



## Answers to Frequently Asked Questions Operable Unit 2 at the National Aeronautics and Space Administration Jet Propulsion Laboratory, Pasadena, California

### SITE DESCRIPTION

**What is JPL's purpose?** The Jet Propulsion Laboratory (JPL) is the federal government's lead center for research and development related to the robotic exploration of the solar system. In addition to its work for the National Aeronautics and Space Administration (NASA), JPL conducts tasks for other federal agencies in areas such as remote sensing and astrophysics.

**Have all necessary steps been taken to ensure that JPL is no longer releasing untreated waste?** Yes, necessary steps have been taken to ensure that current laboratory activities are operating within applicable federal, state, and local environmental regulations. During the 1940s and 1950s, many buildings at JPL maintained seepage pits to dispose of wastes collected from drains and sinks within the facility's buildings. These historic waste management practices were acceptable at the time, but may have contributed to the VOCs currently found at the site. In the late 1950s and early 1960s, a sewer system was installed and the use of seepage pits was discontinued.

### REGULATORY FRAMEWORK

**What is Superfund/CERCLA?** The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is commonly referred to as Superfund. CERCLA was established by the federal government to help identify sites polluting the environment, ensure that they are cleaned up to comply with applicable regulations, evaluate damages to natural resources, and identify responsible parties.

**Why has it taken so long to clean up the site?** The CERCLA process is very involved and several steps are required before a remedy can be selected and implemented. The JPL site was added to the National Priorities List (NPL) in October 1992 (Federal Register Page 47180). Potential source areas were investigated from 1994 to 1998 during the Remedial Investigation phase, which included nine sampling events. The Remedial Investigation phase was followed by the Feasibility Study phase, which involved risk evaluation, data interpretation, and the completion of a soil vapor extraction (SVE) pilot test. The SVE pilot test began in April 1998 and is still operating to remove VOCs from the soil in Operable Unit 2 (OU-2). After the public comment period for the Proposed Plan ends and the Record of Decision has been drafted and approved, the selected remedy will be implemented.

**What is an Operable Unit?** In order to expedite the Superfund process at JPL, the facility was subdivided into Operable Units or separate study areas. An Operable Unit may be established based on a particular type of chemical or medium (soil, water, or

specific chemical compound) and/or a specific geographical portion of the overall site area.

**What are the three Operable Units at JPL?** The on-site soils located beneath the JPL site and above the groundwater table (also known as vadose zone soils) are referred to as OU-2, and are the subject of this public meeting. Operable Unit 1 includes all on-site groundwater, and Operable Unit 3 includes all off-site groundwater. Groundwater will be addressed in future public meetings.

### SITE ASSESSMENT AND INVESTIGATION ACTIVITIES

**What environmental investigation activities have been conducted at the site?** Potential source areas at JPL were investigated from 1994 to 1998 during nine sampling events. The Remedial Investigation phase involved extensive fieldwork including a shallow soil-vapor survey at 45 locations, the drilling and sampling of 35 soil borings, the installation and monitoring of 37 soil vapor monitoring points, and the construction and sampling of three test pits. The Feasibility Study involved conducting a SVE pilot test. During the 14-month duration of the pilot test, one SVE well was installed on site and over 200 lbs of VOCs were removed from vadose zone soils. Due to its initial success, the pilot test has been extended and SVE is currently ongoing at the site.

**What are the chemicals of concern at OU-2?** A human health risk assessment (HHRA) and an ecological risk assessment (ERA) were conducted as part of the Remedial Investigation. Those assessments concluded that the risks to humans and ecological receptors associated with exposure to vadose zone soils were within regulatory limits. Therefore, no chemicals found in JPL soils or soil vapors at OU-2 were designated as chemicals of concern. However, data obtained during the Remedial Investigation suggest that VOCs emanating from the vadose zone may have adversely affected groundwater. These VOCs include carbon tetrachloride (CCl<sub>4</sub>); 1,1,2-trichloro-1,2,2-trifluoroethane (Freon™ 113); trichloroethene (TCE); and 1,1-dichloroethene (DCE).

**What are the risks associated with exposure to the chemicals at OU-2?** Based on the HHRA, there are no risks above regulatory limits associated with exposure to on-site soils and soil vapor at OU-2. The HHRA evaluated the risks associated with direct exposure to surface soils within 15 ft below ground surface and soil vapor within 30 ft below ground surface based on the most likely human exposure scenarios. Conservative assumptions with respect to chemical concentrations, exposure parameters, and toxicity were used to ensure that the calculated risks are protective of human health. Using exposure scenarios

for both commercial and residential land use, the HHRA demonstrated that risks were below the appropriate regulatory thresholds. Furthermore, the proposed SVE system will provide additional reduction in risk by preventing VOCs from migrating to groundwater.

**Have the VOCs in soil vapor migrated beyond the JPL boundary?** Based on results for the Remedial Investigation and subsequent monitoring, the VOCs identified in soil vapor have not migrated to soils beyond the JPL property boundary. The VOC vapor plume is located within the JPL site boundaries and encompasses about 45 acres in the central part of the JPL property.

## REMEDIAL ACTIVITIES AND THE PROPOSED REMEDIAL ALTERNATIVE

**What is SVE?** SVE refers to soil vapor extraction and is one of the most widely used soil treatment technologies at Superfund sites. The U.S. Environmental Protection Agency (U.S. EPA) has identified SVE as a preferred approach (i.e., presumptive remedy) for remediation of VOCs. SVE systems are designed to remove chemicals that have a tendency to volatilize or evaporate easily by applying a vacuum through a system of underground wells. The VOCs are then pulled from the subsurface soils in vapor form and treated before discharge to the atmosphere. See Figure 1 for a simplified diagram of SVE.

**How well does SVE work?** SVE is an effective remedial option at sites impacted by solvents and other volatile compounds. The effectiveness of an SVE system at a given site depends on the properties of the soil and the properties and distribution of the chemicals in the subsurface. SVE is best suited to sites with loose, permeable soil such as sand or gravel. Based on these factors, SVE should be effective at the JPL site because the constituents identified in soil vapor are volatile and the subsurface geology consists primarily of sand and gravel. Additionally, pilot testing indicates that SVE will be an effective remedy since over 200 lb of VOCs have been removed from the site since initiating the study.

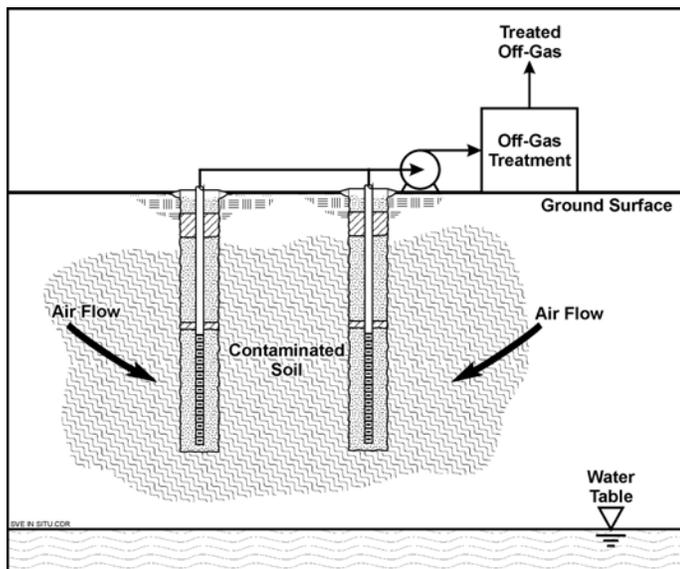


FIGURE 1. Schematic of Soil Vapor Extraction

**How long will it take to clean up the site?** The amount of time it will take to clean up a site is difficult to predict. The length of time needed to achieve successful remediation at a site with SVE depends on several factors including: 1) the amount and distribution of VOCs in the subsurface, 2) the vapor extraction rates that can be achieved, and 3) regulatory cleanup requirements. However, typical durations for SVE applications range from 6 months to 5 years.

**What are the concerns with extracting VOCs using the SVE system?** Concerns related to human health and the environment are minimal because VOCs are removed under vacuum and the extracted vapor is treated prior to discharge. The South Coast Air Quality Management District (SCAQMD) requires that all discharges to the atmosphere meet certain standards to protect ambient air quality for the public health and welfare. Vapors extracted by the SVE process have been and will be treated as required by SCAQMD.

**What are the remediation objectives?** The remedial action objective for Operable Unit 2 is to prevent, to the extent practicable, the migration of VOCs from the vadose zone to groundwater. Compliance with the remedial action objective will be determined by evaluating VOC mass removal by the SVE system, reductions in soil-gas VOC concentrations, and changes in groundwater VOC concentrations.

## OTHER RELATED QUESTIONS

**What about perchlorate?** Although perchlorate has been identified as a potential constituent of concern (COC) in groundwater, it is not a COC for OU-2 (i.e., vadose zone soils), because perchlorate readily migrates through soil. Issues relating to groundwater will be addressed in the remedial documentation and public meetings for OU-1 and OU-3.

**What about my drinking water?** The Safe Drinking Water Act (SDWA) sets standards for the permissible level of various constituents in drinking water and establishes treatment standards for drinking water supply systems. Your water purveyors should meet all SDWA requirements and it is their responsibility to notify you if your water does not meet those standards. The SDWA requires water purveyors to provide customers with "Consumer Confidence Reports" which include information on the quality of local drinking water supplies, any chemicals exceeding public health standards and the potential health effects of those chemicals, enforcement and compliance information, and sources of local drinking water. The reports are provided once a year, either in water bills or in a separate mailing. Contact your local water utility for more information.