FIVE-YEAR REVIEW
FORMER PESTICIDE WASTE PITS SITE
UNIVERSITY OF CALIFORNIA, RIVERSIDE
RIVERSIDE, CALIFORNIA

by Haley & Aldrich, Inc.
San Diego, California

for University of California, Riverside
Riverside, California

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University of California, Riverside  
900 University Avenue  
Environmental Health & Safety  
Riverside, California 92521

Attention: Amanda Grey

Subject: Five-Year Review Report  
Former Pesticide Waste Pits Site  
University of California, Riverside  
Riverside, California

Ladies and Gentlemen:

Haley & Aldrich, Inc. is pleased to provide the University of California, Riverside, with this Five-Year Review Report for the Former Pesticide Waste Pits Site.

Please contact us if you have any questions.

Sincerely yours,
HALEY & ALDRICH, INC.

Mehdi Miremadi  
Principal Consultant

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Enclosures

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1. INTRODUCTION

Haley & Aldrich, Inc., prepared this Five-Year Review Report (Report) on behalf of the University of California, Riverside, (UCR) for the former Pesticide Waste Pit Area (Site). The Report is required under the Operation and Maintenance Agreement (OMA) between UCR and the Department of Toxic Substance Control (DTSC) dated May 12, 2006. Following completion of the Site’s soil remediation in January 2006, and pursuant to the OMA, UCR conducted groundwater monitoring on a semiannual basis. Groundwater monitoring was discontinued in 2011 as approved by DTSC in their correspondence dated September 12, 2011.
2. SITE CHRONOLOGY

Site activities, remedial investigations, remedial actions, and post-remediation activities are summarized below.

1930s: Site and surrounding area were established as a citrus experiment station.

1950s to early 1970s: Agricultural waste was disposed into waste pits as part of UCR’s agricultural research operations.

1970: Soil and groundwater sampling were collected along the perimeter of the waste pits. Results indicated there was no significant samples collected from locations near waste pits and from control site had similar results.

June 2, 1981: UCR submitted a notification of hazardous waste site to U. S. Environmental Protection Agency.

June 1984: DTSC completed a preliminary Site assessment and recommended that UCR conduct a Site investigation.

September 1985: Ecology and Environment, Inc. conducted a Site investigation and concluded that a release of hazardous materials to groundwater may have occurred.

November 12, 1985: DTSC requested that UCR conduct a remedial investigation and feasibility study for the waste pits site.

March 1988: Holguin & Associates, Inc., conducted a preliminary soil investigation. Selected soil samples were analyzed for organochlorine pesticides, chlorinated herbicides, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals. The investigation also assessed the waste pit locations.

November 9, 1990: The remedial investigation and feasibility study work plan was submitted to DTSC.

April and May 1991: Parsons Engineering Science, Inc., (Parsons) conducted a remedial investigation that located additional waste pits, collected soil samples, installed four groundwater monitoring wells and nine piezometers, and hydraulic testing in piezometers.

July 1991: UCR conducted the first groundwater monitoring event.

March 1992: Parsons conducted a supplemental remedial investigation to further delineate the waste disposal areas.

1994: Parsons conducted a supplemental remedial investigation in the southern portion of the Site.

March 1995: Parsons prepared a focused feasibility study that developed soil cleanup levels and presented six remedial alternatives. McLaren/Hart, Inc. performed a treatability study to assess low temperature thermal desorption (LTTD) as a remedial technology.

April and June 1996: Parsons submitted a Remedial Action Plan (RAP) to DTSC in April 1996. The RAP presented a Site remedy that included excavating chemically-affected soil and debris and treating on-Site soil using LTTD. A remedial design implementation plan was prepared in June 1996.

June 1997: UCR selected McLaren/Hart to perform on-Site remediation using LTTD. McLaren/Hart suspended the remedial activities in September 1997, alleging certain polycyclic aromatic hydrocarbons (PAHs) in on-Site soil could not be treated using LTTD and no information regarding those PAHs had been provided prior to initiating the remediation. McLaren/Hart also alleged employees had been exposed to arsenic.

April 1998: Geomatrix Consultants, Inc., (Geomatrix) conducted a Site investigation of arsenic in soil.

September and October 1998: An additional Site characterization was completed by Geomatrix at the request of DTSC to assess concentrations and subsurface distribution of PAH compounds, arsenic, mercury, asbestos, ethylene dibromide, and dibromochloropropane and to assess if additional waste pits were present at the Site.

June 2000 through December 2002: Remediation activities resumed under a new subcontractor and included waste and soil removal and/or treatment using LTTD. Revised risk assessment criteria were established and approved for cleanup goals during the remediation.


May 2006: A Covenant to Restrict Use of Property and OMA were executed.

July 2011: UCR submitted a Draft Five-year Review Report to DTSC.

July 2011: UCR conducted the final semiannual groundwater monitoring event.

September 12, 2011: DTSC conditionally approved the draft Five-year Review Report.

September 12, 2011: DTSC agreed to discontinue groundwater monitoring at the Site.


December 2012: UCR submitted the Combined Annual Summary Report to DTSC.

December 2013: UCR submitted the Combined Annual Summary Report to DTSC.

December 2014: UCR submitted the Combined Annual Summary Report to DTSC.

September 2015: Amec Foster Wheeler Environmental & Infrastructure, Inc., submitted a Revised Erosion Control Plan to DTSC.
November 2015: DTSC conditionally approved the Revised Erosion Control Plan.

January 2016: UCR submitted the Combined Annual Summary Report to DTSC.

December 2016: UCR submitted the Combined Annual Summary Report to DTSC.
3. BACKGROUND

The former agricultural operations pesticide disposal area is located within the Agricultural Experiment Station at 1060 Martin Luther King Jr. Boulevard, in Riverside, California (see Appendix A, Figure 1). The Site encompasses approximately 3.2 acres and is currently vacant, unpaved, and gently slopes from east to west. Prior to establishing the University campus, the Citrus Experiment station operated at the Site during the 1930s. Since the 1950s, the Site has been occupied by the University. Agricultural station and research operations were conducted in the laboratories, greenhouses, and in small field plots at the Site. Some of the waste generated by the research operations conducted between the 1950s and early 1970s consisted of a variety of organic and inorganic waste including agricultural plant wastes, plant containers, pesticides, chemical containers. These wastes, as well as miscellaneous equipment were buried in pits excavated at the Site. Disposal activities at the Site consisted of excavating pits and trenches to a depth of approximately 12 to 18 feet below ground surface (bgs) and filling them with waste layered or mixed with soil. When the waste and/or soil mixture were filled to approximately 5 feet bgs, the waste pits were closed by covering them to the ground surface with native soil. An area located in the southwestern portion of the Site was reportedly used to burn agricultural green waste (e.g., trees, brush, and other plant material). Site assessments conducted between 1988 and 1998 identified seven waste pits at the Site.

Soil and groundwater investigations were conducted at the Site between 1988 and 1998 by various consultants under DTSC oversight. Soil samples collected from within the waste pit areas indicated the presence of chemicals, primarily within 5 to 20 feet bgs. The constituents of concern in soil included chlorinated pesticides, organochlorine pesticides, carbamate and urea pesticides, polychlorinated biphenyls (PCBs), VOCs, SVOCs, PAHs, and chlorinated herbicide. No metals impacts were identified, including arsenic and asbestos.

Five monitoring wells and three sets of clustered piezometers were installed during the Site assessment activities mentioned above (see Appendix A, Figure 2). Groundwater samples were initially analyzed for VOCs, SVOCs, PCBs, pesticides, herbicides, dioxins and furans. Following completion of the soil remedial actions described in Section 4, groundwater samples were collected semiannually from five monitoring wells and one piezometer and analyzed for VOCs, SVOCs, organochlorine pesticides, and carbamate and urea pesticides. SVOCs were analyzed annually.

A review of the results from 16 years of groundwater monitoring indicated no chemical was detected at concentrations greater than its maximum contaminant level. As such, in 2011, UCR requested that groundwater monitoring at the Site be discontinued. DTSC approved this request in their correspondence dated September 12, 2011, with the condition that the Covenant to Restrict Use of Property remain in place.
4. REMEDIAL ACTIONS

Remedial actions at the Site consisted of excavation, debris removal from the soil, off-Site disposal of chemicals, chemical containers, and debris, and treatment of impacted soil using LTLD.

Site cleanup goals were originally established in the Parson’s 1996 RAP, but were later revised with DTSC approval during the remediation program. The initial cleanup goals were based on a future residential use scenario. However, since residential future use was considered unlikely, the revised risk assessment assumed the ongoing use of the Site for UCR purposes and UCR workers were identified as the receptors most likely to be exposed. It was also assumed that a deed restriction (Covenant to Restrict Use of Property) would be put in place to preclude residential redevelopment at the Site, and that a Soil Management, Implementation and Enforcement Plan (SMIEP) would be put in place for future intrusive maintenance or construction activities. The revised cleanup goals were based on non-residential (commercial/industrial) future Site use.

Approximately 38,400 cubic yards of soil was excavated during the remediation program and 21,200 cubic yards treated on-Site using LTLD. The remaining soil either met the approved cleanup goals or was transported off-Site to a licensed disposal facility. Treated soil and soil meeting the approved cleanup goals were reused for backfill in the on-Site excavations. The treated backfill material extended to depths ranging between 4 and 20 feet bgs. Approximately 2,100 tons of clean soil was imported to the Site for use as backfill in the excavations. The Site was then graded to prevent significant ponding in the remediation areas.

Following the implementation of the remedial action at the Site, UCR submitted the Operation and Maintenance Plan (O&M Plan) and SMIEP to DTSC in August 2005. On May 12, 2006 UCR entered the OMA with DTSC. On the same day, the Covenant to Restrict Use of Property was recorded for the Site.

4.1 GROUNDWATER OPERATION AND MAINTENANCE PLAN

In accordance with the O&M Plan, UCR conducted semiannual groundwater monitoring as part of post-remediation activities and submitted the results to DTSC. As discussed previously, since none of the detected chemicals were reported at concentrations greater than their respective maximum contaminant level after 16 years of groundwater monitoring, in 2011, UCR requested that the groundwater monitoring program be discontinued. DTSC approved this request in their correspondence dated September 12, 2011. No groundwater monitoring has been conducted since that decision.

4.2 SOIL MANAGEMENT, IMPLEMENTATION AND ENFORCEMENT PLAN

The SMIEP was prepared and approved by DTSC pursuant to the Covenant to Restrict Use of Property. The SMIEP establishes protocols for safe handling, reuse, and/or disposal of the soil generated at the Site. Soil management protocols established in the SMIEP include:

- Notify the UCR Environmental Health and Safety (EH&S) representative if Site soil is to be disturbed;
- Restrict public access to the Site;
- Minimize traffic across the Site;
• Post signs at the Site stating that soil in the area may be contaminated and no excavation is permitted without approval from the UCR EH&S director or designee;
• No crops for human consumption can be grown within the Site’s boundaries;
• Provide guidance and signs regarding the location of treated soil, instructions to limit soil disturbance, and implement required safety notices and training;
• Control dust generation during construction activities;
• Limit exposure and use precautions when handling soil at the Site;
• Implement measures to limit construction impacts;
• Prevent stormwater runoff using best management practices (BMPs);
• Implement erosion control plan;
• Limit occupancy of the Site to UCR personnel 18 years or older engaging in non-classroom activities;
• Conduct a semiannual inspection of the Site, and:
• Prepare an annual report to include a description of the condition of the soil cover at the Site, construction activities, certifications that no crops have been grown for human or animal consumption, verification that the Site had been limited to personnel authorized by UCR, and a summary of any corrected measures conducted during the subject time period.

UCR has complied with the above requirements for the past five years.

4.3 OPERATION AND MAINTENANCE AGREEMENT

The following summarizes the OMA:

• Implement the O&M Plan and SMIEP;
• Provide DTSC with a minimum of 60-day advance written notice prior to the intended date of any proposed modifications, discontinuation, or other disruption of the groundwater monitoring system;
• Submit an annual summary report;
• Review and reevaluate the groundwater monitoring program five years after approval of the Site Remediation and Closure Report, and submit a draft Five-Year Review Report with recommendations based on the findings;
• In the event of any emergency response action or occurrence, immediately take appropriate action to prevent, abate or minimize such emergency, release or immediate threat of release, notify DTSC, and furnish a report to DTSC within seven days of such event; and
• Develop and submit a Site-specific fact sheet when closure is obtained and DTSC approval is no longer required for O&M.
As indicated in the OMA, UCR’s obligations include the following:

- Implement the Groundwater O&M Plan, and
- Implement the SMIEP.

The reporting requirement in the OMA is primarily related to groundwater monitoring and includes the submittal of Annual O&M Summary Reports, Annual SMIEP Reports, and Five-Year Review Reports. As indicated previously, with DTSC’s approval to discontinue groundwater monitoring in 2011, we do not believe any further reporting (annual and five-year reports) is warranted to comply with the OMA and SMIEP.

UCR has complied with the above requirements for the past five years.

4.4 COVENANT TO RESTRICT USE OF PROPERTY

A Covenant to Restrict Use of Property was recorded on May 12, 2006 for soil within 10 feet of the ground surface at the Site based on the presence of certain chemicals. As indicated in the Deed Restriction, and established as the results of the human health risk assessment, DTSC concluded that “the use of the property as remediated, and subject to the restrictions of the Covenant to Restrict Use of Property, would not present an unacceptable threat to human health safety or the environment if limited to commercial and industrial uses, parks, open space, or as an agriculture research station.” The document also states that no cap is necessary for such use of the property.

The identified restrictions include the following:

- **Prohibited Uses**: The property shall not be used as a residence, hospital for humans, indoor classroom for persons under the age of 18 years of age, or a day care center for children.
- **Prohibited Activities**: The following activities shall not be conducted at the Site:
  - Raising food for human or animal consumption;
  - Drilling for water, oil, or gas that would potentially allow exposed soil to migrate by weather or human action to other locations;
  - Extracting groundwater for purposes other than Site remediation or construction dewatering; and
  - Classroom activities for persons under the age of 18.
- **Soil Management**: The Site’s soil shall be managed in accordance with the OMA, which requires the soil to be managed in accordance with the SMIEP.

UCR has complied with the above restrictions for the past five years.
5. SUMMARY OF OPERATION AND MAINTENANCE PROGRAM

In compliance with the OMA and SMEIP, soil disturbance activities at the Site have been restricted. No construction activities were conducted at the Site in the past five years except for activities related to conducting erosion control improvements. DTSC conducted annual inspections and found the Site to have generally complied with the OMA, SMEIP, and Covenant to Restrict Use of Property. As indicated previously, groundwater monitoring was discontinued with the DTSC approval and no groundwater monitoring has been conducted in the past five years.

5.1 ANNUAL REPORTS

UCR routinely submitted annual reports to DTSC that documented any activities conducted under the OMA and SMEIP during the past five years. As part of their review of the 2014 Annual Report, DTSC provided UCR with comments and recommendations regarding soil erosion and Site drainage. DTSC’s concerns included indications of sheet and rill erosion of soil cover and potential ponding and stormwater infiltration. DTSC requested that “proper drainage pattern and erosion prevention and control best management practices (BMPs) be implemented immediately.” DTSC requested that UCR submit a Final Revised Erosion Control Plan (ECP) for DTSC’s review.

5.2 EROSION CONTROL PLAN

UCR submitted a Final ECP to DTSC on September 28, 2015. The primary objective of the ECP was to provide for long-term erosion, sediment, and stormwater management for the Site and surrounding areas based on its future use. This includes maintaining the surface cover and enhancing the drainage at the Site to minimize stormwater ponding and infiltration. The soil cover was lightly tilled in November 2014 and graded to achieve an adequate slope within the waste pits’ bermed area. A clean, compacted soil berm was constructed around the Site. A drainage ditch with an underdrain pipe was constructed outside the berm to divert stormwater from outside of the berm away from the waste pits area, so that stormwater within the berm collects in a toe drain and flows to the stormwater discharge channel in a separate, dedicated drain pipe. The combination of the graded cover, toe drain, outlet structure, and properly sized drainage pipe facilitate proper drainage inside the berm and minimize ponding and infiltration.

The Site is inspected at least quarterly by UCR staff to assess Site drainage and conditions of the drainage improvements. Semiannual inspections are typically conducted around mid-March, mid-September, and additional inspections are conducted following significant storm events. Photographs and a written inspection report are used to document the semiannual and storm event inspection findings. The revised ECP and its implementation and routine inspections by UCR staff are considered to adequately address Site soil cover erosion and stormwater drainage.

5.3 INSTALLATION OF DRAINAGE IMPROVEMENTS

The installation of the above described drainage improvements began during November 2015 and was completed on January 28, 2016. UCR staff conducted three inspections after the drainage improvements. The results of these inspections were included in the Combined Annual Summary Report submitted to DTSC in December 2016 and are summarized below:
• February 1, 2016 Semi-Annual Inspection Report post-storm event - No evidence of erosion was observed and no repair or maintenance therefore necessary.

• March 8, 2016 post-storm inspection - No evidence of erosion was observed and no repair or maintenance therefore necessary.

• November 2, 2016 Semi-Annual Inspection Report - No evidence of erosion was observed and no repair or maintenance therefore necessary.

The results of the above three post-drainage improvement installation inspections in 2016 show that the revised ECP is effectively addressing erosion and stormwater drainage at the Site.
6. TECHNICAL ASSESSMENT

6.1 PROTECTIVENESS OF REMEDIAL ACTIVITIES

- Site soil remediation has been completed and DTSC issued a No Further Action determination for soil (DTSC, 2006).
- In compliance with the OMA and SMEIP, access and soil disturbance activities at the Site have been restricted. The remediation area is delineated with signs posted around the Site’s perimeter.
- The Site remains undeveloped, and except for the installation of the erosion control improvements, no construction activities have been conducted during the past five years.
- As indicated and confirmed by post-installation Site inspections in 2016, the implementation of the revised ECP is effectively managing soil erosion and stormwater drainage.
- Since no groundwater quality impacts were identified during 16 years of monitoring, groundwater monitoring was discontinued in 2011 with DTSC approval.

6.2 CHANGES IN HEALTH RISK ASSESSMENT

- There have been no changes in land use and practices during the past five years.
- No unacceptable health risks are expected under current Site conditions and use or any future potential Site use, consistent with the recorded Covenant to Restrict Use of Property.

6.3 TECHNICAL ASSESSMENT SUMMARY

In compliance with OMA and the Covenant to Restrict Use of Property, UCR has not conducted any construction or other activities that have disturbed the Site’s soil cover. Groundwater monitoring was discontinued in 2011 because no groundwater quality impacts were identified during 16 years of monitoring. Based on the DTSC-approved ECP, drainage improvements were installed and appear to have effectively addressed potential soil erosion within and outside of the bermed areas. The Covenant to Restrict Use of Property is being effectively enforced and routinely verified by UCR staff inspections.

Pursuant to Section 2.7 (“Five-Year Review”) of the OMA (Docket No. HSA-A 05/06-163), “[i]f, after reviewing the [Five-Year Review Report] the Department concludes that the concentrations of groundwater contaminants are below the MCLs or the demonstrated maximum achievable cleanup levels, the Department shall issue a No Further Action letter to University, University shall cease groundwater monitoring, and this Agreement shall terminate.” The University has already received DTSC’s approval to cease groundwater monitoring, and, for the additional reasons described above, we believe the Site is at a stage where DTSC’s terminating the OMA and SMIEP and issuing a No Further Action letter for the Site is appropriate and warranted. Following the issuance of the No Further Action letter and termination of the OMA and SMIEP, UCR will continue to enforce the Covenant to Restrict Use of Property. The Site will continue to be inspected and maintained for erosion control, as is the practice for all agricultural research fields located at the UCR Citrus Research Center and Agricultural Experiment Station.
7. **RECOMMENDATIONS**

Based on the above discussion and findings, we make the following recommendations:

- That DTSC provide a No Further Action letter to UCR, pursuant to section 2.7 of the OMA;
- That DTSC terminate the OMA and SMIEP, pursuant to section 2.7 of the OMA;
- That UCR develop, submit, and distribute a Site-specific fact sheet, pursuant to section 2.8 of the OMA;
- That UCR assist DTSC in the public participation process, consistent with section 2.8 of the OMA;
- That DTSC grant approval to abandon the monitoring wells and piezometers;
- That UCR present revisions to DTSC to revise the Covenant to Restrict Use of Property as provided under Article 6.02 of the Covenant to recognize the elimination of:
  - Previous OMA requirements;
  - Groundwater restrictions (e.g., Articles 1.02, 1.03, and 4.05 of the Covenant);
  - Reference to remaining groundwater impacts; and
  - Monitoring wells and piezometers, following appropriate abandonment procedures; and
- That a revised Covenant to Restrict Use of Property be recorded for the Site.
- That all notifications and reporting currently required by the OMA no longer be required, including, but not limited to:
  - Semiannual and annual inspections;
  - Annual reporting to DTSC;
  - Annual DTSC inspections; and
  - A Five-Year Review.
References

1. Amec Foster Wheeler Environmental & Infrastructure, Inc., 2015, Revised Erosion Control Plan, Former Pesticide Waste Pits Site, University of California, Riverside, California, September 28.


3. Department of Toxic Substances Control, 2006, Letter to University of California, Riverside, Approval of Remediation and Closure Report, Former Pesticide Waste Pits Site, University of California, Riverside, February 3.

4. Department of Toxic Substances Control, 2006, Operations and Maintenance Agreement, Enforcement Agreement between the DTSC and The Regents of the University of California, Riverside, 900 University Avenue, Pesticide Pits, Parcel #253-090-008-5, Riverside, California, Docket No. HAS-A 05/06-163, May 12.

5. Department of Toxic Substances Control, 2006, Covenant to Restrict Use of Property (Health and Safety Code section 25222.1), Environmental Restriction, Between DTSC and The Regents of the University of California, Riverside, 900 University Avenue, Riverside California, Assessor Parcel No. 2533-090-008-5, May 12.


15. University of California, Riverside, Environmental Health & Safety, 201b, Combined Annual Summary Report, Former Pesticide Waste Pits Site, University of California, Riverside, December.

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