

## Background

The City of Los Angeles (City) encompasses an area of 465 square miles with a population of over four million residents and an annual average water consumption of approximately 660,000 acre-feet (AF), or 215 billion gallons. Local groundwater provides approximately 11% of the total water supply for Los Angeles, and has provided up to 30% of the total supply in drought years.

The City owns water rights in three Upper Los Angeles River Area (ULARA) groundwater basins -- San Fernando, Sylmar, and Eagle Rock -- and in the Central and West Coast Basins. On average, about 86% of the City's groundwater supply is extracted from the ULARA groundwater basins, while the Central Basin provides 14%.

## San Fernando Basin

The San Fernando Basin (SFB) is the largest of the three basins and encompasses an area of 112,000 acres. The City has an adjudicated right to pump approximately 87,000 AF per year. Unfortunately, contamination has increasingly limited LADWP's ability to fully utilize this valuable resource.

## History of SFB Groundwater Contamination

Chlorinated solvents, including trichloroethylene (TCE) and tetrachloroethylene (PCE), were widely used in the United States starting in the 1940s for dry cleaning and for degreasing machinery. Disposal was not well regulated at that time. In the 1980s, TCE was consistently detected in SFB production wells at concentrations greater than the maximum contaminant level (MCL) for drinking water (See Figure 1). The development of the interim groundwater treatment facility known as the North Hollywood Operable Unit (NHOU) began in 1984. In 1986, the U.S. Environmental Protection Agency (USEPA) established four National Priority List sites in the San Fernando Valley under the federal Superfund Program. The USEPA identified several potentially responsible parties (PRPs) that have contributed to the NHOU funding through Consent Decrees. More investigation is necessary to determine the full extent of the contamination and the responsible parties. The USEPA, along with several local regulatory agencies and in cooperation with LADWP, has been pursuing a clean-up remedy of the soils and

groundwater in the vicinity of the most severely contaminated part of the SFB. This remedy would contain the worst part of the contaminant plume, but would not address lower-level contamination impacting several water supply production wells.

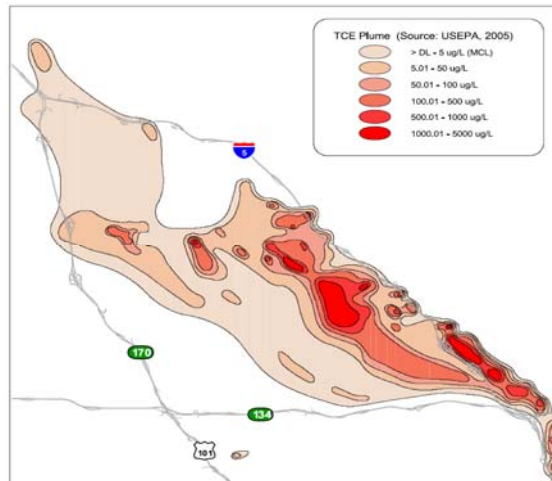
## LADWP Wellfield

LADWP has eight major wellfields within the SFB. These are: Tujunga, Rinaldi-Toluca, NHOU, North Hollywood, Erwin, Whitnall, Verdugo, and Pollock. These wells were installed over a period spanning from 1924 to 1991, with the most recent installations being the Rinaldi-Toluca Wellfield in 1988, and the Tujunga Wellfield in 1991. Collectively, these eight wellfields have the ability to pump and serve approximately 650 AF of water per day, with the Rinaldi-Toluca and Tujunga wells providing about 65% of this total, or 420 AF per day.

To date, 50% of LADWP's wells have been inactivated due to contamination. Additionally, the remaining active wells are not operated at their full capabilities due to the regional contamination issues that affect all of LADWP's wells. This constraint significantly reduces LADWP's flexibility in managing its groundwater resources within the SFB.

## Well Contamination Summary

Of the 115 wells LADWP has in the SFB, 57 of them have been removed from service due to contamination, resulting in a loss of approximately 500 AF per day or 45% of LADWP's total pumping capacity. The remaining 58 active wells have a pumping capacity of approximately 600 AF per day, but 45 of these wells have recorded contaminant concentrations above the corresponding MCLs. Most notable among these contaminants of concern are the volatile organic compounds (VOCs) TCE, PCE, and carbon tetrachloride; chromium; nitrate; and perchlorate. The remaining 13 wells have recorded marginal levels of contamination, mostly VOCs.



**Figure 1: TCE Plume in the SFB**

## LADWP Strategy and Goals

The main goal of LADWP is to restore its pumping capacity to historical levels, and alleviate the need to depend on costly, potentially unreliable, and, in some cases, dwindling imported water supplies. LADWP is looking for a long-term, regional, comprehensive solution to addressing the SFB contamination in order to maintain operational flexibility, reliability, and re-establish the

ability to store and pump its full adjudicated water rights from the SFB, along with any stored water credits.

In order to accomplish these goals on a regional basis, there is the need to investigate and characterize the contamination for a significant portion of the SFB areas in a timely and expedited fashion, and a need to investigate and identify PRPs in cleanup orders. LADWP is currently leading a list of projects to cleanup the SFB and to allow the City to fully utilize this valuable water supply resource.

### Existing and Ongoing Projects

**NHOU:** Constructed in 1989, the 2,000 gallons per minute (gpm) plant was designed to achieve VOC plume containment and reduction of VOC contaminant mass using groundwater extraction wells, air stripping, vapor-phase granular activated carbon (GAC) treatment and chlorination station. NHOU's inability to fully contain the groundwater plume, and the discovery of new contaminants, such as chromium and 1,4-dioxane, necessitates the design and implementation of a new remedy- referred to as NHOU Second Interim Remedy (NHOU IR2). In September 2009, USEPA issued its Record of Decision for the NHOU IR2. To increase the effectiveness of plume containment and contaminant removal, the plan is to deepen several of the existing NHOU extraction wells, construct new wells and a treatment facility that will treat VOCs, chromium, 1,4-dioxane and other contaminants of concern.

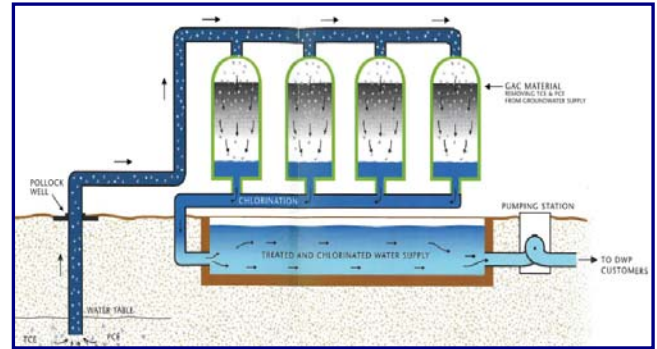
**Tujunga Demonstration Project:** LADWP developed a joint project with the Metropolitan Water District of Southern California to constructing a liquid-phase GAC treatment plant at each of two wells (Tujunga Well #6 and #7) with the highest VOC concentrations, primarily TCE, PCE, CTC, and 1,1-DEC. The treatment of these two wells also allowed increased pumping of other production wells within the Tujunga Wellfield. The Plants have been in operation since May 2010 and has a designed capacity of 8,000 gpm (See Figure 2).



**Figure 2: GAC Vessels at Tujunga Wellfield**

**The Pollock Wells Treatment Plant:** This plant was developed by LADWP to restore the two Pollock wells and to contain and remove contamination, primarily TCE and PCE, from SFB groundwater. The plant consists of

liquid-phase GAC treatment, chlorination stations, and booster pumping station to provide up to 3,000 gpm of high-quality water (See Figure 3).



**Figure 3: Treatment Process at Pollock Wellfield**

**Groundwater System Improvement Study (GSIS):** In 2009, LADWP initiated a 6-year, \$24 million comprehensive analysis by independent experts that will provide recommendations and assistance in developing short- and long-term projects, including the design and construction of a groundwater treatment complex (described below), to maximize the use of the groundwater supply in the SFB, which is of growing importance to Los Angeles as imported water supplies become increasingly contended and limited. As a part of the GSIS, the LADWP will be drilling approximately 26 new groundwater monitoring wells, and perform short-term monitoring of the existing and new groundwater wells, in order to obtain supplemental water quality data necessary for planning the groundwater treatment projects in the SFB. The drilling of the new monitoring wells was initiated in April 2012.

### Future Projects

**Groundwater Treatment Complex:** In response to the critical water supply picture in the region, LADWP is initiating a fast-tracked and ambitious undertaking to restore its lost groundwater production. This undertaking will enable LADWP to safely manage and extract water from existing wellfields and future groundwater recharge efforts. The future groundwater treatment complex in the SFB will include centralized and localized treatment facilities in the vicinity of LADWP's North Hollywood, Rinaldi-Toluca and Tujunga Wellfield. The \$600 to \$900 million groundwater treatment complex will greatly reduce LADWP's reliance on costly and diminishing imported water supplies, and will compliment LADWP's strategies for securing the City's future water supply through sustainable means. The groundwater treatment complex will also enable LADWP to fully utilize its activities to enhance local supplies through groundwater recharge and stormwater projects.