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# News Release

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| May 20, 2004 | Dale A. Cox | 916-997-4209 | dacox@usgs.gov |

# Santa Ana River "Tagged" by Urbanization

A U.S. Geological Survey report found the water quality in the Santa Ana River watershed is not as bad as might be expected for an urban area. This overall finding comes despite some concentrations of dissolved nitrate that exceed the EPA drinking water standard, and low level volatile organic compounds (VOCs) and pesticides being detected in nearly all samples. Possibly harmful concentrations of radon showed up in nearly 80 percent of the groundwater wells sampled.

Excessive dissolved nitrates can cause "blue baby syndrome." Fortunately, said Ken Belitz, lead author of the report, water managers treat and blend sources of water to provide a safe drinking water supply.

"When one looks at the chemical composition of the Santa Ana River, its tributaries and ground water, one sees a very urban watershed," said Belitz. "Considering how very urban this watershed is – I would say the overall water quality is surprisingly good for an urban area."

The Santa Ana River is over 3/4 treated wastewater. Base flow in the Santa Ana River is largely maintained by discharge of treated wastewater, which carries relatively high levels of nitrate and dissolved solids. Water from the river, along with water imported from the Colorado River and Northern California, is used to recharge ground water.

"Although the water sampled by the USGS is not directly used for the drinking water supply," said Belitz, "the surface water of today replenishes ground water supplies of tomorrow – and ground water is important for the people living in the Santa Ana River watershed."

Ground water is the primary source of supply for nearly 5 million people living in the basin. Intense use of the ground-water resource, resulting from large-scale pumping and recharge from engineered facilities, has accelerated the flow of ground water through the aquifer system – and has increased transport rates of man-made compounds, Belitz noted.

The USGS National Water Quality Assessment (NAWQA) report summarizes the results of studies of surface-water quality, aquatic ecology, and ground-water quality in the Santa Ana Basin. Collectively, the NAWQA studies sampled for over 85 VOCs, nearly 100 pesticides, nitrate, and numerous other compounds; concentrations are compared to EPA drinking water standards, to nonenforceable drinking water guidelines, and to aquatic life criteria.

Urbanization has caused degradation of aquatic communities in the Santa Ana Basin, Belitz said. The USGS study found that aquatic invertebrate (animals without backbones) and algal communities were more degraded in streams receiving treated wastewater than in streams receiving either urban runoff or ground-water influx. Additionally, aquatic invertebrate and fish communities were more degraded in

concrete-lined channels than in natural channels or channelized streams with natural bottoms. Chloroform, a water disinfection byproduct, and several pesticides sometimes exceeded aquatic life criteria.

Younger ground water, recharged since the 1950s, has higher concentrations of nitrate, dissolved solids, VOCs, and pesticides than older ground water in the Santa Ana Basin. The drinking water standard for nitrate was exceeded in about 20 percent of the production wells sampled in the San Jacinto and Inland areas of the basin. Only one of the affected wells is used for public supply; water from that well is blended with other water sources to provide a supply that complies with the EPA standard.

The EPA secondary standard for dissolved solids, developed for taste rather than health effects, was exceeded in nearly half of the wells sampled. The secondary standard was exceeded most often for wells in the coastal area and least often for wells in the inland area.

Concentrations of VOCs and pesticides were far below drinking water standards in wells used for public supply. “The low levels of VOCs and pesticides are actually useful in helping us trace the movement of water through the aquifer system,” said Scott Hamlin, USGS hydrologist and ground-water specialist on the study.

Copies of the USGS Circular 1238, "Water Quality in the Santa Ana Basin, California: 1991-2001,” by Kenneth Belitz, Scott Hamlin, Carmen Burton, Robert Kent, Ronald Fay, and Tyler Johnson is available on the internet at: http://water.usgs.gov/pubs/circ/2004/1238/ or are available free of charge by writing the USGS Branch of Information Services, Box 25286, Denver Federal Center, Denver, CO 80225 (or by calling 1-888-ask-usgs).

The USGS assessment is part of a national program currently releasing results on streams and ground water in 14 additional major river basins and aquifer systems. Findings of regional and national interest are highlighted in a separate report "Water Quality in the Nation's Streams and Aquifers--Overview of Selected Findings, 1991-2001." Check the status and availability of these reports on the NAWQA website (http://water.usgs.gov/nawqa/nawqa_sumr.html), as well as accessibility to other publications and national data sets and maps.

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# Chemicals analyzed in the USGS water-quality report

## Nutrients

The term "nutrients" almost sounds like a good thing. Unfortunately, elevated nutrients (nitrogen and phosphorus) in streams can have substantial environmental and economic consequences, in addition to human health concerns. Ingestion of drinking water with high nitrate concentrations can cause low oxygen levels in the blood of infants, a potentially fatal condition known as methemoglobinemia, or “blue baby syndrome.” Because of these health concerns, the U.S. Environmental Protection Agency (USEPA) set the drinking-water standard for nitrate at 10 milligrams per liter.

Elevated nutrient concentrations can lead to excessive and unsightly growth of algae and other aquatic plants, which can clog water-intake pipes and filters and can interfere with recreational activities, such as fishing, swimming, and boating. The decay of plants often results in foul odors, bad taste, and low dissolved oxygen in water (or hypoxia, which can cause fish kills).

Excessive growth of algae was found in some large streams with elevated nutrients and very little shade in the Great and Little Miami River Basins.

## Household chemicals and pharmaceuticals in streams and ground water

Human health and safety have improved through everyday use of household and pharmaceutical chemicals, but these chemicals get into our water supplies when they are disposed of in wastewater. As a result, many of these chemicals have been found at very low concentrations in streams across the country.

It is generally unknown what effects many of these chemicals may have on humans or aquatic life at the low concentrations, although several are known or suspected endocrine disruptors. The endocrine system controls growth, sexual development, and reproduction in animals. Endocrine disruptors are chemicals that interfere with or mimic natural hormones and have the potential to cause reproductive or developmental impairment in animals.

## Arsenic and radon in ground water

Arsenic in drinking water has been linked to multiple health problems, including bladder, lung, and skin cancer; cardiovascular disease; diabetes; and neurological dysfunction. Radon is a colorless and odorless radioactive gas that forms during the decay of natural uranium in rocks and soil. Radon gas is carried in water pumped from wells and is released to the air as the water is agitated during domestic uses such as cooking or showering. Breathing radon increases the risk of lung cancer. Most public-waters supplies that use ground water aerate the water during treatment, causing the radon gas to disperse in the air and radon concentrations in treated water to drop well below the proposed drinking-water standard.