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4. Contaminant Distribution and Source Identification

This section evaluates the data set for the San Gabriel Valley Area 3 ***Superfund*** Site (Area 3) to support ***contaminant*** source identification (***Remedial Investigation*** [RI] Subtask 2). The discussion focuses on the general distribution and the historical and current sources of seven ***Key contaminants of potential concern*** (COPCs) detected in ***groundwater*** underlying Area 3. The ***contamination*** migration ***conceptual site model*** (RI Subtask 3) discussed in Section 5 embodies the interpretation of the relationship between the potential sources of groundwater contamination and the distribution and migration of Key COPCs. Key COPCs include contaminants detected multiple times at production wells in Area 3 at concentrations that exceed the ***evaluation criteria***, which include ***maximum contaminant levels*** (MCL) or ***notification levels*** (NLs). The RI report uses Key COPCs as a way of identifying regional contamination within Area 3.

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.

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

4.1 Remedial Investigation Data Set

The set of ***environmental data*** used to identify potential sources of groundwater contamination consists of ***primary data*** and ***secondary data*** collected through 2007, as listed below. As Section 2.2 describes, the United States Environmental Protection Agency (EPA) uses ***data quality objectives*** (DQOs) to guide data collection, analysis, and interpretation for each RI subtask. Table 2-1 (at the end of Section 2) presents the overall DQOs for the Area 3 RI; Table 4-1 (at the end of this section) presents the DQOs developed for Area 3 contaminant source identification (RI Subtask 2). Figure 2-1 shows the locations of all production wells and ***groundwater monitoring wells*** in Area 3.

Table 4-1 presents the DQOs for the contaminant source identification task.

Figure 2-1 shows the location of groundwater wells in Area 3.

Table 4-1 identifies potential evaluation results and methods to avoid incorrect results. Table 4-1 defines evaluation boundaries for the groundwater investigation for Area 3, lists data needs to complete the subtask, and describes how the data will be used. Table 4-1 also includes an evaluation of the assessment conducted to determine the quality and usability of the data set.

- Primary Data – Collected by EPA
  Environmental data include data obtained during the installation of eight groundwater monitoring wells, quarterly groundwater sampling conducted from 2003 through 2007 at multiple depths, and two sampling events conducted at three irrigation wells.
- Secondary Data – Collected by External Sources
  Environmental data include data compiled from soil, ***soil vapor***, and groundwater investigations performed at potential contaminant source

facilities in Area 3, and data collected from 38 production wells operated by six water purveyors.

Appendix B provides a copy of the analytical data set for Area 3 in Tables B-1 through B-3.

Appendix C presents the data quality and usability assessment for the Area 3 data set.

Section 2.5.1 describes the activities to collect primary data during the RI. Section 2.5.2 describes the activities to collect secondary data during the RI. Appendix B provides the analytical data set in Tables B-1 through B-3. Appendix C presents the data quality and usability assessment for the complete environmental data set used in the RI.

4.2 Contaminants of Potential Concern

4.2.1 Identification of Contaminants of Potential Concern

Exhibit 4-1 summarizes the procedure used to identify Key COPCs for Area 3.

Early in the RI process, EPA developed a list of COPCs based on chemicals found in groundwater throughout the San Gabriel Valley Superfund Sites, including Area 3, and on chemicals potentially used in Area 3. EPA reviewed data for over 300 analytes tested in groundwater in Area 3. Exhibit 4-1 summarizes the procedure EPA used to identify COPCs.

EPA screened the list of COPCs detected in Area 3 by identifying analytes present at concentrations that exceed the following evaluation criteria.

- Federal Safe Drinking Water Act (Code of Federal Regulations [CFR], Title 40, Part 141)
  - MCLs
  - Secondary MCLs
  - Non-zero MCL Goals
- EPA-proposed MCLs and non-zero MCL goals
- California State Safe Drinking Water Act (California Code of Regulations [CCR], Title 22)
  - MCLs
  - Secondary MCLs
- California Department of Public Health (DPH) established NLs
- Hexavalent chromium maximum established by California Toxics Rule for Aquatic Life Protection[1]

Table 4-5 presents the most protective standard or guideline (the lowest allowable concentration level) that constitutes the evaluation criterion for each COPC. Despite use of the evaluation criteria discussed here to screen contaminants, actual requirements for any future groundwater cleanup in Area 3 remain undetermined. The future ***Record of Decision*** completed after the ***feasibility study*** will identify applicable or relevant and appropriate requirements.

[1]Criterion applied in the absence of an established drinking water standard.

EXHIBIT 4-1
COPC and Key COPC Identification Process

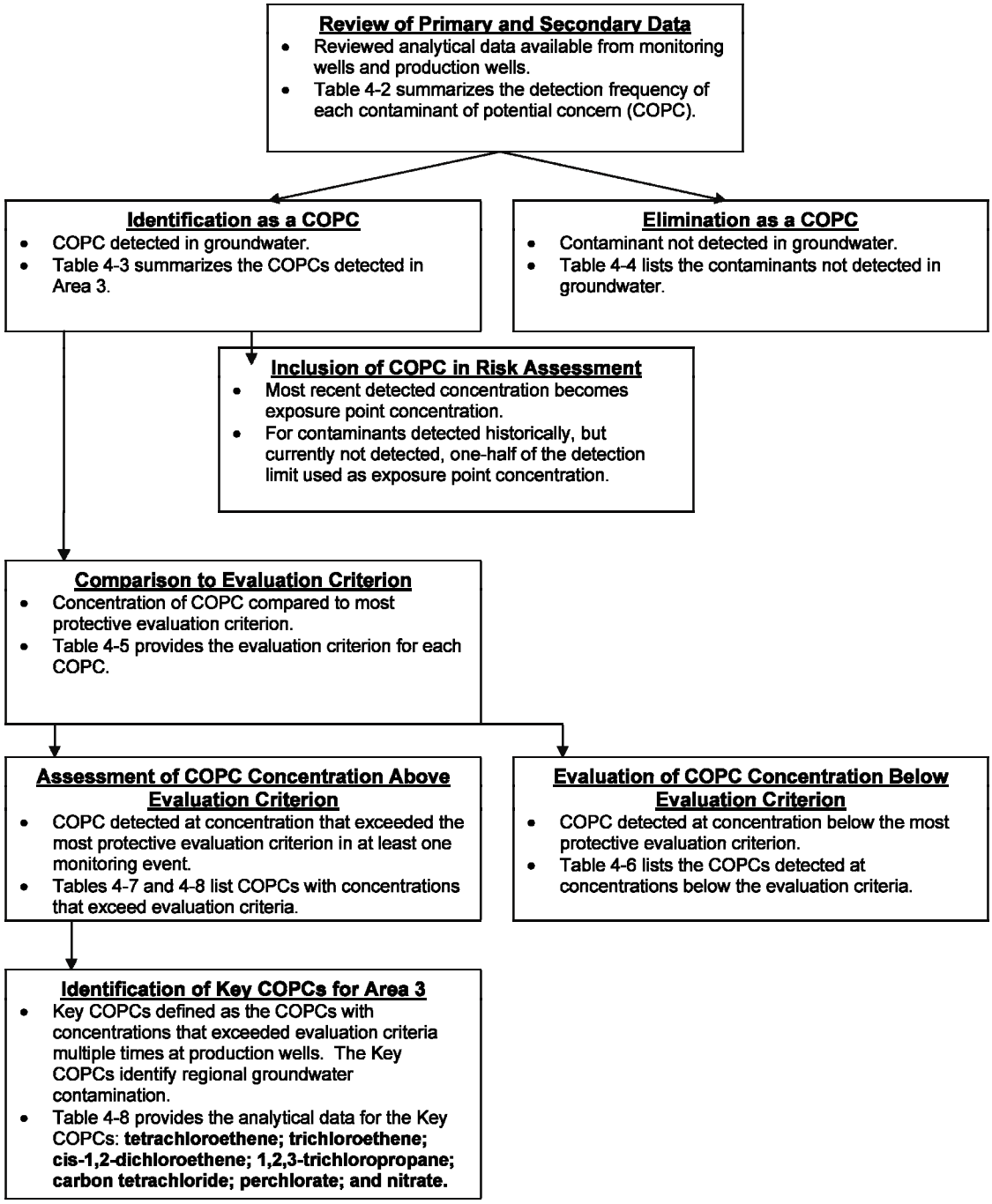

Table 4-2 summarizes the detection frequency of each COPC.

Table 4-3 summarizes COPCs detected in Area 3.

Table 4-4 summarizes COPCs not detected in Area 3.

Table 4-5 presents the most protective evaluation criterion for each COPC.

Table 4-6 lists the COPCs only detected at concentrations below the evaluation criteria.

Table 4-7 lists the COPCs not categorized as Key COPCs.

Table 4-8 presents Key COPC data.

4.2.2 Area 3 Contaminants of Potential Concern

The contaminants of primary concern to EPA include the COPCs that potentially threaten the quality of the drinking water supply in Area 3. Although safeguards are in place to ensure the quality of drinking water, untreated groundwater from many production wells in Area 3 contains ***volatile organic compounds*** (VOCs) at concentrations that exceed MCLs or NLs.

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

Table 4-8 presents Key COPC data.

Table 4-8 provides the analytical data for the Key COPCs. Exhibit 4-2 summarizes the composition of the seven Key COPCs and provides the common commercial and industrial uses of Key COPCs.

Exhibit 4-2 summarizes the composition and common uses of Key COPCs.

EXHIBIT 4-2
Composition and Commercial and Industrial Uses of Key COPCS

Key COPC	Composition	Commercial and Industrial Uses
Chlorinated Volatile Organic Compounds		
Tetrachloroethene (PCE)	Composed of carbon and chlorine.	Used to dry clean fabrics, used as a solvent to clean grease from metals, or used to make chemical products.
Trichloroethene (TCE)	Composed of carbon, hydrogen, and chlorine.	Used as an industrial solvent, used in adhesives, paint removers, dry cleaning, dyestuffs, textiles, and spot removers.
cis-1,2-Dichloroethene (cis-1,2-DCE)	Composed of carbon, hydrogen, and chlorine.	Used as a solvent, and in medicines, perfumes, and thermoplastics.
1,2,3-Trichloropropane (1,2,3-TCP)	Composed of carbon, hydrogen, and chlorine.	Used as a solvent, soil fumigant, sealant, and chemical intermediate.
Carbon tetrachloride	Composed of carbon and chlorine.	Used as a cleaning fluid and in refrigeration fluids, used to manufacture propellants and other industrial chemicals.
Inorganic *Anions*		
Perchlorate	Composed of chlorine and oxygen.	Used as an oxidizer in solid rocket fuel, also occurs in explosives, munitions, and pyrotechnics.
Nitrate	Composed of nitrogen and oxygen.	Results from dissolution of agricultural fertilizers or from human or animal wastes.

Table 4-7 lists the COPCs with exceedances of evaluation criteria not categorized as a Key COPC.

Table 4-7 presents a list of 17 COPCs not included as Key COPCs despite detections in groundwater at concentrations that exceeded the evaluation criteria. The COPCs listed in Table 4-7 showed inconsistent detections, few (or no) detections at production wells, and low reported concentrations. Appendix E presents additional data in tables and figures to support the

discussion in Section 4 and Section 5. Table E-1 in Appendix E summarizes the detection frequency of the 17 COPCs.

Appendix E presents additional data in tables and figures to support the discussion in Section 4 and Section 5.

Several of the 17 COPCs contribute to potential cancer and noncancer risks, as discussed in Section 6, which presents a summary of the ***human health risk assessment*** (HHRA) for Area 3. Table 4-7 summarizes the data needs that will be addressed during the feasibility study discussed in Section 8. Groundwater monitoring will continue during the feasibility study, and the additional data collected will be evaluated to determine the impact of these 17 COPCs in groundwater underlying Area 3.

Table E-1 summarizes the detection frequency and concentration data for the 17 COPCs listed in Table 4-7.

4.3 Distribution of Key Contaminants of Potential Concern

This subsection presents the interpretation of the distribution patterns of the seven Key COPCs in groundwater underlying Area 3, including PCE; TCE; cis-1,2-DCE; 1,2,3-TCP; carbon tetrachloride; perchlorate; and nitrate. Section 4.4 discusses the potential sources of Key COPCs in Area 3. Section 5.2 evaluates the migration of Key COPCs in groundwater.

Contamination from Key COPCs in groundwater appears distributed in five geographic areas within Area 3, designated as southwestern (SW), northwestern (NW), central, southeastern (SE), and northeastern (NE). Figures 4-1 through 4-7 show the distribution of the seven Key COPCs based on concentrations detected at the historical maximums. Figures E-1 through E-6 in Appendix E show the distribution of Key COPCs in 2007. Table 4-8 summarizes the analytical data for Key COPCs collected from each well in Area 3. The figures depict the concentration ranges of Key COPCs in relation to the evaluation criteria (MCL or NL) using the following colored circles:

Figures 4-1 through 4-7 show the historical maximum detections of Key COPCs.

Figures E-1 through E-6 show the 2007 detections of Key COPCs.

Table 4-8 presents Key COPC data.

- Dark green circle – concentration exceeds the evaluation criterion by less than 10 times.
- Yellow circle – concentration exceeds the evaluation criterion by 10 to 20 times.
- Orange circle – concentration exceeds the evaluation criterion by 20 to 100 times.
- Red circle – concentration exceeds the evaluation criterion by more than 100 times.

4.3.1 Tetrachloroethene Distribution in Groundwater

Exhibit 4-3 summarizes data on the prevalence of PCE in groundwater in Area 3, including the maximum concentrations detected.

Exhibit 4-3 summarizes data on the prevalence of PCE in groundwater in Area 3.

EXHIBIT 4-3
Prevalence of PCE Detections in Groundwater Wells in Area 3

Production Wells	Number of Wells Affected	22 of 38 (58% of Wells Sampled)
	Number of Wells with COPC Concentration Exceeding MCL of 5 µg/L	6 of 38 (16% of Wells Sampled)
	Maximum Concentration	23 µg/L at Well 01901681 in Central Area 3
	Well with COPC Concentration Consistently above MCL	01901681
	Wells with COPC Concentration Intermittently above MCL	01900935, 01901679, 01901682, 01902786, 01903086
EPA Monitoring Wells	Number of Wells Affected	7 of 8 (88% of Wells Sampled)
	Maximum Concentration	22 µg/L at Well EPAMW15_05 in Central Area 3
	Wells with COPC Concentration Consistently above MCL	EPAMW11, EPAMW15_05
Facility Monitoring Wells	Number of Facilities Reporting Contamination	12 of 12 (100% of Wells Sampled)
	Maximum Concentration	950 µg/L at Well W11TCSW1 in NE Area 3

Notes:
COPC – contaminant of potential concern
MCL – maximum contaminant level
µg/L – micrograms per liter
PCE – tetrachloroethene

As shown in Figure 4-1, PCE occurs at concentrations that exceed 100 times the MCL in NE Area 3.

As depicted in Figure 4-1, yellow, orange, and red circles show the presence of PCE in groundwater in two locations, SW Area 3 and NE Area 3, at concentrations that exceed the MCL by 10 times. In SW Area 3, PCE appears to occur in several areas at elevated concentrations; whereas, in NE Area 3, PCE appears to occur in one general area. PCE also occurs in NW, central, and NE Area 3 at lower concentrations that exceed the MCL.

4.3.2 Trichloroethene Distribution in Groundwater

Exhibit 4-4 summarizes the data on the prevalence of TCE in groundwater in Area 3.

Exhibit 4-4 summarizes data on the prevalence of TCE in groundwater in Area 3, including the maximum concentrations detected.

As shown in Figure 4-2, TCE occurs at concentrations that exceed 100 times the MCL in SW Area 3.

As indicated by the red circles in Figure 4-2, TCE occurs at concentrations that exceed 100 times the MCL in SW Area 3. In NW, central, NE, and SE Area 3, TCE occurs at lower concentrations that also exceed the MCL.

Detections of TCE generally coincide with detections of PCE, but occur with more prevalence. Specifically, groundwater collected at 16 of 26 groundwater wells reveals the presence of both PCE and TCE with higher concentrations of TCE. Exceptions to this observation occur in NE Area 3, where all monitoring wells show concentrations of TCE lower than concentrations of PCE.

EXHIBIT 4-4
Prevalence of TCE Detections In Groundwater Wells In Area 3

Production Wells	Number of Wells Affected	24 of 38 (61% of Wells Sampled)
	Number of Wells with COPC Concentration Exceeding MCL of 5 µg/L	8 of 38 (21% of Wells Sampled)
	Maximum Concentration	27 µg/L at Well 01900012 in Central Area 3
	Wells with COPC Concentration Consistently above MCL	01900012, 01900013, 01900018, 01900934
	Wells with COPC Concentration Intermittently above MCL	01900010, 01900011, 019000926, 01900934
EPA Monitoring Wells	Number of Wells Affected	8 of 8 (100% of Wells Sampled)
	Maximum Concentration	320 µg/L at Well EPAMW11 in SW Area 3
	Wells with COPC Concentration Consistently above MCL	EPAMW11, EPAMW12A, EPAMW13_03, EPAMW14_03
Facility Monitoring Wells	Number of Facilities Reporting Contamination	10 of 12 (83% of Wells Sampled)
	Maximum Concentration	2,300 µg/L at Well W12ASMW2 in SW Area 3

Notes:
COPC – contaminant of potential concern
MCL – maximum contaminant level
µg/L – micrograms per liter
TCE – trichloroethene

4.3.3 cis-1,2-Dichloroethene Distribution in Groundwater

Exhibit 4-5 summarizes the data on the prevalence of cis-1,2-DCE in groundwater in Area 3.

Exhibit 4-5 summarizes the prevalence of cis-1,2-DCE in groundwater in Area 3, including the maximum concentrations detected.

As shown in Figure 4-3, cis-1,2-DCE occurs at concentrations in central Area 3 that slightly exceed the MCL.

Most cis-1,2-DCE detections in groundwater occur at concentrations below the MCL of 6 µg/L. Figure 4-3 illustrates that concentrations of cis-1,2-DCE in central Area 3 slightly exceed the MCL, as indicated by the dark green circles. Wells with detections of TCE generally also show the presence of cis-1,2-DCE.

Technical Appendix 5 and Section 5.1 discuss the process of biotransformation.

As discussed in Section 5.1 and Technical Appendix 5, the process of ***biotransformation*** can generate cis-1,2-DCE as a ***degradation product*** of TCE. However, the cis-1,2-DCE detected at Monitoring Well W12PMMW1 in SW Area 3 may be from a discrete source. Additional data are needed to evaluate whether biotransformation is occurring in Area 3.

EXHIBIT 4-5
Prevalence of cis-1,2-DCE Detections in Groundwater Wells in Area 3

Production Wells	Number of Wells Affected	5 of 38 (13% of Wells Sampled)
	Number of Wells with COPC Concentration Exceeding MCL of 6 µg/L	2 of 38 (5% of Wells Sampled)
	Maximum Concentration	6.8 µg/L at Well 01900012 in Central Area 3
	Well with COPC Concentration Consistently above MCL	None
	Wells with COPC Concentration Intermittently above MCL	01900012, 01900013
EPA Monitoring Wells	Number of Wells Affected	5 of 8 (63% of Wells Sampled)
	Maximum Concentration	14 µg/L at Well EPAMW12A in Central Area 3
	Wells with COPC Concentration Consistently above MCL	EPAMW12A, EPAMW14_03
Facility Monitoring Wells	Number of Facilities Reporting Contamination	9 of 12 (75% of Wells Sampled)
	Maximum Concentration	99 µg/L at well W12PMMW1 in SW Area 3

Notes:
cis-1,2-DCE – cis-1,2-dichloroethene
COPC – contaminant of potential concern
MCL – maximum contaminant level
µg/L – micrograms per liter

4.3.4 1,2,3-Trichloropropane Distribution in Groundwater

Exhibit 4-6 summarizes the data on the prevalence of 1,2,3-TCP in groundwater in Area 3.

Exhibit 4-6 summarizes data on the prevalence of 1,2,3-TCP in groundwater in Area 3, including the maximum concentrations detected.

EXHIBIT 4-6
Prevalence of 1,2,3-TCP Detections in Groundwater Wells in Area 3

Production Wells	Number of Wells Affected	7 of 38 (18% of Wells Sampled)
	Number of Wells with COPC Concentration Exceeding NL of 0.005 µg/L	7 of 38 (18% of Wells Sampled)
	Maximum Concentration	0.120 µg/Lat Well 01900010 in Central Area 3
	Well with COPC Concentration Consistently above NL	None
	Wells with COPC Concentration Intermittently above NL	01900010, 01900935, 01903014, 01903086, 08000067, 08000133
EPA Monitoring Wells	Number of Wells Affected	4 of 8 (50% or Wells Sampled)
	Maximum Concentration	0.413 µg/L at Well EPAMW15_06 in Central Area 3
	Wells with COPC Concentration Consistently above NL	EPAMW15 in Zones 1, 2, 5, 6
Facility Monitoring Wells	Number of Facilities Reporting Contamination	3 of 12 (25% of Wells Sampled)
	Maximum Concentration	0.032 µg/L at Well W12CPMW1 in SW Area 3

Notes:
COPC – contaminant of potential concern
µg/L – micrograms per liter
NL – notification level
1,2,3-TCP – 1,2,3-trichloropropane

The evaluation of 1,2,3-TCP presented here is based on limited, recent data. As shown in Table 4-8, the 1,2,3-TCP data comprise results for only a few detections at six production wells and seven groundwater monitoring wells. Section C.4.1.2 in Appendix C addresses the usability of the secondary data for 1,2,3-TCP. Figure 4-4 shows the distribution of 1,2,3-TCP in Area 3.

Table 4-8 summarizes the 1,2,3-TCP data for all groundwater wells in Area 3.

Figure 4-4 illustrates the distribution of 1,2,3-TCP in Area 3.

4.3.5 Carbon Tetrachloride Distribution in Groundwater

Exhibit 4-7 summarizes data on the prevalence of carbon tetrachloride in groundwater in Area 3, including the maximum concentrations detected.

Exhibit 4-7 summarizes the data on the prevalence of carbon tetrachloride in groundwater in Area 3.

EXHIBIT 4-7
Prevalence of Carbon Tetrachloride Detections in Groundwater Wells in Area 3

Production Wells	Number of Wells Affected	5 of 38 (13% of Wells Sampled)
	Number of Wells with COPC Concentration Exceeding MCL of 0.5 µg/L	2 of 38 (5% of Wells Sampled)
	Maximum Concentration	1 µg/L at Well 01901679 in NW Area 3
	Well with COPC Concentration Consistently above MCL	None
	Wells with COPC Concentration Intermittently above MCL	01901679, 01903097
EPA Monitoring Wells	Number of Wells Affected	3 of 8 (38% of Wells Sampled)
	Maximum Concentration	1.4 µg/L at Well EPAMW11 in SW Area 3
Facility Monitoring Wells	Number of Facilities Reporting Contamination	4 of 12 (33 % of Wells Sampled)
	Maximum Concentration	3.2 µg/L at Well W12ASMW2 in SW Area 3

Notes:
COPC – contaminant of potential concern
MCL – maximum contaminant level
µg/L – micrograms per liter

Figure 4-5 illustrates that the maximum concentrations of carbon tetrachloride occur in SW Area 3. Other carbon tetrachloride detections at concentrations slightly above the MCL occur in NW and central Area 3. Detections of carbon tetrachloride in groundwater generally occur at locations with elevated concentrations of TCE; the reason for this occurrence is unknown.

Figure 4-5 illustrates the maximum concentrations of carbon tetrachloride occur in SW Area 3.

4.3.6 Perchlorate Distribution in Groundwater

Exhibit 4-8 summarizes data on the prevalence of perchlorate in groundwater in Area 3, including the maximum concentrations detected.

Exhibit 4-8 summarizes the data on the prevalence of perchlorate in groundwater in Area 3.

Perchlorate detections at concentrations slightly above the MCL occur in NW and central Area 3. Figure 4-6 shows the distribution of perchlorate in Area 3.

Figure 4-6 shows the distribution of perchlorate in Area 3.

EXHIBIT 4-8
Prevalence of Perchlorate Detections in Groundwater Wells in Area 3

Production Wells	Number of Wells Affected	7 of 33 (21% of Wells Sampled)
	Number of Wells with COPC Concentration Exceeding MCL of 6 µg/L	1 of 33 (3% of Wells Sampled)
	Maximum Concentration	6.8 µg/L at Well 01901679 in NW Area 3
	Well with COPC Concentration Consistently above MCL	01901679
	Wells with COPC Concentration Intermittently above MCL	None
EPA Monitoring Wells	Number of Wells Affected	7 of 8 (88% of Wells Sampled)
	Maximum Concentration	7.1 µg/L at Well EPAMW15_02 in Central Area 3
Facility Monitoring Wells	Number of Wells Affected	7 of 8 (88% of Wells Sampled)
	Maximum Concentration	3.1 µg/L at Well W12RDFW1 in SW Area 3

Notes:
COPC – contaminant of potential concern
MCL – maximum contaminant level
µg/L – micrograms per liter

4.3.7 Nitrate Distribution in Groundwater

Exhibit 4-9 summarizes the data on the prevalence of nitrate in groundwater in Area 3.

Table 4-8 summarizes the nitrate data for all groundwater wells in Area 3.

Exhibit 4-9 summarizes information on the distribution of nitrate in groundwater in Area 3. Table 4-8 summarizes the nitrate data for all groundwater wells in Area 3.

EXHIBIT 4-9
Prevalence of Nitrate Detections in Groundwater Wells in Area 3

Production Wells	Number of Wells Affected	37 of 37 (100% of Wells Sampled)
	Number of Wells with COPC Concentration Exceeding MCL of 45 mg/L as NO_3^-	10 of 37 (27% of Wells Sampled)
	Maximum Concentration	648 mg/L as NO_3^- at Well 01900018 in Central Area 3
	Well with COPC Concentration Consistently above MCL	01900018, 01900547, 01901681
	Wells with COPC Concentration Intermittently above MCL	01900011, 01900012, 01900017, 01903097, 01901679, 01901669, 01900935
EPA Monitoring Wells	Number of Wells Affected	7 of 8 (88% of Wells Sampled)
	Maximum Concentration	19 mg/L as N at Well EPAMW15_06 in Central Area 3
Facility Monitoring Wells	Number of Wells Affected	Only Analyzed at Facility 19
	Maximum Concentration	18.5 mg/L as N at Wells W11TCSW2 and W11TCSW12 in NE Area 3

Notes:
COPC – contaminant of potential concern
MCL – maximum contaminant level
mg/L – milligrams per liter
N – nitrogen
NO_3^- – nitrate

Figure 4-7 illustrates the distribution of nitrate in Area 3.

Figure 4-7 shows the distribution of nitrate in groundwater in Area 3 based on the maximum detected concentrations. Groundwater from all wells tested for nitrate in Area 3 shows similar concentrations of nitrate.

As nitrate contamination affects approximately one-third of the San Gabriel Valley Groundwater ***Basin*** (San Gabriel Basin) (Main San Gabriel Basin Watermaster [Watermaster], 1995), the scope of the concern with nitrate in groundwater extends beyond Area 3. Because the focus of the RI is to evaluate COPCs in groundwater released by discrete sources of contamination within Area 3, the discussions of contaminant sources and contamination migration in Sections 4.4 and 5.2 place no further emphasis on nitrate contamination.

Although nitrate contamination has been extensively released through ***non-point sources*** in the San Gabriel Basin, the HHRA conducted for Area 3, as presented in Appendix D and summarized in Section 6, shows that nitrate contamination does contribute to the potential noncancer risks in Area 3. Therefore, the feasibility study for Area 3 will evaluate provisions to address nitrate contamination.

4.4 Potential Sources of Contamination

The following discussion summarizes the evaluation of potential sources of regional groundwater contamination in Area 3. EPA and the State of California continue to actively pursue and investigate potential sources of groundwater contamination in Area 3.

The contamination migration conceptual site model described in Section 5.3 considers the potential migration pathways in groundwater of contamination released from sources in Area 3.

In conducting the RI, EPA focuses on identifying point sources and non-point sources of contamination. Point sources include specific sites where releases of contamination to the subsurface occur, such as facilities that manufacture, handle, or store chemicals. Releases of contamination from non-point sources originate from multiple areas or locations, such as potential widespread surface application of COPCs within Area 3, and potential inflow of contaminated groundwater from outside Area 3.

Table 4-9 summarizes information on potential point sources that warranted priority consideration.

Table 4-9 summarizes information on a subset of potential point sources that have warranted priority consideration. Table B-4 in Appendix B presents the complete master list of all facilities identified for consideration and possible investigation as possible sources of contamination.

Appendix B contains the complete master list of all facilities identified for consideration and possible investigation.

4.4.1 Point Sources of Contamination

The investigation of contaminant point sources focuses on industrial and commercial facilities currently and historically in operation in and around Area 3. Facilities that manufacture, handle, or store chemicals (including dry cleaning solutions, solvents, and fuels) comprise the most likely point sources of contamination. Other potential point sources considered include formerly active landfills, fuel handling sites, redevelopment sites, and the former Alhambra airport. Figure 4-8 illustrates the locations of potential contamination sources.

Figure 4-8 shows the locations identified as potential contaminant sources and shows the closed sites.

4.4.1.1 Status of State Process to Investigate Point Sources

The State of California generally has led facility investigations in Area 3 following the approach described in Section 2.6.2. The California Regional Water Quality Control Board, Los Angeles Region (LARWQCB) provides nearly all regulatory oversight for the State of California.

Figure 4-9 shows the tracking number assigned to locations with environmental data as of December 2007 included in the RI report.

The status of each facility investigation falls into one of the following two categories described below.

- **Open Facility Investigation –** Facility has collected data to characterize subsurface contamination or potential contamination, and may require further investigation as indicated by a purple square in Figure 4-8. Figure 4-9 shows the tracking number assigned by EPA to a subset of the open investigations with environmental data included in the RI report.
- **Closed Facility Investigation –** The State of California has concluded the investigation of soil contamination at the facility, as indicated by a green square in Figure 4-8. The potential for further investigation of groundwater contamination remains open.

4.4.1.2 Outcome of Point Source Investigations

Manufacturing and chemical storage facilities comprise the main investigation target due to the use of chemicals in production and processing activities. Most Key COPCs observed in Area 3 are chemical solvents, including PCE, TCE, cis-1,2-DCE, 1,2,3-TCP, and carbon tetrachloride.

Table 4-9 summarizes information on the investigations at 33 facilities in Area 3.

As shown in Table 4-9, 33 existing and former manufacturing and chemical storage facilities in Area 3 have performed site investigation, remediation, or both. Subsurface investigations at the facilities listed in Table 4-9 have involved soil vapor surveys, evaluating the vapor intrusion pathway, soil testing, groundwater monitoring, or a combination of activities. Thirty-one facilities have detected chlorinated VOCs in soil vapor, soil, or groundwater.

Of the 31 facilities with VOC detections, 12 facilities have installed monitoring wells and initiated groundwater sampling programs. All 12 facilities have reported concentrations of chlorinated VOCs in groundwater that exceed the MCLs, as indicated in Figure 4-9 by the facility tracking numbers in bold text. Most facilities undergoing active investigation are located in SW Area 3.

4.4.2 Non-point Sources of Contamination

The following discussion summarizes data on three non-point sources with the potential for inflow of contaminated groundwater into Area 3: (1) the northern boundary of Area 3 across from the Raymond Basin, (2) the southern and southeastern boundaries of Area 3 across from adjacent San Gabriel Basin ***operable units*** (OUs), and (3) imported water for groundwater recharge.

4.4.2.1 Raymond Basin as a Potential Non-point Source of Contamination

The Raymond Basin is located north of Area 3; the Raymond ***Fault*** forms a geologic separation between the Raymond Basin and the San Gabriel Basin. Figure 4-10 shows the geographic relationship between the Raymond Basin and Area 3, and the location where groundwater flows from the Raymond Basin across the Raymond Fault along the NE boundary of Area 3.

Figure 4-10 shows the geographic relationship between the Raymond Basin and Area 3.

Because groundwater flow across the Raymond Fault is primarily restricted to the NE portion of Area 3, the likelihood is low that the Raymond Basin is a non-point source of contamination. Section 5.2.4.2 presents detailed analyses of the potential migration of Key COPCs from the Raymond Basin to NE Area 3.

Although groundwater flow across the Raymond Fault remains poorly characterized, groundwater contamination appears to be a limited concern. The Area 3 Key COPCs present in the Raymond Basin generally occur at concentrations lower than the MCL. Figure 4-1 shows detections of PCE in groundwater at concentrations slightly above the MCL at one of three production wells in the southern portion of the Raymond Basin. Figures 4-2 and 4-7 show detections of TCE and perchlorate in groundwater at concentrations below the MCL at production wells north of the Raymond Fault.

Figure 4-1 shows detections of PCE in production wells in the southern portion of the Raymond Basin.

Figures 4-2 and 4-7 show detections of TCE and perchlorate in production wells in the southern portion of the Raymond Basin, respectively.

4.4.2.2 San Gabriel Basin Operable Units as Potential Non-point Sources of Contamination

The South El Monte OU consists of approximately 8 square miles of contaminated groundwater underlying portions of the cities of South El Monte, El Monte, and Rosemead. Primary contaminants in groundwater include TCE and PCE, with secondary contaminants 1,4-dioxane and perchlorate. EPA and local water utilities are negotiating an agreement with ***potentially responsible parties*** (PRPs) to implement the selected remedy to address contamination in groundwater (EPA, 2000; EPA, 2005b).

The El Monte OU covers approximately 10 square miles, including an area of roughly 2 square miles of contaminated groundwater underlying portions of the cities of El Monte, Rosemead, and Temple City. Primary groundwater contaminants include TCE and PCE, with n-nitrosodimethylamine (NDMA) and hexavalent chromium as secondary contaminants. EPA has negotiated an agreement with PRPs to install and operate facilities to contain and treat contaminated groundwater (EPA, 1999; EPA, 2002b; U.S. District Court, 2004).

Although possible migration of the Area 3 Key COPCs from the South El Monte and El Monte OUs exists, a complete assessment of adverse affects on groundwater in SE Area 3 will require additional data. Figures 4-1 through 4-7 present the concentrations of Key COPCs detected in groundwater in Area 3 and in the South El Monte and El Monte OUs. In general, PCE and TCE occur at concentrations above the MCLs at groundwater wells located near the Area 3 boundary. Sections 5.2.4.2 and 5.2.5.3 discuss in more detail the migration of Key COPCs in NE and SE Area 3.

Figures 4-1 through 4-7 show the historical maximum detections of Key COPCs in Area 3 and in the South El Monte and El Monte OUs.

4.4.2.3 Imported Water as a Potential Non-point Source of Contamination

Imported water used for groundwater recharge in the San Gabriel Basin consists of treated and untreated water (Watermaster, 2006). Watermaster coordinates the well sampling program on behalf of the water purveyors in the San Gabriel Basin. Water samples are collected from potable supply wells and analyzed for compliance with CCR Title 22. As discussed in Section 4.2.2, water purveyors implement safeguards to ensure that all tap water meets drinking water standards through blending, well shutdowns, and wellhead treatment.

Imported water presents a limited concern as a potential non-point source of contamination in Area 3. Groundwater monitoring will continue during the feasibility study, and the collected data will be evaluated to determine the impact of imported water to the contamination in Area 3.

4.5 Summary of Findings

The main sources of contamination in groundwater underlying Area 3 appear to include manufacturing and chemical storage facilities located primarily in SW Area 3, and dry cleaning facilities located throughout Area 3. Most facilities investigated have detected chlorinated VOCs in the subsurface. Twelve facilities have reported chlorinated VOCs in groundwater at concentrations that exceed evaluation criteria.

Evaluation of primary and secondary environmental data revealed the presence of the following seven Key COPCs in groundwater underlying Area 3:

- PCE
- TCE
- cis-1,2-DCE
- carbon tetrachloride
- 1,2,3-TCP
- perchlorate
- nitrate

These seven Key COPCs include contaminants detected multiple times at production wells in Area 3 at concentrations that exceeded the evaluation criteria. The RI uses the Key COPCs to identify regional groundwater contamination in Area 3.

Table 8-1 summarizes the assessment of the next steps for Area 3.

Section 5 describes the interpretation of the relationship between potential contaminant sources identified in this section and the hydrogeological conceptual site model presented in Section 3. Section 8 presents the next steps for Area 3. Contaminant source activities will continue during the feasibility study as presented in Table 8-1. Groundwater monitoring will continue during the feasibility study, and the collected data will be evaluated to determine the impact of point and non-point sources to the contamination in Area 3.

Glossary

Glossary

anion: A negatively charged particle.

basin: A large geologic depression in the bedrock that is filled with unconsolidated sediments.

biotransformation: Chemical alteration of a substance within the body, as by the action of enzymes.

chlorinated volatile organic compound: Any volatile organic compound that contains a chlorine atom. Solvents commonly used in cleaning and degreasing applications often contain chlorinated volatile organic compounds.

conceptual site model: A planning tool that provides the framework from which the study design is structured. It is frequently created as a site map that organizes information that already is known about a site.

contaminant: A substance not naturally present in the environment or present in unnatural concentrations that can, in sufficient concentration, adversely alter an environment.

contaminants of potential concern: Contaminants that potentially pose a risk to human health or the environment.

contamination: The presence of hazardous substances in the environment.

data quality objectives: Performance and acceptance criteria that clarify study objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions.

degradation products: Chemical compounds that are formed by natural degradation or decay of some other chemical compound.

environmental data: Any measurements or information that describe environmental processes, location, or conditions; ecological or health effects and consequences; or the performance of environmental technology.

evaluation criterion: A standard or reference point on which a decision will be assessed.

fault: A fracture in the continuity of a rock formation, caused by a shifting or dislodging of the earth's crust, in which adjacent surfaces are displaced relative to one another and parallel to the plane of fracture.

feasibility study: The mechanism for the development, screening, and detailed evaluation of alternative remedial actions.

groundwater: Water occurring underground, in the zone of saturation in an aquifer.

groundwater monitoring well: A type of well specially designed and installed to sample groundwater at specific locations and depths to evaluate groundwater flow and contamination.

human health risk assessment: Qualitative and quantitative evaluation of the risk posed to human health by the actual or potential presence of specific contaminants.

Key contaminants of potential concern: The contaminants detected multiple times in groundwater at production wells within Area 3 at concentrations that exceed evaluation criteria.

maximum contaminant level: The maximum permissible level of a contaminant in water that is delivered to any user of a public water system.

non-point sources: Sources of contamination that originate from multiple areas or locations rather than from a discrete site.

notification level: Health-based advisory levels (formerly referred to as Action Levels) established by the California Department of Public Health for certain chemicals for which no established drinking water standards exist.

operable unit: A subunit of a Superfund site, defined based on a geographical area or on another parameter, where a number of separate activities are undertaken as part of site cleanup.

potentially responsible parties: Entities that are potentially responsible for generating, transporting, or disposing of the hazardous waste found at a site.

primary data: Data generated or collected by the investigator during an investigative process.

Record of Decision: A document that details the decision, states the reasons for the decision, identifies all alternatives, and states compliance with applicable laws.

remedial investigation: Actions undertaken to characterize the full nature and extent of contamination, including characterization of hazardous substances, identification of contaminant sources, and assessment of human health and ecological risk.

secondary data: Data collected or generated by a party other than the investigator during the investigative process.

soil vapor: Elements and compounds in a gaseous state in the small spaces between particles of soil. Such gases can be moved or driven out under pressure.

Superfund: The program operated under the legislative authority of CERCLA and SARA that funds and carries out EPA solid waste emergency and long-term response actions, including conducting or supervising cleanup actions.

tetrachloroethene: A volatile organic compound primarily used for dry cleaning clothing and in manufacturing processes as a solvent and metal degreaser.

trichloroethene: A volatile organic compound that is a colorless or blue organic liquid with a chloroform-like odor. TCE is primarily used in manufacturing processes as a solvent, metal degreaser, and textile degreaser.

volatile organic compound: An organic (carbon-containing) compound that evaporates readily at room temperature.

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Tables

Figures