



Janice K. Brewer
Governor

State of Arizona Arizona Geological Survey

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Director & State Geologist

April 28, 2011

Honorable Janice Brewer
Governor of Arizona
1700 W. Washington Ave.
Phoenix, Arizona 85007

Dear Gov. Brewer:

The Arizona Geological Survey has completed a study of the amount of naturally-occurring uranium in the Colorado River and the possible impacts of additional uranium entering the river as a result of accidental discharge from current and potential uranium mining in northern Arizona.

This new report addresses one of the primary concerns raised by Interior Secretary Ken Salazar in implementing the temporary federal land segregation in northern Arizona.

We conclude that even the most implausible accident would increase the amount of uranium in the Colorado River by an amount that is undetectable over amounts of uranium that are normally carried by the river from erosion of geologic deposits. Even if the entire annual uranium production from an operating mine were somehow implausibly dumped into the river, the resulting increase in uranium concentration in river water would increase from 4.0 to 12.8 parts per billion (ppb) for one year, which is still far below the 30 ppb EPA Maximum Contaminant Level.

Therefore, we believe the fears of uranium contamination of the Colorado River from mining accidents are minor and transitory compared to the amounts of uranium that are naturally and continually eroded into the river.

Our report is being released as "Breccia-pipe Uranium Mining in the Grand Canyon Region and Implications for Uranium Levels in Colorado River Water", AZGS Open-file Report 2011-4 by Jon Spencer and Karen Wenrich.

We initiated this study in our role as a Cooperator in the Bureau of Land Management's EIS for the proposed withdrawal of federal lands in northern Arizona from mineral exploration and mining, and in response to the fears raised that mining could contaminate the water supplies for millions of people downstream.

Drs. Spencer and Wenrich used data published by the U.S. Geological Survey¹ to find that 40 to 80 tonnes of dissolved uranium (not uranium ore) are currently being carried by the Colorado River through northern Arizona and the Grand Canyon every year. The area has one of the highest concentrations of naturally-occurring uranium in the world with many deposits exposed in the walls of canyons across the area. Even without this, the volume of water carried by the river is adequate to carry large amounts of uranium and other minerals from just average

concentrations in the rocks. Uranium has been eroding out of these deposits into the Colorado River and other streams and creeks for millions of years and will continue to do so for millions more.

They considered a hypothetical, worst-case accident in which a truck hauling thirty metric tons (66,000 pounds) of ore containing one-percent uranium is overturned by a flash flood in Kanab Creek and its entire ore load is washed into the Colorado River where it is pulverized and dissolved during a one-year period to become part of the dissolved uranium content of the river (such a scenario is extremely unlikely if not impossible). This addition of 300 kilograms (660 pounds) of uranium over one year would increase uranium in river water from 4.00 ppb to 4.02 ppb, an increase of one-half of one percent. This would be undetectable against much larger natural variation in river-water uranium content.

The authors of the study note that our deliberately exaggerated, worst-case scenario for a uranium-ore spill into the Colorado River can be applied to even more unlikely environmental situations. Consider the entire 13,200 tonnes of uranium ore production from the currently operating "Arizona 1" mine that occurred during 13 months in 2009-2010. Then consider that, for some reason, this ore was not trucked to a distant uranium mill, but was stockpiled on site in a location vulnerable to flash flooding. At a grade of 1 percent uranium, this stockpile would contain 132 tonnes of uranium. If a flash flood washed the entire 13,200 tonnes of uranium ore into the Colorado River, and all of the ore was pulverized and its 132 tonnes of uranium dissolved in the river over one year, then the annual uranium flux in the Colorado River would increase from approximately 60 tonnes to 192 tonnes. Uranium concentration in river water would increase from 4.0 to 12.8 ppb for one year, which is still far below the 30 ppb EPA Maximum Contaminant Level for uranium.

We recognize the very serious issues to be considered regarding any development in the Grand Canyon region and we will continue to work with the BLM and other stakeholders to bring objective, unbiased scientific results to the discussion.

Sincerely,



M. Lee Allison
State Geologist and Director

¹Hydrological, Geological, and Biological Site Characterization of Breccia Pipe Uranium Deposits in Northern Arizona, U.S. Geological Survey SIR 2010-5025, 2010