

## REPRESENTATIVE PROJECTS

### Former Service Station, Healdsburg, CA

Ongoing

A large petroleum company service station operated the site and initiated environmental and remedial efforts after reports of a release of approximately 12,040 gallons over a period of several months in 1981.

Site work has been performed under a Cleanup and Abatement Order (C&A) since 1998 when methyl tertiary butyl ether (MTBE) was detected in nearby domestic drinking water wells. The service station had experienced a leak in the UST system for several years that resulted in periodic releases of gasoline and MTBE to the environment. MTBE in groundwater migrated downgradient of the site, contaminating 14 private drinking water wells. In 1998, this site had the largest MTBE-affected area in Sonoma County, CA (approximately 1,600 feet long).

Work to date has included:

1. Performing a thorough investigation of the geology, hydrogeology, and the lateral and vertical extent of the MTBE-affected area. The site has multiple water-bearing zones with highly heterogeneous lithology.
2. Installing 22 groundwater monitoring wells to evaluate the groundwater conditions downgradient of the site.
3. Performing community liaison, preparing materials and attending “town-hall” meetings.
4. Providing all the residences with potable drinking water (either point of entry treatment [POET] or connection to municipal water supply), and destroying seven private drinking water wells.
5. Conducting aquifer and remediation technology feasibility tests and designing, constructing and operating a groundwater remediation system that utilizes biological treatment to reduce MTBE and tertiary butyl alcohol (TBA) to non-detectable levels in effluent water.

The remediation system consists of three groundwater recovery wells (on site and up to 650 feet downgradient), five dual-phase extraction wells, a liquid ring vacuum pump, holding tanks, particulate filters, a fluidized bed liquid phase bioreactor, and both liquid phase and vapor phase carbon vessels. The system removes groundwater at an average rate of approximately 40 gallons per minute, and has processed 47 million gallons of groundwater and removed 148 pounds of MTBE.

The MTBE-affected area has been reduced to less than half the original size, and only four of the initial 14 drinking water wells have detectable MTBE concentrations.



## Service Station, Fountain Valley, CA

Ongoing

The site is a dealer operated active service station in Fountain Valley, California. The Orange County Health Care Agency considers the site a High Priority case since a municipal supply drinking water well is located within 1,000 feet of the site. In addition, the top of the Talbert Aquifer, a beneficial drinking water aquifer, is located at approximately 60 feet below grade beneath the site. The perched aquifer we are remediating is separated from the Talbert Aquifer by an approximately 4-foot thick aquitard at approximately 56 feet below grade. Groundwater beneath the site contains MTBE and TBA. The maximum MTBE and TBA concentrations detected at the site prior to remediation were 95,000 micrograms per liter (ug/l) and 48,000 ug/l, respectively.



ERI submitted a corrective action plan to the OCHCA recommending the installation of a dual-phase soil and groundwater remediation system utilizing a high-vacuum liquid ring pump to extract soil vapor and groundwater in conjunction with the operation of a bioreactor to treat groundwater.

In order to determine the exact lithology beneath the site, the depth to the aquitard and the depth to the Talbert Aquifer, ERI supervised the advancement of cone penetration tests. A careful analysis of data obtained from these tests was used to design sentinel wells between the site and the municipal supply wells located downgradient of the site. Three cluster wells were drilled in the public right-of-way. The intermediate and deep wells were discretely screened and set inside 12-inch diameter, steel conductor casings. Our investigation showed that the deepest zone (water supply zone) was not affected, and our well design ensured it stayed that way. In addition to determining groundwater concentrations in the intermediate and deep zones, data obtained from the cluster wells was used to determine if any vertical groundwater gradients were present at the site.

ERI currently operates a high-vacuum liquid ring pump to extract soil vapor and groundwater. Soil vapor is currently being treated with two 2,000-pound carbon adsorption canisters. The soil vapor extraction (SVE) system is operating in compliance with a site-specific South Coast Air Quality Management District permit for the site. Extracted groundwater is being treated with the B-4000

bioreactor followed by final polishing with two 2,000-pound liquid phase carbon canisters. The treated groundwater is being discharged to the sanitary sewer under an Orange County Sanitation District (OCSD) permit.

Analysis of the most recent groundwater concentrations at the site indicates that the 95,000 ug/l MTBE concentration previously detected has been reduced to 837 ug/l. The 48,000 ug/l TBA concentration has been reduced to a non-detectable concentration at a reporting limit of 10 ug/l.

Over the course of the remediation project (37 months), only one of the 2,000-pound liquid-phase carbon vessels has needed carbon replacement, and this was due to the silting up of the vessel. ERI's use of the bioreactor has saved the owner significant costs concerning carbon purchase, transportation and disposal. Operation of the remediation system has proven effective in reducing MTBE and TBA by orders of magnitude in groundwater beneath the site.

## Terminal, Willbridge, OR

Ongoing

ERI has been retained to perform the operations and maintenance (O&M) of two existing remediation systems at this site. The systems include a groundwater extraction system associated with a recently installed interceptor trench as well as a methane gas extraction system.



## Terminal, Coos Bay, OR

Ongoing

The site is a former Terminal adjacent to the bay. ERI has been retained to perform the O&M and optimize the remedial system at the site. The system includes vapor extraction and air sparging through use of a funnel and gate system.

## Terminal, Banta, CA

Ongoing



The site is an operating Terminal. ERI has been retained to perform the O&M of the existing remedial system at the site. The system includes an air sparging system with 26 associated wells.

## Former Chemical Distribution Terminal, Oakland, CA

1998-2004

ERI managed the environmental liability and implemented assessment and remedial action programs at a former Chemical Distribution facility in Oakland, CA. All work was performed under a Cleanup & Abatement (C&A) Order issued by the Regional as well as a national pollutant discharge elimination system permit to treat and discharge groundwater to the adjacent estuary. The scope of work included:

1. Ongoing groundwater monitoring and sampling
2. Ongoing O&M of initial remedial system for C&A order compliance
3. Performance of a risk assessment to obtain soil closure and allow development of property

“ERI should be commended for their work at the High Street terminal. It has resulted in remediation system improvements and significant cost savings to Unocal”  
- Nick Nickerson  
Unocal Corporation

4. Preparation of corrective action plan
5. Design and permitting of remedial system, incorporating treatment of water supplied from adjacent former terminal operator per remediation agreement
6. Installation of remedial system (during ongoing development of former terminal)
7. Performing risk assessment and negotiation of cleanup levels

## Ultramar Refinery, Wilmington, CA

ERI conducted soil investigations, remediation and air monitoring for Ultramar's Clean Fuels Project (CFP). The work included the excavation and remediation of lead-affected soil using a chemical stabilization process; the excavation and off-site treatment of approximately 50,000 tons of hydrocarbon-affected soil; drilling and installation of soil borings and groundwater monitoring wells; delineation of dissolved-phase hydrocarbons in the groundwater using a hydropunch; performing South Coast Air Quality Management District 1166 monitoring throughout the project; performing airborne lead and polychlorinated biphenyl monitoring and sampling; and performing a detailed Phase I site assessment for the acquisition of approximately 12 acres of property. ERI successfully negotiated a plan for the soil cleanup levels with the Regional Board. As a result, thousands of tons of soil have been saved and used as backfill material, resulting in potential savings of millions of dollars.

## Superfund Site - Legal Support

### Ongoing

ERI evaluated over 660,000 pages of technical documents to evaluate if the presence of chlorinated organics in the soil could be the cause of similar chemicals in water supply wells. The water suppliers are suing our client and other potentially responsible parties for many hundreds of millions of dollars in damages in what is the nation's largest superfund site. Despite the enormity of the data, ERI was able to show that chemical effects on groundwater beneath our client's site were coming primarily from an upgradient source. In addition, we were able to show that regardless of the source, the groundwater beneath our client's site would not migrate vertically to the screen intervals of the water supply wells, thereby precluding damage from our client.

## Hunters Point Naval Facilities, San Francisco, CA

ERI procured, installed, operated and maintained a wastewater treatment system at a naval facility that was slated for closure. The system was designed to treat approximately 30,000 gallons per day of water generated during cleaning of the storm sewers and to segregate solids for appropriate disposal. The system included a mixing tank, phase separators, holding tanks, and carbon adsorption vessels. We operated the system continuously for over 12 months, and then dismantled the system.



## Point Molate Naval Fuel Depot, Richmond, CA

ERI procured and installed a wastewater treatment system at a naval facility that was slated for closure. The system included 1,000 feet of ductile-iron piping, a phase separator, bioreactor, organic clay, carbon, sand filters and holding tanks completely installed within a containment pad. The pad was also framed and poured by our company.



## Oil Blending Plant, Los Angeles County, CA

ERI was retained to provide over \$3,000,000 in turnkey environmental services for the investigation and remediation of contaminated soil at a major oil blending facility in Southern California. The work included the demolition and reconstruction of oil blending berms, buildings and tank farms. Six separate areas of hydrocarbon-bearing soil were defined. Methods for remediation of the affected soil included: excavation and disposal for soil containing heavy hydrocarbons and metals; vapor extraction and carbon adsorption of chlorinated organics; and vapor extraction and thermal incineration of stoddard solvents. ERI constructed four tank farms containing the following: eighteen 12,000-gallon storage tanks, eight 8,000-gallon storage tanks, seven 4,000-gallon storage tanks, and thirteen mixing tanks.

## Lilyblad Petroleum, Inc., Tacoma Tide Flats, Tacoma, WA

2004-2005

ERI provided remediation system operation and maintenance services at a large petroleum blending and transportation facility in the Tacoma Tide Flats superfund region in Tacoma, WA. Shallow, tidally-influenced groundwater beneath the site had been affected by petroleum hydrocarbons and chlorinated compounds. ERI conducted an engineering evaluation of an existing large dual-phase extraction remediation system and provided recommendations to resolve frequent shutdowns and improve operating safety and efficiency. Subsequently, ERI implemented the recommended modifications, and operated and maintained the system. ERI also participated in discussions with the Washington State Department of Ecology under terms of an existing Agreed Order to address agency concerns regarding system performance and effectiveness and establish a reasonable work plan and timetable to address agency concerns.



100 GALLON PER MINUTE PUMP AND TREAT SYSTEM NASA AMES RESEARCH CENTER, MOUNTAIN VIEW, CA



METHANE GAS EXTRACTION AND TREATMENT SYSTEM UKIAH LANDFILL, UKIAH, CA



DUAL-PHASE EXTRACTION AND TREATMENT SYSTEM CITRUS HEIGHTS, CA