

# Hassayampa Landfill

## EPA National Priorities List (NPL) Site

### Boundaries:

The [Hassayampa Landfill Site \(Site\)](#) is located about ten miles west of Buckeye, Arizona, and approximately six miles east of the Palo Verde Nuclear Generating Station. The Site consists of about ten acres formerly used for hazardous waste disposal which lies adjacent to the 47-acre former sanitary landfill. The plume boundary varies and may extend beyond the Site boundary, but remains part of the Superfund site in its entirety.

### Site Status Update:

As of January 2010, the [soil vapor extraction](#) (SVE) system has recovered and properly disposed of 96,900 pounds of [chlorinated solvents](#). The groundwater recovery system, installed in 1994, [pumps and treats](#) approximately 1,795,000 gallons of groundwater per year. The groundwater recovery system has removed approximately 290 pounds of [volatile organic compounds](#) (VOCs) since 1994.



Signage near Hassayampa Landfill Site Entrance

The Hassayampa Steering Committee (HSC) continues to submit quarterly soil vapor and groundwater monitoring reports in a timely manner. EPA, ADEQ and the HSC continue to meet on a quarterly basis to discuss issues related to the Site.

Hassayampa is currently undergoing a third [Five Year Review](#) (FYR) with the final report due in Fall 2011.

### Community Involvement Activities:

The [U.S. Environmental Protection Agency](#) (EPA) distributes fact sheets and public notices to the nearby community which can be found on the ADEQ Web site. A [fact sheet](#) was distributed to residents and commercial businesses in the vicinity of the Site in early 2010 announcing the beginning of the third FYR.

### Site History:

**1961-1980:** Maricopa County began operating the Hassayampa Landfill as a municipal solid waste landfill in 1961. On February 15, 1979, [The Arizona Department of Health Services](#) (ADHS) prohibited the disposal of industrial and hazardous wastes into the City of Phoenix 19th Avenue Landfill. Hazardous and industrial wastes were then transported to the Hassayampa Landfill under a manifest tracking system from approximately February 1979 to October 1980 when disposal ceased. The wastes were disposed in a series of excavated pits on a 10-acre

property adjacent to the municipal solid waste landfill. This 10-acre area later became the Hassayampa Superfund Site.

**1981-1987:** In December 1981, three on-site groundwater monitor wells were constructed with ADHS funding. The first sampling in May 1982 indicated groundwater contamination by chlorinated solvents. The Site was subsequently scored by the EPA and placed on the [National Priorities List](#) (NPL) on [July 22, 1987](#).

**1988:** EPA and certain Respondents entered into an administrative consent order on February 19, 1988 which required the Respondents to conduct a [remedial investigation](#) (RI) and [feasibility study](#) (FS) under EPA direction and oversight.

**1991-1992:** The RI and FS were completed in 1991 and 1992, respectively. Hazardous substances including VOCs, and semi-volatile organic compounds (SVOCs) were detected in the soil and groundwater. EPA selected remedial actions in the [Record of Decision](#) (ROD) dated August 6, 1992.

**1994-1996:** Remedial actions were implemented at the Site including:

- A groundwater pump and treat system that began operation in March 1994;
- An engineered [cap](#) over the hazardous waste disposal areas to prevent direct contact with contaminated waste and soil left in place. This cap reduced infiltration of water, and reduced the release of VOC vapors to the atmosphere (constructed in June 1994);
- A SVE system with thermal oxidation treatment to remove VOCs and SVOCs from the [vadose zone](#) in areas where waste and soil contamination were a threat to groundwater (began operation in July 1996); and
- Access and deed restrictions.

The [Consent Decree](#) (CD), CIV94-1821PHXRCB, was signed in November 1994. The CD required all responsible parties to conduct soil and groundwater investigations, conduct a treatability study, conduct analytical modeling, cap construction, a groundwater pilot study, and remedial design and implementation of a remedy.

**1998:** The SVE and treatment system was shut down for repairs in September. Subsequently, under the orders of the EPA, it was not restarted because of potential concerns that [dioxins](#) were produced by the thermal oxidation process.

**2000:** In November, EPA's contractor conducted the FYR of Site remedies. The review found that the cap was in good condition, and the groundwater pump and treat system was achieving hydraulic containment and removed a substantial mass of VOCs. The future operation of the SVE system was deferred until additional data were obtained.

**2002:** In November, split effluent samples from the groundwater treatment system were collected by ADEQ and the potentially [responsible parties](#). The samples were analyzed for 1,4-dioxane. Test results were below laboratory detection limits.

**2005-2006:** Since 1998 and prior to March 2006, the Site remedy had only removed approximately 35 pounds of the contaminants of concern from the groundwater each year. Soil vapor sampling and analyses indicated increasing concentrations of VOCs. Operation of the groundwater pump and treat system was not addressing the concerns relating to the expanding soil vapor plume and off-site groundwater contamination. Two new ground water wells (MW-16UA and MW-17UA) and five soil vapor probes were installed and added to the monitoring network. Additionally, soil vapor samples from wells extending below the basalt layer were collected and analyzed. A [baropneumatic test](#) was conducted to evaluate the effect, if any, of the basalt layer on soil vapor migration.

ADEQ and EPA determined that the existing Site Conceptual Model could no longer be supported by the current Site conditions. EPA and ADEQ requested the HSC to develop a new Site Conceptual Model. In response to the changing conditions at the Site, the HSC hired a new project manager and subsequently selected a new “Supervising Contractor” (Geosyntec Consultants) which was approved by ADEQ and EPA in accordance with the requirements of the existing CD.

ADEQ and EPA communicated to the HSC the need to provide a work plan to detail the work that will further evaluate the Site conditions, update the Site Conceptual Model and address existing data gaps. The HSC submitted a Phase I work plan in July 2005. ADEQ and EPA provided comments on the work plan in September 2005. The parties met and the HSC was advised on how to finalize the work plan which involved installation of new soil vapor and groundwater monitor wells above and beneath the basalt layer and re-starting of the SVE system with an updated off-gas treatment system.



**New Soil Vapor Extraction System**

The HSC conducted site-wide groundwater and soil vapor sampling in November 2005. Implementation of the approved Phase I Work Plan was initiated after January 1, 2006.

**2006:** The SVE was restarted in March. SVE construction and startup testing activities included the construction of a high density polyethylene lined equipment containment pad, installation of a proprietary vapor compression/condensation treatment unit (owned and operated by GEO Inc.) and transmission piping from 11 fine-grained zone vapor wells to the treatment unit. Soil vapor monitoring probe VP-19UA was connected to the SVE system in December. Prior to the re-start of the SVE system, nine soil [borings](#) were drilled in January and February 2006 to further characterize the subsurface conditions in the vicinity of the primary source area at the Site, the former solvent disposal pit (Pit 1). The data collected during that effort helped to focus the operation of the SVE system when it was re-started and further the development of the Site Conceptual Model regarding fate and transport of chemicals. Once the SVE system was restarted under the Phase I Work Plan, removal of VOC mass has increased dramatically.

Two monitor wells (MW-18UA, MW-19UA) and a [piezometer](#) (MW-20UA) were installed and added to the groundwater monitoring program during the year.

In January, EPA initiated the second FYR. The second FYR report was completed by EPA in September which included a review of annual monitoring reports, a review of institutional controls, risk assessment studies, a Site inspection and interviews. The report stated that monitoring data from the period of approximately the late 1990's to early 2006 indicated upward trends in both the size and concentration of the vadose zone VOC vapor plume, prior to the re-start of the SVE system. VOC concentrations in several groundwater wells had also been increasing over the last few years prior to the re-start of the SVE system. The report also stated that VOC vapor concentrations beneath the basalt were found to be higher than above the basalt. The report concluded that the remedy is protective to human health and the environment in the short-term, but further data collection is needed to determine if the remedy will be protective in the long-term.

**2007:** The groundwater recovery system removed and treated approximately 35 pounds of VOCs in 2007. Routine monitoring was on-going to collect supplemental data for use in the continued refinement of the Site Conceptual Model. The HSC continued to submit quarterly soil vapor and groundwater monitoring reports in a timely manner. EPA, ADEQ and the HSC met on a quarterly basis to discuss issues related to the Site.



**View of Landfill across Capped Area along Surface Drainage Channel**

The 2006 annual monitoring report was approved and finalized in October 2007. The HSC submitted a Phase I Report to EPA and ADEQ in June 2007. The Phase I work completed in 2006 and early 2007 was designed to collect supplemental data for addressing remaining data gaps and resume control of the soil vapor plume. Specific Phase I work included soil boring investigations, groundwater well installations, [aquifer](#) tests and the re-start of the SVE system. The Phase I Report also included interpretations of the current state of the Site, in particular the soil vapor and groundwater plumes. The Phase I Report was approved in October.

**2008:** ADEQ, EPA and the HSC prepared for several activities to start Phase II of the Site remediation including:

1. **Letter Work Plan 1 – Groundwater Recovery System Optimization**
  - Upgrade the PLC and data logger systems
  - Update capture zone analysis
  - Convert [extraction wells](#), EW-01UA and EW-02UA, to monitoring
  - Evaluate the need for a new groundwater extraction well
  
2. **Letter Work Plan 2 – Update Monitoring and Reporting Programs**
  - Review and optimize soil vapor monitoring program
  - Update [Quality Assurance Project Plan](#) and [Site Assessment Plan](#) as needed

### 3. Letter Work Plan 3 – Unit B Groundwater Analyses

- Complete a two-dimensional modeling to simulate and analyze the Unit A and Unit B seasonal water level fluctuations
- Develop the possible ranges of Unit A vertical hydraulic conductivities that best fit the simulations

### 4. Letter Work Plan 4 - Optimization of the Restarted SVE System

- Refine the conditions for and timing of the transition from the GEO system to air-phase carbon
- Design of carbon system
- Develop soil vapor performance standards
- Develop SVE closure criteria and testing protocols

In June, EPA and ADEQ approved an updated monitoring schedule for [soil vapor](#) monitoring. The revision included updating monitoring locations, sample collection procedures, laboratory testing methods and quality assurance and quality control protocols.

At the request of EPA and ADEQ, the HSC installed a new Unit A [monitor well](#) at the Site during July. The new well, designated MW-21UA, was located to provide water quality and water level data in an area that was viewed as a data gap between groundwater monitor wells MW-3UA and MW-16UA.

**2009:** The HSC continued to evaluate the performance of the SVE system. ADEQ and EPA worked with the HSC to develop revised clean-up objectives that will establish the future shut down of the SVE system. HSC began the process of conducting a pilot test to determine the effects of shutting down two of the soil vapor extraction wells. In December, an Explanation of Significant Difference was signed revisiting the soil vapor performance standards

**2010:** The pilot test is still underway for the soil vapor extraction system. EPA and ADEQ have requested an updated operation and maintenance manual. EPA and ADEQ continue to review the comments to the updated QAPP.

### Contaminants:

The current contaminants of concern for groundwater include various VOCs: 1,1-[dichloroethene](#) (DCE); trichlorotrifluoroethane ([Freon 113](#)); 1,1,1-[trichloroethane](#) (TCA); 1,1-[dichloroethane](#) (DCA); [trichloroethene](#) (TCE); [tetrachloroethene](#) (PCE); [trichlorofluoromethane](#) (Freon 11); 1,2-[dichloroethene](#) (DCE); 1,2-[dichloropropane](#); and [toluene](#). Soils beneath the waste pits contain VOCs, [heavy metals](#), pesticides, and lime wastes. Contaminants of concern at the Site may change as new data becomes available.

### Public Health Impacts:

Risk assessment results indicate that potential health risks may exist for individuals who might ingest the contaminated groundwater or come into direct contact with hazardous wastes present.

The landfill is capped; therefore, there is no potential for adverse health effects due to inhalation of VOCs in the air or direct contact with the hazardous wastes present below the ground surface. Contamination in the groundwater is contained within the Site boundaries. The groundwater contamination is restricted to the shallow aquifer which is not used as a potable water source.

### **Site Hydrogeology:**

The Site is located on the broad southward-sloping [alluvial](#) plain of the Hassayampa River Basin. The basin is bounded on the east by the White Tank Mountains, on the south by the Buckeye Hills, and on the west by the Palo Verde Hills. The altitude of the land surface at the Site is approximately 910 to 915 feet above mean sea level.

Regional hydrogeologic units in the area of the Site include in order of increasing depth: recent alluvial deposits, basin-fill deposits, and the [bedrock](#) complex. Groundwater levels in the vicinity of the Site generally lie below the base of the recent alluvial deposits. However, where saturated, the recent alluvial deposits may yield moderate quantities of groundwater to wells. The thickness of the basin-fill deposits appears to exceed 1,200 feet in the vicinity of the landfill.

The basin-fill deposits comprise the principal source of groundwater to wells in the area of the Site, and are generally referred to as the regional aquifer. Within a three mile radius of the Site, 349 groundwater wells have been identified, 172 of which potentially service individual residences. These wells yield groundwater from the regional basin-fill deposits aquifer. The reported depths range from five feet below land surface to 250 below land surface. The nearest [downgradient](#) domestic well is about 2,500 feet south of the Site. The basin-fill deposits have been classified in order of increasing depth into the upper, middle, and lower alluvium units. The upper alluvial unit (UAU) beneath the Site was subdivided in order of increasing depth into the upper alluvium deposits, basaltic lava flow unit, subunit A, and subunit B. The upper alluvium subunit consists of a coarse-grained part and a fine-grained part. The average depth to the base of the coarse-grained part is about 34 feet, while the average depth to the base of the fine-grained part is about 58 feet. The basaltic lava-flow consists of vesicular, basaltic rock and is part of the Arlington Mesa basalt flows. This subunit appears to thin and dip towards the north.

The presence of contaminated groundwater in subunit A indicates that the basaltic lava flow unit is not an impermeable unit. The part of the UAU from the base of the basaltic lava-flow subunit to the top of the middle alluvial unit is the uppermost water bearing part of the regional aquifer.

The direction of groundwater flow in subunits A and B is generally to the south, although local variations in the flow direction may occur. The average depth to the water table beneath the Site is 73 feet below ground surface.

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\*In Arizona, but outside the Phoenix area, call toll-free at (800) 234-5677.

\*\*Call EPA's toll-free message line at (800) 231-3075.

## Information Repository:

Interested parties can review select Site documents at the [Buckeye Library](#) located at 310 N. Sixth Street in Buckeye, Arizona, (602) 386-2778.

Site information is also available for review at the ADEQ Main Office located at 1110 W. Washington Street in Phoenix, Arizona. Please contact (602) 771-4380 or (800) 234-5677 to schedule an appointment with 24-hour notice to review these documents. Once all documents requested have been collected, you will be contacted for a review Monday through Friday from 8:30 a.m. to 4:30 p.m. at the ADEQ Records Management Center, 1110 W. Washington Street in Phoenix, AZ.

The complete official Site file can be reviewed at the EPA Region IX, [Records Center](#), Mail Stop SFD-7C, 95 Hawthorne Street, Room 403, San Francisco, CA 94105, (415) 536-2000.