

JUN 17 2014

FIVE-YEAR REVIEW REPORT

KENNECOTT NORTH ZONE SUPERFUND SITE

OU8 Waste Water Treatment Plant and Sludge Ponds

OU9 Magna Soils

OU13 Smelter and Acid Plants

OU14 Refinery

OU15 Mills and Tailings Pond

OU19 Smelter Fallout

OU22 Great Salt Lake, Shoreline Wetlands

OU23 North End Groundwater

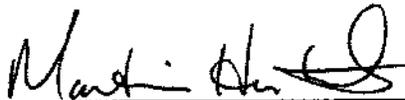
Salt Lake County and Tooele County, Utah

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LIST OF ACRONYMS

AOC	Administrative Order on Consent
ATV	All-terrain Vehicle
ARAR	Applicable or Relevant and Appropriate Requirement
CAMU	Corrective Action Management Unit
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
DAQ	Division of Air Quality
DERR	Division of Environmental Response and Remediation
DOGM	Division of Oil, Gas, and Mining
DWQ	Division of Water Quality
EPA	United States Environmental Protection Agency
GWPP	Groundwater Protection Program
IC	Institutional Control
mg/kg	milligrams per kilogram
mg/l	milligrams per liter
MOU	Memorandum of Understanding
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PRP	Potentially Responsible Party
ROD	Record of Decision
SLCHD	Salt Lake County Health Department
UDEQ	Utah Department of Environmental Quality
UPDES	Utah Pollutant Discharge Elimination System
WWTP	Waste Water Treatment Plant

EXECUTIVE SUMMARY

The Utah Department of Environmental Quality (UDEQ) and the Environmental Protection Agency (EPA) have conducted the first five-year review at Kennecott North Zone operable units (OUs) 8, 9, 13, 14, 15, 19, 22, and 23. These OUs are located near the communities of Magna and Copperton in Salt Lake County, Utah. This review was conducted from December 2012 through April 2014. This is the first review for these OUs. This is a discretionary review. Significant removal and remediation has occurred since the Record of Decision (ROD) was finalized in 2002 and the UDEQ and EPA decided this is an appropriate time to evaluate the ongoing response actions.

Figure 3.1, in section 3.1 of this report, shows the relative locations and areas of the OUs included in this five-year review. The OUs reviewed in this report are as follows:

- OU8:** the footprint of the Kennecott Waste Water Treatment Plant and Sludge Ponds, which were a former industrial waste water treatment plant operation.
- OU9:** the community of Magna, Utah.
- OU13:** the Garfield Smelter, associated facilities, and waste management areas, both historic and current.
- OU14:** the historic and current refining facilities, associated facilities, and the footprint of waste management areas.
- OU15:** the active North Tailings Impoundment and Arthur Step-Back Repository, along with the reclaimed South Tailings Impoundment, the footprints of the Bonneville Crushing and Grinding Mill, Magna Mill (North Concentrator), Arthur Mill, historic and current power plants, and associated facilities and waste management areas.
- OU19:** the Oquirrh Mountain Range and associated drainages, in both Salt Lake and Tooele Counties.
- OU22:** portions of the Great Salt Lake and South Shoreline, associated wetlands, including springs and ponds, all located north and/or down gradient of the refining and smelting operations, and the tailings impoundment at the Kennecott North Zone.
- OU23:** the groundwater located in the bedrock, principal and shallow aquifers underlying OUs 8, 13, 14, 15 and 22.

Different response actions were selected depending on the media impacted (solid mine waste or mining influenced water), the receptors to the contaminants of concern (COCs), and whether an OU includes active mining, milling, smelting, refining or waste management facilities.

Conclusions of this five-year review indicate the following:

- The remedies at OUs 8, 13, 14, 15, and 19 are not protective of human health and the environment. A decision document is needed to address operations and maintenance (O&M) and institutional control (IC) issues in order for the remedy to be protective. A decision document is expected to be completed by June 2015 to address the protectiveness issues.
- The no further action remedy at OU9 is protective of human health and the environment because no unacceptable exposures were found during site assessment studies and exposure conditions have not changed. No further five-year reviews are required at OU9 because generally, soil concentrations of the contaminants of concern are less than the unrestricted land use standards.

- A protectiveness determination for the remedies at OU22 and OU23 cannot be made at this time until further information is obtained. Additional information is required to clarify both active and passive remedies to protect human health and ecological receptors. It is expected that a decision document will take approximately one year to complete, at which time a protectiveness determination will be made.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Kennecott North Zone		
EPA ID: UTD070926811		
Region: 8	State: UT	City/County: Salt Lake County
SITE STATUS		
NPL Status: Proposed		
Multiple OUs? Yes	Has the site achieved construction completion? No	
REVIEW STATUS		
Lead Agency: State		
Author name (Federal or State Project Manager): Douglas Bacon		
Author affiliation: UDEQ		
Review period: December 2012 – April 2014		
Date of site inspection: March 15, 22, and April 4, 2013		
Type of review: Discretionary		
Review number: 1		
Triggering action date: NA		
Due date (five years after triggering action date): NA		

FIVE-YEAR REVIEW SUMMARY FORM (continued)

Issues/Recommendations				
OU(s): 8, 13, 14, 15	Issue Category: Operations and Maintenance			
	Issue 1: There are no maintenance requirements for soil covers and engineered caps.			
	Recommendation: The PRP should develop an O&M plan to require maintenance for covers and caps.			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
Yes	Yes	PRP	EPA/UDEQ	6/30/15
OU(s): 8, 13, 14, 15, 19	Issue Category: Operations and Maintenance			
	Issue 2: Mapping of waste left in place is incomplete.			
	Recommendation: The PRP should develop a data management system for waste left in place which will include a GIS spatial mapping component.			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	PRP	EPA/UDEQ	6/30/15
OU(s): 8, 13, 14, 15, 19	Issue Category: Operations and Maintenance			
	Issue 3: Once the September 1996 AOC is closed, there will be no requirement for submission of work plans for future response work.			
	Recommendation: A decision document is needed to require work plan(s) for future response work.			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	EPA/UDEQ	EPA/UDEQ	6/30/15
OU(s): 8, 13, 14, 15, 19	Issue Category: Institutional Controls			
	Issue 4: There are no institutional controls to manage soils exceeding unrestricted land use standards.			
	Recommendation: A decision document is needed to clarify ICs are required. The PRP should develop environmental covenants to address allowable land uses, and list procedures for changes to land use.			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	EPA/PRP/SLCHD	EPA/UDEQ	6/30/15
OU(s): 13, 14, 15	Issue Category: Operations and Maintenance			
	Issue 5: There are no requirements to maintain compliance with state permits for facilities that can re-introduce contamination.			
	Recommendation: An assessment is needed to determine if Kennecott's compliance with all state permits regulating operations and waste management strategies address CERCLA interests, and to list this management criterion in a decision document.			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
Yes	Yes	UDEQ	EPA/UDEQ	6/30/15
OU(s): 8, 13, 14, 15, 19	Issue Category: Operations and Maintenance			
	Issue 6: There are no requirements for inspections or reports.			
	Recommendation: A decision document is needed to require the Agencies to perform inspections and reports every two years.			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	UDEQ	EPA/UDEQ	6/30/15
OU(s): 15	Issue Category: Operations and Maintenance			
	Issue 7: Once the September 1996 AOC is closed, the Arthur Step-Back Repository needs to be reauthorized for continued use and an O&M plan is required.			
	Recommendation: A decision document and Consent Decree are needed to reauthorize the Arthur Step-back Repository for continued use. The PRP should develop an O&M plan specifying operation, maintenance and performance criteria for continued use of the repository.			

FIVE-YEAR REVIEW SUMMARY FORM (continued)

Issues/Recommendations				
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	EPA/PRP	EPA/UDEQ	6/30/15
OU(s): 19	Issue Category: Institutional Control			
	Issue 8: There is no restriction on the use of seeds of plants capable of up-taking selenium during re-vegetation actions.			
	Recommendation: A decision document is needed to clarify an IC is required to restrict the use of seeds of plants capable of up-taking selenium.			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	UDEQ	EPA/UDEQ	6/30/15
Protectiveness Statements				
<i>Protectiveness Determination, OU8</i> Short-term Protective			<i>Addendum Due Date (if applicable):</i> NA	
<i>Protectiveness Statement:</i> The remedy at OU8 is not protective because there are no maintenance requirements for covers and caps. In order to ensure protectiveness, the PRP should develop two site-wide management plans, one covering waste left in place and one covering future encountered waste. A decision document should be completed to require inspections, reports, ICs, maps, and work plans.				
<i>Protectiveness Determination, OU9</i> Protective			<i>Addendum Due Date (if applicable):</i> NA	
<i>Protectiveness Statement:</i> The no further action remedy at OU9 is protective of human health and the environment because no unacceptable exposures were found during site assessment studies and exposure conditions have not changed. No further five-year reviews are required because generally, soil concentrations of the contaminants of concern are less than the unrestricted land use standards.				
<i>Protectiveness Determination, OU13</i> Short-term Protective			<i>Addendum Due Date (if applicable):</i> NA	
<i>Protectiveness Statement:</i> The remedy at OU13 is not protective because there are no maintenance requirements for covers and caps, and there are no requirements to maintain compliance with state permits. In order to ensure protectiveness, the PRP should develop two site-wide management plans, one covering waste left in place and one covering future encountered waste. A decision document should be completed to require inspections, reporting, ICs, maps, assess COC introduction management strategies, and work plans.				
<i>Protectiveness Determination, OU14</i> Short-term Protective			<i>Addendum Due Date (if applicable):</i> NA	
<i>Protectiveness Statement:</i> The remedy at OU14 is not protective because there are no maintenance requirements for covers and caps, and there are no requirements to maintain compliance with state permits. In order to ensure protectiveness, the PRP should develop two site-wide management plans, one covering waste left in place and one covering future encountered waste. A decision document should be completed to require inspections, reports, ICs, maps, assess COC introduction management strategies, and work plans.				
<i>Protectiveness Determination, OU15</i> Short-term Protective			<i>Addendum Due Date (if applicable):</i> NA	
<i>Protectiveness Statement:</i> The remedy at OU15 is not protective because there are no maintenance requirements for covers and caps, and there are no requirements to maintain compliance with state permits. In order to ensure protectiveness, the PRP should develop two site-wide management plans, one covering waste left in place and one covering future encountered waste. A decision document should be completed to require inspections, reports, ICs, maps, assess COC introduction management strategies, work plans, reauthorization of the Arthur Step-back repository and an O&M plan for the repository.				
<i>Protectiveness Determination, OU19</i> Short-term Protective			<i>Addendum Due Date (if applicable):</i> NA	

FIVE-YEAR REVIEW SUMMARY FORM (concluded)

Protectiveness Statements	
<p><i>Protectiveness Statement:</i> The remedy at OU19 is not protective because there is no requirement to maintain compliance with state permits. In order to ensure protectiveness, the PRP should develop two site-wide management plans, one covering waste left in place and one covering future encountered waste. A decision document should be completed to require inspections, reports, ICs, maps, and work plans. In addition, a decision document should explain that in the absence of site-specific residential land use standards, the unrestricted land use standards are applicable.</p>	
<p><i>Protectiveness Determination, OU22 and OU23</i> Protectiveness Deferred</p>	<p><i>Addendum Due Date (if applicable):</i> 1 year from the date of this five-year review</p>
<p><i>Protectiveness Statement:</i> A protectiveness determination for the remedies at OU22 and OU23 cannot be made at this time until further information is obtained. Additional information is required to clarify both active and passive remedies to protect human health and ecological receptors. It is expected that a decision document will take approximately one year to complete, at which time a protectiveness determination will be made.</p>	

1.0 INTRODUCTION

The purpose of a five-year review is to determine whether response actions at a site are protective of human health and the environment. The methods, findings and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify issues found during the review, if any, and make recommendations to address them.

The Utah Department of Environmental Quality (UDEQ) and the Environmental Protection Agency (EPA) are preparing this first five-year review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The United States Environmental Protection interpreted this requirement further in the NCP; 40 Code of Federal Regulations (CFR) §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

This review is discretionary. Significant removal and remediation has occurred since the Record of Decision (ROD) was finalized in 2002 and the UDEQ and EPA decided this is an appropriate time to evaluate the ongoing response actions.

2.0 SITE CHRONOLOGY

Table 2.1: Chronology of Response Events at the Operable Units

Date	OU	Activity
Oct 1987 to Dec 1990	All OUs	North Zone site-wide Preliminary Assessment/Site Inspection
1988, 1994, and 1998	OU19	Characterization studies
1994	All	Proposed for listing on the National Priorities List (was not finalized)
1994	OU9, OU13, OU14, OU15	Remedial Investigations begin
1994 to present	OU15	Ongoing soil removal response actions
1995	OU13, OU14	Completion of removal response actions
May 1996	OU8	Completion of Engineering Evaluation/Cost Analysis
Sept 1996	OU8, OU13, OU14, OU15	Administrative Order on Consent, CERCLA-VIII-95-04, and Action Memo signed
Jun 1997 to Sep 2002	OU8	Completion of North Zone Remedial Investigation/Feasibility Study
Oct 1996 to Mar 2003	OU8	Completion of removal response action

Date	OU	Activity
Oct 1996	OU19	Completion of Ecological Risk Assessment Northern Oquirrh Mountains
Dec 1999	All	Final Preliminary Remediation Goals for Addressing Risks to Human Health from Exposure to Chemicals in Kennecott Soils
Sept 26, 2002	All OUs	Record of Decision
Oct 2002	OU13, OU14, OU15	Continuation of soil removal actions under 1996 AOC work plan
Nov 2003	OU8, OU13, OU14, OU15	Remedial Design begins for North Zone
Nov 2003	OU22, OU23	Remedial Action begins

3.0 BACKGROUND

This section provides a short summary of the background for the Sites. A more detailed summary of OUs assessed in this five-year review can be found in the 2002 ROD or in Appendix J.

3.1 Physical Characteristics

The Kennecott North Zone is an industrial area at the north end of the Oquirrh Mountains and at the south shore of Great Salt Lake, next to the community of Magna. Interstate highway 80, state highways and rail lines pass through the Site. See Figure 3.1 for the approximate locations of the areas included in the OUs addressed by this five-year review.

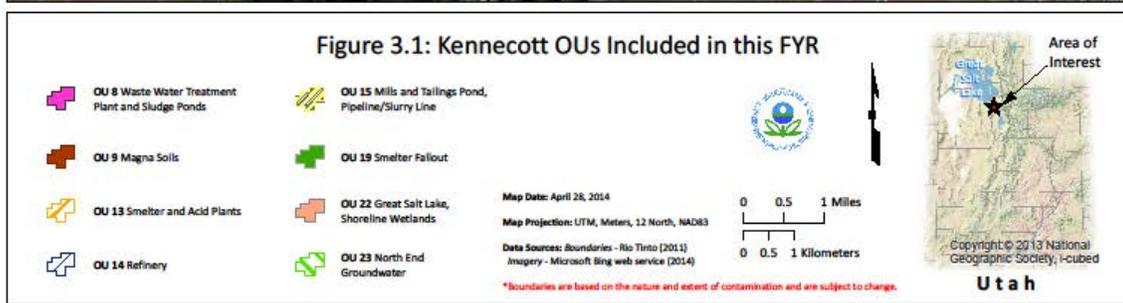
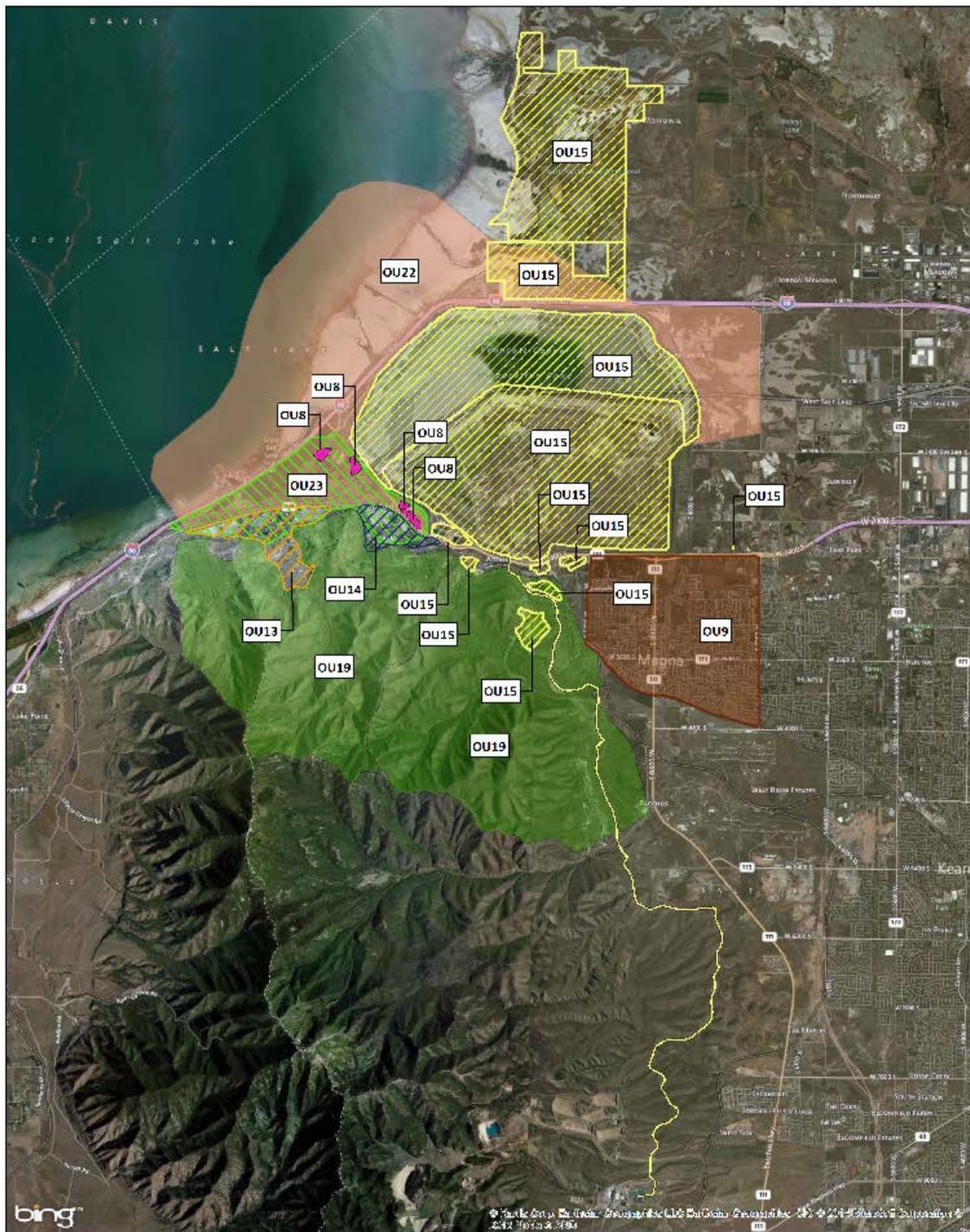


Figure 3.1: Kennecott Operable Units Included in this Five-Year Review

3.2 Land and Resource Use

Today, Rio Tinto Kennecott Copper (Kennecott), the Sites' principal potentially responsible party, maintains active mining operations on or near all of the OUs. Portions of the OUs are adjacent to residential communities and OU9, Magna, is a residential community. Most of the OUs are zoned M-2, manufacturing, heavy, industrial, mining. The current land uses are pockets of heavy industrial complexes separated by areas of open spaces. OUs in the North Zone are likely to remain designated for industrial land use until mine closure and perhaps thereafter, with two exceptions: OU9 Magna Soils and OU19 Smelter Fallout. OU9 will remain residential and OU19 is likely to remain as open space. There has been no redevelopment in the canyons in OU19, but there could be in the future. Development activity was not observed along the OU22 Great Salt Lake shoreline during the site inspection, though some projects are pending.

3.3 History of Contamination

Since 1906 the North Zone has been used to process copper, lead, zinc, molybdenum, arsenic, gold and silver-bearing ores. The wastes produced contain contaminants which can be hazardous, including heavy metals. Soils, sediment, surface water, groundwater and the nearby wetlands have been impacted. Arsenic, cadmium, lead and selenium are the potential contaminants of concern (COCs).

3.4 Initial Response

On January 18, 1994, EPA proposed the Kennecott North Zone to the National Priorities List (NPL). Pursuant to a September 1995 memorandum of understanding (MOU) between Kennecott, EPA and UDEQ, Kennecott agreed to complete numerous cleanup projects. In return, EPA agreed to defer finalizing the listing of the North Zone on the NPL and the State of Utah agreed to use its groundwater authorities to regulate Kennecott's active operations and waste management operations.

Kennecott has taken responsibility for all clean up at the site with oversight by UDEQ and EPA. Pursuant to the previous site characterization efforts and the September 2002 ROD, contaminated soil has and continues to be characterized and either disposed of in the on-site repositories or capped in place. Residential properties were characterized and determined to be in compliance with applicable land use standards. Contaminated groundwater is monitored and collected when it surfaces.

3.5 Basis for Taking Action

The 2002 ROD for all OUs in the North Zone documented that receptors at risk for exposure were industrial workers during their lunch hour or after work, construction workers, occasional visitors, and a few ranchers. An EPA contractor conducted the assessment and produced preliminary remediation goals, detailed in the document entitled, *Final Preliminary Remediation Goals for Addressing Risks to Human Health from Exposure to Chemicals in Kennecott Soils* (December 30, 1999). A risk assessment task force composed of toxicologists and health professionals from EPA, UDEQ, Utah Department of Health, Salt Lake County Health Department (SLCHD), stakeholders from the communities, and Kennecott aided in the evaluation of the assumptions used in the risk assessment. The primary COCs in soils were lead and arsenic for human health and selenium for ecological impacts. Cadmium was later added to the list of human health COCs.

The ROD provided that remedial action should be taken to prevent additional contamination of groundwater by eliminating and/or containing sources of contamination so that they do not continue to leach into the groundwater. Because of the proximity of the Great Salt Lake, the groundwater is elevated in total dissolved solids and would have limited usefulness as a drinking water source unless treated. The groundwater does serve as a source of water to the wetland area and could be important especially after closure of the facilities. Although there is no human exposure because the groundwater is not a current or potential drinking water source, the wildlife exposures can be reduced to acceptable levels by

diversion of the seeps and springs from sensitive habitats and treatment of the groundwater before discharge into the environment.

4.0 REMEDIAL ACTIONS

The overall site cleanup strategy adopted in the 2002 ROD was to address surface materials which posed a current threat to industrial workers and wildlife resources through removal actions. This was to be followed by addressing long term threats to workers and wildlife through treatment of groundwater, cleanup of currently inaccessible mining wastes following facility closure, and mapping of buried wastes for use by future land use planners and developers. The principal threats were addressed by a previous emergency response action which removed and/or capped wastes contributing to groundwater contamination. Major components of the selected remedy include:

- In-situ treatment of selenium-tainted groundwater coupled with collection of contaminated spring and well water for industrial use;
- Demolition of unneeded facilities, characterization of underlying soils, and removal of contaminated soils to an engineered repository;
- Continued use of the Arthur Step-back Repository to store contaminated soils following demolition activities and/or following facility closure;
- Development of a monitoring plan to evaluate progress toward ecological improvement, and;
- Mapping of locations of buried wastes and locations where future unrestricted land use is not appropriate.

Detailed remedy description, remedy implementation, and O&M are summarized below for each OU for which the 2002 ROD specified further action. Because no unacceptable exposures were found during site assessment studies, the 2002 ROD did not require further action for OU9 Magna Soils.

4.1 OU8 Waste Water Treatment Plant and Sludge Ponds

Remedy description: Groundwater monitoring is required as part of the remedy at OU23 North End Groundwater. Kennecott should provide maps showing locations of buried wastes above EPA's action levels for industrial land use and for unrestricted land use.

Remedy implementation: Groundwater monitoring is occurring as part of the remedy at OU23. Maps of buried wastes left in place were originally produced but Kennecott needs to revise them.

O&M: Kennecott manages soils exceeding the cleanup standards pursuant to the September 1996 Administrative Order on Consent (AOC) work plan depending on whether the construction projects are located on areas with unrestricted land use or areas specified as industrial land use.

4.2 OU13 Smelter and Acid Plants, OU14 Refinery, OU15 Mills and Tailings Pond

Remedy description:

- Following facility closure and demolition, soils in the area are to be characterized and removed to the Arthur Step-back repository, the on-site landfill for contaminated waste. Generated RCRA wastes must be recycled or removed to an approved off-site facility.
- Soils to remain in place but exceed the unrestricted land use standards are to be covered with at least 18 inches of clean fill, graded and re-vegetated. If leachable soils with COCs remain in place, an engineered cap to reduce infiltration is required.
- Kennecott should provide maps showing locations of buried wastes above EPA's action levels for industrial land use and for unrestricted land use.

- (OU13 only) Further CERCLA response action for any residual contaminated groundwater may be required at the Former Acid Tank Farm, preventing the migration of sulfuric acid and its residues from entering the wetland.
- (OU14 only) Further CERCLA response action may be required at the former precious metals plant at the time of facility closure. At a minimum, the current cap over the former precious metals plant must be extended to cover the remaining wastes currently inaccessible underneath the current tank house of the new refinery.
- (OU15 only) Kennecott can use the Arthur Step-back repository as a corrective action management unit (CAMU). Following closure of site facilities, the entire repository will be permanently closed.

Remedy implementation: Kennecott has implemented and continues to implement the general removal actions specified in the September 1996 AOC work plan. Appendix F summarizes specific response actions completed by Kennecott. Post removal action sampling determined that the action levels under the September 1996 AOC work plan were attained. Groundwater monitoring is occurring as part of the remedy at OU23.

In 2009, a new release of low pH solutions took place at the Acid Tank Farm Loading Station located on the east end of the Smelter, OU13. Based on characterization data, the Division of Water Quality (DWQ), Division of Environmental Response and Remediation (DERR) and EPA agreed that groundwater would be monitored where surface water quality can be influenced. DWQ is overseeing Kennecott's corrective action required under the Smelter Groundwater Protection Permit in response to the release.

O&M: Kennecott operates and maintains the Arthur Step-back repository pursuant to the requirements of the September 1996 AOC work plan. Once the 1996 AOC is closed, the repository needs to be reauthorized for continued use and Kennecott needs to develop an O&M plan. Operation of the active portions and reclamation of the inactive portions of these OUs are conducted in compliance with permits issued by DWQ under their Utah Pollutant Discharge Elimination System (UPDES) and Groundwater Protection Program (GWPP), air permits issued by Division of Air Quality (DAQ) to manage fugitive emissions, and mining permits issued by the Division of Oil, Gas, and Mining (DOGGM). Under the 1995 MOU, the active operations, waste management activities, and closure of these facilities should maintain compliance with these permits.

4.3 OU19 Smelter Fallout

The ecological risk assessments document unacceptable risk to native wildlife species such that cleanup of the soils within the canyon habitat would be justified. However, the 2002 ROD acknowledges that major soil remediation over a broad area can be especially disruptive and pose even more stress to the native species living in the canyon lands.

Remedy description:

- Map areas where the concentrations of the COCs exceed land use standards or pose an increased risk of observable effects to either ecological or human receptors. Original maps documenting waste left in place need to be revised to be consistent with the completion of ongoing and future response action projects.
- Prevent the use of plants that can up-take selenium during re-vegetation efforts in the canyons.
- Areas that have the potential to pose a threat dependent upon future land use will be segregated and scheduled for appropriate response action at the time of land use change.
- If the canyon areas are mined for sand, gravel and/or topsoil, no material above the unrestricted land use standard can leave the site. On-site use of material must be appropriate for the land use.

Remedy implementation: There has been no excavation of borrow material for use off-site from the canyons.

O&M: Kennecott maintains the canyons south and east of the Smelter as open space and sources of borrow material. Prior to the shipment of borrow material around the North Zone, Kennecott monitors the soils for metals concentrations (though formal work plans for such do not exist). Kennecott does restrict the use of seeds of plants which can uptake selenium.

4.4 OU22 Great Salt Lake, Shoreline Wetlands and OU23 North End Groundwater

Remedy description: The selected remedy for OU22 in the 2002 ROD is focused on response action and protection measures necessary to reduce or prevent avian exposure risks from elevated concentrations of COCs. This includes monitoring and analysis of water, sediment, and macro-invertebrate tissue. The remedy included provisions to suspend monitoring after meeting specific requirements and the option to take ponds in the Garfield Wetlands out of service.

The OU23 remedy requires ongoing monitored natural attenuation of the delineated selenium and arsenic plumes underlying the Smelter (OU13) and Refinery (OU14), ongoing assessment of locations and capture of groundwater when it surfaces. Furthermore, the Refinery selenium plume was to be contained using Garfield Well #5 to extract the plume along its leading edge, and required in-situ treatment of groundwater with elevated selenium upon closure of the smelter and refinery.

Remedy implementation: Concentrations of COCs specified in the 2002 ROD have been measured in water, sediment, and macro-invertebrate tissues collected from established monitoring locations in the nesting and foraging habitat within the Garfield Wetlands. Some of the monitoring in the Garfield Wetlands was suspended based on analytical results documenting concentrations of less than 5 micrograms per liter ($\mu\text{g/L}$) of selenium in the macro-invertebrate tissue samples. In 2007-2009, Kennecott drained and re-contoured some ponds. In 2010, Kennecott, EPA, and UDEQ initiated an investigation into the historic footprint of a dike constructed of copper tailing material located on the southern shore of the Great Salt Lake. Kennecott performs ongoing monitoring, assessment, capture and control of groundwater at OU23. Groundwater with selenium concentrations greater than 50 $\mu\text{g/L}$ for human health, and 5 $\mu\text{g/L}$ for ecological health, is captured at the surface and sent to the process water circuit.

O&M: There is ongoing monitoring of the Garfield Wetlands and the groundwater system of the Northern Oquirrh Mountains around OU13, OU14, OU15, and OU22. Monitoring results have been partially inconclusive. See Appendix I for more detail.

5.0 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

This is the first five-year review for the Kennecott North Zone, OUs 8, 9, 13, 14, 15, 19, 22, and 23.

6.0 FIVE-YEAR REVIEW PROCESS

6.1 Administrative Components

This five-year review was led by Douglas Bacon, UDEQ Project Manager. The following team members participated in the review:

- Scott Everett, UDEQ Toxicologist
- David Allison, UDEQ Community Involvement Coordinator
- Kerri Fiedler, EPA Project Manager

In addition, the following individuals provided supplemental technical information:

- Edward Hickey, Kim Shelley and Dan Hall, UDEQ – Division of Water Quality
- Jeremiah Marsigli, UDEQ – Division of Air Quality
- Rocky Stonestreet, UDEQ – Division of Solid and Hazardous Waste
- Leslie Heppler, UDNR – Division of Oil, Gas and Mining
- Larry Elkin, Brian Vinton, Ann Neville, and Tom Nannini, Kennecott Utah Copper LLC

This effort consisted of reviewing relevant data and documents, conducting a site inspection, and interviewing the community.

6.2 Data and Document Review

No analytical data were collected during this review. Past data from site characterization studies are summarized in Appendix E. Information on permit compliance is summarized in Appendix H.

Under the 1995 MOU, active operations, waste management activities and closure of facilities should maintain compliance with the permits issued by the DWQ, DAQ, and DOGM. Since 2002, Kennecott has maintained compliance with their applicable state permits. In 2011 and 2013, discharges occurred from vacuum breakers on the process tailings pipeline. Although the pipeline does not require a permit under the Utah State Groundwater Rules, the State issued Kennecott Notices of Violation for these releases.

This five-year review includes a review of relevant, site-related documents. Appendix G lists the complete list of documents reviewed.

ARARs Review

The 2002 ROD listed federal and state regulations and made determinations on whether they were Applicable or Relevant and Appropriate (ARARs). The EPA listed certain state ARARs in the 2002 ROD for future response work when facilities are decommissioned or the mine shuts down. The listed ARARs pertain to the control of fugitive emissions under the Utah Air Conservation Regulations and the generation, transport and disposal of hazardous waste under the Utah Hazardous Waste Regulations. Some of the noted citations are inaccurate or out of date and need to be corrected. All ARARs, including any potential ARAR-based cleanup levels, need to be re-evaluated for all OUs.

Institutional Control (IC) Review

ICs were not identified in the 2002 ROD. Kennecott, or its predecessors, have owned the footprints of OUs 8, 13, 14, 15, and 19 since processing facilities were first constructed on the northern boundary of the Oquirrh Mountains. Land use is unlikely to change in the short term. However, after mine closure (estimated at this time in approximately 2029), the land use could change. Soil concentrations can exceed the unrestricted land use standards of 50 milligrams per kilogram (mg/kg) for arsenic, and 500 mg/kg for lead, and the industrial land use standards of 2,764 mg/kg for cadmium, and 13,972 mg/kg for selenium. Therefore, soil management plans for future land use changes are necessary.

Kennecott's property holdings in northern Tooele County are associated with the Oquirrh Mountain Range and its immediate foothills. Development in the communities of northern Tooele County is regulated by Tooele County and the community planning commissions. Development is likely to continue as the populations in these communities continue to increase. Development in the communities of northern and western Salt Lake County is regulated by Salt Lake County.

Kennecott needs to finalize two separate site-wide management plans for known waste left in place and waste that may be encountered in the future. These two management plans will direct future characterization and remedial response work to address soils with elevated COCs. These plans should also specify requirements for maintaining caps and covers. A decision document is needed to clarify ICs are required and Kennecott needs to file environmental covenants for the OUs where waste has been left

in place or is likely to be encountered. The covenants will allow Kennecott to notify future property owners of existing land use restrictions and requirements for redevelopment.

As an added measure, Salt Lake County has developed an IC to alert land developers for proposed development projects and to ensure that contaminated soils above allowable land use standards are managed appropriately. This IC is vested with two Salt Lake County agencies, Planning and Developmental Services and the Health Department (SLCHD), to ensure development projects are reviewed and forwarded to the appropriate agency. However, this ordinance only becomes applicable once EPA and UDEQ provide management plans to SLCHD for areas at Kennecott where soils exceed unrestricted land use standards.

6.3 Site Inspection

The purpose of the site inspection is to observe the current conditions of the property and to assess remedy elements. Following is a summary of the issues identified during the inspection. A detailed site inspection can be found in Appendix K. The site inspection was performed by Douglas Bacon, UDEQ Remedial Project Manager, and Larry Elkin, Kennecott Utah Copper LLC, Senior Remediation Advisor.

OU8: Waste Water Treatment Plant (WWTP) and Sludge Ponds. OU8 was inspected on April 4, 2013. The site inspection consisted of observing the WWTP and Sludge Ponds B, C and C+ (or C Extension), and determining if the covers were stable. The footprints of the WWTP and Sludge Ponds B, C and C+ are owned by Kennecott. The footprints have seen very little disturbance since buildings and other infrastructure have been demolished, cleaned up and reclaimed. The soils are stable and not subject to erosion. No dust was observed during the inspection or is anticipated because of successful vegetation and ongoing re-vegetation efforts.

Sludge Ponds A and D have been converted into a wetland. Sludge Pond B appeared stable and well-vegetated with grasses and forbs, except for the corridor of a recently buried pipeline. Sludge Ponds C and C+ appeared to be stable and well-vegetated. During the inspection, the sides of a reclaimed ingress/egress road were showing signs of vegetation, although it will take some time for successful vegetative cover to establish across the whole footprint. Two-thirds of the WWTP footprint is vegetated with grasses and native forbs, while the western one-third remains barren of vegetation as it is used as part of a staging area. There was evidence that recent activity had occurred, but the soil cover had been re-established.

OU: 9 Magna Soils. OU9 was inspected on March 15, 2013. The site inspection consisted of driving through the community of Magna to observe conditions that may present an issue. EPA determined a significant human health risk did not exist, thus, the visual survey focused on recent development activity. Since 2002, the majority of residential development has taken place in the eastern and southern sections of town and away from the boundary lines of Kennecott's waste management and milling operations. The older section of town has not undergone redevelopment other than the demolition of a school, development of a new senior center, and the construction of a new library. In southern Magna, a new elementary school has been built. Existing road surfaces, residential and commercial yards appeared to be in good condition. No issues were observed during the inspection.

OU13: Smelter and Acid Plants. OU13 was inspected on March 15th and April 4th, 2013. The site inspection consisted of observing the Smelter facility, recent small project sites, integrity of capped facilities, and surrounding land. OU13 is owned by Kennecott and is used to support its smelting operations for copper concentrates. Operations include the storage and distribution of process water, storm water, slag cooling and recycling, acid generating, storage and loading operations.

The overall Smelter footprint appeared to be in good condition. Transport corridors were covered with either asphalt or concrete. The dirt roads behind the smelter were graded and did not show any signs of recent releases. Previously removed and reclaimed facilities, which have asphalt covers, were stable.

The Slag Pot Cooling Area and Mill are operational areas. The cooling area is covered with asphalt. Slag appeared along roadways and along both the northern and eastern boundaries of the cooling area. The footprints appeared to be in good shape. The Smelter's storm water ponds were full of water and below the height of their embankments. Visible sections of liners appeared to be intact.

Areas where recent small projects were completed with asphalt and concrete covers appeared stable. The surface soils along the south side of Hwy-201 appeared to be stable. The Black Rock Tailings Pond is covered with soil and partially vegetated. At the Acid Tank Farm Loading Station, DWQ reported the groundwater extraction system is functional and effective (see Appendix D). The surface area around the Praxair facility and directly over the groundwater extraction system was observed and found to be covered with asphalt.

OU14: Refinery. OU14 was inspected on March 15, 2013. It is owned by Kennecott and is used for refining the final metal products. The site inspection consisted of driving around the Refinery complex and observing areas where infrastructure has been removed. Operations at the Refinery include the production of the final copper products, the refining of precious metals from used electrolytic fluid, product packaging and the rail services that support the operations and transport packaged products.

Generally, the overall facility appeared to be in good condition. The Refinery complex is covered with asphalt; contains foundations of structures; and storm water collects around the facility boundary. The facility structures on site appeared in good condition and structurally sound. No spills from the Tank House or the New Precious Metals Plant were observed on the surrounding surfaces. The engineered cap constructed over the footprint of the historic Precious Metals Plant was intact, well vegetated, and no intrusions were observed.

The engineered cap constructed over the footprint of the historic electrolytic pond was intact, well-vegetated and stable. There was a set of tire tracks that ran over the top of the cap which Kennecott was requested to repair. Therefore, an O&M plan is needed to require maintenance for covers and caps. All rail spurs around the refinery and the rail yard appeared to be stable. During the inspection, water was observed flowing in a rip-rap drainage channel from a tank which Kennecott was requested to turn off. This was completed during the inspection.

OU15: Mills and Tailings Pond. OU15 was inspected on March 15, 2013 and April 4, 2013. The site inspection consisted of driving around the facilities and inspecting surface soils, excavation activities, covers, and facilities undergoing demolition. OU15 is owned by Kennecott and is used for the disposal of solid mine waste, management of mining influenced water, and power production. The reclaimed mill footprints are used as open space and buffer to active rail and power generation operations.

Established soil covers remain intact and stable and re-vegetation efforts of previously removed sites have been successful. Demolition of the structures of the Magna Leaching Facility is proceeding and the surrounding soils will be characterized after demolition activities cease. The conditions were stable, no soils were observed migrating off site, no dust was observed, and surfaces were relatively moist.

The reclaimed surface of the Arthur Mill appeared stable and well-vegetated. No run-off channels or rills were observed. The reclaimed surfaces of the Bonneville Crusher & Grinding footprint appeared stable and no erosion, channels or rills were observed on hillsides. Re-vegetation has been limited due to the high cobble material with low topsoil content, and the fact that the facility footprint is located at a higher elevation. There was a pile of tire debris observed in the lower portion of the bowl of the Bonneville footprint. Removal of the tire debris is planned along with the soils associated with the Copperton High Line removal project.

The surface soils around the Magna Mill footprint were stable and the planting rows scarred into the reclamation cover were visible. A fairly cobbled soil was used for reclamation efforts and the revegetation effort has been partially successful. Closer to the frontage road, near the northern portion of the facility, the footprint slopes at a steeper angle and vegetative success is more limited. The lack of topsoil and high cobble content of the material is suspected to be the reason for the limited vegetation.

The Magna Process Water Pond has been reconstructed and was found to be in pristine condition. The new reservoir has elevated embankments, which are armored with rip-rap. No evidence of spills or releases was observed.

The South Tailings Impoundment was found to be stable and well-vegetated. A few deciduous trees have been planted. Other than established roadways along the top surfaces and embankments of the impoundment, there was no other evidence of vehicular activity along the reclaimed surfaces. There was no dust observed during the inspection. The North Tailings Impoundment is the active tailings disposal facility and the outer embankments appeared stable. The impoundment's southwest and northeast corners were being watered to reduce the potential for dust generation. No dust was observed during the inspection.

The Arthur Step-back Repository is the active facility that receives contaminated soils and materials. During the inspection, no material was being placed into the repository. The repository is permanently capped with a high-density polyethylene liner and soil cover on its eastern half. The soil cover is well vegetated with grasses and forbs that have shallow roots. Rain and snow melt was observed on the lower collection area of the repository's west end.

The Diving Board Tailings area was not in use at the time of the inspection. The surfaces of the embankments and the interior slopes and base of the impoundment were well-vegetated. No signs of spills or releases were observed around the facility. The Kennecott Power Plant is operational. Surrounding hillsides were relatively stable and well-vegetated.

OU19: Smelter Fallout. OU19 was inspected on February 15th, March 15th, 22nd and April 4th, 2013. The site inspection consisted of driving and/or hiking into the canyons located downwind of the Smelter (OU13) and Refinery (OU14). The communities of northern Tooele County were driven through on February 15, 2013. No large-scale developments were observed. Little Valley, Kessler and Black Rock canyons are designated open space. The canyons are still owned and controlled by Kennecott and are not under development right now.

Little Valley is well-vegetated and the surface soils are stable. The sedimentation/flood control dams located in Little Valley were in good condition. Kessler Canyon is well-vegetated and soils are stable. Steeper side slopes and bases in the upper reaches of the canyon are less vegetated and there were signs of erosion. The flood control dams were stable and down gradient slopes were well-vegetated with grasses and forbs. No evidence of erosion was observed along the canyon floor. Black Rock Canyon is well-vegetated along the canyon floor and lower side slopes are stable. Steeper side slopes are relatively void of vegetation, potentially due to lack of soil or because of the grades. Side slopes in Black Rock are rocky with upturned bedrock surfaces. No running water was observed on the surface of the canyon floor.

OU22: Great Salt Lake, Shoreline Wetlands and OU23 North End Groundwater. OU22 and OU23 were inspected on March 15, 2013 and April 4, 2013. The site inspection of OU22 consisted of observing ponds 4 and 5, which were taken out of service in the Garfield Wetlands. In addition, the Garfield Wetlands, the South Shoreline of the Great Salt Lake and the Great Salt Lake were observed. In general, the surface areas in OU22 are in use as they were when the remedy was selected.

The Garfield Wetlands were in good condition. Accumulated water existed because the sump pump was offline and being repaired by Kennecott. Pond 5 did not contain water and thus the response action to convert this pond to riparian habitat was successful.

No development activity was observed at the south shoreline of the Great Salt Lake. The groundwater at OU23 is only visible when it surfaces at the various springs located north of the Smelter (OU13) and Refinery (OU14) complexes. During the inspection, Japanese Springs and Hansen Springs were observed. Both were producing water, which was flowing north.

6.4 Community Involvement

An advertisement inviting public input on the five-year review was published in the *Salt Lake Tribune* and *Deseret News* on January 13, 2013, and in the *Tooele Transcript* on January 15, 2013.

Superfund community involvement staff from UDEQ conducted interviews with Kennecott North Zone stakeholders from January 29 to April 2, 2013. Oftentimes, EPA and UDEQ discover new information from these interviews to be considered in the five-year review. Respondents provided their views regarding the cleanup actions and their protectiveness. Generally, there were no significant issues identified by the community. The interviews are provided in Appendix C.

7.0 TECHNICAL ASSESSMENT

7.1 OU8 Waste Water Treatment Plant and Sludge Ponds

QUESTION A: Is the remedy functioning as intended by the decision documents?

Yes. The remedy is functioning as intended by the 2002 ROD. However, further action by Kennecott, EPA and UDEQ is necessary to support the long-term protectiveness of the remedy (see Question C). See Appendix I for a more detailed discussion.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

No. The exposure assumptions are no longer valid. However, the toxicity data, cleanup levels and RAOs used at the time of the remedy selection are still valid. See Appendix I for a more detailed discussion.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

Yes. The 2002 ROD did not require mapping, work plans, ICs, agency oversight, annual inspections and reports, and five-year reviews. Post-removal data document concentrations of arsenic that exceed the unrestricted land use standard of 50 mg/kg. An IC is needed to ensure soils exceeding the unrestricted land use standards are managed in the future. The 2002 ROD did not require maintenance for soil covers or engineered caps and an O&M plan needs to require such. An IC is also needed to restrict the use of seeds of plants capable of up-taking selenium during re-vegetation actions. When the September 2006 AOC is closed, a site-wide management plan is needed to address the management of waste left in place and encountered waste which may be discovered in the future. A decision document will address these issues and is scheduled for completion prior to the next five-year review. See Appendix I for a more detailed discussion.

7.2 OU9 Magna Soils

QUESTION A: Is the remedy functioning as intended by the decision documents?

Yes. The remedy is functioning as intended by the 2002 ROD. No action was selected under the 2002 ROD. There is concern about soils exceeding the unrestricted land use standard for arsenic and lead. See Appendix I for a more detailed discussion.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

No. The exposure assumptions are no longer valid. However, the toxicity data, cleanup levels and RAOs used at the time of the remedy selection are still valid. See Appendix I for a more detailed discussion.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

Yes. The 2002 ROD did not explain that the unrestricted land use standards in three locations were exceeded for arsenic (50 mg/kg) and lead (500 mg/kg). Although this does not affect protectiveness, EPA and UDEQ need to explain these exceedances in a decision document, scheduled to be completed prior to the next five-year review. See Appendix I for a more detailed discussion. No further five-year reviews are required at OU9 because generally, soil concentrations of the contaminants of concern are less than the unrestricted land use standards

7.3 OU13 Smelter and Acid Plants, OU14 Refinery, and OU15 Mills and Tailings Pond

QUESTION A: Is the remedy functioning as intended by the decision documents?

Yes. The remedy is functioning as intended by the 2002 ROD. However, further action by Kennecott, EPA and UDEQ is necessary to support the long-term protectiveness of the remedy (see Question C). See Appendix I for a more detailed discussion.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

No. The exposure assumptions are no longer valid. However, the toxicity data, cleanup levels and RAOs used at the time of the remedy selection are still valid. See Appendix I for a more detailed discussion.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

Yes. The 2002 ROD did not require mapping, work plans, ICs, agency oversight, annual inspections and reports, and five-year reviews. Post-removal data document concentrations of arsenic and lead exceed the unrestricted land use standard of 50 mg/kg and 500 mg/kg, respectively, and the industrial land use standard for selenium of 13,972 mg/kg. An IC is needed to ensure soils exceeding the unrestricted land use standards are managed in the future. An IC is also needed to restrict the use of seeds of plants capable of up-taking selenium during re-vegetation actions. The 2002 ROD did not require maintenance for soil covers or engineered caps and an O&M plan needs to require such. The 2002 ROD did not discuss how active operations and waste management operations could be managed under existing State of Utah permits (as contemplated by the 1995 MOU) as a means to prevent re-introduction of COCs. When the September 1996 AOC is closed the Arthur Step-back Repository at OU15 needs to be reauthorized and an O&M plan needs to be approved for continued use. In addition, a site-wide management plan is needed to address the management of waste left in place and encountered waste which may be discovered in the future. A decision document will address these issues and is scheduled for completion prior to the next five-year review. See Appendix I for a more detailed discussion.

7.4 OU19 Smelter Fallout

QUESTION A: Is the remedy functioning as intended by the decision documents?

Yes. The remedy is functioning as intended by the 2002 ROD. However, further action by Kennecott, EPA and UDEQ is necessary to support the long-term protectiveness of the remedy (see Question C). See Appendix I for a more detailed discussion.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

No. The exposure assumptions are no longer valid. However, the toxicity data, cleanup levels and RAOs used at the time of the remedy selection are still valid. See Appendix I for a more detailed discussion.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

Yes. The 2002 ROD did not require mapping, work plans, ICs, agency oversight, annual inspections and reports, and five-year reviews. Post-removal data document concentrations of arsenic and lead exceed the unrestricted land use standard of 50 mg/kg and 500 mg/kg, respectively. A limited exposure pathway was assessed for the recreational standard, an IC is needed to protect all potential recreational users, and other users that would necessitate COC concentrations comply with unrestricted land use standards. An IC is also needed to restrict the use of seeds of plants capable of up-taking selenium during re-vegetation actions. A decision document will address these issues and is scheduled for completion prior to the next five-year review. See Appendix I for a more detailed discussion.

7.5 OU22 Great Salt Lake, Shoreline Wetlands and OU23 North End Groundwater

QUESTION A: Is the remedy functioning as intended by the decision documents?

No. It is unknown whether the remedies for OU22 and OU23 are functioning as intended by the 2002 ROD. The Agencies need to further assess the active and passive remedial components which are being addressed by Kennecott under a focused feasibility study. See Appendix I for a more detailed discussion.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

No. It is currently unknown if the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection are valid. Additional information is needed. See Appendix I for a more detailed discussion.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

Yes. EPA, DERR and Kennecott have decided to re-focus and combine the selected remedies for OU22 and OU23 to protect the avian receptors that use the Garfield Wetlands for nesting and foraging habitat during the breeding season. The remedy will require annual inspections and reports, work plans, agency oversight, and five-year reviews. In addition, an IC is required to prevent the use of groundwater as a drinking water source. A five-year review addendum is scheduled for completion one year from the date of this five-year review. See Appendix I for a more detailed discussion.

7.6 Technical Assessment Summary

The remedies at OUs 8, 13, 14, 15, and 19 are not protective of human health and the environment and a decision document is needed to address issues in order for the remedy to be protective in both the short and long-term. A decision document is expected to be completed by June 2015 which will address the short and long-term protectiveness issues.

The no further action remedy at OU9 is protective of human health and the environment because no unacceptable exposures were found during site assessment studies and exposure conditions have not changed. Although it does not affect protectiveness, the few exceedances of the arsenic and lead unrestricted land use standards detected during site assessment need to be explained in a decision document to be completed before April 2019, or before the next five-year review.

A protectiveness determination for the remedies at OU22 and OU23 cannot be made at this time until further information is obtained. Additional information is required to clarify both active and passive remedies to protect human health and ecological receptors. It is expected that a decision document will take approximately one year to complete, at which time a protectiveness determination will be made.

8.0 ISSUES

Table 8.1: Issues (Refer to Appendix I for more detail)

OU	Issue	Affects Protectiveness?	
		Current	Future
8, 13, 14, 15	There are no maintenance requirements for soil covers and engineered caps.	Yes	Yes
8, 13, 14, 15, 19	Mapping of waste left in place is incomplete.	No	Yes
8, 13, 14, 15, 19	Once the September 1996 AOC is closed, there is no requirement for submission of work plans for future response work.	No	Yes
8, 13, 14, 15, 19	There are no institutional controls to manage future land use changes.	No	Yes
13, 14, 15	There are no requirements to maintain compliance with state permits for facilities that can re-introduce contamination.	Yes	Yes
8, 13, 14, 15, 19	There are no requirements for inspections or reports.	No	Yes
15	Once the September 1996 AOC is closed, the Arthur Step-back repository needs to be reauthorized for continued use and an O&M plan is required.	No	Yes
8, 13, 14, 15, 19	There is no restriction on the use of seeds of plants capable of up-taking selenium during re-vegetation actions.	No	Yes

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Table 9.1: Recommendations and Follow-Up Actions (Refer to Appendix I for more detail)

OU	Issue and recommendation or follow-up action	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
8, 13, 14, 15	<u>Issue:</u> There are no maintenance requirements for soil covers and engineered caps. <u>Recommendation:</u> The PRP should develop an O&M plan to require maintenance for covers and caps.	PRP	EPA/ UDEQ	6/30/15	Yes	Yes
8, 13, 14, 15, 19	<u>Issue:</u> Mapping of waste left in place is incomplete. <u>Recommendation:</u> The PRP should develop a data management system for waste left in place which should include a GIS spatial mapping component.	PRP	EPA/ UDEQ	6/30/15	No	Yes
8, 13, 14, 15, 19	<u>Issue:</u> Once the Sept 1996 AOC is closed, no requirement exists for submission of work plans for future response work. <u>Recommendation:</u> A decision document is needed to require work plans for future response work.	EPA/UDEQ	EPA/ UDEQ	6/30/15	No	Yes
8, 13, 14, 15, 19	<u>Issue:</u> No institutional controls exist to manage soils exceeding unrestricted land use standards. <u>Recommendation:</u> A decision document is needed to clarify ICs are required. The PRP should develop environmental covenants to address allowable land uses, and list procedures for changes in land use.	EPA/PRP	EPA/ UDEQ	6/30/15	No	Yes
13, 14, 15	<u>Issue:</u> There are no requirements to maintain compliance with state permits for facilities that can re-introduce contamination. <u>Recommendation:</u> An assessment is needed to determine if Kennecott's compliance with all state permits regulating operations and waste management strategies address CERCLA interests, and to list this management criterion in a decision document.	UDEQ	EPA/ UDEQ	6/30/15	Yes	Yes
8, 13, 14, 15, 19	<u>Issue:</u> There are no requirements for inspections or reports. <u>Recommendation:</u> A decision document is needed to require the Agencies to perform inspections and reports every 2 years.	UDEQ	EPA/ UDEQ	6/30/15	No	Yes
15	<u>Issue:</u> Once the September 1996 AOC is closed, the Arthur Step-back repository needs to be reauthorized for continued use and an O&M plan is required. <u>Recommendation:</u> A decision document and Consent Decree is needed to reauthorize the Arthur Step-back repository for continued use. The PRP should develop an O&M plan.	EPA/PRP	EPA/ UDEQ	6/30/15	No	Yes

OU	Issue and recommendation or follow-up action	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
8, 13, 14, 15, 19	<p><u>Issue:</u> There is no restriction on the use of seeds of plants capable of up-taking selenium during re-vegetation actions.</p> <p><u>Recommendation:</u> A decision document is needed to clarify an IC is required to restrict the use of seeds of plants capable of up-taking selenium.</p>	UDEQ	EPA/ UDEQ	6/30/15	No	Yes

10.0 PROTECTIVENESS STATEMENTS

10.1 OU8 Waste Water Treatment Plant and Sludge Ponds

The remedy at OU8 is not protective because there are no maintenance requirements for covers and caps. In order to ensure protectiveness, the PRP should develop two site-wide management plans, one covering waste left in place and one covering future encountered waste. A decision document should be completed to require inspections, reports, ICs, maps, and work plans.

10.2 OU9 Magna Soils

The no further action remedy at OU9 is protective of human health and the environment because no unacceptable exposures were found during site assessment studies and exposure conditions have not changed. No further five-year reviews are required because generally, soil concentrations of the contaminants of concern are less than the unrestricted land use standards.

10.3 OU13 Smelter and Acid Plants

The remedy at OU13 is not protective because there are no maintenance requirements for covers and caps, and there are no requirements to maintain compliance with state permits. In order to ensure protectiveness, the PRP should develop two site-wide management plans, one covering waste left in place and one covering future encountered waste. A decision document should be completed to require inspections, reports, ICs, maps, assess COC introduction management strategies, and work plans.

10.4 OU14 Refinery

The remedy at OU14 is not protective because there are no maintenance requirements for covers and caps, and there are no requirements to maintain compliance with state permits. In order to ensure protectiveness, the PRP should develop two site-wide management plans, one covering waste left in place and one covering future encountered waste. A decision document should be completed to require inspections, reports, ICs, maps, assess COC introduction management strategies, and work plans.

10.5 OU15 Mills and Tailings Pond

The remedy at OU15 is not protective because there are no maintenance requirements for covers and caps, and there are no requirements to maintain compliance with state permits. In order to ensure protectiveness, the PRP should develop two site-wide management plans, one covering waste left in place and one covering future encountered waste. A decision document should be completed to require inspections, reports, ICs, maps, assess COC introduction management strategies, work plans, reauthorization of the Arthur Step-back repository, and an O&M plan for the repository.

10.6 OU19 Smelter Fallout

The remedy at OU19 is not protective because there is no requirement to maintain compliance with state permits. In order to ensure protectiveness, the PRP should develop two site-wide management plans, one

covering waste left in place and one covering future encountered waste. A decision document should be completed to require inspections, reports, ICs, maps, and work plans. In addition, a decision document should explain that in the absence of site-specific residential land use standards, the unrestricted land use standards are applicable.

10.7 OU22 Great Salt Lake, Shoreline Wetlands and OU23 North End Groundwater

A protectiveness determination for the remedies at OU22 and OU23 cannot be made at this time until further information is obtained. Additional information is required to clarify both active and passive remedies to protect human health and ecological receptors. It is expected that a decision document will take approximately one year to complete, at which time a protectiveness determination will be made.

11.0 NEXT REVIEW

The next five-year review will be five years from the signature date of this review.

- OU8 Waste Water Treatment Plant and Sludge Ponds
- OU13 Smelter and Acid Plants
- OU14 Refinery
- OU15 Mills and Tailings Pond
- OU19 Smelter Fallout
- OU22 Great Salt Lake, Shoreline Wetlands
- OU23 North End Groundwater

Based upon the findings of this review, no further five-year reviews are required for OU9, Magna Soils, because generally, soil concentrations of the contaminants of concern are less than the unrestricted land use standards.