

# Down the Drain

Six Case Studies of Groundwater Contamination  
that are Wasting California's Water

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## EXECUTIVE SUMMARY

The importance of California's water supply is immeasurable. From quenching thirsty cities to supporting fragile ecosystems to making food grow, each drop of water in California is precious. Recent developments sharply underscore this importance. On January 1<sup>st</sup>, after years of failed negotiations between water purveyors, the U.S. Department of the Interior cut California's Colorado River water supply by half.<sup>1</sup> As the Colorado River is the single largest water source for Southern California,<sup>2</sup> this reduction adds enormous uncertainty to the state's water future.

The Colorado River reduction highlights the importance of ensuring that California's existing and potential water supplies are thoroughly protected. Despite this importance, however, careless practices pollute billions of gallons of underground drinking water supplies each year.

*Down the Drain* profiles six cases of groundwater contamination in California and their impact on the state's water supplies. New analysis of data provided by water officials finds that in these six cases alone, 70 billion gallons of otherwise potable water supplies are too polluted to drink. Were these water supplies available for consumption, the volume could compensate for 35% of the water just cut from the Colorado River and support 400,000 families for a year.<sup>3</sup> Because California's water supply is a finite, this loss also increased local, regional and statewide pressures on water supply. If this contamination continues, communities across the state may eventually run out of alternative supplies to turn to.

### Profile Summaries:

#### ***Santa Monica and MTBE***

In 1996 city officials discovered MTBE, a gasoline additive linked to cancer, in local drinking water.<sup>4</sup> The pollutant leaked into the city's supply wells from nearby gas stations and rendered 80% of the city's drink-

ing water supply unusable.<sup>5</sup> Each year, 6,897 acre-feet or 2.2 billion gallons of local water goes unused due to this contamination.<sup>6</sup> The volume of water lost could supply over 13,000 families with enough water for a year.<sup>7</sup> The cost of importing replacement water, which will be paid by the companies responsible for the pollution, will total over \$24 million.<sup>8</sup>

#### ***The San Gabriel Valley and Perchlorate***

Home to several manufacturers that emerged in the post-World War II industrial boom, the San Gabriel Valley has over one million residents.<sup>9</sup> In 1979, local officials discovered PCE and TCE, two chemicals used in a variety of industrial practices, in local drinking water at dangerous levels. In 1997, officials also discovered the presence of perchlorate. PCE and TCE are linked to cancer, while perchlorate can lead to thyroid problems in adults and decreased IQ in developing fetuses.<sup>10</sup> The contamination currently disables fifty wells in the community.<sup>11</sup> These wells could produce 127,369 acre-feet of water each year, enough to supply water to over 250,000 families. The cost to clean up these wells through wellhead treatment will be over \$350 million.<sup>12</sup>

#### ***Fresno and Nitrates***

Nitrates are potent toxins that cause a wide range of health problems, including 'blue-baby syndrome.'<sup>13</sup> City water officials have closed seven drinking water wells due to nitrate contamination, which has seeped into Fresno drinking water supply wells from agricultural fertilizer and leaking septic tanks.<sup>14</sup> These seven wells are capable of producing 8,083 acre-feet of water each year, enough to supply water to 16,000 families.<sup>15</sup> Fearing a lack of sufficient water supplies for the upcoming summer, the city will pay over one million dollars in 2003 to treat four of the wells.<sup>16</sup>

### ***The Inland Empire and Perchlorate***

After first discovering perchlorate, a component of rocket fuel that is linked to thyroid cancer and decreased IQ, in local drinking water supplies in 1997, three cities in the Inland Empire have closed twenty drinking water wells due to the presence of the contaminant. These wells could produce 61,790 acre-feet of water each year, enough to supply water to over 120,000 families.<sup>17</sup> Estimates of cleanup costs run upwards of \$40 million.<sup>18</sup> The small city of Colton, for example, pays \$4,000 each day to provide replacement water to its residents.<sup>19</sup>

### ***San Diego and MTBE***

Underneath Qualcomm Stadium, home to this year's Super Bowl, flows the largest plume of MTBE contamination in the city. The plume, which originates from a large

nearby petroleum storage facility, stretches 6,000 feet and threatens the San Diego River.<sup>20</sup> City officials would like to use the polluted groundwater basin as a drinking water source by 2015.<sup>21</sup> Despite its potential as a water supply, treating the contamination requires permanently discarding 60 million gallons of water from the basin each year. The water is pumped out of the basin, treated and then released to a local creek, where it ultimately flows to the ocean.<sup>22</sup> The MTBE contamination costs the city 180 acre-feet in lost potential water supplies each year.

### ***Rancho Cordova and Perchlorate***

Rancho Cordova is a small community of 50,000 located just east of Sacramento.<sup>23</sup> The community bears the dubious distinction of

**Table 1. Summary of Findings**

Community	Lost Yearly Water Production Capacity from Wells Closed due to Contamination (acre-feet)	Pollutant	Polluter
Santa Monica	6,897	MTBE	Oil Companies
Fresno	8,083	Nitrates	Fertilizer, Septic Tanks
The San Gabriel Valley	127,369	Perchlorate, Volatile Organic Compounds	Aerojet Corporation, Other Industrial Manufacturers
San Diego	180	MTBE	Oil Companies
The Inland Empire	61,790	Perchlorate	Goodrich Inc, Black & Decker, Other Industrial Manufacturers
Rancho Cordova	12,818	Perchlorate	Aerojet Corporation, Boeing Company
<b>TOTAL</b>	<b>217,137*</b>		

***\*Equal to 35% of the recent water reduction to California from the Colorado River<sup>1</sup>***

hosting the first documented case of drinking water contamination by perchlorate, a component of rocket fuel that can harm the thyroid and development of fetuses. Originating from a missile manufacturing facility operated by Aerojet, contamination disables twelve local wells.<sup>24</sup> The city's contaminated wells are capable of producing 12,818 acre-feet of water each year, enough to supply water to 24,000 families.

### **Policy Recommendations:**

If we are to succeed in ensuring California's water future, it is essential to protect our water supplies from costly and health-threatening contamination. To prevent contamination of California's precious underground water supplies, we recommend the following:

1. Reduce the use of contaminants that threaten our drinking water sources;
2. Increase public access to information about pollution threats;
3. Require full payment of cleanup costs and replacement of lost water supplies by entities that cause contamination;
4. Increase citizen participation in pollution prevention;
5. Fully enforce discharge permits to surface water;
6. Establish protective zones around drinking water wells;
7. Increase the monitoring of underground drinking water sources for contamination; and
8. Require permits for all discharges into California water bodies, including agricultural runoff.

## INTRODUCTION

**T**he history of California is the history of its water supply. From gold mining and industrial agriculture to sprawling cities and protected rivers, the control of water has driven California's development for two hundred years. From engineering the largest artificial water delivery system in the world to exploring grand-scale desalination, Californians have invested countless resources in attempts to ensure sufficient water to grow food, build cities and protect the environment. Long-term water sustainability, however, remains elusive.

On January 1, 2003, after years of complaints from Nevada and Arizona about California's overuse of Colorado River water, the U.S. Department of the Interior (U.S. DOI) cut California's entitlement to the Colorado River by 620,000 acre-feet. This reduced Southern California's water supply by half and threw California water policy-makers into a tailspin.<sup>26</sup> Farmers in California's Imperial Valley filed an immediate lawsuit against the U.S. DOI to regain their water entitlements and water utilities across the state worried about meeting summer water demands.<sup>27</sup> Attempts to resolve the dispute continue at a frantic pace.

Meanwhile, California's existing groundwater supply suffers contamination on a

massive scale. Groundwater provides 30% of California's water supply in normal years, and our reliance increases dramatically in times of drought.<sup>28</sup> Stored in underground aquifers throughout the state, groundwater is a valuable and stable source that is not subject to evaporation or rapid fluctuations in precipitation.

Despite the importance of groundwater to water supply, the quality of California's groundwater is in serious trouble. Across the state, pollutants compromise thousands of groundwater sources. MTBE, for example, a gasoline additive linked to cancer, has contaminated 10,000 groundwater sites across the state.<sup>29</sup> Perchlorate, a component of rocket fuel, pollutes 292 underground drinking water sources. DBCP, a pesticide linked to cancer, pollutes the drinking water of one million residents across the Central Valley.<sup>30</sup> This contamination causes billions in cleanup costs and stunts economic growth.

Perhaps most relevant in today's era of water uncertainty, however, is that groundwater contamination renders millions of gallons of water unusable every year. At a time when California's water supply from the Colorado River has been halved and the spectre of drought looms on the horizon, the need to protect our water supplies from pollution has never been greater.

## SANTA MONICA AND MTBE

The City of Santa Monica is one of the most popular tourist destinations in California. Boasting over three million visitors each year, the city is home to the widest stretch of beach on the Pacific Coast.<sup>31</sup> In addition to its reputation as a vacation destination, the City of Santa Monica is widely known for its progressive environmental policies. The 'Sustainable Cities' program adopted by the city in 1994 includes several policies to reduce the city's environmental impacts. Among these are ordinances that require the city to purchase recycled products whenever possible, reduce its energy use by 16%, and ensure that 75% of city vehicles run on reduced-emission fuels.<sup>32</sup>

The City of Santa Monica's water supply plan is part of the 'Sustainable Cities' program. According to the plan, the goal of city planners is to increase Santa Monica's water independence from outside sources.<sup>33</sup> Running its own water utility, the City of Santa Monica produced only 31% of its own water in 1990; 69% was imported from the Metropolitan Water District, a Southern California water broker that pulls most of its water from the Colorado River.<sup>34</sup> Worried about over-reliance on an outside water source that is highly susceptible to drought, the City Council decided to invest heavily in developing local groundwater sources and water conservation programs.<sup>35</sup>

The plan worked. From 1990 to 1995, the City of Santa Monica developed a groundwater basin management plan and dramatically increased its local water independence. In just five years, the percentage of the city's total water supply coming from groundwater increased from 31% to 70%.<sup>36</sup> By the end of the century, the city hoped to produce up to 90% of its water supply locally.<sup>37</sup> This plan not only benefited the city economically and increased the reliability of its water supply, it also benefited the Southern California

### SANTA MONICA

#### **6,897 ACRE-FEET OF CONTAMINATED WATER UNUSED EACH YEAR**

**Pollutant:** MTBE, a possible carcinogen

**Polluter:** Oil Companies

**Policy Recommendation:** All oil companies should phase out the use of MTBE immediately

region by reducing pressure on the strained Colorado River. Between 1990 and 1995, the City of Santa Monica increased groundwater production by 101%, leaving the rest of Southern California enough extra water to supply 10,000 families.<sup>38</sup>

The optimism of city planners was crushed, however, on October 15, 1995, when city officials discovered the chemical Methyl tertiary butyl ether (MTBE) in a local city drinking water well. MTBE is a potent chemical linked to cancer that travels extremely quickly in water. Tests revealed the toxic at concentrations 50 times higher than state drinking water standards.<sup>39</sup> Further testing found similar concentrations of MTBE in six other city wells. All seven were shut off. These wells supplied 80% of the city's drinking water supply.<sup>40</sup>

Several months later, investigators determined that oil companies that operated nearby gas stations with chronically leaking gasoline storage tanks caused the contamination.<sup>41</sup> Tests conducted as early as 1992 revealed gasoline storage tanks with 'six inch rot' at the bottom, but the oil companies, such as Chevron and Exxon-Mobil, did nothing to prevent contamination of the nearby drinking water wells.<sup>42</sup> The City of Santa Monica pursued legal action to require the companies to clean up the wells. In 2002, six years after contamination was first discovered, oil companies finally settled the court case and

agreed to pay for full clean up of the city's lost wells.

In addition to the impact of contamination on public health, the contamination had massive consequences for Santa Monica's drinking water supply. In one year the city went from importing 31% of its drinking water supply from outside sources like the Colorado River to importing 80% of its drinking water. Even with optimistic cleanup projections, the MTBE contamination of Santa Monica's wells will force the city to import an additional 61,475 acre-feet of water by 2015.<sup>43</sup> This is enough water to supply over 120,000 families for a year. Importing this volume of water will cost \$24.5 million. In addition to the water that must be imported

due to contamination, the City of Santa Monica cannot use its contaminated wells. Due to contamination, 6,897 acre-feet of water lies in contaminated wells and is not used each year.

In addition, local officials estimate that Los Angeles County alone is home to more than 280 sites that are leaking MTBE into local groundwater.<sup>44</sup> Despite this threat to underground water supplies, several companies continue to use the cancer-causing contaminant in petroleum. Large companies like Exxon and Ultramar have yet to announce a phase-out of the chemical. In order to protect California's vital groundwater resources, it is essential to immediately phase-out use of the chemical.

# THE SAN GABRIEL VALLEY AND PERCHLORATE

The contamination of the San Gabriel Valley is one of the most notorious cases of drinking water pollution in the country's history. Since the 1940's, twenty companies polluted the groundwater of the region with chemicals like PCE, TCE and perchlorate that are linked to cancer and other health problems.<sup>45</sup> The contamination has resulted in more than \$390 million in cleanup costs so far, caused numerous health problems in the community and has made 127,369 acre-feet of water unusable. This is enough to supply over 250,000 families for a year.<sup>46</sup>

The San Gabriel Valley, bordered by the San Gabriel Mountains, is home to one million people and 30 incorporated cities. The development of the region is marked by heavy industrial and manufacturing activity. Numerous Fortune 500 companies have major offices or plants in the San Gabriel Valley such as Edison International, Miller Brewing Company, Montgomery Watson and Avery Dennison. In addition, the region served as a major hub for the aerospace industry in the post World-War II military boom, hosting companies such as Jet Propulsion Laboratory (JPL), Aerojet and McDonnell Douglas.<sup>47</sup>

In 1979, volatile organic compounds (VOCs), a class of chemicals used in a variety of industrial processes and that have been linked to cancer, were detected in local drinking water supplies. Further testing found the presence of certain VOCs like PCE and TCE in drinking water supply wells at exponentially higher levels than state safety standards.<sup>48</sup> In one well monitored by U.S. EPA officials, for example, PCE levels reached 8,900 parts per billion (ppb). The state safety standard for PCE in drinking water is, in contrast, 5 ppb.<sup>49</sup> Over the next several decades, the parties responsible for the contamination such as Aerojet fought cleanup efforts by local, state and national officials.<sup>50</sup>

## SAN GABRIEL VALLEY

### 127,369 ACRE-FEET OF CONTAMINATED WATER UNUSED EACH YEAR

**Pollutants:** Perchlorate and Volatile Organic Compounds, toxics that cause thyroid problems and cancer

**Polluter:** Aerojet Corporation, other industrial manufacturers

**Policy Recommendation:** Government should use all available tools, including civil penalties, to ensure cleanup of drinking water sources proceeds as quickly as possible

In 1997, a new contaminant was discovered in the Valley's water supply. Perchlorate, a component of rocket fuel, was found at concentrations 40 times higher than the state's provisional safety standard.<sup>51</sup> The discovery turned on its head what little progress had been made toward cleanup. Government agencies continued lengthy settlement battles with numerous responsible parties. In 2002, five years after the discovery of perchlorate



Photo credit: NASA

and twenty years after contamination was first discovered, the major responsible parties agreed to a final cleanup settlement.<sup>52</sup> Despite this agreement, however, physical cleanup of many wells has not yet begun.

The public health and economic costs of the contamination of the San Gabriel Valley's drinking water supply are tremendous. In 1997, 2,500 residents of the San Gabriel Valley filed suit against their water suppliers and Aerojet, alleging a variety of harmful health effects from drinking contaminated tapwater. Most victims cited blood cancers and blood disorders as the major health effects of the contamination. After five years of court battles, the California Supreme Court ruled in favor of the community, holding water utilities responsible for the water quality delivered to their customers.<sup>53</sup>

The economic costs of contamination to the San Gabriel Valley are also severe. In 2002, Aerojet Corporation signed a \$250 million settlement agreement to clean up drinking water contamination.<sup>54</sup> This settlement, however, covers only a fraction of the total cost of cleanup. In the past 20 years, public entities have paid over \$85 million dollars in unrecovered cleanup costs. Additional cleanup agreements for contamination in the valley to-

tal \$75 million. While the ultimate cleanup costs have never been tallied, the current costs involved in cleaning up contamination in the San Gabriel Valley total over \$390 million dollars.<sup>55</sup>

The resulting pressure on local water supplies is enormous. In a region of 400 supply wells, prior to contamination, local groundwater provided 90% of the region's water supply.<sup>56</sup> Fifty wells currently are closed because of contamination by VOCs and perchlorate. These 50 wells are capable of producing a maximum of 79,000 gallons of water each minute, with a total annual production of 127,369 acre/feet of water. In addition, due to lost local supply capacity, imports of water have increased 10,000 acre-feet each year.<sup>57</sup>

In order to protect local water supplies like the San Gabriel Valley's in the future, it is essential to expedite the cleanup process; cleanup of groundwater contamination should not take two decades. U.S. EPA has the power to issue civil penalties up to \$27,500 each day to parties responsible for contamination that fail to comply with cleanup requirements. Despite years of delay by Aerojet, U.S. EPA never issued any fines. In order to hasten cleanup efforts, government agencies should employ all available tools, including imposing these civil penalties.

## FRESNO AND NITRATES

**B**illing itself as the state's "New Frontier," the City of Fresno is located in the San Joaquin Valley, the most productive agricultural county in the country. In 2000, Fresno County growers grossed over \$3.4 billion from the production of more than 200 commercial crops.<sup>58</sup> The city forms the population hub of the region and is home to 60% of the county's residents.<sup>59</sup>

The economic strength of Fresno hinges upon its water supply. Nitrate contamination, however, threatens this essential resource. Chronic exposure to nitrates that are found in fertilizers and leak from septic tanks can cause increased urination, decreased circulatory function and rupture of the spleen.<sup>60</sup>

Nitrate contamination of drinking water sources is widespread in the Central Valley. Between 1984 and 2000, nitrates were found in drinking water sources 9,263 separate times.<sup>61</sup> Nitrate contamination has forced the closure of eight drinking water wells in the City of Fresno, and levels in remaining wells remain high.<sup>62</sup> As a result, in its 2001 report to consumers on water quality, the City of Fresno recommended pregnant women seek medical advice before drinking the water.<sup>63</sup>

The costs involved in treating nitrate pollution in drinking water are tremendous. Water officials estimate that treating nitrate-contaminated water increases the cost of supplying water five-fold from \$300/acre-foot to \$1,500/acre-foot.<sup>64</sup> Treating just four of the wells will cost more than \$1 million. On January 6, the City Council, fearing for its ability to supply water to consumers on high demand hot summer days, voted to pay for treatment and reopen four of the wells for the summer. The city cannot afford to open all eight.<sup>65</sup>

Given the problems plaguing its groundwater supply, projected growth for the region, and the cost of treating nitrate-contaminated wells, the City of Fresno plans to turn to the San Joaquin

### FRESNO

#### **8,083 ACRE-FEET OF CONTAMINATED WATER UNUSED EACH YEAR**

**Pollutant:** Nitrates, chemicals found in fertilizer that can damage the spleen and causes 'blue baby' syndrome.

**Polluter:** Fertilizer manufacturers, septic tanks

**Policy Recommendation:** Increase the adoption of nutrient management plans to reduce amounts of nitrates that contaminate drinking water sources.

River for increased water supply. In order to do this, the city must build a water treatment plant that is estimated to cost \$31.5 million. The treatment plant will be completed in 2004.<sup>66</sup>

The contamination of Fresno's groundwater supplies has created a great deal of pressure on local supplies. The intermittent closure of seven wells has cost the city 8,083 acre-feet in lost water in the past year alone.<sup>67</sup> This is sufficient water to supply 16,000 families for a year.

In order to prevent future situations like the City of Fresno's, it is necessary to target the source of pollution. In 1998, President Clinton passed a 'Plan of Action' that required all states to develop nutrient management criteria based on national guidelines. U.S. EPA published these guidelines in October 2002.<sup>68</sup> California must now use these guidelines to set state limits on the amount of nitrate pollution that enters local water bodies. These limits should be set quickly and incorporated into other relevant programs to limit pollution.

In addition to incorporating nitrates into pollution limits set by the state, state agencies should also fully enforce state laws that govern construction and maintenance of individual disposal systems such as septic tanks.

## THE CITY OF SAN DIEGO AND MTBE

The City of San Diego is one of the fastest-growing cities in the country. With a population growth rate twice that of the national average, the San Diego region expects to add over one million residents in the next thirty years.<sup>69</sup> People move to San Diego for good reason: boasting an average yearly temperature of 70° and miles of beautiful coastline, the city offers something for everyone from surfers to suburbanites.

The rapid growth of the San Diego region has sparked great concern among water resource planners. According to official estimates, an additional one million residents of the San Diego Region will require a 30% increase in water supply.<sup>70</sup> Most of this water will be imported from the Metropolitan Water District. Local sources, however, will play an increasingly important role. According to the 2000 Urban Water Management Plan, published by the San Diego County Water Authority and that lays out the region's water supply strategy for the next thirty years, "Local resources provide the Authority and its member agencies with highly reliable water, under local control, with more price certainty than is provided by Metropolitan [Water District], the Authority's main supplier of imported water."<sup>71</sup>

These local resources include both surface water and ground water. The San

Diego River is one of the primary sources of local surface water in the San Diego region. Providing water to as many as 760,000 residents in the region, San Diego River water is stored in five reservoirs along the waterway.<sup>72</sup> Groundwater in the San Diego region has historically not been heavily used as a water supply source, primarily because of high salt content. Projections outlined in the Urban Water Plan, however, list groundwater as a source of increased water supply. To meet increased demand, San Diego water planners project an increase in groundwater use of 91% by 2020.<sup>73</sup>

Located directly adjacent to Qualcomm Stadium, home of the 2003 Super Bowl, the Mission Valley Tank Farm was established in 1963 as a major storage facility for petroleum to be distributed throughout San Diego County. With a storage capacity of 25 million gallons, the tank farm is owned and operated by some of the largest oil companies in the world, including Shell Oil and Exxon-Mobil.<sup>74</sup>

In 1991, the San Diego Regional Water Quality Control Board, the local agency in charge of enforcing water quality laws in the area, received several reports of massive contamination underneath the storage facility's petroleum storage tanks. The report detailed heavy concentrations of poisonous gasoline chemicals well above state health standards. These chemicals included toxics like benzene, toluene and xylene that have been linked to cancer. One company even reported a well that contained one foot of leaked petroleum at its bottom.<sup>75</sup> Despite the discovery of this extensive contamination and cleanup orders issued by the San Diego Regional Water Quality Control Board, the responsible oil companies stalled cleanup. Failing to meet the deadline for full cleanup in 1995, the companies asked for—and received—an extension until 1999.<sup>76</sup>

In 1996, under state mandate, the oil companies began testing for MTBE, a component of petroleum linked to cancer that

### SAN DIEGO

#### 180 ACRE-FEET OF UNUSED WATER EACH YEAR

**Pollutant:** MTBE, toxin linked to cancer

**Polluter:** Large oil companies like Shell Oil and Exxon-Mobil

**Policy Recommendation:** Require polluters to pay costs of replacing contaminated water that will be a future drinking water source

oil companies falsely touted as the answer to California’s air quality problems. Highly mobile in water, MTBE was found to have travelled 6,000 feet from the site and was threatening the groundwater quality of the entire area.<sup>77</sup> Despite the discovery of MTBE and the extension of the cleanup deadline, oil companies continue to delay full cleanup. While the companies have installed some treatment wells that have removed up to 650,000 pounds of hydrocarbons from the groundwater, the contamination continues to spread.<sup>78</sup>

The impact on local water supplies of the Mission Valley Tank Farms cannot be underestimated. In an attempt to slow the spread of contamination, oil companies are pumping massive amounts of groundwater from the basin, treating it to meet basic water quality standards, then releasing the water into the San Diego River to be washed into the ocean. This groundwater, contained in the Mission San Diego Hydrologic Sub-area, is listed by the city as a potential source of drinking water. The city would like to tap into the area for drinking water by 2015.<sup>79</sup>



Photo credit: City of San Diego

Each year, however, millions of gallons are pumped out of the aquifer and permanently disposed of in a nearby creek. In 2002, between March and October, 39 million gallons of treated water from the basin was washed out to sea. Should cleanup take until 2015, the total amount of potential water supply lost to San Diego County from MTBE pollution will amount to 10% of the total amount of groundwater needed to meet the San Diego region’s needs over the next twenty years.<sup>80</sup>

**Table 2. Potential Drinking Water Pumped out of Local Groundwater Basin and Released to Ocean Due to Contamination in 2002**

Month	Amount (gallons)
March	5,312,640
April	5,248,130
May	5,281,020
June	5,133,030
July	3,035,690
August	4,314,200
September	4,858,480
October	5,843,390
Total for 8 months	39,026,580

## THE INLAND EMPIRE AND PERCHLORATE

**T**he Inland Empire is made up of Riverside and San Bernardino counties. The region, a rapidly expanding network of small cities and suburbs is located just east of Los Angeles County and boasts affordable housing and safe living for all newcomers. In recent years, the region has experienced an economic boom. The Inland Empire Economic Partnership reports, “The Inland Empire produces new jobs at a five percent rate, or nearly 50,000 per year, outpacing all other state regions.” The personal income of the region reaches \$58 billion and surpasses that of eighteen states.<sup>81</sup>

The rapid economic growth projected for the Inland Empire, however, is in jeopardy. This past year local water agencies shut down twenty local drinking water wells due to contamination by perchlorate, a component of rocket fuel.<sup>82</sup> The chemical, which can cause decreased IQ and affects the brain development of unborn fetuses at very low concentrations, was present in some wells at 250 times the state safety standard.<sup>83</sup> Inland Empire cities such as Colton lost a third of their drinking water supplies.<sup>84</sup>

Companies that caused the contamination are fighting cleanup efforts. In all, the Santa Ana Regional Water Quality Control Board (Regional Board) the local agency that oversees water quality in the region, has identified 30 responsible parties. Among these are

huge companies like Black & Decker and Goodrich Inc.<sup>85</sup>

Slow handling by the Regional Board has allowed the contamination to spread quickly. In 1997, the City of Rialto discovered perchlorate in one of its drinking water wells.<sup>86</sup> Despite this report, the Regional Board did not move to identify the polluters and limit the spread of contamination. The contamination soon spread to 19 other wells in three other cities. Finally forced to act by pressure from local legislators, the Regional Board conducted investigations and found that the source of contamination was a landfill purchased by the County of San Bernardino from several companies that used perchlorate decades ago.

This discovery, however, was not enough to prompt cleanup measures. The County of San Bernardino, which had covered the site with one million cubic yards of dirt, denied all responsibility for the contamination.<sup>87</sup> Other responsible parties identified by the Regional Board, such as Black & Decker, also denied any responsibility for the cleanup. Meanwhile, fearing the collapse of the region’s water supply and lacking the resources to begin cleanup, local water utilities implored officials to act.<sup>88</sup>

Responding to these pleas, State Senator Nell Soto established a regional Perchlorate Task Force to speed up cleanup efforts.<sup>89</sup> In response to its prompting, the Regional Board issued an order requiring the polluting companies to pay the full costs of providing the community with replacement water and cleanup costs.<sup>90</sup> The next day, however, in a meeting closed to the public, the Regional Board rescinded the order.<sup>91</sup> On January 12<sup>th</sup>, affected water utilities reached a settlement agreement with one of the responsible parties, Goodrich. The other 29 responsible parties have yet to contribute any resources to the cleanup effort.

The perchlorate contamination that affects the Inland Empire is wreaking havoc with local water supplies. The six-mile long plume

### THE INLAND EMPIRE

#### 61,790 ACRE-FEET OF UNUSED WATER EACH YEAR

**Pollutant:** Perchlorate, thyroid-damaging chemical

**Polluter:** Large manufacturers like Black & Decker and Goodrich

**Policy Recommendation:** Implement an ‘early warning system’ that notifies communities of imminent contamination

stretches into the water supplies of four cities, Rialto, Colton, San Bernardino, and Fontana, and threatens the water supplies of nearby Riverside. In total, the contaminant is found in 75 supply wells in San Bernardino County. To date, the contamination has resulted in 61,790 acre-feet in lost water supplies each year. This lost capacity is crippling. Several local officials warn that due to contamination, the region will not have enough water to carry it through the summer.<sup>92</sup>

The costs involved in importing extra water are enormous. The City of Colton estimates that it currently spends about \$4,000 a day to import water.<sup>93</sup> Perchlorate has destroyed a third of the city's water supply. The cost to treat the contaminated wells is incapacitating as well. Officials estimate that the cost of cleanup will be approximately \$2 million per well; treatment will increase the cost of water produced from \$100/acre-foot to \$455/acre-foot. This amounts to \$44 million that must be paid by polluters, but does not include the extra costs already shouldered by the public. In November 2002, the State Water Resources Control Board approved a \$3 million emergency loan to the City of Colton to begin cleanup efforts.<sup>94</sup>

In addition to the economic impact of the contamination, perchlorate is throwing the region's plan for growth into serious jeopardy. A state law passed last legislative session mandates that before any new housing can be built, a builder must demonstrate a reliable water supply.<sup>95</sup> Water officials in

San Bernardino currently question whether there will be enough water to supply existing residents this summer, let alone hundreds of thousands of additional residents projected by growth estimates. To meet growth demands, the San Bernardino Municipal Water District estimated that it needed to increase local groundwater capacity to 240,000/acre-foot per year.<sup>96</sup> With 61,790 acre-feet or 25% of this estimated need each year tied up by contamination, the economic future of the Inland Empire is in serious jeopardy.

The contamination of the drinking water of the Inland Empire by perchlorate is particularly egregious because of the lack of warning to the community. When perchlorate was first discovered in Rialto, it had not yet spread to surrounding communities. Despite the likelihood that the contaminant had spread, however, surrounding towns like Colton and Fontana were not provided any warning. If they had been aware of the danger, the impacted water systems could have implemented measures to confront contamination earlier. In order to prevent future cases, 'early warning systems' should be implemented that notify communities of potential contamination threats *before* they pollute local drinking water supplies. After contamination has already occurred, cleanup costs and replacement water costs escalate dramatically; preventing contamination in the first place is cost effective and the safest option for public health.

## RANCHO CORDOVA AND PERCHLORATE

**R**ancho Cordova, a small suburban community in Northern California, offers a quiet, safe haven for 20,000 largely middle-class families.<sup>97</sup> But, located 10 miles east of Sacramento, near the confluence of the American and Sacramento Rivers, the region is victim to one of the oldest groundwater contamination controversies in the state.

Since 1951, Aerojet Corporation, one of the industry's leading makers of solid and liquid propellants, has operated an industrial facility in the northeast corner of the city. Violating numerous environmental and safety codes for decades, operators at the plant dumped waste chemicals into deep, unlined pits. Among these chemicals was perchlorate, a component of rocket fuel. Perchlorate is an extremely hazardous toxic that can cause decreased IQ in developing fetuses and thyroid problems in adults.<sup>98</sup>

According to U.S. EPA records, the perchlorate dumped on the grounds radiated from the site in six plumes. The plumes spread into local drinking water sources and were first officially noted in the mid 1980's.<sup>99</sup> In 1997, after performing more sensitive tests, local water officials discovered the contaminant in several local

drinking water wells. By the time testing was complete, perchlorate contaminated 55% of the city's water supply.<sup>100</sup>

The discovery prompted a public outcry and demands of compensation for damages done to public health. In 1997, several community members living in close proximity to the plant filed a lawsuit claiming that Aerojet Corporation committed fraud in denying leaks from its facility. Complaints surfaced of entire families who were afflicted by thyroid abnormalities and other diseases linked to perchlorate exposure. Greg Voetsch, a local minister, described a litany of thyroid-related problems that afflicted him and family members. These health problems ranged from cancerous thyroid tumors to abnormal hormone conditions.<sup>101</sup>

In addition to the public health problems sustained by citizens of Rancho Cordova, the contamination of the community's water supply also threw local water supply plans into chaos. After losing over half of its water supply from contamination, the City of Rancho Cordova searched frantically for new sources. In 1998, Arden Cordova filed suit against Aerojet to recover the costs of building a local water treatment plant.<sup>102</sup>

In all, eleven drinking water wells in Rancho Cordova are currently closed due to contamination. These wells are capable of producing 7,260 gallons each minute or 12,818 acre-feet of water each year, enough to supply over 25,000 families for a year. An additional six are threatened by spreading contamination.<sup>103</sup>

This contamination has led to concerns that the community drinking water need will be unmet in coming years. The community has managed to obtain temporary water supplies from nearby cities, but a long-term solution to replacing the contaminated water remains elusive. One suggestion is to deposit treated ground-

### RANCHO CORDOVA

#### **12,818 ACRE-FEET OF WATER UNUSED EACH YEAR DUE TO CONTAMINATION**

**Pollutant:** Perchlorate, thyroid-damaging chemical

**Polluter:** Large industrial manufacturers like Aerojet Corporation and The Boeing Company

**Policy Recommendation:** Communities should have access to information that identifies potential drinking water contamination sources in a community.

water into the nearby American River and withdraw the equivalent volume of water downstream. This proposal, however, raises concerns over additional contamination of the vital waterway.

In order to protect California's water supplies from such contamination in the future, the California Department of Health Services (DHS) must make all information about potential drinking water contaminants sources readily available to the public. The DHS Drinking Water Source Assessment Program, as required by the federal Safe Drinking Water Act, identifies and maps all potential sources of drinking water contamination in a community. If the citizens of Rancho Cordova had access to such information readily, the community may have identified the source of the mysterious ailments plaguing its citizens much sooner than it did. Armed with this information, the community could have acted sooner to stop the spread of contamination.

In order to prevent such harm in the future, DHS should provide specific infor-

mation to the public on which facilities are prone to contamination. This information should be readily accessible on the Internet and in an easily understandable format.

**Table 3. Drinking Water Wells in Rancho Cordova Closed Due to Contamination<sup>81</sup>**

Well Number	Production capacity (gallons per minute)	Amount of Potential Water Supply Lost (acre-feet per year)
1	405	652.97
3	750	1209.20
4	350	564.29
7	700	1128.59
11	760	1225.33
12	675	1088.28
13	950	1531.66
14	800	1289.82
15	300	483.68
16	500	806.13
19	1760	2837.60
Total:	7,950	12,817.54

## POLICY RECOMMENDATIONS

Each drop of water in California is precious. From the rivers of the North to the aquifers of the South, every ounce of available water in the state is needed to grow food, quench thirst or support the environment. At a time when California's water supply from the Colorado River has been halved, and the spectre of drought looms on the horizon, our need to tap all possible water sources has never been greater.

Due to contamination, however, many of our water supplies are unusable and many more are threatened. Across the state, pollution has contaminated the groundwater that millions rely upon. An examination of just six of these cases reveals that billions of gallons of water each year go unused because of this contamination. This water is sufficient to supply over 400,000 families for a year and to make up 35% of the water just lost from the Colorado River.

As California continues to grow, the need to protect the drinking water sources that we have left becomes increasingly urgent. If we do not adopt measures to protect our water supplies, we place the very future of the state in jeopardy.

The following recommendations suggest policy changes that would prevent additional contamination of California's precious underground water supplies.

### **1. Reduce the use of contaminants that threaten our drinking water sources.**

From MTBE to perchlorate to nitrates, chemicals linked to serious health problems are used in massive quantities throughout the state.

- MTBE is a gasoline additive linked to cancer that contaminates 10,000 groundwater sites throughout the state. While many of California's retail gasoline companies recently revealed intentions to phase out MTBE from their supplies, several major companies such as Exxon and Ultramar have not announced any

plans to stop using the additive. This delay continues despite the recent one-year delay of a statewide ban on MTBE use. These companies should immediately phase out the chemical from their petroleum supplies.

- In 1998, U.S. EPA announced plans to formulate a national nutrient management strategy. As part of this effort, U.S. EPA released national objectives to limit the occurrence of nitrates in water supplies in October 2002. State officials should incorporate these guidelines and set nitrate pollution limits throughout California. These guidelines should also be incorporated into other state programs that set pollution limits.

### **2. Increase public access to information about pollution threats.**

Although drinking water quality is a major concern to Californians, communities are often unaware of contamination threats facing their drinking water supplies.

- Despite knowledge of leaks at their facilities, companies often fail to warn communities of impending contamination. Had the City of Santa Monica been warned of nearby MTBE leaks by oil companies, for example, local water officials may have been able to prevent the shut down of 80% of the city's water supply. In order to protect public health and reduce cleanup costs, water suppliers should have access to information about the use and leaks of contamination-prone chemicals in the vicinity of drinking water wells.
- The California Department of Health Services (DHS) Drinking Water Source Assessment Program identifies and maps potential threats to drinking water sources. This information should be posted on the Internet and available to the public in an easily understandable, detailed format. Had the citizens

of Rancho Cordova been apprised of the potential contamination threat posed by the Aerojet facility, the community may have identified the source of the mysterious ailments plaguing its citizens much sooner.

### **3. To prevent pollution, government agencies should require full payment of cleanup costs and replacement of lost water supplies by companies that cause contamination.**

- When a local drinking water supply is polluted, the cost of providing replacement water often falls to the community. In the case of the City of Colton in the Inland Empire, for example, the city spends \$4,000 a day to provide its citizens with safe replacement water. Those responsible should pay the full cost of providing replacement water to a community whose water supply they have tainted.
- Often when a community drinking water supply is contaminated, responsible parties delay cleanup for years. In the San Gabriel Valley, for example, a final cleanup agreement was signed 20 years after contamination was first discovered. Government agencies should use all available tools, including civil penalties, to ensure that cleanup of contaminated drinking water sources proceeds as quickly as possible.

### **4. Increase citizen participation in pollution prevention.**

- Volunteer citizen monitoring is an increasingly powerful, cost-effective tool to monitor our most important drinking water sources. Government agencies should fully utilize data obtained through citizen monitoring programs and provide technical assistance to these programs.
- Information regarding contamination threats should be fully disseminated to the public and all public meetings should be announced far in advance. The public

should also be fully involved in the zoning and siting of facilities that use or store chemicals likely to contaminate groundwater.

### **5. Fully implement and enforce discharge permits to surface water.**

- National Pollution Discharge Elimination Permits limit the discharge of contaminants into surface water bodies. According to the 2002 Legislative Analyst's Office Budget Analysis, however, in 2001 the State Water Resources Control Board issued fines to only 44% of significant NPDES permit violators. Full enforcement of these permits will protect California's underground water supplies by reducing the amount of contamination that percolates through the soil and into the groundwater.

### **6. Establish protective zones to protect drinking water wells.**

Groundwater aquifers that provide drinking water to a community should be protected from activities that could contaminate the local underground water supply.

- The U.S. EPA Sole Source Aquifer program provides protection to groundwater basins that provide over 50% of the drinking water in a community. Mandated by the federal Safe Drinking Water Act, the program requires that U.S. officials review any facility that could endanger a sole-source aquifer before construction. A groundwater basin is designated a sole-source aquifer after a petition is submitted by a private citizen, community organization or local agency. In order to maximize the effectiveness of the program and protect California's drinking water sources, all qualifying aquifers in California should be registered with the U.S. EPA and protected to the maximum extent.

### **7. Increase the monitoring of underground drinking water sources for pollution.**

- In order to protect California's underground water supplies, it is essential to monitor them for pollution. Despite the overlapping jurisdiction of several government agencies, no coordinated groundwater monitoring program exists in California. In response to this problem, in 2001 the legislature passed and Governor Davis signed AB 599 into law. The law requires that state government agencies establish a coordinated statewide groundwater monitoring program. A task force will design this program with representatives from various responsible government agencies and members of the public. The recommendations issued by the task force should be adopted quickly by all responsible agencies. Only when California's groundwater is monitored comprehensively will contamination of drinking water supplies be prevented.

#### **8. Require permits for all discharges into California water bodies, including agricultural runoff.**

- Agricultural runoff is a major source of the nitrate contamination of California's waterways. Unlike other discharges of its kind, however, agricultural runoff is not subject to pollution permits set by state water quality agencies. On December 5<sup>th</sup>, 2002, the Central Valley Regional Water Quality Control Board voted to extend this waiver for two more years. This decision will greatly harm the quality of the state's waterways and drinking water. In order to protect the state's waterways from nitrate pollution, the Central Valley Regional Water Quality Control Board should lift the agricultural runoff waiver.

## ENDNOTES

1. US Department of the Interior, Press Release 'Interior Department Transmits 2003 Water Order Approvals to Colorado River Users.' 27 December 2002
2. Metropolitan Water District of Southern California, Report on Metropolitan's Water Supplies, 11 February 2002
3. Tony Perry, 'Southland Share of Water to Be Cut as Deal Collapses' The Los Angeles Times 1 Jan 2003 One acre-foot is approximately enough to supply two families with sufficient water from the year
4. California Department of Health Services, MTBE Occurrence Database, Last Updated 7 January 2003
5. Nancy Vogel, 'Tough Rule Urged for Gas Additive in Drinking Water,' Sacramento Bee, 9 May 1998
6. City production levels provided by Charmaine Bao, Water Supply Engineer, City of Santa Monica, 9 January 2002. In 1990, the City of Santa Monica produced 1.625 billion gallons from local groundwater sources. In 1995, the city produced 3.270 billion gallons
7. One acre-foot is enough to supply two families with water for a year
8. U.S. EPA Region 9, 'Unilateral Administrative Order for Water Replacement, Shell Oil Company, Shell Oil Products Company, Equilon Enterprises LLCI, U.S. (docket no. RCRA 7003-09-99-0007), 10 March 2000
9. [valleynet.org](http://valleynet.org), 'The Economic Partnership,' downloaded 17 January 2002
10. [epa.gov/superfund](http://epa.gov/superfund), 'U.S. EPA,' downloaded 13 January 2002
11. Number of disabled wells and capacity provided by Kevin Smead, Engineer, Main San Gabriel Basin Watermaster
12. 'U.S. EPA,' downloaded 13 January 2002
13. [epa.gov](http://epa.gov), 'U.S. EPA,' Consumer Factsheet on: Nitrates/Nitrites, downloaded 12 January 2003
14. Well capacities and closure numbers provided by Douglas Kirk, City of Fresno, 20 January 2002
15. Ibid.
16. Pablo Lopez, 'Fresno to Restore Four Wells,' The Fresno Bee, 5 June 2002
17. Well capacities and closure numbers provided by Leon Long, Assistant General Manager, West San Bernardino Municipal Water District
18. Andrew Silva, 'Our Troubled water,' San Bernardino County Sun, 14 December 2002
19. Andrew Silva, 'Water Board Spares Companies from Cleaning Order,' 13 September 2002
20. Kelly Dorsey, Engineering Geologist, San Diego Regional Water Quality Control Board, Clean Water Task Force Presentation, 5 December 2002
21. Letter to Mayor, City of San Diego from John H. Robertus, Executive Officer, San Diego Regional Water Quality Control Board, 15 November 2002
22. Volumes of treated water discharged provided by Cheryl, Engineer, San Diego Regional Water Quality Control Board, 10 January 2003
23. [populations.com](http://populations.com), 'The World News Network,' downloaded 21 January 2003
24. Number of disabled wells, well capacities provided by Alex MacDonald, Central Valley Regional Water Quality Control Board, 13 January 2003
25. US Department of the Interior, Press Release 'Interior Department Transmits 2003 Water Order Approvals to Colorado River Users.' 27 December 2002. Total amount of Colorado River water cut to California is 204,900 acre-feet to Imperial Irrigation District and 415,100 acre-feet to Metropolitan Water District of Southern California.
26. 'Interior Department to cut California Water Supply,' Associated Press, 28 December 2000
27. Press Release, Imperial Irrigation District, 'Imperial Irrigation District Sues Department of Interior to Defend Water Rights,' 10 January 2003
28. California Department of Water Resources, 'Drought Preparedness Home Page,' downloaded from <http://watersupplyconditions.water.ca.gov>, 14 January 2003
29. Happel, Halden, Beckenbach, 'An Evaluation of MTBE impacts to California Groundwater Resources', Lawrence Livermore Laboratory, June 11, 1998; National Institute of Health Sciences, MTBE Factsheet, downloaded from <http://www.niehs.nih.gov/external/faq/gas.htm>, 13 January 2002
30. California Department of Health Services, Perchlorate in California Drinking Water: Monitoring Update, Perchlorate in Drinking Water Sources (Year Initially Found), Last Update: January 7, 2003; "Perchlorate Environmental Contamination: Toxicological Review and Risk Characterization," United States Environmental Protection Agency, National Center for Environmental Assessment, Office of Research and Development, January 16, 2002, External Review Draft; Pesticide Watch, Environmental Working Group 'Tap Water in 38 Central Calif. Cities Tainted With Banned Pesticide Some Bottle-Fed Infants May Exceed 'Safe' Dose Before Age 1,' 15 November 1999
31. [househunt.com](http://househunt.com), "Santa Monica Real Estate," downloaded 9 January 2003.
32. City of Santa Monica, - "Sustainable City Home Page." Downloaded from [www.santa-monica.org/environment/policy](http://www.santa-monica.org/environment/policy), 9 January 2003
33. Santa Monica City Council, meeting minutes (item 6-S), 9 October 1990
34. City of Santa Monica, 'Urban Water Management Plan,' December 2000

35. Santa Monica City Council, meeting minutes (item 6-S), 9 October 1990
36. City of Santa Monica, Urban Water Management Plan
37. Conversation with Charmaine Bao, Utilities Engineer, City of Santa Monica, 6 January 2002
38. City production levels provided by Charmaine Bao, Water Supply Engineer, City of Santa Monica, 9 January 2002. In 1990, the City of Santa Monica produced 1,625 million gallons from local groundwater sources. In 1995, the city produced 3,270 million gallons. One acre-foot is equivalent to approximately 326,000 gallons of water, approximately enough to supply two families for a year.
39. California Department of Health Services, MTBE Occurrence Database, Last Update 7 January 2003
40. Nancy Vogel, "Tough Rule Urged for Gas Additive in Drinking Water," Sacramento Bee, 9 May 1998
41. U.S. EPA, Region 9, *Unilateral Administrative Order for Water Replacement, Shell Oil Company, Shell Oil Products Company, Equilon Enterprises LLC, U.S.* (docket no. RCRA 7003-09-99-0007), March 10, 2000
42. Ibid.
43. Charmaine Bao, City of Santa Monica
44. California Environmental Protection Agency, 'Geotracker' - Database, 10 January 2003
45. PCE (perchloroethylene), TCE (trichloroethylene) San Gabriel Basin Water Quality Authority, Press Release 'San Gabriel Basin Water Quality Authority and other Water Agencies Finalize Historic \$250 million Groundwater Cleanup Deal,' 28 March 2002
46. Cleanup costs obtained from [epa.gov/superfund](http://epa.gov/superfund), 'U.S.EPA Superfund Program', last updated 13 November 2002
47. [arcadia-realtors.com](http://arcadia-realtors.com), Arcadia Realtors, downloaded 17 Jan 2002
48. [epa.gov/superfund](http://epa.gov/superfund), U.S. EPA, Downloaded 13 January 2002
49. CA DHS, 'Primary MCLs' downloaded from <http://www.dhs.ca.gov/ps/ddwem/chemicals/MCL/primarymcls.htm>, 13 January 2003.
50. San Gabriel Basin Water Quality Authority, Press Release 'Water Authority Calls on EPA to Make Polluters Pay,' 3 December 2001
51. [dhs.ca.gov](http://dhs.ca.gov), 'Department of Health Services, Perchlorate Monitoring Data', downloaded 13 January 2002
52. San Gabriel Basin Water Quality Authority, Press Release 'San Gabriel Basin Water Quality Authority and other Water Agencies Finalize Historic \$250 million Groundwater Cleanup Deal,' 28 March 2002
53. Hartwell vs. Superior Court, S082782
54. San Gabriel Basin Water Quality Authority, 28 March 2002
55. [epa.gov/superfund](http://epa.gov/superfund), 13 November 2002
56. [epa.gov/superfund](http://epa.gov/superfund), updated 1 December 2002
57. Number of well closures and well capacity figures supplied by Main San Gabriel Water Master, email from Eric Smead, Engineer, 20 January 2002
58. [fresno-county.com](http://fresno-county.com), Fresno City and County Convention and Business Bureau, downloaded 14 January 2003
59. [censusscope.org](http://censusscope.org), Censusscope, downloaded 14 January 2003; Jim Davis and John Ellis "Water key to accord: County, city adopt pact on growth that may hinge on Fresno installing meters," The Fresno Bee, 7 January 2003
60. [epa.gov](http://epa.gov) 'U.S. EPA', Consumer Factsheet on: NITRATES/NITRITES, downloaded 12 January 2003
61. [dhs.ca.gov](http://dhs.ca.gov), California Department of Health Services, Drinking Water: Overview of Monitoring Results 1984-2000, Last Update: 10 September 2001
62. Pablo Lopez, "Fresno to Restore Four Wells," The Fresno Bee, 5 June, 2002
63. 2001 Water Quality Annual Report, City of Fresno, page 5
64. Increased cost estimate provided by Douglas Kirk, City of Fresno, personal communication, 10 January 2003
65. Pablo Lopez, 5 June 2002
66. Ibid.
67. Douglas Kirk, City of Fresno, 13 January 2002.
68. U.S. EPA 'EPA Water Quality Criteria,' downloaded from <http://www.epa.gov/waterscience/standards/nutrient.html>, 17 January 2002
69. San Diego Association of Governments, Demographic 'Fast Facts,' [http://www.sandag.org/resources/demographics\\_and\\_other\\_data/demographics/fastfacts/sand.htm](http://www.sandag.org/resources/demographics_and_other_data/demographics/fastfacts/sand.htm), downloaded January 11, 2001
70. San Diego County Water Authority, 2000 Urban Water Management Plan – p 2-1
71. Ibid, p 4-1
72. 'Project Cleanwater,' downloaded from [www.projectcleanwater.org](http://www.projectcleanwater.org)
73. EXISTING AND PROJECTED GROUNDWATER SUPPLIES (AF/YR), San Diego County Water Authority 2000 Urban Water Management Plan, Appendix E
74. San Diego Regional Water Quality Control Board, Cleanup and Abatement Order, 92-01, p 3
75. Ibid. p 2
76. Addendum No. 1 to Cleanup and Abatement Order

- 92-01, California Regional Water Quality Control Board, San Diego, 9 May 1994
77. Kelly Dorsey, Engineering Geologist, San Diego Regional Water Quality Control Board, Clean Water Task Force Presentation, 5 December 2002
78. Ibid.
79. Letter to Mayor, City of San Diego from John H. Robertus, Executive Officer, San Diego Regional Water Quality Control Board, 15 November 2002
80. Ibid.
81. [ieep.com](http://ieep.com), Inland Empire Economic Partnership, downloaded 19 January 2002
82. Leon Long, Assistant General Manager, West San Bernardino Municipal Water District
83. California Department of Health Services, Perchlorate Monitoring Update, Last Updated 7 Jan 2003
84. Emily Sachs, "Closure of three wells stirs action," San Bernardino Sun, 7 May 2002
85. Andrew Silva, 'Our Troubled Water,' San Bernardino County Sun, 14 December 2002
86. Rick McLaughlin, 'Plume focus of Rialto Meeting,' 29 October 2002
87. Andrew Silva, 'Task Force Pushes its Toxic Cases vs. County,' San Bernardino County Sun, 12 September 2002
88. Letter from Senator Soto to Santa Ana Regional Water Quality Control Board, September 12, 2002
89. Rick McLaughlin 'Plume Focus of Rialto Meeting,' San Bernardino County Sun, 29 October 2002
90. Santa Ana Regional Water Quality Control Board, Testimony of Executive Officer, Senate Committee on Urban and Economic Development, 28 October 2002
91. Rick McLaughlin, 'Water panel broke meeting laws, state lawmaker alleges,' San Bernardino County Sun, 21 September 2002
92. Pumping capacity and number of contaminated wells provided by Leon Long, Assistant General Manager, West San Bernardino Municipal Water District, personal communication, 10 Jan 2002
93. Andrew Silva, 'Water Board Spares Companies From Cleaning Order,' San Bernardino County Sun, 13 September 2002
94. Staff Reports, 'Board Okays \$3 million for cleanup,' Fresno Bee, 20 November 2002
95. [legweb.com](http://legweb.com), SB 221, 2001-2002 Senator Sheila Kuehl
96. West San Bernardino Urban Water Management Plan, 2002
97. [populations.com](http://populations.com), 'The World News Network,' downloaded 21 January 2003
98. [epa.gov/superfund](http://epa.gov/superfund) 'U.S. EPA National Priority List,' downloaded from <http://www.epa.gov/superfund/sites/npl/nar905.htm>, downloaded 20 January 2003
99. Ibid.
100. [bcwaternews.com](http://bcwaternews.com), "Brown and Caldwell," downloaded 13 January 2002.
101. Peter Waldman, 'Perchlorate Runoff Flows To Water Supply of Millions,' Wall Street Journal, 16 December 2002
102. Chris Bowman, 'Water utility targets latest Aerojet move,' Sacramento Bee, 20 October 2001
103. Data provided by Alex MacDonald, Aerojet Site Cleanup, Central Valley Regional Water Quality Control Board, 13 January 2003