CHAPTER 9
WATER QUALITY IMPACTS ON RELIABILITY

9.1 OVERVIEW

Planning efforts of IEUA and the Chino Basin Watermaster emphasize the importance of water quality. The region enjoys generally good water quality, but isolated areas of poor quality require that certain water sources be blended, or be treated to meet drinking water standards.

The percentage of urban water use by source within the IEUA service area during 2005 is shown in Table 9-1. About 32 percent of the urban water use in 2005 was MWD water, while 45 percent of the urban water use was from Chino Basin (including desalter water). IEUA distributes MWD water to the Cucamonga Valley Water District (CVWD) and the Water Facilities Authority (WFA) in our service area. The WFA serves five retail water agencies: the Cities of Chino, Chino Hills, Ontario, Upland and the Monte Vista Water District (MVWD). In 2005, about 92,400 acre-feet of Chino Basin groundwater was used for urban water supply, while an estimated additional 31,800 acre-feet of groundwater was used for agricultural irrigation. In order to reduce reliance on imported MWD water, significant increases in the use of ground, recycled and desalter water will be needed. The expansion of use of local supplies is expected to have a positive effect on water quality and an increased focus on water quality monitoring of local supplies. Water quality of existing and future water supply sources are discussed below.

Table 9-1
Current Percentage of Urban Water Supplies within the IEUA Service Area

Water Source	Percent
Chino Basin Groundwater	43
Imported MWD water	32
Other basin groundwater	13
Surface Water	8
Desalter Water	2
Recycled Water	2

By year 2025, approximately half (50%) of the urban water supply is projected to be from Chino Basin groundwater wells. Thus, the discussion of water quality impacts on reliability presented in this chapter focuses primarily on water quality in the Chino Basin, although the water quality issues of the other water sources is also evaluated for impacts to reliability.

9.2 WATER QUALITY OF LOCAL SUPPLIES

Local water supplies include surface water from nearby mountain streams, recycled water from IEUA treatment plants, recovered groundwater from the Chino Basin Desalters, and groundwater extracted from the Chino Basin and other groundwater basins in the area.

Surface Water
Surface water from local sources that originate in the San Antonio Canyon, Cucamonga Canyon, Day Creek, Deer Creek, Lytle Creek and several other smaller surface streams is generally of high quality, as these creeks are feed by snowmelt and other precipitation in the San Gabriel Mountains. Nevertheless, surface water sources are treated prior to introduction to the potable water supply in order to insure bacteriological quality and compliance with state and federal drinking water quality standards.

Recycled Water
Recycled water holds the greatest potential as a new source of supply in the Chino Basin and in the southern California region as a whole; it also requires the highest level of treatment to meet Title 22[1] water recycling requirements. By the year 2025, direct recycled water use is projected at 69,000 AFY (24 percent of the IEUA water urban water supply) and another 35,000 AFY of recycled water will be used for groundwater replenishment.

All of IEUA water recycling treatment plants produce recycled water suitable for full body contact recreation and generally meet the more stringent aquatic habitat criteria. Due to salinity management (brine line) and the exclusive use of the SWP supply for imported water, TDS concentrations in recycled water remain relatively low for recycled water (typically 500 mg/l). Since recycled water is regulated and monitored carefully, water quality is expected to remain high.

Treated Groundwater
Treated groundwater from the Chino Desalters 1 and 2 is very high quality as a result of treatment by reverse osmosis (RO), ion exchange (IX) and air stripping. Raw groundwater from the Chino Basin is treated by the desalters, as it has high TDS and nitrates. TDS and nitrates are removed by the RO process and nitrate is removed by the IX process. Some of the groundwater wells for Desalter 1 have been impacted by a VOC plume located near the Chino Airport. In the future, other identified plumes (CIM plume and an Ontario Airport Plume) could impact desalter wells. VOCs are removed by an air stripping facility at Desalter 1. Areas within the Chino Basin with water quality concerns are discussed in Section 9.3.

Other Groundwater Basins
Limited information is available on water quality from the groundwater basins surrounding Chino Basin. Most of the surrounding groundwater basins have elevated concentrations of nitrate. Use of these local groundwater supplies by retail water agencies for potable water supply suggests that there are no significant water quality issues, or issues are solved by blending or well head treatment.

[1]The State Department of Health Services requirements as specified in Title 17 and Title 22 of the California Health

Imported Water
MWD supplies about half the water used in southern California. Its' two main source of water are: 1) water from northern California as part of the State Water Project (SWP) delivered via the California Aqueduct, and 2) water from the Colorado River via the Colorado River Aqueduct (CRA). The total dissolved solids in Colorado River water average about 650 mg/l during normal water years. Water supplies from the SWP have significantly lower TDS levels than the Colorado River, averaging 320 mg/l during the past 20 years. IEUA only imports MWD water from the SWP in order to meet TDS objectives in Chino Basin. Other major water quality concerns include the following:

- Perchlorate in Colorado River and local groundwater supplies
- Disinfection by-products
- MTBE in groundwater and local surface reservoirs
- NDMA in groundwater and treated surface waters
- Hexavalent chromium in groundwater
- Radon and gross alpha

9.3 CHINO BASIN GROUNDWATER QUALITY[2]

For the most part, the groundwater quality in the northern and central portions of the Chino Basin is good and in most areas meets the California Department of Health Services' Safe Drinking Water Standards. The quality of groundwater in the southern portion of the basin becomes increasingly poor, with high total dissolved solids (TDS) and nitrate concentrations resulting from past and continuing agricultural uses overlying the southern half of the basin. In addition, new contaminants such as perchlorate have been discovered in the region and other contaminants such as TCE, PCE, DBCP and Chromium have been detected in groundwater extracted from Chino Basin.

The Santa Ana Regional Water Quality Control Board (SARWQCB) with the Chino Basin Watermaster, SAWPA and IEUA staff have developed water quality standards and management programs that will lead to the long-term clean up and management of the water quality issues in the Chino Basin. Treatment processes including desalination and the removal of brine are essential parts of the overall strategy to ensure maximum use of groundwater supplies.

Chino Basin groundwater is not only a crucial resource to overlying producers of water; it is a critical resource to the entire Santa Ana River Watershed. From a regulatory perspective, the use of Chino Basin groundwater to serve potable demands will be governed by drinking water standards, groundwater basin water quality objectives, and

[2] Chino Basin Optimum Basin Management Program, State of the Basin Report – 2004, July 2005

Santa Ana River water quality objectives. In August 1999, Phase I of the OBMP established a program for conducting groundwater quality and water level monitoring for the Chino Basin[3] to assess the state of the basin.

Figure 9-1[2] shows all wells that have groundwater quality monitoring results for the period ranging from 1999 to 2004. The locations of existing and new desalter supply wells are also shown in Figure 9-1 for geographic reference.

Numerous water quality standards are in place and governed by Federal and State agencies. Primary “maximum contaminant levels” (MCL) are enforceable criteria established to improve human health and environmental effects. Secondary standards are related to aesthetic qualities of the water such as taste and odor. In addition, for some chemicals there are “notification level” criteria set by the state. These notification levels have been established to meet health concerns but are not enforceable. Table 3-2 (presented in Chapter 3) lists the constituents that exceeded at least one water quality criteria for more than 10 wells in the Chino Basin groundwater for the period January 1999 through June 2004. The main water quality issues for Chino Basin are: total dissolved solids, nitrates, perchlorate, radon and gross alpha radiation, chlorinated volatile organic compounds, and some elemental inorganic constituents.

Total Dissolved Solids
In Title 22, TDS is regulated as a secondary contaminant. The recommended drinking water maximum contaminant level (MCL) for TDS is 500 mg/l; however, the upper limit is 1,000 mg/l.

TDS concentrations in the northeast part of Chino Basin range from about 170 to about 300 mg/l for the pre-1980 period ranging with typical concentrations in the mid to low 200s[4]. TDS concentrations in excess of 200 mg/l would indicate degradation from overlying land use.

Figure 9-2 shows the distribution of TDS concentrations in Chino Basin for water well sampling from 1999 to 2004. Most of the basin has TDS concentrations in the range of 150 to 300 mg/l. Nevertheless, the southwest portion of the basin has elevated dissolved solids over 500 mg/l. With a few exceptions, areas with either significant irrigated land use or dairy waste disposal histories overlie groundwater with elevated TDS concentrations. The exceptions are areas where point sources have contributed to TDS degradation; for instance, the former Kaiser Steel site in Fontana and the former wastewater disposal ponds near the IEUA Regional Plant No. 1 (RP-1) in South Ontario.

Wastewater generally has higher dissolved solids that potable water (although Colorado River water has higher salinity than the IEUA water recycling supplies). Typically, each cycle of urban water use adds 250 to 400 mg/l of TDS to wastewater. Where

[3] Wildermuth Environmental, Inc. 1999. Optimum Basin Management Program; Phase I Report. Prepared for the Chino Basin Watermaster, August 19, 1999.
[4] Chino Basin Optimum Basin Management Program, State of the Basin Report - 2004

wastewater flows have high salinity levels, the use of recycled water may be limited or require more expensive treatment. Landscape irrigation and industrial reuse become problematic at TDS levels of over 1,000 mg/l.

The Chino Desalters were built in part to assist in water quality remediation of the salinity and nitrate contamination in the lower portion of the Chino Basin and protect the downstream water quality of the Santa Ana River.

Nitrate-Nitrogen

In Title 22, nitrate is regulated in drinking water with an MCL of 10 mg/L (as nitrogen). By convention, all nitrate values are reported in this document as nitrate-nitrogen (NO_3-N). Hence, the values of nitrate-nitrogen reported in this document should be compared with an MCL of 10 mg/l. Nitrate measurements in the surface water flows of the San Gabriel Mountains and in the groundwater near the foot of these mountains are generally less than 0.5 mg/l (Montgomery Watson, 1993). Nitrate concentrations in excess of 0.5 mg/L may indicate degradation from overlying land use.

Figure 9-3 shows the distribution of nitrate-nitrogen concentrations in Chino Basin for the period 1999 through 2004.

This sampling period primarily reflects data in the southern portion of Chino Basin. The results of comprehensive monitoring indicated that about eighty-three percent of the private wells had nitrate concentrations greater than the MCL and 60 percent are more than 2.5 times greater than the MCL. As with TDS, each consecutive sampling program saw a shift toward higher nitrate concentrations.

Most of the nitrate concentrations in the northern portions (north of the 60 freeway) of Chino North MZ are generally less than 5 mg/l. However, the Pomona-Claremont area (up to 15 mg/l), the eastern Fontana area (up to 10 mg/l), and the Cucamonga Basin (up to 25 mg/l), all have elevated nitrate concentrations. The following areas, south of the 60 Freeway, have somewhat elevated nitrate concentrations; east of the Puente and Chino Hills, south of the Jurupa Hills, along the Santa Ana River, the Temescal and Riverside Basins, and down gradient of the former RP-1 discharge point. Several wells in the southern portion of Chino Basin have nitrate concentrations greater than the MCL and 21 wells exceed 40 mg/l (4 times the MCL).

Areas with either significant irrigated land use or dairy waste disposal histories overlie groundwater with elevated nitrate concentrations. The primary areas of nitrate degradation are the areas formerly or currently overlain by:

- Citrus in the northern parts of the Chino-North Management Zone (MZ) and,
- Dairy areas in the southern parts of the Chino-North MZ, the Chino-South MZ, the Chino-East MZ, and the Prado Basin MZ (PBMZ).

Nitrate concentrations in groundwater have increased slightly or remained relatively constant in the northern parts of the Chino-North MZ over the period ranging from 1960 to the present. These are areas formerly occupied by citrus groves and vineyards. Nitrate concentrations underlying these areas rarely exceed 20 mg/l (as nitrogen). Over the same period, nitrate concentrations have increased significantly in the southern parts of the Chino-North MZ, the Chino-South MZ, the Chino-East MZ, and the Prado Basin BMZ. These are areas where land use was progressively converted from irrigated/non-irrigated agricultural land to dairies, and nitrate concentrations typically exceed the 10 mg/l MCL and frequently exceed 20 mg/l.

Recycled water generally has a nitrate concentration in excess of 10 mg/l. Direct use of recycled water is for non-potable water uses, primarily irrigation and industrial use. A mixture of stormwater, imported and recycled water will be used to recharge Chino basin. By blending recycled water with stormwater and imported water, nitrate concentrations will be reduced.

Perchlorate

Perchlorate has been detected in wells in the Chino Basin, in other basins in California, and in other states in the West. The probable reason that perchlorate was not detected in groundwater until recently is that analytical methodologies did not previously exist that could attain a low enough detection limit. Prior to 1996, the method detection limit for perchlorate was 400 µg/l. By March 1997, an ion chromatographic method was developed with a detection limit of 1 µg/l and a reporting limit of 4 µg/l (parts per billion).

Perchlorate (ClO_4) originates as a contaminant in the environment from the solid salts of ammonium perchlorate (NH_4ClO_4), potassium perchlorate ($KClO_4$), or sodium perchlorate ($NaClO_4$). Perchlorate salts can be highly reactive. Ammonium perchlorate is used as a main component in solid rocket propellant and in some types of munitions and fireworks. Perchlorate salts are quite soluble in water. The perchlorate anion (ClO_4) is exceedingly mobile in soil and groundwater environments. Because of its resistance to react with other available constituents, it can persist for many decades under typical groundwater and surface water conditions.

The primary human health concern related to perchlorate is its interference with the thyroid glands ability to produce hormones required for normal growth and development. The California Department of Health Services (CDHS) had adopted a notification level of 6 µg/l for perchlorate and is in the process of developing a drinking water regulation. USEPA is also developing a drinking water standard for perchlorate.

Perchlorate was detected in 152 wells in the Chino Basin between January 1999 and June 2004. The results of perchlorate analysis of groundwater samples from the Chino Basin are shown in Figure 9-4. Perchlorate concentrations exceeding the State Action Level have occurred in the following areas of Chino Basin.

- There is a significant perchlorate plume in the Rialto-Colton Basin. The source of the plume is being investigated by the RWQCB and it appears to be located near the Mid-Valley Sanitary Landfill. According to the RWQCB, other companies including B.F. Goodrich, Kwikset Locks, American Promotional Events Inc., and Denova Environmental Inc. operated nearby and used or produced perchlorate. These companies were located on a 160-acre parcel at T1IN R5W S21 SW1/4. Denova Environmental also operated a 10-acre lot at T1N R5W S20 S1/2 (along the boundary between Sections 20 and 29). The perchlorate in the Fontana area of the Chino Basin may be a result of (1) the Rialto-Colton perchlorate plume migrating across the Rialto-Colton fault; (2) other point sources in Chino Basin; and (3) non-point application of Chilean nitrate fertilizer in citrus groves.

- Down gradient of the Stringfellow Superfund Site. Concentrations have exceeded 600,000 µg/l in on-site observation wells and the plume has likely reached Pedley Hills and may extend as far as Limonite Avenue.

- City of Pomona well field (source unknown).

- Wells in the City of Ontario water service area, south of the Ontario Airport (source(s) unknown).

- Scattered wells in the Monte Vista water service area (source(s) unknown).

- Scattered wells in the City of Chino water service area (source(s) unknown).

Several types of treatment systems designed to reduce perchlorate concentrations are operating in the United States, reducing perchlorate to below the 4 ppb, the quantitation level. Biological treatment and ion (anion) exchange systems are among the technologies that are being used, with additional treatment technologies development.[5]

Radon and Gross Alpha

Radon is a radioactive gas found in nature. It has no color, odor, or taste and is chemically inert. Higher concentrations of radon and gross alpha in groundwater typically occur near granite bedrock outcrops; one might expect to see higher occurrences of these constituents near the San Gabriel Mountains, Jurupa Hills, Puente Hills, and Chino Hills and along fault zones- Rialto-Colton Fault, San Jose Fault, and the Red Hill Fault. The geographic distributions of radon and gross alpha do not show the expected pattern however, there are no spatial patterns or outside evidence to suggest a source other than naturally-occurring. Based on water quality results from 1999 to the present, 58 wells in the basin are at or above the US EPA proposed MCL for radon. For gross alpha results, 165 wells are at or above the US EPA MCL.

VOCs

The following five volatile organic chemicals (VOCs) were detected at or above their MCL in more than 10 wells:

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[5] Ground Water & Drinking Water, Perchlorate, EPA www.epa.gov/safewater/ccl/perchlorate.html

- Tetrachloroethene (PCE) and Trichloroethene (TCE)
- 1,1-dichloroethene and *Cis*-1,2-dichloroethene;
- 1,2,3-trichloropropane'

Tetrachloroethene and Trichloroethene

Tetrachloroethene (PCE) and Trichloroethene (TCE) were and are widely used industrial solvents. PCE is commonly used in the dry-cleaning industry. About 80 percent of all dry cleaners use PCE as their primary cleaning agent (Oak Ridge National Laboratory, 1989). TCE is commonly used for metal degreasing and as a food extractant. In general, PCE is below detection limits for wells in the Chino Basin (Figure 9-5). The wells with detectable levels tend to occur in clusters such as those seen around Milliken Landfill, south and west of the Ontario Airport, and along the margins of the Chino Hills. The spatial distribution of TCE resembles that of PCE. TCE was not detectable in most of the wells in the basin, but similar clustering of wells with elevated TCE occurred around Milliken Landfill, south and southeast of Ontario Airport, south of the Intersection of Euclid Avenue and Holt Boulevard (from General Electric Flatiron facility), southwest of Chino Airport and in the Stringfellow plume as shown in Figure 9-5.

Dichloroethene and *cis*-1,2-Dichloroethene

Dichloroethene (1,1-DCE) and *cis*-1,2-dichloroethene (*cis*-1,2-DCE) are degradation by-products of PCE and TCE (Dragun, 1988) formed by the reductive dehalogenation, and their distribution as shown in Figure 9-6 and 9-7. In a majority of wells in the Chino Basin, dichloroethene and *cis*-1,2-dichloroethene were not detected. Dichloroethene is found near the Milliken Landfill, south and west of the Ontario Airport, south of Chino Airport and at the head of the Stringfellow plume; *cis*-1,2-dichloroethene was found in the same general locations.

1,2,3-Trichloropropane

1,2,3-Trichloropropane (1,2,3-TCP) is a colorless liquid that is used primarily as a chemical intermediate in the production of polysulfone liquid polymers and dichloropropene, synthesis of hexafluoropropylene, and as a cross linking agent in the synthesis of polysulfides. It has been used as a solvent, extractive agent, paint and varnish remover, cleaning and degreasing agent, and it has been formulated with dichloropropene in the manufacturing of soil fumigants, such as D-D.

The current California State Notification Level for 1,2,3-TCP is 0.005 micrograms per liter (µg/l). The adoption of the Unregulated Chemicals Monitoring Requirements (UCMR) regulations occurred before a method capable of achieving the required detection limit for reporting (DLR) was available. According to DHS, some utilities moved ahead with monitoring and the samples were analyzed using higher DLRs. Unfortunately, findings of non-detect with a DLR higher than 0.005 µg/l do not provide DHS with adequate information needed for possible standard setting. New methodologies to analyze for 1,2,3-TCP with a DLR of 0.005 µg/l have since been developed and the DHS is requesting that any utility with 1,2,3-TCP findings of nondetect with reporting levels of 0.01 μg/l or higher do follow-up sampling using a DLR of 0.005 μg/l. Private wells monitored in 1999 through 2001 were analyzed for 1,2,3-TCP at a DLR of 50 μg/l. Because 1,2,3-TCP may be a basin-wide water quality issue, all private wells are being retested at a lower detection limit - 0.005 μg/l.

Aluminum, Arsenic, Fluoride, Iron and Managanese
The concentrations of aluminum, arsenic, iron, and manganese depend on mineral solubility, ion exchange reactions, surface complexations, and soluble ligands. These speciation and mineralization reactions, in turn, depend on pH, oxidation-reduction potential, and temperature.

<u>Aluminum and Iron</u>
In general, across the Chino Basin, aluminum and iron were below detection limits. However, both constituents were high in the Stringfellow plume. Outside of the Stringfellow plume, there were 18 wells with concentrations greater than the MCL. Aluminum concentrations exceeded the primary California MCL in 5 wells outside of the Stringfellow plume. Exceedances may be an artifact of sampling methodology – relatively high concentrations of aluminum, iron, and trace metals are often the result of dissolution of aluminosilicate particulate matter and colloids caused by the acid preservative in unfiltered samples.

<u>Arsenic</u>
The current arsenic MCL is 50 μg/l. In January 2001, EPA mandated that compliance with the new federal arsenic MCL of 10 μg/l would be required by 2006. After adopting 10 μg/l as the new standard for arsenic in drinking water, the US EPA decided to review the decision to ensure that the final standard was based on sound science and accurate estimates of costs and benefits. In October 2001, the US EPA decided to move forward with implementing the 10 μg/l standard for arsenic in drinking water (US EPA, 2001). Fourteen wells in the Chino Basin had arsenic concentrations that exceed the 2006 MCL. Only 4 wells in the basin exceeded the current MCL of 50 μg/l. Three of these wells belong to the City of Chino Hills, the remaining well is at the northern tip of the Stringfellow plume. Higher concentrations of arsenic in the Chino Hills area are found at depths greater than about 350 feel below ground surface.

Chino Hills 1A is a production well that is located about 30 feet from Chino Hills 1B, the well with the highest concentration of arsenic in the period from 1999 to 2004. During this period, samples from Chino Hills 1A (perforated interval: 166-217 ft. below ground surface) were below detection limit.

<u>Fluoride</u>
Fluoride occurs naturally in groundwater in concentrations ranging from less than 0.1 mg/l to 10-20 mg/l (Freeze and Cherry, 1979). However, site-specific monitoring wells may reveal point sources (e.g., wells near landfills have shown relatively high concentrations of manganese). Fluoride was detected in 954 wells within the basin, only 7 of which have concentrations that exceed the California primary MCL.

<u>Manganese</u>
Manganese is a naturally occurring element that is a component of over 100 minerals. Because of the natural release of manganese into the environment by the weathering of manganese-rich rocks and sediments, manganese occurs ubiquitously at low levels in soil, water, air, and food. Manganese compounds are used in a variety of products and applications including water and wastewater treatment, matches, dry-cell batteries, fireworks, fertilizer, varnish, livestock supplements, and as precursors for other manganese compounds. Manganese is often found near landfills especially when oxidation-reduction conditions promote its mobility in groundwater. Neither manganese nor any manganese compounds are regulated in drinking water. However, the US EPA has set a secondary standard MCL of 0.05 mg/l as has California. All these standards though are non-enforceable. Most of the wells sampled for manganese have resulted in non-detect. High concentrations of manganese in groundwater have been observed along the Santa Ana River in Reach 3, scattered throughout the southern portion of Chino Basin and near the Milliken Landfill.

Chloride and Sulfate
Chloride and sulfate both exceeded secondary MCLs. As discussed previously, secondary MCLs apply to chemicals in drinking water that adversely affect its aesthetic qualities and are not based on direct health effects associated with the chemical. Chloride and sulfate are major anions associated with TDS. Most wells in the basin had detectable levels of sulfate but most were less than 125 mg/l (one-half the water quality standard). A total of 83 wells had concentrations at or above the sulfate MCL of 250 mg/l. In general, these wells were distributed in the southern portion of the basin, along the margins of the Chino Hills and in the Stringfellow plume. All wells had detectable levels of chloride but most concentrations were less than 125 mg/l (one-half the MCL). The secondary MCL for chloride is exceeded in 68 well samples almost all of which are located in the southern portions of the basin.

Color, Odor and Turbidity
Color, odor and turbidity were detected at greater than their secondary MCLs in more than 10 wells in the last 5 years. These parameters are monitored purely for aesthetic reasons and should not limit water quality in Chino Basin.

9.4 CHINO BASIN AREAS OF CONCERN

The previous water quality discussion broadly described water quality conditions across the entire basin. The discussion presented below describes the water quality anomalies associated with known point source discharges to groundwater.

Figure 9-8 shows the extent of VOC plumes from likely sources including the Chino Airport, the California Institute for Men, General Electric Flatiron Facility, General Electric Test Cell Facility, the Milliken and Mid-valley Landfills, VOC Anomaly – South of the Ontario Airport and the approximate location of plumes from Kaiser Steel

Corporation and Stringfellow superfund site. The State of the Basin Report - 2005[6] presents a description of these plumes and their probable sources.

9.5 IMPORTED WATER QUALITY

The results of all of Metropolitan's recent planning activities, have emphasized the central importance of water quality. In addition to the usual health considerations, water

quality has near-term supply quantity implications. For example, high dissolved solids (TDS) in water supplies lead to high TDS in wastewater, which lowers the usefulness of recycled water and increases its cost.

Salinity
Within MWD service area, local water sources account for about half of the salt loading, while imported water accounts for about half. All water sources need to be managed appropriately to sustain water quality and supply reliability goals. Due to salinity concerns, only imported water from the SWP is used in IEUA's service area. Water supplies from the SWP have significantly lower TDS concentrations than the Colorado River, averaging 250 mg/l. Nevertheless, the supply and TDS levels of SWP water can vary significantly in response to hydrologic conditions in the Sacramento-San Joaquin watersheds.

TDS levels of SWP water can also vary widely over short periods of time due to seasonal and tidal flow patterns in bay delta. For example during the 1977 drought, the TDS of SWP reaching MWD increased to 430 mg/l and supplies became limited. Unless salinity of source supplies can be reduced, it may not always be possible to maintain both salinity standards and water supply reliability.

Metropolitan's Board approved a Salinity Management Policy in April 1999. The goal of this policy was to achieve delivered water with less than 500 mg/l of TDS. At the same time, the Board adopted an Action Plan consisting of the following four components:

1. Imported water source control and salinity reduction actions,
2. Distribution system salinity management actions,
3. Collaborative actions with other agencies, and
4. Local salinity management actions to protect groundwater and recycled supplies.

[6] Chino Basin Optimum Basing Management Program, State of the Basin Report – 2004, Section 4.4.3.4

Other Water Quality Issues
In addition to general concerns over TDS levels, health issues have been raised over particular pollutants in drinking water. For the region's supplies, the major concern have been associated with the following:

- Perchlorate in Colorado River and local groundwater supplies
- Disinfection by-products formed by disinfectants reacting with bromide and total organic carbon (TOC) in SWP water
- Methyl tertiary butyl ether (MTBE) in groundwater and local surface reservoirs
- Arsenic
- N-nitrosodimethylamine (NDMA) in groundwater and treated surface waters
- Hexavalent chromium in groundwater, and
- radon

In addition to monitoring for and controlling specific identified chemicals in the water supply, MWD has undertaken a number of programs to protect the quality of its water supplies.

Source Water Protection

Source water protection is important for all of California. The California Department of Health Services requires large utilities delivering surface water to complete a Watershed Sanitary Survey every five years to examine possible sources of drinking water contamination. The survey includes suggestions for how to protect water quality at the source. Metropolitan completed its most recent sanitary surveys in 2001.

A similar requirement from EPA calls for utilities to complete a Source Water Assessment. Information collected in the sanitary surveys is used to evaluate the vulnerability of water sources to contamination and to help determine the need for additional protective measures. Metropolitan completed its source water assessment in December 2002. Water from the Colorado River is considered to be most vulnerable to contamination by recreation, urban stormwater runoff, increasing urbanization in the watershed, wastewater and past industrial practices. Water supplies from northern California are most vulnerable to urban/storm-water runoff, wildlife, agriculture, recreation and wastewater.

Support SWP Water Quality Programs

Metropolitan supports DWR policies and programs that are aimed at maintaining or improving the quality of SWP water delivered to Metropolitan. In particular, Metropolitan supported the Depart of Water Resources (DWR) policy to govern the quality of non-project water conveyed by the California Aqueduct, and it continued funding DWR's Municipal Water Quality Investigations Program that monitors and studies conditions affecting the quality of water in the Bay-Delta system.

Metropolitan also supports the Sacramento River Watershed Program, which was founded in 1 996 to encourage interest groups to work together to address water quality problems in the watershed. Metropolitan provides funds to the program to help finance public service announcements to educate the public about the need to protect water quality in the watershed. Metropolitan also provides input to the development and implementation of the water quality monitoring in the watershed.

Water Quality Exchanges

Metropolitan has developed and fostered water quality exchange partnerships with the Friant Water Users Authority and the Kings River Water Association. Under these partnerships, Metropolitan will invest in local infrastructure in the partners' service areas, which will provide the physical capability for the partners to exchange high-quality Sierra water supplies for a portion of Metropolitan's SWP supplies.

In addition, Metropolitan has implemented selective withdrawals from the Arvin-Edison storage program and the Kern Water Bank to improve water quality. Although these programs were initially undertaken to provide dry-year supply reliability, they can also be used to store SWP water at periods of higher water quality, with the water available to withdraw and dilute SWP water deliveries at times of lower water quality.

9.6 SUMMARY OF WATER QUALITY IMPACTS

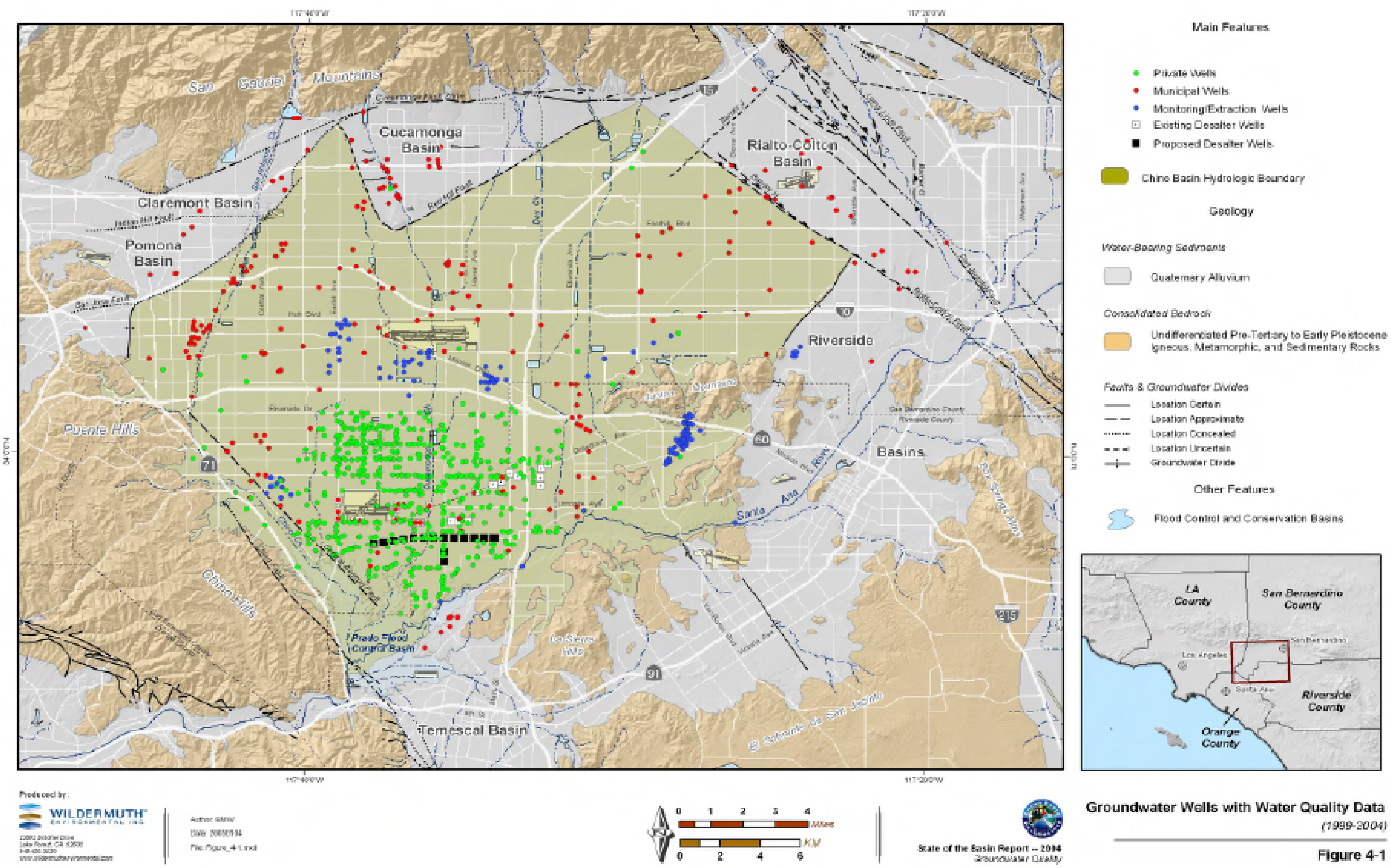
The groundwater quality in Chino Basin is generally good, with better groundwater quality found in the northern portion of Chino Basin where recharge occurs. Salinity (TDS) and nitrate concentrations increase in the southern portion of Chino Basin. About 83 percent of the private wells south of the 60 Freeway had nitrate concentrations greater than the MCL.

The other constituents that have the potential to impact groundwater quality from a regulatory or Basin Plan standpoint are certain VOCs, arsenic, and perchlorate. As discussed in Section 9.12, there are a number of point source releases of VOCs in Chino Basin. These are in various stages of investigation or cleanup.

Likewise, there are known point source releases of perchlorate (Mid-Valley Sanitary Land Fill area, Stringfellow, et cetera) as well as what appears to be non-point source related perchlorate contamination from currently undetermined-sources. Arsenic at levels above its water quality standard appears to be limited to the deeper aquifer zone near the City of Chino Hills.

The Chino Basin Watermaster is coordinating it efforts to address water quality issues in the basin with the Santa Ana Regional Water Quality Control Board to ensure proactive efforts protect the basin quality.

Figure 9-1
Location of Groundwater Wells in Chino Basin



(Adapted from the State of the Basin Report – 2004)

Figure 9-2
Total Dissolved Solids in Well Water in Chino Basin

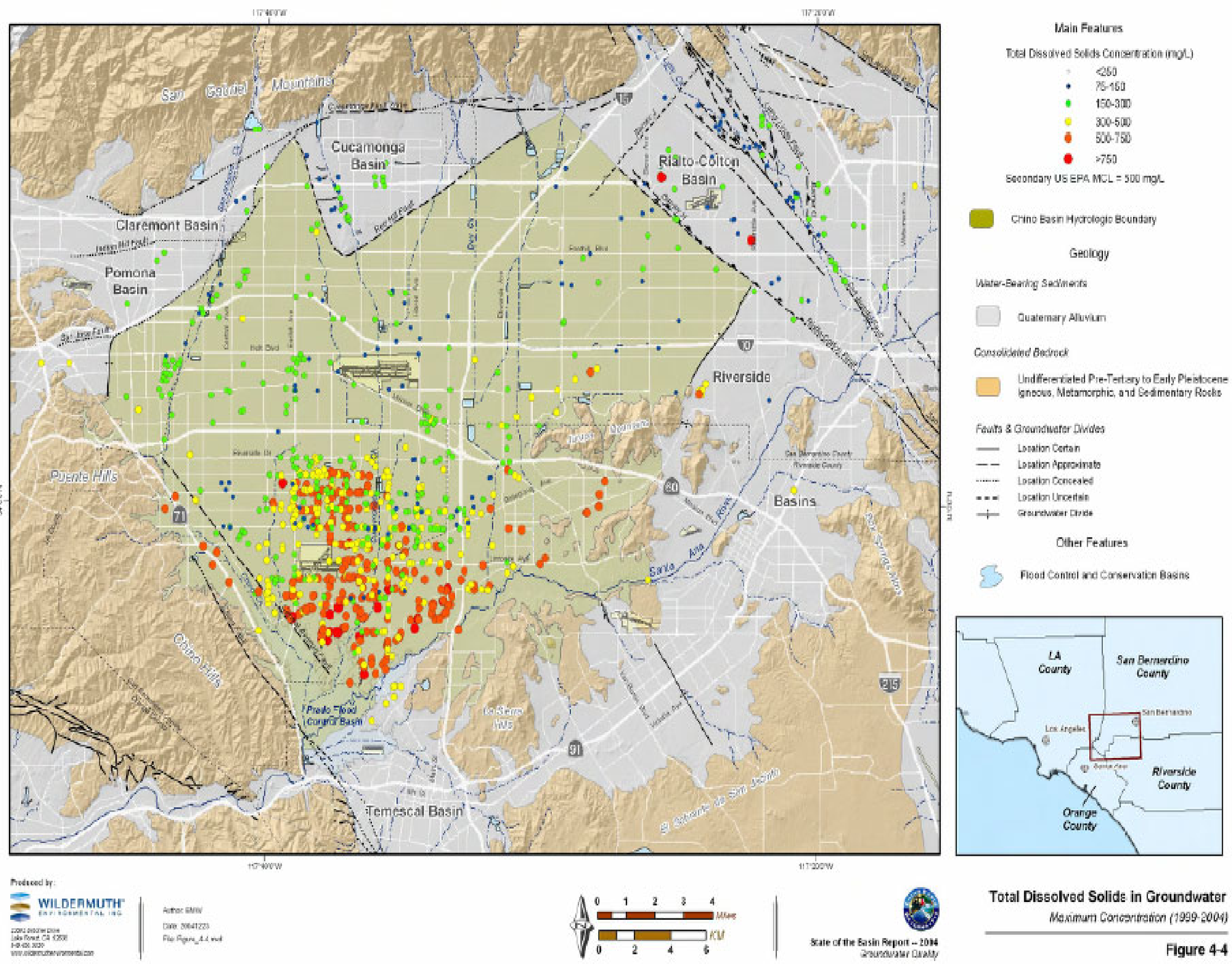


Figure 9-3
Nitrate-Nitrogen in Groundwater

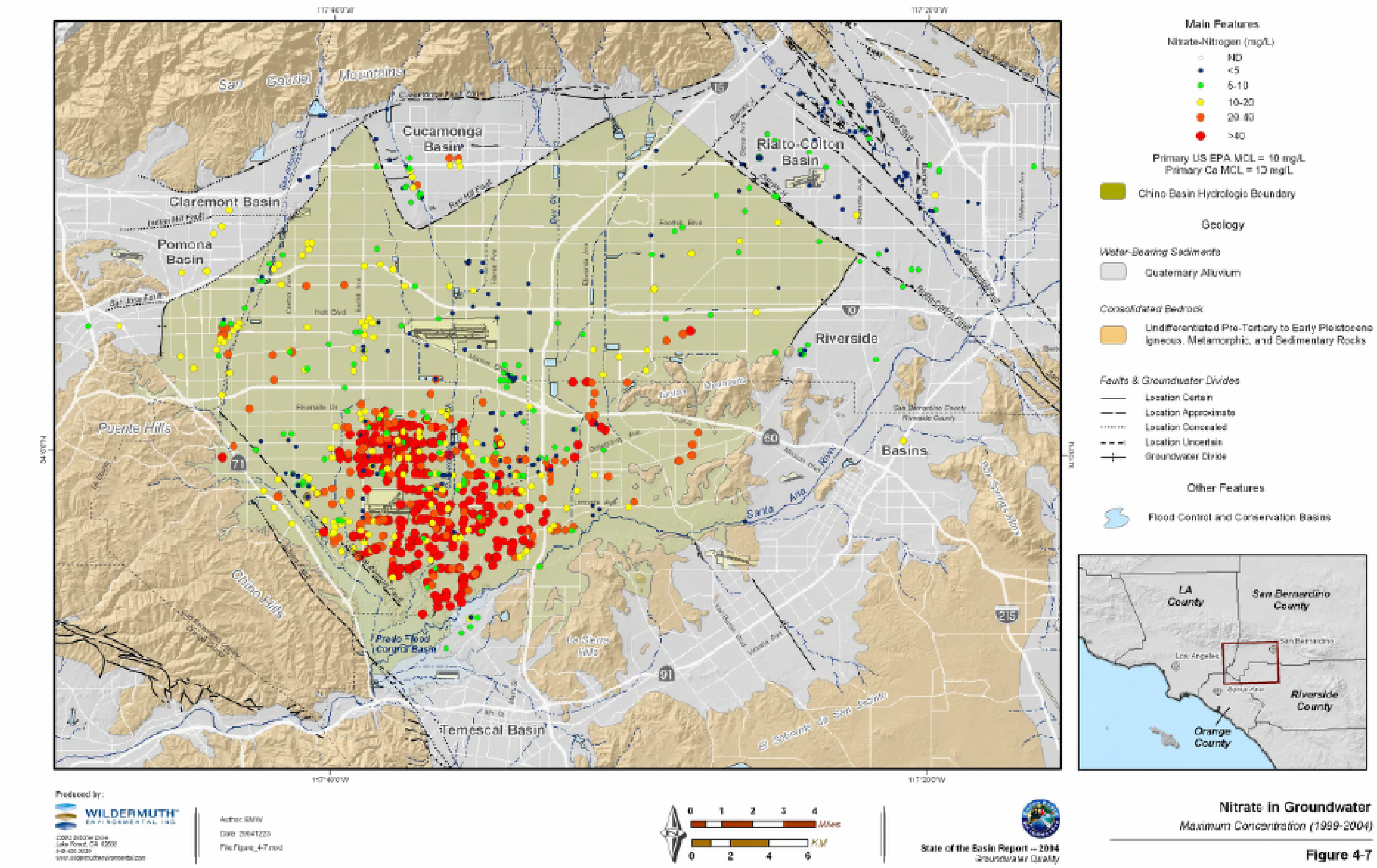


Figure 9-4
Perchlorate in Groundwater

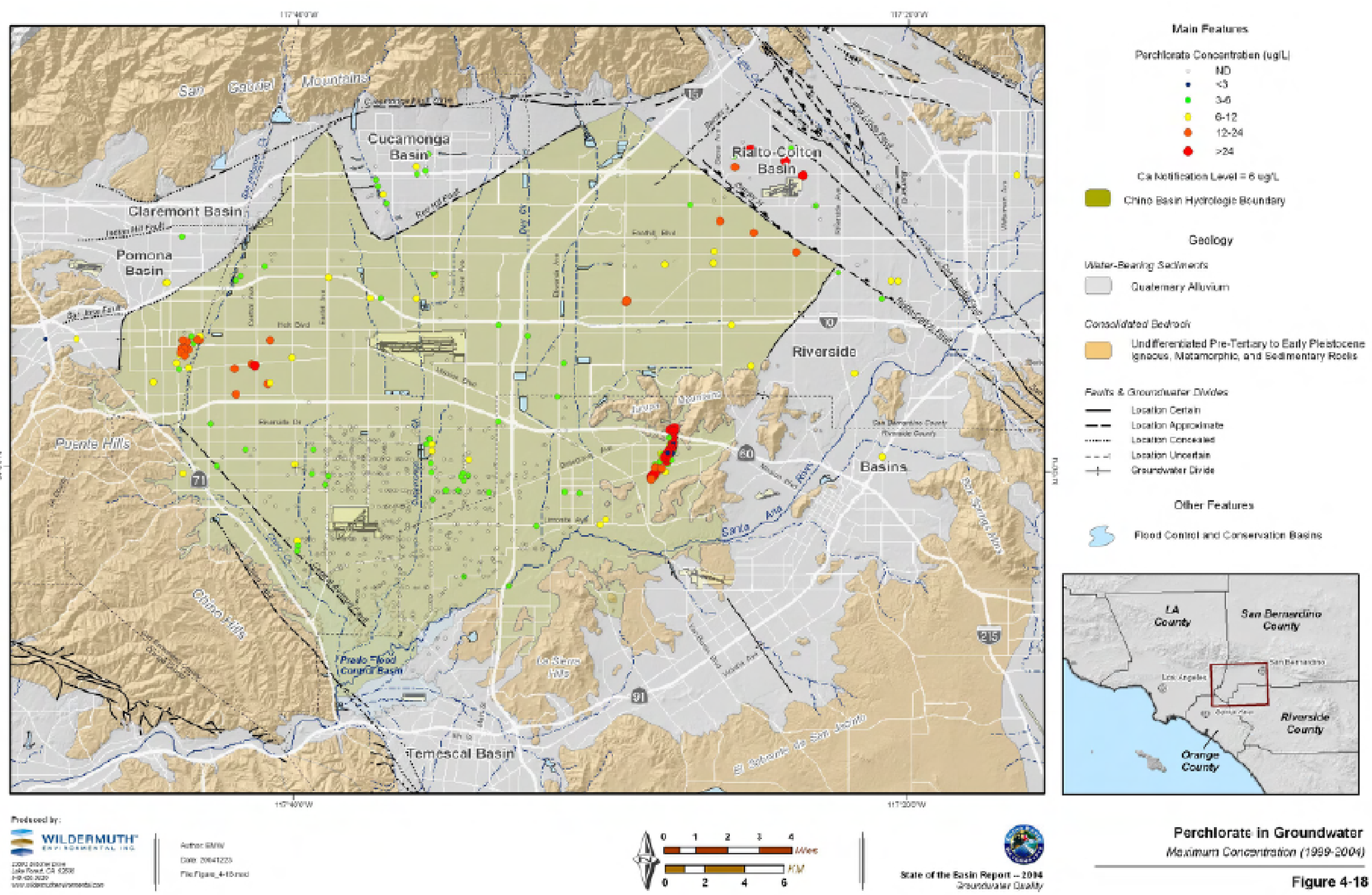


Figure 9-5
Tetrachloroethene in Groundwater

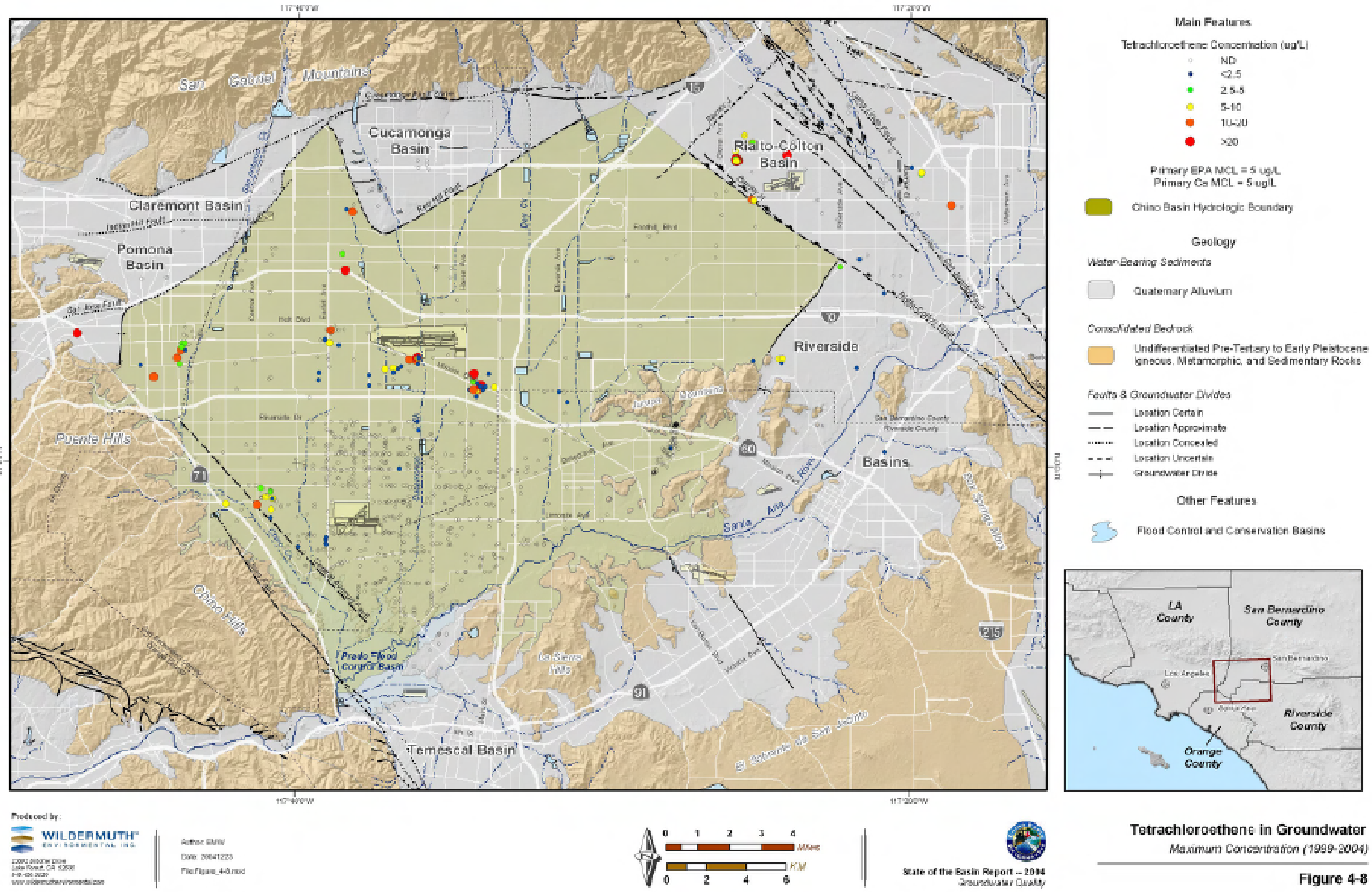


Figure 9- 6
Dichloroethene in Groundwater

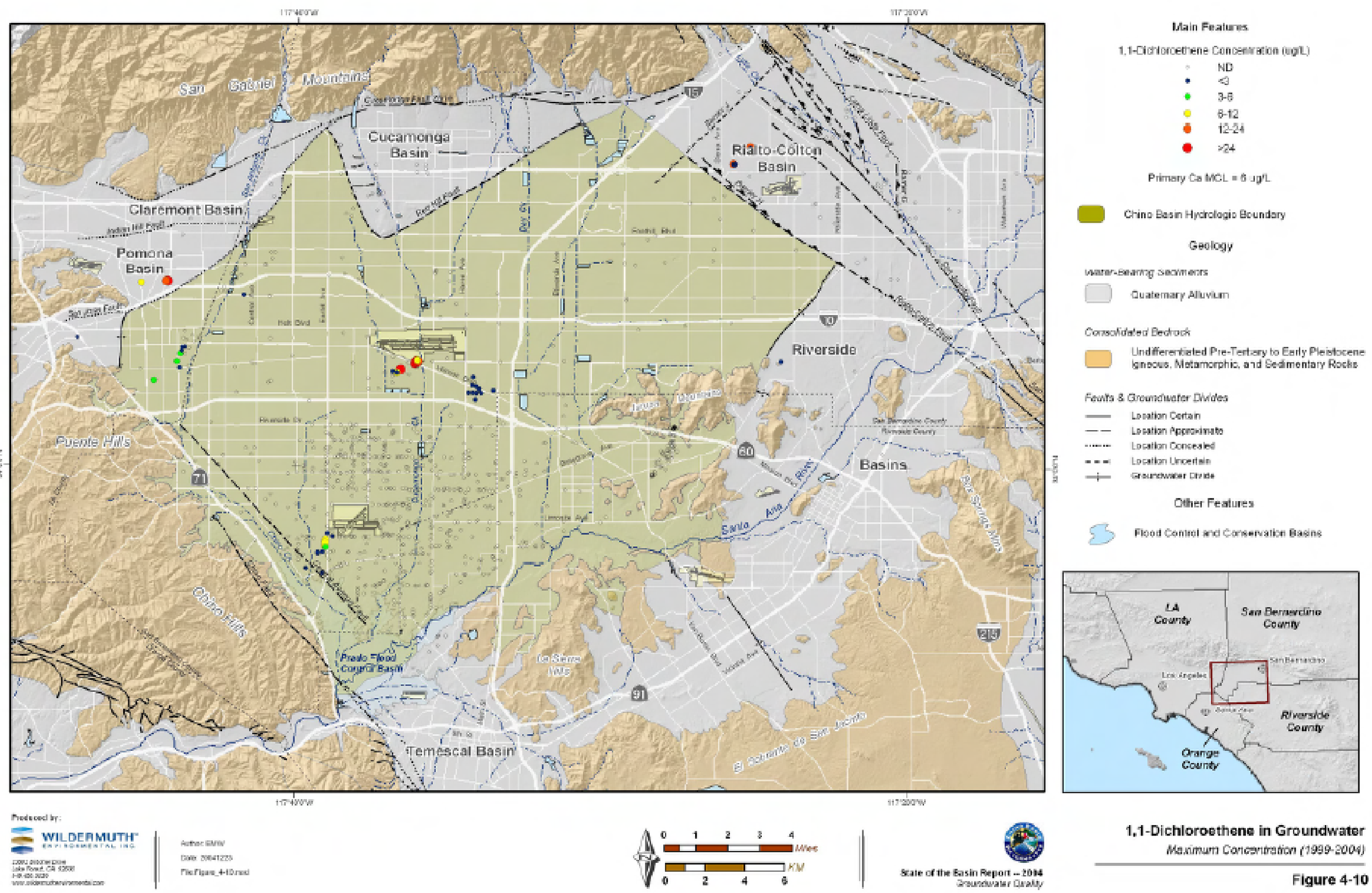


Figure 9-7
Cis-1,2-Dichloroethene in Groundwater

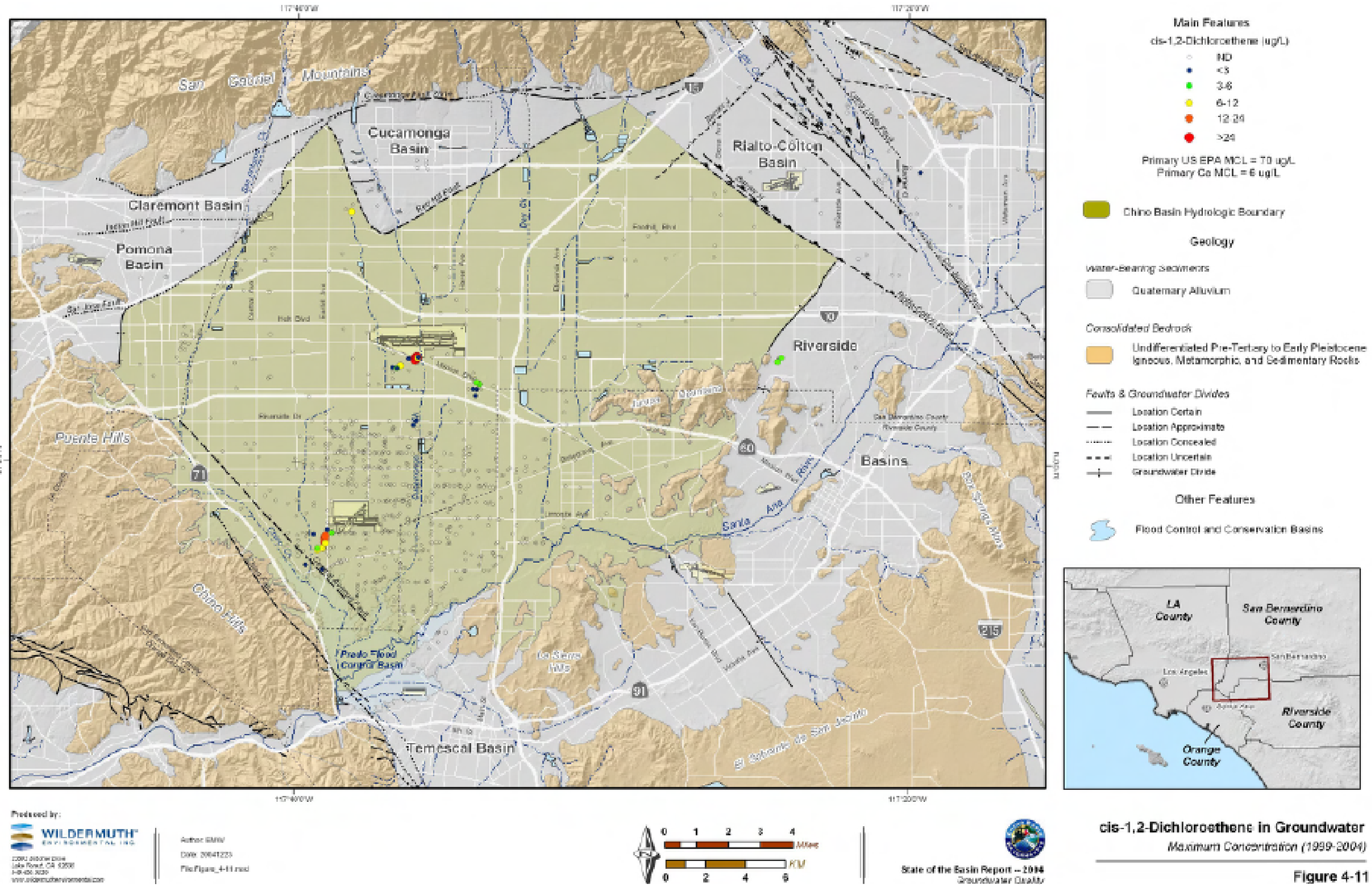


Figure 9-8
VOC Plumes in the Chino Basin