Cloud seeding may increase near Lake Tahoe

Cloud seeding would ideally increase water flowing over Slab Creek Dam. Photo/SMUD

By Joann Eisenbrandt

Cloud seeding over the upper portion of the American River watershed from Fresh Pond to Twin Bridges in El Dorado County may be expanding next winter.

Sacramento Municipal Utility District (SMUD) is having a public meeting in Strawberry on June 1 to discuss its plans to increase the cloud seeding area of its Upper American River Project (UARP) from 190 square miles to approximately 400

square miles for the 2017-18 wet season. The expanded cloud seeding area would include small portions of Placer, Amador and Alpine counties, but the majority would take place in El Dorado County over mainly U.S. Forest Service land.

Not everyone supports cloud seeding. Questions have been posed regarding the safety of the silver iodide used in the process, its effects on plant life and especially on fish and aquatic wildlife in affected areas. Others dispute whether cloud seeding really enhances snowfall at all. Some believe it takes away needed snow or rainfall from areas downwind of the seeded area.

Not a new idea

SMUD began cloud seeding in El Dorado County in 1968. The goal of the Upper American River Project is to augment snowfall and subsequent snow melt. The increased spring flows of water into its system of storage reservoirs and hydroelectric power plants would meet the electric power needs of the Sacramento area's growing population. SMUD estimates its cloud seeding efforts have increased snowfall in this targeted area by an average of 3 to 10 percent.

Last winter, SMUD actually ceased its cloud seeing operations mid-winter due to the record snowfall produced by Mother Nature. But as the recent drought years have shown, that's not always the case. SMUD believes cloud seeding is of value in wet and dry years.

The project does not require state or local permits or approvals, but it does require the preparation of an environmental document under the California Environmental Quality Act (CEQA) to analyze any potential environmental impacts. This document, a mitigated negative declaration, has been prepared. The 30-day public review period ends on June 16. During this time, comments from public agencies and individuals are gathered and then included into the final

document which is then voted on by the SMUD board of directors. Thursday's meeting in Strawberry is part of this process of gathering public input.

Recreation opportunities are offered at SMUD reservoirs like Loon Lake. Photo/SMUD

How cloud seeding works

Cloud seeding goes back to the 1940s after a discovery by the General Electric laboratories in Schenectady, N.Y., about how snowflakes form. As Dudley McFadden, principal civil engineer at SMUD, explains, "When a cold winter storm is actively producing snow which is falling to the ground, some of the moisture in the cloud remains in liquid form, even way up in the sky where it is below freezing. So, instead of turning into snowflakes and dropping to the ground, the moisture stays in the cloud … ice crystals require a tiny solid particle to

attach to in order to start forming a snowflake. Every snowflake you would find on the ground has microscopic particles which formed a base for the water to freeze into the snowflake."

Once all the natural microscopic particles in the cloud have been used up, there is still enough moisture in the cloud to form more snowflakes. That's where silver iodide comes in. Microscopic particles of silver iodide inserted into the clouds give the remaining sub-freezing moisture in the cloud something to adhere to and create additional snowflakes.

The Upper American River Project

Why is SMUD generating power for Sacramento residents through a project situated mainly in El Dorado County? "The hydropower project is partly on federal land, owned by all Americans and not by residents of a particular city or county," McFadden told *Lake Tahoe News*. The economy of El Dorado County is interconnected with Sacramento, and the rest of California and Northern Nevada. We are all interdependent and work together on our American River watershed to provide food, housing, and quality of life for everyone living here."

SMUD has an entire system of reservoirs and hydroelectric plants in El Dorado County's Upper American River watershed. It received permission in 1957 from the Federal Energy Regulatory Commission (FERC) to build this system with a 50-year license. A second 50-year license was granted in 2014. The expanded cloud seeding project will focus on the watersheds of Ice House, Union Valley and Loon Lake reservoirs, the South Fork American River watershed that drains to Slab Creek Reservoir and their associated hydropower facilities. The cloud seeding "season" runs from November 15, 2017, through April 15, 2018.

When SMUD began establishing this power generation system, most of El Dorado County was open land. As McFadden explains,

“SMUD and the capital city wanted to grow and recognized the water resources available in the mountains. It had the money and the ambition. It is federal land, national forest land.”

Basically, they got there first.

The hydropower generated by the UARP (Upper American River Project) provides from 15 to 20 percent of the energy supplied by SMUD to its customers. It generates clean power and helps them avoid using “peaker plants” during high usage peak summer periods in the middle of the day. These are power-generation plants that stand ready to be used as needed, but are operated by natural gas which is as McFadden terms it, “the negative side of the emissions spectrum.”

Public benefits are mandated under SMUD’s FERC license. Their system provides boating and other recreation opportunities on Sierra Nevada lakes as well as whitewater rafting in Coloma. As part of the current license, SMUD will set aside 30,000 acre-feet of water and hold it in storage in their Union Valley Reservoir to be released for customers in El Dorado Irrigation District’s service area during drought conditions.

Here is a map of the project area.

The mechanics of cloud seeding

Silver iodide is dissolved in a flammable solution or combined with other flammable solids to produce “seeding flares” which are then burned. They release microscopic silver iodide aerosol streams into the atmosphere. These “silver iodide ice nuclei” then fuse at below-freezing temperatures with the moisture in the clouds. SMUD dispenses these silver iodide nuclei either with remotely controlled or mobile ground-based units, or from aircraft. SMUD usually does cloud seeding for about 10 storms in an average winter. Storms to seed are selected based on wind direction, wind speed and cloud characteristics, including how much precipitation they are predicted to produce. There are controls built in to avoid

cloud seeing during major storm events or when there are avalanche warnings. Cloud seeding already in progress can be stopped quickly if needed.

Does it work?

SMUD estimates that cloud seeding will increase snowfall by an average of 3 to 10 percent. Opponents of cloud seeding dispute that. McFadden admits, “We can’t directly prove it.” There is no way to say how much snowfall seeded clouds would have produced on their own. McFadden added that SMUD believes numerous tests in the field and in lab settings across the country prove that it does.

Critics point to the dangers of messing with Mother Nature’s balance in the atmosphere between evaporation and precipitation. Cloud seeding in one area, they say, may lead to a decrease in rainfall or snowfall in areas downwind of the seeded area. This would increase the chance of drought conditions and high fire danger in such areas. SMUD disagrees, stating, “Although cloud seeding increases the amount of precipitation in the target area, it has not been found to reduce naturally occurring precipitation in downwind area. Clouds continually regenerate and release only a portion of their moisture in rainfall or snowfall.”

Is it safe?

SMUD believes cloud seeding is safe. McFadden explained that silver iodide is insoluble in water and is not bio-reactive if ingested by aquatic wildlife or by humans. He compared it to a microscopic grain of sand which just passes through an organism but does not react with it or form any other potentially harmful compounds. There are a number of endangered or protected species in the cloud seeding target area. There is no danger to fish or wildlife, SMUD’s environmental document concludes, because silver iodide’s small accumulations in soil or vegetation would not be above

natural background levels.

Not everyone agrees. Concerns expressed by Texas rancher, Johnny Micou, in an article for ranches.org back in 2003, is representative of the concerns heard from many over silver iodide's safety both then and now. "To effectively monitor the levels of silver toxicity, at the very minimum, water samples should be taken on a monthly basis from every dam, creek … and other water capture places in the respective district while cloud seeding is being conducted. Also, soil samples should be taken. If private land or public health is compromised, then the program should be held liable … the question is not that is cloud seeding harmful, but how harmful."

Excessive exposure to chemical compounds of silver by humans can produce a condition called argyria—a grayish-blue discoloration of the skin. Whether or not the amount of silver iodide dispersed during cumulative seasons of cloud seeding can produce such levels or is toxic to humans and wildlife, remains in dispute. An April 11, 2016, article by Christian Cristiano in Los Angeles City Watch, expresses the general unease of cloud seeding opponents. "In spite of claims that the long-term effects of this procedure are said to be harmless," he says, "it still feels like we are something of test subjects in the area of cloud seeding."

The SMUD board of directors will consider approval of the environmental document for expanded Upper American River Project at its Sept. 21, 2017, meeting in Sacramento. More information on the June 1 meeting in Strawberry, on the overall project or on how to submit comments is available from SMUD by contacting Jerry Park at 916.732.7406 or jerry.park@smud.org.