Selenium Update

For Colorado's Lower Gunnison River Basin and Grand Valley
Prepared by the National Irrigation Water Quality Program

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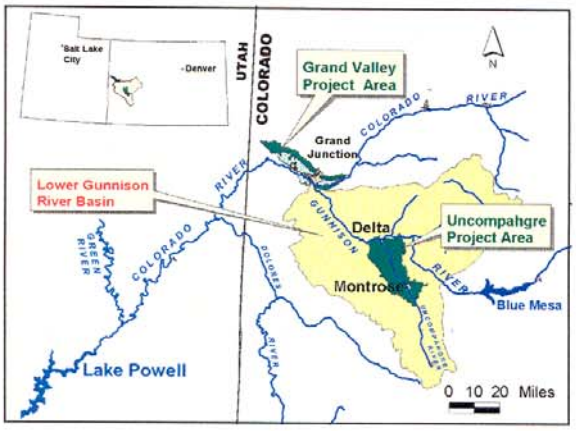

Grand Valley News:

Open House to be held October 30th

An open house will be held Tuesday, October 30th to provide stakeholders and other interested public an opportunity to participate in planning selenium remediation measures at Colorado River backwaters and bottomland habitat in the Grand Valley. The event is scheduled from 2 - 5 p.m. and 6:30 - 8 p.m. at the old Whitman School building at the Museum of Western Colorado on the corner of 4th Street and Ute Avenue in downtown Grand Junction.

We will have maps, exhibits and aerial photos focusing on the current study areas for viewing. Staff from the National Irrigation Water Quality Program (NIWQP) will be available to discuss the selenium issues and listen to your ideas and concerns. A formal presentation is not planned, so please join us at your convenience, during the scheduled hours, to learn and share your thoughts. Refreshments will be served. Parking is available by turning north off of Ute Avenue between 5th and 4th Streets onto the museum grounds.

Lower Gunnison Basin News:

Finding Selenium Solutions

Over the last 2 years, the Gunnison River Basin Selenium Task Force and the NIWQP have been working to identify and evaluate possible solutions to selenium problems in the Gunnison River Basin. About 200 selenium control measures were suggested by the public and agency representatives at a November 1999 brainstorming workshop held in Delta. Since that time, engineers, scientists and stakeholders have been going through a process to analyze and evaluate those measures. Promising measures are now the subject of demonstration projects aimed at analyzing their on-the-ground effects and studying the feasibility of their use throughout the lower Gunnison basin.

The goal of these studies is to develop a comprehensive plan which reduces selenium to meet the State of Colorado's water quality standards and benefits aquatic species in the Colorado River ecosystem including, possibly, endangered fish species in the Gunnison and Colorado rivers while maintaining the "economic viability and lifestyle" of the basin. This comprehensive plan may include various measures addressing seepage from irrigation delivery systems and ponds, and deep percolation resulting from on-farm, municipal and residential water use.

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Grand Valley News (continued from page 1)

What's Happening with Remediation?

For the last several years, we have been looking at ways to reduce potential selenium impacts to endangered fish and other aquatic life in the Grand Valley. The focus has been on measures that would have the least impact (lowest cost with minimal impacts on affected stakeholders) while solving or reducing the selenium problems. Many different measures ranging from agricultural land retirement to water treatment to diversion and dilution were studied for the Orchard Mesa Wildlife Area (OMWA), our first targeted area. In December 2000, the first remediation took place at the OMWA. It was a very simple project, involving the excavation of a "flushing" channel that would carry "clean" (i.e., low selenium) water from the Colorado River into an old slough to dilute high selenium concentrations to safer levels for the aquatic life. Additional flushing channels were recently excavated to reduce selenium concentrations in other parts of the wildlife area. Monitoring will continue over the next several years, and, if needed, additional "adaptive management" measures may be implemented.

We are presently planning improvements at 3 additional Colorado River backwater/ bottomland sites. These improvements are being studied in cooperation with the landowners. Any proposed improvements will require their concurrence.

Adobe Creek backwater near Fruita

These sites are:

- Colorado River Wildlife Area Backwater - north side of the river between 30 and 31 Roads,
- Mouth of Adobe Creek - north side of the river at about 18 ½ Road, and
- Panorama - south side of the river near the Panorama subdivision on the Redlands.

Reducing selenium concentrations at these sites will improve habitat quality for aquatic life. Eventually, 20 or more additional sites in the Grand Valley may be studied and improved under this program.

Lower Gunnison News

Finding Solutions *(continued from page 1)*

Some of the most promising measures surfacing thus far, are:

- membrane lining and/or piping irrigation canals and laterals (ditches),
- applying PAM in canals and laterals,
- installing on-farm irrigation improvements,
- lining farm and residential ponds,
- growing harvestable trees or other vegetation that reduce groundwater volumes, and
- providing educational activities aimed at reducing water use.

The articles on the following pages describe current demonstration projects involving piping laterals in the Montrose Arroyo drainage and applying PAM to canals and laterals. Additionally, efforts are underway to initiate a new series of demonstration projects for some of the other promising measures. If you would like additional information concerning these studies, or if you have other ideas that might help reduce selenium in the area, please contact Mike Baker at (970) 248-0637.

The Montrose Arroyo Demonstration Project

A demonstration project was initiated in 1998 to determine if replacing five open-ditch laterals with 7.5 miles of buried pipe in the Montrose Arroyo basin would reduce selenium loads and to examine the relation between salt and selenium loading. Montrose Arroyo is a small basin south of Montrose that has high selenium and salt concentrations and is significantly affected by irrigation drainage. The project was funded by the Colorado River Basin Salinity Control Program and NIWQP. Workers from the Uncompahgre Valley Water Users Association completed the project in 2000 at a cost of about $1.3 million which is about 24% less than originally anticipated.

Biweekly sampling was done by the USGS from 1998 through October 2000 to monitor five sites in the basin. Data were separated into pre-project and post-project sets for each site.

Changes in selenium and salt loads in the ground-water were then used to determine the effects of the project. Placing the five laterals in pipe caused a significant reduction in selenium loads in the post-project period at all monitoring sites except at the control site, where selenium loads did not change. At the outflow monitoring site at Niagara Road in Montrose, the selenium load decreased by about 28 percent of the pre-project load, and more than 90 percent of that decrease was in the ground-water load. Salt load also decreased in the post-project period at all monitoring sites except the control site. The percentage decreases in salt loads were smaller than the percentage decreases in selenium loads.

It should be noted that all of the potential effects of the project on selenium and salt loads were not measured at the monitoring sites. Part of the seepage that originated from some of the laterals prior to their being replaced with pipe probably did not discharge into Montrose Arroyo upstream from the outflow monitoring site at Niagara Road. Taking into consideration the extent of the drainage not captured at the Niagara Road site and using the USGS data from that site, the Bureau of Reclamation has estimated the project's total salt load reduction at about 2,500 tons per year and the selenium load reduction at 210 pounds per year.

One interesting observation was that the project caused a greater percentage decrease in selenium loads than in salt loads. This may have been partially the result of decreases in selenium concentrations in the ground-water in some portions of the project area in addition to the decrease in selenium load caused by the reduction in ground-water discharge. The USGS plans to continue sampling two sites in the Montrose Arroyo to monitor the long-term effects of future residential and golf-course development on selenium and salt loads.

In addition to piping the laterals, the project also included a component to replace lost wildlife habitat resulting from eliminating the seepage from the laterals. The "habitat replacement plan" involved constructing a pipeline to provide a water supply for development of new habitat at the Escalante State Wildlife Area near Delta.

Using PAM to Reduce Selenium Loads

Water leaking from irrigation canals and laterals contributes to shallow ground-water and is a significant source of selenium loading to rivers and streams in the lower Gunnison River Basin and the Grand Valley. This ground water picks up selenium and salts and, in places, comes to the surface in drains or streams that are tributary to rivers in the area. A new approach to reduce seepage from canals and laterals is to use a product commonly known as polyacrylmide (PAM). PAM is commonly used by irrigators to improve flow in furrows and to minimize soil erosion. Additionally, PAM is used in treating domestic water to remove impurities. A white crystalline solid, PAM can be applied as a solution to a dry canal or lateral or by injecting PAM into canal water. Sealing occurs when the PAM adheres to particles of water-borne sediment causing the sediment to settle out and seal the canal bottom. PAM has been used to seal canals in the Uncompahgre Project in several localized instances. Monitoring changes in salt and selenium loads is part of a trial application of PAM to canals and laterals in the Sunflower Drain area (east of Delta), and for a future test involving the sealing of up to 15 miles of canals and laterals in the Loutzenhizer Arroyo drainage. However, some concerns have been raised about the effects PAM may have on streams and rivers downstream. To address those concerns, a monitoring plan is being developed to detect any movement of PAM associated with its application in the Loutzenhizer Arroyo. Information developed about the use of PAM to reduce selenium loading will be reported in various forums including future editions of this newsletter.

For more information on any of the articles in this newsletter or to provide comments, please write or call Mike Baker, at the Bureau of Reclamation, 2764 Compass Drive, Suite 106, Grand Junction CO 81506.

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