

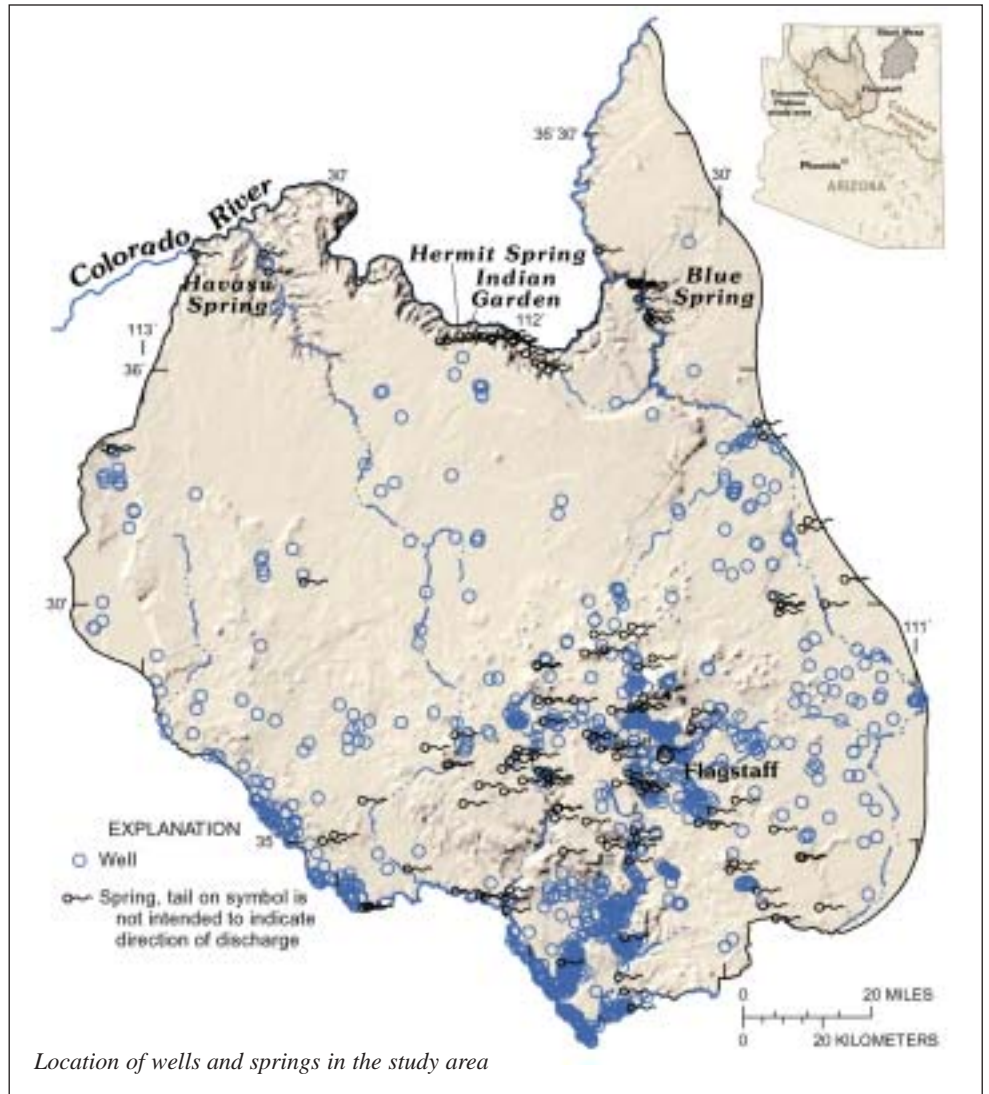
Coconino Plateau Hydrologic Database, Web Site Available Through USGS

The U.S. Geological Survey (USGS) recently completed a compilation of geologic, water resources, climate, land use, land-surface elevation and vegetation data of the Coconino Plateau in northern Arizona. The data were incorporated into a database for ongoing and planned water-resource studies of the area. Data from the study are also published in a report (cited below). In addition, the investigation is described on a Web site, which is currently being expanded for users to retrieve the data through interactive maps, displays, and graphs. The study was performed in cooperation with the City of Williams, who received grant funding from the Arizona Water Protection Fund Commission, and with USGS cooperative funds.

Groundwater from deep regional aquifers has become increasingly important for household, municipal, and in-stream uses on the Coconino Plateau. Increasing growth, development, and recent drought conditions have increased public interest in the availability and sustainability of water resources in this mostly rural part of Arizona. The roughly 5,000-square-mile Coconino Plateau is bounded by Grand Canyon, the Little Colorado River, Flagstaff, and Seligman and is larger than the state of Connecticut. The study area is roughly 10,300 square miles in size — approximately one-tenth the land area of Arizona. The hydrologic data collected include information on wells, springs, stream flow rates, water chemistry, and water use. According to Donald Bills, lead author of the report and a hydrologist with the USGS in Flagstaff, Arizona, the occurrence and movement of groundwater are poorly understood because the aquifer systems are deeply buried, which limits exploratory drilling and testing, and because the geologic structure, which partly controls the occurrence and movement of ground water, is complex.

"Data compiled in this report represent the

Continued on next page



Preserving Earth's water resources
is second nature to us.

Providing Sustainable
Solutions to Your Water
Resources Challenges Since 1960

- 🌿 Surface Water and Groundwater Resource Development
- 🌿 Watershed Planning, Hydrologic Modeling, and Instream Flow Studies
- 🌿 Fluvial Geomorphology
- 🌿 Wetlands Delineation and Mitigation
- 🌿 Mine Waste Characterization and Reclamation
- 🌿 Pit Lake Hydrology, Geochemistry, and Limnology
- 🌿 Risk Assessment
- 🌿 Regulatory Compliance and Permitting

4730 North Oracle Road, Suite 210
Tucson, Arizona 85705
Tel: 520.888.8818
e-mail: info@golder.com
web: www.golder.com

Ccontinued from previous page

initial phase of a comprehensive cooperative study to assess the water resources of the Coconino Plateau as part of the State's Rural Watershed Initiative," said Bills. "Regional studies like this one provide water resources managers with important tools needed to develop and manage water resources. We are particularly excited about our project Web site that will make it possible to access, view, and print interactive maps for the study that contain hydrologic data and satellite imagery for the study area. This will make it easier for water managers and the public to monitor changing water conditions in their area of interest over the next few years."

The report "Hydrologic Data for the Coconino Plateau and Adjacent Areas, Coconino and Yavapai Counties, Arizona" by Donald J. Bills and Marilyn E. Flynn is published as USGS Open-File Report 02-265 and can be accessed online at az.water.usgs.gov/pubs/02-265intro.html. A USGS Fact Sheet on the study is available at az.water.usgs.gov/factsheets/FS-113-02.pdf.

Irvine Ranch Using Recycled Water in Office Buildings

Irvine Ranch Water District

Irvine Ranch Water District (IRWD) has successfully converted a new 14-story Irvine office building to recycled water use in two air conditioning cooling towers. This is the first such use for recycled water in Orange County, and brings to 11 the total number of facilities converted to interior recycled water use by IRWD. Cooling towers use water to exchange heat in air conditioning systems, and use of recycled water in these towers can help cut water costs by as much as 40 percent.

The building, located at 2040 Main Street in Irvine, also uses recycled water for toilet flushing, which accounts for approximately 25 percent of the recycled water used in the building. The cooling towers use the remaining 75 percent. After conversion, recycled water use will account for about 90 to 95 percent of the total building water use and will save an estimated 3.3 million gallons of potable water per year.

IRWD has been a leader in promoting recycled water use for landscaping and agricultural needs for more than 30 years. Wastewater is collected and treated using tertiary treatment, producing high quality water that earned the district the first

unrestricted use permit in California in 1991. This permit allows the recycled water to be used for everything but drinking. Recycled water is delivered through a completely separate pipeline system throughout the community. Recycled water now makes up more than 20 percent of IRWD's total water supply, reducing the need to import expensive water and helping to keep rates low.

IRWD serves a population of 266,000 in the city of Irvine and portions of Tustin, Newport Beach, Costa Mesa, Lake Forest, and Orange.

Visit www.irwd.com

Tests Show Many Water Vending Machines Fail State Health Standards

Environmental Law Foundation

Glacier Water Services, the largest seller in California and the United States of filtered water from vending machines, claims its machines dispense chemical-free drinking water. But in California, the first statewide tests of vended water for chemical contaminants found that one-third of Glacier machines sell water that fails state health standards.

In a report released Dec. 10, Environmental Working Group (EWG) and the Environmental Law Foundation (ELF) say that buying water from a vending machine in California is like playing a slot machine: you can't be sure what will come out. "Considering the steep premium that vended water customers are paying for supposedly 'chemical-free' water, this is an outrageous fraud," said EWG analyst Renee Sharp, principal author of the report.

ELF filed a suit in San Francisco Superior Court charging Glacier with unfair or fraudulent business practices under Section 17200 of the state Unfair Competition Law, which allows private citizens and groups to sue companies for consumer fraud.

Glacier, based in San Diego County, operates more than 7,000 machines statewide, and more than 14,000 vended water machines nationwide. California is one of the few states where vended water –

almost always ordinary tap water filtered as it passes through the machine – must be cleaner than tap water.

California state law targets trihalomethanes (THMs), chlorination byproducts linked to increased risk of multiple types of cancer, miscarriages, and birth defects. THMs in vended water must not exceed 10 parts per billion (ppb), the level at which studies show an association with low birth weight of babies whose mothers drank contaminated water during pregnancy.

EWG and ELF tested samples from 274 Glacier machines in nine urban counties, and more than one-third had THM levels above 10 ppb. About one in six had THM levels twice as high as the state standard. More than two-thirds couldn't live up to Glacier's claim that its filters "typically remove 97 percent of all contaminants from the source water."

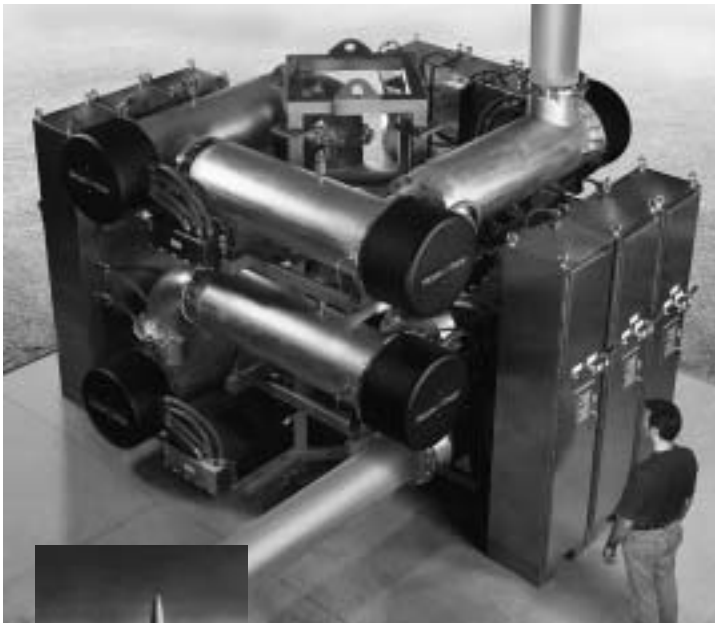
Brian McInerney, President and CEO of Glacier Water Services, Inc. claims on the company Web site that the report and lawsuit are part of an "absolutely fabricated controversy." McInerney states that "these so-called state standards have nothing to do with what is safe for the people," and "as the EWG report notes, 100% of the Glacier water machines sampled met federal EPA standards for safe drinking water."

The report is available at www.ewg.org. The Environmental Law Foundation's complaint is at www.envirolaw.org/cases/vendbrief.htm. Visit www.glacierwater.com

Update on Emerging Contaminants: NDMA

Excerpted from the NDMA Fact Sheet by Trojan Technologies, Inc.

N-nitrosodimethylamine (NDMA) has recently attracted significant attention from the water treatment community as a potent and potentially wide-ranging water contaminant. In its pure form, NDMA is a semi-volatile, yellow, oily liquid with very little odor. During the 1950s, NDMA was a key intermediate in the production of 1,1-dimethylhydrazine, a component of liquid rocket fuel. It has also been used in battery, rubber, and polymer manufacturing, and can be found in some lubricants. NDMA was produced



Commercial UV reactors such as the Trojan UVPhox™ can be used to treat NDMA on a large scale (hundreds of million gallons per day).

NDMA is an intermediate in the production of liquid rocket fuel, such as that used to propel the German V2 rocket

commercially until the mid-1970s, but today it is produced only in limited quantities for research purposes.

In many cases, NDMA is not directly released into the environment. If it is released in quantities greater than 10

pounds, and such incidences are rare, the United States Environmental Protection Agency (USEPA) requires that it be reported to the Toxic Release Inventory (TRI). However, even in the absence of direct releases, NDMA is being detected in drinking water supplies and wastewater streams, as the compound can form in the environment under suitable conditions and in the presence of precursor compounds. While there appear to be a number of possible pathways, NDMA can be formed by the combination of dimethylamine and nitrite, particularly in slightly acidic waters. Another important formation pathway occurs during the disinfection of drinking water and wastewater with the widely-used disinfectants chlorine and chloramines. Either disinfectant, when combined with dimethylamine, has been shown to form NDMA. Dimethylamine is a common component of animal and human waste and can remain in water even after secondary wastewater treatment. Due to this formation pathway, NDMA can be classified as a disinfection by-product. Studies are ongoing to determine the conditions and precursors that favor NDMA formation.

NDMA has a high chronic and acute toxicity. The USEPA, the Agency for Toxic Substances and Disease Registry, and the Department of Human Services, among others, have determined that NDMA may reasonably be considered a human carcinogen that is hazardous at very low concentrations. The EPA's Integrated Risk Information System lists the one in one million lifetime cancer risk for NDMA in drinking water as 0.7 parts per trillion

(ppt) consumed by a 70-kg person drinking 2 liters of water per day. California's Office of Environmental Health Hazard Assessment reports a one in one million cancer lifetime cancer risk of 2 ppt in drinking water.

Reflecting this health risk, many regulatory bodies have moved to regulate NDMA. While historically not considered a common drinking water contaminant, NDMA is listed on the 2001 CERCLA Priority List of Hazardous Substances. In 2002, the California Department of Health Services set an action level for NDMA of 10 ppt. At the national level, EPA has issued recommendations that NDMA levels in lakes and streams be limited to 0.69 ppt. Playing a role in the lowering of regulatory standards is the improvement of analytical methods for detecting NDMA. A handful of laboratories, currently using high-resolution gas-chromatograph/mass spectroscopy techniques, can detect NDMA at 0.1 ppt and report at concentrations of 0.4 ppt.

NDMA is not easily removed from water because it is highly soluble, resists adsorption, and has low volatility. Thus, traditional methods such as carbon adsorption and air stripping fail to remove NDMA. However, it does degrade relatively quickly when exposed to ultraviolet radiation. This action is cost-effectively performed in optimized UV reactors containing lamps with the special characteristics needed to destroy NDMA. Trojan Technologies is one company with the technology to cost-effectively remove NDMA from water.

For more information about NDMA, including treatment alternatives, contact Adam Festger at Trojan Technologies at afestger@trojanuv.com

RBF

PLANNING ■

DESIGN ■

CONSULTING ■

CONSTRUCTION ■

JOIN THE RBF TEAM!

Watershed and Stream Corridor Planning

River Engineering/ Stream Restoration

Regional Flood Protection Systems

Sediment Transport/Fluvial Systems

Urban Drainage Facilities & Master Planning

Storm Water Quality Control & NPDES Compliance

WWW.RBF.COM

800.479.3808