Officials study overhauling dam

Lake Powell’s low level imperils the ability to generate power, release water.

JOHN WEISHEIT, an activist who has advocated for removing Glen Canyon Dam, is pleased that federal officials are discussing retooling the structure. (Carolyn Cole Los Angeles Times)

By Ian James

The desiccation of the Colorado River has left Lake Powell, the country’s second-largest reservoir, at just 23% of capacity, its lowest level since it was filled in the 1960s.

With the reservoir now just 32 feet away from “minimum power pool” — the point at which Glen Canyon Dam would no longer generate power for six states —
federal officials are studying the possibility of overhauling the dam so that it can continue to generate electricity and release water at critically low levels.

A preliminary analysis of potential modifications to the dam emerged during a virtual meeting held by the federal Bureau of Reclamation, which is also reviewing options for averting a collapse of the water supply along the river. These new discussions about retooling the dam reflect growing concerns among federal officials about how climate change is contributing to the Colorado River’s reduced flows, and how declining reservoirs could force major changes in dam management for years to come.

Among the immediate concerns is the threat of the reservoir dropping below the dam’s power-generating threshold. If that were to occur, water would flow only through four 8-foot-wide bypass tubes, called the outlet works, which would create a choke point with reduced water-releasing capacity.

“There is now an acknowledgment, unlike any other time ever before, that the dam is not going to be suited to 21st century hydrology,” said Kyle Roerink, executive director of the environmental group Great Basin Water Network, who listened to the meeting. “They’re not sugarcoating that things have to change there, and they have to change pretty quickly.”

Those who participated in the Feb. 7 meeting included dozens of water managers, representatives of electric utilities, state officials and others. They discussed proposals such as penetrating through the dam’s concrete to make new lower-level intakes, installing a new or reconfigured power plant, and tunneling a shaft around either side of the dam to a power plant, among other options.

The Interior Department declined a request for an interview, but spokesperson Tyler Cherry said in email that the briefing was part of broader conversations with state officials, tribal leaders, water managers and others “to inform our work to improve and protect the short-term sustainability of the Colorado River System and the resilience of the American West to a changing climate.”

Roerink and two other people who listened to the webinar told The Times that cost estimates for several alternatives ranged from $500 million to $3 billion. The agency will need congressional approval and will have to conduct an environmental review to analyze options.

The Bureau of Reclamation’s presentation, given by regional power manager Nick Williams, included some additional alternatives that wouldn’t require major structural modifications of the dam. Those options included adjusting operations
to maximize power generation at low reservoir levels, studying ways of using the existing intakes at lower water levels, and making up for the loss of hydroelectric power by investing in solar or wind energy.

Glen Canyon Dam stands 710 feet tall, anchored to the canyon’s reddish sandstone walls in northern Arizona, about 320 miles upstream from Lake Mead, the nation’s largest reservoir. The dam has been controversial since its inception, with environmental activists and others arguing the reservoir was unnecessary and destroyed the canyon’s pristine ecosystem.

Lake Powell and Lake Mead have declined over the last 23 years during the most severe drought in centuries. Federal officials have sought to boost Powell’s levels in recent months by reducing the amount of water they release downstream until the spring runoff arrives. They’ve said they may need to further cut water releases.

A central concern is that if the water drops below minimum power pool — 3,490 feet above sea level under the current operating rules — the main intakes would need to be shut down and water would instead flow through the dam’s lower bypass tubes. Because of those tubes’ reduced capacity, that could lead to less water passing downstream, shrinking the river’s flow in the Grand Canyon and accelerating the decline of Lake Mead toward “dead pool” — the point at which water would no longer pass through Hoover Dam to Arizona, California and Mexico.

Federal officials prepared the initial studies of alternatives for Glen Canyon Dam using $2 million that the Bureau of Reclamation secured as part of $200 million for drought response efforts.

According to a slide presentation shown at the meeting, officials see potential hazards in some of the six alternatives. Piercing the dam’s concrete to create new low-level or mid-level intakes, for example, would entail “increased risk from penetration through dam,” the presentation said.

They also describe risks due to possible “vortex formation,” or the creation of whirlpools above horizontal intakes as the water level declines. Their formation could cause damage if air is pulled into the system. The presentation said one alternative would involve lowering the minimum power pool limit and possibly installing structures on the intakes to suppress whirlpools, but it said this still would not allow for the water level to go much lower.

One of the possible fixes includes installing a new power plant that would generate electricity with water flowing from the bypass tubes, or taking a similar approach
using existing infrastructure. Another would involve excavating a tunnel to the left or right side of the dam, and installing a power plant underground or in the riverbed.

Other options include changing operations at both Glen Canyon and Hoover dams “to maximize power generation under low flow conditions using existing infrastructure.”

“Any of the options are going to be very expensive and they’re going to be very time-consuming,” said Leslie James, executive director of the Colorado River Energy Distributors Assn., who participated in the meeting.

James praised the Bureau of Reclamation for “starting the processes to look at structural options like this.”

Her association represents nonprofit electric utilities that buy power produced by Glen Canyon Dam and other dams that are part of the Colorado River Storage Project. The association includes members in Arizona, Colorado, Nevada, Utah, New Mexico and Wyoming.

Power from the dam has long been a vital energy source, though its output has decreased dramatically in recent years as Lake Powell has declined. During the 2022 fiscal year, Glen Canyon Dam generated 2,591 gigawatt-hours of electricity, enough to power more than 240,000 average homes for a year.

James said electric utilities across the region have had to make up for the reduced hydropower by turning to other costlier sources.

“It’s a real challenging time,” James said.

Lake Powell’s level is projected to rise this spring with runoff from the above-average snowpack in the Rocky Mountains. But that boost in water levels is expected to have a limited effect on the deep water deficit that has accumulated over more than two decades.

And in the long term, scientific research indicates warming and drying will continue to take a major toll on the river.

Scientists have found that roughly half the decline in the river’s flow since 2000 has been caused by higher temperatures, that climate change is driving the aridification of the Southwest, and that for each additional 1 degree Celsius (1.8 degrees Fahrenheit) of warming, the river’s average flow will probably decrease about 9%.
Environmental activists have for years urged the federal government to consider draining Lake Powell, decommissioning the dam and storing the water downstream in Lake Mead.

Activists who listened to the Bureau of Reclamation’s presentation said they welcome the agency’s examination of the issues at Glen Canyon Dam but would prefer to see a broader analysis that evaluates other options, including draining the reservoir.

John Weisheit, an activist who has advocated for removing the dam, said he was delighted to hear federal officials openly discussing these options for the first time. “I’m glad we’re having this conversation. It’s long overdue,” said Weisheit, who is co-founder of the group Living Rivers.

Weisheit said he also thinks the agency’s alternatives aren’t broad enough, and leave unanswered questions about the dam’s life span.

Weisheit said one major concern should be the accumulation of sediments in the bottom of the reservoir, which, according to a recent federal survey, has lost nearly 6.8% of its water-storing capacity.

Another issue with the agency’s current alternatives, he said, is that they wouldn’t solve problems of intakes or bypass tubes sucking in air at low water levels, potentially causing cavitation that would pit and tear into metal, damaging the infrastructure.

Overall, the modifications to the dam that the federal government is considering would be “too much investment for very little return,” Weisheit said. “And it’s going to take a long, long time.”

Weisheit said he favors the option of investing in solar and wind energy. Instead of spending up to $3 billion trying to squeeze a shrinking amount of power from the dam, he said, “you can build a lot of solar cells and turbines,” including nearby on the Navajo Nation, which needs electricity.

“Take the dam out,” he said, “because it’s not the right dam for climate change.”