LOS ANGELES[1]

Los Angeles earned a water quality and compliance grade of Fair for 2000 and 2001.

Elevated levels of cancer-causing by-products of disinfection were found in the water in parts of Los Angeles, including total trihalomethanes (TTHMs) and haloacetic acids (HAAs). In Central and Eastern Los Angeles, levels averaged 80 parts per billion of TTHMs in 2001, the maximum allowed limit permitted under new EPA standards for TTHMs, effective in January 2002. Other parts of the city registered average TTHM levels between 59 and 69 parts per billion—lower, but still relatively high. While not a violation of the law, these levels present a health concern including a risk of cancer. Los Angeles has begun switching to "chloramines" for disinfection, a half solution that will only modestly reduce the levels of these chemicals and will not kill chlorine-resistant pathogens. In the meantime, levels remain unacceptably elevated in parts of the city. The EPA announced the reduced standard more than eight years ago, in July 1994, after extensive regulatory negotiations resulted in an agreement with the water industry—a process of which Los Angeles was well aware and in which Los Angeles and its wholesaler Metropolitan Water District of Southern California (MWD) participated.[3] The final rule was issued in 1998.[4]

Arsenic levels in many areas of Los Angeles, including parts of central and eastern Los Angeles, western Los Angeles, and the San Fernando Valley, averaged approximately 4 parts per billion. Although this arsenic level is below the EPA's new 10-parts-per-billion drinking water standard, it still poses a lifetime cancer risk exceeding 1 in 1,000[5]—more than 10 times worse than the highest cancer risk the EPA usually allows from tap water. While L.A. has made some recent successful efforts to reduce its arsenic levels, additional measures are needed to reduce arsenic risks.

Radon was detected in some of Los Angeles's water wells at levels above the EPA's proposed 300-picocuries-per-liter proposed standard. Some wells in the Central and Eastern service area in 2000 had levels of radon that exceeded the EPA's proposed standard, although these levels fluctuated in 2001, dipping below the proposed standard. Radon in tap water at this level poses a lifetime cancer risk of about 1 in 3,000[6]—more than triple what the EPA says is the highest acceptable cancer risk from tap water. Levels at wells in the San Fernando Valley also came very near the maximum levels allowed under the EPA's proposed Maximum Contaminant Level (MCL), posing a cancer risk of nearly 1 in 5,000. While Los Angeles might be eligible for a waiver from the EPA's proposed standard, and while, in many L.A. homes, radon seeping into the basement is likely to be a bigger risk than tap water radon, the elevated levels of radon in some of L.A.'s drinking water remain a health concern.

Perchlorate, an unregulated contaminant from rocket fuel, was found in the L.A. system including in some wells in the San Fernando Valley and in some water used in central

NRDC
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WHAT'S ON TAP?
Grading Drinking Water in U.S. Cities
EARLY RELEASE
CALIFORNIA EDITION
October 2002

LOS ANGELES	
System Population Served 3.8 million[2]	
Water Quality and Compliance **2000▶Fair** **2001▶Fair**	
Right-to-Know Report—Citizenship **2000▶Good** **2001▶Good**	
Threats to Source Water	
Imported (90%)	**5**
Local (10%)	**3**
(1=least threat to 6=highest threat)	
REPORT CARD	

and eastern Los Angeles. Perchlorate levels ranged as high as 5 to 10 parts per billion—higher than California's January 2002 action level of 4 parts per billion, and much higher than the recently issued EPA draft safe level (the draft drinking water equivalent level, or DWEL) of 1 part per billion in drinking water. L.A. reports that average levels of perchlorate system-wide were less than 4 parts per billion, but some parts of the system had higher spikes.

Los Angeles continues to use two open, uncovered finished-water reservoirs that pose a threat to tap water. In 1998, state regulators cited the city for missing an interim deadline to remove one such reservoir from use. Finally, in 2001, Los Angeles took two Hollywood reservoirs out of service (except during emergencies), leaving the Encino and Lower Stone Canyon reservoirs online. The city is now under orders from the state to move gradually away from their use by 2003–2004. State and federal rules require that they be removed from service, or that water from them be treated further, because runoff into the uncovered reservoirs could contaminate tap water with microbes or other contaminants.

Nitrate levels sometimes exceeded EPA standards in wells. While L.A. water generally contains very low levels of nitrates, at least some wells in the San Fernando Valley contained nitrates at levels up to 11 parts per million—in excess of the EPA standard of 10 parts per million. L.A. authorities deny that the water was in violation, because the city blends higher nitrate water with lower nitrate water from other sources, bringing the levels in water actually delivered to customers below the standard—at most, about half the standard.[7] Nitrate is the product of fertilizers and human or animal waste, and infants who drink excessive nitrates for even a short period of time can develop "blue baby syndrome," in which nitrate poisoning prevents their blood from holding oxygen. Nitrate levels in L.A.'s water therefore merit careful monitoring.

Other contaminants detected in Los Angeles's treated water in 2000 or 2001 that are of potential health concern include total chromium and chromium 6, cancer-causing radioactive contaminants (including alpha and beta radiation, radium, and uranium), perchloroethylene (also called "perc," PCE, or tetrachloroethylene), toluene, and trichloroethylene (TCE). None were found at levels that exceeded EPA standards, although in some cases, the EPA has no standard in place. Levels did often exceed California's health goals, the level at which no harmful health effects are caused.

The need for major capital investment in L.A.'s water infrastructure

The Los Angeles Department of Water and Power (LADWP) has adopted a five-year, $2 billion capital improvement budget for water services, including more than $500 million to pay for water quality improvements.[8] The LADWP pipeline rehabilitation program has relined approximately 850 miles of old water mains already, and expects to spend $340 million over the next 10 years to line an additional 130 miles per year.[9] Los Angeles is replacing water meters to improve their accuracy, and improving computer controls, telemetry, and water quality monitoring.[10] Water costs are expected to increase over the next five years as Los Angeles complies with new drinking water standards and continues to replace aging water mains.[11] A capital improvement program to bring the city's open reservoirs into compliance with EPA and state standards will cost an estimated $417 million over the next decade.[12]

Los Angeles earned a Good for its 2001 and 2000 right-to-know reports.

On the "good citizen" side of the ledger:

▶ The format of the reports and their tables were relatively user friendly—one of the better reports reviewed by NRDC.

▶ The reports described specifics on how the water is treated, and included useful diagrams.

▶ Los Angeles produced four separate right-to-know reports; each provided "area-specific" data, thus preventing the confusion that could occur if all areas were grouped together into one report.

▶ The reports included good source water information and maps.

▶ The reports revealed information about the health effects of some contaminants found in the city's water, even though such information is not required by the EPA.

▶ The 2001 reports included a "public health goal report" that acknowledged that Los Angeles does not meet 13 state Public Health Goals or Maximum Contaminant Level Goals, discussed the reasons for those failings, and put forth the city's plans for fixing the problems.

▶ The 2001 reports prominently included a "special notice to immuno-compromised" individuals, under a large headline on the first page after the cover letter.

▶ The reports included useful information on system rehabilitation and treatment and on water conservation.

▶ The reports made no sweeping statements about the absolute safety of the water, although they did emphasize that L.A. water "met or surpassed all drinking water standards."

▶ The reports summarized special information on the switch to chloramines as a disinfectant, and gave "special notice" to users of kidney dialysis machines, and fish owners about the implications of the switch for them.

On the "not-so-good citizen" side of the ledger:

▶ Los Angeles did not translate its reports into Spanish or any other language. According to the 2000 Census, 42 percent of L.A.'s population speak Spanish at home, and 25 percent speak Spanish but speaks English "less than very well." The EPA and state rules require that systems serving "a large proportion of non-English speaking residents," defined in California's regulations as 10 percent or 1,000 people, must provide information on the importance of the report in the relevant language(s), or a phone number or address where citizens can get a translated copy of the report or assistance in their language.[13] Los Angeles admits that it "should have" translated the report at least into Spanish, but still has not done so.[14] Los Angeles does make the mandatory reference in Spanish in the reports to their importance, and gives a phone number for more information in Spanish, but provides no translated reports. In addition, more than 8 percent of L.A. citizens, far more than the 1,000 cited by state regulations, speak Asian or Pacific Island languages, yet the reports only included the mandatory short statement in five other languages directing consumers to find someone to translate the report into their native tongue. Chinese, Korean, Vietnamese, and Cambodian are widely spoken in Los Angeles and the city should consider translating the reports, or at least providing assistance in these languages.

▶ The 2000 and 2001 reports included no information on specific known or potential polluters in L.A.'s watershed, nor did they map or otherwise indicate the locations or types of such polluters. EPA and state rules require utilities to name known or likely sources of any regulated contaminant found in tap water.[15] For example, L.A. and the Metropolitan Water District of Southern California are aware that a Kerr-McGee plant in Nevada is the source of the perchlorate contamination in the portion of the city's water supply that comes from the Colorado River, but the right-to-know report never specifically mentioned this plant. Even where EPA rules do not require such specific notice about a specific polluter, or where the specific polluter cannot be tied with assurance to a specific contaminant, the EPA encourages water systems to highlight significant sources of contamination in the watershed. Dissemination of such information helps increase consumer awareness of the importance of protecting the watershed.

▶ While the right-to-know reports discussed some health effects of some contaminants—perchlorate and chromium 6, for example—they did not include explanations of the health effects of certain regulated contaminants found at levels in excess of health goals, including, for example, chlorination by-product chemicals linked to cancer and possibly to reproductive problems (e.g., trihalomethanes and haloacetic acids), and radioactive contaminants known to cause cancer.

Los Angeles earned "Threats to Source Water" ratings of 3 for the area surface water in the water supply, and 5 for the vast majority of the water supply that is from local groundwater or imported from elsewhere.

As discussed in greater detail below, nearly 90 percent of Los Angeles's water is imported from elsewhere. The EPA ranks the threats to many of the sources for the city's imported waters as "5" on its Index of Watershed Indicators (IWI) watershed threat scale, a six-point scale ranging from 1 (least threat) to 6 (highest threat). In 2001, about 47 percent of Los Angeles's water came from the Colorado River (the source of water for the Colorado River Aqueduct) or from Northern California (sources of water for the State Water Project). Parts of the Colorado River watershed and these Northern California watersheds have a high threat ranking of 5. In addition, parts of the watershed originating at Mono Lake and feeding the Los Angeles Aqueduct, which in 2001 provided about 41 percent of Los Angeles's water, also rank as a 5 on the watershed threat scale. Finally, about 12 percent of the city's water (particularly in the San Fernando Valley and the Manhattan well field, which is sometimes used to supply water to parts of Eastern and Central L.A.) is from local groundwater supplies. The EPA ranks the water quality threats to Los

Angeles's local watershed as a 3.[16] While the EPA does not use the IWI scale to rank threats to groundwater, some of the local groundwater used by Los Angeles is threatened by urban pollution, agricultural pollution, and other pollution sources, as is illustrated by the fairly low levels of industrial chemicals and other contaminants found in local wells.

KEY CONTAMINANTS FOUND ABOVE NATIONAL HEALTH GOALS

The following contaminants are found in Los Angeles's drinking water. For more information on their properties and health effects, see chapter 2, "Health Concerns for Common Tap Water Contaminants."

MICROBIOLOGICAL CONTAMINANTS

Total Coliform Bacteria

Levels found city wide 2000[17]	Range: 0–0.30%	Average: 0.08%
Levels found city wide 2001[18]	Range: 0–0.5%	Average: 0.2%

National Standard (MCL) for Coliform Bacteria: 5%

National Health Goal (MCLG) for Coliform Bacteria: 0

Note that contaminant levels are presented as a percentage. Total coliform is regulated as a percentage of positive samples that are present in water. The national standard of 5 percent means that if more than 5 percent of the utility's total coliform samples test positive, then the national standard has been violated. To say that a sample tests positive is to say that there are total coliform bacteria present in the sample. Therefore, for compliance purposes, the utilities provide the percentage of total coliform samples that tested positive.

Total coliform bacteria is a microbial contaminant and its presence is a potential indicator that disease-causing organisms may be present in tap water. The coliform bacteria finding in Los Angeles is not viewed as a serious health threat to healthy consumers. The fact that low levels of coliform are detected in Los Angeles's water is a potential indication that bacterial regrowth may be occurring in the city's distribution system. Some studies suggest that serious regrowth problems may allow disease-causing pathogens to subsist in pipes.

INORGANIC CONTAMINANTS

Arsenic

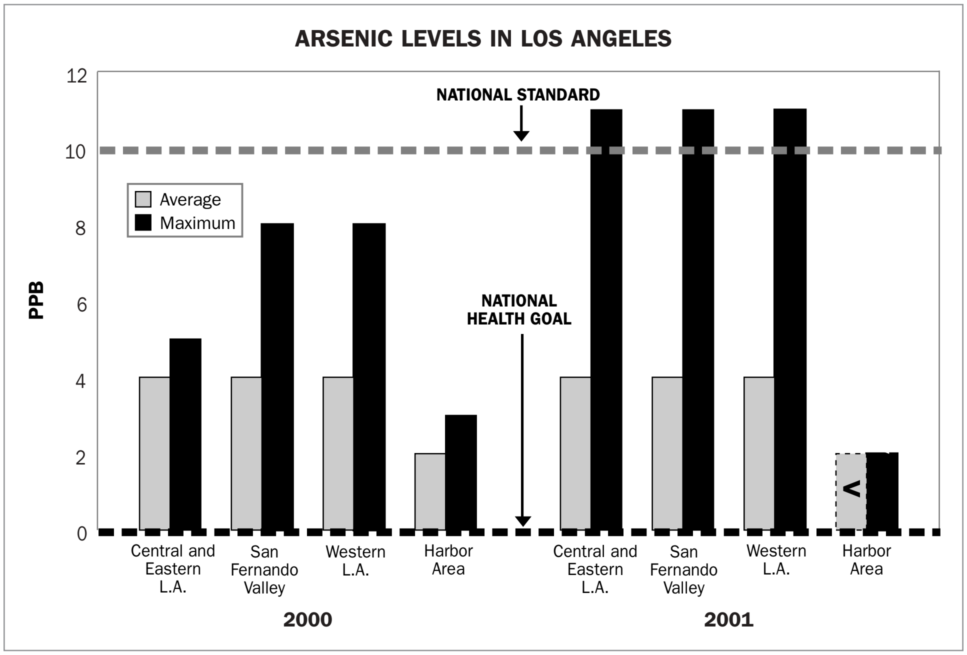
Levels found 2000

Central and East Los Angeles	4 ppb average[19]	5 ppb maximum
San Fernando Valley	4 ppb average[20]	8 ppb maximum
Western Los Angeles	4 ppb average[21]	8 ppb maximum
Harbor Area	2 ppb average[22]	3 ppb maximum

Central and East Los Angeles average is for the Upper Hollywood Reservoir, highest in the area. San Fernando Valley average is for the L.A. Aqueduct water, highest in the area.

Levels found 2001

Central and East Los Angeles	4 ppb average[23]	11 ppb maximum
San Fernando Valley	4 ppb average[24]	11 ppb maximum



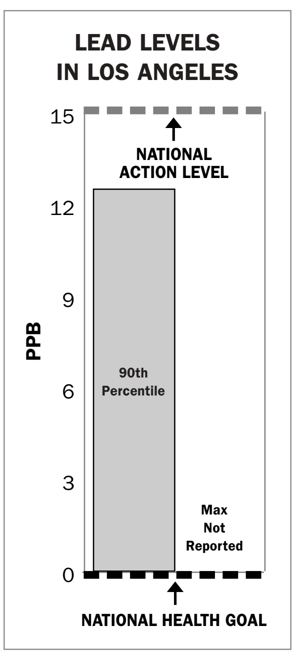
Western Los Angeles	4 ppb average[25]	11 ppb maximum
Harbor Area	<2 ppb average[26]	2 ppb maximum

Central and East Los Angeles average is for the Los Angeles Filtration Plant, highest in the area. San Fernando Valley average is for the L.A. Filtration Plant and Encino Reservoir water, highest in the area.

National Standard (MCL): 10 ppb (average) (effective 2006) (50 ppb effective through 2005)

National Health Goal (MCLG): 0 ppb—there is no known fully safe level of arsenic

Arsenic is a known and potent human carcinogen and is linked to a variety of other diseases.[27] While the average arsenic level in Los Angeles's blended and treated water is below the new EPA standard of 10 parts per billion, even at 3 parts per billion arsenic poses a cancer risk of about 1 in 1,000, according to the National Academy of Sciences.[28] That risk level is 10 times higher than the EPA usually allows. According to the most recent published information from LADWP, the major contributing source of arsenic is Hot Creek near Lake Crowley, apparently a source of naturally occurring arsenic. Other local wells are also problematic.[29] Los Angeles could and should take additional action to remedy the city's arsenic problem.



Lead

Levels Found 1992: 12–13 ppb at 90th percentile levels (1992 data is most recent tap sampling reported)[30]

National Standard (TT): 15 ppb (action level)

National Health Goal (MCLG): 0 ppb—there is no known fully safe level of lead

Los Angeles's most recent reported sampling for lead was completed in 1992. Lead[31] is a major environmental threat; no amount of it in water is considered safe. Even though it has reported no lead testing for a decade, Los Angeles claims it has been in compliance with the EPA standard since at-the-tap monitoring began in 1992, saying it did not exceed the EPA action level in more than 10 percent of homes tested. However, it appears to NRDC that EPA rules, as amended in 2000, required LADWP to conduct updated monitoring by 2000, as well as to install corrosion control within 18 months if, as appears is the case, the city's 90th percentile lead level (12 to 13 parts per billion in 1992) was more than 5 parts per billion higher than its lead level when it left the treatment plant. LADWP says it plans to install corrosion control treatment that will make L.A. water less likely to leach lead from pipes.[32] A demonstration facility to reduce lead leaching through the addition of a corrosion inhibiter will be constructed in Stone Canyon Reservoir complex. The facility is scheduled to be operational in 2002, and the technology will be installed system-wide later.[33]

Nitrate

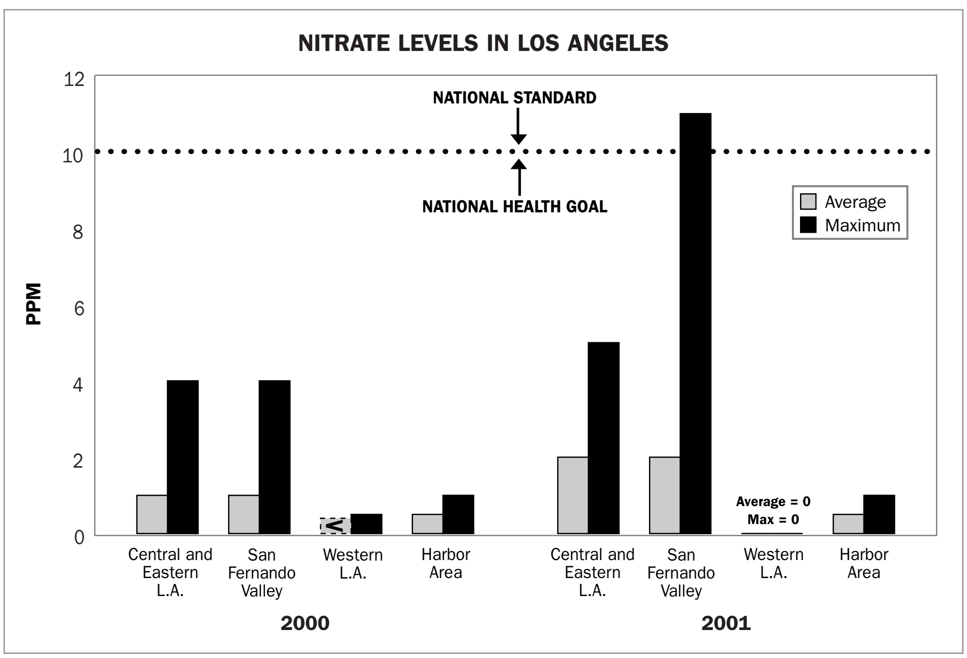
Levels Found 2000

Central and East Los Angeles	1 ppm average[34]	4 ppm maximum
San Fernando Valley	1 ppm average[35]	4 ppm maximum
Western Los Angeles	<0.4 ppm average[36]	0.5 ppm maximum
Harbor Area	0.5 ppm average[37]	1 ppm maximum

Central and East Los Angeles average listed is for the Upper Hollywood Reservoir, highest in the area. San Fernando Valley average is for the Los Angeles Aqueduct water, highest in the area.

Levels Found 2001

Central and East Los Angeles	2 ppm average[38]	5 ppm maximum
San Fernando Valley	2 ppm average[39]	11 ppm maximum
Western Los Angeles	Not detected[40]	
Harbor Area	0.5 ppm average[41]	1 ppm maximum



Central and East Los Angeles average is for the Los Angeles Filtration Plant, highest in the area. San Fernando Valley average is for the Los Angeles Filtration Plant and Encino Reservoir water, highest in the area.

National Standard (MCL): 10 ppm (two-sample average within 24 hours)

National Health Goal (MCLG): 10 ppm

Excess nitrates, even after very short-term exposure, can pose an acute risk to infants, causing what is known as "blue baby syndrome."[42]

Perchlorate

Levels Found 2000

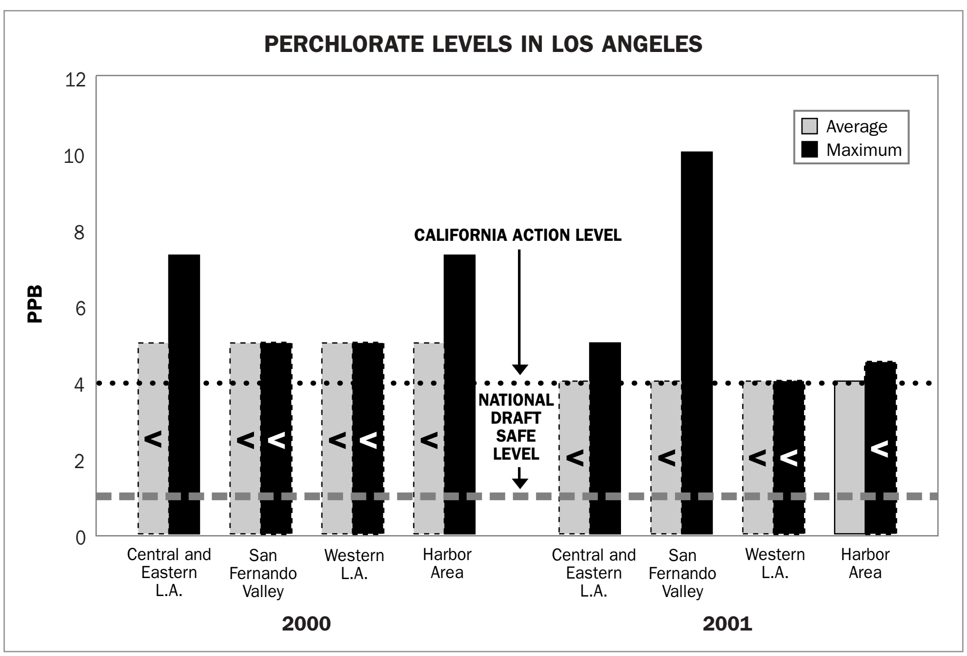
Central and Eastern Los Angeles	<5 ppb[54] average	7.3 ppb maximum
San Fernando Valley	<5 ppb[55] average	<5 ppb maximum
Western Los Angeles	<5 ppb[56] average	<5 ppb maximum
Harbor Area	<5 ppb[57] average	7.3 ppb maximum

Central and Eastern Los Angeles maximum level recorded at Lower Hollywood reservoir. Harbor Area maximum level recorded at Weymouth Treatment Plant.

Levels Found 2001

Central and Eastern Los Angeles	<4 ppb[58] average	5 ppb maximum
San Fernando Valley	<4 ppb[59] average	10 ppb maximum
Western Los Angeles	<4 ppb[60] average	<4 ppb maximum
Harbor Area	4 ppb[61] average	<4.5 ppb maximum

Central and Eastern Los Angeles maximum level recorded at MWD's Weymouth Plant. San Fernando Valley maximum level recorded in combined wells for San Fernando Valley. Harbor Area maximum level recorded at Weymouth Treatment Plant reported in Central and Eastern LA was 5 ppb; according to the Harbor Area report, the same Weymouth plant had a maximum of <4.5 ppb.



National Standard (MCL): None established
National Draft Safe Level ("Drinking Water Equivalent Level,"or DWEL): 1 ppb[62]
California Action Level (health-based advisory level): 4 ppb

Perchlorate is an inorganic contaminant that harms the thyroid and may cause cancer. It usually comes from rocket fuel spills or leaks at military facilities.[63] Perchlorate gets into Los Angeles water via the Metropolitan Water District's Colorado River Aqueduct, which has been contaminated by perchlorate from a Kerr-McGee site in Henderson, Nevada.[64] Some LADWP wells in the San Fernando Valley also contain perchlorate.

ORGANIC CONTAMINANTS

Total Trihalomethanes

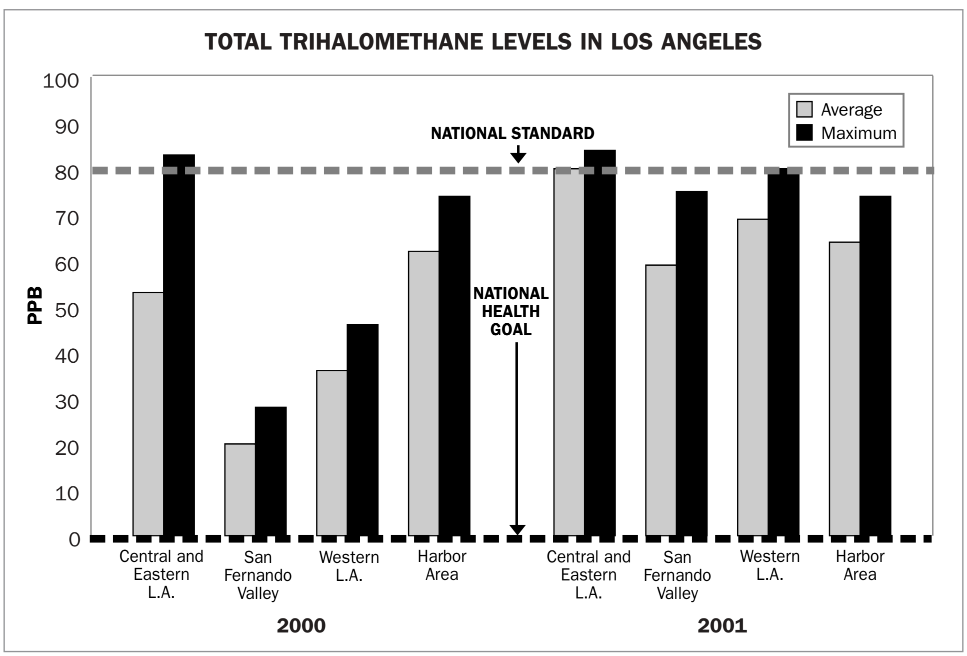
Levels Found 2000

Central and Eastern Los Angeles	53 ppb average[43]	83 ppb maximum
San Fernando Valley	20 ppb average[44]	28 ppb maximum
Western Los Angeles	36 ppb average[45]	46 ppb maximum
Harbor Area	62 ppb average[46]	74 ppb maximum

Levels Found 2001

Central and Eastern Los Angeles	80 ppb average[47]	84 ppb maximum
San Fernando Valley	59 ppb average[48]	75 ppb maximum
Western Los Angeles	69 ppb average[49]	80 ppb maximum
Harbor Area	64 ppb average[50]	74 ppb maximum

National Standard (MCL): 80 ppb (average) (effective 2002) (100 ppb effective through 2001)
National Health Goal (MCLG): 0 ppb—there is no known fully safe level of trihalomethanes



Total trihalomethanes (TTHMs) consist of a sum of the levels of four closely related chemicals—chloroform, dibromochloromethane, bromoform, and bromodichloromethane—which occur together at varying ratios when water is chlorinated. The latter two TTHMs have health goals of zero. The EPA promulgated and then withdrew (after a court decision) a zero health goal for chloroform, and has not yet issued a new goal for chloroform. Dibromochloromethane has a health goal of 60 ppb. Since water systems generally report only the combined TTHM level, and since it is essentially chemically impossible to create one trihalomethane in tap water without some level of the others, we list the health goal for TTHMs as zero.

Total trihalomethanes (TTHMs)[51] are chemical contaminants that result when chlorine used to treat drinking water interacts with organic matter in the water. Many studies show that these chemicals are linked with cancer, and the EPA has classified some TTHMs as probable human carcinogens. Recent preliminary studies also link TTHMs to miscarriages and birth defects.

Haloacetic Acids

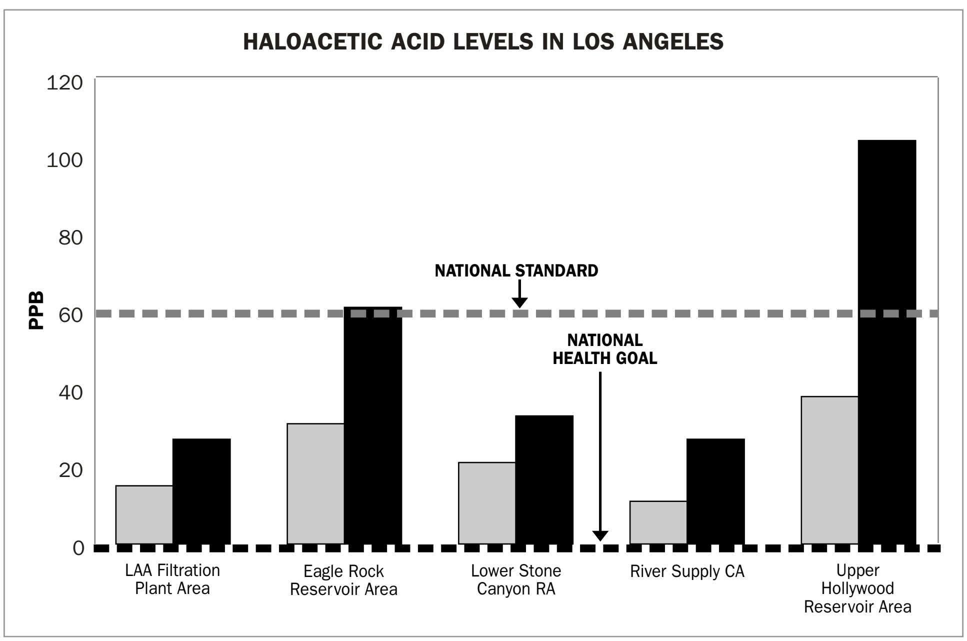
Haloacetic Acids Levels found (1997–1998—most recent reported data)[52]

LAA Filtration Plant Area	15 ppb average	27 ppb maximum
Eagle Rock Reservoir Area	31 ppb average	61 ppb maximum
Lower Stone Canyon RA	21 ppb average	33 ppb maximum
River Supply CA	11 ppb average	27 ppb maximum
Upper Hollywood Reservoir Area	38 ppb average	104 ppb maximum

National Standard (MCL): 60 ppb (average) (effective 2002; no previous standard)

National Health Goal (MCLG): 0 ppb—no known fully safe level of haloacetic acid

Some of the haloacetic acids have national health goals of 0 and others have non-zero goals. For the purposes of consistency, we list the national health goal as 0 because we list a single standard.



Haloacetic acids, like TTHMs, are by-products of disinfection. People exposed to haloacetic acids in drinking water over a long term may be at risk of developing cancer.[53]

RADIOACTIVE CONTAMINANTS

Radon

Levels Found in 2000 (in picocuries per liter, pCi/L)

Radon found in groundwater portions of system only

Central and Eastern Los Angeles[65]		
Metro. Water Dist. (MWD)	<100 pCi/L average	119 pCi/L maximum
Combined Wells	369 pCi/L average	525 pCi/L maximum
San Fernando Valley[66]		
Combined Wells	234 pCi/L average	256 pCi/L maximum
Western Los Angeles[67]	no radon detected	
Harbor[68]	no radon detected.	

Averages listed are highest average for a source in the area listed.

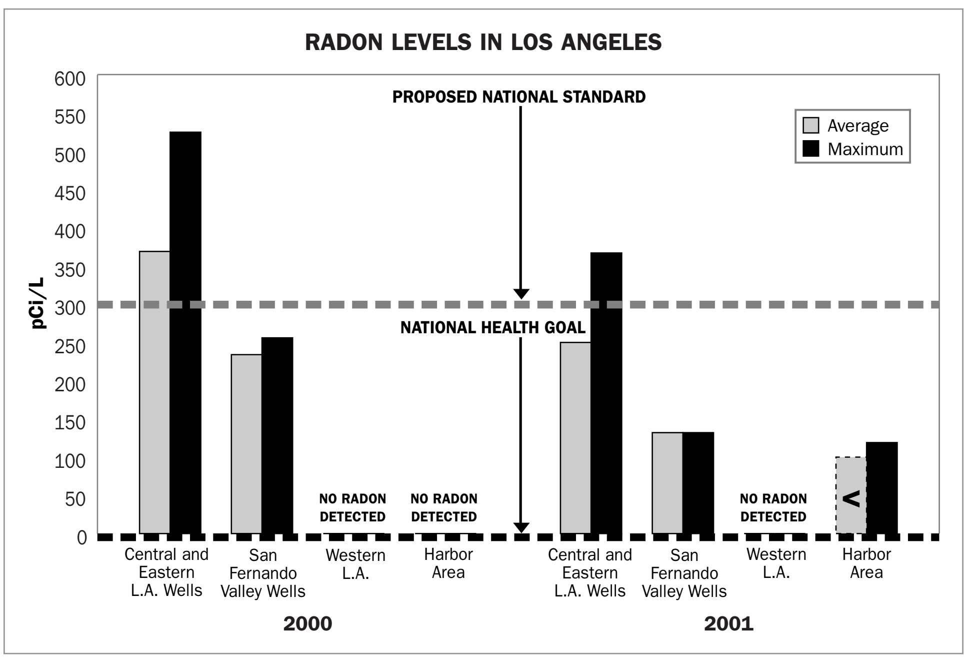
Radon's Cancer Risk at 300 pCi/L: 1 in 5,000 twice the EPA's usual maximum acceptable cancer risk.[69]

Levels Found in 2001 (in picocuries per liter, pCi/L)

Radon found in groundwater portions of system only

Central and Eastern Los Angeles	250 pCi/L average[70]	367 pCi/L maximum
San Fernando Valley	132 pCi/L average[71]	132 pCi/L maximum
Western Los Angeles	no radon detected[72]	
Harbor Area	<100 pCi/L average[73]	119 pCi/L maximum

Averages listed are highest average for a source in the area listed. Central and Eastern Los Angeles maximum level recorded at combined wells, which had the highest radon levels in the



area. San Fernando Valley maximum level recorded in combined wells for San Fernando Valley. Harbor Area maximum level recorded at Weymouth Treatment Plant.

Radon's cancer risk at 300 pCi/L: 1 in 5,000, twice EPA's usual maximum acceptable cancer risk.[74]

National Standard (MCL) (proposed): 300 pCi/L (alternate MCL is 4000 pCi/L where approved multimedia mitigation program is in place) (averages)

National Health Goal (MCLG)(proposed): 0 pCi/L—there is no known fully safe level of radon

Radon is a radioactive gas known to cause lung cancer. Radon was detected in some Los Angeles water supplies drawn from groundwater. Surface water supplies in L.A. did not contain detectable levels of radon.[75] In 2000, wells in the Central and Eastern service area had average levels of radon exceeding 360 pCi/L, well above the proposed national MCL, but average levels reported in this area in 2001 dropped to 250 pCi/L. Levels at combined wells in the San Fernando Valley came close to the EPA proposed MCL in 2000, posing a cancer risk of about 1 in 5,000. But levels dropped to about 130 pCi/L in 2001.

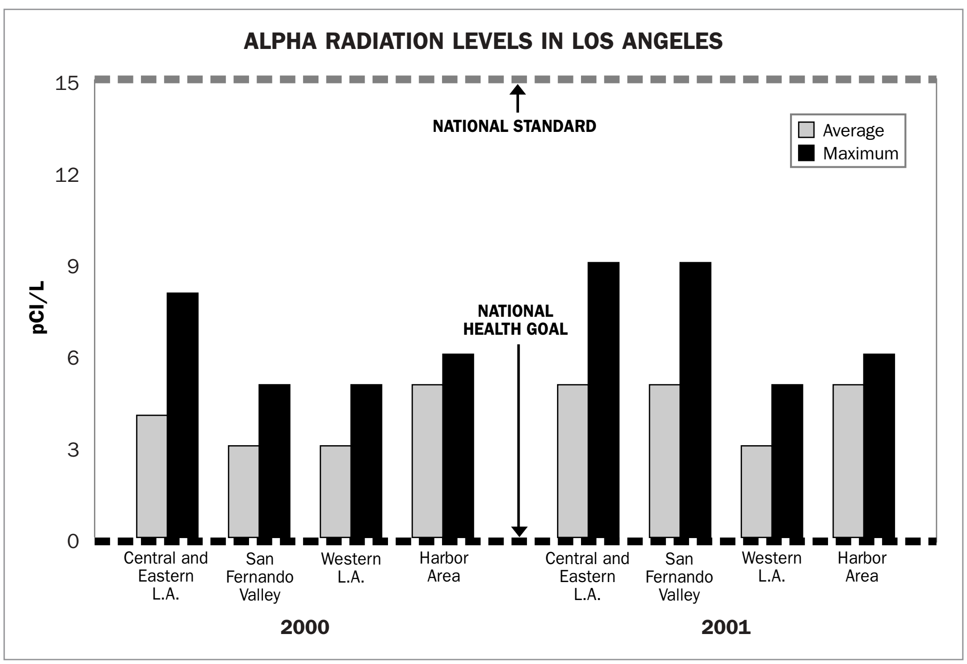
While no drinking water standard or monitoring requirement has been established for radon, levels detected in Los Angeles in 2000 were above the proposed national standard in some places.

Alpha Radiation

Levels Found 2000

Central and Eastern Los Angeles	4 pCi/L average	8 pCi/L[76] maximum
San Fernando Valley	3 pCi/L average	5 pCi/L[77] maximum
Western Los Angeles	3 pCi/L average	5 pCi/L[78] maximum
Harbor Area	5 pCi/L average	6 pCi/L[79] maximum

Averages listed are highest average for a source in the area listed.



Levels Found 2001

Central and Eastern Los Angeles	5 pCi/L average	9 pCi/L[80] maximum
San Fernando Valley	5 pCi/L average	9 pCi/L[81] maximum
Western Los Angeles	3 pCi/L average	5 pCi/L[82] maximum
Harbor Area	5 pCi/L average	6 pCi/L[83] maximum

Averages listed are highest average for a source in the area listed.

National Standard (MCL): 15 pCi/L

National Health Goal (MCLG): 0 pCi/L—there is no known fully safe level of alpha radiation

Gross alpha radiation[84] causes cancer. It generally comes from decay of radioactive minerals in underground rocks, and in some cases it can come from mining or the nuclear industry. Levels in L.A.'s water were below the EPA's standard, but still present a cancer risk.

Beta Radiation

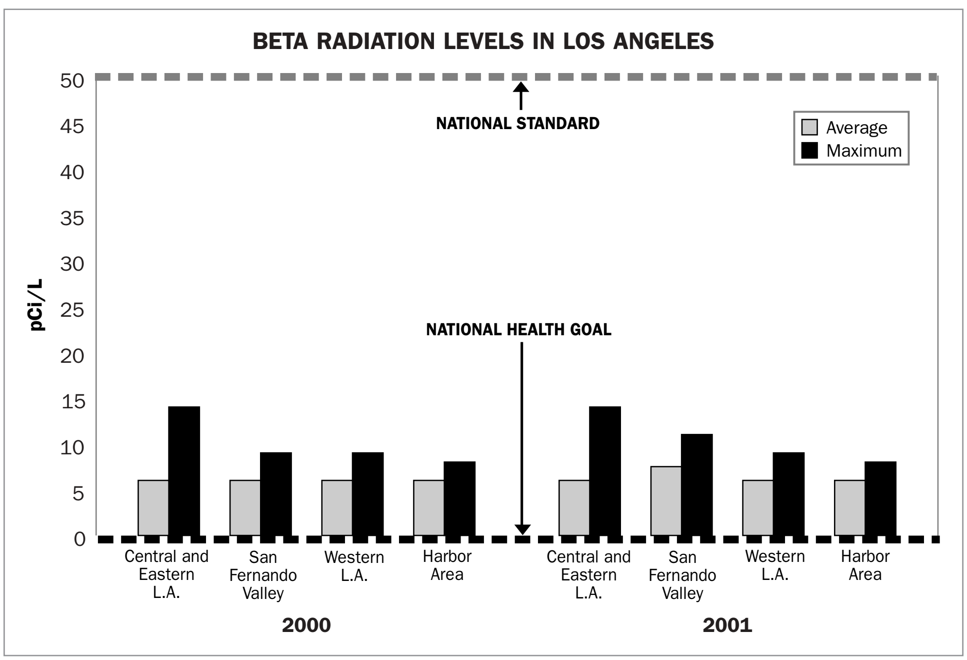
Levels Found 2000

Central and Eastern Los Angeles[85]	6 pCi/L average	14 pCi/L maximum
San Fernando Valley[86]	6 pCi/L average	9 pCi/L maximum
Western Los Angeles[87]	6 pCi/L average	9 pCi/L maximum
Harbor Area[88]	6 pCi/L average	8 pCi/L maximum

Averages listed are highest average for a source in the area listed.

Levels Found 2001

Central and Eastern Los Angeles[89]	6 pCi/L average	14 pCi/L maximum
San Fernando Valley[90]	7.5 pCi/L average	11 pCi/L maximum
Western Los Angeles[91]	6 pCi/L average	9 pCi/L maximum
Harbor Area[92]	6 pCi/L average	8 pCi/L maximum



Averages listed are highest average for a source in the area listed.

National Standard (MCL): 50 pCi/L (average)

National Health Goal (MCLG): 0 pCi/L—there is no known fully safe level of beta radiation

Beta radiation[93] causes cancer. It generally comes from decay of radioactive minerals in underground rocks, although in some cases has also come from nuclear testing or the nuclear industry. The levels of beta emitters in Los Angeles water are below the EPA standards, but still present a cancer risk.

Uranium

Levels Found 2000

Central and Eastern Los Angeles	4 pCi/L average	5 pCi/L maximum[94]
San Fernando Valley	3 pCi/L average	5 pCi/L maximum[95]
Western Los Angeles	3 pCi/L average	4 pCi/L[96]
Harbor Area	3 pCi/L average	4 pCi/L[97]

Averages listed are highest average for a source in the area listed.

Levels found 2001

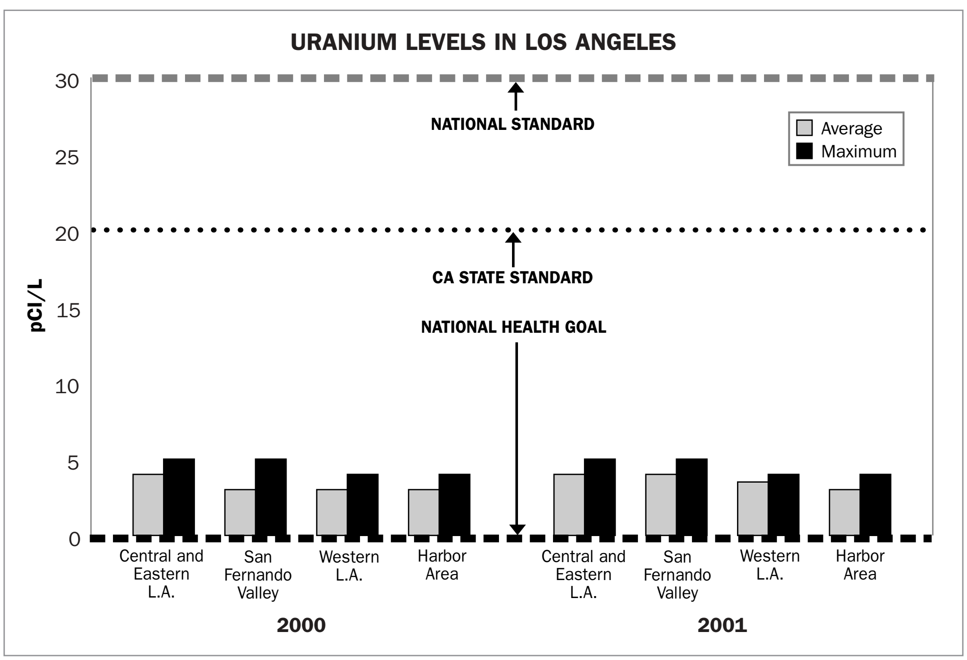
Central and Eastern Los Angeles	4 pCi/L average	5 pCi/L maximum[99]
San Fernando Valley	4 pCi/L average	5 pCi/L maximum[99]
Western Los Angeles	3.5 pCi/L average	4 pCi/L maximum[100]
Harbor Area	3 pCi/L average	4 pCi/L maximum[101]

Averages listed are highest average for a source in the area listed.

National Standard (MCL): 30 mg/L (EPA assumes to be @30 pCi/L)

National Health Goal (MCLG): 0 pCi/L—there is no known fully safe level of uranium

California Standard: 20 pCi/L



Uranium is radioactive and may cause cancer when ingested.[102] In addition, the EPA has determined that uranium also causes serious kidney damage at levels above the MCL. Uranium is contained in minerals in the ground, and sometimes is released by mining or by the nuclear industry. The source of the uranium and some other radionuclides in L.A. water is not known. Uranium tailings were placed along the Colorado plateau, and the Colorado River aqueduct also travels through the Coso range, which contains much radioactivity (see "Threats to Source Water" section on Colorado River, below). One expert notes that while uranium often occurs naturally, L.A. soil contains very little uranium.[103] Another potential source is a former Rocketdyne facility in the western end of the San Fernando Valley that is reported to have operated nuclear reactors, reprocessed nuclear fuel, and conducted fabrication. In addition, it is possible, this expert notes, that wells were recharged with water from the Colorado River.

While the EPA admits that uranium poses a cancer risk at levels below the EPA MCL of 30 pCi/L, the agency completed a cost-benefit analysis and found that, considering all U.S. water systems, including small systems where costs can be much higher per customer than they would be for larger systems like Los Angeles, the cost of reducing uranium to less than 30 pCi/L would not be justified by its benefits. The cancer risk at 30 pCi/L is about one in 10,000[104], the highest cancer risk the EPA usually allows in drinking water, and about 100 times higher than the one in one million risk the EPA allows for carcinogens under the Superfund or pesticide programs. California's standard of 20 pCi/L is about one-third lower than the EPA's MCL. L.A.'s water never approaches the California standard, but, in some areas of the city, still contains sufficient amounts of uranium to pose a modest cancer risk.

PROTECTING LOS ANGELES'S DRINKING WATER

Following are approaches to treating Los Angeles's drinking water, as well as a discussion of threats to source water. Also included in this section is information on how individuals can protect drinking water.

TREATMENT OPTIONS AVAILABLE FOR CONTAMINANTS OF GREATEST CONCERN

Treatment to reduce disinfection by-products, such as trihalomethanes and haloacetic acids. Los Angeles's disinfection by-product levels are relatively high in those areas of the city reliant upon surface water. The Los Angeles Department of Water and Power is phasing in a system-wide conversion to chloramines as an alternative disinfectant, with the goals of reducing the levels of DBPs that result from chlorine disinfection and improving the taste and odor of the water. Unlike "free chlorine" (pure chlorine gas) chloramines are considered less reactive, and form fewer disinfection by-products. Although they have recently been linked to the creation of very low levels of NDMA, a nitrogen-containing disinfection by-product with potential health risks, most experts believe that, on balance, chloramines are preferable to free chlorine because they modestly reduce TTHMs and many other chlorination by-products.

Disinfection by-products and other contaminants could be reduced with additional treatments. For significant reductions in TTHM levels, Los Angeles should plan to switch to activated carbon, or an alternative primary disinfectant such as ozone or ultraviolet light, which would reduce disinfection by-product levels further. L.A.'s Sylmar treatment plant, which treats most, but not all, of the city's water, uses ozone as part of its disinfection treatment train, but the city continues to use chlorine as well.[105] The continued use of chlorine negates some of the benefits that might be realized through a system-wide switch to ozone as the sole primary disinfectant, and chloramines as the secondary disinfectant for the distribution system—the city's pipes.

Treatment to Reduce Arsenic. Los Angeles has successfully reduced its drinking water arsenic levels somewhat in recent years, but additional reductions could be achieved with targeted treatment. The water sources that contain the highest levels of arsenic—Hot Creek, for example—could be targeted for treatment with activated alumina, granular ferric hydroxide, membranes, or other technologies that would further reduce arsenic levels in the city. The city says it has been studying options for arsenic treatment for several years in joint projects with the American Water Works Research Foundation. The city has not published cost estimates for such treatment, but the EPA projects that, in a city the size of Los Angeles, even if *all of the water* were treated for arsenic—a step not under consideration in Los Angeles—the cost of getting arsenic levels below 3 parts per billion would be less than $.75 per household per month.[106]

Treatment to Reduce Radon. The EPA has found that radon levels in tap water are very inexpensive to reduce using aeration, a technology that essentially bubbles air through the water. The cost per household is less than $.80 per month for families served by a large utility, according to the EPA.[107]

THREATS TO SOURCE WATER QUALITY

Los Angeles gets its water from three main sources. Some comes from the Los Angeles Aqueduct (LAA), some is purchased and imported by the Metropolitan Water District of Southern California (MWD), and some comes from local groundwater.

The Los Angeles Aqueduct provided for about 41 percent of the city's water needs in 2001, according to the 2001 right-to-know report from the Los Angeles Department of Water and Power (LADWP). Court decisions to provide additional aqueduct water to benefit the ecosystem in the Mono Basin and Owens Valley have limited the City's aqueduct deliveries. Still, over the next 20 years the Los Angeles Aqueduct (LAA) is expected to continue to provide nearly half of the city's water.[108] LADWP owns more than 314,000 acres of largely undeveloped watershed lands in the eastern Sierra, which are used to supply water to the LAA.[109] However, according to the EPA's Index of Watershed Indicators (IWI), the water quality in some of the streams and rivers upon which the LAA relies for water is threatened. For example, in the waters upstream of the LAA, Mono Lake[110] and Crowley Lake[111] are fragile ecosystems ranked as a 5 on the EPA's water quality threat scale (ranging from a low of 1 to a high of 6); further depletion of these threatened waters will not only cause environmental havoc, it would likely also reduce drinking water quality. The Owens River,[112] which feeds much of the LAA, is also ranked a 5 by the EPA. Hot Creek, which drains into the Owens River near Crowley Lake and ultimately into the LAA, is the most concentrated source of arsenic in the city's water supply, reportedly due to naturally occurring arsenic in this geothermally active area.[113] L.A.'s diversion of the Owens River for city water resulted in Owens Lake drying up completely by the 1920s, so the exposed dry lakebed became a major source of easily inhaled and arsenic-laden windblown dust.[114] The EPA classified the area as a serious nonattainment area for particulates (dust) in 1991 and required California to prepare a State Implementation Plan (SIP) to bring the region into compliance with federal air-quality standards by 2006.[115] Part of this SIP requires flooding part of the area with water.

The Metropolitan Water District of Southern California (MWD) is the largest wholesaler of water in California. On average, MWD provides approximately 47 percent of the city's water supply.[116] Much of this MWD water is from the State Water Project, which diverts water from the Sacramento-San Joaquin Delta in Northern California to Los Angeles.[117] The San Joaquin Delta is rated by the EPA's IWI as a 5 out of 6,[118] and an NRDC report concludes that the Bay-Delta area ecosystem and water quality are severely threatened.[119] Similarly, according to a review of Bay-Delta water quality by the state-federal agency CALFED, the contaminants in Bay-Delta waters of "most concern with respect to the production of drinking water include microbial pathogens, bromide, natural organic matter, dissolved solids, salinity, turbidity, and nutrients. Some other contaminants of Delta waters, including pesticides, metals, and methyl tertiary-butyl ether (MTBE), were evaluated and considered to be of limited significance to drinking water at this time because of their relatively low concentrations in Delta waters."[120] This relatively sanguine view of pesticides, metals, and gasoline constituents in Bay-Delta waters may change as additional data become available and more pollution sources are located in the watersheds.

The city also purchases MWD's Colorado River water. Colorado River water travels through a largely unprotected watershed past thousands of miles of farms, towns, and historical mining sites. The Colorado receives water containing substantial concentrations of the rocket fuel perchlorate from the Las Vegas Wash in Nevada, which is contaminated by a leaking waste area at a Kerr-McGee plant in Henderson, Nevada, and also receives contaminants from urbanized areas, including poorly treated wastewater discharges and runoff. A uranium tailing pile in Moab, Utah, is the size of 118 football fields, making it the largest tailings pile situated on the bank of a river—just 750 feet from the Colorado River and 10 feet above the aquifer, according to data collected by the Project on Government Oversight (POGO).[121] The tailings pile contains about 10.5 million tons of uranium mill wastes, including 426 million gallons of highly contaminated liquid.[122] The uranium tailing contaminant leakage into the Colorado River is estimated at 9,648 gallons per day. Radioactive uranium, ammonia, molybdenum, aluminum, iron, nitrates, and sulfates from the tailings site are contaminating groundwater that feeds into the Colorado River.[123] The river also has flooded 26 times this century to the level of the tailings.[124] In addition, the Colorado passes along the route of potential exposure from Yucca Mountain, the selected site for storage of the national repository of high-level radioactive waste.[125]

The U.S. Geological Survey (USGS) notes that water quality problems in the Colorado River include pesticides from farms, nutrients, metals from historic mining (although these often adhere to sediments), and dissolved solids.[126] USGS reports that the "salinity of the Colorado River probably is the biggest water-quality issue in the basin. The major sources of salinity are the saline soils of the Colorado Plateau and agricultural irrigation-return flows. . . . Urbanization, population growth, mining, agricultural practices, and recreation affect the salinity concentrations in the Colorado River."[127] The Colorado River water's elevated levels of total dissolved solids make reuse difficult and wreak havoc on plumbing and infrastructure.

Local Groundwater. LADWP says the city draws approximately 12 percent of its water supply from wells in the San Fernando Basin (SFB), and the Central, Sylmar and West Coast groundwater basins.[128] About 80 percent of this groundwater comes from the SFB, and in emergencies or during droughts, additional groundwater can be extracted from the SFB. LADWP says the availability of groundwater supplies is expected to increase by 2015 when recycled water will be used to recharge and replenish groundwater stored in the SFB.[129] Much of this groundwater is potentially vulnerable to surface contamination from industry, agriculture, and urbanization. An NRDC report documenting widespread groundwater contamination in California found that the San Fernando Basin is threatened by nitrate, chromium, solvents and other volatile organic compounds, and other contaminants.[130] The LADWP says that this groundwater is "replenished by deep percolation from rainfall, surface runoff, and from a portion of the water used (mainly from irrigation) within these basins."[131] Thus, at least some of these wells are potentially vulnerable to contamination from agricultural chemicals and other pollution sources.

OPEN RESERVOIRS

Of serious local concern are four uncovered reservoirs that hold treated drinking water before it is sent to consumers. Los Angeles was ordered by the California Department of Health Services to remove these from regular service, and was cited in 1998 for failing to meet an interim milestone for one of them—the Lower Stone Canyon reservoir. These uncovered reservoirs are subject to degradation from algae, aquatic organisms, microbes, airborne particles, humans and animals. Covering, abandoning, or replacing these uncovered reservoirs is needed to provide better protection. Until improvements are completed, Los Angeles will

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be out of compliance with the state interpretation of the requirements of the EPA's Surface Water Treatment Rule (SWT).[132] Even though the water stored in these reservoirs has been treated, it is considered raw because the reservoirs are uncovered. L.A. has said that all of these reservoirs will be maintained for use as reserve water supply for emergency conditions.[133] As of late 2001, L.A. continued to use two of the open-air reservoirs even in non-emergency situations, thereby posing a threat to tap water quality. Los Angeles did take two Hollywood reservoirs out of service in 2001, although it continued to operate them for use in emergencies. But the Encino and Lower Stone Canyon Reservoirs are open and still being used to supply drinking water. The city is under state orders to stop using them by 2003–2004.

HOW INDIVIDUALS CAN PROTECT SOURCE WATER

You can take steps to protect Los Angeles's drinking water by protecting its sources.

Reduce the amount of water you use. Plant drought-resistant plants or "xeriscape" (use plants that need little or no watering), use low-flow shower-heads, shorten your shower time, don't spray down your driveway to clean it, minimize the number of times (and how long) you water your lawn. Consider installing low-flush toilets. For more tips on water conservation, see:

- www.monolake.org
- www.mwdh2o.com/mwdh2o/pages/conserv/save/tentips/tentips01.html

Avoid using pesticides in the home or yard, or storing pesticides in the home. Consumer pesticide use in the home leads to runoff into water resources.

Buy organic foods, if possible. Purchasing organically grown food helps prevent the drinking water source contamination from pesticide and herbicide runoff that results from conventional agricultural practices.

Attend meetings of the Los Angeles Department of Water and Power (contact info below). The LADWP Board meets on the first and third Tuesdays of each month at 1:30 p.m. at LADWP, 111 N. Hope St., Room 1555H, in Los Angeles. For agendas visit www.ladwp.com/whatsnew/index.htm and look under "public meetings."

Attend meetings of the Metropolitan Water District of Southern California (MWD), which provides Los Angeles with about half of its water. According to MWD, "the general public is welcome to attend the monthly meetings of Metropolitan's board of directors, usually scheduled for the second Tuesday of each month. The meetings are held in the lobby-level boardroom at Metropolitan's headquarters in downtown Los Angeles, 700 North Alameda Street, adjacent to Union Station. For more information about the board meeting agenda, or to confirm the date and start time, please call Metropolitan's External Affairs Group at (213) 217-6485." You can also check MWD's website for more information at www.mwd.dst.ca.us/

Learn more from these groups:
- Clean Water Action, www.cleanwater.org
- Mono Lake Committee, www.monolake.org
- NRDC, www.nrdc.org
- Santa Monica Baykeeper, www.smbaykeeper.org
- Heal the Bay (Santa Monica), www.healthebay.org
- WaterKeepers Northern California, www.sfbaykeeper.org
- CALPIRG, www.calpirg.org
- Clean Water Network, www.cwn.org.

NOTES

1 Peer reviewers of the L.A. report included Marguerite Young, California Clean Water Action; Jonathan Parfrey, Executive Director, Los Angeles Physicians for Social Responsibility; and Frances Spivey-Weber, Mono Lake Committee, and David Beckman, NRDC.

2 City of Los Angeles Department of Water and Power (DWP), Annual Water Quality Report 2000, pg. 6, available online at www5.dwp.ci.la.ca.us/water/quality/Annual/index.htm (last visited March 30, 2002).

3 See EPA, Proposed Stage I Disinfection Byproducts Rule, 59 Fed. Reg. 38668 (July 29, 1994).

4 See EPA, Final Stage I Disinfection Byproducts Rule, 63 Fed. Reg. 69389 (December 16, 1998).

5 Cancer risk estimate is taken from NAS, National Research Council, *Arsenic in Drinking Water: 2001 Update*, 2001.

6 Cancer risk estimate is from EPA, Proposed National Primary Drinking Water Regulations: Radon 222, 64 Fed. Reg. 59246, 59270, Table VII.1 (November 2, 1999), which in turn is based upon the National Academy of Sciences' estimates in NAS, National Research Council, *Risk Assessment of Radon in Drinking Water,* pg. 17, Table ES-2 (1999).

7 Personal Communication with Mike Remwick, LADWP, August 19, 2002.

8 City of Los Angeles DWP, Annual Water Quality Report 2001, pg. 3, available online at www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep01/index.htm (last visited August 19, 2002).

9 LADWP, "City of LA Water Services: Water Supply Fact Sheet," available online at www5.ladwp.com/water/supply/facts/index.htm.

10 Ibid.

11 Ibid.

12 Ibid.

13 40 CFR §141.153(h)(3).

14 Personal Communication with LADWP, August 21, 2002.

15 See EPA regulations at 40 C.F.R. §141.153(d)(4)(ix), which provide that the RTK report must include "the likely source(s) of detected contaminants to the best of the operator's knowledge. Specific information about the contaminants may be available in sanitary surveys and source water assessments, and should be used when available to the operator." While EPA allows reliance upon general lists of potential sources where the water system is not aware of the specific source of pollution, where the water system *is* aware of the pollution source, the rules require that polluter to be identified.

16 EPA Index of Watershed Indicators, available online at www.epa.gov/iwi/hucs/18070105/score.html (last visited March 30, 2002).

17 City of Los Angeles DWP, Annual Water Quality Report 2000, pg. 6, available online at www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep00/index.htm (last visited March 31, 2002).

18 City of Los Angeles DWP, Annual Water Quality Report 2001, pg. 6, available online at www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep01/index.htm (last visited August 19, 2002).

19 City of Los Angeles DWP, Annual Water Quality Report 2001, pp. 8–9, available online at www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep01/WQARCELA.pdf (last visited March 31, 2002).

20 City of Los Angeles DWP, Annual Water Quality Report 2001, pp. 8–9, www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep01/WQARSF.pdf (last visited March 31, 2002).

21 City of Los Angeles DWP, Annual Water Quality Report 2000, pp. 8–9, available online at www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep00/WQARWLA.pdf (last visited March 31, 2002).

22 City of Los Angeles DWP, Annual Water Quality Report 2000, pp. 8–9, available online at www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep00/WQARH.pdf (last visited March 31 2002).

23 See note 19.

24 See note 20.

25 City of Los Angeles DWP, Annual Water Quality Report 2001, pp. 8–9, www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep01/WQARWLA.pdf (last visited March 31 2002).

26 City of Los Angeles DWP, Annual Water Quality Report 2001, pp. 8–9, www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep01/WQARH.pdf (last visited March 31 2002).

27 National Academy of Sciences, National Research Council, *Arsenic in Drinking Water,* 1999, available online at books.nap.edu/books/0309063337/html/index.html; National Academy of Sciences, National Research Council, *Arsenic in Drinking Water: 2001 Update,* 2001, available online at www.nap.edu/books/0309076293/html/.

28 National Academy of Sciences, National Research Council, *Arsenic in Drinking Water: 2001 Update,* 2001, available online at www.nap.edu/books/0309076293/html/. For a summary of the report, see www4.nationalacademies.org/news.nsf/isbn/0309076293?OpenDocument.

29 City of Los Angeles DWP, Arsenic Fact Sheet, available online at www.ladwp.com/water/quality/wq_arsnc.htm.

30 See note 26.

31 See EPA, Consumer Fact Sheets on Lead, available online at www.epa.gov/safewater/Pubs/lead1.html and www.epa.gov/safewater/standard/lead&co1.html, and IRIS summary for lead online at www.epa.gov/iris/subst/0277.htm.

32 City of Los Angeles DWP, Annual Water Quality Report 2001, pg. 13, available online at www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep01/WQARH.pdf; City of Los Angeles DWP, www5.ladwp.com/water/quality/wq_ldcp.htm.

33 Ibid.

34 See note 19.

35 See note 20.

36 See note 21.

37 See note 22.

38 See note 19.

39 See note 20.

40 See note 25.

41 See note 26.

42 The information regarding the health effects of nitrate are derived from National Academy of Sciences, National Research Council, *Nitrate and Nitrite in Drinking Water,* 1995, available online at www.nap.edu/catalog/9038.html; and EPA, Nitrates, (Fact sheet), available online at www.epa.gov/safewater/dwh/c-ioc/nitrates.html.

43 City of Los Angeles DWP, Annual Water Quality Report 2000, pp. 8–9, available online at www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep00/WQARCELA.pdf (last visited March 31, 2002).

44 City of Los Angeles DWP, Annual Water Quality Report 2000, pp. 8-9, available online at www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep00/WQARSF.pdf (last visited March 31, 2002).

45 See note 21.

46 See note 22.

47 See note 19.

48 See note 20.

49 See note 25.

50 See note 26.

51 Health effects information on disinfection by-products is summarized from NRDC, *Trouble on Tap* (1995); NRDC, *Bottled Water: Pure Drink or Pure Hype?* (1999), available online at www.nrdc.org/water/drinking/bw/bwinx.asp; and EPA, Draft Preamble for Stage 2 Disinfection By-products Regulation, available online at www.epa.gov/safewater/mdbp/st2dis-preamble.pdf.

52 From July 1997 to December 1998, participating water systems nationwide collected data on their raw and finished water under the Information Collection Rule (ICR) to guide future regulatory and public health decisions.

53 See note 51.

54 City of Los Angeles DWP, Annual Water Quality Report 2000, pp. 8-9, available online at, www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep00/WQARCELA.pdf (last visited March 31, 2002).

55 City of Los Angeles DWP, Annual Water Quality Report 2000, pp. 8-9, www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep00/WQARSF.pdf (last visited March 31, 2002).

56 See note 21.

57 See note 22.

58 See note 19.

59 See note 20.

60 See note 25.

61 See note 26.

62 A DWEL is the presumed level of perchlorate that one would need to consume in tap water to reach the Reference Dose—the maximum safe level. See EPA, "Perchlorate," Fact Sheet, available online at www.epa.gov/safewater/ccl/perchlor/perchlo.html.

63 California Office of Environmental Health Assessment, Draft Public Health Goal for Perchlorate in Drinking Water (March 2002), available online at www.oehha.org/water/phg/pdf/PHGperchlorate372002.pdf.

64 MWD is well aware that this Henderson facility is the source of this perchlorate. See MWD, "In the News: Perchlorate." Available online at www.mwdh2o.com/mwdh2o/pages/yourwater/ccr02/ccr03.html; MWD Press Release, "Water Officials Report Significant Progress in Perchlorate Removal," April 17, 2002. This release puts an unduly optimistic face on the problem, since MWD is well aware that the cleanup of the facility remains problematic and partially unsuccessful. See also Environmental Working Group, Rocket Science (2001).

65 City of Los Angeles DWP, Annual Water Quality Report 2000, pg. 10, available online at, www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep00/WQARCELA.pdf (last visited March 31, 2002).

66 City of Los Angeles DWP, Annual Water Quality Report 2000, pg. 10, available online at, www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep00/WQARSF.pdf (last visited March 31, 2002).

67 City of Los Angeles DWP, Annual Water Quality Report 2000, pg. 10, available online at, www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep00/WQARWLA.pdf (last visited March 31, 2002).

68 City of Los Angeles DWP, Annual Water Quality Report 2000, pg. 10, available online at, www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep00/WQARH.pdf (Mar. 31, 2002).

69 EPA, Proposed Radon in Drinking Water Rule, 64 Fed. Reg. 59246, 59270 (Table VII.1) (last visited November 2, 1999).

70 City of Los Angeles DWP, Annual Water Quality Report 2001, pg. 10, available online at, www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep01/WQARCELA.pdf (last visited August 19, 2002).

71 City of Los Angeles DWP, Annual Water Quality Report 2001, pg. 10, www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep01/WQARSF.pdf (last visited August 19, 2002).

72 City of Los Angeles DWP, Annual Water Quality Report 2001, pg. 10, www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep01/WQARWLA.pdf (last visited August 19, 2002).

73 City of Los Angeles DWP, Annual Water Quality Report 2001, pg. 10, www5.dwp.ci.la.ca.us/water/quality/Annual/AnnRep01/WQARH.pdf (last visited August 19, 2002).

74 See note 69.

75 Ibid.

76 See note 65.

77 See note 66.

78 See note 67.

79 See note 68.

80 See note 70.

81 See note 71.

82 See note 72.

83 See note 73.

84 See EPA Fact Sheets on radionuclides for information on health effects and sources, available online at www.epa.gov/safewater/hfacts.html#Radioactive; and www.epa.gov/safewater/rads/technicalfacts.html.

85 See note 65.

86 See note 66.

87 See note 67.

88 See note 68.

89 See note 70.

90 See note 71.

91 See note 72.

92 See note 73.

93 See note 84.

94 See note 65.

95 See note 66.

96 See note 67.

97 See note 68.

98 See note 70.

99 See note 71.

100 See note 72.

101 See note 73.

102 Health effects information is derived from EPA's final rule issued in December 2000, 65 Fed. Reg. 76708 (December 7, 2000), available online at www.epa.gov/safewater/rads/radfr.pdf.

103 Personal Communication with Jonathan Parfrey, Executive Director, Physicians for Social Responsibility, Los Angeles, June 6, 2002.

104 EPA, Final Radionuclides National Primary Drinking Water Regulation, 65 Fed. Reg, 76708, pg. 76715 (December 7, 2000).

105 LADWP, "City of LA Water Services: Water Supply Fact Sheet," available online at www5.ladwp.com/water/supply/facts/index.htm.

106 EPA, Final Arsenic National Primary Drinking Water Regulation, 66 Fed. Reg. 7011, Table III.E-2 (January 22, 2001).

107 EPA, Proposed Radon in Drinking Water Rule, 64 Fed. Reg. 59246, 59328 (Table XIII.11)(Nov. 2, 1999).

108 Information quoted from LADWP Factsheet, available online at www.ladwp.com/water/supply/facts/index.htm.

109 http://web.ladwp.com/~wsoweb/Aqueduct/default.htm.

110 www.epa.gov/iwi/hucs/18090101/score.html.

111 www.epa.gov/iwi/hucs/18090102/score.html.

112 www.epa.gov/iwi/hucs/18090103/score.html.

113 J. Hering, "Chinatown Revisited: Arsenic and the Los Angeles Water Supply," Engineering & Science (1997), available online at http://pr.caltech.edu/periodicals/EandS/articles/Hering%20Feature.pdf.

114 Ibid.; see also LADWP, "Urban Water Management Plan, Fiscal Year 2000–2001 Annual Update, pg. 6.

115 LADWP, "Urban Water Management Plan, Fiscal Year 2000-2001 Annual Update, pg. 6.

116 Information from LADWP, 2001 Water Quality Report, and LADWP Factsheet, available online at www.ladwp.com/water/supply/facts/index.htm.

117 San Diego website, www.sannet.gov/water/quality/#a.

118 EPA, IWI, for the Jan Joaquin Delta is available online at www.epa.gov/iwi/hucs/18040003/score.html.

119 See www.nrdc.org/water/conservation/cabay/fcabay.asp.

120 CALFED, *Water Quality Program Plan,* pp. 3–5, July 2000.

121 See POGO, "Moab Utah Uranium Mill Tailings Fact Sheet," available online at www.pogo.org/p/environment/eo-000507-moab.htm.

122 Ibid.

123 Ibid.

124 Ibid.

125 See State of Nevada, *Mountain of Trouble: A Nation at Risk* (2002) (outlining risks to local hydrology from Yucca Mountain high level waste depository and from transportation of waste to the site).

126 USGS, "Water Quality in the Upper Colorado River Basin, 1996-1998, available online at http://water.usgs.gov/pubs/circ/circ1214/; USGS, "Monitoring the Quality of the Nation's Largest Rivers: The Colorado River NASQAN Program," available online at http://water.usgs.gov/nasqan/progdocs/factsheets/clrdfact/clrdfact.html.

127 USGS, "Monitoring the Quality of the Nation's Largest Rivers: The Colorado River NASQAN Program," available online at http://water.usgs.gov/nasqan/progdocs/factsheets/clrdfact/clrdfact.html

128 Information quoted from LADWP Factsheet, available online at www.ladwp.com/water/supply/facts/index.htm.

129 Ibid.

130 NRDC, *California's Contaminated Groundwater: Is the State Minding the Store?*, 2001, available online at www.nrdc.org/water/pollution/ccg/ccg.pdf.

131 www.ladwp.com/water/supply/grdwtr/index.htm.

132 "The reservoirs are Encino, Lower Stone Canyon, and Upper and Lower Hollywood. Projects are being developed with significant involvement from surrounding communities to meet this new standard. The Department's compliance is governed by an agreement with DHS entered into July 1993. Milestones include completion required by June 15, 1998, for Lower Stone Canyon Reservoir; January 1, 2001, for the Hollywood Reservoirs; and January 1, 2003, for Encino Reservoir." City of Los Angeles, Annual Water Quality Report 2000, pg. 14.

133 Ibid.