

## COTTER MILL – OLD TAILINGS PONDS AREA

### Decision Document for Enhancing Ground Water Quality and Responsiveness Summary May 1, 2006

#### Introduction and Statement of Purpose

This document explains the significant difference between actions specified in the 1988 Remedial Action Plan (RAP) and those actions selected in this decision to improve the ground water quality in the vicinity of the Old Tailings Ponds Area of the Cotter Mill Facility in Fremont County Colorado (OTPA). The Colorado Department of Public Health and Environment (CDPHE) is the lead regulatory agency for the Cotter Mill Facility. The U.S. Environmental Protection Agency (EPA) is assisting as the support agency and maintains its authority for the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund).

The Consent Decree, Order, Judgment and Reference issued by the U.S. District Judge J. R. Carrigan on April 4, 1988 is a document written for the purposes of settling state claims against Cotter Corporation under the Natural Resource Damage provisions of CERCLA. The RAP is part of the Consent Decree and by that instrument enforceable. The environmental characterization and clean-up actions required under the Consent Decree are contained in the RAP. The RAP focused on three major areas:

- eliminating exposure of residents to contaminants from the site,
- eliminating or controlling sources of contamination, and
- obtaining additional data to determine the nature and extent of contamination, and helping determine any additional cleanup actions that might need to be taken.

Section 8 of the RAP deals with controlling and/or eliminating sources of contamination in the OTPA. The prescribed efforts of limited excavation, chemical flushing and creating a hydraulic barrier were tried, but did not work well. The area continues to be a major molybdenum and uranium source of ground water contamination.

This document provides a brief history of the OTPA, describes the alternative selected and explains how the proposed remedy differs from the other alternatives considered. This document presents only a synopsis of information relating to the OTPA. This document and its supporting documentation will be incorporated into the Administrative Record pursuant to NCP 300.825(a)(2). The Administrative Record file is available for public review at the following locations:

- 1) U.S. Environmental Protection Agency  
EPA Records Center  
999 18th Street  
Denver, Colorado 80202  
(303) 312-6473

- 2) Colorado Department of Public Health and Environment  
Hazardous Materials and Waste Management Division  
4300 Cherry Creek Drive South  
Denver, Colorado 80246  
(303) 692-3300

Reports and major documents, including documents relevant to this decision such as the Feasibility Study, but not the full Administrative Record, are available at:

Royal Gorge Regional Museum and History Center  
612 Royal Gorge Boulevard  
Cañon City, Colorado 81215  
(719) 269-9036

An internet web site for Cotter Mill information is at:  
[www.cdphe.state.co.us/hm/cotter/cotterhom.htm](http://www.cdphe.state.co.us/hm/cotter/cotterhom.htm)

For additional information contact:

- Rebecca Thomas, USEPA Region VIII, (303) 312-6552,
- Edgar Ethington, CDPHE, (303) 692-3438.

## **OTPA HISTORY, CONTAMINATION, AND SELECTED REMEDY**

Cotter Corporation's Cañon City uranium mill facility (the Cotter Mill) and associated facilities (the Site) are located south of Cañon City, in unincorporated Fremont County, Colorado. The Site is south of an unincorporated community known as Lincoln Park. Uranium processing mill operations began in 1958 with production of uranium oxide, or yellowcake. In addition, the mill produced both vanadium and molybdenum as by-products.

From 1958 to 1979 mill wastes (tailings) were discharged to a series of unlined tailings ponds called the Old Tailings Ponds Area adjacent to the mill. Seepage of liquids from the unlined ponds resulted in contamination of shallow ground water with uranium and molybdenum. Use of the OTPA for tailings disposal ceased in 1979, when a new uranium mill was built. Two new, lined impoundments were built in 1978 adjacent to the OTPA for management of wastes derived from the new mill.

Between 1981 and 1983, approximately 2.5 million cubic yards of alkaline tailings from the OTPA were moved into the lined Secondary Impoundment cell. In 1988 the upper two feet of contaminated soils were removed from the OTPA. This material was placed in the Primary lined Impoundment. In 1992 and 1994, soil characterization of uranium and molybdenum was performed. In 1999, an additional 100,000 cubic yards of contaminated soil was removed and placed in the Primary impoundment cell. In some places soil was removed to bedrock. Even with these actions, ground water down gradient of the OTPA continues to exceed clean-up goals for uranium and molybdenum.

In addition to tailings and soil removal, three pilot tests were performed in the early and mid-1990s to judge the effectiveness of three in-situ, or in-place, treatment systems that would remove or fix in place uranium and molybdenum. These tests were only partially effective. Two active hydraulic barrier systems have also been installed and tested. Their performance was marginal. The ineffectiveness of these various actions is due to the fracture-controlled hydrogeology of the Site, which greatly influences the movement and continuity of liquids within it.

It should be noted that in order to protect the local community and natural resources, a dam, a hydrologic clay barrier, and a second impermeable barrier are located on Sand Creek to intercept contaminated ground and surface water and prevent it from flowing off the Cotter Corporation property. These measures have been successful.

Cotter Corporation (Cotter) submitted a Feasibility Study Old Tailings Ponds Area for the Cotter Cañon City Mill Site report on September 9, 2004, and a revised report on March 17, 2005 (the Feasibility Study). Based on the information and findings presented in this report, previous reports, risk assessments, studies of the Cotter Mill and public comment, the CDPHE has selected the preferred remedial alternative for the Old Tailings Ponds Area. The overall decision-making process being used is similar to the CERCLA process.

Six alternatives have been considered. They are:

- A. No Action
- B. In-Situ Treatment, Soil Washing
- C. In-Situ Treatment, Chemical Reduction
- D. In-Situ Containment
- E. Selected Excavation with On-Site Disposal
- F. Selected Excavation with Off-Site Disposal.

The Selected alternative is E: selected excavation with on-site disposal.

### **Basis for this Document**

The actions laid out in this document continue the efforts specified in Section 8 of the RAP. The remedies specified in the RAP have been tried and were not as effective as necessary to meet ground-water standards. The CDPHE believes additional action is needed to eliminate or control contamination in the OTPA from impacting ground water. To that end, Cotter submitted the Feasibility Study. CDPHE evaluated the Feasibility Study and chose a preferred alternative. Public comment has been received and evaluated on the proposed remedial alternatives.

Alternative F was suggested by public comment. It differs from Alternative E in where the excavated soil or rock would be disposed of. In this instance, disposal would occur at a licensed facility outside the Cañon City area. The Department has carefully considered

Alternatives E and F and weighed their respective merits. Alternative E can be implemented sooner and more economically than Alternative F. Short-term impacts such as transportation accidents are much lower for Alternative E. Although shipping material off site may represent a lower long-term risk, CDPHE believes that on-site disposal is protective, especially in light of existing volumes already disposed in the impoundments and existing data that indicates the impoundments are functioning as designed. CDPHE is currently requiring additional investigation of the impoundments to resolve potential issues relating the integrity of the impoundment liner. There is, at this time, no compelling technical or regulatory reason for not using the on-site disposal capabilities at Cotter.

**DESCRIPTION OF ALTERNATIVES**

The Department has considered a range of alternatives for remedial action at the OTPA. The alternatives are based on the collective experience of CDPHE, previous actions performed at the facility, and on EPA guidance for presumptive remedies. Costs are estimated in present-day value and implemented for thirty years, if necessary. This is a method of comparing technologies. Some of the alternatives would require management for longer time periods. This document summarizes the alternatives, which are described more fully in the Feasibility Study. It is through the interruption or removal of the source contamination in soil that ground water objectives will be met.

The alternatives developed for soils follow four general approaches:

- No Action Alternative,
- In-situ treatment,
- In-situ containment
- Excavation and disposal.

**Alternative A – No Action**

The No-Action Alternative leaves contamination in its current condition. This alternative is presented as a comparison against other alternatives.

Capital Cost	\$0
Time to implement	immediate
Operation and Maintenance Costs	\$0
<b>Total Cost</b>	<b>\$0</b>

**Alternative B – In-Situ Treatment, Soil Washing**

In-situ flushing is a technology used to remove metals such as uranium and molybdenum from soil and ground water by injecting water or other suitable aqueous solutions into the

ground to mobilize the uranium and molybdenum. Extraction fluid is passed through the soil and collected, along with ground water, in extraction wells or trenches for treatment or disposal.

Capital Cost	\$6,300,000
Time to implement	years
Operation and Maintenance Costs	\$3,100,000
<b>Total Cost</b>	<b>\$9,400,000</b>

### **Alternative C – In-Situ Treatment, Chemical Reduction**

Chemical reduction is a technology used to change the chemical oxidation state of a contaminant and so make it immobile and/or less toxic. A permeable reactive barrier using zero-valent iron is such a system to treat water. Saturating an area with a chemical reductant, such as calcium polysulfide, is another chemical treatment.

Capital Cost	\$4,000,000
Time to implement	months to years
Operation and Maintenance Costs	\$220,000
<b>Total Cost</b>	<b>\$4,220,000</b>

### **Alternative D – In-Situ Containment**

In-situ containment consists of technologies that confine contaminated media at their current locations. These technologies reduce contaminant mobility and the associated potential for exposure, but do not reduce contaminant toxicity or volume. In-situ containment technologies include surface controls/diversions, surface water/sediment control barriers, and caps and covers.

Capital Cost	\$4,300,000
Time to implement	months to years
Operation and Maintenance Costs	\$1,300,000
<b>Total Cost</b>	<b>\$5,600,000</b>

### **Alternative E – Selected Excavation, On-Site Disposal**

Excavation of contaminated soils by conventional earth-moving equipment will reduce the volume and mass of uranium and molybdenum available for leaching into ground water. Soils containing more than 27 mg/Kg (milligrams per kilogram) of uranium and/or 86 mg/Kg of molybdenum will be excavated and disposed on site in the current impoundment. The amount of soil to be excavated is estimated at 400,000 cubic yards. It should be noted that the RAP currently requires Cotter to excavate six feet of additional material at the OTPA upon final decommissioning of the facility. This decision would

accelerate the excavation activities, and tie excavation depths to actual contamination data.

Capital Cost	\$1,300,000
Time to implement	months
Operation and Maintenance Costs	\$900,000
<b>Total Cost</b>	<b>\$2,200,000</b>

### **Alternative F – Selected Excavation, Off-Site Disposal**

Excavation of contaminated soils by conventional earth-moving equipment will reduce the volume and mass of uranium and molybdenum available for leaching into ground water. Soils containing more than 27 mg/Kg of uranium and/or 86 mg/Kg of molybdenum will be excavated and disposed off site at a facility licensed to accept this material. For costing purposes, the Envirocare facility in Utah was used. The amount of soil to be excavated is estimated at 400,000 cubic yards. The transportation distance was estimated at 715 miles, and the transportation cost, using recent data from other cleanup projects was \$ 300 / cubic yard. Disposal costs at the facility, obtained by a direct quote, were \$200-250/yard.

Capital Cost	\$220 million
Time to implement	years
Operation and Maintenance Costs	\$900,000
<b>Total Cost</b>	<b>\$221 million</b>

### **Description of Significant Differences**

The methods of in-situ treatment specified in the RAP, and as implemented by Cotter, were not as effective as needed to remove or reduce the sources of ground-water contamination present in the soil. Soil excavation as prescribed in the RAP was not to be implemented until final site decommissioning, and did not use data to guide the excavation and ensure that all of the more contaminated soils were removed. The selected alternative, Selected Excavation with On-Site Disposal, will directly remove the source of ground-water contamination by removing the contaminated soil and placing it in an engineered impoundment in a timely and data-driven manner. Leaving contamination above certain levels until decommissioning would permit continuing contamination of ground water until whenever the site is decommissioned. Effectiveness and completeness will be verified and checked through monitoring.

The short-term risks to the community and to workers resulting from excavation with on-site disposal are less than excavation with off-site disposal. The increase in heavy traffic through the community increases the risk of transportation-related accidents. Transport of contaminated soil increases the potential for the spread of contamination in the community.

The long-term risk differences between on-site and off-site disposal of excavated soil depends on the integrity of the disposal impoundment and the type of disposal. If the on-site impoundment fails to isolate generated leachate, then long-term risk to the nearby inhabitants is greater than off-site disposal. Material placed in a dry state and kept dry does not generate leachate. As long as the on-site impoundment keeps generated leachate isolated, the risks of the on-site and off-site disposal of excavated tailings are similar from the long-term risk viewpoint.

Soil excavation with on-site disposal can be fully implemented in a shorter time than excavation with off-site disposal. The short distance between excavation and disposal, the lack of permitting requirements, simple logistical arrangements and the lower disposal cost contribute to a quicker implementation. The Remedial Action Objectives can be achieved sooner with on-site disposal.

### **SUPPORT AGENCY COMMENTS**

The Environmental Protection Agency supports the preferred alternative of soil excavation and on-site disposal.

### **STATUTORY DETERMINATIONS**

The changes to the remedy selected in the 1988 RAP, as presented in this decision document, were designed to meet all applicable regulatory and statutory requirements as required by Section 121 of CERCLA. A comprehensive evaluation of Applicable, Relevant and Appropriate Requirements (ARARs) has not been conducted because the Environmental Protection Agency has not yet taken CERCLA action on this Operable Unit of the Superfund site. However, the remedy has considered ARARs, including compliance with chemical-specific requirements such as Maximum Contaminant Levels (MCLs,) Colorado water standards, and location-specific requirements regarding disposal.

Considering the new information that has developed and the changes that have been made to the selected remedy, CDPHE and EPA believe that the revised remedy is protective of human health and the environment, complies with federal and state requirements, and is cost effective. In addition, the revised remedy utilizes permanent solutions to the maximum extent practicable for the site.

### **PUBLIC PARTICIPATION ACTIVITIES**

The amended Feasibility Study has been available for public review since March 2005. CDPHE issued a Preferred Alternative document in May 2005 and announced a public comment period for the document. Two public information meetings were held jointly

with CDPHE and EPA for local citizens in February and May 2005 concerning the preferred alternative chosen by CDPHE.

Oral comments concerning the preferred alternative were received from seventeen people during the June 9, 2005, public meeting. Eight written comments were received during the public comment period. A responsiveness summary addressing these comments is attached.

**COTTER MILL SITE  
OLD TAILINGS POND PROPOSED PLAN  
RESPONSIVENESS SUMMARY**

On February 10, 2005, CDPHE and EPA held a public meeting and presented the draft alternatives analysis for clean-up of residual contaminated soils at the Cotter Mill site Old Tailings Ponds Area (OTPA). The alternatives analysis was finalized in May and a 30 day public comment period ran from May 31, 2005. This document presents the CDPHE's responses to the questions and issues raised by the community (before and during the formal comment period, including a second public meeting held on June 9, 2005. Comments submitted, but not related to the OTPA are not addressed in this document.

CDPHE has carefully considered the comments received and our own evaluation of the alternatives. A decision on the most appropriate alternative has been reached, and is documented in the "Decision Document for Enhancing Ground Water Quality", dated May 2006.

Comment: Several comments stated a preference for excavation of soils, versus containment or treatment of ground water.

Response: CDPHE and EPA agree that soil excavation is the most reliable method of addressing residual soil contamination at the OTPA.

Comment: Several comments favored off-site disposal of the contaminated soils, rather than placement in the existing Cotter impoundment. One comment suggested that this option should be added to the formal assessment of alternatives. These comments noted that the integrity of the ponds is currently in question, and that there is an ongoing investigation by CDPHE to determine whether the impoundments are performing adequately.

Response: CDPHE agrees that evaluation of off-site disposal should be considered among the range of potential options. This evaluation has been performed and incorporated in to the decision document.

Regarding performance of the impoundments, with CDPHE guidance Cotter is performing assessments of the geology and hydrology of the area adjacent to the toes of the impoundments. Geophysical and soil sampling investigations have been conducted. Additional monitoring wells in this area are being installed and will sample the deep and shallow ground water for evidence of a release from the impoundment. Information from these new wells will be used to develop an effective long-term ground water monitoring program.

Although there are reports regarding problems in the initial impoundment construction, such as tears in one of the liners, to date there is no direct evidence that the ponds are not performing. We do realize that existing reports indicate the existing monitoring system

may not be adequate to detect all problems that might exist. CDPHE agrees that additional monitoring should be implemented to address this concern. In the license renewal of December 2004, required Cotter to do several things:

- Improve their impoundment performance monitoring by March 1, 2005;
- By June 1, 2005, determine what would be required to start dry placement of tailings;
- By June 1, 2005, determine what would be required to dewater the impoundments; and
- By September 1, 2005, develop a plan for interim closure of the Secondary Impoundment.

Cotter appealed these conditions. In April 2006 Administrative Law Judge Richard Dana ruled in favor of CDPHE. In addition, CDPHE believes that the information obtained by the geophysical investigation, soil sampling, and new ground water samples will answer the questions regarding the performance of the impoundments. If necessary, strategies will be developed to address any problems that are found.

The question that remains is whether CDPHE should allow placement of additional materials in the impoundments while the investigation is ongoing. As mentioned above, as part of the new license conditions, CDPHE required Cotter to investigate dewatering the impoundments and the “dry” placement of any new materials in the impoundments. This strategy is designed to minimize the amount of leachate that could move through the liners. The general principle is that the addition of dry materials is less of a leachate-generating concern than placement of saturated tailings. The placement of OTPA materials would be consistent with this approach.

(Note: comments on this issue included data the commenter believes shows evidence of leakage from the impoundments. This includes a conclusion that lack of decreasing concentrations in drains below the impoundment represents steady state leakage. However, data from these under drains also shows decreasing flow rates, or no flow at all. This data would not support a conclusion that the impoundments are leaking. CDPHE believes that the current investigations will address this issue.)

Comment: One comment stated a preference for the use of permeable reactive barriers in conjunction with phytoremediation. Another suggested continued research into the reactive barrier technology, while implementing soil extraction for the OTPA.

Response: The CDPHE assessment of these technologies is contained in the proposed plan. They have not been chosen for the OTPA remediation because the source removal achieved with excavation is more reliable and more cost effective. The permeable reactive barrier wall below the Soil Conservation Service (SCS) Dam has received a lot of negative reaction from some local citizens. The technology is now considered by national experts to be established, after 10 years of field implementation. Of 55 sites across the country with adequate data, 48 are currently meeting objectives. Problems, such as the ones encountered at the Cotter treatment wall, do occur and have been

documented at 5 other sites (information from web-based training). We have received suggestions that engineering solutions to the carbonate precipitation problem at this site could be formulated. However, because water backed up behind this barrier effectively prevents groundwater from migrating into Lincoln Park, it is unlikely that additional investigation will occur.

Comment: Several comments focused on the soil clean-up levels and whether these were appropriate. Comparisons were made to clean-up levels on other sites in Colorado or to other states' ground water standards that are lower than those used at Cotter. Some comments requested additional information on how the numbers were calculated. It was noted that we only want to perform the cleanup once, so it should be done right, and to the correct standards.

Response: The soil clean-up levels in the proposed plan were specifically developed to meet a ground water goal at the point of compliance. This goal was set at the EPA groundwater standard, (the MCL) because the state does not currently have a standard. Several local residents have expressed their concern that the MCL is not protective, and cite other states with more stringent standards. CDPHE is currently examining this issue, and will make a recommendation to the state Water Quality Control Commission regarding this issue, if appropriate. However, for the time being, we are using the most stringent applicable standard.

Regarding comparison to the Uravan site and to historical comments made by CDPHE concerning the Cotter RAP, these are valid issues. There is no question that all citizens of Colorado deserve equal protection. This equal protection will be provided by utilizing the same methodology as the Uravan (or any other licensed) site in determining final decommissioning soil clean-up goals. Specifically, Cotter will need to calculate clean-up values for radium and thorium that were not part of the OTPA analysis under the RAP. These calculations are based on the radiation dose to an exposed individual, as well as potential ground water impacts. It is very possible that this analysis will result in lower clean-up numbers. In order to insure that these two clean-up determinations are coordinated, CDPHE will require submittal and approval of the decommissioning plan prior to beginning excavation under this preferred alternative.

Comment: Several comments expressed concern that the soil sampling performed to date (specifically the sample spacing on a 200 foot grid = 1 per acre) is insufficient to characterize the contamination. The concern is that contamination will be left behind because of this insufficient characterization. Surface gamma surveys were suggested as a method of obtaining many samples cost effectively. In addition, there were comments recommending sampling of additional constituents such as radium (radon).

Response: CDPHE believes that additional soil sampling may help Cotter in targeting excavation areas, but it is not necessary to make the decision regarding which clean-up strategy should be chosen. The current data does adequately provide the boundaries on the extent of contamination for the purposes of beginning excavation. In addition, based on the extrapolation of existing data, there are areas of the site where excavation is

already known to be necessary, and additional sampling will not provide data that would be useful in directing the excavation. Surface gamma sampling that has been suggested might be useful for the upper 1-2 feet, and could be used in stages to provide real time field measurements to direct the excavation. Ultimately it is the verification sampling that shows whether the clean-up goal has been reached that will be most important. Prior to beginning construction, Cotter will provide more detailed plans for implementing excavation that will include additional characterization and verification sampling. These plans must be reviewed and approved by CDPHE. CDPHE has also committed to discussing these plans with the local community during this review.

Comment: Some comments expressed concern about stockpiling these soils on site due to dust control issues.

Response: Dust will be controlled both during the excavation and for any stockpiling of soils that may occur on site. The radioactive materials license and the RAP both contain dust control requirements, as well as air monitoring to verify adequate dust control is being performed. CDPHE shares the community's requirement that dust is adequately controlled.

Comment: There was a comment expressing concern about the existing placement of the impoundments over some of the area that was the OTPA. Was there any source material left there, and how would the excavation plan address this material? A 1995 report indicates that uranium and molybdenum found in the under drains could be coming from either the old ponds or the new impoundments.

Response: There is no plan to excavate materials below the Primary or Secondary Impoundments. Based on our review of the proposed plan, this material, if it exists, would not be expected to compromise the ability of the cleanup to meet water quality goals. If this turns out to be a false assumption, Cotter would be responsible for meeting those goals in another way.

Regarding these materials and their impact on determining the integrity of the impoundment liners, these issues are currently under discussion and will be factored into the monitoring and assessment of the impoundment's performance.

Comment: One comment expressed the opinion that the Health Risk Assessment should be updated before any work is done at the site. The comment notes that the original Assessment is 15 years old and the supplemental assessment is 10 years old.

Response: The original Health Risk Assessment was based on existing environmental conditions at the time, which were worse than present conditions. Specific exposure scenarios used in the assessment would be similar, despite the increased population in the area. In addition, risk assessments are generally used to establish the need for cleanup to occur. They are not used to decide among various cleanup options. CDPHE does not believe it is necessary to update the risk assessment in order to make this decision.

Comment: There were comments about errors in the Proposed Plan document.

Response: The following table lists the errors noted in the comments and the revisions to the proposed plan that have been made.

Comment / error	Response / change
The distance from the mill site to the town is incorrect.	The plan will be revised to indicate that the mill property is directly south of Lincoln Park
The numbering of the operable units is incorrect.	This will be corrected.
The document should explain the “negotiated clean-up values” in more detail	The term “negotiated clean-up values” was inaccurate. It will be modified in the Proposed Plan.
Use soil units of ug/g rather than ug/kg.	This is not an error. Soil concentration values are most often reported per kilogram of soil. This will not be changed.
Statements about the use of water for consumption are misleading. While people within the study area may not be drinking the water, people outside the study area may have contaminated water.	People outside the study area may be drinking water that has contaminants above background, and therefore could be considered by some to be contaminated. However, this water is not above drinking water standards. Therefore, no change will be made in the Proposed Plan.

The revised Proposed Plan will be put on file at:

Royal Gorge Regional Museum and History Center  
612 Royal Gorge Boulevard  
Cañon City, Colorado 81215