

Ulf Lindmark | Senior Principal Engineer, PE, BCEE

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Professional Summary:

Ulf Lindmark has been active in the environmental field since 1980. He has specialized knowledge in both the theoretical and practical aspects of environmental engineering, particularly in the areas of remedial action design, water treatment, contamination transport, hydrogeology, construction management, and agency requirements.

Ulf has extensive experience in assessment and remediation of sites containing gasoline and associated compounds such as MTBE, TBA and benzene; PCE, TCE, and other chlorinated hydrocarbons; diesel; waste oil; crude oil; pesticides; PCBs; PNAs (poly-nuclear aromatics); acids; alkalines; brine; and heavy metals. His experience includes a variety of sites, such as chemical plants, construction sites, dry cleaners, fueling facilities, hospitals, landfills, manufacturing facilities, office buildings, oil fields, plating shops, salvage yards, schools, and service stations.

Areas of Expertise:

- Assessments of contamination of soils, groundwater, air, or surface water
- Natural attenuation of subsurface contamination
- Age dating and source identification of subsurface contamination
- Remedial investigations and feasibility studies
- Soils remedial action including vapor extraction and carbon treatment, thermal treatment, recycling, bio-venting, incineration, landfarming, chemical fixation, heat injection, systematic excavation, and vapor barriers
- Groundwater monitoring and soil and air sampling programs
- Groundwater remedial action including phase separation, ion-exchange, air stripping, air sparging, carbon adsorption, chemical oxidation, dual-phase extraction, oxygen-release compounds, and enhanced biodegradation
- Operation and maintenance of treatment systems
- Underground storage tank design and engineering including electronic, liquid and vapor monitoring; tank integrity testing; corrosion prevention; fuel management systems; operational manuals; inventory control; overfill protection, piping systems; flow restriction devices; and tank lining, as well as site closures involving removal and abandonment in place
- Aboveground storage tank design and compliance
- Construction management and preparation of operation and maintenance manuals and specifications
- Stormwater management and compliance
- Spill containment and contingency programs
- Sewers and leach-field investigations
- Preliminary endangerment assessments
- Real Estate Phase I investigations

- Vapor intrusion assessments and mitigation
- Expert witness testimony and litigation support

Licenses and Certifications:

Professional Registered Civil Engineer, California (No. 36787)

Board Certified Environmental Engineer (BCEE) in the specialty of hazardous waste management, American Academy of Environmental Engineers

California Contractors Class A/Haz License, Inactive

Project Experience:

Los Angeles County, California Superfund Cleanups

Secured closure for five responsible parties located within either the Burbank/Glendale or Puente Valley Superfund areas. These sites had contributed to soil and groundwater contamination from chlorinated solvents. Characterized the impacts to soil and groundwater and implemented remediation schemes including limited excavation, vapor extraction, and in some cases, air sparging. As a part of services to some clients, Ulf successfully provided consultation and mediation presentations for the purpose of allocating share of corrective action costs among the responsible parties.

City of Santa Monica, Santa Monica, California Diesel Remediation by Hot-Air Injection

Ulf directed site investigations of soil conditions, then designed and specified a soil remediation system for a municipal fire station and selected hot-air injection in conjunction with vapor extraction as the most technologically sound alter-native because of the presence of diesel, a relatively heavy hydrocarbon. The remediation system operated for 18 months, extracting more than 6,500 pounds (980 gallons) of petroleum hydrocarbons from the ground. Additional contamination reduction was aided by the higher soil temperature that created optimized conditions for biodegradation, and the site was successfully closed.

Sweetheart Cup Company Pond and Pits Closure

Ulf directed an investigation and assessment of the impact on subsurface soil from an evaporative brine pond and eight 80-foot-deep, large-diameter seepage pits that contained a mix of heavy metals with volatile and semi-volatile organic compounds. All work was conducted under the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR 300. As a part of the remediation, the contaminants had to be removed from the pits to a maximum depth of 120 feet, approximately 10 feet below the water table. To reduce the liability of off-site disposal and because the cap was already required, Ulf recommended a combined closure of the pond and the pits, and the sludge and soil from the pits were fixated and placed beneath the cap for the pond. The site was closed by the California Regional Water Quality Control Board, Santa Ana Region.

Beck Trust Soil and Groundwater Investigation and Hydrogeologic Modeling for MTBE-Vulnerable Area

Ulf was initially retained as a forensic expert; however, the client was not satisfied with the progress of site characterization and retained Ulf to investigate the lateral and vertical extent of contamination in soil by gasoline-related petroleum hydrocarbons, including fuel oxygenates. High

concentrations of MTBE at depth and the near proximity to water-supply wells rendered this site a high priority to the California Regional Water Quality Control Board, Los Angeles Region.

Ulf directed the generation of site conceptual models using various sources for local geologic conditions, including water well and oil well electric logs that were included in report graphics to illustrate potential contaminant pathways. He also developed and obtained agency approval of a remedial action plan that included vapor extraction and thermal treatment, as well as groundwater monitoring, including monitoring of shallow groundwater within 100 feet of the usable aquifer at depths below 200 feet.

The vapor extraction and thermal treatment unit operated until the levels of volatile organic compounds (VOCs) subsided, when a carbon treatment system was chosen for economic reasons. After removal of over 10,000 pounds of gasoline and MTBE, the Regional Board approved rebound testing, which was successfully completed, and the site was subsequently granted soil closure.

Los Angeles Unified School District – Francisco Bravo Magnet School, Los Angeles, California

Groundwater and Vapor Extraction for Gasoline Cleanup

Ulf managed site investigations of soil and groundwater conditions and designed and specified a remediation system at a school construction site where releases from an old underground storage tank had contaminated soil and groundwater. Ulf served as both the engineering principal and manager for the project and specified a 150-foot-long collection trench for groundwater extraction, combined with vapor extraction to mitigate the soil contamination in the vadose zone and the capillary fringe. In order to minimize installation costs and maintain stability of the trench during excavation, he specified biodegradable guar gum, which degraded to a nonhazardous, thin, pumpable liquid after the 35-foot-deep trench was completed.

A carbon adsorption system for treatment of contaminated groundwater and gasoline vapors operated for four years, reaching a point when soil contamination was fully mitigated and groundwater contamination was reduced to trace levels, facilitating closure from the California Regional Water Quality Control Board.

Southern California

Landfill and Methane Gas Recovery Projects

Ulf has extensive experience as a project engineer and resident engineer on a large number of projects involving mitigation, monitoring, and recovery of landfill and methane gases. Landfills such as Duarte and Scholl Canyon Landfills in Glendale were developed into golf courses and recreational facilities, and Ulf was involved in the design, installation and startup of methane gas monitoring and recovery systems. During the final years of operation at Operating Industries Landfill in Monterey Park, Ulf was involved in pilot tests, perimeter methane monitoring, leachate monitoring, and design and installation of an air dike system. At the Penrose Landfill in Sun Valley, Ulf was responsible for supervising the operation and maintenance of a gas collection system. At Puente Hills Landfill, Ulf was the principal-in-charge for the installation of an 8,200-foot-long, 15- to 18-inch-diameter methane gas collection system. Ulf has also been responsible for long-term pilot testing programs at this landfill.

City of Santa Monica, Santa Monica, California

Excavation by Large-Diameter Auger of Diesel-Contaminated Soil

After a sudden loss of diesel product from an emergency generator system, Ulf managed a site assessment and soil remediation project. The release had occurred in a narrow greenbelt between a freeway and a municipal building, resulting in very limited access. Under Ulf's direction, the spill

was assessed, the tank removed, and an emergency excavation plan to drill out and remove the contaminated soil to a depth of 45 feet implemented—all within a four-month time frame.

The site was remediated by drilling twelve 6-foot-diameter borings to 45 feet and backfilling the excavation with a specially designed sand-cement slurry mix. After remediation, verification drilling and groundwater monitoring were carried out to obtain site closure, and Ulf oversaw installation of a new double-walled underground storage tank.

**City of Beverly Hills, Beverly Hills, California
Vapor Extraction and Air Sparging for Cleanup of Gasoline, Benzene, and MTBE;
Hydrogeologic Modeling**

After a series of soil and groundwater investigations were carried out at one vacant and one active City maintenance facility, Ulf managed a remedial investigation and feasibility study in which several options were explored and evaluated for cost and timeliness. He recommended an approach involving product recovery, vapor extraction, and air sparging and installed systems at both sites to remediate high levels of gasoline and associated compounds in the sub-surface.

The vacant facility was successfully remediated in six months and closed by the California Regional Water Quality Control Board. The site that is an active maintenance facility had subsequent gasoline and MTBE releases after the remediation system was designed. Due to these releases, additional vapor extraction and air-sparging wells were installed to facilitate extraction of contaminants and containment of the plume. The system was highly effective and recovered over 16,000 pounds of gasoline from soil and groundwater. The plume, which was shown to be stable, was completely contained within the property, and monitoring showed it to be attenuating naturally.

Because of the site's proximity to future municipal water-supply wells, Ulf managed hydrogeologic investigations that included analytical groundwater modeling and developing of a site conceptual MTBE model. Due to municipal well extraction in the immediate site vicinity, the Regional Board put a very high priority on the site. However, Ulf was able to show that the site had been adequately remediated and did not pose a threat to the underlying water supply, and the Regional Board issued regulatory closure.

**Los Angeles Unified School District – Gratts Elementary School. Los Angeles, California
Design of Protective Membrane and Ventilation System, Groundwater and Vapor
Extraction for Gasoline and TCE Cleanup**

Ulf directed site investigations of soil and groundwater conditions and designed and specified a remediation system for a new school site where releases of gasoline from an old underground storage tank system had contaminated soil and groundwater. In addition, TCE from an unknown source had contaminated groundwater at the site.

After performing a remedial investigation/ feasibility study, Ulf designed an active soil and groundwater treatment system consisting of fifteen vapor-extraction wells: five wells for vapor extraction only, eight for combined vapor and groundwater extraction, and two for combined vapor, groundwater, and product extraction. The treatment system also included a 1,000-cfm catalytic oxidizer, a hydrochloric acid scrubber, an air-stripping tower, an oil-water separator, a 500-gallon product storage tank, and two 1,200-pound carbon vessels. In addition to the active remediation system, Ulf also designed a passive ventilation system and a vapor barrier for the structures at the school sites where elevated VOC concentrations could be present. The passive ventilation system was designed to be employed as an air-intake system during vapor extraction.

After the remediation system had been in operation for seven years and recovered over 38,000 pounds of VOCs, the California Department of Toxic Substances Control granted soil closure and soil remediation ceased.

Los Angeles Unified School District – SRES No. 6 Elementary School, Los Angeles, California

Remedial Action Implementation

Ulf was the managing principal for a remedial action implementation on a new LAUSD school site. The project entailed construction of seven soil ventilation cells of 2,000 cubic yards each, real-time design modifications following a triad approach, and ex-situ vapor extraction of VOCs to trace levels. Once the soil was treated, it was used as on-site backfill material for the school construction, which negated the need for off-site disposal and import of over 13,000 cubic yards of soil.

Professional Experience:

EFI Global, Senior Principal Engineer, 2022 - Present
Lindmark Engineering, Senior Principal, 2011 - 2022
Coffey Environments, Senior Principal, 2008 – 2011
Lindmark Engineering, Senior Principal, 1987 – 2008
Emcon Associates, Engineering Manager, 1984 – 1986
Conservtech, Project Engineer, 1983 – 1984
Engineering-Science, Resident Engineer, 1982 – 1983
Lockman & Associates, Staff Engineer, 1981 – 1982
Charles Kober Associates, Civil Designer, 1980 – 1981

Specialized Education:

Certificate, Executive Program, General Management, University of California at Los Angeles – The Anderson School of Management, 2008

Education:

MS Degree, Civil Engineering, Royal Institute of Technology, Stockholm, Sweden, 1980

Affiliations:

American Academy of Environmental Engineers
American Society of Civil Engineers
Groundwater Resources Association of California
National Ground Water Association
National Society of Professional Engineers