September 9, 2008

Mr. Bob Morris
Senior WRC Engineer – Orange/Riverside Co. Groundwater Unit
San Diego Regional Water Quality Control Board
9174 Sky Park, Suite 100
San Diego, CA 92123 - 4340

Subject: **Supplement to Tentative Order No. R9-2008-0081 (section A.3)**
SDRWQCB WDR permit
ARCO Facility No. 3102
23921 Alicia Parkway
Mission Viejo, California

DELTA

Dear Mr. Morris:

Delta Consultants, on behalf of Atlantic Richfield Company, has prepared this correspondence to add surfactant injection to the original WDR permit application for sulfate injection (Tentative Order No. R9-2008-0081 scheduled for October 8, 2008). The Orange County Health Care Agency has recently approved surfactant flushing to help remediate the site, and therefore, Delta would like to have surfactant injection added to Tentative Order No. R9-2008-0081. The information and documentation requested in Section A.3 (a – i) is provided below. In addition, Delta is also providing the Work Plan for Sulfate Injection Pilot Test, the Addendum to Work Plan for Sulfate Injection Pilot Test, and the MSDS for sulfate as a reference.

Included in this correspondence are the following:

- 3.a – A copy of the Revised Corrective Action Plan (RCAP) dated June 28, 2007, is included as Attachment A.
- 3.b – A description of site specific hydrogeologic characteristics, including significant water bearing zones and aquitards, is in section 2.3 and 2.4 of the RCAP (Attachment A). Hydraulic conductivity for the site is approximately 1×10^{-5} cm/s.
- 3.c – See sections 2.3 and 2.4 of the RCAP (Attachment A)
- 3.d – See figures 4, 5, and 6 of the Quarterly Monitoring Report (Attachment B)
- 3.e – See section 2.3 of the RCAP (Attachment A)
- 3.f – The MSDS for the sulfate and surfactant that will be used is included as Attachment C. Additional information about the surfactant, EnviroClean, is in Appendix C of the RCAP (Attachment A).
- 3.g – See the work plans (Attachment D)
- 3.h – See section 2.5 of the RCAP (Attachment A)
- 3.I – See the work plans (Attachment D)

a member of: Inogen Environmental Alliance

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If you have any questions or require additional information, please contact me by phone at (949) 623-3234, or by email at abaird@deltaenv.com.

Sincerely,

DELTA CONSULTANTS

Aaron Baird
Project Manager

Attachments:

Revised Corrective Action Plan dated June 28, 2007 (Attachment A)
Quarterly Monitoring Report dated June 5, 2008 (Attachment B)
Material Safety Data Sheets (Attachment C)
Work Plans (Attachment D)

1. Work Plan for Surfactant Flushing dated September 2, 2008
2. Work Plan for Sulfate Injection Pilot Test dated September 7, 2007
3. Addendum to Work Plan for Sulfate Injection Pilot Test dated June 12, 2008

OnMaterials™

1425 Russ Blvd., Suite T-107E
San Diego, California 92101

Manufacturer of Z-Loy™ Nanoscale Materials for Environmental Remediation

29 September 2008

RE: *R9-2008-0081*

Thank you for taking the time to talk to me about the upcoming order that will prescribe waste discharge requirements for the discharge of amendments for in-situ biological, chemical, and physical treatment of contaminated groundwater.

I would like the order specifically address a couple of items in the section "Conditions of Eligibility" on page 3. This section includes a part that describes amendments that create reducing conditions. There are 4 points that I would like to see clarified. The first is with point (i) Zero Valent Iron. Please consider changing this to (i) Zero Valent Metals, including iron, aluminum, and magnesium. Both aluminum and magnesium provide greater reactive potentials (lower oxygen-reduction potentials, ORPs), and both have lower densities. This subset of metals have field implementations combined with biological remediation in multiple states.

The second point is the addition of propylene glycol included in the easily degraded carbon sources. Propylene glycol is an effective carbon source and has been used in Pittsburg, CA for bioremediation.

The third point is the addition of buffer solutions, and in particular calcium carbonate, sodium bicarbonate, and sodium tetraborate (borax). Each of the buffers are used in household applications in large quantities.

The fourth point is the addition of hydrogenation catalysts for reactive metals. Hydrogenation catalysts change the degradation pathways for reductive dechlorination in trichloroethylene. For example, adding 0.02% Pd to iron and/or aluminum metal powders. Hydrogenation catalysts include palladium and silver. I have provided a few slides presented at the ESTCP conference in Washington, D.C. in December 2007. The important point to take from this work is that a small additions of hydrogenation catalysts provides a pathway to complete degradation while minimizing daughter product formation. Often, daughter products are as toxic or more toxic than their parent compounds.

Pd Catalyzed Reactions

⇨ **The most effective dehalogenation involves Pd catalyzed reactions**

Example: TCE to Ethane

$$4\ Fe\ (s) + 5\ H^{+}\ (aq) \rightarrow 4\ Fe^{+2}\ (aq) + 5/2\ H_2\ (aq)$$

$$C_2HCl_3\ (aq) + 5/2\ H_2\ (aq) \xrightarrow{Pd} C_2H_6\ (aq) + 3\ Cl\text{-}\ (aq)$$

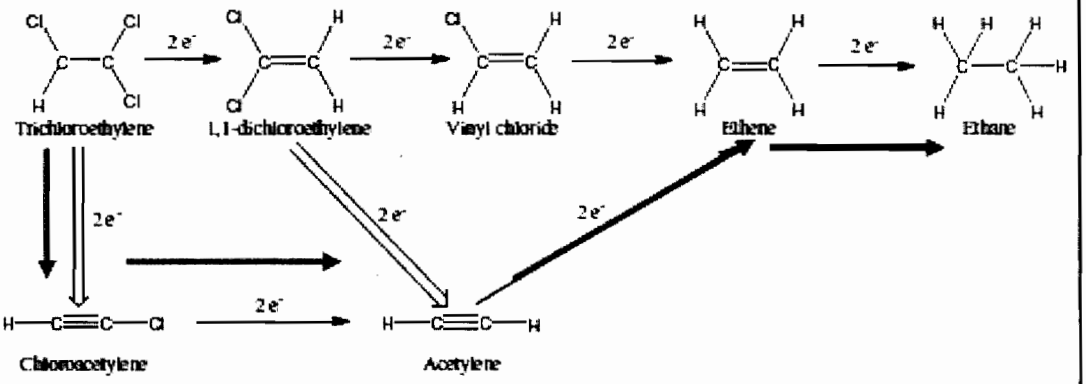
$$4\ Fe(s) + C_2HCl_3(aq) + 5\ H^{+}(aq) \rightarrow 4\ Fe^{+2}(aq) + C_2H_6(aq) + 3\ Cl^{-}(aq)$$

⇨**Pd- provides greatly accelerated reaction kinetics**

⇨**Pd-provides preferred reaction pathways**

⇨**Z-Loy™ provides Pd and an abundant hydrogen supply to sustain Pd catalyzed hydrogenation.**

Reactivity: TCE Reaction Pathways



⇨ E_2 elimination reaction (beta-elimination)

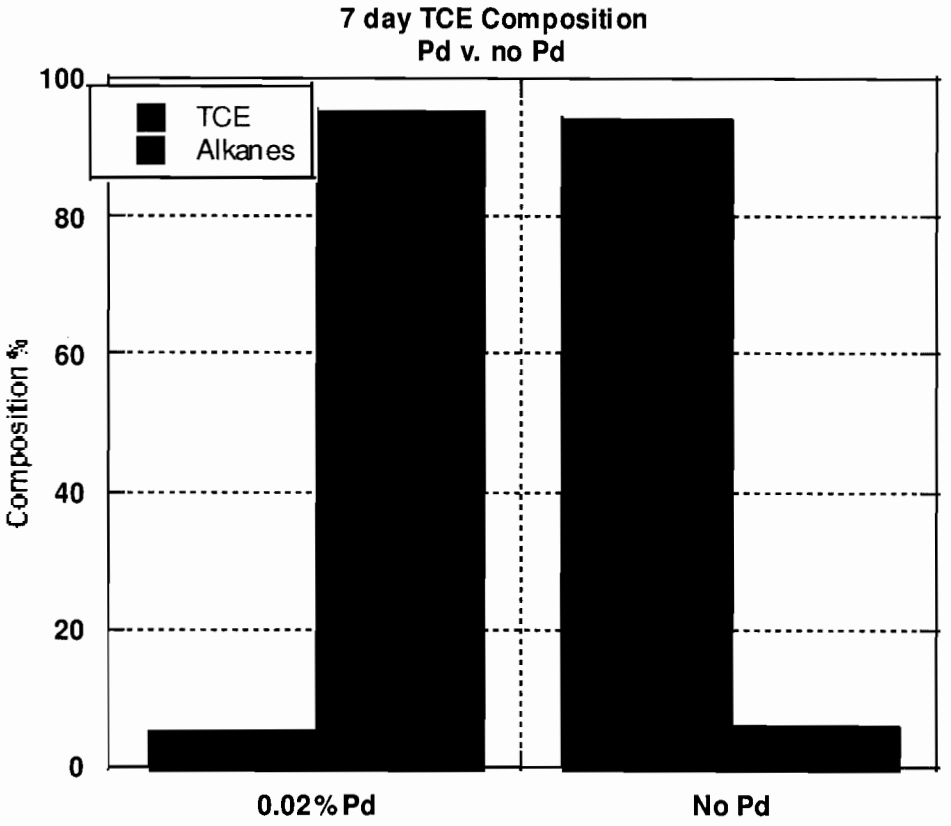
→ Hydrogenolysis reaction

→ Primary reaction pathway

⇨ Reaction pathway mostly bypasses the formation of similarly toxic daughter products

Reactivity: TCE kinetics

Effect of Pd



95% conversion **5% conversion**

⇨ **0.02 m/m% Pd greatly accelerates reaction kinetics with TCE**

Thank you for your consideration. Please feel free to contact me if you would like to discuss these comments.

Sincerely yours,

Clint Bickmore, Ph.D.
OnMaterials, LLC

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SCS ENGINEERS

October 28, 2008

Mr. Robert Morris
California Regional Water Quality Control Board, San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Subject: Tentative Order R9-2008-0081

Dear Mr. Morris:

SCS Engineers (SCS) would like to make the following recommendations for clarification of the Conditions of Eligibility that would help, in our opinion, make the Order more technically accurate.

Specifically:

1. Section A.1.a.v "Macronutrients such as nitrate, phosphate, and potassium" should be amended to include ammonia (which is the preferred form of nitrogen for microbial uptake). A recommended edit would be as follows: "Macronutrients such as ammonia, nitrate, phosphate, and potassium"

2. Section A.1.a.vi "Microorganisms cultured on site materials" should be amended to also include microorganisms cultured via standard laboratory techniques. A recommended edit would be as follows: "Microorganisms cultured on site materials and/or cultured via standard laboratory techniques". This would help include bacteria that are not necessarily cultured from on-site materials, but which contain well-researched, non-pathogenic, non-genetically-engineered, naturally-occurring bacterial strains that can provide excellent degradation of petroleum and chlorinated solvents.

3. Section A.1.b "Amendments that create oxidizing conditions..." should include a fifth subsection (in addition to the i, ii, iii, and iv that are already listed) that reads "v. Electron acceptors such as sulfate and nitrate". This would help cover the addition of alternative electron acceptors (in addition to oxygen) that can provide very effective degradation of a range of petroleum hydrocarbon substrates, including MTBE, which is a big problem in California.

SCS believes these are important additions/adjustments to the Conditions of Eligibility in order to include/clarify some important elements of bioremediation and biological processes.

Should you have any questions regarding this letter, please do not hesitate to call the undersigned at (858) 571-5500.

Sincerely,

Keith L. Etchells, P.G. 8028
Project Geologist
SCS ENGINEERS

Daniel E. Johnson
Vice President
SCS ENGINEERS

F:\Users\keithe\R9-2008-0081 Response Comments.doc
KLE

ARCADIS

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MEMO

To:
Lynn Berlad
Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Copies:
Jeffrey Schroeder, BAE Systems
Chuck McLaughlin, *de maximis*
Mike Palmer, de maximis, inc.
Rachel Steinberger, PhD
Project File

From:
Rachel Steinberger, PhD
Robert Ruscitto, PG, ARCADIS

Date:
October 29, 2008

ARCADIS Project No.:
CA000671.0008.00007

Subject:
Comments Regarding Tentative Order R9-2008-0081, General Waste Discharge Requirements for In-Situ Groundwater Remediation Projects within the San Diego Region

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ARCADIS, on behalf of de maximis and BAE Systems, has reviewed the Tentative Order No. R9-2008-0081 as provided in the August 28, 2008, *Request for Consultation (Water Code Section 13304.1) Regarding Tentative Order R9-2008-0081, General Waste Discharge Requirements for In-Situ Groundwater Remediation Projects within the San Diego Region.* The following addresses general and specific comments as presented in the Tentative Order relating to the former BAE Systems site in San Marcos, California. Specifically, many of the comments address how the Tentative Order would affect the San Diego RWQCB-approved in-situ groundwater remedy currently ongoing at the site using enhanced reductive dechlorination. ARCADIS appreciates the opportunity to comment on the proposed Tentative Order.

General Comments to the General Waste Discharge Requirements (WDRs)

Given the ongoing in-situ groundwater remedy, what will the approval procedure be for existing dischargers with RWQCB-approved remedial workplans or Report of Waste Discharges (ROWD)? Would a form of "grandfathering" of sites with approved remedies occur? Would BAE Systems be required to submit the Standard Form 200, even though project-specific information has been provided in the RWQCB-approved workplan and amendments provided under the site's Corrective Action Order? Would the General WDRs be managed by the site's RWQCB project manager, or under a separate group with responsibility in coordinating the program?

Specific Comments to the General WDRs

Finding 1, page 1, and Finding 8, page 2: Reference is made to petroleum hydrocarbons and VOC impacts to groundwater and that "This order is not intended for … remediation of waste constituents in

ground water other than VOCs, perchlorate, nitrogen compounds (nitrate, ammonia, etc.), some selected pesticides and semi-volatile organic compounds, and petroleum hydrocarbons."

Comment – For consistency, the expanded list of compounds included at the end of Finding 8 should mirror those included in Finding 1. Furthermore, acceptable treatment processes listed under Finding 2 and in Section *A. Conditions of Eligibility* should include metals (i.e., hexavalent chromium and other metals amenable to in-situ remediation), and 1,4-dioxane. A complete list should also be reflected in Section A paragraph 3d.

Finding 12 – CEQA: Finding 12 states that under California Environmental Quality Act (CEQA) the Regional Board adopted a Negative Declaration on June 13, 2003, "...determining that there was no substantial evidence that the proposed project could have a significant effect on the environment."

Comment – Section V of Attachment A (CEQA, Application Form 200), requests acknowledgement if the proposed project has undergone CEQA and if a public agency has determined that the proposed project is exempt from CEQA. Clarification is needed if any project submitted for a General WDR under the Tentative Order will require a CEQA determination or if it is exempt under CEQA, specifically in relation to a site with an existing RWQCB-approved groundwater remedy where the General WDR would be applicable.

Section A. Conditions of Eligibility, paragraph A1a *i-vi*: A listing is made with respect to amendments that can be used to create reducing conditions, and nutrients.

Comment – We request the addition of another sub-bullet that is inclusive of commercially-available food products and food by-products containing one or more carbon sources, such as molasses, corn syrup, cheese whey, yeast, and others. Molasses has been used at the site during the pilot test and currently corn syrup is used as a carbon source for full-scale remediation.

The current draft of the WDR permit permits bioaugmentation using bacteria cultured with onsite materials (*item vi – Microorganisms cultured on site materials*). However, Bioaugmentation cultures are commercially available to provide the appropriately cultured species that may be applicable to a site's subsurface conditions, and, for some vendors, cannot be cultured using onsite materials. Since commercially available laboratory grown cultures suitable for a wide variety of in-situ remedial applications can be safely used at sites, ARCADIS recommends that an item vii be added to make reference to "*Commercially available microorganisms suitable for bioaugmentation treatment with approval of the Executive Officer.*"

Comments Regarding the Tentative Monitoring and Reporting Program No. R9-2008-0081

Section A. Monitoring Provisions, Paragraph 4: Reference is made that "Monitoring results must be reported on discharge monitoring report forms approved by the Regional Board."

Comment – Data related to the groundwater remedy at the former BAE Systems site is currently reported to the RWQCB in data tables and laboratory reports in a report format. Would the proposed reporting requirements be in effect for sites with approved and ongoing treatment?

Section B. Monitoring Plan, Paragraph 1(b): "The constituents to be analyzed, which at a minimum shall include the constituents of concern, anticipated byproducts, process residual wastes, pH, total dissolved solids, dissolved oxygen, hexavalent chromium, other geochemical parameters potentially impacted by the waste, and other constituents as needed to assess impacts to water quality."

Comment – Reference is made to developing a site-specific groundwater monitoring plan. For the former BAE Systems site, a groundwater monitoring plan is produced annually to monitor key wells for parameters necessary to assess the effectiveness of the groundwater remedy and to be protective of beneficial uses of groundwater. The groundwater monitoring plan is based on site specific conditions known about the site since prior to, and following, the in-situ pilot test started at the site in 2002. Would analysis of all constituents listed in Paragraph 1(b) of Section B be required if a prior demonstration has been made to eliminate them from monitoring?

Section C. Report Schedule: Reference is made to an annual reporting frequency, with a report due date of February 1.

Comment – Given the existing groundwater treatment at the site, and an existing reporting frequency that presents results of site remedial and monitoring activities, would a separate report related to the WDR be required, or would inclusion of WDR required monitoring information already reported be acceptable?

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ENVIRONMENT

Mr. Robert Morris
Senior Engineer, North Groundwater Unit
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, California 92123

Subject:
Comments on Tentative Order No. R9-2008-0081, General Waste Discharge Requirements for In-Situ Ground-water Remediation Projects within San Diego Region

Date:
November 5, 2008

Contact:
Lisa Kellogg

Phone:
951-677-0577

Email:
lisa.kellogg@arcadis-us.com

Dear Mr. Robertus:

ARCADIS appreciates the opportunity to provide written comment on the *California Regional Water Quality Control Board (RWQCB), San Diego Region, Tentative Order No. R9-2008-0081, General Waste Discharge Requirements for In-Situ Ground-water Remediation Projects within San Diego Region* (Tenative Order). The Tentative Order has been made available from the San Diego RWQCB through their website at (http://www.swrcb.ca.gov/sandiego/board_decisions/tentative_orders/docs/R9_2008_0081.pdf). We appreciate that the Tentative Order will facilitate timely remedy implementation, while facilitating groundwater protection under San Diego RWQCB (SDRWQCB) jurisdiction.

Comments on specific paragraphs of the Tentative Order are provided below following a brief summary of the relevant Tentative Order text.

Finding 1 – Petroleum hydrocarbon fuel and volatile organic chemicals (VOCs) have been detected in ground water at various cleanup sites throughout the San Diego Region that cause or threaten to cause adverse impacts to beneficial uses of ground water.

and

Finding 8 – This Order is not intended for use and application of other materials to remediate ground-water pollution or for remediation of waste constituents in ground water other than VOCs, perchlorate, nitrogen compounds (nitrate, ammonia, etc.), some selected pesticides and semi-volatile organic compounds, and petroleum hydrocarbons.

Comment – For clarity, the expanded list of compounds covered under this order in *Finding 8* should also be included in *Finding 1*. In addition, the treatment processes listed under *Finding 2* and the amendments listed under *Conditions of Eligibility Part A1* could also be used to treat various metals in situ. Hexavalent chromium in groundwater is a compound that is routinely and successfully addressed with in situ remediation. Other metals, for example nickel, can be precipitated as sulfide minerals through the stimulation of sulfate reduction by injection of various carbon sources. As such, ARCADIS requests inclusion of metals in the list of compounds presented in *Findings 1* and *8*, for which the Tentative General Order is applicable.

In addition, the specific references included in the body of the Tentative General Order should include the entire compound list. In addition to *Finding 1* and *8*, an abbreviated compound list is found in the *Conditions of Eligibility A3d,* which only refers to petroleum hydrocarbons and VOCs.

Finding 2 – Cleanup of groundwater at these sites may include the use and application of chemical, biological, and physical treatment systems, such as oxygen releasing compounds, chemical oxidation, nutrient, and chemical addition for enhanced biodegradation into groundwater (in situ).

and

Finding 7 – This Order regulates the use and application of in-situ biological, chemical, and physical treatments to clean up waste constituents in ground water.

Comment – *Finding 3* and *Finding 7* both refer to physical treatment systems, however, the balance of the Tentative Order does not discuss in-situ physical treatment systems (e.g., cosolvent or surfactant injection).

Finding 3 – The application of amendments can be done actively with hydraulic control of the treatment zone as the amendments are added to the extracted ground water and injected upgradient into the treatment area.

Comment – This finding is very specific about the placement of injection wells upgradient of extraction wells. However, hydraulic control can be maintained with other configurations of injection and extraction wells, for instance by placing extraction wells on the periphery of the plume and injection wells on the interior. As such, ARCADIS requests that the word "upgradient" be removed from this statement

in *Finding 3* to allow the necessary flexibility for injection/extraction designs to be based on the unique hydraulic conditions at every site.

Conditions of Eligibility, Paragraph A1 – Coverage under this Order applies to the following groups of amendments, except as specifically included in A5 below, provided the conditions of A2, A3, and A4 are satisfied:

a. Amendments that create reducing conditions (i.e., amendments that provide carbon, energy, electrons and/or macronutrients). Examples include:

   i. Zero valent iron

   ii. Easily degradable carbon sources such as glucose, acetate, citric acid, acetic acid, ethanol, and others

   iii. Slowly degradable carbon sources such as edible oils, poly-lactate, and other hydrogen release compounds

   iv. Polysulfides

   v. Macro nutrients such as nitrate, phosphate, and potassium

   vi. Microorganisms cultured on site materials

Comment – Although the list under *Paragraph A1* serves only as an example, ARCADIS believes the list of reagents to be incomplete with respect to reagents that are typically employed for in situ anaerobic remediation. Specifically, the following modifications to the list of potential reagents are requested:

- *Sub-bullet ii.* – We request the addition of methanol to the list of easily degradable carbon sources. Ethanol, another readily available alcohol, is present on the list in the Tentative General Order.

- *Sub-bullet iii.* – For clarity and to avoid confusion by remediation practitioners, we request the removal of "hydrogen release compounds" from the list of slowly degradable carbon sources. The application of slowly degradable carbon sources to the subsurface does not by itself release or produce hydrogen. Rather, a succession of microbial processes consumes the organic carbon substrate, which generates

dissolved hydrogen in situ. The hydrogen then serves as an electron donor for the reductive dechlorination of chlorinated VOCs.

- *Additional sub-bullet.* – We request the addition of another sub-bullet that is inclusive of commercially-available food products containing one or more carbon sources, such as molasses, corn syrup, cheese whey and others. Commercially-available food products are often times the most cost-effective and technically-effective carbon sources for remediation. Food-based organic carbon sources can usually be procured from local vendors and support a more sustainable approach to groundwater remediation.

The exclusion listed in the first sentence of this section should refer to "A2" rather than "A5".

Conditions of Eligibility, Paragraph A1b – Amendments that create oxidizing conditions (i.e., amendments that provide oxygen or otherwise gain electrons). Examples include:

i. Ozone

ii. Potassium or sodium permanganate

iii. Oxygen release compounds

iv. Hydrogen peroxide

Comment – Although we understand the list under *Paragraph A1b.* provides example reagents, ARCADIS requests the addition of sodium persulfate to the list of compounds presented in *Paragraph A1b.*

Sodium persulfate has recently seen broad applicability with in situ treatment of constituents commonly treated with in situ chemical oxidation, as well as historically recalcitrant compounds (e.g., 1,4-dioxane). The persulfate anion requires activation by one or more of a number of activation methodologies to result in favorable reaction kinetics (i.e., balance of oxidant persistence and reaction rate with target constituents) [ITRC, 2005]. Persulfate activation strategies include heat, divalent metals (e.g., ferrous iron), hydrogen peroxide, and/or elevated pH. The combination of oxidant strength, activator methodology, and activator concentration allows for

more precise control of target and non-target reactions when compared to other radical-based oxidation systems (e.g., Fenton's chemistry, which is explicitly excluded from the Tentative General Order).

Effective treatment and secondary water quality issues can be managed through appropriate engineering of the in situ chemical oxidation process with persulfate (i.e., mode of activation, oxidant and activator concentrations, magnitude of injected volume, frequency of injections, etc.). Similar to the permanganate salts included in *Paragraph A1bii*, the decomposition of sodium persulfate will generate salts that are amendable to natural attenuation. Sodium will undergo weak cation exchange-based sorption, while sulfate may attenuate through precipitation, co-precipitation, biologically-mediated reduction, and/or weak sorption reactions, based on site-specific biogeochemical conditions of the aquifer. Both ions will undergo dilution along a flow path.

Conditions of Eligibility, Paragraph A1e – Biofouling control agents such as chlorine dioxide, chlorine and bleach.

Comment – Although we understand the list under *Paragraph A1e* provides example biofouling control reagents, ARCADIS requests the addition of a provision for use of standard commercial mixtures of well rehabilitation compounds that are certified under the specifications of National Science Foundation/American National Standard Institute (NSA/ANSI) 60-2005 (Drinking Water Treatment Chemicals –Health Effects) in accordance with manufacturer's instructions. The NSF/ANSI 60-2005 certified compounds are routinely used for rehabilitation of drinking water wells in California under the California Waterworks Standard (California Code of Regulations Title 22, Section 64590 Direct Additives).

Conditions of Eligibility, Paragraph A2 – Fenton's reagent due to its potential for violent exothermic reactions is specifically excluded from coverage under this Order.

Comment – ARCADIS respectfully requests that the San Diego RWQCB clarify whether it is their intent to ban the injection of Fenton's reagent. Further, under *Condition of Eligibility* A.1.b.iv, the injection of chemicals that would (or could) produce in-situ Fenton's chemistry is left open since hydrogen peroxide injection is explicitly allowed and could involve safety issues similar to those resulting from the engineered injection of Fenton's reagent. As such care should be taken to inject appropriately low concentrations of hydrogen peroxide into ground water containing ferrous iron.

In closing, the General Order is very clear with respect to proactive monitoring and mitigation, if warranted, of secondary water quality impacts associated with reagents applied to the subsurface for purposes of in situ remediation. Although the lists of reagents that are potentially applicable to each remedial strategy (i.e., reducing or oxidizing reactive zones) are somewhat limited (*Paragraphs A1* of the Tentative General Order), the site-specific hydrobiogeochemical conditions under which in situ remediation can be applied are vast. As stipulated in the Tentative General Order, the onus is on the remediation practitioner to develop an appropriate remedial strategy that relies on effective treatment of target constituents, to understand the potential secondary water quality issues and modes of attenuation, and the development and implementation of an appropriate monitoring plan to demonstrate control of reaction byproducts.

We look forward to discussing the above comments with you at your earliest convenience. Please contact the undersigned if you have any questions regarding our comments at (415) 374-2744, extension 32 (Kelly) or at (951) 677-0577(Lisa).

Sincerely,
ARCADIS

Kelly S. Houston
Senior Remediation Engineer

Lisa R. Kellogg, PG, CEM
Certified Project Manager

Reference:

ITRC (Interstate Technology and Regulatory Council). 2005. Technical and Regulatory Guidance for In Situ Chemical Oxidation of Contaminated Soil and Groundwater, 2nd ed. ISCO-2. Washington, D.C.: Interstate Technology and Regulatory Council, In Situ Chemical Oxidation Team. http://www.itrcweb.org.

HARGIS + ASSOCIATES, INC.
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November 5, 2008

VIA E-MAIL & U.S. MAIL

Mr. Robert W. Morris
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, California 92123

Re: Comments on Tentative Order No. R9-2008-0081General Waste Discharge Requirements for In-Situ Groundwater Remediation Projects within the San Diego Region

Dear Mr. Morris:

Hargis + Associates, Inc. (H+A) provides environmental consulting services in the southern California area and has several in-situ groundwater remediation projects within the San Diego Region. H+A has reviewed California Regional Water Quality Control Board (RWQCB), San Diego Region Tentative Order No. R9-2008-0081 General Waste Discharge Requirement (WDR) for In-Situ Groundwater Remediation within the San Diego Region (Tentative Order) and would like to provide the following comments:

- It is recommended that the Tentative Order include specific provisions under conditions of eligibility for bioaugmentation. Bioaugmentation is a process where a specific commercial bacterial culture is introduced to assist in the biodegradation of target compounds. Bioaugmentation is typically used to ensure that biodegradation does not stall at intermediate compounds, such as cis-1,2-dichloroethylene or vinyl chloride, and not reach the terminal harmless compound ethene in the case of trichloroethylene biodegradation. The Tentative Order could include a condition of eligibility of commercial microbiological cultures that have been demonstrated to have been used successfully at other sites, and to be non-pathogenic.
- Modify the proposed monitoring schedule of Page 3, Section B1b to delete the requirement for hexavalent chromium sampling. Hexavalent chromium is not likely present at all remediation sites and should only be included if present, or there is a probability that it is present in groundwater.

Thank you for the opportunity to comment on the Tentative Order. If you have any questions or comments, please contact us.

Sincerely,

HARGIS + ASSOCIATES, INC.

James D. Schwall
Senior Engineer

Leo Lehmicke, PhD
Principal Microbiologist

JDS/LGL/am

001 Ltrs morris01.ama.doc

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