CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

WASTE DISCHARGE REQUIREMENTS ORDER R5-2013-0014
FOR
UNIVAR USA INC.
IN-SITU GROUNDWATER BIOREMEDIATION PROJECT
1152 G STREET, FRESNO
FRESNO COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Central Valley Water Board), finds that:

1. Univar USA Inc. (Discharger) submitted a Report of Waste Discharge (ROWD) on 4 February 2011 for an in-situ groundwater treatment system to treat tetrachloroethene-contaminated groundwater at and downgradient of the former Van Waters and Rogers site at Fresno and G Streets, Fresno, Fresno County. The Discharger submitted a Remedial Action Plan dated May 2010 and addendums to the remedial action plan on 29 April and 7 September, 2011. Univar will be constructing and operating the remediation systems. Jeff Markarian, the Union Pacific Railroad, and the City of Fresno are the owners of the land on which the system will be constructed.

2. The project will be constructed at 1152 G Street in Fresno, on Union Pacific Railroad property to the northwest of 1152 G Street, and on City of Fresno right-of-ways downgradient of 1152 G Street (collectively referred to as the "Site"). The project site plan is shown on Attachment A, which is attached hereto and made part of this Order by reference.

BACKGROUND

3. Univar leased the property at 1152 G Street from approximately 1965 to 1986. An aboveground storage tank located at the northeast corner of the Site was used for storing tetrachloroethene. The tank was removed in the mid 1980's.

4. The site was occupied by a chemical supply company known as United Agri-Products (UAP) from 1987 to 1989. The site was not used for chemical mixing or repackaging. Beginning in 1989, the Site was leased to the Good Guys Tire Center for use as a warehouse for storage of tires. Currently the Site is unoccupied.

5. Numerous assessments have been conducted at the Site. Tetrachloroethene (PCE) was detected at high concentrations in soil and groundwater at the Site. A soil vapor extraction system (SVE) was operated at the Site from 1998 to 2003. During operation of the SVE system, the concentration of PCE in on-site groundwater declined from 14,000 micrograms per liter (ug/L) in 1998 to 280 ug/L in 2005.

6. The SVE system was upgraded and moved off-site in 2009 to the vicinity of monitoring well MW-4, where it is currently operating. Vapors are extracted from up to nine wells, extending north from the Site.

7. Groundwater assessments indicate that impacted groundwater has migrated approximately 1,500 feet to the north and 1,800 feet to the west. The maximum concentration of tetrachloroethene in October 2011 was 2,000 micrograms per liter in well VW-4. PCE has been detected as deep as 250 feet below ground surface (bgs). Tetrachloroethene concentrations below the State of California maximum contaminant level of five micrograms per liter have been detected in City of Fresno well 22A, 1,800 feet west of the Site.

8. The Discharger submitted a remedial action plan and Report of Waste Discharge in May 2010. An addendum to the remedial action plan and Report of Waste Discharge was submitted in February 2011 and additional information requested by the Central Valley Water Board was submitted in September 2011. The Report of Waste Discharge was determined to be complete in a Central Valley Water Board letter dated 19 December 2011.

HYDROLOGY, GEOLOGY, AND LAND USE

9. Groundwater beneath the Site is encountered at depths of 100 to 110 feet bgs. Groundwater in the vicinity of the Site is of good inorganic constituent quality, with water from nearby City of Fresno well 22A having a total dissolved solids concentration of approximately 330 milligrams per liter (mg/L), a chloride concentration of 22 mg/L, and a sodium concentration of 27 mg/L.

10. Boring logs from site investigations indicate that soils encountered at the Site consist predominantly of silt and clay from the surface to a depth of approximately 20 feet bgs, and alternating layers of poorly graded sand, silty sand, and clay to a depth of approximately 50 feet bgs. Soil encountered below 50 feet bgs to about 80 feet bgs consists of alternating layers of silt and sandy silts and, below 80 feet bgs to 90 feet bgs, the soil becomes more permeable and consists predominantly of sand.

11. Historical groundwater flow near the Site was predominantly to the north-northwest. More recent groundwater elevation data have indicated a shift towards the west. The apparent westerly shift in the groundwater flow direction appears to be influenced by the operation of City well 22A, located northwest of the Site. Groundwater flow at the Site has a slight downward gradient that is in the range of 0.007 ft/ft. Horizontal groundwater flow velocity is in the range of 100 to 200 feet per year.

PROPOSED REMEDIATION SYSTEM

12. The Discharger proposes to remediate groundwater using an anaerobic bioremediation process called enhanced anaerobic dechlorination. This process operates under anaerobic conditions and breaks down tetrachloroethene and its byproducts to ethane, ethene, and carbon dioxide.

13. The proposed groundwater remediation system is composed of three zones, a treatment zone, a transition zone, and a compliance zone. The boundaries of the zones and the proposed remediation system locations are shown on Attachment A. A minimum of eleven injection wells and four extraction wells will be installed in the treatment zone. Groundwater will be pumped from the extraction wells, treated with additives and pumped into the injection wells to create a circulation loop. The California High Speed Rail line is projected to be built on at least a portion

of the Site. If that project proceeds, locations of wells and equipment may need to be adjusted. If adjustments in locations of wells and/or equipment within 300 feet of currently proposed locations are needed, a report needs to be submitted to the Executive Officer proposing the new location(s) and including justification for the requested change(s).

14. An electron donor consisting mainly of alcohol (methanol, ethanol, and/or isopropyl alcohol) and soy bean vegetable oil will be injected into groundwater. Other proposed additives include potassium hydroxide for pH buffering, di-ammonium phosphate to support microbial growth, and a bioaugmentation culture. The Discharger will inject annually up to 90,000 gallons of alcohol, up to 30,000 gallons of soybean vegetable oil, up to 7,500 gallons of 50% potassium hydroxide, up to 10,000 gallons of di-ammonium phosphate, and up to 1,000 gallons of NJ-14 Bioaugmentation Culture. Groundwater will be recirculated at an approximate rate of 110 gallons per minute with approximately 10 gallons per minute being injected into each injection well.

15. Creation of reducing conditions in groundwater is expected to result in increases in the concentration of iron and manganese, and possibly other metals. The Discharger has proposed the installation of a minimum of 25 oxygen sparge point couplet wells in the transition zone downgradient of the treatment zone. The Discharger proposes to inject both 90% oxygen and pulses of outdoor air to distribute the added oxygen. These are intended to re-aerate groundwater and reduce the concentration of iron and manganese. It will also enhance aerobic co-metabolic degradation of residual volatile organic compounds.

16. Additional monitoring well(s) will be installed in the compliance zone upgradient of City of Fresno well 22A. Locations of the compliance well(s) will be determined in consultation with Univar and Central Valley Water Board staff. The monitoring well(s) will be installed and sampled prior to the startup of the groundwater treatment system.

REGULATORY CONSIDERATIONS

17. The *Water Quality Control Plan for the Tulare Lake Basin, Second Edition, revised January 2004* ("Basin Plan") designates beneficial uses, establishes narrative and numerical water quality objectives, contains implementation plans and policies for protecting all waters of the Basin, and incorporates, by reference, plans and policies of the State Water Board. In accordance with section 13263(a) of the Water Code, these requirements implement the Basin Plan.

18. The Site is in Detailed Analysis Unit (DAU) 233, within the Kings Basin hydrologic unit. The Basin Plan identifies the beneficial uses of groundwater as municipal and domestic supply, agricultural supply, industrial service supply, industrial process supply, and water contact and non-contact water recreation.

19. The Basin Plan establishes numerical and narrative water quality objectives for surface water and groundwater within the basin, and recognizes that water quality objectives are achieved primarily through the Board's adoption of waste discharge requirements and enforcement orders. Where numerical water quality objectives are listed, these are limits necessary for the reasonable protection of beneficial uses of the water. Where compliance with narrative water

quality objectives is required, the Board will, on a case-by-case basis, adopt numerical limits in orders, which will implement the narrative objectives to protect beneficial uses of the waters of the state.

20. The Basin Plan identifies numerical water quality objectives for waters designated as municipal supply. These are the maximum contaminant levels (MCLs) specified in the following provisions of Title 22 of the California Code of Regulations: Tables 64431-A (Inorganic Chemicals) and 64431-B (Fluoride) of section 64431, Table 64444-A (Organic Chemicals) of section 64444, and Table 64449-A (Secondary Maximum Contaminant Levels- Consumer Acceptance Limits) of section 64449. The Basin Plan's incorporation of these provisions by reference is prospective, and includes future changes to the incorporated provisions as the changes take effect. The Basin Plan recognizes that the Board may apply limits more stringent than MCLs to ensure that waters do not contain chemical constituents in concentrations that adversely affect beneficial uses.

21. The Basin Plan contains narrative water quality objectives for chemical constituents, tastes and odors, and toxicity. The toxicity objective requires that groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in humans, plants or animals. The chemical constituent objective requires that groundwater shall not contain chemical constituents in concentrations that adversely affect beneficial uses. The tastes and odors objective requires that groundwater shall not contain tastes or odors producing substances in concentrations that cause nuisance or adversely affect beneficial uses.

22. This Order addresses water quality as it relates to the chemicals being injected, as well as the byproducts and breakdown products produced by the reactions of the injectants, chemicals being treated and geological materials. As discussed above, chemicals are injected to stimulate reduction in concentrations of the target waste constituent and the target waste constituent may undergo a series of transformations to other constituents as it degrades. The injected chemical itself may leave residuals of its components, as well as cause changes in groundwater chemistry that liberate metals found in the formation materials.

    Background/baseline concentrations of metals and total dissolved solids will be established pursuant to the attached Monitoring and Reporting Program. The applicable WQOs are the narrative toxicity objective, Primary and Secondary Maximum Contaminant Levels, and the narrative taste and odor objective as found in the Basin Plan. The following Table presents numerical WQOs and numerical limits that implement narrative WQOs for waste constituents of concern at the Site:

Constituent	**WQO/Limit**	**Reference**
trichloroethene	5 µg/L	Primary Maximum Contaminant Level
tetrachloroethene	5 µg/L	Primary Maximum Contaminant Level
vinyl chloride	2 µg/L	Primary Maximum Contaminant Level
cis 1,2-dichloroethene	6 µg/L	Primary Maximum Contaminant Level
1,2-dichloroethene	10 µg/L	Primary Maximum Contaminant Level
1,2-dichloroethane	0.5 µg/L	Primary Maximum Contaminant Level

1,1-dichloroethene	6 µg/L	Primary Maximum Contaminant Level
1,1-dichloroethane	5 µg/L	California Public Health Goal
1,2,3-trichloropropane	0.0007µg/L	California Public Health Goal
1,2-dichloropropane	5 µg/L	Primary Maximum Contaminant Level
1-chloropropane	280 µg/L	IRIS
propene	28 µg/L	Taste and Odor
iron	300 µg/L	Secondary Maximum Contaminant Level
ethane	7500 ug/L	Taste and Odor
manganese	50 µg/L	Secondary Maximum Contaminant Level
hexavalent chromium	0.02 µg/L	California Public Health Goal
total chromium	50 µg/L	Primary Maximum Contaminant Level
total dissolved solids	500 mg/L	Secondary Maximum Contaminant Level
sulfate	250 mg/L	Secondary Maximum Contaminant Level
bromate	10 µg/L	Primary Maximum Contaminant Level
chloride	250 mg/L	Secondary Maximum Contaminant Level

23. Some amendments used to stimulate degradation of waste constituents in groundwater have a salt component (generally sodium or potassium). Upon completion of the intended degradation process, the salt component remains. Groundwater in the Central Valley is degraded by salts and the Central Valley Water Board is intent on minimizing the discharge of salts to groundwater. The use of non-salt-containing injectants is preferred, and the Discharger is required to demonstrate that there are no non-salt containing injectant alternatives that will cost-effectively promote the degradation of the target constituent before being allowed to use a salt-containing injectant. Furthermore, the Discharger is required to establish background salt concentrations and monitor the groundwater for changes in salt concentrations during the life of the project. Increases in salt concentrations in groundwater are restricted by Groundwater Limitation C.2, below.

24. The action to adopt these Waste Discharge Requirements is exempt from the provisions of the California Environmental Quality Act (CEQA) (Pub. Resources Code § 21000 et seq.) because it: (1) authorizes activity that will result in a minor modification to land (Cal. Code Regs., tit. 14, §15304); (2) consists of an action by a regulatory agency authorizing actions for the protection of the environment (Cal. Code Regs., tit. 14, §15308); and (3) authorizes a small or medium action costing $1 million or less that is taken to prevent, minimize, stabilize, mitigate, or eliminate the release or threat of release of a hazardous waste or substance (Cal. Code Regs., tit. 14, §15330).

25. The discharge is exempt from the requirements of *Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste,* set forth in the Title 27 of the California Code of Regulations (hereafter "Title 27") pursuant to Subsections 20090(b) and 20090(d) of Title 27.

    The discharge authorized by these WDRs is exempt from Title 27 pursuant to Subsection 20090(b) because:

    a. The Central Valley Water Board is issuing these waste discharge requirements;

b. The discharge is in compliance with the applicable Basin Plan; and

c. The wastewater does not need to be managed as a hazardous waste, as defined by California Code of Regulations, title 22, sections 66261.1 et seq.

The discharge authorized by these WDRs is exempt from Title 27 pursuant to Subsection 20090(d) because:

a. The application of amendments to groundwater is at the direction of the Regional Water Board to cleanup and abate conditions of pollution or nuisance resulting from the unauthorized discharge of waste.

b. Wastes removed from the immediate place of release must be discharged according to the Title 27 regulations; and

c. The cleanup actions intended to contain wastes at the place of release shall implement the Title 27 regulations to the extent feasible.

26. Water Code section 13267(b) provides that:

> In conducting an investigation specified in subdivision (a), the Regional Board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge within its region … shall furnish under penalty of perjury, technical or monitoring program reports which the Regional Board requires. The burden, including costs of these reports, shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. In requiring these reports, the Regional Board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports.

The technical reports required by this Order and the attached Monitoring and Reporting Program are necessary to assure compliance with this Order.

27. The California Department of Water Resources sets standards for the construction and destruction of groundwater wells, as described in *California Well Standards Bulletin 74-90* (June 1991) and *Water Well Standards: State of California Bulletin 94-81* (December 1981). These standards, and any more stringent standards implemented by the Regional Water Board or adopted by the local county where the Site is located pursuant to Water Code section 13801 apply to all monitoring and injection wells.

28. Section 3020(b)(2) of the Resource Conservation and Recovery Act (RCRA) states that, prior to injection into or above an underground source of drinking water, contaminated groundwater shall be "…treated to substantially reduce hazardous constituents prior to such injection." In a letter dated 10 December 1999, the United States Environmental Protection Agency, Office of Solid Waste and Emergency Response (OSWER) states, "if extracted groundwater is amended at the surface (i.e., "treated") before reinjection, and the subsequent in-situ bioremediation achieves a substantial reduction of hazardous constituents the remedy would satisfy section 3020(b)(2)." The injection of groundwater within the treatment zone in compliance with this Order, with or without the treatment for the constituents of concern, complies with section 3020(2)(b) of RCRA.

29. Water Code section 13307.5 prescribes specific public participation requirements that the Board must follow when the Board approves a cleanup proposal submitted by a primary or active

discharger who has been issued an order pursuant to Water Code section 13304. Although these WDRs do not exactly constitute such a cleanup proposal, the Board's process for issuing WDRs substantively complies with the requirements of Water Code section 13307.5 because these WDRs will be circulated to affected or potentially affected property owners, local government entities will be apprised of the Board's intention to issue these WDRs, a comment period of at least 30 days will be provided, and the Board will approve these WDRs in a public meeting after considering all relevant comments.

Antidegradation Analysis

30. State Water Board Resolution 68-16 requires the Board, in regulating discharges, to maintain high quality waters of the State until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and potential beneficial uses, and will not result in water quality less than that described in plans and policies (e.g., quality that exceeds WQOs). The Central Valley Water Board finds that these WDRs authorize limited temporal groundwater degradation, but that such degradation is consistent with Resolution 68-16 since: (1) the purpose of the discharge is to accelerate and enhance remediation of the existing groundwater pollution, and such remediation is consistent with the maximum benefit to the people of California; (2) the degradation is limited in scope and duration; (3) this Order requires use of best practicable treatment or control of the wastes to be discharged, including adequate monitoring and contingency plans to assure protection of water quality; and (4) this Order does not allow discharges of waste to exceed water quality objectives, other than the temporary exceedances that will occur as a result of the treatment process. If the monitoring conducted pursuant to the MRP shows that the discharge causes or threatens to cause degradation of water quality (other than those temporarily permitted by these WDRs), then the Discharger will be required to cease the discharge, implement source control, change the method of discharge, or take other action. A slight residual increase in salts may occur, but will be limited to a maximum 20 percent increase over background and less than the WQO/Limit listed above in Finding 22.

General Findings

31. Pursuant to Water Code section 13263(g), the discharge of waste is a privilege, not a right, and adoption of this Order does not create a vested right to continue the discharge.

32. All the above and the supplemental data and information and details in the attached Information Sheet, which is incorporated by reference herein, were considered in establishing the following conditions of discharge.

33. The Discharger and interested agencies and persons were notified of the Board's intent to prescribe waste discharge requirements for this discharge and were provided with an opportunity for a public hearing and an opportunity to submit written comments.

34. In a public meeting, all comments pertaining to this Order were heard and considered.

IT IS HEREBY ORDERED that pursuant to Water Code sections 13263 and 13267, Univar USA Inc. and its agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the Water Code and regulations adopted thereunder, shall comply with the following:

A. Prohibitions

1. Discharge of waste or pollutants to surface waters or surface water drainage courses is prohibited.

2. Discharge of amendments or other materials at locations or in manner different from that described in this order is prohibited.

3. Discharge of waste classified as 'hazardous', as defined in California Code of Regulations, title 22, sections 66261.1 et seq., is prohibited. Discharge of waste classified as 'designated', as defined in Water Code section 13173, in a manner that causes violation of groundwater limitations, is prohibited.

4. Neither the treatment nor the discharge shall cause a nuisance or a condition of pollution, as defined by Water Code section 13050, outside of the treatment and transition zones.

B. Discharge Specifications

1. Monitoring wells MW-7, MW-9, MW-14S, MW-14D, MW-15S, MW-15D, MW-15D1, MW-16D, MW-20S, MW-20D, MW-20D1, T1-2, T2-1, and proposed well couplet MW-21 shall comprise the compliance monitoring well network.

2. No waste constituent shall be released or discharged, or placed where it will be released or discharged, in a concentration or in a mass that causes violation of the Groundwater Limitations in groundwater outside of the treatment and transition zones.

3. Groundwater shall not be amended with materials other than those listed in Findings 14 and 15.

C. Groundwater Limitations

1. The release, injection, discharge or addition of constituents from the remediation system shall not cause the groundwater at the compliance wells listed in B.1 to contain concentrations of constituents added as amendments, or by-products of the in-situ treatment process, in amounts that exceed the Water Quality Objectives listed in Finding 22, or above background concentrations.

2. The release, injection, discharge or addition of constituents from a remediation system shall not cause the groundwater at the compliance wells to contain concentrations of metals, total dissolved solids, or electrical conductivity that are more than 20% greater than their respective background concentrations, as established by the Monitoring and Reporting Program.

3. The discharge shall not cause the pH of the groundwater at the compliance points to be less than 6.5 or greater than 8.5.

4. The release, injection, discharge or addition of constituents from the remediation system shall not cause the groundwater to contain taste or odor producing substances that cause nuisance or adversely affect beneficial uses at the compliance wells.

D. Provisions

1. The Discharger shall comply with the *Standard Provisions and Reporting Requirements for Waste Discharge Requirements,* dated 1 March 1991 (Standard Provisions), which are part of this Order.

2. The Discharger shall comply with MRP R5-2013-0014, which is part of this Order, and any revisions thereto as adopted by the Central Valley Water Board or approved by the Executive Officer. The submittal date of Discharger self-monitoring reports shall be no later than submittal dates specified in the MRP.

3. The Discharger may be required to submit technical reports pursuant to Water Code section 13267, as directed by the Executive Officer. The technical reports required by this Order are necessary to assure compliance with this Order.

4. A report needs to be submitted proposing any needed changes in amendments or the location of wells, and justification for the changes. Changes to the proposed remediation system, as described in the above findings, shall not be made until approved by the Executive Officer.

5. All technical reports and work plans required herein that involve planning, investigation, evaluation, or design, or other work requiring interpretation and proper application of engineering or geologic sciences, shall be prepared by or under the direction of persons registered to practice in California pursuant to California Business and Professions Code sections 6735, 7835, and 7835.1. As required by these laws, completed technical reports and work plans must bear the signature(s) and seal(s) of the registered professionals(s) in a manner such that all work can be clearly attributed to the professional responsible for the work. All reports required herein are required pursuant to Water Code section 13267.

6. A copy of this Order shall be maintained at the project site and be available at all times to operating personnel.

7. Provisions of this Order are severable. If any provision of these requirements is found invalid, the remainder of this Order shall not be affected.

8. The Discharger shall maintain in good working order and operate as efficiently as possible any facility or control system installed by the Discharger to achieve compliance with this Order.

9. In the event of a violation of the order, or any material change in the character, location, or volume of the discharge, or if the Discharger is unable to comply with any of the conditions of this Order due to:

    a. breakdown of any facility or control system or monitoring equipment installed by the Discharger to achieve compliance with this Order;

    b. migration or application of amendments, pollutants or byproducts outside the specified treatment area;

    c. accidents caused by human error or negligence; or

    d. other causes such as acts of nature;

    The Discharger shall notify the Central Valley Water Board by telephone with 24 hours after it or its agents have knowledge of the incident and confirm this notification in writing within two weeks of the telephone notification. The written notification shall include pertinent information explaining reasons for the noncompliance and shall indicate the steps taken to correct the problem from recurring. The reporting of migration or application of amendments, waste constituents or byproducts outside the specified treatment area shall include an assessment of and schedule for implementation of contingency plans required to bring the discharge into compliance with the Order.

10. The Discharger shall report within 48 hours to the Central Valley Water Board any violation of this Order, and any material change in the character, location, or volume of the discharge.

11. In the event of any change in control or ownership of land or waste treatment and storage facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to the Central Valley Water Board.

12. To assume operation under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the state of incorporation if a corporation, the address and telephone number of the persons responsible for contact with the Central Valley Water Board and a statement. The statement shall comply with the signatory paragraph of Standard Provision B.3 and shall state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request may be considered a discharge without requirements, a violation of the Water Code. If the request is tentatively approved by the Executive Officer, the Central Valley Water Board will complete the transfer by issuing a name-change Order at one of its regularly scheduled meetings.

13. This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to

persons or property, nor protect the discharger from his liability under Federal, State, or Local laws, nor create a vested right for the discharger to continue the waste discharge.

14. Chemical, bacteriological, and bioassay analyses must be conducted at a laboratory certified for such analyses by the State Department of Public Health. For specialized analysis where no certification exists, the laboratory and analytical method must be approved by the Executive Officer.

15. All reports or other documents required by this Order, and other information requested by the Central Valley Water Board, shall be signed by a person described below or by a duly authorized representative of that person.

    a. for a corporation: by a responsible corporate officer such as (a) a president, secretary, treasurer, or vice president of the corporation in charge of principal business function; (b) any other person who performs similar policy or decision making functions for the corporation; or (c) the manager of one or more manufacturing, production, or operating facilities if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

    b. Reports required by this Order and other information requested by the Central Valley Water Board may be signed by a duly authorized representative provided:

        i. the authorization is made in writing by a person described in paragraph (a) of this provision;

        ii. the authorization specifies either an individual or a position having responsibility for the overall operation for the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company; and

        iii. written authorization is submitted to the Central Valley Water Board prior to or together with any reports, information, or applications signed by the authorized representative.

    c. Any person signing a document under paragraph (a) or (b) of this provision shall make the following certification: "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate 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 fine and imprisonment for knowing violations.

16. The Central Valley Water Board is currently implementing the CV-SALTS initiative to develop a Basin Plan amendment that will establish a salt and nitrate management plan for the Central Valley. Through this effort the Basin Plan will be amended to define how the narrative water quality objectives are to be interpreted for the protection of agricultural use. If new information or evidence indicates that groundwater limitations different than those prescribed herein are appropriate, this Order will be reopened to incorporate such limits.

17. The Central Valley Water Board may review this Order periodically and may revise requirements when necessary. In addition, the discharger shall file a report of waste discharge with the Executive Officer at least 120 days before making any material change or proposed change in the character, location, or volume of the discharge.

18. This Order is in effect until terminated by the Central Valley Water Board.

If, in the opinion of the Executive Officer, the Discharger fails to comply with the provisions of this Order, the Executive Officer may refer this matter to the Attorney General for judicial enforcement, may issue a complaint for administrative civil liability, or may take other enforcement actions. Failure to comply with this Order or with the WDRs may result in the imposition of administrative civil liability of up to $10,000 per violation, per day, depending on the violation, pursuant to the Water Code, including sections 13268, 13350 and 13385. The Central Valley Water Board reserves its right to take any enforcement actions authorized by law.

Any person aggrieved by this action of the Central Valley Water Board may petition the State Water Board to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, sections 2050 and following. The State Water Board must receive the petition by 5:00 p.m., 30 days after the date of this Order, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the Internet at:

http://www.waterboards.ca.gov/public_notices/petitions/water_quality

or will be provided upon request.

I, PAMELA C. CREEDON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 1 February 2013.

Original signed by

PAMELA C. CREEDON, Executive Officer

Order Attachments:

A. Site Location Map
B. Sampling Frequency and Constituent Suite

Monitoring and Reporting Program R5-2013-0014
Information Sheet
Standard Provisions (1 March 1991) (separate attachment to Discharger only)

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM R5-2013-0014
FOR
UNIVAR USA INC.
IN-SITU GROUNDWATER BIOREMEDATION PROJECT
1152 G STREET, FRESNO
FRESNO COUNTY

This Monitoring and Reporting Program (MRP) describes requirements for monitoring a groundwater extraction and treatment system. This MRP is issued pursuant to Water Code section 13267. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer. As appropriate, Central Valley Water Board staff shall approve specific sample station locations prior to implementation of sampling activities.

All samples should be representative of the volume and nature of the discharge or matrix of material sampled. The time, date, and location of each grab sample shall be recorded on the sample's chain of custody form.

GROUNDWATER MONITORING

Existing and proposed wells for the site are shown on Attachment A. The groundwater monitoring program for these wells and any wells installed subsequent to the issuance of this MRP, shall follow the schedule in Attachment B. The volume of injected and/or extracted groundwater, if applicable, shall also be provided in quarterly monitoring reports. Sample collection and analysis shall follow standard EPA protocol.

The monitor wells, extraction wells and/or injection wells shall be sampled according to the schedule in Attachment B and the samples analyzed by the methods in Table 1.

Table 1: Analytical Methods

Constituent	Method[1]	Maximum Practical Quantitation Limit (µg/L)[2]
Suite A		
Volatile Organic Compounds	EPA 8020 or 8260B	0.5
Sodium		
Potassium		
Suite B		
Organic Acids	EPA 300	1,000
Ethane	Modified EPA 602	0.3
Ethene	Modified EPA 602	0.3
Methane	Modified EPA 602	0.3
Total Dissolved Solids	EPA 160.1	10,000
Total Organic Carbon	EPA 415	1,000
Chloride	EPA 6500	1,000

Nitrate	EPA 6500	1,000
Sulfate	EPA 6500	1,000
Sulfide	Hach Method 8131	50
Alkalinity	Hach Titration	1,000
Suite C		
Total and Dissolved Manganese	EPA 200.7	various
Orthophosphate	EPA 365.5	500
Ammonia	EPA 350.1	50
Suite D		
Dissolved Metals[3]	EPA 200.7, 200.8	Various
Suite E		
Hexavalent chromium	EPA 218.6	0.5

[1] Or an equivalent EPA Method that achieves the maximum Practical Quantitation Limit.

[2] All concentrations between the Method Detection Limit and the Practical Quantitation Limit shall be reported as an estimated value.

[3] Metals include arsenic, barium, cadmium, calcium, total chromium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, selenium, and silica.

FIELD SAMPLING

In addition to the above sampling and analysis, field sampling and analysis shall be conducted each time a monitor well or extraction well is sampled. The sampling and analysis of field parameters shall be as specified in Table 2.

Table 2: Field Sampling Requirements

Parameters	Units	Type of Sample
Groundwater Elevation	Feet, Mean Sea Level	Measurement
Oxidation-Reduction Potential	Millivolts	Grab
Electrical Conductivity	uhmos/cm	Grab
Dissolved Oxygen	mg/L	Grab
Temperature	Degrees C	Grab
pH	pH Units (to 0.1 units)	Grab

Field test instruments (such as those used to test pH and dissolved oxygen) may be used provided that:

1. The operator is trained in proper use and maintenance of the instruments;
2. The instruments are calibrated prior to each monitoring event;
3. Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are submitted as described in item (b) of the “Reporting” section of this MRP.

DISCHARGE MONITORING

The Discharger shall monitor daily the discharge of water and amendments that are injected into the groundwater according to the requirements specified in Table 3. Each amendment addition shall be recorded individually, along with information regarding the time period over which the amendment was injected into the aquifer. The Discharger is required to demonstrate that there are no non-salt containing injectant alternatives that will cost-effectively promote the degradation of the target constituent before being allowed to use a salt-containing injectant.

Table 3: Discharge Monitoring Requirements

Parameters	Units	Type of Sample
Injected Volume	gallons per day	Meter
Amendment(s) Added	kilograms per day	Measured

AMENDMENT ANALYSIS

Prior to use, amendments shall be analyzed for the constituents listed in Table 4. The analysis should be done on the pure amendment (if possible) and on a mixture of the amendment and deionized water at the estimated concentration that would be injected during the project.

Table 4: Amendment Analytical Requirements

Constituent	Method[1]	Maximum Practical Quantitation Limit (µg/L)[2]
Volatile Organic Compounds	EPA 8260B	0.5
General Minerals[3]		
Metals, Total and Dissolved[4]	EPA 200.7, 200.8	Various
Hexavalent Chromium	EPA 218.6	0.5
Semi-Volatile Organic Compounds	EPA Method 8270	5.0
pH	meter	NA
Electrical Conductivity	meter	NA

1 Or an equivalent EPA Method that achieves the maximum Practical Quantitation Limit.

2 All concentrations between the Method Detection Limit and the Practical Quantitation Limit shall be reported, and reported as an estimated value.

3 Alkalinity, bicarbonate, sodium, calcium, magnesium, potassium, chloride, sulfate, total hardness, nitrate, nitrite, ammonia, total dissolved solids.

4 Metals include arsenic, barium, cadmium, total chromium, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium and silica.

ESTABLISHEMENT OF BACKGROUND CONCENTRATION VALUES

The Discharger shall develop background values for concentrations of general minerals, metals, and electrical conductivity in groundwater following the procedures found in California Code of Regulations section 20415(e)(10). The Discharger shall sample each compliance well and analyze the samples for the constituents above a minimum of two times prior to startup of the injection system.

REPORTING

When reporting the data, the Discharger shall arrange the information in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner as to illustrate clearly the compliance with this Order. In addition, the Discharger shall notify the Central Valley Water Board within 48 hours of any unscheduled shutdown of any soil vapor and/or groundwater extraction/injection system. The results of any monitoring done more frequently than required at the locations specified in the Monitoring and Reporting Program shall also be reported to the Central Valley Water Board.

As required by the California Business and Professions Code sections 6735, 7835, and 7835.1, all reports shall be prepared by a registered professional or their subordinate and signed by the registered professional.

The Discharger shall submit quarterly electronic data reports, which conform to the requirements of the California Code of Regulations, Title 23, Division 3, Chapter 30. The quarterly reports shall be submitted electronically over the internet to the Geotracker database system by the 1st day of the second month following the end of each calendar quarter by **1 February, 1 May, 1 August, and 1 November** until such time as the Executive Officer determines that the reports are no longer necessary.

Hard copies of quarterly reports shall be submitted to the Central Valley Water Board by the **1st day of the second month following the end of each calendar quarter (i.e., by 1 February, 1 May, 1 August, and 1 November**). Each quarterly report shall include the following minimum information:

(a) a description and discussion of the groundwater sampling event and results, including trends in the concentrations of pollutants and groundwater elevations in the wells, how and when samples were collected, and whether the pollutant plume(s) is delineated;

(b) field logs that contain, at a minimum, water quality parameters measured before, during, and after purging, method of purging, depth of water, volume of water purged, etc.;

(c) groundwater contour maps for all groundwater zones, if applicable;

(d) pollutant concentration maps for all groundwater zones, if applicable;

(e) a table showing well construction details such as well number, groundwater zone being monitored, coordinates (longitude and latitude), reference elevation, screened interval, depth of seal, depth of well;

(f) a table showing historical lateral and vertical (if applicable) flow directions and gradients;

(g) cumulative data tables containing the water quality analytical results and depth to groundwater;

(h) a copy of the laboratory analytical data report, which may be submitted in an electronic format with the report;

(i) the status of any ongoing remediation, including an estimate of the cumulative mass of pollutant removed from the subsurface, system operating time, the effectiveness of the remediation system, and any field notes pertaining to the operation and maintenance of the system; and

(j) if applicable, the reasons for and duration of all interruptions in the operation of any remediation system, and actions planned or taken to correct and prevent interruptions.

An Annual Report shall be submitted to the Central Valley Water Board by **1 February (1 November for semi-annual monitoring)** of each year. This report shall contain an evaluation of the effectiveness and progress of the investigation and remediation, and may be substituted for the fourth quarter monitoring report. The Annual Report shall contain the following minimum information:

(a) both tabular and graphical summaries of all data obtained during the year;

(b) groundwater contour maps and pollutant concentration maps containing all data obtained during the previous year;

(c) a discussion of the long-term trends in the concentrations of the pollutants in the groundwater monitoring wells;

(d) an analysis of whether the pollutant plume is being effectively treated;

(e) a description of all remedial activities conducted during the year, an analysis of their effectiveness in removing the pollutants, and plans to improve remediation system effectiveness;

(f) an identification of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program; and

(g) if desired, a proposal and rationale for any revisions to the groundwater sampling plan frequency and/or list of analytes.

A letter transmitting the monitoring reports shall accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

The Discharger shall implement the above monitoring program on the first day of the month following adoption of this Order.

Ordered by: _____
PAMELA C. CREEDON, Executive Officer

_____
(Date)

INFORMATION SHEET

ORDER R5-2013-0014
UNIVAR USA INC.
IN-SITU GROUNDWATER BIOREMEDIATION PROJECT
1152 G STREET, FRESNO
FRESNO COUNTY

Univar USA Inc. (Univar) is proposing in-situ bioremediation for groundwater impacted by tetrachloroethene and its breakdown products. Amendments will be injected into groundwater to create reducing conditions and an appropriate bacteria culture will be added to groundwater to optimize the breakdown of volatile organic compounds.

Background
Univar leased property at 1152 G Street, Fresno from 1965 to 1986. An aboveground storage tank (AST) was located in the northeast corner and was used to store tetrachloroethene (PCE). The AST has since been removed. PCE was initially detected in soil samples during a 1994 assessment. Numerous assessments of soil, soil gas, and groundwater have been conducted since that time to delineate the extent of PCE in soil and groundwater.

PCE impacted groundwater forms a plume extending approximately 1,400 feet to the north and 1,800 feet to the northwest, toward City of Fresno well 22A. PCE has been detected at depths up to 250 below ground surface in the vicinity of City well 22A. Concentrations of PCE detected in City well 22A are well below State of California drinking water standards.

Univar's clean-up remedy is a three-pronged approach, and will include anaerobic (oxygen deficient) breakdown of volatile organic compounds (VOCs) with downgradient plume polishing by aerobic (oxygen rich) degradation and natural attenuation. This approach is expected to remediate most, if not all, of the plume over time (7+ years). A carbon substrate is used to provide food for the existing and introduced bacteria to grow. The bacteria will break down the PCE and other VOCs. Univar has tested several variations of the in-situ biodegradation process at dozens of its own properties across the US and has conducted laboratory testing to ensure success at its Fresno project site. The process has shown significant success in reducing the bulk of PCE concentrations in the aquifer to innocuous end products (ethane and carbon dioxide).

Anaerobic biodegradation is not occurring to any significant extent because the groundwater is aerobic. As such, sufficient electron donor (carbon substrate) must be added to the impacted zone to enhance anaerobic biodegradation. Univar will use an amendment mixture of alcohol and soybean vegetable oil as the carbon substrate. Alcohols serve as excellent electron donors, and also keep the wells clean by acting as disinfectant in the immediate vicinity of the well. The alcohol may be emulsified (on-site or off-site) with vegetable oil (which is also food-grade soybean oil). Other additives include small amounts of potassium hydroxide for pH buffering and di-ammonium phosphate to enhance microbial growth. Groundwater will be extracted (4 extraction wells), amended, and reinjected into a network of approximately 11 wells. Carbon source addition may also occur in a batch basis followed by groundwater recirculation.

Univar's laboratory microcosm studies indicated that bioaugmentation is also required to remediate groundwater. As such, once anaerobic conditions have been established, Univar proposes to bioaugment the impacted zone with a NJ-14 bacteria culture. To further enhance aerobic conditions in the downgradient portion of the plume, oxygen will be added. Note that this oxygen (introduced by a

sparging compressor and an oxygen generator) will be utilized for the co-metabolic degradation; but more importantly, it will re-oxidize any reduced metals (iron mostly) to minimize the possibility of iron migration towards City well 22A. The portion of the plume downgradient of Tuolumne Street is generally expected to naturally attenuate at a much more rapid rate because of the proposed upgradient remedial system. Due to the proximity of City well 22A, Univar does not believe that it is advisable to actively (anaerobically) remediate groundwater that is downgradient of Tuolumne Street, particularly since iron will be reduced as part of any active remediation and may impact the City well.

Groundwater Conditions

Groundwater monitoring has been ongoing since at least 1996. Groundwater occurs at a depth of approximately 100 to 110 feet below ground surface. More than 45 monitoring wells are currently gauged and sampled semi-annually. The monitoring and reporting program requires sampling of the existing wells on a quarterly, semi-annual, or annual basis, depending on the specific well. Groundwater samples will be analyzed for general mineral, metal, and volatile organic constituents, along with constituents associated with the amendments to be injected.

Fourteen monitoring wells outside of the treatment and transition zones or on the outside edges of the transition zone have been selected as compliance wells. Several of the compliance wells are located upgradient of Fresno City well 22A to ensure that the remediation systems do not cause impacts to that well. The compliance wells will be monitored to ensure that injected materials do not affect the beneficial uses of groundwater outside of the treatment and transition zones.

Basin Plan, Beneficial Uses, and Regulatory Considerations

The Water Quality Control Plan for the Tulare Lake Basin (second edition) (the “Basin Plan”) designates beneficial uses, establishes water quality objectives, and contains implementation plans and policies for all waters of the basin. The receiving water is groundwater. Beneficial uses include municipal and domestic water supply, agricultural supply, industrial service supply, industrial process supply, and water contact and non-contact water recreation. Discharges shall not cause groundwater at the compliance points to exceed drinking water primary or secondary standards unless background concentrations already exceed the primary or secondary standards. Discharges shall not cause concentrations of metals, total dissolved solids, or electrical conductivity to increase more than 20% over their background concentrations.

Antidegradation

State Water resources Control Board Resolution 68-16 (hereafter Resolution 68-16) requires the Regional Water Board to maintain high quality waters of the State until it is demonstrated that any change in quality will be consistent with the maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality less than that described in State and Regional Water Board policies (e.g., quality that exceeds water quality objectives).

The Central Valley Water Board finds that these WDRs authorize limited temporal groundwater degradation, but that such degradation is consistent with Resolution 68-16 since: (1) the purpose of the discharge is to accelerate and enhance remediation of the existing groundwater pollution, and such remediation is consistent with the maximum benefit to the people of California; (2) the degradation is limited in scope and duration; (3) this Order requires use of best practicable treatment or control of the wastes to be discharged, including adequate monitoring and contingency plans to assure protection of water quality; and (4) this Order does not allow discharges of waste to exceed water quality objectives, other than the temporary exceedances that will occur as a result of the treatment process. If the

monitoring conducted pursuant to the MRP shows that the discharge causes or threatens to cause degradation of water quality (other than those temporarily permitted by these WDRs), then the Discharger will be required to cease the discharge, implement source control, change the method of discharge, or take other action. A slight residual increase in salts may occur, but will be limited to a maximum 20 percent increase over background and will not be permitted to impact beneficial uses.

Proposed Order Terms and Conditions

Discharge Prohibitions, Discharge Specifications, and Provisions

The proposed Order would prohibit discharge to surface waters and water drainage courses.

Injection of substances other than those specifically allowed in the Order is prohibited.

Neither the treatment nor the discharge shall cause a nuisance or condition of pollution as defined by Water Code section 13050, outside of the treatment and transition zones.

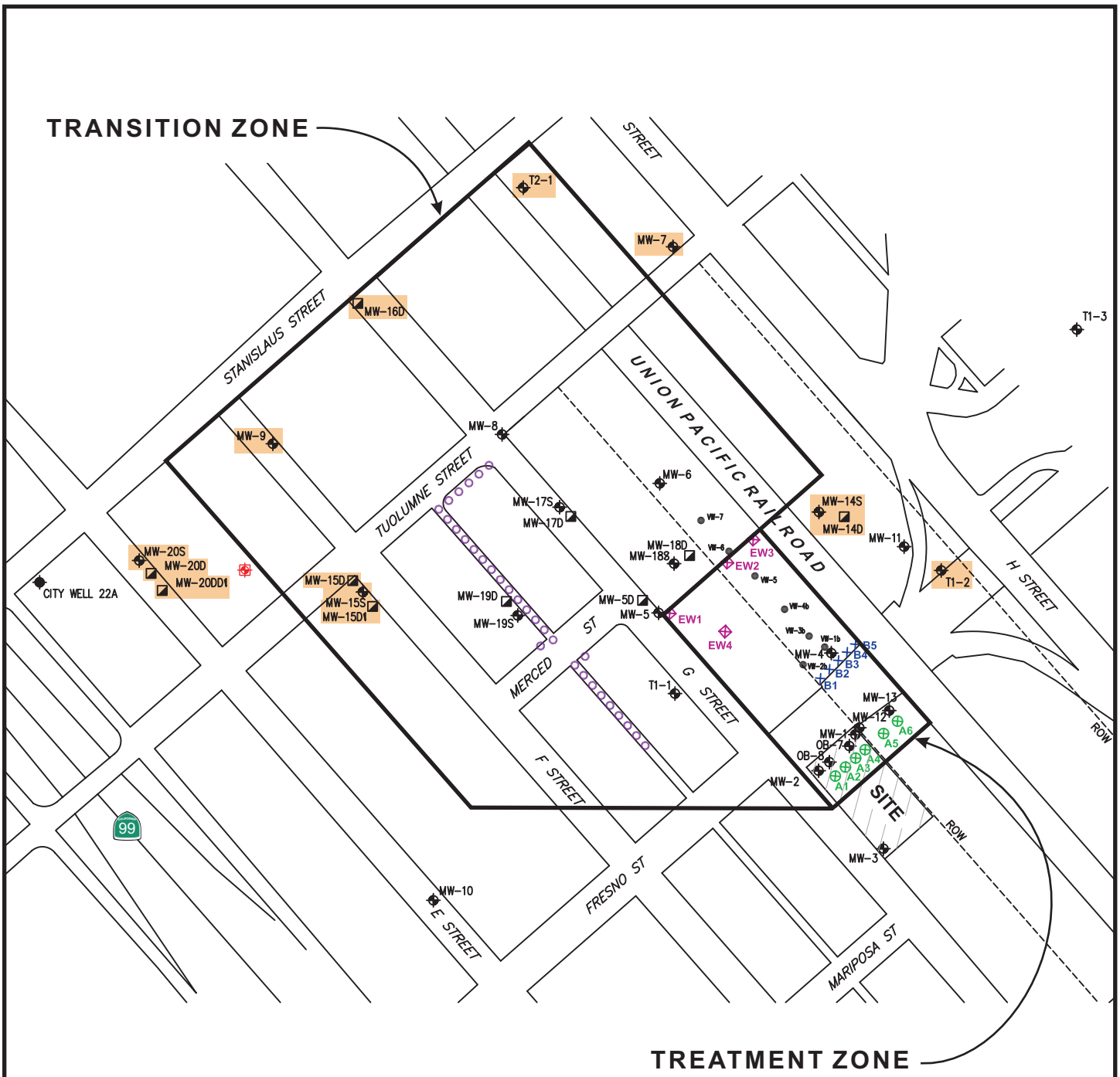
The release, injection, discharge or addition of constituents from the remediation system shall not cause the groundwater at the compliance wells listed in B.1 to contain concentrations of constituents added as amendments, and by-products of the in-situ treatment process, in amounts that exceed the limits specified in the WDRs.

The release, injection, discharge or addition of constituents from a remediation system shall not cause the groundwater at the compliance wells to contain concentrations of metals, total dissolved solids, or electrical conductivity that are more than 20% greater than their respective background concentrations, as established by the Monitoring and Reporting Program.

Monitoring Requirements

Water Code section 13267 authorizes the Central Valley Water Board to require monitoring and technical reports as necessary to investigate the impact of a waste discharge on waters of the State. Water Code section 13268 authorizes assessment of civil administrative liability where appropriate.

The proposed Order includes discharge and groundwater monitoring. The monitoring is necessary to ensure that any potential degradation from the discharge is minimized.



LEGEND

- MONITORING WELL
- DEEP MONITORING WELL
- COMPLIANCE WELL
- VAPOR EXTRACTION WELL
- INJECTION/EXTRACTION WELL
- EXTRACTION WELL
- INJECTION WELL
- OXYGEN SPARGE WELL
- PROPOSED COUPLET MONITORING WELL

Map Source:
Innovative Engineering Solutions, Inc. - Figure 5-3

N

SCALE IN FEET
0 200 400

SITE MAP

WASTE DISCHARGE REQUIREMENTS ORDER R5-2013-0014
FOR
UNIVAR USA INC.
IN-SITU GROUNDWATER BIOREMEDIATION PROJECT
1152 G STREET, FRESNO
FRESNO COUNTY

ATTACHMENT A

ATTACHMENT B

Sampling Frequency and Constituent Suite

Well Number[1]	Quarterly[2]	Semi-Annually[2]	Annually[2]	Monitoring Objective
MW-1 (if not dry)		A,B	C	Treatment Zone[3]
MW-2 (if not dry)			A,B,C	Treatment Zone
MW-3		A	B,C,D	Transition Zone
MW-4 (if not dry)	A,B		C	Treatment Zone
MW-5	A,B		C	Treatment Zone
MW-6	A,B		C	Treatment Zone
MW-7		A,B	C,D	Compliance[4]
MW-8		A,B	C,D	Transition Zone[5]
MW-9		A	B,C,D	Compliance
MW-10			A,B,C,D	Compliance
MW-11		A,B	C	Migration[6]
MW-12		A,B,C		Treatment Zone
MW-13		A,B,C		Treatment Zone
MW-14		A,B	C,D	Compliance
MW-14D		A,B	C,D	Compliance
MW-15S		A,B,C,D,E		Compliance
MW-15D		A,B,C,D,E		Compliance
MW-15D1		A,B,C,D,E		Compliance
MW-16D		A	B,C,D	Compliance
MW-17S		A,B,C		Transition
MW-17D		A,B,C		Transition
MW-18S		A	B,C	Transition
MW-18D		A	B,C	Transition
MW-19S		A,B,C	D	Transition
MW-19D		A,B,C	D	Transition
MW-20S		A,B,C,D,E		Compliance
MW-20D		A,B,C,D,E		Compliance
MW-20D1		A,B,C,D,E		Compliance
MW-21 (proposed)		A,B,C,D,E		Compliance
MW-21D (proposed)		A,B,C,D,E		Compliance
T1-1		A,B	C,D	Compliance
T1-2		A,B	C,D	Compliance
T1-3		A		Compliance
T2-1		A		Compliance
T2-2		A		Compliance
T2-2D		A		Compliance
T2-3		A		Compliance
T3-1		A		Compliance

T3-1D		A		Compliance
EW-1	A,B		C	Treatment Zone
EW-2	A,B		C	Treatment Zone
EW-3	A,B		C	Treatment Zone
VW-1b		A,B,C		Treatment Zone
VW-2b		A,B,C		Treatment Zone
VW-3b		A,B,C		Treatment Zone
VW-4b		A,B,C		Treatment Zone
BIO-1		A,B,C		Treatment Zone

[1] Well numbers as shown on Attachment A.

[2] Constituents/parameters are listed in Tables 1 and 2.

[3] Wells sampled to evaluate in-situ bioremediation progress inside the treatment zone.

[4] Wells used to determine compliance with groundwater limitations.

[5] Wells sampled to evaluate changes in water quality along the treatment zone boundary and in the transition area.

[6] Wells sampled to evaluate migration of pollutants.