

Polonium-210 Found in Nevada Wells

In August, the U.S. Geological Survey released data to state and local officials in Nevada documenting the occurrence of elevated polonium-210 (Po-210) levels in 17 wells in rural Lahontan Valley, near the town of Fallon in west-central Nevada. Po-210 is a radioactive element derived from the decay of uranium. According to the USGS, Po-210 concentrations in Lahontan Valley groundwater appear to result entirely from the decay of naturally occurring uranium in alluvial sediments derived from Sierra Nevada granites. Scientists found no indication that human activity was in any way responsible.

Po-210 concentrations in untreated, unfiltered water collected from 25 wells in the valley ranged from less than 0.1 to 67.7 picocuries per liter (pCi/L). Thirteen of the wells had concentrations greater than 15 pCi/L, the U.S. Environmental Protection Agency's maximum contaminant level for gross alpha radioactivity in public-supply wells.

According to the USGS, no systematic surveys of the occurrence of Po-210 in the United States have been completed, but based on the literature, the Nevada data were unexpectedly elevated (greater than about 1 pCi/L). Except for a well in Louisiana, one in Virginia, and about 35 in Florida, Po-210 concentrations that exceed the values in the Lahontan Valley wells have not been documented elsewhere in the country. Only under an uncommon set of geologic and groundwater conditions does the compound become mobile and available for transport in water; the compound typically binds strongly to sediment.

Most of the wells included in the USGS study provide water for human or domestic animal consumption. The public water supply for Fallon and the Fallon Naval Air Station were known to be safe and were not included in the study. Water filters and treatment technologies, such as

in-home reverse osmosis systems, have been shown to remove Po-210 from water.

Visit nevada.usgs.gov/polonium/faq.pdf.

Water Managers: Prepare for Drought

The drought and dry conditions currently gripping much of the country are a taste of things to come, according to a July 2007 report by the Natural Resources Defense Council (NRDC) that assessed the effects of global warming on water supplies in the West. The researchers say that as the hotter, drier weather already afflicting the region becomes the norm, water managers will have to take bold measures to improve conservation and efficiency.

The NRDC report analyzes the effects of global warming on a full range of water management tools and offers comprehensive recommendations to help meet the challenge. Conservation tops the list of proven water supply solutions. For example, water use in Los Angeles has remained steady for 30 years despite dramatic population growth thanks to investments such as low-flow showerheads and toilets. The city can save even more water through programs promoting drought-tolerant landscaping.

The report calls on regions to work much more closely together, developing cooperative solutions to meet their water needs and providing other important benefits. For example, groundwater desalters in California's Chino Basin produce water supplies while cleaning up contaminated underground aquifers. Urban stormwater retention programs designed to reduce flooding and pollution can also provide water supplies. Wastewater recycling is another promising source of water, especially because it will not be affected by global warming.

The report suggests that traditional approaches—dams, diversions, and groundwater pumping—are likely to perform worse in a warmer, drier climate.

“Increasingly, traditional dams are no longer realistic or financially feasible solutions,” said Barry Nelson, the study's co-author and co-director of NRDC's western water project. “The thousands of dams across the West have already captured most of the water. There are so few rivers left, and the cost of building dams is so high that the result is very expensive water. And global warming is likely to reduce the potential water supplies from new dams even further.”

The 90-page report is available at www.nrdc.org/globalwarming/hotwater/contents.asp.

SNWA Seeks Automated Irrigation Device

Last fall, the Southern Nevada Water Authority (SNWA) solicited bids to develop an irrigation scheduler that will automatically change seasonal watering schedules based on a customer's assigned watering group. SNWA appropriated up to \$250,000 for the initial purchase of such a device that could be attached to existing landscape irrigation controllers to help ensure compliance with the region's mandatory watering schedules. In theory, the customer would input the current date, time, and assigned watering group; once programmed, the device would comply with the mandated watering schedules without further intervention from the customer.

“We currently use an extensive public outreach campaign to remind people to make the seasonal changes,” said Doug Bennett, SNWA's conservation manager. “The device would provide a carefree way to assure compliance with watering restrictions while maintaining the health of their landscapes, which are prone to overwatering.” Research has shown that landscapes are most overwatered in the late summer, fall, and early winter, according to Bennett.

Under SNWA watering restrictions, landscape irrigation is limited to three days a week in the spring and fall and

one day a week in winter. Watering is permitted any day of the week in summer, although lawn sprinkler irrigation is prohibited from 11 a.m. to 7 p.m. While many people comply with the regulations, water-waste enforcement personnel still issue hundreds of violations.

The device would allow the controller's signal to activate the valves only during allowable days and times. Although it is specifically intended to be programmed for SNWA watering schedules, the manufacturer may be able to adapt it for use in other communities.

"With complete, year-around compliance from residents, we estimate the additional savings could be as much as 30,000 acre feet of water each year," Bennett said.

Proposals were due at the end of October.

Visit www.snwa.com/html/news_conservation_proposal.html.

Algae: A Promising Biofuel Source

Last summer, Diversified Energy Corporation, a privately held alternative and renewable energy company, announced a new partnership and licensing arrangement for an algae production system invented by XL Renewables Inc., a biorefinery project developer. The approach, called Simgae (for simple algae), utilizes common agriculture and irrigation components to produce algae at relatively low cost. According to the press release, the new system is expected to offer the biofuels industry access to cheap and readily available oils and starches for the production of biodiesel, ethanol, and other renewable fuels with significantly lower water requirements than other biofuels crops.

Widespread algae production has thus far been hindered by high costs to build and maintain the systems. Typical architecture consists of a series of rigid frameworks that incur capital costs on the order of hundreds of thousands of dollars to over \$1 million per acre.

Simgae, however, uses thin-walled polyethylene tubing called Algae Biotape, similar to conventional drip irrigation tubes, laid out in parallel across a field. Under pressure, water that contains nutrients and a small fraction of algae is slowly introduced into the biotape. Carbon dioxide is injected periodically, and after about 24 hours the flow leaves the biotape with a markedly greater concentration of algae than at the start. All supporting hardware components and processes involved in Simgae are direct applications from the agriculture industry.

The Simgae design is expected to provide an annual algae yield of 100 to 200 dry tons per acre. Capital costs are expected to be approximately \$45,000 to \$60,000 and profitable oil production costs are estimated at \$0.08 to \$0.12 per pound. These oil costs compare to recent market prices of feedstock oils of \$0.25 to \$0.44 per pound, said Diversified Energy.

The team is currently conducting a demonstration of the technology in Casa Grande, Arizona. Continued testing and system optimization is expected to occur through 2008.

In another very promising test in Arizona last summer, Arizona Public Service Co. (APS) and GreenFuel Technologies Corp. of Cambridge, Massachusetts, successfully grew algae with biomass production levels 37 times higher than corn and 140 times higher than soybeans, according to APS. The algae was grown using carbon dioxide emissions from the Redhawk natural gas power plant near the Palo Verde Nuclear Generating Station. Further testing is being undertaken at APS's Four Corners coal power plant in Farmington, New Mexico.

Visit www.diversified-energy.com/simgae, www.xlrenewables.com, and www.aps.com.

Update: Trees on Levees OK

After nearly a year of discussion about whether trees on California levees could stay or must go, the California Reclamation Board, Sacramento Area

Flood Control Agency (SAFCA), U.S. Army Corps of Engineers (ACE), U.S. Fish and Wildlife Service, National Marine Fisheries Service, local levee districts, and the state's Water Resources and Fish and Game departments seem to have reached an agreement that, in California at least, trees on levees are acceptable, maybe even useful.

Six months ago, *Southwest Hydrology* (July/Aug 2007) reported that ACE had announced its intention to enforce a national policy requiring all trees and vegetation to be cleared from levees. This directive was prompted largely by levee failures in New Orleans following Hurricane Katrina and the subsequent inspection of levees nationwide. Californians objected to the policy for reasons including expense, loss of aesthetic appeal, and the fact that tree-lined levees are often the only riparian habitat available.

After 32 levee districts in the Central Valley failed a maintenance inspection last winter, largely due to having vegetation greater than ACE's 2-inch-diameter maximum requirement, they faced loss of federal levee rebuilding funds and Federal Emergency Management Agency decertification unless they removed the vegetation by March 2008, reported the *Sacramento Bee*. Yet many experts—including some ACE scientists—claimed the trees actually helped maintain levee integrity.

To attempt to resolve the issue, in August SAFCA held a symposium on levee vegetation. Much evidence was presented in favor of trees, and little could show their harm, according to the *Bee*. Following the symposium and another meeting among the agencies several weeks later, the paper reported, ACE agreed to drop the March 2008 compliance deadline and develop a new policy more suited to local conditions.

Visit www.sacbee.com.

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Municipal Wastewater Provides Clues to Community Drug Use

A team of researchers from Oregon State University and the University of Washington has developed an automated monitoring method that makes it possible to detect traces of drugs, from cocaine to caffeine, in municipal wastewater and monitor the patterns of drug use in entire communities. Their findings were reported last August at the American Chemical Society meeting in Boston.

The presence of both pharmaceutical and illicit drugs in municipal wastewater has been known for several years, beginning with European studies that tracked drugs in sewage and river water. Oregon State University chemist Jennifer Field and her colleagues have developed new methods of analysis so that detection is possible from very small samples taken automatically over a 24-hour period from wastewater as it enters a treatment plant.

The analyses can detect the presence of a long list of illicit drugs, from methamphetamine to Ecstasy, and other markers of human presence such as caffeine and cotinine, a product of nicotine from cigarette smoke.

Although wastewater is often tested for contaminants after it is treated as a measure of potential environmental impact, this new approach tests sewage as it enters a wastewater treatment plant and before it is treated, to get a profile of the drugs being used in the community.

Finding patterns of drug consumption in the wastewater can alert municipalities to problems that occur in particular communities or at particular times. This may be useful for tracking such things as the geographic patterns of methamphetamine use.

The researchers tested wastewater from ten mid-sized (unnamed) municipalities, calculating the concentrations of individual drugs and using the volume of wastewater flowing into the treatment plant and the municipal population in order to estimate the community load of each drug.

Even in their preliminary study, the researchers found patterns over time of drug occurrence in wastewater, with higher concentrations of recreational drugs such as cocaine on weekends. They found no change in concentrations of either prescription drugs or methamphetamines in their samples over time, which suggests more consistent use of both.

The researchers' wastewater analysis demonstrates that the new methodology can be applied cost-effectively on a larger scale to collect data from communities across a region or state. And because the data can be collected daily, weekly, or monthly, they represent a real-time measure that provides communities with more opportunity for prevention and intervention.

Visit oregonstate.edu/dept/ncs/newsarch/2007/Aug07/drugsinwastewater.html.

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