NEWSLETTER OF THE BLUEWATER VALLEY DOWNSTREAM ALLIANCE

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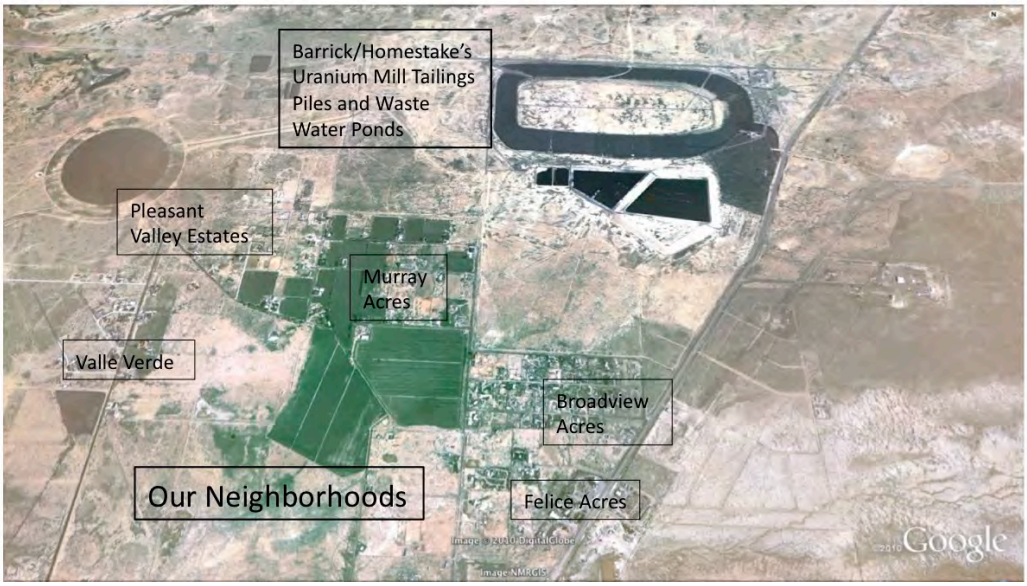
May 2013



BLUEWATER VALLEY DOWNSTREAM ALLIANCE: AN INTRODUCTION

The Bluewater Valley Downstream Alliance (BVDA) is a group of citizens from neighboring communities north of Milan and Grants, New Mexico where groundwater and soil have been contaminated by uranium mining and milling activities that began in the 1950s. Our membership includes sixth-generation New Mexicans; families with a historically rural culture; former underground uranium miners; ranchers; farmers; environmentalists; business owners and wage earners. Please visit our webpage or contact us at contact1@bvdownstreamalliance.org to find out who we are, what we are doing and why.

Officers

Jonnie Head, President (505) 287-3496
headjonnie@gmail.com

Larry Carver, Vice-President
carver@7cities.net

Sandy Brewer, Secretary
sandygrant2@aol.com

Gray Kershner, Treasurer
kersh47@hotmail.com

Technical Assistance Grant (TAG) Staff

Candace Head-Dylla, Coordinator,
(505) 401-4349; cheaddylla@gmail.com
Paul Robinson, Technical Advisor,
(505) 262-1862; sricpaul@earthlink.net
Chris Shuey, Technical Advisor
(505) 262-1862; sric.chris@earthlink.net

BVDA NEWSLETTER PURPOSE AND CONTENT

The BVDA Newsletter is part of a Technical Assistance Grant (TAG) Program that provides summaries of recent documents related to the continuing effort to remediate contamination associated with the Homestake Mining Company Superfund site. This document has been funded partly or wholly through the use of U.S. Environmental Protection Agency (EPA) TAG funds. Its contents do not necessarily reflect the policies, actions, or positions of the EPA, Homestake Mining Co. TAG, or BVDA.

This third edition of the newsletter includes:

- Summary of Findings in the EPA Region 6 "Initial Draft Human Health Risk Assessment for the Homestake Mining Co. Superfund Site", released in April 2013 for initial comments; and
- Summary of 2012 and 2013 Department of Energy (DOE) inspection reports for the former Anaconda Bluewater uranium mill tailings disposal site identify uranium concentrations exceeding ground-water standards in both alluvial aquifer and San Andres Glorieta Aquifer monitoring wells.

Excess Lifetime Cancer Risk in BVDA Neighborhoods Exceeding EPA's "Generally Acceptable Risk" Level Identified in Draft Human Health Risk Assessment

Residents of the Five Subdivisions where BVDA members live south of the Homestake site face excess cancer risks 18 times higher than EPA's "generally acceptable risk" range for radionuclides in outdoor air among other increased risks according to EPA Region 6's long-awaited *Human Health Risk Assessment for the Homestake Mining Co. Superfund Site* that was released as an Initial Draft (DHHRA) for comment in April 2013.

The report, authored by Dr. Ghassan Khoury, identifies excess lifetime cancer risk from radionuclides of concern for residents of Five Subdivisions near the Homestake site in the northern part of the Village of Milan, New Mexico in comparison to risks identified in a scientifically identified background location, the nearby Village of Bluewater, New Mexico.

While the data and findings in the Initial Draft HHRA are subject to change following review by agency staff and the public, the excess lifetime cancer risk and indoor radon exposures in the neighborhoods nearest to the Homestake site are of great interest to the residents and their friends and neighbors.

Excess Lifetime Cancer Risk Findings

To provide a little context for the local excess cancer risk findings, EPA says,

"Government agencies regard cancer risks less than 1 x 10-6 as de minimis and consider risks between 1 x 10-6 and 1 x 10-4 to be within a generally acceptable range. These regulatory risk levels have been adopted by the EPA Superfund program."

The risk rate provides an estimate of the frequency or amount of cancer occurrence. A risk of 1 x 10-6 is the same as a risk of "one in a million" or "1:1,000,000"; a risk of 1 x 10-4 is the same as "one in ten thousand" or "1:10,000." 1 x 10-4, or 1:10,000 is the highest level of cancer risk in the "generally acceptable range" identified by EPA. When EPA regards risk less than 1 x 10-6 as "de minimus", it means that risk below that level are below consideration or of minor concern.

The DHHRA says,

"Under current EPA Superfund policy, as stated in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP)…, acceptable exposures to known or suspected carcinogens are generally those that represent an excess upper-bound lifetime cancer risk to an individual of between 1 x 10-6 and 1 x 10-4."

The DHHRA found the excess lifetime cancer risks in the Five Subdivisions that are in addition to the risks in the background location were above the highest "generally acceptable risk" rate of 1:10,000 for risks from soil, air, and water contaminants.

Excess cancer risks for the Five Subdivisions above the risks at the background location were:
- 18 times the highest generally acceptable risk (1:10,000) for radionuclides in ambient air, primarily from radon-222;
- 2.4 times the highest generally acceptable risk for radionuclides in soil, primarily from radium-226 and its decay products;
- 22 times the highest generally acceptable risk for radionuclides in water beneath the subdivisions if used, primarily from radon-222.
- 5.6 times the highest generally acceptable risk for the "residential maximum exposure" for combined exposures to soil, air and produce grown in the area.

These excess cancer risks for the residents of the Five Subdivisions are above and beyond – in addition to - the excess lifetime cancer risk calculated for the background location, Bluewater Village, which also exceeded the generally acceptable risk range of 1:10,000. Excess lifetime cancer risk at Bluewater was found to be 13 times the highest generally acceptable risk for radionuclides ambient air and 1.8 times higher for radionuclides in soil.

The DHHRA reports:

- "**The estimated excess lifetime cancer risk from exposure to radionuclides of concern in ambient air at the Five Subdivisions was 1.8 x 10-3 in a residential scenario**. 1.8 x 10-3 equals 1.8;1,000, **18 times higher than 1 x 10-4, the highest "generally acceptable cancer risk" level identified by EPA**. The DHHRA notes that this risk is "primarily due to inhalation of radon- 222 in ambient air which was calculated to be 1.7 x 10-3."

- "**The estimated excess lifetime cancer risk from exposure to radionuclides of concern in soil at the Five Subdivisions was 2.4 x 10-4 in a residential setting**." 2.4 x10-4 equals 2.4:10,000, **2.4 times the 1 x**

10-4 the highest "generally acceptable cancer risk" level identified by EPA. The report notes that this risk is "primarily due to external exposure to radium-226+D (Ra-226 plus its decay products) that poses a potential risk of 1.9 x 10-4," 1.9 times the highest "generally acceptable cancer risk" level identified by EPA.

- "**The estimated excess lifetime cancer risk from exposure to radionuclides of concern in water at the Five Subdivisions was 2.2 x 10-3 in a residential setting," if it were used by for domestic uses by homeowners**. This risk is equivalent to 2.2:1,000, **22 times higher than 1 x 10-4, the highest "generally acceptable cancer risk" level identified by EPA**.

The risk is primarily due to inhalation of radon-222 +D (plus decay products) emitted from water due to indoor domestic uses (showering, cooking, dishwashing, laundering etc.) which has a risk of 1.6 x 10-3 and secondly from inhalation of radium-226+D and ingestion of radium-228+D which has a risk of 3.5 x 10-4 and 2.2 x 10-4 respectively (see DHHRA Appendix A Table 7.1.5).

The excess lifetime cancer risk in the Five Subdivisions are above and beyond the lifetime cancer risk determined for air and soil contaminants at the background location that themselves exceeded EPA's highest "generally acceptable cancer risk level" of 1 x 10-4. In the Village of Bluewater, DHHRA found;

- **"The estimated excess lifetime cancer risk from exposure to radionuclides of concern in ambient [outdoor] air at the background area was 1.3 x 10-3 in a residential scenario**." This risk is equivalent to 1.3:1,000, **13 times higher than 1 x10-4, EPA's highest "generally acceptable cancer risk" level**.

- "**The estimated excess lifetime cancer risk from exposure to radionuclides of concern in soil at in the background area was 1.8 x 10-4 in a hypothetical residential setting**." A risk of 1.8 x 10-4 equals 1.8:10,000, **1.8 times higher than 1.4 x 10-4, EPA's highest "generally acceptable cancer risk" level**.

The DHHRA provides risk estimates for the "reasonable maximum exposure" to a person in the Five Subdivisions living a subsistence agricultural lifestyle, reporting that:

- "**In a residential scenario, a hypothetical "reasonable maximum exposure" (RME) individual living at the Five Subdivision area and exposed to different media namely soil, air and produce through different routes of intake or through external exposure is expected to have a total excess cancer risk of 5.6 x 10-4** after subtracting risk from background exposures to the same media through the same routes of intake. **This excess risk is 5.6 times higher than 1 x 10-4, the highest "generally acceptable cancer risk" level identified by EPA**.

- "**In an agricultural scenario, a hypothetical RME individual living at the Five Subdivision area and involved in subsistence living exposed to radionuclides of potential concern in different media namely soil, air, produce, beef, milk, poultry and egg through different routes of intake and external exposure is expected to have a potential total excess cancer risk of 6.0 x 10-4"** after subtracting risk from background exposures to the same media through the same routes of intake. **This excess risk is equivalent to 6.0 x 10-4, 6 times higher than EPA's highest "generally acceptable cancer risk" level.**

INDOOR RADON FINDINGS

Excess lifetime cancer risks for residents of the Five Subdivisions were not reported for indoor exposure to radon, a radioactive gas that is a decay product of radium, in the DHHRA. Indoor radon concentrations in homes were compared to EPA action levels for protection of residents from lung cancer risk from radon decay products.

The DHRRA found indoor radon concentrations in the Five Subdivisions to be higher in non-trailer than trailer homes. Homes built of primarily of brick were found to have had the highest annual average indoor radon - 5.5 pCi/l; followed by wooden – 4.6 pCi/l; stone – 3.5 pCi/l; stucco – 3.2 pCi/l while trailers averaged less than 1 pCi/l – 0.97 pCi/l.

The Public Health Statement on Radon in DHHRA Appendix D says, "EPA recommends fixing your home if measured indoor levels of radon are 4 or more pCi per liter (pCi/L) of air. EPA also notes that radon levels less than 4 pCi/L still pose a health risk and can be reduced in many cases."

"Yearly Average Indoor Radon Results" from 75 homes in the Five Subdivisions, illustrated below, showed:

- 9 homes (including no trailers) with annual average Rn exposures greater than 4 pCi/l in air;
- 7 homes (including one trailer) with annual average Rn between 3 – 4 pCi/l;
- 15 homes (including one trailer) with annual average Rn between 2 – 3 pCi/l;
- 14 homes (including 8 trailers) with annual average Rn between 1 – 2 pCi/l; and
- 30 homes (including 20 trailers) with annual average Rn below 1 pCi/l.

Radon risk for non-smokers from these exposure levels are summarized below.

Radon Risk for Non-Smokers and Recommended Responses

Radon Level	Lifetime lung cancer risk per 1000 non-smokers	Radon cancer risk comparison	What to do
8 pCi/L	About 15 people could get lung cancer	4 times the risk of dying in a fall	Fix your home
4 pCi/L	About 7 people could get lung cancer	The risk of dying in a car crash	Fix your home
2 pCi/L	About 4 people could get lung cancer	The risk of dying from poison	Consider fixing between 2 - 4 pCi/L
1.3 pCi/L	About 2 people could get lung cancer	(Average indoor radon level)	(Reducing radon levels <2 pCi/L is difficult.)

Source: EPA, A Citizen's Guide to Radon", http://www.epa.gov/radon/pubs/citguide.html

In the DHHRA, EPA reports that its staff recommended mitigation measures to homeowners with radon levels above 4 pCi/l to reduce exposures. No EPA staff recommendations are discussed for residents with homes in the 2 – 4 pCi/l radon level range where "fix your home" is recommend in EPA's Citizen's Guide to Radon".

The DHHRA report relies on data EPA gathered in 2010 and 2011 on radionuclides and on contaminants of concern in air, soil and water quality indoor and outdoor radon in the Five Subdivisions, the Village of Bluewater and the area surrounding the Homestake site. This data was compared to previous data from the area and analyzed statistically by Dr. Khoury to develop the risk characterization findings in the report.

The DHHRA is available at http://www.epa.gov/region6/6sf/newmexico/homestake_mining/index.html where the final version will also be posted. Sai Appaji, Homestake Superfund Site Project Manager, for EPA – Region 6 is available at appaji.sairam@epa.gov and 214-665-3126.

Summary of Elevated Uranium Concentrations Detected in Both the Alluvial and San Andres Aquifers at Bluewater Uranium Mill Tailings Disposal Site in 2012 DOE Data

US Department of Energy (DOE) tests revealed elevated uranium concentrations in groundwater both the Alluvial and San Andres/Glorieta Aquifers in monitoring wells near the boundary of the Bluewater uranium mill tailings disposal site in 2012. In the most recent available data, from November 2012 samples, the pattern of elevated uranium detected has led DOE to determine that contaminated groundwater was leaving the Bluewater site in both aquifers. The Figure below shows the Bluewater disposal site, the locations of the wells at the site, and the November 2012 data for uranium concentrations detected in alluvial and bedrock – San Andres-Glorieta – aquifers in those wells.

The Bluewater uranium mill tailings disposal site 2 miles east of the Homestake tailings site is owned by the Federal government and managed by DOE following transfer of land title to the site from the last licensed uranium mill operator ARCO. The site was transferred to DOE ownership in 1997 following completion of reclamation and has been subject to a Nuclear Regulatory Commission (NRC) general license for long-term custody since that time. The DOE's Office of Legacy Management (DOE-LM) manages the site through a Long-Term Stewardship Plan (LTSP), as is the case with the other uranium mill tailings sites across the west where reclamation was completed to NRC and Environmental Protection Agency (EPA) standards.

As is the case with all the other uranium mill tailings sites in New Mexico, Alternate Concentration Limits (ACLs) have been established at the Bluewater site to allow site groundwater standards to be set at higher concentration levels than the NRC and EPA standards adopted to implement the Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978, as amended.

Two recent DOE-LM reports on the Bluewater disposal site provide the data and findings discussed in this summary (available at the DOE-LM Bluewater disposal site web site at http://www.lm.doe.gov/Bluewater/Documents.aspx) are:

- *"2012 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title II Disposal Site – Bluewater, New Mexico, Disposal Site" – Called DOE 2012 below; and*
- *"Data Validation Package – November 2012 Water Sampling."*

DOE's determination that contaminated groundwater has been leaving the Bluewater site in both aquifers was communicated in a March 5, 2013 letter ("DOE 2013") to the NRC available from the NRC ADAMS document system at Accession Number ML 13072A623 attached to the *"Data Validation Package – November 2012 Water Sampling."*

The May 2012 Bluewater Disposal Site monitoring data, reported in DOE 2012, showed that uranium detected in a point-of-compliance well - alluvial monitoring well T(M) - had reached 0.55 mg/l, continuing to exceed the Alternative Concentration Limit (ACL) established for the site of 0.44 mg/l for the fifth consecutive sampling event since late 2010. Uranium concentrations in the well have risen from less than 0.1 mg/l uranium in 1999 to approximately 0.4 mg/l in 2009 before exceeding the ACL of 0.44 mg/l in late 2009.

Detection of elevated uranium concentrations in the two aquifers at the site in previous years – see BVDA's 2012 Newsletter for a Bluewater site summary through 2011 – prompted DOE to more than double the number of groundwater monitoring wells at the site by installing 10 new wells - two in 2011 and eight in 2012 – to the nine wells previously installed.

DOE 2012 reported uranium concentrations exceeding the 0.030 mg/l NM drinking water standard were also detected in the alluvial aquifer at recently installed monitoring wells 21(M) and 22(M) in all samples collected since their installation in mid-2011. In May 2012 samples, well 21(M) contained 0.13 mg/l uranium and well 22(M) contained 0.31 mg/l; uranium concentrations four to seven times higher, respectively, than the drinking water standard but below the NRC-established ACL for the site of 0.44 mg/l.

The elevated uranium level detected in well 21(M), which is located downgradient of the tailings disposal cells in the southeastern corner of the Bluewater Disposal Site, provides the basis for DOE's determination that contaminated groundwater was apparently leaving the site.

Uranium concentrations detected in the bedrock San Andres-Glorieta Formation were found to exceed the 0.03 mg/l NM drinking water standards for uranium in well S(SG) in May 2012. DOE found San Andres-Glorieta wells OBS-3 and S(SG) both contained 0.44 mg/l uranium. Though more than 12 times the drinking

water standard and equal to the ACL established for the alluvial aquifer, that concentration does not exceed the ACL established for the bedrock aquifer, set at 2.15 mg/l uranium.

The November 2012 alluvial aquifer sampling at the Bluewater site detected uranium exceeding the NM drinking water standard of 0.030 mg/l but below the alluvial ACL of 0.44 mg/l. As the uranium concentration in wells the downgradient of the tailings piles in the Southeastern corner of the site all contained uranium well above the uranium concentration of 0.0197 mg/l uranium level detected in upgradient well 20(M), DOE determined that contaminated alluvial groundwater was leaving the Bluewater site. The November 2012 data for down-gradient wells showed well 21(M) contained 0.132 mg/l, well 22(M) contained 0.315 mg/l uranium and point of exposure well X(M) contained 0.134 mg/l.

Well T(M), the alluvial monitoring well with the highest uranium concentration among May 2012 samples, was dry at the time of the November 2012 sampling. DOE's November 2012 bedrock - San Andres-Glorieta - aquifer sampling at the Bluewater site reported in DOE 2013, determined that 6 of the 9 bedrock wells sampled exceed the 0.03 mg/l NM drinking water standard for uranium, with the highest uranium concentration detected at 1.43 mg/l in downgradient well 16(SG). Upgradient well 14(SG) produced water containing uranium at the approximately 0.044 mg/l, downgradient wells 13(SG) at 0.116 mg/l; S(SG) at 0.367 mg/l and 18(SG) at 0.207 mg/l all exceeding the 0.03 mg/l NM drinking water standard for uranium.

Based on the November 2012 data showing that wells 13(SG) and 18(SG) exceed the uranium concentrations of upgradient well 14(SG), substantially exceed the UMTRCA MCL and are located along the downgradient site boundary, DOE-LM determined that contaminated San Andres/Glorieta aquifer groundwater is leaving the Bluewater tailings disposal site.

NRC staff addressing the Bluewater disposal site includes John Buckley, Senior Project Manager, Decommissioning and Uranium Recovery, at John.Buckley@nrc.gov and 301-415-6607. The DOE site manager at Bluewater Disposal site is Deborah Barr at deborah.barr@lm.doe.gov and 970-248-6550.