ANACONDA / YERINGTON MINE

U.S. Environmental Protection Agency • Region 9 • San Francisco, CA • April 2010

Yerington, Nevada

Groundwater Investigation Results and Next Steps

This fact sheet presents the U.S. Environmental Protection Agency's (EPA's) current information about groundwater contamination at the Anaconda Yerington Mine Site. It also describes the EPA's next steps in the groundwater investigation.

We have concluded that uranium contamination from the Anaconda Mine site has migrated off-site north of the boundary, although it is not yet clear how far. It is less certain whether contaminants other than uranium (arsenic, for example) have moved off-site. Studies are underway to further define the extent of groundwater contamination. These studies are necessary to clean up or otherwise address this off-site impact.

In the interim, EPA continues to implement the bottled water program to reduce the impact to domestic well owners. EPA may consider further interim actions in the future.

Next Phase of Field Work Begins in April

Key areas for further groundwater investigation in 2010 include areas west of the mine near Locust Drive, and areas to the north of Luzier Lane, including wells as far as two miles north of the site boundary. Well drilling began the week of April 5. Approximately 40 locations have been chosen. At most locations, wells will be drilled in shallow, intermediate, and deep groundwater zones (see "Subsurface Structure" section for explanation of the zones). This will provide over 100 additional groundwater data points. Locations were selected based on technical input from EPA and stakeholder experts as part of a public process.

Subsurface Structure

Knowledge of the subsurface is important for understanding the groundwater contamination, as well as the next groundwater investigation steps. Groundwater in the subsurface occurs in layers called "aquifers". Aquifers are underground layers of materials that hold water similarly to a sponge. These layers may be made of rock (these aquifers are known as bedrock aquifers) or unconsolidated material such as gravel, sand, silt, or clay (these aquifers are known as alluvial aquifers). Water moves within and between these layers at varying speeds and directions, depending on the materials that make them up. Both types of aquifers, bedrock and alluvial, occur in the Mason Valley, where the site is located.

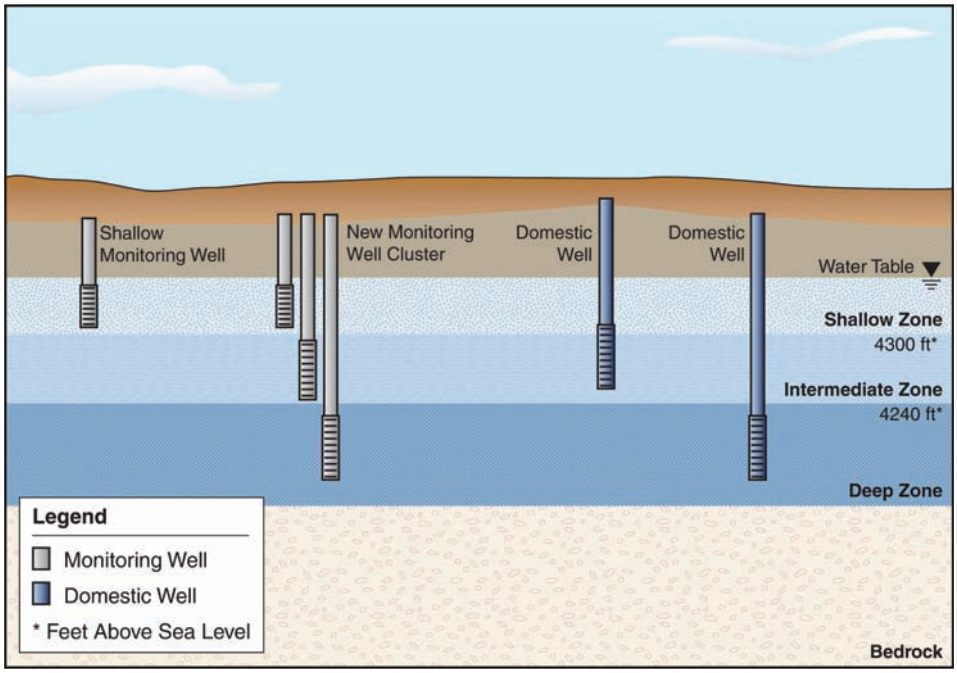


Figure 1: Wells placed throughout the aquifer

Groundwater is extracted from aquifers using water wells. To the north of the site, the overwhelming majority of water wells draw water only from the alluvial aquifer. Therefore, the alluvial aquifer has been the focus of studies to date. The bedrock aquifer will be the subject of future investigations.

Groundwater north of the mine is generally found starting at 15–25 feet below the ground surface. The upper groundwater boundary is called the "water table". The alluvial aquifer is roughly divided into three zones: shallow, intermediate, and deep (see Figure 1). The shallow zone extends to 20–30 feet below the water table, meaning 35–55 feet below the ground surface. The intermediate zone represents the next 60 feet of the aquifer. The deep zone extends between the intermediate zone and bedrock, which begins at varying depths. These three zones were once thought to be separated from one another by clay layers, but we now believe that they are connected to one another. Domestic wells generally draw water from the intermediate or deep alluvial zone.

What We Know About the Extent of Groundwater Contamination

Groundwater investigation results collected in 2009 and presented at the September 2009 public meeting were based on shallow zone data collected in 2009. These data clearly show a plume of uranium extending to the north of the mine, beyond the mine boundary, indicating that the contamination has migrated off-site (see Figure 2 at right). Further study is necessary to determine the extent to which this plume continues into the intermediate and deep zones.

Figure 2: Contamination plume at the Anaconda Yerington Mine Site

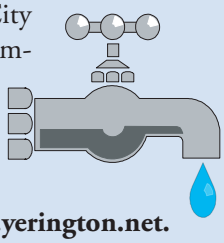
A plume is a mixture of a chemical and groundwater created by a contaminant source. EPA suspects the plume at the site was caused by leakage or disposal of fluids onto the land surface during historical mining operations.

Each black line on the map (called a "contour line") connects points in the shallow aquifer at which concentrations of uranium are approximately equal, indicated by the number associated with the line. For example, the contour line with "100" next to it indicates that uranium concentrations in the shallow zone along the line are approximately 100 parts uranium per billion parts total liquid solution.

This map only shows Uranium because it is the chemical that is most readily traced to mining operations at this site. The values shown on each line of the plume map represent total uranium, which includes both uranium from a contaminant source and uranium that occurs naturally in local groundwater.

Since more monitoring wells are being installed in 2010, there will be more data points to use to draw the map. This means that some areas of the map will change as a result of the new data.

Water supplied to residents by the City of Yerington Water System is not impacted by the mine site. City water is regularly tested and complies with federal drinking water requirements. Information on the City of Yerington Water System is available at **www.yerington.net.**



How far off-site has the uranium contamination moved?

EPA has concluded that contamination from the mine has moved off-site. Our investigation found shallow zone uranium concentrations above the federal drinking water standard as far as two miles north of the site. Data obtained within one mile from the mine property boundary suggest that a hot spot of uranium (concentrations significantly higher than expected to occur naturally) exists in that area.

However, it is possible that some, though not all, of the uranium detected north of the site may occur naturally or come from sources other than the mine. In order to determine what cleanup actions may be necessary, it will be helpful to determine the level of naturally occurring, or "background", uranium in groundwater.

Background uranium concentrations likely differ throughout the site. This variation depends on soil and rock type, which vary in this part of the Mason Valley, and on the depth of the groundwater being tested. EPA will look to conduct a science-based background level study as part of the next site investigation steps.

What about arsenic?

While EPA has been able to trace some uranium contamination that occurs north of the site back to the mine, it is much more difficult to do so for the elevated concentrations of arsenic.

Arsenic, like uranium, occurs naturally in varying concentrations throughout the area. EPA will look to study background arsenic concentrations as part of the next site investigation steps. Determining the naturally occurring levels of arsenic in groundwater will help measure the amount of arsenic coming from the mine or other sources.

How fast does the contamination spread?

Contaminants move along with groundwater, but usually more slowly due to physical and chemical interactions with underground materials. Groundwater travels locally at up to 100 feet per year. Rates of groundwater movement may have been higher in the past, which makes it difficult to use current groundwater speed to estimate how far the contamination may have moved in the last few decades.

Next Steps

During the next phase of work, we expect to make significant progress in defining the extent of the contamination plume and determining how much of it derives from the mine site. This work is slated to begin in April 2010 (see text box on page 1 for more details).

EPA is planning a groundwater summit meeting in 2010 to focus its future investigations. Those investigations will include further work on determining background levels of uranium and arsenic in groundwater.

EPA is also expanding the Domestic Well Monitoring Program, which provides sampling of domestic wells located north and west of the mine. The intent of the program is to address immediate threats to human health until we determine the full extent of groundwater contamination.

With EPA oversight and domestic well owner consent, Atlantic Richfield Company (ARC) takes samples from those wells and analyzes the samples for uranium and other constituents. ARC is now sampling a greater number of domestic wells more frequently and checking the samples for an expanded list of contaminants. The resulting data can help determine the impact of mine-related contaminants on domestic wells. Furthermore, the expanded program will help determine if ARC needs to provide more residents with bottled water.

ARC sampled over 130 wells in March 2010 as part of the expanded program, while most recent prior sampling events included less than 30 domestic wells. EPA expects results to be available by June 2010.

Why is so Much Data Needed to Characterize the Plume?

The situation at the site is very complex. The mine operated for approximately 25 years, producing contamination. Mining operations have been shut down for the past approximately 30 years. This made for a total of 55 years for natural processes (rainfall and natural groundwater movement) to spread the contaminants around, resulting in complex contamination patterns that require extensive investigation to define. In addition, background concentrations and the possibility of other sources of uranium and arsenic make it more difficult to define how much of the contamination comes from the mine. EPA is working to gain a thorough understanding of the site in order to develop an effective long-term remedy.

Anaconda / Yerington Mine

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For More Information

If you have questions or concerns regarding the Anaconda Yerington Mine site, please contact any of the staff below:

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EPA website:
www.epa.gov/region09/anaconda

U.S. Environmental Protection Agency
75 Hawthorne St.
San Francisco, CA 94105

EPA toll-free number
(leave a message and your call will be returned):
(800) 231-3075

Information Repository

Site reports and other information on the Anaconda Yerington Mine can be found at:

Lyon County Library
20 Nevin Way
Yerington, NV 89447
(775) 577-5042
Hours: Mon, Wed. Fri – 9 am to 6 pm
Tues, Thurs – 9 am to 7 pm
Saturday – 9 am to 4 pm

EPA Superfund Records Center
95 Hawthorne St. (4th floor)
San Francisco, CA 94105
(415) 535-2000
Hours: Mon through Fri – 8 am to 5 pm

United States Environmental Protection Agency, Region 9
75 Hawthorne Street (SFD-6-3)
San Francisco, CA 94105
Attn: Svetlana Zenkin (Anaconda 4/10)

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