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May 28, 2013

VIA ELECTRONIC MAIL AND FEDERAL EXPRESS

Ms. Dyan Whyte
Assistant Executive Officer
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, California 94612

Re: *Submittal of Site-Specific Ceriodaphnia TRE Workplan – January 22, 2013 Water Code section 13267 Order, Order No. R2-2013-1005, Directive 8*

Dear Ms. Whyte:

Enclosed, pursuant to the Regional Water Quality Control Board, San Francisco Bay Region's, ("Regional Water Board") January 22, 2013 Water Code section 13267 Order, Order No. R2-2013-1005, ("Order"), as modified per the parties' discussions, Lehigh Southwest Cement Company ("Lehigh") timely encloses the Toxicity Reduction Evaluation Work Plan for Ceriodaphnia Dubia in accordance with Directive 8 of the Order. If you or your staff have any questions regarding the enclosed Work Plan, or would like to discuss further, please do not hesitate to contact me or Greg Knapp at Lehigh, or Mike Bryan and Ben Giudice of RBI..

Very truly yours,

Nicole E. Granquist

Enclosure

Cc: Brian Thompson, Regional Water Quality Control Board, San Francisco Bay Region
Ellen Howard, Counsel, State Water Resources Control Board
Greg Knapp, Director Environmental Region West, Lehigh
Michael Hyer, General Counsel, Lehigh Hanson

TOXICITY REDUCTION EVALUATION WORK PLAN FOR *CERIODAPHNIA DUBIA* PERMANENTE QUARRY AND CEMENT PLANT LEHIGH SOUTHWEST CEMENT COMPANY

Prepared for:

REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

On Behalf of:

LEHIGH SOUTHWEST CEMENT COMPANY

Prepared *by:*

ROBERTSON - BRYAN, INC.
Solutions for Progress

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May 2013

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1 INTRODUCTION

1.1 Facility Background

The Lehigh Southwest Cement Company (Lehigh) operates the Permanente Quarry and Cement Plant (Permanente Facility) within the drainage of Permanente Creek in southwestern Santa Clara County, California. The discharge of quarry water and other facility process and storm water is currently regulated by a general National Pollutant Discharge Elimination System (NPDES) permit for discharges from sand and gravel mining operations (San Francisco Bay Regional Water Quality Control Board (RWQCB) Order R2-2008-0011; NPDES general permit number CAG982001) and a general NPDES permit for stormwater discharges associated with an industrial activity (State Water Resources Control Board (SWRCB) Order No. 97-03-DWQ). In the near future, the Regional Water Board intends to regulate discharges at the Permanente Facility through a facility-specific individual NPDES permit. Most recently, the RWQCB has issued a 13267 Investigative Order directing Lehigh to compile and submit technical and monitoring reports pertaining to discharge water quality, including monitoring for chronic toxicity and a program for toxicity reduction evaluation (TRE).

The Permanente Facility is located in the southern headwater area of the Permanente Creek watershed, which encompasses approximately 3.9 square miles of steep, upland terrain. Flow in Permanente Creek generally rises in the late fall or early winter and then recedes to base flow during the spring and summer. Permanente Creek is a perennial flowing stream in most years, but during particularly dry years, the creek has ceased to flow in the summer or early winter (Santa Clara County 2011).

In the reach adjacent to the Permanente Facility, the Permanente Creek alignment has been straightened in some areas and portions of the creek are contained within a culvert or open concrete-lined channel. Permanente Creek is typically perennial at the upstream end of the property; however, over the middle section of the site (i.e., south of the quarry pit), the creek flows only intermittently. Downstream of the intermittent reach, discharges from the quarry supplement or provide for the entirety of flow in Permanente Creek, which helps to keep the flow regime largely perennial.

Discharges from the Permanente Facility to Permanente Creek consist of quarry discharge (ground and storm water entering the quarry that is pumped out), process water, and storm water associated with industrial activities. The 13267 Investigative Order specifies chronic toxicity monitoring for four on-site ponds. The source and characteristics of water in these ponds is summarized in **Table 1**.

Pond 4A is located off-stream and adjacent to Permanente Creek. This pond primarily receives drainage water from the quarry pit, but also receives an intermittent and small volume of water from the primary crusher. Pond 9 is similarly located off-stream and adjacent to Permanente Creek. This pond receives process and storm water from Pond 11 (intermittently) at the cement plant and storm water from the areas immediately adjacent to Pond 9.

Table 1. Characteristics of Permanente Facility Ponds Subject to Chronic Toxicity Testing Provisions of 13267 Investigative Order.

Pond Name	Type of Water	Period / Frequency of Release
Pond 4A	Groundwater and storm water that enters the quarry and primary crusher wash water	Daily
Pond 13	Permanente Creek. During dry season water is primarily that released from upstream Pond 4A	Daily
Pond 9	Cement Plant process water from Pond 11 (intermittent) and storm water	Intermittent in response to inflow
Pond 14	Permanente Creek. During dry season, water is primarily a mix of Pond 4A and Pond 9 proportional to their respective release volumes. Volume of Permanente Creek entering Pond 14 is regulated by an upstream diversion structure that bypasses the majority of flow around Pond 14.	Daily, depending on upstream flow diversion

Low dams on the channel of Permanente Creek create Ponds 13 and 14. In the case of Pond 14, a diversion structure immediately upstream of Pond 14 diverts the majority of flow around Pond 14 via a bypass channel that is considered the mainstem of Permanente Creek. During the dry season, Permanente Creek immediately upstream of Pond 13 is dry except when Pond 4A is discharging. As such, during the dry season, Pond 13 water is similar in chemical composition to that of Pond 4A. Typical operations at Pond 4A include daily continuous releases of water. However, in cases of maintenance activities or power outages that affect pumping from the quarry pit, Pond 4A may not release for periods of several days or more.

When inflows are sufficient to cause Pond 9 to release water into Permanente Creek, this released water mixes with water released from Pond 4A into Permanente Creek and Pond 13. This combined water ultimately flows to Pond 14. As such, during the dry season when there is no or very low ambient upstream Permanente Creek flow, Pond 13 shares similar water chemistry to Pond 4A, and Pond 14 shares a blended water chemistry between Pond 4A and Pond 9.

1.2 Chronic Toxicity Background

Whole effluent toxicity (WET) testing is a monitoring component of Lehigh's 13267 Investigative Order. Chronic three-species WET testing utilizing the green algae *Selenastrum capricornutum*, the fathead minnow (*Pimephales promelas*) and the water flea (*Ceriodaphnia dubia*) is required on a quarterly basis. WET testing was initiated in the first quarter of 2013. Samples of site water from Pond 4A, Pond 13, and Pond 14 collected on March 25, 2013, with renewal samples collected on March 27, and March 29, exceeded the single sample maximum WET monitoring trigger of >2 chronic toxicity units (TUc; expressed as $100/EC_{25}$ or IC_{25}) in the *Ceriodaphnia dubia* test. This exceedance of the WET monitoring trigger initiated accelerated monitoring and the preparation of this toxicity event-specific TRE Work Plan. Toxicity was not observed in Pond 9 for any of the three test species, nor was toxicity observed for fathead minnow or green algae in first quarter 2013 samples from Pond 4A, Pond 13, or Pond 14.

1.3 Purpose and Use of Report

Section 8 of the 13267 Investigative Order describes activities related to chronic WET monitoring. In accordance with the requirements of the 13267 Investigative Order, a general TRE Work Plan was prepared and submitted in May 2013 (RBI, 2013). The general TRE Work Plan provides an initial framework for investigating the causes and sources of chronic toxicity in Ponds 4A, Pond 9, Pond 13, and Pond 14. As required in the 13267 Investigative Order, a toxicity event-specific TRE Work Plan is to be prepared following a chronic toxicity event of magnitude exceeding a WET monitoring trigger. In such cases, the 13267 Investigative Order specifically states:

> *Within thirty (30) days of exceeding either chronic toxicity trigger, the Discharger shall submit to the Regional Water Board a TRE work plan, which shall be the general work plan revised as appropriate for the toxicity event and after consideration of available discharge data.*

Notice of the observed toxicity to *Ceriodaphnia dubia* in Ponds 4A, Ponds 13, and Pond 14 was provided by Lehigh's contract bioassay laboratory on April 26, 2013. As such, this document represents Lehigh's toxicity event-specific TRE Work Plan for *Ceriodaphnia dubia* toxicity observed in Pond 4A, Pond 13, and Pond 14 site waters.

The purpose of this TRE Work Plan for *Ceriodaphnia dubia* toxicity is twofold, 1) to comply with the 13267 Investigative Order requirement for a TRE Work Plan specific to the observed toxicity event, and 2) to guide subsequent WET monitoring activities and other actions in response to exceedence of the WET monitoring trigger, including activities during periods of accelerated monitoring and a future possible TRE. This TRE Work Plan builds upon the specific general guidance provided in Lehigh's general TRE Work Plan (RBI, 2013), and is to be specifically used to guide all future near-term activities based on a foundation of gathered data relevant to the noted toxicity observed in March 2013.

This Work Plan is presented in three parts, 1) initial investigative actions and findings, 2) suspected cause of toxicity and next steps, and 3) reporting. As discussed in greater detail in the general TRE Work Plan, initial investigative actions include:

- Evaluation of bioassay test performance
- Initial site water screening, information gathering. and data acquisition
- Initial facility performance review

Based on the findings of these initial investigative actions, the suspected cause or source of toxicity is discussed, and a plan for further investigation is presented. Given the early stage of monitoring and investigative activities, toxicity source evaluation, and toxicity control evaluation are not specifically addressed in this TRE Work Plan. However, a plan of reporting progress to the San Francisco Bay Regional Water Quality Control Board (RWQCB), including future addendums of this toxicity event-specific TRE Work Plan, is provided.

2 INITIAL INVESTIGATIVE ACTIONS AND FINDINGS

2.1 Ceriodaphnia dubia Bioassay Performance Evaluation

Results for March 2013 *Ceriodaphnia dubia* chronic WET tests are summarized in **Table 2**. All toxicity testing was conducted by Pacific EcoRisk, located in Fairfield, California. Serial dilutions were prepared with laboratory control water. Tests met all method specified test acceptability criteria. There was greater than 80% survival of control organisms and an average of 15 or more young per surviving female in the control solution. Greater than 60% of surviving control females produced three broods of young. The concurrent reference toxicant test and percent minimum significant difference (PMSD) for the tests were within method specified limits. All test conditions were within normal limits. Samples were utilized for testing within the method specified hold time of 36 hours and were kept chilled at <6°C between use for renewal. Bioassay test results are considered reliable.

Table 2. Survival (%) and Reproduction (neonates/female) Results for *Ceriodaphnia dubia* Chronic Toxicity Testing Conducted March 2013.

Site Water Concentration	Pond 4A		Pond 13		Pond 14	
	Survival	Reproduction	Survival	Reproduction	Survival	Reproduction
Hardness Blank	100	10.3	100	10.3	100	10.3
Laboratory Control	100	28.3	100	26.3	100	27.4
6.25%	100	21.0*	70	15.1*	100	31.4
12.5%	90	8.2*	70	7.0*	100	32.1
25%	40*	5.0*	10*	5.1*	100	28.1
50%	0*	3.8*	10*	3.6*	100	18.9*
100%	0*	0.7*	0*	0.9*	80	16.8*
NOEC	12.5%	<6.25%	12.5%	<6.25%	100%	25.0%
EC_{25}/IC_{25}	16.6%	6.1%	6.9%	3.7%	>100%	39.6%
EC_{50}/IC_{50}	21.6%	9.6%	12.7%	7.8%	>100%	>100%
TUc ($100/EC_{25}$-IC_{25})	6.0	16.5	14.5	27.3	<1	2.5
100% Site Water Survival at 96 hr	10%		30%		100%	

* statistically significant ($p<0.05$) reduction relative to laboratory control
NOEC no observable effect concentration
EC_{25}/IC_{25} effective or inhibition concentration at 25%
EC_{50}/IC_{50} effective or inhibition concentration at 50%

Measurement of standard initial water quality parameters indicated high electrical conductivity (approximately 1200-1400 µS/cm) and very high hardness (approximately 600-750 mg/L as $CaCO_3$). Concerns regarding ion balance prompted testing of a hardness blank. The hardness blank was prepared following standard method protocols, utilizing reagent grade salts of

calcium, magnesium, sodium and potassium. The hardness blank was prepared to a representative hardness of 650 mg/L (as $CaCO_3$).

As shown in **Figure 1**, the observed concentration-response relationships are non-monotonic, and fit a toxicological pattern of increasing effect with increasing concentration (e.g., dose) of site water. The exception to this trend is *Ceriodaphnia dubia* reproduction in Pond 14, where reproductive output was enhanced at the 6.25% and 12.5% dilutions. This pattern of stimulation at lower concentrations of site water is not uncommon, and is often related to the presence of macro or micro nutrients in the site water that are at concentrations greater than in the control and that provide added benefit to the organism.

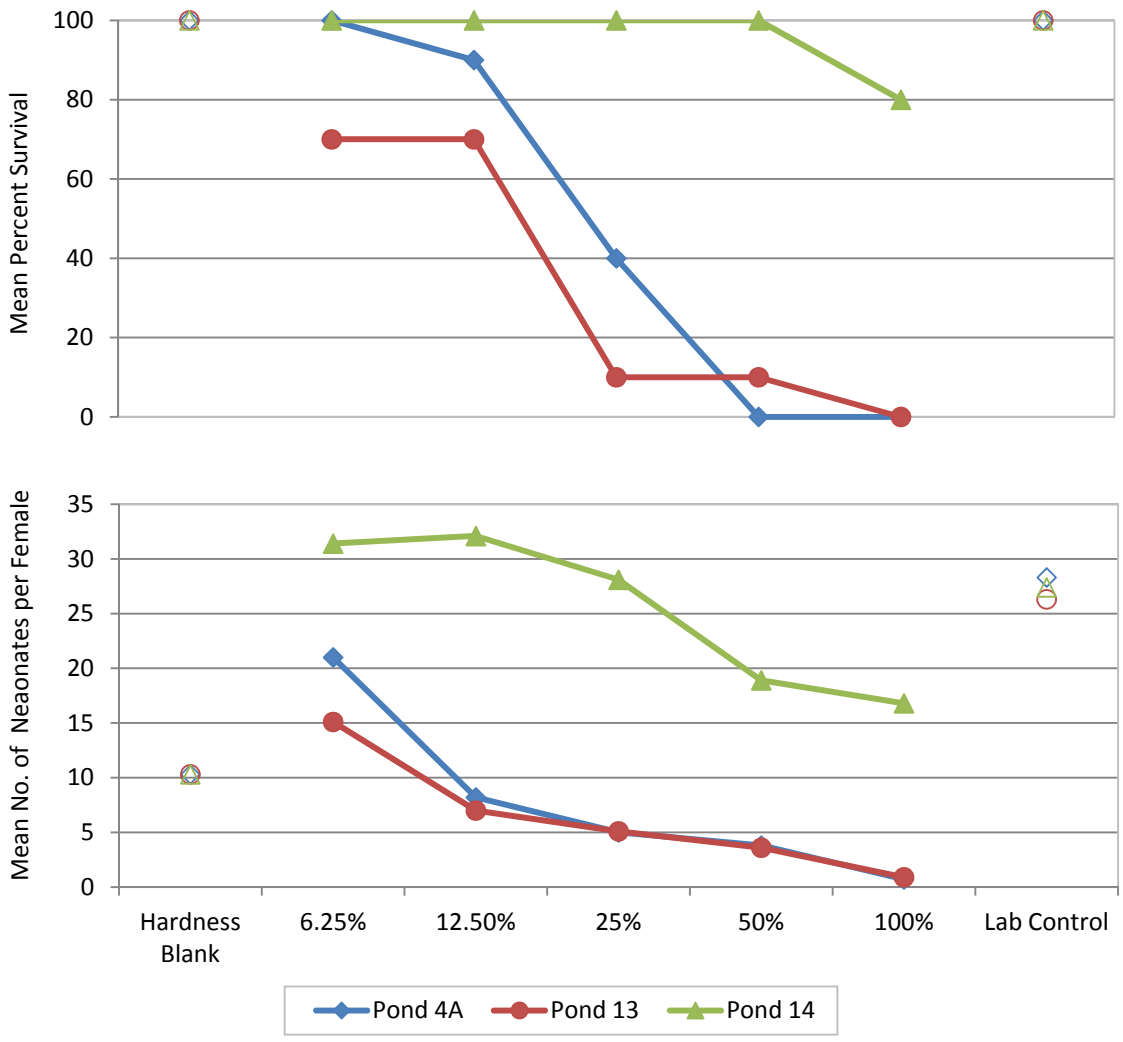

Figure 1. March 2013 pond water concentration-response relationships for *Ceriodaphnia dubia* survival and reproduction endpoints.

2.2 Site Water Screening

Recent pond water quality data was compiled for evaluation. In addition, aliquots of composited pond water (i.e., equal volume composites of pond samples collected on March 25, March 27, and March 29) were analyzed for trace metals and standard minerals. Data are presented in **Table 3** and **Table 4**.

Although no single trace metal constituent exceeded its lowest hardness-based aquatic life criteria, some elements were substantially elevated in all three ponds relative to representative aquifer waters collected across dry climate regions of the United States (Ayotte et al., 2011). These elevated constituents included aluminum, antimony, molybdenum, nickel, selenium and vanadium.

Total dissolved solids and sulfate are also elevated, both of which are important in toxicity to freshwater organisms. The observed effects in the hardness blank demonstrate the importance of bulk ions as a direct toxicant or added stressor toward *Ceriodaphnia dubia* survival and reproduction.

2.3 Initial Facilities Performance Review

An initial facility performance review indicated that a single non-routine activity occurred during the period of toxicity sampling. On March 28, 2013, there was an operational failure with the quarry sediment filters that resulted in a brief discharge of high suspended solids to Pond 4A, which was subsequently cured. However, this brief operational upset is not believed to have caused or significantly contributed to observed toxicity. As indicated in Table 2, 90% mortality occurred within the first 96 hours of exposure to Pond 4A water, and prior to use of any potentially affected sample collected on March 29, 2013.

All other activities and operations at the Permanente Facility were routine and within normal operating parameters for the facility.

3 SUSPECTED SOURCE OF EFFLUENT TOXICITY TO CERIODAPHNIA DUBIA AND NEXT STEPS

As indicated in Table 2, toxicity in Pond 4A and Pond 13 was rapid and substantial, with near complete mortality of *Ceriodaphnia dubia* within 96 hours. As shown in Table 2 and Figure 1, effects were greatest in Pond 4A, diminished slightly in Pond 13, and diminished substantially in Pond 14. This trend in decreasing magnitude of toxicity is very likely related to the specific hydrologic regime present during the time of sampling, where there was insignificant upstream ambient flow in Permanente Creek to dilute water released from Pond 4A, and thus water in Pond 13 was directly sourced to Pond 4A. During sampling, Pond 9 was releasing water, which appears to have combined and diluted water released from Pond 13 prior to entering Pond 14.

Table 3. Trace Metals in Pond Water for March 2013.

Parameter	Units	PQL	Pond 4A		Pond 13	Pond 14	90th Percentile Dry Climate Aquifer Concentration[1]
			3/21/2013	WET Sample	WET Sample	WET Sample	
Aluminum	µg/L	10		87	310	72	5.0
Antimony	µg/L	0.5	4.5	4.4	3.6	2.0	<1
Arsenic	µg/L	0.5	1.6	2.0	1.7	0.92	11
Barium	µg/L	0.5	32	32	45	57	200
Beryllium	µg/L	0.1	ND	ND	ND	ND	<1
Boron	µg/L	50		64	69	68	300
Cadmium	µg/L	0.1	0.64	0.57	0.30	ND	<1
Chromium	µg/L	0.5	0.55	0.86	2.0	1.5	5.4
Cobalt	µg/L	0.1	1.3	0.93	1.8	0.48	1.0
Copper	µg/L	0.5	0.88	0.92	2.8	0.89	6.0
Iron	µg/L	100		170	610	120	360
Lead	µg/L	0.25	ND	ND	ND	ND	0.61
Manganese	µg/L	20		ND	54	57	350
Mercury	ng/L	0.5		ND	ND	0.9	
Molybdenum	µg/L	2.5	360	380	330	240	11
Nickel	µg/L	0.5	61	66	100	19	5.0
Selenium	µg/L	1	28	37	33	25	6.8
Silver	µg/L	0.1	ND	ND	ND	ND	<1
Strontium	µg/L	50		690	720	720	3,600
Thallium	µg/L	0.1	0.19	0.17	0.16	0.26	<1
Tin	µg/L	1		ND	ND	ND	
Vanadium	µg/L	10	130	170	150	45	39
Zinc	µg/L	5	44	37	22	ND	87

Notes:

PQL practical quantification limit
ND not detected at or above the PQL

All metals are total recoverable. Sample collected on 3/21/2013 is a 24 hour composite sample. WET sample is an equal volume composite of grab samples used for chronic toxicity testing collected on March 25, March 27, and March 29, 2013. Blank cells indicate that parameter was not measured.

[1] Ayotte et al., 2011

Table 4. Critical Minerals and Bulk Ions in Pond Water for March 2013.

Parameter	Units	PQL	Pond 4A	Pond 13	Pond 14
			WET Sample	WET Sample	WET Sample
Calcium	mg/L	1	200	200	170
Magnesium	mg/L	1	38	38	44
Potassium	mg/L	1	1.4	1.4	6.4
Sodium	mg/L	1	20	20	30
Bicarbonate	mg/L	5	210	180	210
Carbonate	mg/L	5	ND	ND	ND
Hydroxide	mg/L	1	ND	ND	ND
Total Dissolved Solids	mg/L	10	1100	1000	1000
Bicarbonate Alkalinity ($CaCO_3$)	mg/L	5	180	140	170
Carbonate Alkalinity ($CaCO_3$)	mg/L	5	ND	ND	ND
Hydroxide Alkalinity ($CaCO_3$)	mg/L	5	ND	ND	ND
Total Alkalinity ($CaCO_3$)	mg/L	5	180	140	170
Phosphorus, Total	mg/L	0.1	ND	ND	ND
Nitrate (NO_3)	mg/L	1.0	ND	ND	ND
Bromide	mg/L	0.025	0.056	0.077	0.14
Chloride	mg/L	0.5	12	12	28
Fluoride	mg/L	0.1	0.15	0.12	0.21
Sulfate (SO_4)	mg/L	10	560	550	530

Notes:

PQL practical quantification limit
ND not detected at or above the PQL

All metals are total recoverable. Sample collected on 3/21/2013 is a 24 hour composite sample. WET sample is an equal volume composite of grab samples used for chronic toxicity testing collected on March 25, March 27, and March 29, 2013. Blank cells indicate that parameter was not measured.

All available evidence points to Pond 4A as the source of observed toxicity. The trend in diminishing Pond 4A chronic toxicity with downstream travel distance is supported by chemical analysis of the pond water samples used in chronic toxicity testing. As shown in Table 3 and Table 4, trace metal and bulk ion chemical signatures are virtually identical between Pond 4A and Pond 13, as are the toxicity profiles (see Figure 1). Moreover, given the nature of the quarry operation and the chemical composition of quarry discharge water, it is likely that the active toxicant(s) are metals, ion imbalance, or some combination of both.

Based on the results of the March 2013 *Ceriodaphnia dubia* bioassay performance evaluation, site water screening, and the facility performance review discussed above, the source of observed chronic *Ceriodaphnia dubia* toxicity is believed to be related to Pond 4A, and more specifically either the quarry water discharge, the primary crusher discharge, or some combination of both discharges to Pond 4A. While inflows to Pond 4A during the time of March 2013 sampling were primarily quarry water, intermittent discharge from the primary crusher were also observed and, therefore, the primary crusher as a possible source of toxicity cannot entirely be ruled out. As such, the present working hypothesis for the observed toxicity is formulated as such:

> *Recent Ceriodaphnia dubia toxicity in Pond 4A, Pond 13, and Pond 14 is directly associated with quarry water and/or primary crusher discharges to Pond 4A. The likely toxicant(s) are metals, ion imbalance, or some combination of both.*

Because the magnitude of observed toxicity is acute and substantial, and the nature of facility operations and sources of discharged water are relatively static, a formal TRE is expected to be triggered during the next round of sampling (i.e., accelerated monitoring event No. 1). Therefore, future planned TRE related activities are designed around this working hypothesis, and are discussed in the following subsections.

3.1 Continued and Ongoing Facilities Performance Review and Non-WET Monitoring

Facilities performance review is an on-going process, and will continue through the *Ceriodaphnia dubia* TRE process. Chemical constituent monitoring will continue as planned and scheduled per the Sand and Gravel NPDES permit and the 13267 Investigative Order. Additional chemical constituent monitoring beyond that specified in the NPDES permit and 13267 Investigative Order is currently not proposed, but may be added as directed by the TRE investigative process.

3.2 TRE WET Monitoring and TIE Trigger and Procedures

Monthly accelerated monitoring for *Ceriodaphnia dubia* chronic WET testing will continue at Pond 4A, Pond 13, and Pond 14 until a TRE is triggered. Results from the initial sampling event described above indicate that Pond 4A is the likely source of toxicity. Therefore, consistent with Lehigh's general TRE Work Plan, if accelerated monitoring confirms this finding, Pond 4A will be the focus of TIEs at the outset of the TRE. March 2013 toxicity in Pond 4A was greater than 4 TUc with inhibition greater than 50% in undiluted site water (i.e., 100% Pond 4A). As discussed in Lehigh's general TRE Work Plan, even though initiation of a formal TRE will not have yet occurred at the time of sampling for the first accelerated monitoring event, scheduled for May 2013, additional samples at Pond 4A will be collected during that round of sampling for

performance of a comprehensive Phase I toxicity identification evaluation (TIE), if toxicity is observed in the sample.

For the immediate near-term, sampling of Pond 4A for TRE-related WET testing and forensic TIE is scheduled for May (the first accelerated monitoring event) and June 2013 (either the second accelerated monitoring event, or the first sample of the formal TRE). For baseline WET testing, serial dilutions will be prepared with laboratory control water and with a dilution schedule of 100%, 50%, 25%, 12.5% and 6.25% site water. A reference toxicant test will be conducted for each WET test, and test performance will be validated against standard quality control metrics and test acceptability criteria.

An initial Phase I TIE will be performed on Pond 4A site water collected in May 2013 if WET test results for *Ceriodaphnia dubia* reproduction exceed a TIE trigger of 2 TUc with a relative effect level of >50% reduction in average neonates/female, relative to the control, in undiluted Pond 4A site water. Observed toxicity greater than this TIE trigger has a higher probability of developing useful information from the TIE procedures.

The initial Phase I TIE will be comprehensive, and will target all typical classes of potential toxicant. The initial Phase I TIE will include all of the treatments listed in **Table 5**. Several listed treatments overlap in target toxicant class, but individually confirm and corroborate each other and assist with narrowing the potential list of toxicants within the class. If applicable, aliquots of those treatments that successfully identify a toxicant class will be subject to targeted chemical analysis for preliminary toxicant identification.

Table 5. Initial Phase I TIE Treatments and Targeted Toxicant Classes.

TIE Treatment	Target Toxicant Class
Aeration	Volatiles, oxidizable compounds, semivolatiles with pH adjustment
Filtration/Centrifugation	Physical matrix and particle effects
pH adjustment	Organic acids/bases, metals speciation
Anion/Cation Exchange	Charged ions
Zeolite	Charged ions, ammonia
C_{18} Solid Phase Extraction	Non-polar organics
Ethylenediaminetetraacetate (EDTA)	Cationic metals
Sodium Thiosulfate (STS)	Oxidizable compounds and cationic metals
Piperonylbutoxide (PBO)	Synergist/Antagonist of insecticides (pyrethroid and organophosphate insecticides)
Carboxylesterase	Insecticides and organics with ester bond linkages (organophosphate insecticides)
Bovine Serum Albumin	Nonpolar organic adsorbant

Upon completion of the initial Phase 1 TIE, results will be evaluated to determine if a toxicant class(es) can be identified. Upon completion of this evaluation, additional targeted Phase I TIE experiments will be developed and scheduled for the same sample, or a new sample, depending on expected toxicant stability, remaining sample volume, and the specific initial Phase I TIE result. Based on the strength of evidence generated through the initial and/or subsequent TIEs,

experiments will be conducted to confirm the identified toxicant(s). Experiments may include toxicant removal and add back, serial additions and/or toxicant spiking experiments.

In addition to TIEs, experiments may be conducted with synthetic site water. Given the high dissolved solids, hardness, and sulfate content of Pond 4A site water, toxicity due to ion imbalance may be occurring. Evidence for such effects is supported by the hardness blank test conducted along with WET testing in March 2013. Synthesizing a site water based on actual measured chemical composition of Pond 4A sample will allow specific investigation into possible ion effects. Possible experiments could include comparison of concentration-response relationships from diluting site water with laboratory control water alongside site water diluted with synthetic effluent.

In summary, all TRE-related WET testing and TIE work will be conducted on an evidence driven basis. Evidence and data developed through the forensic TRE process, including TIE testing, will determine next steps and associated schedule for TRE actions. Given issues of possible toxicant stability and necessary sample volume, sampling for experimentation as described above is anticipated to be conducted on an approximate once per month schedule, the frequency of which will be accelerated or reduced pending findings from initial TRE activities.

3.3 Accelerated Monitoring and Continued 13267 Investigative Order Prescribed Monitoring

As required in Lehigh's 13267 Investigative Order, observed chronic toxicity to *Ceriodaphnia dubia* in Pond 4A, Pond 13, and Pond 14 triggers accelerated monitoring. Accelerated monitoring includes monthly WET testing for three consecutive months for the affected species in the affected ponds. If, during accelerated monitoring, the WET trigger is exceeded again, a TRE is initiated. If, after three accelerated monitoring events, the WET trigger is not exceeded, monitoring for the affected species may return to a routine quarterly schedule.

As previously discussed, it is expected that the first accelerated monitoring event scheduled for May 2013 will trigger a TRE for *Ceriodaphnia dubia* in Pond 4A, Pond 13, and possibly Pond 14. As stated in the 13267 Investigative Order, TRE-related WET testing and forensic TIE analysis will satisfy routine and accelerated monitoring requirements for *Ceriodaphnia dubia* in the ponds covered by the TRE.

> *Monitoring conducted pursuant to a TRE, for the species being investigated by the TRE, shall satisfy the requirements for routine and accelerated monitoring while the TRE investigation is underway. Routine monitoring shall continue to be conducted according to the quarterly schedule for one year for the other species not being evaluated under the TRE.*

Based on the outcome of accelerated monitoring for *Ceriodaphina dubia* in Pond 4A, Pond 13, and Pond 14, Lehigh will continue with routine quarterly WET monitoring of all applicable ponds. For the ponds subject to a TRE, continued WET monitoring with the TRE covered species will be based on the schedule provided in the attendant TRE Work Plan.

3.4 Pilot Treatment Plant Influent/Effluent Testing

Lehigh is currently pilot-testing a treatment system design that will be the basis of the full-scale design of treatment facilities to be constructed in 2014. While the pilot-testing is still underway (i.e., prior to mid-August), experiments will be performed on influent and effluent from the pilot treatment system, to investigate whether the current treatment design reduces or eliminates chronic toxicity to *Ceriodaphina*. Results of the toxicity testing, along with concurrent chemistry data, will be used in part to identify the nature of the toxicant, and in part to determine whether a toxicity control strategy is already part of the current design.

3.5 Mitigation and Prevention Activities Schedule

Further investigation under this TRE Work Plan will be necessary before mitigation and prevention activities, aside from the treatment system investigation identified above and the treatment facilities Lehigh is already designing consistent with the recent proposed Consent Decree, can be identified. In such a case, mitigation and prevention activities, and associated schedules, will be provided when potential causes and/or sources of toxicity can be more assuredly identified. As discussed in Lehigh's general TRE Work Plan, once toxicity has been identified and controlled at its source, confirmatory tests will be conducted on other ponds in the TRE to verify that toxicity is no longer present.

4 REPORTING

Lehigh will report on activities to the RWQCB: 1) following the completion of accelerated monitoring that indicates frequent toxicity is not occurring and thus a return to routine monitoring is warranted, or 2) in the third quarter of 2013, should *Ceriodaphnia dubia* toxicity greater than the WET monitoring triggers formally initiate a TRE. In the first case, Lehigh will communicate to the RWQCB its intent to return to routine quarterly monitoring for *Ceriodaphnia dubia*. In the second case, an Addendum will be prepared to this specific TRE Work Plan, that will add information obtained from the accelerated monitoring and any related actions, and submitted to the RWQCB. The TRE Work Plan Addendum will summarize all TRE activities accomplished to date, including any forensic TIE, and provide a revised schedule for TRE activities in the future.

5 REFERENCES

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