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Executive Summary

ES.1 Background and Purpose of the Remedial Investigation

Each section of this report provides a discussion of the subject, followed by any tables or figures cited in the text. In addition, exhibits and text boxes noted in the margins present key concepts, tables, and figures.

This executive summary highlights the results of the ***remedial investigation*** (RI) of regional ***groundwater contamination*** in the San Gabriel Valley Area 3 ***Superfund*** Site (Area 3). The executive summary explains the types of ***contaminants*** found, the locations of potential contaminant sources, contamination migration pathways, results of the risk assessments, and the next steps in the cleanup process.

The RI is part of a process initiated by the United States Environmental Protection Agency (EPA) to evaluate and address groundwater contamination in the San Gabriel Valley. EPA added Area 3 to the ***National Priorities List (NPL)***, commonly called the Superfund list, in 1984. EPA subsequently prioritized ***remedial actions*** in the San Gabriel Valley Superfund NPL Areas and associated ***operable units*** (OUs), based on the following ranking factors.

*The glossary explains words presented in **bold, italicized** text.*

- Confidence in the estimated extent of ***volatile organic compound*** (VOC) contamination in groundwater
- Quantity of the VOC-impacted water supply
- Severity of VOC contamination relative to contamination in other OUs
- Potential for contamination migration

This report examines the physical characteristics and ***hydrogeology*** of Area 3; the sources and movement of regional groundwater contamination; and the potential risks posed to human health and the environment from the contamination. The assessments performed for the RI lay the foundation for a ***feasibility study*** that will evaluate possible groundwater cleanup alternatives for Area 3.

Area 3 consists of a 19-square-mile area underlying the cities of Alhambra, Rosemead, San Gabriel, San Marino, South Pasadena, Temple City, and parts of unincorporated Los Angeles County, California, where groundwater contamination has been detected in monitoring wells and production wells. Figure ES-1 shows the location of Area 3.

Figure ES-1 shows the location of Area 3.

Groundwater underlying Area 3 is used for local water supplies. Water purveyors implement safeguards through well shutdowns, wellhead treatment, and blending to ensure that all tap water meets drinking water standards.

Untreated groundwater from many drinking water production wells in Area 3 contains contamination from

VOCs at concentrations that exceed federal or state ***evaluation criteria.*** Water purveyors implement safeguards to ensure the quality of drinking water, so all water that reaches the public meets drinking water standards.

ES.2 Method for Conducting the Remedial Investigation

Figure ES-1 shows the location of the groundwater wells.

EPA has gathered data including measurements collected at 41 groundwater monitoring wells and 38 production wells in Area 3 as shown in Figure ES-1, information found in public records, and information from other investigations. Section ES.3 summarizes the results of the six types of evaluations completed for the RI; the evaluations are listed below.

- Evaluation of Physical Characteristics and Hydrogeology
- Identification of Contaminant Sources
- Evaluation of Contamination Migration
- ***Human Health Risk Assessment*** (HHRA)
- ***Ecological Risk Assessment***
- Assessment of Next Steps

In conducting the RI, EPA worked with the California Regional Water Quality Control Board, Los Angeles Region (LARWQCB) and the California Department of Toxic Substances Control (DTSC), collectively referred to as the State of California in this report. EPA also solicited input from stakeholders, including groundwater management agencies, local municipalities, and members of the community.

Although the RI focuses exclusively on groundwater contamination, the State of California's process addresses the investigation and ***mitigation*** of contamination in soils and ***soil vapor***.

ES.3 Results of the Remedial Investigation in Area 3

ES.3.1 Evaluation of the Hydrogeologic Conceptual Site Model for Area 3

Figure ES-2 illustrates the hydrogeology in Area 3.

EPA reviewed data for surface water, **groundwater recharge**, and **aquifer** properties to evaluate site conditions in Area 3. The diagram in Figure ES-2 shows a representation of the hydrogeology in Area 3.

Area 3 contains ***bedrock*** and ***alluvial*** aquifers. A geologic ***structural bedrock discontinuity*** appears to restrict groundwater flow between the western and eastern portions of Area 3. The RI identifies three aquifers in Area 3: the western bedrock aquifer; the western alluvial aquifer; and the eastern alluvial aquifer, which is divided into the shallow, intermediate, and deep groundwater zones. Although groundwater historically flowed from west to east, a decline in groundwater levels caused by groundwater production in the eastern portion of Area 3 has resulted in the separation of the alluvial aquifer into western and eastern portions.

ES.3.2 Evaluation of Contaminants and Potential Contaminant Sources in Area 3

Remedial investigations initially analyze for a large number of chemicals to determine the ***contaminants of potential concern*** (COPCs) to be further assessed. Of the 300 chemicals initially tested, this RI identifies seven Key COPCs, shown in Exhibit ES-1. The Key COPCs include contaminants detected multiple times at production wells in Area 3 at concentrations that exceed the evaluation criteria. This RI report uses Key COPCs as a way of identifying regional groundwater contamination within Area 3.

Exhibit ES-1 presents the Key COPCs that occur in groundwater underlying Area 3.

EXHIBIT ES-1
Key COPCs Detected In Groundwater Underlying Area 3

Key COPC	Common Industrial and Commercial Use	Total Number of Potential Discrete Sources of Key COPC Identified in the Geographic Areas
Chlorinated VOCs		
Tetrachloroethene (PCE)	Dry cleaning solution, degreaser	At least seven (southwestern [SW], central, and northeastern [NE] Area 3)
Trichloroethene (TCE)	Industrial solvent and degreaser	At least six (SW and central Area 3)
cis-1,2-Dichloroethene (cis-1,2-DCE)	Solvent, component in medicines and perfumes	cis-1,2-DCE likely occurs as a ***degradation product*** of TCE, but has at least one discrete source (SW Area 3)
1,2,3-Trichloropropane (1,2,3-TCP)	Solvent, soil fumigant, sealant	Unknown*
Carbon tetrachloride	Cleaning fluid	Unknown*
Inorganic ***Anions***		
Perchlorate	Component in rocket fuel and highway flares	Unknown*
Nitrate	Component in agricultural fertilizers	Release through widespread application.

The Key COPCs include contaminants detected multiple times at production wells in Area 3 at concentrations that exceed the evaluation criteria. This RI report uses the Key COPCs as a way of identifying regional contamination within Area 3.

*Point or non-point sources likely exist. Contaminant investigation source activities will continue during the feasibility study.

Since 2000, EPA and the State of California have worked to identify potential sources of COPC contamination in Area 3, focusing efforts on manufacturing, chemical storage, and dry cleaning facilities. From a list of over 500 potential source facilities, the State of California directed 33 facilities to investigate the subsurface. Twelve of the facilities detected COPCs in groundwater.

Groundwater contamination appears to occur in five geographic areas within Area 3 (shown in Figures ES-3 and ES-4) as southwestern (SW), northwestern (NW), central, northeastern (NE), and southeastern (SE) Area 3. The contamination appears most severe in SW and NE Area 3. Efforts to identify and investigate sources of contamination continue in all five areas.

Figures ES-3 and ES-4 illustrate the occurrence of contamination in Area 3.

Trichloroethene (TCE) and ***tetrachloroethene*** (PCE) are the most widespread of the Key COPCs, with maximum concentrations up to, respectively, 460 and 190 times the ***maximum contaminant level*** (MCL) (5 micrograms per liter [µg/L]) in groundwater.

ES.3.3 Evaluation of Contamination Migration Conceptual Site Model for Area 3

Groundwater contamination in Area 3 impacts the following aquifers: the bedrock aquifer; the western alluvial aquifer; and the eastern alluvial aquifer in the shallow, intermediate, and deep groundwater zones. Migration of the Key COPCs in Area 3 occurs in the direction of groundwater flow. Groundwater production in the eastern portion of Area 3 also impacts contamination migration. Although evidence of ***biological degradation*** occurs in Area 3, the impact of biological degradation on the migration of COPCs is unknown, but is likely minimal.

ES.3.4 Human Health Risk Assessment

This RI includes a baseline HHRA to estimate the *future* potential cancer risks and health hazards to residents in Area 3 from exposure to untreated groundwater used for drinking water and other domestic purposes.

The assessment sought to answer one question: if EPA did *nothing* to address the contamination in groundwater used in drinking water systems, what would be the likelihood that an adult or child would experience an adverse health impact? In other words, what would be the health risk?

Exhibit ES-2 summarizes the results of the HHRA.

As shown in Exhibit ES-2, the results of the HHRA indicate that due to the presence of contamination, groundwater in many parts of Area 3 is unsuitable as a source of tap water for domestic use. Potential exposure to the contamination would create a risk of more than one additional cancer in a population of one million (risks greater than ***1E-06***). A ***hazard index*** (HI) value of greater than 1.0 indicates that the potential for noncancer effects also exists. The HHRA indicates that action needs to be taken to protect human health in Area 3.

EXHIBIT ES-2
Summary of Estimated Human Health Risks and Hazards Based on Detected Current Maximum Concentrations of Key COPCS in Groundwater Underlying Area 3

Key COPC	Current Maximum Concentration Detected (µg/L)	Evaluation Criterion[a] (µg/L)	Estimated Cancer Risk Based on Current Maximum Concentration (Risks greater than 1E-06)	Estimated Hazard Index Based on Current Maximum Concentration (Hazards greater than 1)
PCE	640	5	6E-03	10.5
TCE	1,700	5	1E-03	**
cis-1,2-DCE	17	6	--	0.05
1,2,3-TCP	0.23	0.005	2E-05	0.001
Carbon tetrachloride	1.2	0.5	6E-06	0.05
Perchlorate	6.8	6	--	0.3
Nitrate as N	18.5[b]	10[b]	--	0.74

Notes:
[a]Evaluation criterion, the most protective standard or lowest allowable concentration is either the maximum contaminant level (MCL) or ***notification level*** (NL).
[b]Nitrate concentration measured in milligrams per liter (mg/L).
Other COPCs that also contribute to estimated risks in Area 3 include arsenic, naphthalene, n-nitrosodimethylamine (NDMA), dibromochloropropane, 1,2,4-trimethylbenzene, benzene, and atrazine. These COPCs will also be addressed during the feasibility study.
** – Key COPC occurs only at concentrations that present no potential hazard to human health.
-- – Key COPC occurs only at concentrations that present no potential risk to human health.
cis-1,2-DCE – cis-1,2-dichloroethene
µg/L– micrograms per liter
PCE – tetrachloroethene
TCE – trichloroethene
1,2,3-TCP – 1,2,3-trichloropropane

ES.3.5 Ecological Risk Assessment

This RI also includes an ecological risk assessment to evaluate the likelihood of harmful effects to plants and animals resulting from contact with contaminated groundwater used for irrigation and stored in ponds. The ecological risk assessment identifies no risks to ecological ***receptors*** from potential exposure to groundwater contamination in Area 3.

ES.3.6 Conclusions and Next Steps for the Area 3

The collection and evaluation of data have enabled EPA to complete the investigation of regional groundwater contamination in Area 3. The results of the RI indicate that due to the presence of COPC contamination, groundwater in many parts of Area 3 is unsuitable as a source of tap water for domestic use. The overall conclusion of the RI is that action needs to be taken to protect human health in Area 3 by addressing groundwater contamination.

The RI identifies the ***contaminants of concern*** to be addressed during the feasibility study as part of the next steps for Area 3. The potential risk contributors include Key COPCs and the following COPCs: arsenic, naphthalene,

n-nitrosodimethylamine (NDMA), dibromochloropropane, 1,2,4-trimethylbenzene, benzene, and atrazine.

EPA will use the contamination migration conceptual site model as a basis for the feasibility study, which will evaluate technologies, costs, and challenges for cleaning up contaminated groundwater in Area 3. The feasibility study will consider the data needs identified during the RI. The current schedule envisions completion of a draft feasibility study report in 2010.

Figures