



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
1600 EAST LAMAR BLVD  
ARLINGTON, TEXAS 76011-4511

October 1, 2012

MEMORANDUM TO: Docket File 040-08902

THROUGH: D. Blair Spitzberg, PhD, Chief */RA/*  
Repository and Spent Fuel Safety Branch  
Division of Nuclear Materials Safety  
Region IV

FROM: Robert J. Evans, CHP, PE, Senior Health Physicist */RA/*  
Repository and Spent Fuel Safety Branch  
Division of Nuclear Materials Safety  
Region IV

SUBJECT: OBSERVATIONAL SITE VISIT AT BLUEWATER DISPOSAL SITE

The purpose of this memorandum is to document the NRC's observational site visit at the Bluewater disposal site. On August 21, 2012, an NRC Region IV inspector conducted an observational site visit at the U.S. Department of Energy's (DOE) Bluewater disposal site located near the Village of Bluewater, Cibola County, New Mexico. This site visit was conducted in accordance with NRC guidance dated April 17, 2012 (ML120930240). The purpose of the site visit was to observe the DOE's routine, annual visit to the facility. Enclosed to this memorandum is the NRC's trip report for this site visit.

In summary, the DOE representatives conducted the annual inspection in accordance with the Long-Term Surveillance Plan dated July 1997 (ML12263A274). No significant regulatory issues or safety concerns were identified during the site visit.

Docket: 040-08902

Enclosure:  
NRC Trip Report

cc:  
Deborah Barr, Site Manager  
DOE Office of Legacy Management  
2597 Legacy Way  
Grand Junction, CO 81503

Internal Distribution:

Anton Vegel, D:DNMS  
 Vivian Campbell, DD:DNMS  
 Blair Spitzberg, C:RSFS  
 Robert Evans, RSFS  
 Linda Gersey, RSFS  
 Lydia Chang, FSME/DWMEP/DURLD  
 Dominick Orlando, FSME/DWMEP/DURLD  
 John Buckley, FSME/DWMEP/DURLD  
 Paul Michalak, FSME/DWMEP/DURLD

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RIV:DNMS/RSFS	C:RSFS		
RJEvans	DBSpitzberg		
<b>/RA/</b>	<b>/RA/</b>		
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U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket: 040-08902

Report: 040-08902/12-001

Licensee: U.S. Department of Energy

Facility: Bluewater Disposal Site

Location: Village of Bluewater, Cibola County, New Mexico

Date: August 21, 2012

Inspector: Robert J. Evans, CHP, PE, Senior Health Physicist  
Repository and Spent Fuel Safety Branch

Approved by: D. Blair Spitzberg, PhD, Chief  
Repository and Spent Fuel Safety Branch

Attachment: Photographs Taken at the Bluewater Disposal Site

Enclosure

## NRC Trip Report

### 1. Background

Anaconda Copper Company constructed and operated a carbonate-leach mill at the Bluewater site from 1953-1959. Anaconda Copper later constructed and operated an acid-leach mill at the site from 1957-1982. In 1986, Anaconda Copper became the Atlantic Richfield Company (ARCO).

The licensee decommissioned the site from 1989-1995. The decommissioning efforts resulted in six onsite disposal cells—main tailings disposal cell with adjacent south bench disposal area, carbonate tailings disposal cell, asbestos disposal area, an 11-acre disposal area containing mill components and a polychlorinated biphenyl (PCB) disposal cell, and two landfills.

The Bluewater disposal site is classified as a Title II site under the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA). The U.S. Department of Energy (DOE) maintains long-term custody of the site under the NRC's general license requirements of 10 CFR 40.28. The site was transferred to the DOE during 1997. The NRC-approved Long-Term Surveillance Plan (LTSP) explains how the DOE will fulfill the general license requirements of 10 CFR 40.28. The current LTSP is dated July 1997.

The property is approximately 3,300-acres in size. Two disposal cells were constructed for the two waste streams, to avoid mixing of the acidic compounds from the acid-leach mill with the basic compounds from the carbonate-leach mill. The main tailings disposal cell, with tailings from the acid-leach mill, contains 23-million tons of material and covers 354 acres of land. The carbonate tailings cell contains about 1.3-million tons of material and covers 54 acres of land.

The cover of the main tailings disposal cell consists of two layers, a low-permeability radon barrier and an erosion protection layer. In general, the northern end of the main tailings disposal cell contains tailings slimes, while the southern end contains tailings sands. The cover of the carbonate tailings disposal cell consists of a layer of radon barrier material capped with a soil/rock matrix. The remainder of the burial areas consists of various combinations of soil, vegetation, and rock covers.

### 2. Site Status

Site operations resulted in contamination of the underlying alluvial and bedrock aquifers. The chemical constituents of concern include uranium, selenium, and molybdenum. Nine monitoring wells were originally installed to sample the groundwater. The wells are situated in the two underlying aquifers, the alluvial aquifer and the San Andres (bedrock) aquifer. The wells included two background, five point-of-compliance, and two point-of-exposure wells. According to the LTSP, the five wells situated in the alluvial aquifer were to be sampled annually, while the four wells situated in the San Andres aquifer were to be sampled every 3 years. The two point-of-exposure wells were to be sampled only if an exceedance was observed at a point-of-compliance well. Alternate concentration limits (ACLs) were established for the point-of-compliance wells, and these limits are presented in Table 3-4 of the LTSP.

During the fall of 2008, in response to a request by the State of New Mexico, DOE began sampling all wells on an annual basis, including the two point-of-exposure wells. During the November 2010 sampling event, the sample collected from the alluvial aquifer point-of-compliance Well T(M) exceeded the ACL for uranium. The exceedance was confirmed during April 2011. The NRC was notified about the ACL exceedance by letters dated March 1, 2011, and May 24, 2011. The DOE also notified the NRC that it would develop an evaluative monitoring plan for NRC review and approval. In response to the ACL exceedance, DOE installed two new monitoring wells down-gradient of Well T(M) during July 2011, and DOE commenced with semi-annual sampling of these two wells during 2011.

The most recent sampling event occurred during May 2012. Groundwater samples were collected from 12 wells, the original 9 wells and the 9 new wells. The DOE also voluntarily collected a sample from the Simpson well, a private well located near the site. The results indicate that the uranium concentration in the point-of-compliance Well T(M) continues to exceed the respective ACL, although the upward trend appears to have stabilized. As of May 2012, the cause of the elevated uranium concentrations in Well T(M) continues to be studied by DOE.

In response to the continued exceedance of the uranium ACL at point-of-compliance Well T(M), DOE installed eight new wells during June-July 2012. The DOE will sample these new wells during the next routine sampling event, currently scheduled for November 2012. The installation of these new wells will bring the total number of wells sampled to 20—nine alluvium aquifer wells, 10 San Andres (bedrock) aquifer wells, and the Simpson well. The DOE was also considering adding a second off-site well, the former Homestake production well, to the routine sampling program. By letter dated June 27, 2012, the DOE stated that additional wells would be constructed, as needed, to determine the source of the groundwater contamination.

The last annual DOE inspection was conducted during August-September 2011. During that inspection, no significant problems were identified with the tailings impoundment covers, although some pooled water was noted on the northern end of the main tailings disposal cell. The pooled water was a result of shallow depressions that may be indicative of minor subsidence in this portion of the tailings cell. Also some deep-rooted plants were identified on the cell covers. The DOE later removed these plants.

In response to the shallow depressions on the main tailings disposal cell and the elevated uranium concentrations in point-of-compliance Well T(M), the DOE implemented a cell performance study and developed a proposed work plan. The DOE presented the details about the study and work plan to the NRC in its letters dated August 31, 2011, and June 27, 2012. In summary, the DOE plans to review cover design documents and completion reports, determine what information is needed to complete the evaluation, characterize and analyze the cell covers, and implement changes as necessary based on the evaluation results.

### 3. Site Observations and Findings

The purpose of the annual inspection is to observe site conditions. To conduct the annual inspection, the DOE and its contractors created an inspection checklist.

The checklist included requirements to inspect the tailings cells and other disposal areas as well as site fences, boundary monument, site markers, perimeter signs, and entrance gates.

The DOE inspectors checked the tailings cells for quality of the cover rock, signs of settlement and erosion, evidence of ponding, and evidence of deep-rooted shrubs and trees. Overall, the main tailings disposal cell cover appeared to be in good condition, although pooled water was observed at the northern end of the cell. The pooled water may be indicative of slight subsidence on this end of the disposal cell. As discussed earlier, the DOE has started a cell performance study, in part, to determine if the cell cover is still effective at encapsulating the tailings material.

The carbonate tailings disposal cell also appeared to be in good condition with no standing water, surface ripples, or deep-rooted vegetation on the cover. In addition, the surface covers for the asbestos disposal area, PCB disposal area, and landfills appeared in good condition.

During the August-September 2011 site inspections, DOE representatives observed deep-rooted plants growing on both the main and carbonate tailings disposal cells. At that time, the plants were cut and the roots were treated with herbicides. During this inspection, vegetation was observed on the two tailings disposal cells, but none of the vegetation appeared to be deep-rooted and detrimental to the integrity of the disposal cell covers.

The NRC inspector observed building debris (bricks) on the ground surface between the asbestos disposal area and Disposal Area 1. The bricks appeared to have been buried near the ground surface, but rains apparently washed the cover soils away from the bricks. The DOE representatives pointed out that the bricks were in a location that was not associated with a disposal cell or a landfill; therefore, the bricks could not be radioactive wastes. Instead, the bricks may be from the shallow burial of non-contaminated structures.

The NRC inspector conducted radiological surveys using a Ludlum Model 19 microRoentgen survey meter (NRC No. 016337, calibration due date of 01/10/13, calibrated to cesium-137). With a background of 15-20 microRoentgens per hour ( $\mu\text{R/hr}$ ), measurements on the two tailings impoundments ranged from 5-7  $\mu\text{R/hr}$ , suggesting that the radon and erosion protection covers were effectively containing the radiation from the tailings. The asbestos disposal area ranged from 11-13  $\mu\text{R/hr}$ . The areas around the tailings cells averaged about 20  $\mu\text{R/hr}$ , and the area between the asbestos disposal area and Disposal Area 1 (the area with the bricks) ranged from 25-30  $\mu\text{R/hr}$ . The highest exposure rate reading, 40  $\mu\text{R/hr}$ , was observed in soils at several discreet locations around the site but outside of the radioactive burial areas. The source of these slightly elevated radiation levels was not clearly discernable, but may be the result of naturally occurring radioactive material or residual windblown material. None of these survey results were indicative of a radiological hazard due to formerly buried tailings or radioactive waste material.

#### 4. Conclusions

The NRC inspector concluded that the DOE inspectors conducted the site inspection in accordance with LTSP and 10 CFR 40.28 requirements. The main and carbonate

tailings disposal cells appeared to be structurally intact, and the covers were in good condition. In response to the shallow depressions on the northern end of the main tailings disposal cell and the ACL exceedances in Well T(M), the DOE plans to evaluate the site, including the condition of the main tailings disposal cell cover and groundwater quality, to determine if additional monitoring or corrective actions are necessary.

5. Meeting Summary

The NRC inspector participated in a pre-planning meeting with the DOE site manager and DOE representatives prior to the site inspection. During this meeting, the NRC and DOE contractor discussed topics such as site status, inspection plan, and potential hazards.

6. Persons Contacted

D. Barr, Site Manager, DOE Office of Legacy Management  
S. Hall, Site Lead/Scientist, S. M. Stoller Corp.  
R. Johnson, Site Lead/Scientist, S. M. Stoller Corp.



Figure 1: Bluewater disposal site monument



Figure 2: Shallow depression in northern end of main tailings disposal area



Figure 3: Western edge of main tailings disposal cell (looking north)



Figure 4: Carbonate tailings disposal cell (as seen from main tailings disposal cell)