinity levels measured for samples collected in District 7 on Interstate 5 on November 5, 2004, were substantially elevated compared to the rest of the collected samples.

[1] Statistical data evaluation is discussed in Section 3.2

Supplemental General Mineral Parameters

As presented in Table 2B, with the exception of sulfide, which was not detected above its PQL in any of the samples, all other supplemental analytes were detected in at least one sample. Ortho-phosphate and manganese were detected above their respective laboratory practical quantitation limits (PQLs) in only one sample each. With the exception of phenols, the concentrations of which were similar between all samples, the levels of other analytes varied greatly between sampling events.

None of the liquid samples used for fish bio-assay testing resulted in fish mortality.

Metals

No detectable concentrations of silver or beryllium were determined to be present in any of the collected liquid samples. Similarly, with the exception of only two samples (collected from different sites), levels of antimony and thallium were below their respective laboratory PQL in all of the collected liquid samples. Conversely, detectable levels of barium, total chromium, vanadium and zinc were found in all of the collected samples. With only a few exceptions, detectable levels of arsenic, cobalt, copper, nickel, selenium and hexavalent chromium were also present in the majority of liquid samples. The remaining analytes were detected in some, but not a majority of the samples above their respective PQLs.

As with general mineral analytes, metal concentrations varied both between and within sampling events. These variations are considered to be reflective of variations in natural cement composition, as well as variations in the water used in the grinding process.

Relative concentration of hexavalent to total chromium ranged from less than 1% to more than 150% in liquid samples. The latter ratio is considered to be an outlier[2], without which concentrations of hexavalent chromium reach up to 65% of total chromium levels. In samples collected from District 3 on Interstate 5 on November 1, 2004, and District 7 on Interstate 5 on November 5, 2004, this ratio was less than

[2] Due to significant differences associated with analytical methodology used for total chromium (acid digestion, ICP analysis) and hexavalent chromium (WET extraction, UV analysis), as well as low levels at which both analytes were detected, a ratio of concentrations greater than 100% is not of concern.

15%, although total chromium levels in the November 1, 2004, samples were somewhat higher than for samples collected during other events. These results indicate that hexavalent chromium concentrations can not be predicted by the total chromium levels.

Organic Constituents

As presented in Table 2A, no detectable concentrations of Total Petroleum Hydrocarbons (TPH) of gasoline, diesel or oil ranges were found in any of the liquid samples. Minor concentrations of Oil & Grease were detected in 18 out of 27 collected samples.

With the exception of several detections of chloroform and 1,2,4-trimethylbenzene (TMB) in several samples, no other VOCs were detected in the majority of collected liquid samples. With one exception, all detections of both chloroform and 1,2,4-TMB were measured in samples collected in District 3 on Interstate 5 on November 1, 2004.

Similar to VOC detections, only a handful of semi-volatile compounds were detected in the collected liquid samples. Benzoic acid was detected in 5 samples, benzyl alcohol in three samples, phenol in two samples, n-nitroso-di-n-propylamine and 2-nitrophenol in one sample each.

As presented in Table 2B, neither organochlorine pesticides nor PCBs were detected in any of the liquid samples analyzed for these parameters.

### 3.1.2 Slurry Analytical Testing Results

As presented in Table 1, all 27 slurry samples were analyzed for pH, CAM 17 Metals, hexavalent chromium, petroleum hydrocarbons, and volatile and semi-volatile organics. Results of these primary analyses are presented in Table 3A. In addition, one sample from each sampling location was analyzed for supplemental general chemistry parameters, pesticides and PCBs. Results of the supplemental analyses are presented in Table 3B. A slurry composite for each sampling location was analyzed for grain size distribution, results of which are presented in Table 4.

General Chemistry Parameters

As presented in Table 3A, pH of collected slurry samples ranged from 9.3 to 11.8. Similar to liquid samples, only minor variations in pH levels were measured between samples collected during different sampling events, as well as in between samples collected from the same event. With regard to samples collected during the same sampling event, the most variations in pH levels were measured during the event in District 8 on Interstate 10 on January 19, 2005. The least variability was measured in samples collected in District 8, on Interstate 15 on October 26, 2004, and in District 3 on Interstate 5 on November 1, 2004, which is the same as for liquid samples. In general, pH of slurry samples was slightly lower than that of liquid samples.

Similarly to the liquid samples, and as presented in Table 3B, no orthophosphate was detected above its PQL in any of the slurry samples analyzed. With regard to the remaining general mineral parameters, a great variability was measured in all analytes, as was the case with the liquid samples.

Grain Size Analyses

100 percent of all grains tested passed the #4 sieve size with the largest grain size obtained appearing just before the #8 sieve size. The grain size decreases approximately logarithmically at a rate of 0.1 mm per 10 percent decrease. Approximately 5 – 10% (by weight) of the material passes the #200 sieve size. Each sieve test by shaker machine took approximately 1440 minutes (24 hours).

Metals

In general, detections of metal analytes in slurry samples were similar to those detected in liquid samples, although PQLs for some slurry samples were elevated due to significant matrix interferences, such as high buffering capacity of several samples, which affected sample preparation (acid digestion).

As shown on Table 3A, no detectable concentrations of silver or beryllium were determined to be present in any of the collected slurry samples. In addition, cadmium, mercury and thallium were likewise undetected in all of the slurry samples. Also similar to liquid samples, antimony was undetected in all slurry

samples, but one. Unlike the liquid samples, arsenic and selenium, were undetected in a majority of slurry samples, whereas the same analytes were detected in a majority of liquid samples. It is therefore possible that detections of arsenic and selenium in liquid samples are attributable to the water used in the grinding process rather than the PCC itself.

Barium and zinc were found above their respective PQLs in all slurry samples. The remaining analytes were found in the majority of collected samples.

Among all metal analytes, only one sample, PCC-08-010-S-2 collected from District 8 on Interstate 10 on January 19, 2005, exceeded 10-times the STLC[3] value for lead. In addition, sample PCC-03-005-S-1 collected from District 3 on Interstate 5 on November 1, 2004 exceeded 10-times the TCLP[4] value for total chromium. None of the remaining samples exceeded any of the respective TTLC[5], STLC or TCLP values, as shown in Table 3A. Results of STLC analysis of sample PCC-08-010-S-2 for lead and TCLP analysis of sample PCC-03-005-S-1 for chromium showed no detectable levels of either analyte.

The relative concentration of hexavalent to total chromium in slurry samples ranged from less than 1% to just over 10% in slurry samples. These ratios are significantly lower than for liquid samples. In samples collected from District 7 on Interstate 5 on November 5, 2004, and District 8 on Interstate 15 on October 26, 2004, hexavalent chromium was not detected above the laboratory PQL. These results are consistent with the fact that hexavalent chromium compounds are significantly more soluble than other chromium compounds.

Organic Constituents

As presented in Table 3A, no detectable concentrations of Total Petroleum Hydrocarbons (TPH) of gasoline or diesel ranges were found in any of the slurry samples. Detectable concentrations of TPH-oil were found in several samples, while Oil & Grease was detected in 25 out of 27 collected samples.

[3] California Soluble Threshold Limit Concentration
[4] Federal Toxicity Characteristic Leaching Potential
[5] California Total Threshold Limit Concentration

With the exception of one detection of 1,3,5-TMB and several of 1,2,4-TMB in several samples, no other VOCs were detected in the majority of collected slurry samples. With one exception, all detections of both TMBs were measured in samples collected from District 3 on Interstate 5 on November 1, 2004, which was also the case for detection of 1,2,4-TMB in liquid samples. Comparison of data sets for liquid and slurry samples collected from the District 3 location on November 1, 2004, indicates that the source of these compounds was most likely water used in the grinding operation.

Minor levels of bis(2-ethylhexyl)phthalate [or di(2-ethylhexyl)phthalate, DEHP] were detected in several slurry samples. A common plasticizer, DEHP could have been derived from PCC components or hosing used in the grinding operation.

As presented in Table 3B, PCBs were not detected in any of the slurry samples analyzed. Minor concentrations of two organochlorine pesticides, 4,4-DDD and d-BHC, were detected in slurry samples collected on December 21, 2004 and January 19, 2005, respectively. Concentration of 4,4-DDD was significantly below the respective TTLC and STLC levels, as shown in Table 3B.

## 3.2 STATISTICAL DATA EVALUATION

The data described above was reviewed and evaluated for statistical significance. The statistical evaluation was based on the following criteria:

- Statistical evaluations were performed on the complete data set for each target analyte from all sampling events. No calculations were performed for individual sites / sampling events.
- Statistical evaluations were not performed for analytes where all results were reported as non-detected.
- Statistical evaluations were not performed for analytes where less than five (5) samples had detected concentrations.
- For analytes where the data set included both detected and non-detected (i.e. below laboratory PQL) concentrations, the full laboratory PQL value was used in the data evaluation as the analytical result for samples with non-detected results.
- For analytes where the data set included both detected and non-detected (i.e. below laboratory PQL) concentrations, AND the PQL values were significantly

elevated when compared to the actual detected concentrations, the non-detected data points were excluded from the statistical evaluation.

- Statistical evaluations were not performed for analytes that were tested for, or detected in, only a small number of samples AND the range of detected values varied over an order of magnitude between minimum and maximum (Note: this applied mostly to compounds on the extended analyte lists)

As presented in Tables 4A and 4B, the majority of the target analytes from the primary analyte lists for both liquid and slurry samples were subjected to statistical evaluation. However, only a limited number of analytes from the extended lists, for both liquid and slurry samples, were evaluated.

Once the data sets were selected, they were initially evaluated for normality using the Shapiro-Wilk method, as provided by the Analyze-it for Excel software package. The results of this evaluation are provided in Appendix D and summarized in Tables 4A and 4B.

As presented in Appendix D and Tables 4A and 4B, not all of the data sets were determined to configure to a normal distribution. A Shapito-Wilk coefficient of 0.9 or higher was used as a threshold value in determining whether a data set was normally distributed. As presented in Tables 4A and 4B, the only data sets that met this criterion were the pH data set for both liquid and slurry samples, the cobalt data set for liquid samples, and the sulfate data set for slurry samples.

As a result, the majority of both the liquid and slurry analyte data sets were defined as non-parametric distributions and tested by the Bootstrap method, a variation of the Monte Carlo technique, as provided by the Excel Modeling VBA software set. The results of these evaluations are also provided in Appendix D and summarized in Tables 4A and 4B.

Results of the statistical evaluations determined that the pH of the liquid waste stream from Department PCC grinding operations is anticipated, with 95% confidence, to be between 10.78 and 11.26, with a mean of 11.0. This indicates that, with 95% confidence, liquid PCC waste will not constitute a hazardous waste stream. In addition, the following constituents are anticipated to be present in the liquid waste from Department PCC grinding operations: arsenic, barium, cobalt,

chromium, copper, mercury, molybdenum, nickel, lead, selenium, vanadium, zinc, hexavalent chromium, oil & grease and a variety of other general mineral constituents. The data and statistical evaluations furthermore indicated that the liquid waste from Department PCC grinding operations is not anticipated to contain detectable concentrations of silver, beryllium, cadmium, antimony, thallium, sulfide, ortho-phosphate, petroleum hydrocarbons, VOCs, SVOCs, pesticides or PCBs.

The pH of slurry waste generated during Department PCC grinding operations is predicted, with 95% confidence, to be between 10.48 and 10.92, with a mean of 10.7, which is slightly lower than the liquid waste. Although numerous heavy metal constituents were detected in the slurry samples, only barium, cobalt, chromium, copper, molybdenum, nickel, lead, selenium, vanadium, zinc and hexavalent chromium are anticipated to be consistently detected in the slurry waste from Department PCC grinding operations, and none are anticipated to be present at concentrations in excess of applicable Federal and State hazardous waste standards. In addition to these heavy metals constituents, the slurry waste is anticipated to contain detectable levels of TPH-oil, oil & grease, chloride, nitrate, sulfate, iron and aluminum. The data and statistical evaluations furthermore indicate that slurry waste for Department PCC grinding operations are not anticipated to contain detectable concentrations of silver, arsenic, beryllium, cadmium, antimony, thallium, ortho-phosphate, gasoline or diesel range petroleum hydrocarbons, VOCs, SVOCs, pesticides, or PCBs.

# SECTION 4.0

# CONCLUSIONS

# 4.0 CONCLUSIONS

Based on the results of the sampling, testing, and data analysis efforts described in the previous sections, the following conclusions can be made with regard to the nature of PCC waste being generated through Department grinding operations conducted throughout the state:

- The detected concentrations of inorganic parameters in both liquid and slurry samples varied between the locations tested and in some cases within a single grinding project. As a result, it is difficult to predict with certainty the exact inorganic chemistry characteristics that would be typical of the PCC waste. However, generally speaking, both the liquid and slurry waste have pH levels of 10 or higher, which are basic but non-hazardous, and detectable, but non-hazardous levels of heavy metals and other inorganic parameters. The most frequently detected heavy metals in liquid samples were arsenic, barium, chromium, cobalt, copper, nickel, selenium, vanadium, and zinc. Silver, beryllium, cadmium, antimony, and thallium were found in fewer than half of the liquid samples. Heavy metals concentrations in slurry samples were detected but inconclusive due to elevated detection limits for some of the samples. However, the most frequently detected heavy metals in slurry samples were barium, cobalt, chromium, copper, molybdenum, nickel, lead, vanadium, and zinc. Silver, arsenic, beryllium, cadmium, mercury, antimony, selenium, and thallium were detected only sporadically, if at all, in slurry samples.

- Chromium and hexavalent chromium were found to be ubiquitous throughout the liquid samples as well as in many of the slurry samples. None of the detected concentrations were at hazardous levels.

- Total petroleum hydrocarbons as gasoline, diesel and oil were at non-detectable levels in almost all liquid and slurry samples. However, detectable levels of oil & grease were consistently detected. The presence of oil and grease is not unexpected given the source of the PCC grinding waste even though no pronounced staining of the PCC pavement was noted in the field observations.

- Volatile and semi-volatile organic compounds were detected only sporadically and at relatively low concentrations. No discernible trends could be identified in these detections, which are thought to be specific to individual sites and not associated with

PCC waste in general. The most frequently detected semi-volatile compound was bis(2-ethylhexyl)phthalate, which is a common laboratory contaminant.

- Organochlorine pesticides and PCBs were generally at non-detectable levels in both liquid and slurry samples with few exceptions.

Based on these results, PCC waste is not considered hazardous and disposal of these wastes can be done at appropriately licensed non-hazardous waste disposal sites or recycling facilities. Tables 4A and 4B provide a statistical summary of the results of all of the analyses performed as part of this Supplemental Study. The information included in these tables can be provided to Department contractors, sub-contractors, and/or disposal facilities to demonstrate the typical chemical composition of PCC waste from Department grooving or grinding operations.

It should be noted that these results are typical of waste generated within Department rights-of-way where no significant near-site or on-site contaminant sources exist. In cases where a notable potential contaminant source is identified near a grooving or grinding operation, additional sampling may be necessary to eliminate the possibility of impacts related to that condition. Examples of potential contaminant sources that may affect the characteristics of the PCC grinding waste include, but are not limited to, any of the following types of facilities or activities that through their location or orientation may allow for accidental or intentional discharges onto the Department right-of-way where the grinding operations are occurring.

- Industrial facilities that manufacture, store, use, or dispose of significant quantities of chemicals,
- Major petroleum refineries, or processing and storage facilities,
- Major industrial or hazardous waste processing, storage, or disposal facilities,
- Sites currently under investigation and/or subject to clean-up and abatement orders issued by the United States Environmental Protection Agency, the California Environmental Protection Agency, the California Department of Toxic Substances Control, any of the California Regional Water Quality Control Boards, or any local enforcement agency.

# ATTACHMENT D

# CALIFORNIA LABORATORY SERVICES

**3249 Fitzgerald Road Rancho Cordova, CA 95742**


August 14, 2013

**CLS Work Order #: CWH0398**
**COC #: 149240**

Travis Brandt
Diversified Concrete Cutting
59 Coney Island Dr.
Sparks, NV -

**Project Name: Soil Sampling**

Enclosed are the results of analyses for samples received by the laboratory on 08/09/13 09:00. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D.
Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233

# CALIFORNIA LABORATORY SERVICES



08/14/13 16:08

| | | |
|---|---|---|
| Diversified Concrete Cutting | Project: Soil Sampling | |
| 59 Coney Island Dr. | Project Number: [none] | **CLS Work Order #: CWH0398** |
| Sparks, NV - | Project Manager: Travis Brandt | COC #: 149240 |

CLS - Labs

CHAIN OF CUSTODY

CLS ID No.: CWH0398 LOG NO. 149240

REPORT TO:

NAME AND ADDRESS: Diversified Concrete Cutting, 59 Coney Island Dr. Sparks NV

PROJECT MANAGER: Travis Brandt PHONE: 775-342-8885

PROJECT NAME:

SAMPLED BY:

JOB DESCRIPTION:

SITE LOCATION:

CLIENT JOB NUMBER:

DESTINATION LABORATORY:

☐ CLS (916) 638-7301
3249 FITZGERALD RD.
RANCHO CORDOVA, CA.
95742

☐ OTHER

PRESERVATIVES: Cool, Ice

ANALYSIS REQUESTED

GEOTRACKER:
EDF REPORT ☐ YES ☐ NO
GLOBAL ID:

COMPOSITE:

FIELD CONDITIONS:

TURN AROUND TIME: 1 DAY, 2 DAY, 3 DAY, 5 DAY

SPECIAL INSTRUCTIONS OR ALT. ID:

| DATE | TIME | SAMPLE IDENTIFICATION | MATRIX | CONTAINER NO | CONTAINER TYPE | | | 5 DAY |
|---|---|---|---|---|---|---|---|---|
| 8/8/13 | | Solid | solid | 1 | Jar | X | X | ✓ |
| 8/8/13 | | Slurry | w/solids | 1 | Jar | X | X | ✓ |

INVOICE TO:

P.O. #

QUOTE #

SUSPECTED CONSTITUENTS:

PRESERVATIVES: (1) HCl, (2) HNO3, (3) = COOL, (4) = NaOH, (5) = H2SO4, (6) = Na2S2O3, (7) =

| RELINQUISHED BY (SIGN) | PRINT NAME / COMPANY | DATE / TIME | RECEIVED BY (SIGN) | PRINT NAME / COMPANY |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

RECEIVED AT LAB BY:

DATE / TIME: 8/9/13 0900

CONDITIONS / COMMENTS: RC

SHIPPED BY: ☐ FED X ☐ UPS ☐ OTHER

AIR BILL #

08/14/13 16:08

# CALIFORNIA LABORATORY SERVICES

| | | |
|---|---|---|
| Diversified Concrete Cutting | Project: Soil Sampling | |
| 59 Coney Island Dr. | Project Number: [none] | **CLS Work Order #: CWH0398** |
| Sparks, NV - | Project Manager: Travis Brandt | COC #: 149240 |

## CHANGE OF STATUS

CLS Labs Job # CWH0398

Project Name: SOIL SAMPLES

Date Sample(s) Were Received: 8/5/13 Original Date 8/16/13

TRAVIS BRANDT (Client Contacted) of DIVERSIFIED CONCRETE (Company)

on 8/13/13 (Date) at 1510 hrs (Time).

... and requested the following:

CHANGE TAT TO 3 DAY.

Turnaround time requested for additional work: _____

(Signature) 8/13/13 (Date)

Updated lab job database and file folder by: 8/13/13

Cc: DEBBIE

H:\Will\Orallana\ChangeOfStatus.Doc

# CALIFORNIA LABORATORY SERVICES



08/14/13 16:08

Diversified Concrete Cutting
59 Coney Island Dr.
Sparks, NV -

Project: Soil Sampling
Project Number: [none]
Project Manager: Travis Brandt

**CLS Work Order #: CWH0398**
COC #: 149240

## CAM 17 Metals

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Solid (CWH0398-01) Soil Sampled: 08/08/13 00:00 Received: 08/09/13 09:00** | | | | | | | | | |
| **Arsenic** | **8.7** | 1.0 | mg/kg | 10 | CW05270 | 08/13/13 | 08/13/13 | EPA 6020/7000 | |
| Selenium | ND | 2.5 | " | " | " | " | " | " | |
| Thallium | ND | 1.0 | " | " | " | " | " | " | |
| Antimony | ND | 2.5 | " | 1 | CW05268 | 08/13/13 | 08/14/13 | EPA 6010B | |
| **Barium** | **390** | 1.0 | " | " | " | " | " | " | |
| **Beryllium** | **0.66** | 0.50 | " | " | " | " | " | " | |
| **Cadmium** | **0.68** | 0.50 | " | " | " | " | " | " | |
| **Cobalt** | **13** | 1.0 | " | " | " | " | " | " | |
| **Chromium** | **22** | 1.0 | " | " | " | " | " | " | |
| **Copper** | **28** | 1.0 | " | " | " | " | " | " | |
| **Lead** | **13** | 2.5 | " | " | " | " | " | " | |
| Molybdenum | ND | 1.0 | " | " | " | " | " | " | |
| **Nickel** | **17** | 1.0 | " | " | " | " | " | " | |
| Silver | ND | 0.50 | " | " | " | " | " | " | |
| **Vanadium** | **55** | 1.0 | " | " | " | " | " | " | |
| **Zinc** | **70** | 1.0 | " | " | " | " | " | " | |
| Mercury | ND | 0.10 | " | " | CW05273 | 08/13/13 | 08/13/13 | EPA 7471A | |
| **Slurry (CWH0398-02) Sludge Sampled: 08/08/13 00:00 Received: 08/09/13 09:00** | | | | | | | | | |
| **Arsenic** | **5.4** | 1.0 | mg/kg | 10 | CW05270 | 08/13/13 | 08/13/13 | EPA 6020/7000 | |
| Selenium | ND | 2.5 | " | " | " | " | " | " | |
| Thallium | ND | 1.0 | " | " | " | " | " | " | |
| Antimony | ND | 2.5 | " | 1 | CW05268 | 08/13/13 | 08/14/13 | EPA 6010B | |
| **Barium** | **270** | 1.0 | " | " | " | " | " | " | |
| Beryllium | ND | 0.50 | " | " | " | " | " | " | |
| Cadmium | ND | 0.50 | " | " | " | " | " | " | |
| **Cobalt** | **19** | 1.0 | " | " | " | " | " | " | |
| **Chromium** | **10** | 1.0 | " | " | " | " | " | " | |
| **Copper** | **24** | 1.0 | " | " | " | " | " | " | |
| **Lead** | **4.7** | 2.5 | " | " | " | " | " | " | |
| **Molybdenum** | **4.3** | 1.0 | " | " | " | " | " | " | |

| | | |
|---|---|---|
| Diversified Concrete Cutting | Project: Soil Sampling | |
| 59 Coney Island Dr. | Project Number: [none] | **CLS Work Order #: CWH0398** |
| Sparks, NV - | Project Manager: Travis Brandt | COC #: 149240 |

## CAM 17 Metals

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Slurry (CWH0398-02) Sludge** | **Sampled: 08/08/13 00:00** | **Received: 08/09/13 09:00** | | | | | | | |
| **Nickel** | **26** | 1.0 | mg/kg | 1 | CW05268 | " | 08/14/13 | EPA 6010B | |
| Silver | ND | 0.50 | " | " | " | " | " | " | |
| **Vanadium** | **20** | 1.0 | " | " | " | " | " | " | |
| **Zinc** | **25** | 1.0 | " | " | " | " | " | " | |
| Mercury | ND | 0.10 | " | " | CW05273 | 08/13/13 | 08/13/13 | EPA 7471A | |

| | | |
|---|---|---|
| Diversified Concrete Cutting | Project: Soil Sampling | |
| 59 Coney Island Dr. | Project Number: [none] | **CLS Work Order #: CWH0398** |
| Sparks, NV - | Project Manager: Travis Brandt | COC #: 149240 |

## Conventional Chemistry Parameters by APHA/EPA Methods

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Solid (CWH0398-01) Soil Sampled: 08/08/13 00:00 Received: 08/09/13 09:00** | | | | | | | | | |
| **pH** | **8.87** | 1.00 | pH Units | 1 | CW05217 | 08/09/13 | 08/09/13 | EPA 9045C | |
| **Slurry (CWH0398-02) Sludge Sampled: 08/08/13 00:00 Received: 08/09/13 09:00** | | | | | | | | | |
| **pH** | **11.50** | 1.00 | pH Units | 1 | CW05217 | 08/09/13 | 08/09/13 | EPA 9045C | |

| | | |
|---|---|---|
| Diversified Concrete Cutting | Project: Soil Sampling | |
| 59 Coney Island Dr. | Project Number: [none] | **CLS Work Order #: CWH0398** |
| Sparks, NV - | Project Manager: Travis Brandt | COC #: 149240 |

## CAM 17 Metals - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch CW05268 - EPA 3050B** | | | | | | | | | | |
| **Blank (CW05268-BLK1)** | | | | Prepared & Analyzed: 08/13/13 | | | | | | |
| Antimony | ND | 2.5 | mg/kg | | | | | | | |
| Barium | ND | 1.0 | " | | | | | | | |
| Beryllium | ND | 0.50 | " | | | | | | | |
| Cadmium | ND | 0.50 | " | | | | | | | |
| Cobalt | ND | 1.0 | " | | | | | | | |
| Copper | ND | 1.0 | " | | | | | | | |
| Lead | ND | 2.5 | " | | | | | | | |
| Molybdenum | ND | 1.0 | " | | | | | | | |
| Nickel | ND | 1.0 | " | | | | | | | |
| Silver | ND | 0.50 | " | | | | | | | |
| Vanadium | ND | 1.0 | " | | | | | | | |
| Zinc | ND | 1.0 | " | | | | | | | |
| **LCS (CW05268-BS1)** | | | | Prepared & Analyzed: 08/13/13 | | | | | | |
| Antimony | 24.7 | 2.5 | mg/kg | 25.0 | | 99 | 75-125 | | | |
| Barium | 25.5 | 1.0 | " | 25.0 | | 102 | 75-125 | | | |
| Beryllium | 24.7 | 0.50 | " | 25.0 | | 99 | 75-125 | | | |
| Cadmium | 23.0 | 0.50 | " | 25.0 | | 92 | 75-125 | | | |
| Cobalt | 24.6 | 1.0 | " | 25.0 | | 98 | 75-125 | | | |
| Copper | 25.2 | 1.0 | " | 25.0 | | 101 | 75-125 | | | |
| Lead | 21.8 | 2.5 | " | 25.0 | | 87 | 75-125 | | | |
| Molybdenum | 24.8 | 1.0 | " | 25.0 | | 99 | 75-125 | | | |
| Nickel | 24.6 | 1.0 | " | 25.0 | | 98 | 75-125 | | | |
| Silver | 24.3 | 0.50 | " | 25.0 | | 97 | 75-125 | | | |
| Vanadium | 12.4 | 1.0 | " | 12.5 | | 99 | 75-125 | | | |
| Zinc | 24.3 | 1.0 | " | 25.0 | | 97 | 75-125 | | | |
| **Matrix Spike (CW05268-MS1)** | **Source: CWH0494-01** | | | Prepared & Analyzed: 08/13/13 | | | | | | |
| Antimony | 10.1 | 2.5 | mg/kg | 25.0 | ND | 40 | 75-125 | | | QM-5 |
| Barium | 220 | 1.0 | " | 25.0 | 95.3 | 500 | 75-125 | | | QM-5 |
| Beryllium | 22.4 | 0.50 | " | 25.0 | 0.441 | 88 | 75-125 | | | |
| Cadmium | 21.0 | 0.50 | " | 25.0 | 0.320 | 83 | 75-125 | | | |

Diversified Concrete Cutting
59 Coney Island Dr.
Sparks, NV -

Project: Soil Sampling
Project Number: [none]
Project Manager: Travis Brandt

**CLS Work Order #: CWH0398**
COC #: 149240

## CAM 17 Metals - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch CW05268 - EPA 3050B** | | | | | | | | | | |
| **Matrix Spike (CW05268-MS1)** | | **Source: CWH0494-01** | | Prepared & Analyzed: 08/13/13 | | | | | | |
| Cobalt | 28.7 | 1.0 | mg/kg | 25.0 | 6.75 | 88 | 75-125 | | | |
| Copper | 38.0 | 1.0 | " | 25.0 | 15.5 | 90 | 75-125 | | | |
| Lead | 29.2 | 2.5 | " | 25.0 | 25.4 | 15 | 75-125 | | | QM-5 |
| Molybdenum | 20.6 | 1.0 | " | 25.0 | 0.635 | 80 | 75-125 | | | |
| Nickel | 38.9 | 1.0 | " | 25.0 | 18.1 | 83 | 75-125 | | | |
| Silver | 21.6 | 0.50 | " | 25.0 | 0.180 | 86 | 75-125 | | | |
| Vanadium | 38.2 | 1.0 | " | 12.5 | 31.5 | 53 | 75-125 | | | QM-5 |
| Zinc | 54.4 | 1.0 | " | 25.0 | 33.0 | 85 | 75-125 | | | |
| **Matrix Spike Dup (CW05268-MSD1)** | | **Source: CWH0494-01** | | Prepared & Analyzed: 08/13/13 | | | | | | |
| Antimony | 9.87 | 2.5 | mg/kg | 25.0 | ND | 39 | 75-125 | 3 | 30 | QM-5 |
| Barium | 178 | 1.0 | " | 25.0 | 95.3 | 330 | 75-125 | 21 | 30 | QM-5 |
| Beryllium | 22.1 | 0.50 | " | 25.0 | 0.441 | 87 | 75-125 | 1 | 30 | |
| Cadmium | 20.8 | 0.50 | " | 25.0 | 0.320 | 82 | 75-125 | 0.9 | 30 | |
| Cobalt | 28.2 | 1.0 | " | 25.0 | 6.75 | 86 | 75-125 | 2 | 30 | |
| Copper | 37.2 | 1.0 | " | 25.0 | 15.5 | 87 | 75-125 | 2 | 30 | |
| Lead | 27.6 | 2.5 | " | 25.0 | 25.4 | 9 | 75-125 | 6 | 30 | QM-5 |
| Molybdenum | 20.2 | 1.0 | " | 25.0 | 0.635 | 78 | 75-125 | 2 | 30 | |
| Nickel | 37.4 | 1.0 | " | 25.0 | 18.1 | 77 | 75-125 | 4 | 30 | |
| Silver | 21.5 | 0.50 | " | 25.0 | 0.180 | 85 | 75-125 | 0.7 | 30 | |
| Vanadium | 39.3 | 1.0 | " | 12.5 | 31.5 | 62 | 75-125 | 3 | 30 | QM-5 |
| Zinc | 53.8 | 1.0 | " | 25.0 | 33.0 | 83 | 75-125 | 1 | 30 | |
| **Batch CW05270 - EPA 3050B** | | | | | | | | | | |
| **Blank (CW05270-BLK1)** | | | | Prepared & Analyzed: 08/13/13 | | | | | | |
| Arsenic | ND | 0.10 | mg/kg | | | | | | | |
| Selenium | ND | 0.25 | " | | | | | | | |
| Thallium | ND | 0.10 | " | | | | | | | |
| Chromium | ND | 0.10 | " | | | | | | | |

# CALIFORNIA LABORATORY SERVICES

08/14/13 16:08

| | | |
|---|---|---|
| Diversified Concrete Cutting | Project: Soil Sampling | |
| 59 Coney Island Dr. | Project Number: [none] | **CLS Work Order #: CWH0398** |
| Sparks, NV - | Project Manager: Travis Brandt | COC #: 149240 |

## CAM 17 Metals - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch CW05270 - EPA 3050B** | | | | | | | | | | |
| **LCS (CW05270-BS1)** | | | | Prepared & Analyzed: 08/13/13 | | | | | | |
| Arsenic | 4.61 | 0.10 | mg/kg | 5.00 | | 92 | 75-125 | | | |
| Selenium | 4.32 | 0.25 | " | 5.00 | | 86 | 75-125 | | | |
| Thallium | 5.12 | 0.10 | " | 5.00 | | 102 | 75-125 | | | |
| Chromium | 4.91 | 0.10 | " | 5.00 | | 98 | 75-125 | | | |
| **Matrix Spike (CW05270-MS1)** | | **Source: CWH0494-01** | | Prepared & Analyzed: 08/13/13 | | | | | | |
| Arsenic | 12.2 | 1.0 | mg/kg | 5.00 | 7.99 | 85 | 75-125 | | | |
| Selenium | 4.31 | 2.5 | " | 5.00 | 0.275 | 81 | 75-125 | | | |
| Thallium | 5.90 | 1.0 | " | 5.00 | 0.0850 | 116 | 75-125 | | | |
| Chromium | 20.1 | 1.0 | " | 5.00 | 16.0 | 82 | 75-125 | | | |
| **Matrix Spike Dup (CW05270-MSD1)** | | **Source: CWH0494-01** | | Prepared & Analyzed: 08/13/13 | | | | | | |
| Arsenic | 13.0 | 1.0 | mg/kg | 5.00 | 7.99 | 99 | 75-125 | 6 | 30 | |
| Selenium | 4.37 | 2.5 | " | 5.00 | 0.275 | 82 | 75-125 | 1 | 30 | |
| Thallium | 5.70 | 1.0 | " | 5.00 | 0.0850 | 112 | 75-125 | 3 | 30 | |
| Chromium | 22.1 | 1.0 | " | 5.00 | 16.0 | 122 | 75-125 | 10 | 30 | |
| **Batch CW05273 - EPA 7471A** | | | | | | | | | | |
| **Blank (CW05273-BLK1)** | | | | Prepared & Analyzed: 08/13/13 | | | | | | |
| Mercury | ND | 0.10 | mg/kg | | | | | | | |
| **LCS (CW05273-BS1)** | | | | Prepared & Analyzed: 08/13/13 | | | | | | |
| Mercury | 0.242 | 0.10 | mg/kg | 0.250 | | 97 | 75-125 | | | |
| **Matrix Spike (CW05273-MS1)** | | **Source: CWH0388-01** | | Prepared & Analyzed: 08/13/13 | | | | | | |
| Mercury | 0.267 | 0.10 | mg/kg | 0.250 | ND | 107 | 75-125 | | | |

| | | |
|---|---|---|
| Diversified Concrete Cutting | Project: Soil Sampling | |
| 59 Coney Island Dr. | Project Number: [none] | **CLS Work Order #: CWH0398** |
| Sparks, NV - | Project Manager: Travis Brandt | COC #: 149240 |

## CAM 17 Metals - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch CW05273 - EPA 7471A** | | | | | | | | | | |
| **Matrix Spike Dup (CW05273-MSD1)** | | **Source: CWH0388-01** | | Prepared & Analyzed: 08/13/13 | | | | | | |
| Mercury | 0.255 | 0.10 | mg/kg | 0.250 | ND | 102 | 75-125 | 5 | 25 | |

| | | |
|---|---|---|
| Diversified Concrete Cutting | Project: Soil Sampling | |
| 59 Coney Island Dr. | Project Number: [none] | **CLS Work Order #: CWH0398** |
| Sparks, NV - | Project Manager: Travis Brandt | COC #: 149240 |

## Notes and Definitions

| | |
|---|---|
| QM-5 | The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable. |
| DET | Analyte DETECTED |
| ND | Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified) |
| NR | Not Reported |
| dry | Sample results reported on a dry weight basis |
| RPD | Relative Percent Difference |

# ATTACHMENT E

UNIVERSITY OF CALIFORNIA, DAVIS

BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO SANTA BARBARA • SANTA CRUZ

DEPARTMENT OF MICROBIOLOGY
COLLEGE OF BIOLOGICAL SCIENCES
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ONE SHIELDS AVENUE
DAVIS, CALIFORNIA 95616

Comments on letter of 7/17/2013 from Mr. David Cullen (PGP International) to Mr. Paul Hanson, Senior Planner, City of Woodland.

I was asked by Mr. Travis Brandt of Diversified Concrete Cutters (DCC) to provide consultation on the "Pathogen Control Measures" section (point 5) of the above referenced letter. Mr. Cullen's letter details his firm's concerns about the "Proposed Golden State Reclamation Project", here after termed the "Project"

While reading near the beginning of this section of Mr. Cullen's letter, I took sharp notice of the following sentence: "The Project **would** (emphasis mine) increase the local populations of several pathogens that are of special concern to food production facilities." Mr. Cullen's letter used the word "would", not "might" or "could possibly", so – as an academic microbiologist -- I read the rest of this section with special interest to determine which pathogens he was certain **would** be increased and what activities related to the Project would cause the increases. The section lists 5 pathogens or groups of possible pathogens whose populations, according to a Dr. Deibel, would be increased by "Project-related conditions". I do not agree with Dr. Deibel's conclusions.

My summary conclusions are: (1) Dr. Deibel's assertion is certainly incorrect when she refers to the "presence of waste water in the reclamation ponds" or "annual removal of the processed material in the processing ponds" increasing local populations of pathogenic bacteria. (2) Dr. Deibel's assertion about local pathogen populations possibly being increased by the impact of "earth-moving during project construction" or "dirt from local construction sites tracked onto Hanson Way" is **in no way specific to the Project.**

**Details of Analysis:** I will first discuss the second point raised above. Any disturbance of soil, for example by agricultural use or any other nearby construction project, raises a similar possibility of certain potentially pathogenic bacteria or their spores being suspended into the air. It would seem, therefore, to be "best practices" in the food-processing industry to have filters on air-intake systems that would minimize the impact of these potential pathogens, regardless of their source or how they got into the air. These concerns about general soil disturbance are specific to *Clostridium botulinum*, *Salmonella* species and *Listeria monocytogenes* among the 5 groups cited in the PGP letter as highlighted by Dr. Deibel. *C. botulinum*, the causative agent of botulism poisoning from consumption of canned foods, is widely present in soils as heat-resistant and desiccation-resistant spores. It can only grow in the complete absence of oxygen and does not appear to be of concern for the sorts of foods processed by PGP International. Certain *Salmonella* species, although best known as pathogens, can grow slowly in certain soils. *Listeria monocytogenes* is also found in a variety of soils and wastewater; however, fecal contamination is generally believed to be the common denominator for *Listeria* dissemination, and fecal contamination is not, to my knowledge, an issue with the proposed reclamation ponds. For these reason, concern about these three types of bacteria getting into food products should be a general one in the food-processing industry, regardless of specific localized earth-moving and construction activity. Put another way, **any construction or agricultural activity** in the vicinity of the PGP International facility has the same small probability as construction of the Project to disseminate very modest quantities of the three pathogens listed above.

The basis of my conclusion that neither the wastewater in reclamation ponds nor the removal of processed material from these ponds is a potential source of pathogens comes mainly from the following: "Report of Findings, State-Wide Portland Cement Concrete Waste, Supplemental Study (April 29, 2005)", which was prepared for Caltrans by Bryan A. Stirrat & Associates. This study (along with numerous associated tables and figures) provides a wealth of information on conditions that will prevail in

reclamation ponds proposed for the Project. In this report, slurried concrete materials collected in late 2004 and early 2005 from 5 different Interstate or State highway sites throughout California were analyzed for a wide range of parameters. Most notably from my perspective was the observation that all slurries and liquid samples (derived from slurries by settling) were characterized by alkaline pH values, with the average values being 10.7 and 11.0, respectively (see Table 1 at the end of this correspondence). The respective 95% confidence limits are 9.7 to 11.8 and 9.8 to 12.2. A single pH value determined for a pond managed by Diversified Concrete Cutters near Argent, NV yielded a slurry pH of 11.5, which is in the range of the Caltrans findings, and an adjacent soil pH value much closer to neutrality strongly supported the view that the pond liner was functioning as designed (Table 1). It is expected that impounded slurries in the Project will remain this alkaline or more alkaline because calcium carbonate will continue to dissolve out of the cement chunks and grains, thereby increasing the pH of the solution. Sediments at the bottom of Project reclamation ponds, which will be subject to periodic removal, will have a similarly alkaline pH as long as they retain some moisture. Additionally, the analyses of slurried-materials showed "minor concentrations of oil and grease" as the main organic constituents. What do these analyses have to do with concerns about pathogens? Of the 5 pathogen "types" identified as concerns in the PGP International letter two --*Salmonella* species and coliform bacteria -- are actually subgroups within the family *Enterobacteriaceae*. (Not all members of this family are pathogenic. For example, most strains of the well know species *Escherichia coli* are not pathogenic but rather harmless members of our gut flora.) As a group the *Enterobacteriaceae* grow by respiring or fermenting a wide range of organic compounds but are not able to multiply with "oil" or "grease" as an organic nutrient source. These bacteria, taken as a group, can grow over the pH range of 4.0 to 9.5 but not under more alkaline conditions. Thus, conditions in the reclamation ponds will be too alkaline (pH > 9.5) to allow their growth. *Listeria monocytogenes* is similarly inhibited by environmental pH values greater than 9.5 and is not expected to find suitable organic substrates in these environments. Finally, since the waters of these shallow reclamation ponds are not expected to be anoxic, *Clostridium botulinum* (an anaerobe) would not be expected to be able to grow there. Additionally, there is no reason to

believe that the carbohydrates needed to fuel its growth will be present in any significant abundance in these ponds. In conclusion, due to the highly alkaline pH environment of the ponds and pond-sediments, coupled with the absence of suitable organic nutrients, the types of pathogenic bacteria identified in the PGP International letter of July 17, 2013, will not find suitable conditions for growth or survival.

Prepared: August 2013

Douglas C. Nelson

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Table 1: Characteristic pH values of Portland Cement Concrete Waste

| Sample Source | pH of liquid | pH of slurry |
|---|---|---|
| 5 Sites in Northern and Southern California (n = 27); Caltrans Study (*State-wide Portland Cement Concrete Waste Supplemental Study*) | Average = 11.0<br>95% CL = 9.8 to 12.2 | Average = 10.7<br>95% CL = 9.7 to 11.8 |
| Diversified Concrete Cutting Pond near Argenta, NV Analysis by California Laboratory Services (#CWH0398; COC# 149240) | Not determined separately* | 11.5** |

*Although not determined separately, this value is expected to be very close to that of 11.5, which characterized the slurry. In the California Department of Transportation Study "liquid" is defined as the upper aqueous portion that results when a "slurry" sample is allowed to settle. The 27 pH pairs (liquid vs. slurry) from that study showed a very high degree of correlation between the two.

**For the Argenta, NV pond, a pH of 8.87 was measured in a soil sample taken approximately 1 foot back from the pond margin. Since this pH value is typical of non-impacted soil it strongly supports the view that the pond liner was performing as expected, i.e. isolating the pond water and sediment from the adjacent soil.

# CURRICULUM VITAE

## DOUGLAS C. NELSON

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*BIRTH*: 27 July 1948, Ann Arbor, Michigan

*EDUCATION:*

University of Oregon, Eugene, 1972-1979, Ph.D. in Biology (Advisor: R. W. Castenholz)

State University of New York, Stony Brook, 1971-1972, Department of Ecology and Evolutionary Biology

Harvey Mudd College, Claremont, CA. 1966-1970, B.S. in Chemistry/Biology

*PROFESSIONAL EXPERIENCE:*

Chair, 2006-2011 and 1999-2003, Department of Microbiology, College of Biological Sciences, University of California, Davis
Adjunct Scientist, 1998-present, Monterey Bay Research Institute, Moss Landing, CA
Professor, 1997-present, Department of Microbiology, University of California, Davis
Chair, 1992-1997, Microbiology Graduate Group, UC Davis
Assistant & Associate Professor, 1985-1997, Department of Microbiology, University of California, Davis
Postdoctoral Investigator, 1984, Institute of Ecology and Genetics, University of Aarhus, Denmark (Advisor: B. B. Jørgensen)
Postdoctoral Investigator, 1981-1985, Department of Biology, Woods Hole Oceanographic Institution (Advisor: H. W. Jannasch)
Visiting Assistant Professor, 1980, Botany Department, Oregon State University
Instructor, 1977 and 1979, Biology Department, University of Oregon

*PROFESSIONAL SERVICES:*

Editorial Board (member) for Environmental Microbiology since 2005
Reviewer for the following journals:
Applied and Environmental Microbiology

Archives of Biochemistry and Biophysics
Archives of Microbiology
Biological Bulletin
Environmental Microbiology
FEMS Microbiology Letters
Journal of Bacteriology
Journal of Experimental Biology
Limnology and Oceanography
Marine Biology
Marine Ecology Progress Series
Molecular Marine Biology and Biotechnology
Nature
Proceedings of the National Academy of Sciences
Science
Symbiosis
Systematic and Applied Microbiology

Member of the following grant review panels or overview groups:
RIDGE2000 Panel (NSF) 2008
C-MORE site review team (NSF), 2007, chair
Ridge2000 Steering Committee (NSF), member, 2002-2004
NOAA Ocean Exploration Program Panel, 2004-2005
Ridge2000 Relevancy Review panels, 2002-2004
NSF Biogeosciences Panel 2003
DOE Ocean Margins Program Panel
NSF Ecological & Evolutionary Physiology Panel 1997-2002
NSF Special RIDGE Program Review Panel, May 2001
NSF Life in Extreme Environments Panel, 2000
NSF Biological Oceanography Panel 1996
ALVIN Review Committee, University National Oceanographic Laboratory Systems, 1987-1992
US Navy /National Undersea Research Program-Submersible Proposals, 1994
RIDGE Relevancy Review Panel, 1993

External Reviewer for the following granting agencies:
Department of Commerce, National Undersea Research Program
Department of Energy, Division of Energy Biosciences
National Environmental Research Council (United Kingdom)
National Science Foundation
Biological Oceanography Program
Cell Biology Program
Cellular Biochemistry Program
Ecological and Evolutionary Physiology Program
Foreign Centers of Excellence Program
Functional And Physiological Ecology
International Programs
Life in Extreme Environments (LExEN)
Metabolic Biochemistry Program
Metabolic Biology
Polar Biology Program
Population Biology and Physiological Ecology
Small Business Innovation Research Program
Surficial Processes
Systematic and Population Biology Program

Systematic Biology Program
New York Bight, National Undersea Research Program
NOAA National Undersea Research Program
US Navy, National Undersea Research Program

Other Service:

Chair-elect -- Division I (General Microbiology) American Society for Microbiology (1987-88)
Chair -- Division I (General Microbiology) American Society for Microbiology (1988-89)
Member -- Homestake Mine Technical Review Panel, Yolo County (1988-1996)
Chair -- Homestake Mine Technical Review Panel, Yolo County (1991-1994)
Member -- InterRidge Biological Studies Working Group (1994-1997). Initiative for international cooperation in ridge-crest studies.

University Service:

Chair (1999-2003; 2006-2011) Department of Microbiology, College of Biological Sciences
Chair (1992-1997) Microbiology Graduate Group
Member (1988-1997) Executive Committee, Microbiology Graduate Group
Chair (1990-92, 1995) Admissions Committee, Microbiology Graduate Group
Member (1989-95) Admissions Committee, Microbiology Graduate Group
Member (1992-present) Teaching Committee, Department of Microbiology
Chair or Member (1989-present) approx. 50 Ph.D. Qualifying Exam or Masters Exam Committees

*INVITED SEMINARS: (since 1985):*

1985 - Woods Hole Oceanographic Institution, Biology Department, Woods Hole, MA
1986 - Precambrian Paleobiology Research Group, International Meeting, Palo Alto, CA
American Society for Microbiology, Annual Meeting, Washington, DC
1987 - International Symposium on Lithoautotrophy, Göttingen, Germany
1988 - Sonoma State University, Biology Department, Sonoma, CA
International Congress of Comparative Physiology and Biochemistry, Baton Rouge, LA;
American Society for Microbiology, Rocky Mt. Branch, Pingree Park, CO
Scripps Institution of Oceanography, La Jolla, CA
1990 - Marine Biological Laboratories, Woods Hole, MA
West Coast Bacterial Physiologists, Annual Meeting, Asilomar, CA
1991 - Biology Department, University of Oregon
1993 - American Society of Zoologists, Annual Meeting, Los Angeles, CA
1995 - International C1 Symposium, San Diego, CA.
1996 - Hopkins Marine Station of Stanford University, Pacific Grove, CA
Monterey Bay Aquarium Research Institute, Moss Landing, CA
1997 - First International Symposium on Deep-Sea Hydrothermal Vent Biology, Funchal, Madeira (Portugal)
1998 - Ridge 9° N Events Symposium on Deep Sea Hydrothermal Vents, Santa Barbara, CA
1999 - Biology of Organisms in Extreme Environments, a Symposium for 80th Annual Meeting, AAAS, Pacific Division, San Francisco, CA
Bay Area Science Symposium, San Francisco, CA
Woods Hole Oceanographic Institution, Woods Hole, MA
International Congress on Ecosystem Health, Sacramento, CA

Annual Meeting, American Society of Limnology and Oceanography, Santa Fe, NM
2000 – RIDGE Symposium, DeKalb, Illinois
2001 - Annual Meeting, American Society for Limnology and Oceanography, Albuquerque, NM
Scripps Institution of Oceanography, La Jolla, CA
Biology Department, California State University, Chico
Max Planck Institute for Marine Microbiology, Bremen, Germany – 3 different seminars
2002 - RIDGE Integrated Studies Meeting, Los Angeles, CA
Marine Biological Laboratories, Woods Hole, MA
2003 – ASLO Annual Meeting, Salt Lake City, UT; co-organized and co-chaired session titled: "Symbiosis and Syntrophy in Extreme Environments"
2004 - CALFED Science Conference, Sacramento, CA
2006 – Mercury 2006, Biannual International Conference on Mercury as a Global Pollutant, Madison, Wisconsin
2007- Marine Biological Laboratories, Woods Hole, MA
2008 – Delta Tributaries Mercury Council, Sacramento, CA (May 13)
Hopkins Marine Station of Stanford University, Pacific Grove, CA (June 26)
Bigelow Laboratory, Boothbay Harbor, ME (November 3)
2009 – Northern California Brach Meeting, ASM, San Ramon, CA (March 13)

*MAJOR OCEANOGRAPHIC RESEARCH EXPEDITIONS:*

Northwestern Atlantic, R/V Oceanus Cruise #107, November 198l. Chief Scientst: Holger Jannasch

Hydrothermal Vents, 21°N East Pacific Rise, Oasis Project (ALVIN & R/V Lulu, Legs I & II), April and May 1982. Chief Scientist: Ken Smith

Northwestern Atlantic, Newfoundland to Woods Hole, R/V Oceanus Cruise #136-2, August, 1983. Chief Scientist: Holger Jannasch

Hydrothermal Vents, Galapagos Rift, ALVIN & R/V Atlantis II, February and March, 1985. Chief Scientist: Jim Childress

Hydrothermal Vents, Guaymas Basin, ALVIN & R/V Atlantis II, July and August, 1985. Chief Scientist: J. F. Grassle

Sediment Microbiology and Geochemistry, Peru oxygen-minimum region, R/V Moana Wave, July, 1987. Chief Scientist: John Farrington

Hydrothermal Vents, Guaymas Basin, ALVIN & R/V Atlantis II, January and February. 1988. Chief Scientist: Holger Jannasch

Hydrothermal Vents, Galapagos Rift, ALVIN & R/V Atlantis II, April and May, 1988. Chief Scientist: Jim Childress

Hydrothermal Vents, Guaymas Basin, ALVIN & R/V Atlantis II, March 1991. Chief Scientist: Holger Jannasch

Hydrothermal Vents, 9°45'N on East Pacific Rise, ALVIN & R/V Atlantis II, February and March, 1992. Chief Scientists: Rachel Haymon and Dan Fornari

Chemo2 - Hydrocarbon and Sulfide Seeps, Gulf of Mexico, Johnson Sealink & R/V Edwin Link, July 1997. Chief Scientist: Ian MacDonald

Chemo2 - Hydrocarbon and Sulfide Seeps, Gulf of Mexico, Johnson Sealink & R/V Edwin Link, June and July 1998. Chief Scientist: Ian MacDonald

Hydrothermal Vents, Juan de Fuca Plate, ALVIN & R/V Atlantis, July and August, 1998. Chief Scientist: Chuck Fisher

Hydrothermal Vents, Juan de Fuca Plate, ALVIN & R/V Atlantis, August and September, 1999. Chief Scientist: Chuck Fisher

*FUNDING (last 20 years)*

12/15/90 to 6/30/94 Award: $171,359 (direct + indirect costs)
Source: Biological Oceanography Program, NSF
Project: NSF OCE-9018198. Studies on Physiological Ecology and Genetics of Hydrothermal Vent Sulfur Bacteria.

7/94 -- 6/96 Award: $ 57,699 (direct costs)
Source: UC Salinity/Drainage Program.
Project: State Salinity 94-1. Can bacteria that accumulate elemental sulfur be used to remediate selenium contaminated waters and soils?
Co-PI: William H. Casey, Department of Land, Air and Water Resources, UC Davis.

8/95 -- 6/00 Award ca $ 50,000 (direct costs)
Source: Center for Ecological Health Research, UCD (EPA funded)
Project: Clear Lake Watershed: Microbiology of mercury methylation in sediments.

3/96 -- 2/00 Award: $ 237,837 (direct + indirect costs)
Source: Ecological and Evolutionary Physiology Program, NSF
Project: NSF IBN-95-13962. Ecophysiology and phylogeny of diverse *Beggiatoa* species, bacterial specialists of the sulfide-oxygen interface.

3/96 - 2/98 Award: $ 96,216 (direct + indirect, including $60,000 submersible use costs)
Source: NOAA, West Coast National Undersea Research Program
Project: NOAA UAF-96-06. Ecology and physiology of *Beggiatoa* sp. at Monterey Canyon seeps: a model of novel, sulfide-driven, bacterial denitrification.

7/96 -- 6/98 Award: $ 58,289 (direct costs)
Source: UC Salinity/Drainage Program.
Project: State Salinity 96-18. Bacteria that accumulate elemental sulfur can remediate selenium contaminated waters and soils.
Co-PI: William H. Casey, Department of Land, Air and Water Resources, UC Davis.

10/96 -- 9/98 Award: $ 29,986 (direct + indirect) Projected total through 3/00: $ 52,477.
Source: Department of Interior, Minerals Mgt. Service. (Subcontract from Texas A&M Univ.)
Project: Stability and Change in Gulf of Mexico Chemosynthetic Communities.: Bacterial mats: metabolic diversity, productivity and competition with symbiont-containing animals.

1/98 -- 2/00 Award: $ 746,249 (direct + indirect)
Source: EPA-Superfund, Region IX
Project: The role of the Sulphur Bank mercury mine site (and associated hydrogeological processes) in the dynamics of mercury methylation, transport and bioaccumulation within the Clear Lake (CA) aquatic ecosystem.
Co-PI with Tom Suchanek, UCD (PI)

3/00 -- 2/03 -- Award: $ 270,000 (direct + indirect)
Source: NSF, Ecological and Evolutionary Physiology
Project: Ecophysiology and phylogeny of vacuolate, nitrate-accumulating sulfur bacteria.

8/15/00 – 9/14/05 – Award: $ 360,000 (direct + indirect)
Source: DOE, Basic Energy Biosciences
Project: Physiology and genetics of energy conservation in chemoautotrophic sulfur-oxidizing bacteria.

3/1/01 – 2/28/06 – Total Award: $2,000,000 (direct + indirect)
Source: EPA, Western Center for Estuarine Indicators Research
Project: Biogeochemistry and Bioavailability Component
Co-Investigator; Rick Higashi (UCD) = PI
Nelson receives a sub-award of $50,000 per year (direct + indirect) to fund a student to study microbial Hg-cycling in an impacted California estuary.

9/15/01 – 9/14/04 – Award: $ 370,107 (direct + indirect)
Source: DOE, Biological and Environmental Research
Project: Microbiological impact of direct carbon dioxide injection – exploratory studies under deep-sea conditions.

8/15/00 – 9/14/05 – Award: $ 360,000 (direct + indirect)
Source: DOE, Basic Energy Biosciences
Project: Physiology and genetics of energy conservation in chemoautotrophic sulfur-oxidizing bacteria.

10/1/05– 9/30/09 – Award: $392,943 (direct + indirect)
Source: NSF, OCE – Biological Oceanography
Project: Ecophysiology of vacuolate marine sulfur bacteria.

9/1/07—8/31/10 -- Award: $335,990 (direct + indirect)
Source: NSF, CCMI
Project: Bio-Mediated Improvement of Soil and Soil-Structure Interface Behavior
PI: Jason DeJong, Civil and Environmental Engineering, UCD; Co-PI: Douglas C. Nelson

8/15/08-- 8/15/11 -- Award: $375,000 (direct + indirect)
Source: NSF, CCMI
Project: NEESR-II: Biological improvement of sands for liquefaction prevention and damage mitigation. PI: Jason DeJong, Civil and Environmental Engineering, UCD; Co-PIs: Douglas C. Nelson and Ross Boulanger

7/15/12—6/30/15 – Award: $596,646 (direct + indirect)
Source: NSF, CCMI-1234367-0
Project: Bio-cementation field-scale trials: addressing the challenges of treatment uniformity and verification, bio-stimulation and by-product management. Jason DeJong, Civil and Environmental Engineering, UCD; Co-PIs: Douglas C. Nelson and Tim Ginn
10/1/2013 – 9/30/17 – Requested: $199,024 (direct + indirect)
Source: US-Israel Binational Science Foundation-2012196
Project: Stimulation and Permanence of Microbially Induced Calcite Precipitation Treatment of Sands. Investigators: Michael Tsesarsky & Ronen Zeev (Ben Gurion University); Jason DeJong, Douglas C. Nelson, and Timothy R. Ginn (UCD)

## *PUBLICATIONS*


1. Nelson DC (1979) The biology of *Beggiatoa* -- organic nutrition, sulfur utilization and light responses. Ph.D. thesis (Adviser: Richard W. Castenholz), University of Oregon, Eugene

2. Nelson DC and RW Castenholz (1981) The organic nutrition of *Beggiatoa* sp. J Bacteriol 147:236-247.

3. Nelson DC and RW Castenholz (1981) The use of reduced sulfur compounds by *Beggiatoa* sp. J Bacteriol 147:140-154.

4. Nelson DC and RW Castenholz (1982) Light responses of *Beggiatoa*. Arch Microbiol 131:146-155.

5. Nelson DC, JB Waterbury and HW Jannasch (1982) Nitrogen fixation and nitrate utilization by marine and fresh-water *Beggiatoa*. Arch Microbiol 133:172-177.

6. Nelson DC and HW Jannasch (1983) Chemoautotrophic growth of a marine *Beggiatoa* in sulfide-gradient cultures. Arch Microbiol 136:262-269.

7. Jannasch HW and DC Nelson (1984) Recent progress in the microbiology of hydrothermal vents. pp. 170-176. In: MJ Klugg and CA Reddy (eds.) Current Perspectives In Microbial Ecology, Amer. Soc. Microbiol. Publ., Washington.

8. Nelson DC, JB Waterbury and HW Jannasch (1984) DNA base composition and genome size of the prokaryotic symbiont in *Riftia pachyptila* (Pogonophora). FEMS Microbiol. Lett. 24:267-271.

9. Jannasch HW, CO Wirsen, DC Nelson and LA Robertson (1985) *Thimicrospira crunogena* sp. nov., a colorless sulfur oxidizing bacterium from a deep sea hydrothermal vent. Int. J. Syst. Bacteriol. 34:422-424.

10. Belkin S, DC Nelson and HW Jannasch (1986) Symbiotic assimilation of $CO_2$ in two hydrothermal vent animals, the mussel, *Bathymodiolus thermophilus* and the tube worm, *Riftia pachyptila*. Biol. Bull. 170:110-121.

11. Nelson DC, NP Revsbech and BB Jorgensen (1986) Microoxic-anoxic niche of *Beggiatoa* spp.: micro-electrode survey of marine and freshwater strains. Appl. Environ. Microbiol. 52:161-168.

12. Nelson DC, BB Jorgensen and NP Revsbech (1986) Growth pattern and yield of chemoautotrophic *Beggiatoa* sp, in oxygen-sulfide microgradients. Appl. Environ. Microbiol. 52:225-233.

13. Jorgensen BB and DC Nelson (1988) Bacterial zonation, photosynthesis, and spectral light distribution in hot spring microbial mats of Iceland. Microb. Ecol. 16:133-147.

14. Williams CA, DC Nelson, BA Farah, HW Jannasch, and JM Shively (1988) Ribulose bisphosphate carboxylase of the procaryotic symbiont of a hydrothermal vent tube worm: kinetics, activity and gene hybridization. FEMS Microbiol. Lett. 50:107-112.

15. Nelson DC (1989) Physiology and biochemistry of filamentous sulfur bacteria. pp. 219-238 In: HG Schlegel and B Bowien (eds.) The Biology of Autotrophic Bacteria, Science Tech Publishing, Madison, WI.

16. Nelson DC, CA Williams, BA Farah and JM Shively (1989) Occurrence and regulation of Calvin cycle enzymes in non-autotrophic *Beggiatoa* strains. Arch. Microbiol. 151:15-19.

17. Nelson DC, CO Wirsen and HW Jannasch (1989) Characterization of large, autotrophic *Beggiatoa* spp. abundant at hydrothermal vents of the Guaymas Basin. Appl. Environ. Microbiol. 55:2909-2917

18. Jannasch HW, DC Nelson and CO Wirsen (1989) Massive natural occurrence of unusually large bacteria (*Beggiatoa* sp.) at a hydrothermal deep-sea vent site. Nature 342:834-836.

19. Edwards DB and DC Nelson (1991) DNA-DNA solution hybridization studies of the bacterial symbionts of hydrothermal vent tube worms (*Riftia pachyptila* and *Tevnia jerichonana*). Appl. Environ. Microbiol. 57:1082-1088.

20. Renosto F, RL Martin, JL Borrell, DC Nelson and IH Segel (1991) ATP sulfurylase from trophosome tissue of *Riftia pachyptila* (hydrothermal vent tube worm). Arch. Biochem. Biophy. 290:66-78

21. Nelson DC (1992) The genus *Beggiatoa*. pp. 3171-3180. In: A Balows, HG Truper, M Dworkin, W Harder and K-H Schleifer (eds.) The Prokaryotes, Second Edition. Springer-Verlag, New York.

22. Jorgensen BB, DC Nelson and DM Ward. (1992) Chemotrophy and decomposition in modern microbial mats. pp. 287-293. In: JW Schopf and C Klein (eds.) The Proterozoic Biosphere. Cambridge University Press, Cambridge.

23. Laue BE and DC Nelson (1994) Characterization of the gene encoding the autotrophic ATP sulfurylase from the bacterial endosymbiont of the hydrothermal vent tube worm *Riftia pachyptila*. J. Bacteriol. 176, 3723-3729

24. Nelson DC, KD Hagen and DB Edwards (1995) The gill symbiont of a hydrothermal vent mussel, *Bathymodiolus thermophilus*, is a psychrophilic, chemoautotrophic sulfur bacterium. Mar. Biol. 121:487-495

25. Nelson DC and KD Hagen (1995) Physiology and biochemistry of symbiotic and free-living chemoautotrophic sulfur bacteria. Amer. Zool. 35, 91-101

26. Nelson, DC and CR Fisher (1995) Chemoautotrophic and methanotrophic endosymbiotic bacteria at deep-sea vents and seeps. In DM Karl (ed) The Microbiology of Deep Sea Hydrothermal Vents. CRC Press. pp125-167.

27. Hagen KD and DC Nelson (1996) Organic carbon utilization by obligately and facultatively autotrophic *Beggiatoa strains* in homogeneous and gradient cultures. Appl. Environ. Microbiol. 62:947-953.

28. McHatton, SC, JP Barry, HW Jannasch and DC Nelson (1996) High nitrate concentrations in autotrophic, vacuolate marine *Beggiatoa*. spp. Appl. Environ. Microbiol. 62:954-958.

29. Nelson, DC and SC McHatton (1996) Sulfur metabolism of autotroph-invertebrate symbioses. In: ME Lidstrom and FR Tabita (eds), Microbial Growth on $C_1$ Compounds. Kluwer Academic Publishers, Dordrecht, The Netherlands. pp293-300.

30. Nelson, DC, WH Casey, JD Sisson, EE Mack, A Ahmad and JS Pollack (1996) Selenium uptake by sulfur-accumulating bacteria. Geochim. Cosmochim. Acta 60:3531-3539.

31. Laue, BE and DC Nelson (1997) Sulfur-oxidizing symbionts have not co-evolved with their tube worm hosts: an RFLP analysis. Molec. Mar. Biol. Biotech. 6:180-188.

32. Hagen, KD and DC Nelson (1997) Use of reduced sulfur compounds by *Beggiatoa* spp.: enzymology and physiology of marine and freshwater strains in homogeneous and gradient cultures Appl. Environ. Microbiol. 63:3957-3964

33. Loge, FJ, RW Emerick, DE Thompson, DC Nelson and JL Darby (1999) Development of a fluorescent 16S rRNA oligonucleotide probe specific to the family Eterobacteriaceae. Water Environ. Res. 71:75-83.

34. Ahmad A, JP Barry and DC Nelson (1999) Phylogenetic affinity of vacuolate, nitrate-accumulating *Beggiatoa* sp. (Monterey Canyon, CA) with *Thioploca* spp. Appl. Environ. Microbiol. 65:270-277.

35. Nelson, DC (1998) Recent progress in the microbiology of deep-sea hydrothermal vents and seeps. Cah. Bio. Mar. 39:373-378.

36. Loge, FJ, RW Emerick, DE Thompson, DC Nelson and JL Darby (1999) Factors influencing UV disinfection performance. Part I: Light penetration into wastewater particles. Water Environ. Res. 71:377-381.

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44. Jorgensen, BB and DC Nelson (2004) Sulfide oxidation in marine sediments: geochemistry meets microbiology. In: J. Amend, K.J. Edwards and TW Lyonns (eds.), Sulfur Biogeochemistry – Past and Present. Geological Society of America, Special Paper 379, pp. 63-81.

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49. Ahmad, A, KM Kalanetra and D.C. Nelson (2006) Cultivated *Beggiatoa* spp. define the phylogenetic root of morphologically diverse, non-cultured, vacuolate sulfur bacteria. Can. J. Microbiol. 52(6): 591-598.

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53. Kalanetra, KM and DC Nelson (2010) Vacuolate attached filaments: highly productive epibionts of *Ridgeia piscesae* at the Juan de Fuca hydrothermal vents. Marine Biology 157(4): 791-800.

54. DeJong, JT, K Soga, SA Banwart, WR Whalley, TR Ginn, DC Nelson, BM Mortensen, BC Martinez and T Barkouki (2011) Soil engineering *in vivo*: harnessing natural biogeochemical systems for sustainable, multifunctional engineering solutions. Journal of the Royal Society Interface 8: 1-15.

55. Mortensen, BM, MJ Haber, JT DeJong LF Caslake and DC Nelson (2011) Effects of environmental factors on microbial induced calcium carbonate precipitation. J. Appl. Microbiol. 111: 338-349.

56. DeJong, JT, KS Soga, E Kavazanjian, S Burns, L Van Paassen, A Al Qabany, A Aydilek, SS Bang, M Burbank, L Caslake, CY Chen, X Cheng, J Chu, S Ciurli, S Fauriel, AE Filet, N Hamdan, T Hata, Y Inagaki, S Jefferis, M Kuo, L Laloui, J Larrahondo, DAC Manning, B Martinez, BM Montoya, DC Nelson, A Palomino, P Renforth, JC Santamarina, EA Seagren, B Tanyu, M Tsesarsky and T Weaver (2013) Biogeochemical processes and geotechnical applications: progress, opportunities and challenges. Géotechnique 63: 287-301

57. Fleming, EJ, KD Hagen, HD Christman, SC Dawson, PG Green and DC Nelson (In revision) Decoupling of mercury-methylation from sulfate-reduction in salt marsh sediments.

4/17/13

This record is currently unavailable.

3301 Kinsman Blvd
Madison, WI 53704

V. Deibel: 608.347.0083
T. Lombardo: 608.218.0510

COVANCE

Mr. Paul Hanson
City of Woodland,
Planning Commission
300 First Street
Woodland, CA 95695

Re: Golden State Reclamation Project

Dear Mr. Hanson:

PGP International, Inc. ("PGPI") has retained me to evaluate the impact that the Golden State Reclamation Project (the "Project") will have on PGPI's Woodland, CA food ingredient manufacturing facility (the "Facility"). I understand that PGPI's counsel provided an overview of my initial conclusions to the Planning Commission during the July 18th hearing, but I would like to take this opportunity to provide a more detailed explanation of my conclusions. In addition, this letter report includes rebuttal comments to the letter provided by Dr Douglas Nelson, Professor of Microbiology, University of California (Davis), dated August 2013. (The "Comment Letter").

Before going into my conclusions I wanted to include a short synopsis of my background in the food microbiology field. I obtained my B.S., Masters of Science/Bacteriology, and Ph.D. from the University of Wisconsin. My Ph.D. major was food microbiology, and my minor was bacteriology. I have worked for over twenty years in the food microbiology field, and have specialized in food safety controls for pathogens, including the pathogens that are of concern here. In that capacity, I have developed and reviewed pathogen control programs for food and packaging establishments, and conducted microbiological investigations for pathogens and spoilage organisms in food production plants. My CV is attached for your review.

## I. Executive Summary:

The Project presents serious risks to PGPI's Woodland Facility because of the increased dust and pathogen load that the Project's construction and ongoing operation are likely to generate. As discussed in more detail below, dust from construction is a serious concern at food manufacturing facilities. In addition, food-borne pathogens which are regulated by the FDA and international certification bodies are present in soil. Those pathogens are likely to multiply as a result of the Project's construction and operation, and will certainly be aerosolized as a result of the Project. PGPI's Facility currently controls for the existing levels of dust and pathogens in the local environment, but the Project will greatly increase the levels of both of these contaminants, and will have an adverse effect on PGPI's ability to continue its operations.

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COVANCE

With respect to the Comment Letter, I respectfully disagree with Dr. Nelson's conclusions, for the reasons discussed below.

## II. PGPI's Concerns Regarding the Project:

The proposed project presents a significant threat to the continued operation of PGPI's Woodland facility. Because of stringent food quality standards, PGPI must continually monitor the content of its products for contaminants, including dust and pathogens. Some pathogens, for example *Salmonella* species (spp.) and *Listeria monocytogenes*, are designated as "zero tolerance" pathogens by the FDA, meaning that the detection of even one cell in a product sample means that the product is not marketable. Because of the nature of its operations, and its concerns about the Project, PGPI retained Covance to conduct an investigation to determine what effects the Project will have.

### A. The Pathogens and Soil Microbiology

Based on my 25 years of experience as a food safety microbiologist, I identified the following pathogens that present a threat to PGPI's Facility: *Salmonella spp.*, spore-forming bacteria, *Listeria monocytogenes*, and *coliforms*. All of these are found naturally in the environment, and in particular, soils. In addition, because of the mechanics of soil microbiology, changes and disturbance in the soil can lead to increased levels of microbial growth, particularly when moisture is introduced.

#### *Salmonella spp*

*Salmonella* spp. contains over 2000 species, all of which are considered pathogenic or disease producing. *Salmonella* is found throughout nature and usually originates from animals in their gastrointestinal tracts (birds, insects, swine). While *Salmonella spp.* can be found in the environment, it is usually associated with feces. The route that *Salmonella spp.* travels can be from one animal into the environment (soil or water) and then back into another animal through contaminated water and food (Podolak, *et. al)*. Since *Salmonella spp.* has been shown to have increased resistance to heat when it has been dried, in soil for example, and studies have shown that *Salmonella spp.* may survive in dry products for long periods of time, PGPI is rightly concerned about the safety of their products. As noted above, *Salmonella spp.* is a "zero tolerance" pathogen pursuant to FDA regulations. If these products are ingested by the elderly or infants, illness can occur. The illnesses caused by *Salmonella* spp. of healthy individuals may include diarrhea (which may be bloody), fever, nausea, vomiting and abdominal pain (FDA, 2011). In some, albeit rare circumstances, *Salmonella spp.* can get into the blood stream and cause arterial infections (i.e., infected aneurysms), endocarditis, and arthritis (FDA, 2011).

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COVANCE

**Spore Formers (*Clostridium botulinum*, and *Bacillus cereus*)**

Ever present in soil and the environment, spore-forming bacteria are of concern to many food manufacturers. These bacteria have two distinct phases: the vegetative cell and the spore phase. Under ideal conditions, the bacterial vegetative cell will grow, multiply, and die in a pre-determined cycle. However, once the bacteria growth cycle has been threatened and interrupted, it will sporulate, forming a protective covering like that of a shell protecting a walnut. In the spore phase, it can survive without nutrients and water and under other adverse conditions. Sporeforming bacteia are ubiquitous within the soil. Thus, *Clostridium botulinum* and *Bacillus cereus,* may be present in the soil surrounding PGPI's Woodland facility, in both the vegetative cell and spore forms.

***Listeria monocytogenes***

*Listeria monocytogenes* is one of 6 organisms that comprise the genus *Listeria.* Unlike *Salmonella,* wherein all of the species are pathogenic, it is believed that only *L. monocytogenes* causes disease in humans. The FDA Compliance Policy Guide, Section 555.320, states that "*Listeria monocytogenes* is a pathogenic bacterium that is widespread in the environment and may be introduced into a food processing facility. *L. monocytogenes* can contaminate foods and cause a mild illness (called listerial gastroenteritis) or a severe, sometimes life-threatening, illness (called invasive listeriosis)." Regrettably, Dr. Nelson's assertion that fecal contamination is a common denominator for *Listeria monocytogenes* contamination is incorrect. Rather, *Listeria monocytogenes* is ubiquitous within the environment. According to the USDA Food Safety Inspection Service, *"L. monocytogenes* is widely distributed in the environment; it is found in the air, soil, water, dust, and plant material, including silage. As such, *L. monocytogenes* may enter the environment of processing plants and subsequently contaminate" food production equipment and food products. Those knowledgeable with food manufacturing practices understand that the ubiquitous nature of *Listeria monocytogenes* is well published and easily found in FDA and USDA guidance documents available on their website under the food safety tabs. Additionally, published scientific studies have suggested that *Listeria monocytogenes* was found in 8.3% and 30.8% of cultivated and uncultivated fields, respectively.*s* (Dowe, *et al.*). One of our leading Food Safety Leaders, Dr. Bruce Tompkin (2002), in his landmark publication, identified *Listeria monocytogenes* presence in the food production environment as a result of construction and construction dust.

Increased trucking and dredging operations in the vicinity of the PGPI Woodland facility, can allow for increased localized concentrations of *Listeria*, thus increasing the possibility of contamination to the rice storage as well as the processing areas of the PGPI facility.

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**Coliforms**

From the historical perspective, the term "coliform" was likely meant to include all of the species of the family Enterobacteriaceae that use lactose or milk sugar as a food source (Envir 131-Fall). Enterobacteriaceae are commonly found in feces of humans and animals although some exist naturally in the environment (TRAC, 2007). For example, *E. coli* is a member of the Enterobacteriaceae family. They are considered an indicator of unsanitary conditions or soil contamination when they are identified in a food plant environment. PGPI customers require finished product testing for coliforms and have imposed strict specifications for each lot shipped. If these specifications are not met, the customer will not accept the product.

**Soil Microbiology**

As discussed above, it is widely held that wide arrays of microbes are prevalent in soil. Soil has the capacity to host microorganisms, either in an active growth mode or in a state of quiescence where there is no growth but the cells are viable. The microbial status (growth or viable) depends on the amount of nutrients and water present. Cells may stay in a viable state until they are exposed to a suitable environment where they can grow. *Salmonella,* for example, has been shown to stay viable in dry environments for long periods of time (months to years) (FDA, 2009). Soil hosts *Salmonella* growth and viability, as well as *Listeria, Clostridium, Bacillus* and *E. coli.* Soil has microhabitats where some areas will host rapid and prolific microbial growth whereas just inches away the soil's environment may be less favorable and prohibits growth, but supports viability. Each of these microhabitats has its own pH, water and nutrient content. According to Ulukanli and Digrak (2002), soil is made up of a mosaic of microhabitats, each of which is characterized by its specific set of physiological, chemical and biological factors.

It is widely held that soil is a vehicle for microbial dissemination (Dowe *et al.*, 1997, Gorski, *et al,* 2011). It is for this exact reason that food and ingredient manufacturing facilities place covers over shoes when walking into the production areas of plants or spray chemical disinfectants around doorways leading into production rooms. Plants also go to extreme measures to prohibit cross traffic from non-production areas of the plant into and out of production rooms. Wheels, pallets and shoes all carry soils that may cross-contaminate microorganisms into the food products. As a trained food microbiologist for the entirety of my career and having been in hundreds of food and ingredient manufacturing facilities, it is fair to say that these practices are common to those who are familiar to the food industry.

When construction and DCC activity disrupts soils, there will be more chances for the soil to gain exposure to different microhabitats and thus support growth and/or disseminate microorganisms. The proposed DCC site is likely to disseminate microbes that will lead to contamination of PGP's product..

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**B. pH and Pathogen Growth**

The peer reviewed scientific literature demonstrates that pathogens can grow at pH levels of up to 10, but very little data are provided on the ability of foodborne spoilage and pathogenic organisms to grow and survive at higher alkalinity ranges.* In the alkalinity pH range, substances have a soapy feel. Most foods are unappetizing at alkaline pH's, which may be why food pathogens are not studied in these ranges. *Salmonella* has a growth range up to a pH of 9.5 and at higher levels there may not be growth, but the organism may remain viable (alive). (Jay, 2005) Similarly, *Listeria monocytogenes* can grow up to a pH of 10, but remain viable at higher pH values. (Jay, 2005) Of course, spores of *Clostridium* and *Bacillus,* have the capacity to survive many adverse environments without loss of viability because, as discussed above, they simply form a protective shell when faced with adverse conditions. Each of the organisms of concern to this project (Table 1) have the capacity to grow up to a pH of at least 9.0 and potentially survive at higher pH values.

*The pH scale measures acidity and alkalinity of a substance. The scale ranges from 1-14 with 7 being neutral. Any value <7 is acidic and >7 is alkaline.

Table 1. Pathogenic Microorganisms of Concern and their pH Ranges for *Growth*

| **Microorganism** | **pH Range for Growth** |
|---|---|
| *Salmonella spp.* | 4.1 – 9.5 |
| Spore formers: | |
| *Clostridium botulinum* | 4.6 – 9.0 |
| *Bacillus cereus* | 4.3 – 9.0 |
| *Listeria monocytogenes* | 4.5 – 10.0 |
| Coliforms: | |
| *E. coli* | 4.4 – 9.0 |

The Applicant has provided a Soil Sampling Report ("Soil Report") from California Laboratory Services dated August 14, 2013, which includes a pH analysis of a "Solid" – presumably the solid material that forms in the collection ponds – and "Slurry" – presumably the material that is collected on roadsides and dumped into the ponds. The Soil Report shows a pH of 11.50 for the slurry, and 8.87 for the pond material. Based on the figures above, all of the pathogens of concern to PGPI can grow in an environment with a pH of 8.87 and potentially survive at a pH of 11.50.

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Those growth rates are significant. For example, if ten cells of *Salmonella spp.* are introduced into a water source, after six hours under normal conditions, over **2.6 million** *Salmonella* cells will be present. In other words, in this scenario, *Salmonella* spp. can double its numbers every 21.8 minutes (Todar). Even eating one *Salmonella* cell has shown to produce illness, which is why *Salmonella* spp. is designated a "zero tolerance" pathogen. (FDA, 2009). *Listeria monocytogenes,* while a slower grower, can reach similar cell volumes in approximately 26 hours under its ideal growth conditions (Augustin, *et. al).* Understandably, PGPI is particularly concerned because a very small amount of contamination – from pathogen contamination in the soil or fecal contamination – can result in significant increases in the microbial load increasing the chances that contamination can enter into their production stream.

## III. Air Intake Filtration:

PGPI's current air filtration practices and procedures are in line with industry and regulatory standards given the present state of the activities of the surrounding environment. Ongoing pond dredging, truck traffic and concrete dust nearby will increase the particulate matter of surrounding air requiring unfeasible filtration levels. Any significant increase of dust generation in close proximity to a manufacturing plant will increase the risk of microbiological contamination to PGPI's food products.

Those who understand the food industry know that proper air filtration is more than a "best practice" but a necessity in food manufacturing. Indeed, the United States Code of Federal Regulation, Title 21, Section 110.40(d) states that food "(h)olding, conveying, and manufacturing systems, including gravimetric, pneumatic, closed, and automated systems, shall be of a design and construction that enables them to be maintained in an appropriate sanitary condition."

Air filtration is measured on the effectiveness of removing particulates from the air. In the United States, filter efficiency is classified by a Minimum Efficiency Reporting Value (or MERV) rating. The lower the MERV rating, the more coarse the filter will be. Conversely, the higher the MERV rating the more fine the filter. To remove the microbes of concern (*Listeria*, *Salmonella*, spores, *E. coli*, and other Enterobacteriaceae), HEPA (or MERV 18) filtration would be required. Appendix A illustrates the filter classifications, particle size ranges, and intended uses.

The Woodland facility of PGPI manufactures Ready-to-Eat as well as Not Ready-to-Eat foods. The air filtration standard for most food manufacturing is to capture 90 – 95% of all particulates 1 μm and larger. This is achieved by use of MERV 14 – 15 filters. *Salmonella* spp and *Listeria monocytogenes*, at 0.3 μm and 0.5 μm respectively,

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are smaller than 1 μm. In general, bacteria range from 0.3-1.0 μm rendering even MERV 15 filtration ineffective against bacteria (Jay). Milled flour facilities use MERV 10 filters, hospital inpatient rooms use MERV 15 and general surgery rooms use MERV 16. While some food manufacturers do require the use of MERV 18 (HEPA) air filtration, these products are typically only used in "high risk" food products such as infant formulas. In these circumstances, MERV 18 filtration is only used for air that is used to convey the product through piping or in small, interior packaging rooms where the costs and maintenance are controllable rather than in large open plant areas, which appears to be what Dr. Nelson is suggesting. Appendix B of this document describes the recommended level of air filtration by product and production room.

Since pathogens, and *Salmonella,* in particular, persists in the environment for years (Gorski, et al) and are carried via air currents, disruption to environments within close proximity has concerning implications for PGPI's product safety. PGPI's current MERV 14-15 filters meet industry standards, and are sufficient to handle the current dust and microbial load. PGPI's concern is that the Project may require the installation of non-standard and impractical MERV 18 filters, at great cost to PGPI, particularly given the volume of air that is exchanged at the Facility each day.

In addition to creating a greater microbiological risk to the food processing portions of PGPI's facility, there is further concern with the raw ingredient storage. The proposed DCC trucking activity is along an unpaved road adjacent to PGPI's loading dock and rice storage area. Being an agricultural commodity, rice storage silos do not have the same air filtration requirements as the processing areas within the food manufacturing facility proper. Therefore, since the air filtration for rice storage will not remove any microorganisms, an increase in the microbial loading of the surrounding air may also increase in the microbiological loading of the rice.

## IV. FDA and International Certification:

When grounds surrounding a food plant generate environments that may jeopardize the safety of the product manufactured, the plant is responsible for minimizing risk. In this case, the surrounding area and grounds may result in PGPI failing FDA and 3rd Party Food Safety Audit requirements due to the increased potential of product contamination Since PGPI requires FDA registration for operations and passing 3rd party audits as customer requirements, this puts their overall operations in jeopardy.

United States Code of Federal Regulation, Title 21, Section 110.20(a)states that "(t)he grounds about a food plant under the control of the operator shall be kept in a condition that will protect against the contamination of food."

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In regards to roads, yards, and parking lots, the regulation further specifies that they must be kept in a condition such "that they do not constitute a source of contamination in areas where food is exposed".

21 CFR 110.20 continues to proscribe that if "the plant grounds are bordered by grounds not under the operator's control and not maintained in the manner described in paragraph (a), care shall be exercised in the plant by inspection, extermination, or other means to exclude pests, dirt, and filth that may be a source of food contamination".

In addition to the FDA regulations, most of PGPI's customers require certification with an approved agency of the Global Food Safety Initiative (GFSI). In order to maintain its customer base, PGPI must maintain current and uninterrupted GFSI certification. PGPI is currently certified by the British Retail Consortium (BRC). Specific to the BRC external food manufacturing standards:

> Section 4.1.1 Consideration shall be given to local activities and the site environment, which may have an adverse impact on finished product integrity, and measures shall be taken to prevent contamination. Where measures have been put into place to protect the site (from potential contaminants, flooding etc.), they shall be reviewed in response to any changes.
>
> Section 4.1.2 The external areas shall be maintained in good order. Where buildings are surrounded by grassed or planted areas, they shall be regularly tended and well-maintained. External traffic routes under site control shall be suitably surfaced and maintained in good repair to avoid contamination of the product.

Failure to comply with these and other 3rd party standards could result in loss of certification and thus loss of customers. The Project will result in a source of "pests, dirt and filth" that PGPI may not be able to control, and may increase the overall microbial load to a point where PGPI is no longer able to obtain the necessary certifications for its products.

## V. Response to Dr. Nelson's Comment Letter:

Dr. Nelson's Comment Letter comes to two fundamental conclusions, both of which are inaccurate: "(1) Dr. Deibel's assertions are almost certainly fully incorrect when the refer to 'presence of waste water in the reclamation ponds' or 'annual removal of the processed material in the processing ponds' increasing pathogen loads. (2) Dr. Deibel's conclusions about the impact of 'earth-moving during project construction' or 'dirt from local construction

sites tracked onto Hanson Way' are **in no way specific to the Project**." Without intending to disparage Dr. Nelson, I wish to respond to both of those conclusions.

1) Dr. Nelson bases his first conclusion on tests showing the pH of concrete slurry material, and his conclusion that "conditions in the reclamation ponds will be too alkaline (pH > 9.5)" to allow the growth of pathogens. As a basis for the pH levels he relies on the Report of Findings, State-Wide Portland Cement Concrete Waste, Supplemental Study from 2005. That report did show that the pH of concrete slurry was between 9.5 and 12. However, that report did not test the pH of any concrete slurry reclamation ponds, which is the subject of PGPI's concern. As noted above, the August 14, 2013, Soil Test shows that the pH of the pond material is 8.87, well below the pH level of 9.5 that Dr. Nelson states is the maximum pH level for pathogen growth. Accordingly, even if one were to disregard the peer-reviewed scientific literature summarized in my Table 1 above and to accept Dr. Nelson's opinion as to the alkalinity level that does not allow for pathogen growth, the pathogens at issue will multiply and grow exponentially in the recovery ponds proposed in connection with the Golden State Reclamation Project at the pH levels documented in applicant's August 14, 2013 Soil Test.

Next, the Comment Letter cites no support for the conclusion that pathogen growth cannot occur in pH's higher than 9.5. In fact, that conclusion is contradicted by the research cited above showing that some pathogens can grow at higher pH levels. Finally, Dr. Nelson does not address the fact that several of the pathogens of concern can survive higher pH levels and remain viable, even if they cannot grow at those levels.

Dr. Nelson's first conclusion is contradicted by the Applicant's own test results as well as the available scientific literature.

2) With regards to his second conclusion, Dr. Nelson acknowledges that the pathogens can grow in soil and wastewater, and are spread through fecal contamination. As described above, these facts form the basis of PGPI's concerns about the increased pathogen load. However, Dr. Nelson concludes that the proposed project does not present a concern because "fecal contamination is not, to my knowledge, an issue with the proposed reclamation ponds" and "concern about these three types of bacteria getting into food products should be a general one in the food-processing industry, regardless of specific localized earth-moving and construction activity." He provides no support for either of these conclusions, and does not explain why the fact that pathogen concerns are ubiquitous in the food production industry precludes reasonable mitigating measures in this case.

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In his letter, Dr Douglas Nelson surprisingly states that it "would seem, therefore, to be 'best practices' in the food-processing industry to have filters on air-intake systems that would minimize the impact of these potential pathogens, regardless of how they got into the air." PGPI already complies with the industry standard for air filtration. PGPI's concern is that the increased pathogen load will require a much higher, and more costly and impractical level of filtration.

Next, Dr. Nelson's offhand dismissal of fecal contamination is improper. Open ponds are subject to fecal contamination from area birds, snakes, rodents and insects, As Dr. Nelson admits, fecal contamination is a primary means of spreading the pathogens that are of concern for this project.

As a trained food microbiologist who has spent my entire career servicing food production facilities, the proposed use of the adjacent land has food safety and quality implications for PGPI.

Respectfully submitted,

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**APPENDIX A. Air Filtration Standards and Their Uses**

| EU Filter Classification | US Filter Classification | Particle Size Range ASHRAE 52.2* (µ m) Efficiency % | | | Filter Use |
|---|---|---|---|---|---|
| | | 3-10 | 1-3 | 0.3-1 | |
| G1 | MERV 1-4 | < 20 | | | Primary Filters for Coarse dust |
| G2 | | < 20 | | | |
| G3 | MERV 5 | 20 - 50 | | | |
| G4 | MERV 6-7 | 50 - 70 | | | |
| F5 | MERV 8-9 | > 85 | 50 - 80 | | Secondary Filters for fine dust and some yeasts and molds |
| F6 | MERV 10-12 | > 90 | > 80 | | |
| F7 | MERV 13 | > 90 | > 90 | < 75 | |
| F8 | MERV 14 | > 90 | > 90 | 75 - 85 | |
| F9 | MERV 15 | > 95 | > 95 | 85 - 95 | |
| H10 | | | | | Semi HEPA and HEPA for yeasts, molds and most Bacteria |
| H11 | MERV 16 | > 95 | > 95 | > 95 | |
| H12 | | | | | |
| H13 | MERV 18 | | | > 99.97 | |
| H14 | | | | > 99.99 | |
| U15 | | | | > 99.999 | ULPA ultra high efficiency |
| U16 | | | | >99.9999 | |
| U17 | | | | | |

* American Society of Heating, Refrigeration, and Air Conditioning Engineers Standard 52.2-2007

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**APPENDIX B*. Recommended Air Filtration by Processing Room / Product Sensitivity**

| AREA / ROOM | Pre-Filter Efficiency @ 1 Micron | Pre-Filter Grade (US) | Final Filter Efficiency @ 1 Micron | Final Filter Grade (US) | Room Air Changes per Hour | % Outside Make Up Air |
|---|---|---|---|---|---|---|
| High Risk Packaging / Conveying | 70 – 80% | MERV 8 | 99.97% @ 0.3 µ | MERV 18 | 20 | 10 – 20% |
| High Risk Processing Rooms | 70 – 80% | MERV 8 | 90 – 95% | MERV 15 | 10 – 12 | 10 – 20% |
| Ready – to – Eat Processing Rooms | 70 – 80% | MERV 8 | 90 – 95% | MERV 15 | 8 – 10 | 10 – 20% |
| Not Ready-to-Eat Processing Rooms | 70 – 80% | MERV 8 | 90 – 95% | MERV 14 – 15 | 8 – 10 | 10 – 20% |
| CIP / COP Room | 70 – 80% | MERV 8 | 90 – 95% | MERV 14 – 15 | Single Pass | 100% |
| Raw Ingredient Storage | NA | NA | 50% | MERV 7 – 8 | NA | 100% |

***Best practices adopted from Kraft Foods, Nestle and Leprino Foods internal guidelines.**

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