

Quivira Mine Site
Red Water Pond Road Removal Action
Map ID E4, Mine ID 305 (Churchrock #1); Map ID E5, Mine ID 303 (Churchrock #1E)
SSID# 09QM
August, 2012



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

MEMORANDUM

DATE: August 21, 2012

SUBJECT: Request for a Time-Critical Removal Action at the Quivira Mine, McKinley County, New Mexico, Coyote Canyon Chapter of the Navajo Nation

FROM: Mark Ripperda, Remedial Project Manager
Arizona and Navajo Section (SFD-6-2)

THROUGH: Claire Trombadore, Chief
Arizona and Navajo Sites Section (SFD-6-2)

TO: Clancy Tenley, Assistant Director
Superfund Division
Partnerships, Land Revitalization & Cleanup Branch (SFD-6)

I. PURPOSE

The purpose of this Action Memorandum is to describe the hazardous conditions at a portion of the Quivira Mine Site ("Site"), Map ID E4, Mine ID 305 (Churchrock #1) that require the proposed time-critical removal action, which we anticipate will be performed pursuant to an August 8, 2012 Unilateral Administrative Order issued to Rio Algom Mining LLC, ("Rio Algom") a subsidiary of BHP Billiton, which provided its Notice of Intent to Comply on August 16, 2012. This Action Memorandum also seeks approval to spend up to \$372,020 in direct costs to oversee Rio Algom's actions to mitigate threats to human health and the environment posed by the presence of hazardous substances and to provide temporary housing alternatives during the action. In addition, approval is requested to spend an additional \$500,000 in the event that a work takeover is necessary. The proposed removal action would include excavating the portion of Red Water Pond Road and its sides that runs approximately 2,200 foot from Hwy 566 on the south to the bridge over the Unnamed Arroyo #2 on the north.

Quivira Mine Site
Red Water Pond Road Removal Action
Map ID E4, Mine ID 305 (Churchrock #1); Map ID E5, Mine ID 303 (Churchrock #1E)
SSID# 09QM
August, 2012

Removal actions:

Excavate and remove soil contaminated with radium along Red Water Pond Road and its side areas within the fence line from Hwy 566 to the bridge over the unnamed Arroyo.

Placement and storage of the excavated material at the Quivira Mine Site (or at the Northeast Church Rock Mine Site)/

Resurfacing of the excavated portion of the road.

The proposed removal of hazardous substances would be undertaken pursuant to Section 104(a)(1) of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. § 9604(a)(1), and Section 300.415 of the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 CFR § 300.415.

II. SITE CONDITIONS AND BACKGROUND

Site Status: Non-NPL
Category of Removal: Time-Critical
CERCLIS ID: NNSFN0905492
SITE ID: QM

A. Removal Action Area and Site Description

1. Physical Location

The Site is the Quivira Mine Site located in Coyote Canyon Chapter on the Navajo Indian Reservation immediately north of Sections 35 and 36, Township 17 North, Range 16 West approximately 20 miles northeast of Gallup in McKinley County, New Mexico. The Removal Action Area is that portion of Red Water Pond Road from the bridge over the Unnamed Arroyo #2 on the north to New Mexico Route 566 on the south, a length of approximately 2,200 feet, plus the road shoulders and the areas within the roadside fence line. The fence is typically located approximately 50-60 feet from the center of the road.

The following aliases have been used to describe the Site: Northeast Church Rock Quivira Mine Site, Churchrock 1, NE Churchrock, Kerr McGee Quivira, Quivera, and Kerr-McGee Section 35 Mine. Lat/Long: 35.6654391042 N / -108.500960227 W. See Figure 1 for Site Location Maps.

Quivira Mine Site
Red Water Pond Road Removal Action
Map ID E4, Mine ID 305 (Churchrock #1); Map ID E5, Mine ID 303 (Churchrock #1E)
SSID# 09QM
August, 2012

2. Removal Action Area Characteristics

The Removal Action Area is in close proximity to the United Nuclear Corporation Mill NPL Site located on Sections 36 and 2, which is managed jointly by the US Nuclear Regulatory Commission (NRC) and EPA Region 6. It is also in close proximity to the United Nuclear Corporation NECR mine site and located immediately between the Step Out Area #1 Removal Action Area and the Eastern Drainage Removal Action Area.

Contaminated material originating from the Quivira Mine has been observed in the road crown and shoulders and has migrated to at least one homesite east of Red Water Pond Road. Rio Algom characterized the Removal Action Area and found radium 226 contamination above the action level in both surface and subsurface soils along the length of the Removal Action Area.

The Quivira Mine areas contain abandoned uranium mines and are considered to be the major sources of the soil contamination at the Red Water Pond Road Removal Action Area. The Kerr McGee Corporation and Kerr McGee Nuclear Corporation, a corporate predecessor to the Quivira Mining Company and, subsequently, Rio Algom, operated the mine areas from approximately 1974 to 1985. All the uranium ore from the mines, approximately 5 million pounds, was processed at the Quivira Mining Corporation Ambrosia Lake Mill located in Grants, New Mexico and accessed via the Red Water Pond Road.

3. Quivira Removal Site Evaluation

Rio Algom, a Potentially Responsible Party ("PRP"), conducted the removal site evaluation at the Quivira Mine with U.S. EPA and Navajo Nation EPA oversight. In addition to the Quivira Mine area, the RSE included Red Water Pond Road. The work plan was developed and executed pursuant to an Administrative Order on Consent ("AOC") between U.S. EPA and Rio Algom.

Rio Algom collected analytical samples and conducted gamma surveys during the RSE field investigations. The survey was conducted consistent with MARSSIM guidance.

Red Water Pond Road Removal Site Evaluation Results: According to the removal site evaluation report, 100% of the gamma radiation measurements averaged over an 80-foot grid spacing performed along the Red Water Pond Road and its sides exceeded the field screening level of 2.24 pCi/g. EPA believes that the most likely source is the historical use of this road as a haul road for the Site. This is supported by the fact that the measurements along the road are higher than in the areas immediately to the west and east.

Quivira Mine Site
Red Water Pond Road Removal Action
Map ID E4, Mine ID 305 (Churchrock #1); Map ID E5, Mine ID 303 (Churchrock #1E)
SSID# 09QM
August, 2012

4. Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant

Action Level: The residential Preliminary Remediation Goal (PRG) for radium-226 is 0.0124 Pico Curies per gram (pCi/g). This represents the 1 in 1,000,000 risk and is below the analytical detection limit (0.1 pCi/g). EPA policy states that a 1 in 10,000 risk is acceptable as a Removal Action objective, therefore, the PRG was scaled up to the 1 in 10,000 risk range to give a risk-based value of 1.24 pCi/g. When added to background, this results in 2.24 pCi/g as the Action Level. EPA used residential exposure scenarios for the road, based on the likelihood that road materials will continue to migrate from the road and recontaminate the recently remediated residential areas located adjacent to the road.

5. NPL status

The Site is not listed on the National Priorities List (NPL). In 2000, the Navajo Superfund Program conducted a pre-CERCLIS site screening of the Quivira Mine (CERCLIS ID No. NNSFN0905492).

B. Other Actions to Date

The UNC NECR Residential Time Critical Removal Actions #1 and #2 consisting of three homesites and one homesite respectively situated near the Red Water Pond Road area occurred in summer 2007. At that time, the surface soils from approximately one-half acre around each homesite were scraped and hauled off-site for disposal. In 2009, UNC, under EPA oversight, removed approximately 100,000 cubic yards of radium-contaminated soils from the Step-out Area #1, which is located adjacent to and immediately west of the Red Water Pond Road Removal Action Area. UNC will be conducting a removal action addressing approximately 30,000 cubic yards of radium-contaminated soil from the Eastern Drainage Area of the Northeast Church Rock (NECR) Mine Site, which is located adjacent to and immediately east of the Red Water Pond Road Removal Action Area. Federal Nuclear Regulatory Commission remedial actions have taken place at the NECR Mine Site as well as the Mill, an NPL Site.

As part of its 2010 Removal Action, Rio Algom chip sealed the Red Water Pond Road within the Removal Action Area and applied tackifier to the road shoulders to help contain radium-contaminated soils and mitigate exposure pathways. Rio Algom also repaired fencing

Quivira Mine Site
Red Water Pond Road Removal Action
Map ID E4, Mine ID 305 (Churchrock #1); Map ID E5, Mine ID 303 (Churchrock #1E)
SSID# 09QM
August, 2012

and improved erosion controls on the Quivira Mine Site and conducted the removal site evaluation as part of the 2010 Removal Action.

C. State and Local Authorities Roles

1. State and local actions to date

No State actions have taken place at the Site. Region 9 issued a letter formally accepting lead for the Quivira Mine on November 7, 2005

U.S. EPA has consulted with the Navajo Nation EPA and DOJ with respect to the planning documents and enforcement orders for the Quivira Mine Site RWPR RA.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Current Site conditions pose the threat of potential future releases of a hazardous substance, namely radium-226. The likelihood of direct human exposure, via ingestion and/or inhalation of hazardous substances, and the threat of potential future releases and migration of those substances, pose an imminent and substantial endangerment to public health, and/or welfare, or the environment based on the factors set forth in the NCP, 40 CFR § 300.415(b)(2). These factors include:

1. Actual or potential exposure to hazardous substances or pollutants or contaminants by nearby populations or the food chain

As described in Section II.A.4, high concentrations of radium-226 have been detected in soil samples at the Removal Action Area. Radium may be found in air and water. Radium in the soil may be absorbed by plants.

Analytical results indicate that concentrations of radium-226 identified in these media exceed background and U.S. EPA's PRGs. Acute inhalation exposure to high levels of radium can cause adverse effects to the blood (anemia) and eyes (cataracts). It also has been shown to affect the teeth, causing an increase in broken teeth and cavities. Exposure to high levels of radium results in an increased incidence of bone, liver, and breast cancer. The U.S. EPA and the National Academy of Sciences, Committee on Biological Effects of Ionizing Radiation, has

Quivira Mine Site
Red Water Pond Road Removal Action
Map ID E4, Mine ID 305 (Churchrock #1); Map ID E5, Mine ID 303 (Churchrock #1E)
SSID# 09QM
August, 2012

stated that radium is a known human carcinogen (ATSDR, 1999). Inhalation of radium contaminated particulates is of particular concern. Radium emits alpha radiation, which, when inhaled, becomes a source of ionizing radiation in the lung and throat, possibly leading to toxic effects.

Much of the contaminated material in the Site is fine-grained and therefore likely to result in human exposure via inhalation or ingestion. Contamination is readily accessible to nearby full-time and part-time residents. Persons occupying or traversing the Site may be exposed to contaminated dust by inhalation or ingestion of contamination sorbed to particulate matter. Incidences of direct contact with natural and mechanically generated dust during these activities account for known contamination exposure scenarios faced at the Site. Radium-226 may be entrained in naturally and mechanically generated dust and/or transported on shoes and clothing of residents passing over contaminated areas. Gardening and other yard work also may result in exposure to contamination.

Activities that occur in contaminated areas that may put persons at risk include walking, livestock grazing, and modes of transportation including automobile, truck, motorcycle, or on-horseback. Children may eat contaminated soils during play activities.

2. High levels of hazardous substances in soils at or near the surface that may migrate

Contaminated soils from the Site may migrate off-site via wind and water transport mechanisms including mechanical dust generation. It is believed that radium in soils at the homesites was transported there from sources including the upgradient Quivira Mine. It is likely that this contamination could continue to migrate beyond the Removal Action Area boundary.

3. Weather conditions that may cause hazardous substances to migrate or be released

Rainfall events may lead to transport of the contamination from the mine to areas of concern and the homesites. High soil erosion rates may indicate transport of contamination from the Site constituting a release of hazardous substances and resulting in secondary contamination sources. In addition, contaminants may migrate during high wind events due to the propensity for contaminants to adhere to windborne dust particles.

4. Availability of other appropriate federal or state response mechanisms to respond to the release

The Navajo Nation EPA has informed U.S. EPA that it does not have the resources to address the Site.

IV. ENDANGERMENT DETERMINATION

Actual and threatened releases of hazardous substances from this site, if not addressed by implementing a Time-Critical Removal Action, may continue to present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

U.S. EPA has directed Rio Algom through a Unilateral Administrative Order pursuant to Section 106 of CERCLA to conduct the removal action. U.S. EPA proposes to conduct technical oversight of Rio Algom. Work will consist of the following activities:

1. Proposed action description

U.S. EPA proposes to mitigate the imminent and substantial threats to human health, welfare, or the environment by taking steps to prevent the release of radium-226. The removal action will include the following activities to prevent direct human contact with environmental radium-226 in Red Water Pond Road and adjacent soils and:

- Excavate and remove soil contaminated with radium along Red Water Pond Road and its side areas within the fence line from Hwy 566 to the bridge over the Unnamed Arroyo.
- Place excavated soil on the main pile at the Quivira Mine Site's #1 Area and cover with six inches of clean soil on top and one foot of clean soil on slopes. Engineer any side slopes to minimize erosion and vegetate the cover and provide appropriate erosion controls. Maintain the soil to prevent erosion and exposure until the Red Water Pond Road waste can be addressed in a final disposal action.
- Backfill, grade and compact the road with appropriate road base aggregate material.
- Backfill shoulders and side areas as appropriate to maintain existing drainage patterns and prevent erosion.

Quivira Mine Site
Red Water Pond Road Removal Action
Map ID E4, Mine ID 305 (Churchrock #1); Map ID E5, Mine ID 303 (Churchrock #1E)
SSID# 09QM
August, 2012

- Revegetate disturbed road-side areas to control erosion.

Cultural Resource Survey and Permit: Contact Navajo Historic Preservation Department about protocols for conducting a cultural resource survey and application for a permit.

Health & Safety: Implement the Work in a safe manner that is protective of site personnel as well as residents.

Excavation and removal of contaminated soils will achieve the ultimate goal of reducing the radium concentration in the excavation footprint to a concentration that is less than the Site action level.

Region 9 intends to provide Voluntary Alternative Housing for residents who are adversely affected by the removal action and to cost recover this amount, as appropriate.

2. Contribution to remedial performance

This removal action is expected to provide protection from radium contaminated soils on Red Water Pond Road and its sides. A subsequent, non-time critical removal action is planned to address the remainder of radium contaminated soils and sediments at the Quivira Mine Areas (#1 and #1E).

The long-term cleanup plan for the Site:

It is expected that this removal action will mitigate the threat of direct or indirect contact with or inhalation of hazardous substances at the areas addressed in this removal. As discussed below, U.S. EPA expects to conduct subsequent removal actions at the larger Quivira Mine Site following site-wide characterization, including a Site-wide Final Status Survey (MARSSIM).

The extent to which the removal will ensure that threats are adequately abated:

The removal of hazardous substances contamination by excavation and disposal will abate the threats described in Section III.

Consistency with the long-term remedy:

The Time-Critical Removal proposed for the Red Water Pond Road Removal Action Area is consistent with addressing the larger issue of potential exposures posed by the Quivira and NECR Mine Sites.

Quivira Mine Site
Red Water Pond Road Removal Action
Map ID E4, Mine ID 305 (Churchrock #1); Map ID E5, Mine ID 303 (Churchrock #1E)
SSID# 09QM
August, 2012

3. **Applicable or relevant and appropriate requirements (ARARs)**

Section 300.415(j) of the NCP provides that removal actions must attain ARARs to the extent practicable, considering the exigencies of the situation.

Section 300.5 of the NCP defines applicable requirements as cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstances at a CERCLA site.

Section 300.5 of the NCP defines relevant and appropriate requirements as cleanup standards, standards of control and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not “applicable” to a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstances at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site and are well-suited to the particular site.

Because CERCLA on-site removal actions do not require permitting, only substantive requirements are considered as possible ARARs. Administrative requirements such as approval of, or consultation with administrative bodies, issuance of permits, documentation, reporting, record keeping, and enforcement are not ARARs for the CERCLA actions confined to the site.

Federal ARARs determined to be practicable for the Site are:

- U.S. Department of Transportation of Hazardous Materials Regulations 49 CFR Part 171, 172 and 173.
- The RCRA Land Disposal Restrictions (LDRs) 40 CFR 268.40 Subpart D implemented through Title 22 Section 66268.40.
- Uranium Mill Tailings Radiation Control Act (40 CFR Part 192.12 subparts B and C) requirements for residential cleanup levels of tailings sands.
- Native American Graves Protection and Repatriation Act, 25 U.S.C. ' 3001 *et seq.* and its implementing regulations, 43 CFR Part 10.
- National Historic Preservation Act, 16 U.S.C. ' 470 *et seq.*; 36 CFR Part 800.
- Archaeological Resources Protection Act of 1979, 16 U.S.C. ' ' 47000-47011; 43 CFR Part 7.
- American Indian Religious Freedom Act, 42 U.S.C. ' 1996 *et seq.*

Quivira Mine Site
Red Water Pond Road Removal Action
Map ID E4, Mine ID 305 (Churchrock #1); Map ID E5, Mine ID 303 (Churchrock #1E)
SSID# 09QM
August, 2012

- Clean Water Act, Section 402, 33 U.S.C. ' 1342 (NPDES storm water discharges).
- Clean Water Act, Section 404, 33 U.S.C. ' 1344 (Regulates discharge of dredge or fill material into waters of the U.S.).

Additional Federal guidance to be considered:

- U.S. EPA Directive on Protective Cleanup Levels for Radioactive Contamination at CERCLA sites. OSWER Directive 9200.4-18.

The RA Area must be surveyed for potential impacts on archaeological, historic and cultural resources. The Navajo Historic Preservation Department must approve the proposed removal action with a Cultural Resources Compliance Form.

No State or Tribal ARARs have been identified.

4. Project schedule

The field work for the removal action is scheduled to start October 1, 2012. Planning activities have already begun. The removal activities are expected to take approximately three months to complete.

B. Estimated Costs

As stated above, U.S. EPA has issued a Unilateral Administrative Order to Rio Algom Mining LLC to conduct the removal action and Rio Algom has provided its notice of intent to comply. U.S. EPA may incur the following costs in its role overseeing or reviewing the removal actions to be completed. The funding for the costs would come from the Quivira Site Special Account.

Housing	\$ 200,000
START Contractor/USCG PST	<u>\$ 50,000</u>
Extramural Subtotal	\$ 250,000

Intramural Costs¹

¹ Direct costs include direct extramural costs and direct intramural costs. Indirect costs are calculated based on an estimated indirect cost rate expressed as a percentage of site-specific direct costs, consistent with the full cost accounting methodology effective October 2, 2000. These estimates do not include pre-judgment interest, do not take into account other enforcement costs, including Department of Justice costs, and may be adjusted during the course of a removal action. The estimates are for illustrative purposes only and their use is not intended to create

Quivira Mine Site
Red Water Pond Road Removal Action
Map ID E4, Mine ID 305 (Churchrock #1); Map ID E5, Mine ID 303 (Churchrock #1E)
SSID# 09QM
August, 2012

U.S. EPA Direct Costs	\$ 25,000
U.S. EPA Indirect Costs (35.28%) <u>For Intramural and Extramural Costs</u>	<u>\$ 97,020</u>
TOTAL Intramural Costs	\$ 122,020
TOTAL Intramural and Extramural Costs	\$ 372,020

The cost of the actions to be performed by Rio Algom pursuant to the Unilateral Administrative Order is estimated to be \$500,000. In the event of a work takeover, EPA would incur this cost paid for out of the Quivira Special Account, which would be eligible for cost recovery.

TOTAL, Removal Action Project Ceiling \$ 872,020

any rights for responsible parties. Neither the lack of a total cost estimate nor deviation of actual costs from this estimate will affect the United States' right to cost recovery.

Quivira Mine Site
Red Water Pond Road Removal Action
Map ID E4, Mine ID 305 (Churchrock #1); Map ID E5, Mine ID 303 (Churchrock #1E)
SSID# 09QM
August, 2012

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Given the site conditions, the nature of the hazardous substances documented on site, and the potential exposure pathways to nearby populations described in Sections III and IV above, actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the removal actions selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

VII. OUTSTANDING POLICY ISSUES

No outstanding policy issues with respect to the Site have been identified at this time.

VIII. ENFORCEMENT

Please see the attached Confidential Enforcement Addendum for a discussion regarding the potentially responsible parties. If Rio Algom does not perform pursuant the Unilateral Administrative Order, EPA intends to perform the work and then seek penalties and cost recovery.

The total USEPA extramural and intramural costs for this removal action, based on full-cost accounting practices that will be eligible for cost recovery are estimated to be \$872,020.

IX. U.S. EPA RECOMMENDATION

This decision document represents the selected removal action for the Quivira Mine Site, Red Water Pond Road Removal Area, Coyote Canyon Chapter, McKinley County, New Mexico, developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the Administrative Record for the Site.

Because conditions at the site meet the NCP criteria for a Time-Critical Removal Action, USEPA enforcement staff recommends the approval of the removal action proposed in this Action Memorandum. The total project ceiling if approved will be \$872,020, of which Region 9 expects the entire amount can be funded from the Quivira Mine Site Special Account. Approval may be indicated by signing below.

Quivira Mine Site
Red Water Pond Road Removal Action
Map ID E4, Mine ID 305 (Churchrock #1); Map ID E5, Mine ID 303 (Churchrock #1E)
SSID# 09QM
August, 2012

Approve: Clancy Tenley 9/11/12
Clancy Tenley, Assistant Director Date
Superfund Division
Partnerships, Land Revitalization & Cleanup Branch

Disapprove: _____
Clancy Tenley, Assistant Director Date
Superfund Division
Partnerships, Land Revitalization & Cleanup Branch

Attachments:

I. Index to the Administrative Record

Quivira Mine Site
Red Water Pond Road Removal Action
Map ID E4, Mine ID 305 (Churchrock #1); Map ID E5, Mine ID 303 (Churchrock #1E)
SSID# 09QM
August, 2012

cc: Sherry Fielding, USEPA, OERR, HQ
Steven Etsitty, Navajo Nation Environmental Protection Agency
David Taylor, Navajo Nation Department of Justice
Steven Spencer, U.S. Department of Interior
David Sitzler, BLM
Don Williams, USEPA, Region 6

Quivira Mine Site
Red Water Pond Road Removal Action
Map ID E4, Mine ID 305 (Churchrock #1); Map ID E5, Mine ID 303 (Churchrock #1E)
SSID# 09QM
August, 2012

bcc: H. Allen, SFD-9-2
A. Bain, SFD-6-2
L. Williams, ORC-3
C. Temple, SFD-9-2
Mark Purcell, U.S. EPA Region 6
Katrina Coltrain, U.S. EPA Region 6
Michele Dineyazhe, Navajo Nation Environmental Protection Agency
Freida White, Navajo Nation Environmental Protection Agency
Site File

Quivira Mine Site
 Red Water Pond Road Removal Action
 Map ID E4, Mine ID 305 (Churchrock #1); Map ID E5, Mine ID 303 (Churchrock #1E)
 SSID# 09QM
 August, 2012

ATTACHMENT I
INDEX TO THE ADMINISTRATIVE RECORD
Unilateral Administrative Order - August 8, 2012

Doc Date	Title/Subject	Author
6/11/2009	Northeast Churchrock Mine Engineering Evaluation/Cost Analysis (EE/CA) for Non-Time Critical Removal <u>Administrative Record Index</u> ²	Environmental Protection Agency - Region 9
12/2010	Removal Evaluation Work Plan Church Rock Sites #1 and #1-E Phase II	Senes Consultants Ltd. for Rio Algom Mining LLC
4/8/2011	Northeast Churchrock Mine Superfund Site, Residential Site #1 Removal <u>Administrative Record Index</u>	Environmental Protection Agency - Region 9
4/8/2011	NE Churchrock Quivira Mines Superfund Site, Residential Site #2 Removal <u>Administrative Record Index</u>	Environmental Protection Agency - Region 9
9/16/2011	Northeast Churchrock Mine Superfund Site step-out interim removal <u>Administrative Record Index</u>	Environmental Protection Agency - Region 9
9/16/2011	NE Churchrock Quivira Mines Superfund Site removal <u>Administrative Record Index</u>	Environmental Protection Agency - Region 9
9/27/2011	Northeast Churchrock Mine Superfund Site, Engineering Evaluation/Cost Analysis (EE/CA) non-time-critical update 1 removal <u>Administrative Record Index</u>	Environmental Protection Agency - Region 9
9/27/2011	Northeast Churchrock Mine Superfund Site, drainage East of Red Water Pond Rd removal <u>Administrative Record Index</u>	Environmental Protection Agency - Region 9
9/2011	Final Removal Site Evaluation (RSE) Report for Quivira Site Evaluation for Church Rock (CR-1) and (CR-1E) Mine Sites	Senes Consultants Ltd. for Rio Algom Mining LLC
12/9/2011	EPA comments on final removal site evaluation (RSE) rpt for Quivira site evaluation for NE Church Rock (CR-1 & CR-1E) mine sites, w/TL to K Black	Mark Ripperda / Environmental Protection Agency - Region 9
2/10/2012	Ltr: Response to EPA comments on final removal site evaluation rpt for Quivira site evaluation for CR1 & CR1E mine sites, w/attchs	Ken Black / Rio Algom Mining LLC

² Each of the documents in the seven Administrative Record Indices listed in this Index are incorporated into the Quivira Mine Site Red Water Pond Road Removal Action Administrative Record by reference.

Quivira Mine Site
Red Water Pond Road Removal Action
Map ID E4, Mine ID 305 (Churchrock #1); Map ID E5, Mine ID 303 (Churchrock #1E)
SSID# 09QM
August, 2012

3/6/2012	Ltr: Further comments on response to 11/21/11 EPA comments on final removal site evaluation rpt	Mark Ripperda / Environmental Protection Agency - Region 9
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