California Regional Water Quality Control Board
Los Angeles Region

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Linda S. Adams
Cal/EPA Secretary

Arnold Schwarzenegger
Governor

December 21, 2010

Mr. Paul Weaverling
International Risk Assumption Downey LLC
7991 Shaffer Pkwy, Suite 300
Littleton, CO 80127

SUBJECT: **APPROVAL OF MATERIAL CHANGE REQUEST FOR WASTE DISCHARGE REQUIREMENTS (ORDER NO. R4-2010-0088, CI NO. 8724) FOR USING SODIUM PERMANGANATE INJECTION FOR REMEDIATION OF VOLATILE ORGANIC COMPOUNDS IN DEEP VADOSE ZONE**

SITE: **FORMER NASA INDUSTRIAL PLANT, 12214 LAKEWOOD BOULEVARD, DOWNEY, CALIFORNIA (SCP NO. 0302C, SITE ID# 2045E00)**

Dear Mr. Weaverling:

The California Regional Water Quality Control Board, Los Angeles Region (Regional Board) is the public agency with the primary responsibility for the protection of ground and surface water quality for all beneficial uses within major portions of Los Angeles and Ventura Counties, including the above referenced site.

The International Risk Assumption Downey LLC (Discharger), is the responsible party for the former NASA Industrial Plant located at 12214 Lakewood Boulevard in Downey, Los Angeles County, California (Site). The Site is 155 acres and was used between approximately 1929 and 1998 for aeronautical and aerospace manufacturing operations and was acquired by National Aeronautics and Space Administration (NASA) in the 1960's. During the fourth quarter of 2003, the property was transferred from NASA to the City of Downey, California. Following transfer from NASA to the City of Downey, the property was redeveloped, and International Risk Assumption Downey LLC has assumed the role of responsible party as part of the redevelopment arrangements.

Soil and groundwater beneath the Facility is contaminated with volatile organic compounds (VOCs), including mainly perchloroethene (PCE), trichloroethene (TCE), and cis-1,2-dichloroethene (cis-1,2,-DCE).

Under the oversight of this Regional Board, Discharger has been performing soil and groundwater cleanup at the Site. To facilitate the ongoing subsurface remediation, we have issued the following Waste Discharge Requirement (WDR) permits to you:

1. On March 22, 2004, the Regional Board issued a permit under General WDR Order No. R4-2002-0030 (Series No. 47) and Monitoring and Reporting Program (MRP) No. 8724 to allow the injection

of a carbohydrate solution into groundwater at the site to remediate the VOC-impacted groundwater. The latest revision of the Order (Order No. R4-2007-0019) was adopted on March 1, 2007, and supersedes the previous version, including Order No. R4-2002-0030.

2. On June 3, 2010 the Regional Board issued Individual WDR Order No. R4-2010-0088, File 97-197, CI No. 8724. Order No. R4-2010-0088 was issued to accommodate injection of both carbon source amendments and a bacterial culture (Dehalococcoides ethenogenes) into the groundwater to enhance the groundwater remediation. Because Site-Specific WDR Order No. R4-2010-0088 includes coverage of injection of carbohydrate solution at this Site, the existing General WDR for injection of the carbohydrate solution at the Site is no longer required and is in the process being terminated.

The Regional Board has received the *Work Plan for Deep Vadose Remediation, Former Building 244 Area , Former NASA Industrial Plant*, dated October 22, 2010 (Work Plan), prepared by ARCADIS. The Work Plan proposes a material change to your WDR permit Order No. R4-2010-0088 to expand the coverage to include the sodium permanganate solution into the vadose zone beneath the former Building 244 location. The Work Plan was approved by the Regional Board on November 10, 2010. Sodium permanganate is allowed for in-situ remediation by the General WDR originally used for the site (Order No. R4-2002-0030) as well as by the current General WDR (Order No. R4-2007-0019) that superseded it. The proposed injections are intended to reduce concentrations of VOCs (mainly perchloroethylene or PCE) in a silt layer between 40 and 45 feet below ground surface (bgs). Soil Vapor Extraction (SVE) was performed beneath the former Building 244 area between June 2000 and September 2003 and from March 2004 to July 2007. Rebound samples indicated the SVE system had reached the limit of its effectiveness. Post-SVE soil samples indicated the silt layer between 40 and 45 feet bgs contained PCE concentrations up to 4,200 micrograms per kilogram (µg/kg) and use of an alternative remedial technique was directed by the Regional Board.

To treat the remaining adsorbed-phase PCE and other VOCs in soil at 40 to 45 feet bgs, eight direct push injection points will be used to distribute a five percent sodium permanganate solution to the target silt zone in the area of Former Building 244 (see attached Figure). A direct-push injection system will be used to inject the sodium permanganate into the silt interval using a one-foot injection screen. A total of 2,600 gallons of sodium permanganate solution will be injected at each point to obtain the desired 10-foot injection radius and provide complete coverage for the five foot thick silt layer. The total volume of oxidant to be used is estimated at 20,800 gallons of solution. Assuming a five percent by weight sodium permanganate solution, approximately 17,600 pounds of sodium permanganate will be used.

Groundwater monitoring wells cross-gradient to the injection area (MW-17, MW-19), up-gradient of the injection area (PERF-105), and down-gradient of the injection area (MW-10, MW-11) will be used for monitoring and baseline characterization. Sodium permanganate reacts with the PCE, producing carbon dioxide, manganese dioxide, sodium chloride, and hydrochloric acid. The hydrochloric acid would be expected to react with the naturally occurring alkaline soils to form water with anions and cations.

The proposed sodium permanganate injections are permitted under the general WDR permit (Order No. R4-2007-0019). Therefore, we have modified your individual WDR Order No. R4-2010-0088 to incorporate the proposed material change. The monitoring requirements have been modified to reflect the change in groundwater monitoring wells. You shall comply with the prescribed monitoring schedule, as indicated in the enclosed Modified Monitoring and Reporting Program (MRP), to account for the new 5% sodium

permanganate injection. The reporting requirements of R4-2010-0088 and MRP No. CI-8724 for the ongoing monitoring of injected amendments and bacterial culture remain. As indicated in the MRP, your next monitoring report shall be submitted to the Regional Board by **January 15, 2011**. Subsequent monitoring reports will be due by the 15th day after the end of each quarterly period.

The "Monitoring and Reporting Program" requires you to implement the monitoring program on the effective date of this enrollment under Regional Board Order No. R4-2010-0088. All monitoring reports shall be sent to the Regional Board, ATTN: Information Technology Unit. When submitting monitoring or technical reports to the Regional Board per these requirements, please include a reference to "Compliance File No. CI-8724", which will assure that the reports are directed to the appropriate file and staff. Also, please do not combine other reports with your monitoring reports. Submit each type of report as a separate document.

The State Water Resources Control Board (State Water Board) adopted regulations requiring the electronic submittals of information over the internet using the State Water Board GeoTracker data management system. You are required not only to submit hard copy reports required in this Order, but also to comply by uploading all reports and correspondence prepared to date on to the GeoTracker data management system. The text of the regulations can be found at the URL:

http://www.waterboards.ca.gov/ust/cleanup/electronic_reporting/docs/final_electronic_regs_dec04.pdf.

All future technical reports shall contain a completed perjury statement, in the following format:

"I [NAME], do hereby declare, under penalty of perjury under the laws of the State of California, that I am [JOB TITLE] for [NAME OF RESPONSIBLE PARTY\DISCHARGER], that I am authorized to attest to the veracity of the information contained in the reports described herein, and that the information contained in [NAME AND DATE OF REPORT] is true and correct, and that this declaration was executed at [PLACE], [STATE], on [DATE]."

The perjury statement shall be signed by a senior authorized representative and not by a consultant.

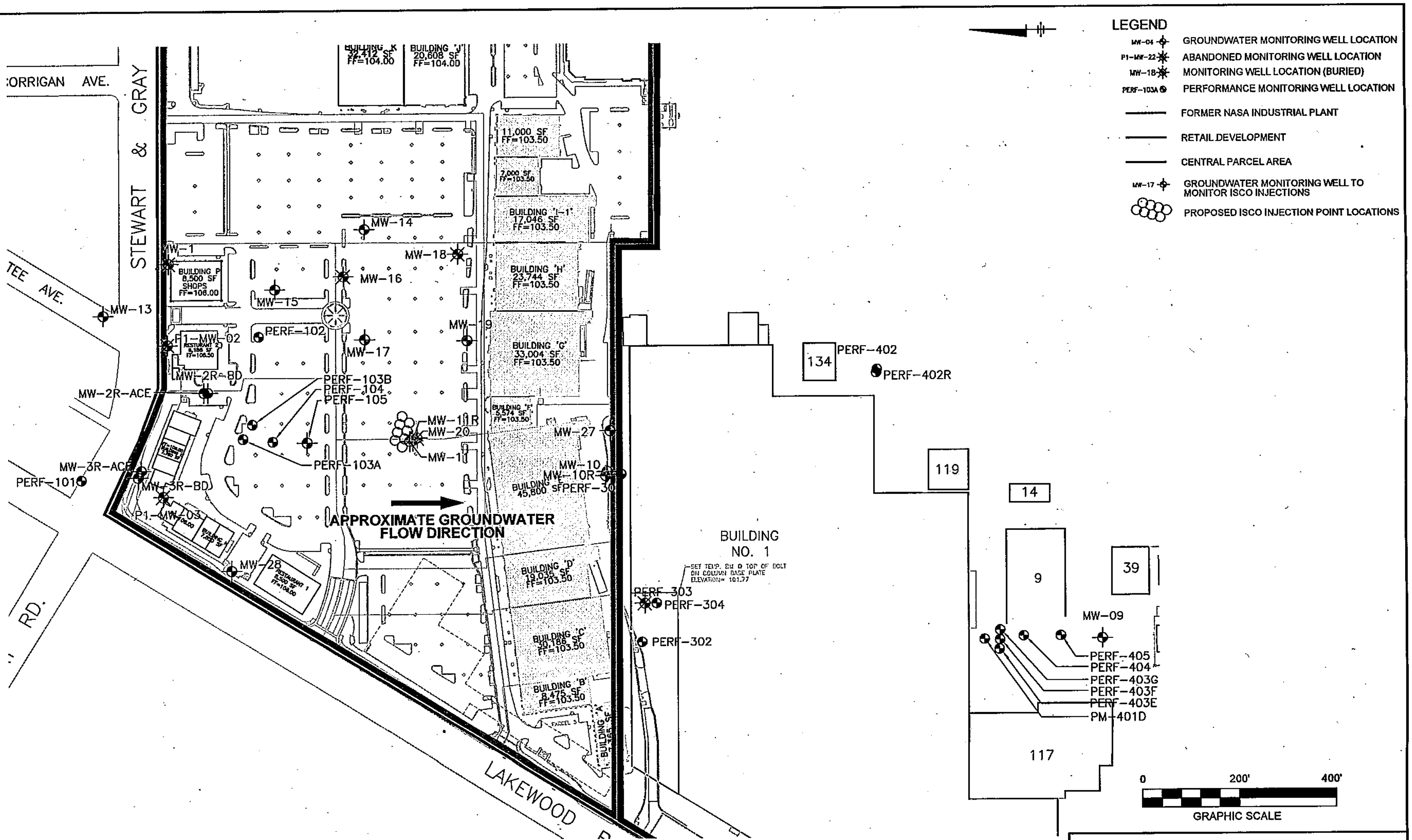
If you have any questions regarding this project, please contact Don Indermill at (213) 576-6811 (dindermill@waterboards.ca.gov).

Sincerely,

Samuel Unger, P.E
Executive Officer

Attachments: Site Plan Map
Revised Monitoring and Reporting Program, CI No. 8724

Electronic Copies: Mr. Phil Nicolay, ARCADIS


LEGEND
GROUNDWATER MONITORING WELL LOCATION
ABANDONED MONITORING WELL LOCATION
MONITORING WELL LOCATION (BURIED)
PERFORMANCE MONITORING WELL LOCATION
FORMER NASA INDUSTRIAL PLANT
RETAIL DEVELOPMENT
CENTRAL PARCEL AREA
GROUNDWATER MONITORING WELL TO MONITOR ISCO INJECTIONS
PROPOSED ISCO INJECTION POINT LOCATIONS
CORRIGAN AVE.
STEWART & GRAY
TEE AVE.
RD.
LAKEWOOD
APPROXIMATE GROUNDWATER FLOW DIRECTION
BUILDING NO. 1
MW-1
MW-13
MW-14
MW-15
MW-16
MW-17
MW-18
MW-19
MW-20
MW-27
MW-28
MW-10
MW-10R
MW-2R-ACE
MW-3R-ACE
MW-3R-BD
MW-09
PERF-101
PERF-102
PERF-103A
PERF-103B
PERF-104
PERF-105
PERF-302
PERF-303
PERF-304
PERF-402
PERF-402R
PERF-403E
PERF-403F
PERF-403G
PERF-404
PERF-405
PM-401D
134
119
14
9
39
117
0
200'
400'
GRAPHIC SCALE

FORMER NASA INDUSTRIAL PLANT
DOWNEY, CALIFORNIA

SITE PLAN MAP
(NORTHERN PORTION)

ARCADIS

FIGURE
2

STATE OF CALIFORNIA
CALIFORIA REGIONAL WATER QUALTIY CONTROL BOARD
LOS ANGELES REGION

MONITORING AND REPORTING PROGRAM NO. CI-8724
FOR
INTERNATIONAL RISK ASSESSMENT DOWNEY LLC
FORMER NASA INDUSTRIAL PLANT – DOWNEY, CA

FILE NO. 97-197

International Risk Assumption Downey LLC (hereafter "Discharger") shall implement this revised Monitoring and Reporting Program (MRP), effective December 21, 2010. This revised MRP incorporates materials change and replaces the MRP issued June 3, 2010 under the Individual Waste Discharge Requirements (WDR) Order No. R4-2010-0088, File 97-197, CI No. 8724. The June 3, 2010 MRP was issued to accommodate injection of carbon source amendments and a bacterial culture (SDC-9 or KB-1), into the groundwater. The groundwater bacterial culture injection has been performed with baseline and post-injection monitoring. The revised MRP described herein accommodates the following two subsurface remediation activities: 1). ongoing carbohydrate solution injections, post-bacterial injection monitoring, permitted March 22, 2004; 2). the injection of sodium permanganate into soil in the area of former Building 244 permitted to start December 21, 2010. Sodium permanganate injection was proposed in a Work Plan dated October 26, 2010 and approved by the Regional Water Quality Control Board (Regional Board) on November 10, 2010. The Discharger shall not implement any changes to this MRP unless approved by the Executive Officer.

I. GROUNDWATER MONITORING PROGRAM

Discharger shall comply with the following two parts of the Monitoring Program:

Part 1

The following groundwater wells and amendment points will be included in the sampling program related to carbohydrate solution and bacterial culture injection:

Group A:	AI-1002,-1010, 1016
Group B:	PERF-1005
Group C:	MW-29
Group D:	PERF-601,-901,-902

Figure 1 shows the location of the Site. Groundwater well and amendment point locations at the Site are shown in Figure 2. Group A sampling points are amendment points. The Group B points are monitoring wells within each treatment area. Group B wells consist of monitoring wells that are located in close proximity to solution distribution zones, and will be used to evaluate carbohydrate consumption and distribution. All Group A and B wells will be used for performance monitoring purposes. The Group C sampling point is a downgradient sample location, and Group D are upgradient sample points.

With bacterial culture injection completed, samples will be taken from Group A and Group B monitoring wells Figure 2 and will be analyzed for field parameters (oxidation-reduction potential, dissolved oxygen, pH, specific conductance, temperature, turbidity and groundwater elevation), chlorinated volatile organic compounds (VOCs), total organic carbon (TOC) and volatile fatty acids (VFAs) for process monitoring purposes.

The required constituents to be analyzed and the monitoring schedule for each sample group are shown below.

CONSTITUENT	UNITS	TYPE OF SAMPLE	MINIMUM FREQUENCY OF ANALYSIS
Total Daily Injections	Gallons	Measurement	Per injection at each injection point
Groundwater Elevation	Feet below ground surface (bgs)	In situ	Group A: quarterly Group B: quarterly Group C: quarterly Group D: quarterly
Dissolved Oxygen	mg/l	Grab	Group A: quarterly Group B quarterly Group C: quarterly Group D: quarterly
Oxidation-Reduction Potential	Millivolts	Grab	Group A: quarterly Group B: quarterly Group C: quarterly Group D: quarterly
PH	pH units	Grab	Group A: quarterly Group B: quarterly Group C: quarterly Group D: quarterly
Temperature	Degrees C	Grab	Group A: quarterly Group B: quarterly Group C quarterly Group D: quarterly
Specific Conductance	µS/cm	Grab	Group A: quarterly Group B: quarterly Group C: quarterly Group D: quarterly
Turbidity	NTU	Grab	Group A: quarterly Group B: quarterly Group C: quarterly Group D: quarterly
Chlorinated Volatile Organic Compounds (EPA Method 8260B)	µg/l	Grab	Group A: quarterly Group B: quarterly Group C: quarterly Group D: quarterly
Total Organic Carbon (SM5310D) and Volatile Fatty Acids	mg/l	Grab	Group A: quarterly Group B: quarterly Group C: semi-annually Group D: semi-annually
Dehalococcoides PCR	presence or absence	Grab	Group A: semi-annually Group B: semi-annually Group C: semi-annually Group D: semi-annually
Dissolved Metals (Manganese, Iron and Arsenic) and Anions (sulfate, nitrate, nitrite and chloride) and Total Sulfides	mg/l	Grab	Group A: semi-annually Group B: semi-annually Group C: semi-annually Group D: semi-annually

CONSTITUENT	UNITS	TYPE OF SAMPLE	MINIMUM FREQUENCY OF ANALYSIS
Dissolved Hydrocarbon Gases (ethane, ethane, and methane)	mg/l	Grab	Group A-D: quarterly in first year, Semi-annually thereafter

Part 2

The following groundwater wells and amendment points will be included in the sampling program related to sodium permanganate injection:

The Discharger shall sample monitoring wells PERF-105, MW-10, MW-11, MW-17, and MW-19 to provide groundwater quality information prior to and after the sodium permanganate injection. Groundwater from the wells noted above shall be monitored for the duration of the remediation in accordance with the following discharge monitoring program:

CONSTITUENT	UNITS	TYPE OF SAMPLE	MINIMUM FREQUENCY OF ANALYSIS
Total sodium permanganate delivered per injection point	Gallons/day	--	• Per injection at each injection point
Volatile Organic Compounds (EPA Method 8260B)	µg/l	Grab	• Baseline prior to injection • 2 weeks after injection • Monthly post-injection for 3 months • Once approx. 6 months after injection
Total chromium and hexavalent chromium[1]	µg/l	Grab	• Baseline prior to injection • 2 weeks after injection • Monthly post-injection for 3 months • Once approx. 6 months after injection
Carbon Dioxide, Methane, Ethane, Ethene	µg/l	Grab	• Baseline prior to injection • 2 weeks after injection • Monthly post-injection for 3 months • Once approx. 6 months after injection
Total dissolved solids	mg/l	Grab	• Baseline prior to injection • 2 weeks after injection • Monthly post-injection for 3 months • Once approx. 6 months after injection
Total Organic Carbon, Dissolved (EPA Method 9060 Modified)	µg/l	Grab	• Baseline prior to injection • 2 weeks after injection • Monthly post-injection for 3 months • Once approx. 6 months after injection
Specific Conductivity	µmhos/cm	Grab	• Baseline prior to injection • 2 weeks after injection • Monthly post-injection for 3 months • Once approx. 6 months after injection
Turbidity	NTU	Grab	• Baseline prior to injection • 2 weeks after injection • Monthly post-injection for 3 months • Once approx. 6 months after injection

Constituent	Units	Type of Sample	Minimum Frequency of Analysis
pH	pH units	Grab	• Baseline prior to injection • 2 weeks after injection • 4 weeks after injection • Semiannually thereafter
Oxidation-reduction potential	Millivolts	Grab	• Baseline prior to injection • 2 weeks after injection • 4 weeks after injection • Semiannually thereafter
Temperature	°F	Grab	• Baseline prior to injection • 2 weeks after injection • 4 weeks after injection • Semiannually thereafter
Groundwater Elevation	Feet, mean see level (msl) and below ground surface (bgs)	In situ	• Baseline prior to injection • 2 weeks after injection • 4 weeks after injection • Semiannually thereafter
Dissolved Oxygen	µg/l	Grab	• Baseline prior to injection • 2 weeks after injection • 4 weeks after injection • Semiannually thereafter
Major Anions (bromide, chloride, sulfate, nitrate, nitrite, O-phosphate, and sulfide)	µg/l	Grab	• Baseline prior to injection • 2 weeks after injection • 4 weeks after injection • Semiannually thereafter
Major Cations (barium, calcium, magnesium, sodium and sodium)	µg/l	Grab	• Baseline prior to injection • 2 weeks after injection • 4 weeks after injection • Semiannually thereafter

1 The Discharger is required to monitor for total chromium and chromium six if total chromium is detected in the baseline samples. The monitoring is required only for the well(s) that the total chromium was detected.

III. REPORTING REQUIREMENTS

The first monitoring report under this program, for October – December 2010, shall be received at the Regional Board by **January 15, 2011**. Subsequent monitoring reports shall be received at the Regional Board according to the following schedule:

Monitoring Period	Report Due
January – March	April 15
April – June	July 15
July – September	October 15
October – December	January 15

All reports must include, at a minimum, the following:

1. Well identification, date and time of sampling;
2. Sampler identification, and laboratory identification;
3. Quarterly observation of groundwater levels, recorded to 0.01 feet mean sea level and groundwater flow direction;
4. Depth of injection points;
5. Type and quantities of materials injected and dates.

In each report, the Discharger shall include baseline and injection data, gauging and sampling results. The reports should include effectiveness evaluations of the amendments, RTB-1™ solution, and sodium permanganate solution to remediate VOC-contaminated groundwater and soil at the Site. The reports should discuss impacts of any by-products on the receiving groundwater quality, and any other effects the *in situ* treatments may have. The Discharger is required to submit a Final Report of the results of the remediation by **October 15, 2012**.

The method limits (MLs) employed for effluent analyses shall be lower than the permit limits established for a given parameter, unless the discharger can demonstrate that a particular ML is not attainable and obtains approval for a higher ML from the Regional Board Executive Officer (Executive Officer). The Discharger shall submit a list of the analytical methods employed for each test and the associated laboratory quality assurance / quality control (QA/QC) procedures upon request by the Regional Board.

Each monitoring report shall contain a separate section titled "Summary of Non-Compliance" which discusses the compliance record and the corrective actions taken or planned that may be needed to bring the discharge into full compliance with WDRs. This section shall be located at the front of the report and shall be clearly list all non-compliance with WDRs, as well as all excursions of the effluent limitations.

The Discharger shall maintain all sampling and analytical results: date, exact place, and time of sampling; dates analyses were preformed; analyst's name; analytical techniques used; and results of all analyses. Such records shall be retained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the Regional Board.

If the Discharger performs analyses on any groundwater samples more frequently than required by this Order using approved analytical methods, the results of those analyses shall be included in the report.

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized to demonstrate compliance with the requirements and, where applicable, shall include results of receiving water observations.

If there is no discharge or injection during any reporting period, the report shall so state. Monitoring reports must be addressed to the Regional Board, Attention: Information Technology Unit.

Whenever wastes associated with the discharge under this Order, are transported to a different disposal site, the following shall be reported in the monitoring report: type and quantity of wastes; name and address of the hauler (or method of transport if other than by hauling); and location of the final point(s) of disposal.

IV. CERTIFICATION STATEMENT

Each report shall contain the following completed declaration:

> "I certify under penalty of law that this document, including all attachments and supplemental information, was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment.
>
> Executed on the _____day of _____ at _____.
>
> _____(Signature)
>
> _____(Title)"

V. MONITORING FREQUENCY REVISION

Specifications in this monitoring program are subject to periodic revisions. Monitoring requirements may be modified or revised by the Executive Officer based on review of monitoring data submitted pursuant to this Order. Monitoring frequencies may be adjusted to a less frequent basis or parameters and locations dropped by the Executive Officer if the Discharger makes a request and the request is backed by statistical trends of monitoring data submitted.

VI. PUBLIC DOCUMENTS

These records and reports are public documents and shall be made available for inspection during normal business hours at the office of the California Regional Water Quality Control Board, Los Angeles Region.

Ordered by: _____ Date: December 21, 2010
Samuel Unger, P.E.
Executive Officer