Review of
Draft San Gabriel Valley Area Superfund site Remedial Investigation Report

by The Cadmus Group, Inc.

for the San Gabriel Valley Oversight Group
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The San Gabriel Valley Area 3 Superfund site, located on the northeast part of Los Angeles, has been listed on Superfund's National Priorities List since 1984 due to groundwater contamination. Area 3 communities rely on groundwater for drinking water, and water shortages also affect the communities. Groundwater pumping is controlled under court order throughout the San Gabriel Valley to ensure water is delivered equitably. In Area 3, groundwater is being pumped out of wells at a rate that is faster than water can flow back, and this drawdown of groundwater is the primary influence on the flow direction of contaminated groundwater towards wells used to supply drinking water. Drinking water for Area 3 residents currently is a mixture of treated groundwater with clean groundwater to ensure that it meets health standards when it reaches the tap.

The Draft San Gabriel Valley Area Superfund site Remedial Investigation (RI) Report is one of the steps used by the US Environmental Protection Agency (EPA) to begin the cleanup process for Area 3. This analysis of the groundwater contamination in Area 3 was prepared by EPA's contractor, CH2MHILL. The RI will be used to inform EPA and the public. The RI is used to identify contaminants, and to create conceptual models and drawings to make it easier to visualize the pathways and locations of contaminants, and their potential migration routes to humans and through the local environment. This analysis allowed EPA to do quantitative human health and ecological risk assessments to quantify any risks posed by the site, and this risk assessment is included in the RI.

The RI is required for projects that receive EPA funding under a Superfund grant, contract, or other agreement involving environmental data, and must meet strict data quality objectives (e.g., how much uncertainty is tolerable with respect to the proposed use of the data), must follow EPA technical guidance, and must show all applicable environmental data in the RI. These data cover all physical characteristics of the site such as the geologic soil and rock formations, and hydrologic movement of water. Chemical analyses of the water, soil, and air at the site are also included to identify natural components and contaminants. Wells, constructed by EPA and the state, include 38 groundwater monitoring wells and 38 public drinking water production wells in Area 3 that extend below the ground surface to one of three zones where groundwater occurs. From 1980 until 2007, the wells were used to collect groundwater data by EPA and the Los Angeles Regional Water Quality Control Board (LARWQB also acquired data from industrial/commercial facilities in Area 3 to assess contamination of groundwater). Approximately 4,000 pages of this RI are dedicated to presenting data and supporting documentation.

At Area 3, EPA and State agencies investigated over 500 known sources of contamination including commercial and industrial facilities potentially responsible for the contamination. So far, 12 of these properties are most likely responsible for contributing at least

some of the volatile organic chemicals (VOCs) that contaminated groundwater. **Future investigation will continue to identify more contaminants and additional responsible parties**. EPA identified key contaminants of potential concern (COPCs) by testing for over 300 chemicals in groundwater collected from Area 3. The seven contaminants that were selected because they exceeded screening levels include nitrates, perchlorate, 1,2,3-trichloropropane (1,2,3-TCP), cis-1,2-dichloroethylene (cis-1,2-DCE), trichloroethene (TCE), tetrachloroethene (PCE). Examples include TCE at 460 times the maximum contaminant level (5 ug/l) and PCE at 160 times the MCL of 5 ug/l. It is likely that some biodegradation (i.e., biological processes working to break down the contaminants – in some cases, to nontoxic chemicals) at Area 3 occurs, but **additional data are needed to determine the extent of beneficial effects of biodegradation on reducing contamination.**

In an idealized/simplified model of groundwater flow, rainfall and sources of fresh water trickle through soil and rocks until reaching an impermeable surface where the water can no longer flow downward by gravity. This water movement through the subsurface tends to trap and filter out contaminants so that, in theory, groundwater deep underground is cleaner than surface water. In some communities with very deep wells and no sources of contamination, the water is drinkable without treatment. Where groundwater reaches an impermeable rock layer, it starts to fill in the spaces in the overlying soil and sand, and these saturated zones, known as aquifers, can be tapped for drinking water by placing wells below the water table (top surface of the aquifer), and pumping out clean water.

However, in Area 3, several differences from such a simplified conceptual model occur. Groundwater aquifers can be reached at depths of only10 to 100 feet below the ground surface, and extend down to 300 or so feet below that level. The RI provides a conceptual model of the flow of groundwater both vertically and horizontally at Area 3. The results showed a number of fault zones and folded bedrock that affect groundwater flow, and a "structural bedrock discontinuity" (possible fault zone) that separates the east and west portions of the site and restricts flow between the two. **Additional research is still needed** to complete this conceptual model. However, at Area 3, it is well known that drinking water production wells draw the water table (top surface of the aquifer) lower. As the water is pumped out, groundwater flows back into pore spaces in soil and sand surrounding the well screen at the bottom of the well and draws contaminants in the groundwater with it. Of five areas where groundwater occurs at Area 3, the southwest and northeast are the most contaminated. Representations of the spatial relationships between surfaces structures, groundwater, contaminants ,and hydrogeological features at Area 3 are found throughout the RI. See Figure ES-2 in the RI for a simplified conceptual hydrogeology drawing.

However, the **three dimensional model has not been fully prepared to show the extent of contamination (plumes of contamination) because the contaminant transport mechanism is not well-defined by existing data. That is, it is not clear whether contaminated groundwater flows primarily directly downward by gravity, or is spread in other directions due to groundwater pumping. This significant data limitation produces uncertainty in the RI.**

The Area 3 Human Health Risk Assessment is a part of the RI where the contaminant migration is compared to human health criteria/standards. This RI analysis was consistent with EPA's Risk Assessment Guidance for Superfund (1989), and was performed using EPA's current health effects criteria and EPA risk assessment policy. This systematic analysis was

reviewed by The Cadmus Group, Inc. and found to be very thorough including presentation of all available data, and explanation of the process used for hazard identification of chemicals, calculations of exposure assessment, and selection of the most conservative human health criteria to assess risk.

The basic approach for the risk assessment for Area 3 was to use the most conservative available site data and human health criteria (i.e., representing the worst-case scenario), and the most conservative contaminant occurrence data (i.e., the highest observed concentrations of contaminants). These values were then used in standard calculations for risk. Uncertainty in groundwater assessments comes either from data- or model assumption-related errors, both of which are unavoidable, even with the best scientific research. To produce scientifically defensible groundwater vulnerability assessments, scientists attempt to reduce uncertainty by following quality assurance and quality control plans, and by overestimating risks by using the most conservative health criteria and the most contaminated sample data, as long as they meet the data quality assurance/control requirements. The RI explained, in detail, the five main areas where uncertainty plays a role, including data collection and analysis, fate/transport assumptions, exposure estimates, toxicological data (risks such as health status, which affect an individual's reaction to a contaminant) and uncertainty in the risk characterization assumptions. If **significant new data become available on COPCs or on the contaminant transport model, then the Human Health Risk Assessment will be updated.**

For Area 3, the risk to people for both cancer and non-cancer effects was calculated for **untreated** groundwater. As a reminder, residents at Area 3 currently drink **treated** groundwater, which is acceptable as drinking water. The risk level for untreated groundwater that is considered to be unacceptable is 1 case in 1 million for cancer. For non-cancer effects, a hazard index of greater than 1 is considered unacceptable, and this is defined as the likelihood of an effect being greater than a toxicological reference dose of the contaminant that causes effects in a general population. At Area 3, the highest cancer risk was calculated to be 1 case in 1000 for consuming TCE in groundwater, but cancer risks for each of the cancer-causing contaminants at this site (carbon tetrachloride, 1,2,3-TCP, TCE, and PCE) were all above the acceptable level of 1 in a million. Only PCE exceeded hazard criteria for non-cancer effects of COPCs. Future re-calculation of the risk may include other COPCs, such as arsenic, etc. if data show they meet the criteria. The risk assessment concluded that actions should be taken to protect human health due to significant contamination by the contaminants mentioned above, and that untreated groundwater is unsuitable for use as tap water.

The ecological risk assessment was used to calculate the maximum exposure for wildlife and plants that would be expected, and these values were compared to ecological criteria. Specifically, the risk assessment determined that Area 3 effects could occur for amphibians, reptiles, terrestrial plants, and birds due to contact with contaminated groundwater when used to irrigate the two golf courses, or when plants and animals are exposed to contaminated groundwater in streams and ponds (surface water) at the golf courses. In Area 3, no unacceptable ecological risks were found.

Future steps in the Superfund process usually include a Feasibility Study (FS), which is conducted concurrently with the RI. The Feasibility Study is not yet available, but should identify options and activities to clean up the site, and evaluate the performance and cost of those options before implementation at the site.