

**Rico-Argentine Site
Removal Action Work Plan
Appendix C: Previous Removal Action Task Status
and Site Investigations**

September 2021

Administrative Settlement Agreement and Order on Consent

Removal Action Tasks and Deliverables (from 2011 RAWP)	Current Status	Submittals Related to Removal Action Task (presented in chronological order per task)
Task A - Pre-Design and Ongoing Site Monitoring		
A1 Ongoing Water Quality and Flow Monitoring		• Rico Quality Assurance Project Plan Ground and Surface Water Final (Atlantic Richfield Company, 2014a) • Rico Sampling and Analysis Plan Ground and Surface Water Final (Atlantic Richfield Company, 2014b)
Flow monitoring installations	Completed	
Quarterly downloads	Ongoing	
A2 Seasonal Water Quality and Flow Monitoring	Ongoing	
SAP/QAPP	Completed	
First sampling event	Completed	
Task B - Management of Precipitation Solids in the Upper Settling Ponds		
B1 Develop Initial Solids Removal Plan	Completed	• Initial Solids Removal Plan (Atlantic Richfield Company, 2011a) • Field Sampling Plan for Solids Repository, Permanent Drying Facility and Pond Flood Dike and Embankment Improvements (Atlantic Richfield Company, 2011b) • Calcine Tailings Tech Memo (AECOM, 2011a) • Geotechnical Investigation of Pond 18 Treatment Solids Drying Behavior (AECOM, 2011b) • Interim Flood Dike Upgrades Technical Memorandum (AECOM, 2012) • Pond 15 Solids Removal Work Plan (Atlantic Richfield Company, 2012a) • 2013 Solids Removal Work Plan (Atlantic Richfield Company, 2013a) • 2014 Solids Removal Work Plan (Atlantic Richfield Company, 2014c)
B2 Drying Bed Construction, Solids Removal, and Solids Management		
Mobilization and site preparation	Completed	
Pond 18 initial solids removal	Completed	
Downstream ponds initial solids removal	Completed	
IDF Construction	Completed	
Additional pond solids removal (if/as needed)	See Task C	
B3 Pond Stability Analysis and Upgrades		
Pond stability analysis (Geotechnical and Hydrology)	Completed	
Embankment armoring	Completed	
Stability upgrades - structural	Completed through Pond 11	
Interim ponds solids management	Ongoing; Solids Management Plan to be submitted w/in 90 days of AOC Effective Date	

Removal Action Tasks and Deliverables (from 2011 RAWP)	Current Status	Submittals Related to Removal Action Task (presented in chronological order per task)
Task C - Design and Construction of a Solids Repository		
<i>C1 Develop a Repository Design and Operating Plan</i>		<ul style="list-style-type: none"> • Solids Repository Alternative Evaluation and Preliminary Design Report (Atlantic Richfield Company, 2013b) • Solids Repository Engineering Design and Operations Plan (AECOM, 2013)
Submit Repository Design and Operating Plan	Completed	
Permitting	Completed	
<i>C2 Solids Repository Construction and Initial Solids Placement</i>		
Mobilization	Completed	
Construct repository	Completed	
Placement of pond solids	Ongoing; Solids Management Plan to be submitted w/in 90 days of AOC Effective Date	
Task D - Hydraulic Control Measures for the Collapsed Area of St. Louis Tunnel Adit		
<i>D1 Adit Collapse Area Investigations Plan</i>		<ul style="list-style-type: none"> • Investigation Plan for Collapsed Adit Area at SLT (Atlantic Richfield, 2011c) • Supplement to Investigation Plan for Collapsed Adit Area at SLT Rico (Atlantic Richfield Company, 2012b) • 2013 Supplement to the Investigation Plan for Collapsed Adit Area at SLT (Atlantic Richfield Company, 2013c) • Preliminary Design Report, SLT Hydraulic Control Measures (Atlantic Richfield Company, 2013d) • Adit and Portal Investigation Report 2013 Update (Atlantic Richfield Company, 2013e) • Final Design Report, SLT Hydraulic Control Measures (Atlantic Richfield Company, 2014d) • SLT Water Level Monitoring Status Report (Amec Foster Wheeler, 2015) • Interim Risk Reduction Measures Work Plan and Addenda (Atlantic Richfield Company, 2016a; Atlantic Richfield Company, 2016b; Atlantic Richfield Company, 2016c)
Adit and Portal Investigation Report	Completed	
<i>D2 Preliminary Design of Hydraulic Controls of the Adit Discharge</i>		
Preliminary Design Report	Completed	
<i>D3 Final Design and Construction of Adit Hydraulic Controls</i>		
Stages 1 & 2 Final Design	Completed	
Stages 1 & 2 Construction	Completed	
Additional Monitoring/ Evaluations	Ongoing	
Stage 3 Design	Draft Design to be submitted w/in 180 days after the AOC Effective Date; Final Design to be submitted w/in 90 days after EPA approval of the Draft Design	
Stage 3 Construction	Next Field Season following Final Design Approval	

Removal Action Tasks and Deliverables (from 2011 RAWP)	Current Status	Submittals Related to Removal Action Task (presented in chronological order per task)
Task E - Source Water Investigations and Controls (Assumes Blaine/Argentine Treatment)		
<i>E1 Review Existing Data</i>	Completed	<ul style="list-style-type: none"> • 2011 Source Water Investigation Report (EPA, 2012) • Blaine Base Flow Measurement Work Plan (Atlantic Richfield Company, 2012c) • Evaluation of Source Water Controls Report Revision 1 (Atlantic Richfield Company, 2014e)
<i>E2 Additional Investigations Primary Blaine Rehab Work</i>	Completed Completed	
<i>E3 Evaluation of Hydraulic Controls Alternatives</i>	Completed	
<i>E4 Mine Water Source Controls - Design and Construction (Pending E3 Findings)</i>	None per E3 Findings	

Removal Action Tasks and Deliverables (from 2011 RAWP)	Current Status	Submittals Related to Removal Action Task (presented in chronological order per task)
Task F - Water Treatment System Analysis and Design (Assumes St. Louis Tunnel/Ponds based System)		
<i>F1 Preliminary Water Treatment Technology Alternatives Screening Report</i>	Completed	<ul style="list-style-type: none"> • Preliminary Water Treatment Technology Screening Report (Atlantic Richfield Company, 2011d) • SLT Discharge Constructed Wetland Pilot Scale Test Work Plan (Atlantic Richfield Company, 2012d) • SLT Discharge Source Mine Water Treatability Study Work Plan (Atlantic Richfield Company, 2012e) • SLT Discharge Ion Exchange Bench-Scale Treatability Test Work Plan (Atlantic Richfield Company, 2013f) • SLT Discharge Source Mine Water Treatability Study Work Plan Addendum (Atlantic Richfield Company, 2013g) • SLT Discharge Constructed Wetland Pilot Scale Test Construction and Pre-Implementation Report (Atlantic Richfield Company, 2013h) • SLT Discharge CWD Treatability Study Work Plan (Atlantic Richfield Company, 2013i) • SLT Discharge Constructed Wetland Pilot Scale Test Completion Report (Atlantic Richfield Company, 2013j) • SLT Discharge CWD Treatability Study Unified Design (Atlantic Richfield Company, 2013k) • SLT Discharge CWD Treatability Study Final Design Report (Atlantic Richfield Company, 2014f) • SLT Discharge CWD Treatability Study Work Plan Revision 2 (Atlantic Richfield Company, 2014g) • SLT Discharge Constructed Wetland Pilot Scale Test Completion Report Addendum: Supplemental Sample Analysis Results (Atlantic Richfield Company, 2014h) • Final Commissioning Plan, Revision 1 (Atlantic Richfield Company, 2014i) • Operations, Maintenance, and Monitoring Plan (Atlantic Richfield Company, 2014j) • Performance Monitoring Plan Addendum 1 (Atlantic Richfield Company, 2015)
<i>F2 Treatment System Conceptual Designs and Additional Investigations</i>		
<i>Pilot Scale – 517 Shaft In-Situ Treatment</i>	Completed	
<i>Additional Investigations/Pilot Scale Testing</i>	Completed	
<i>Demonstration Scale Wetland Constructed and Operating</i>	Completed	
<i>Enhanced Wetland Demonstration System – Hydraulic Commissioning and Inoculation</i>	Completed	
<i>Performance Evaluation and Technology(s) Selection Report</i>	Ongoing - Will be submitted as Appendix A to the AOC Work Plan	
<i>F3 30% Design Report</i>	Draft Design to be submitted w/in 180 days of AOC Effective Date	
<i>F4 Final Design and Construction of the Water Treatment Facility</i>		
Final Design (including pond stability upgrades if/as needed)	Final Design to be submitted w/in 180 days of EPA approval of Draft Design	
Construction (including pond stability upgrades if/as needed)	Start - Next Field Season following Final Design Approval	

List of Site Investigations Conducted prior to 2011 RAWP

- Anaconda Copper Company, Rico Project, Final Report (Gibbs and Hill, Inc., December 1981)
- Geotechnical and Hydrologic Investigations, St. Louis Adit Site, Silver Creek Tailings Site, Silver Creek Pipeline Route, Rico, Colorado; (Dames and Moore, 1981)
- Summary of Water Quality Sampling and Modeling (SRK, 1983 and 1984)
- Water Quality Studies for the Dolores River at Rico, Colorado (SRK, 1985)
- Rico Water Quality Study – Preliminary Results of Duplicate Sampling Conducted on September 22, 1983 (Hutchinson, 1983a)
- Rico Project - Cadmium Contamination (Hutchinson, 1983b)
- Analytical Results for Rico-Argentine Mine (E&E, 1985)
- Dolores River Basin Water Quality Study (Bureau of Reclamation, 1993)
- Phase I and Phase II Environmental Site Assessment, Rico Colorado (Walsh, 1995)
- Summary of Surface Water and Groundwater Data for Rico, Colorado (PTI, 1995)
- Dolores River Watershed Evaluation and Recommendations Report for the Town of Rico (Matrix Design Group, 2004)

Notes:

EPA = U.S. Environmental Protection Agency

SLT = St. Louis Tunnel

CWD = Constructed Wetlands Demonstration

SRK = Steffen Robertson and Kirsten
(Colorado) Inc.

REFERENCES

- AECOM, 2011a, Investigation of Calcareous Sludge Pore Fluid on Leachability of Calcine Tailings, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rev 1, submitted by Atlantic Richfield Company to US EPA, dated August 30, 2011.
- AECOM, 2011b, Geotechnical Investigation of Pond 18 Treatment Solids Drying Behavior, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rev. 0, submitted by Atlantic Richfield Company to US EPA, dated September 20, 2011.
- AECOM, 2012, Interim Flood Dike Upgrades Technical Memorandum—Rico Tunnels Operable Unit OU01, Rico, Colorado, EPA Unilateral Administrative Order, Docket No. CERCLA-08-2011-005, dated March 1, 2012.
- AECOM, 2013, Solids Repository Engineering Design And Operation Plan, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU1, Rico, Colorado, submitted by AECOM to US EPA, dated December 13, 2013.
- Amec Foster Wheeler, 2015, Memorandum St. Louis Tunnel Water Level Monitoring Status Report Rico-Argentine Mine Site, Dolores County, Colorado, submitted by Amec Foster Wheeler to US EPA, dated September 15, 2015.
- Atlantic Richfield Company, 2011a, Initial Solids Removal Plan, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico, Colorado, submitted by Atlantic Richfield Company to US EPA, Dated July 7, 2011.
- Atlantic Richfield Company, 2011b, Field Sampling Plan for Solids Repository, Permanent Drying Facility, and Pond Flood Dike and Embankment Improvements, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, submitted by Atlantic Richfield Company to US EPA, Dated August 25, 2011.
- Atlantic Richfield Company, 2011c, Investigation Plan for Collapsed Adit Area at St. Louis Tunnel, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico, Colorado, submitted by Atlantic Richfield Company to US EPA, dated August 29, 2011.
- Atlantic Richfield Company, 2011d, Preliminary Water Treatment Technology Screening Report, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico, Colorado, submitted by Atlantic Richfield Company to US EPA, dated November 29, 2011.
- Atlantic Richfield Company, 2012a, Pond 15 Solids Removal Work Plan, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico, Colorado, submitted by Atlantic Richfield Company to US EPA, dated August 3, 2012.
- Atlantic Richfield Company, 2012b, Supplement to Investigation Plan for Collapsed Adit Area at St. Louis Tunnel, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, submitted by Atlantic Richfield Company to US EPA, dated July 3, 2012.
- Atlantic Richfield Company, 2012c, Blaine Base Flow Measurement Work Plan, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, submitted by Atlantic Richfield Company to US EPA, dated March 20, 2012.
- Atlantic Richfield Company, 2012d, St. Louis Tunnel Discharge Constructed Wetland Pilot Scale Test Work Plan, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, submitted by Atlantic Richfield Company to US EPA, dated August 29, 2012.
- Atlantic Richfield Company, 2012e, St. Louis Tunnel Discharge Source Mine Water Treatability Study Work Plan, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, submitted by Atlantic Richfield Company to US EPA, dated August 30, 2012.

Atlantic Richfield Company, 2013a, 2013 Solids Removal Work Plan, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico, Colorado, submitted by Atlantic Richfield Company to US EPA, dated May 10, 2013.

Atlantic Richfield Company, 2013b, Solids Repository Alternatives Evaluation and Preliminary Design Report, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU1, Rico, Colorado, submitted by Atlantic Richfield Company to US EPA, dated September 30, 2013.

Atlantic Richfield Company, 2013c, 2013 Supplement to the Investigation Plan for Collapsed Adit Area at St. Louis Tunnel, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, submitted by Atlantic Richfield Company to US EPA, dated May 31, 2013.

Atlantic Richfield Company, 2013d, Preliminary Design Report, St. Louis Tunnel Hydraulic Control Measures, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, submitted by Atlantic Richfield Company to US EPA, dated October 30, 2013.

Atlantic Richfield Company, 2013e, Adit and Portal Investigation Report 2013 Update, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico, Colorado, submitted by Atlantic Richfield Company to US EPA, dated October 30, 2013.

Atlantic Richfield Company, 2013f, St. Louis Tunnel Discharge Ion Exchange Bench-Scale Treatability Study Work Plan, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, submitted by Atlantic Richfield Company to US EPA, dated June 21, 2013.

Atlantic Richfield Company, 2013g, St. Louis Tunnel Discharge Source Mine Water Treatability Study Work Plan Addendum, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, submitted by Atlantic Richfield Company to US EPA, dated June 14, 2013.

Atlantic Richfield Company, 2013h, St. Louis Tunnel Discharge Constructed Wetlands Pilot Scale Test Construction and Pre-Implementation Report, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, prepared by AMEC, submitted by Atlantic Richfield Company to US EPA, dated June 12, 2013.

Atlantic Richfield Company, 2013i, St. Louis Tunnel Discharge Constructed Wetlands Demonstration Treatability Study Work Plan, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, prepared by AMEC, submitted by Atlantic Richfield Company to US EPA, dated August 13, 2013.

Atlantic Richfield Company, 2013j, St. Louis Tunnel Discharge Constructed Wetlands Pilot Scale Test Completion Report, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, prepared by AMEC, submitted by Atlantic Richfield Company to US EPA, dated November 4, 2013.

Atlantic Richfield Company, 2013k, Unified Design, St. Louis Tunnel Discharge Constructed Wetlands Demonstration Treatability Study, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, prepared by AMEC, submitted by Atlantic Richfield Company to US EPA, dated December 31, 2013.

Atlantic Richfield Company, 2014a, The Quality Assurance Project Plan for Surface Water and Groundwater, Rico-Argentine Mine Site – Rico Tunnels Operable Unit OU01, Rico, Colorado, submitted by Atlantic Richfield Company to US EPA, Document Control No. 2013-R1-001, dated May 15, 2014.

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Atlantic Richfield Company, 2014d, Final Design Report, St. Louis Tunnel Hydraulic Control Measures, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, submitted by Atlantic Richfield Company to US EPA, dated April 30, 2014.

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Atlantic Richfield Company, 2014f, Final Design Report, St. Louis Tunnel Discharge Constructed Wetland Demonstration Treatability Study, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, prepared by AMEC, submitted by Atlantic Richfield Company to US EPA, dated January 31, 2014.

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Atlantic Richfield Company, 2014i, Commissioning Plan, St. Louis Tunnel Discharge Constructed Wetland Demonstration Treatability Study Revision 1, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, prepared by AMEC, submitted by Atlantic Richfield Company to US EPA, dated August 18, 2014.

Atlantic Richfield Company, 2014j, Operation, Maintenance, And Monitoring Plan, St. Louis Tunnel Discharge Constructed Wetland Demonstration Treatability Study, Rico-Argentine Mine Site—Rico Tunnels Operable Unit OU01, Rico Colorado, prepared by AMEC, submitted by Atlantic Richfield Company to US EPA, dated October 24, 2014.

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Atlantic Richfield Company, 2016b, Work Plan – Addendum 1 St. Louis Tunnel Hydraulic Controls Interim Risk Reduction Measures, Rico-Argentine Mine Site – Rico Tunnels Operable Unit OU01, submitted by Atlantic Richfield Company to US EPA, dated May 16, 2016.

Atlantic Richfield Company, 2016c, Work Plan – Addendum 2 St. Louis Tunnel Hydraulic Controls Interim Risk Reduction Measures, Rico-Argentine Mine Site – Rico Tunnels Operable Unit OU01, submitted by Atlantic Richfield Company to US EPA, dated May 26, 2016.

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Hutchinson, I., 1983b, Personal communication (memorandum to Art O'Hare, of Anaconda, regarding sampling results), Steffen Robertson and Kirsten (Colorado) Inc., Lakewood, CO.

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PTI Environmental Services, 1995, Summary of Surface Water and Groundwater Data for Rico, Colorado, prepared for Atlantic Richfield Company, dated November 1995.

SRK, 1983, Summary of Water Quality Sampling and Modeling, Rico project, 1982-1983. Prepared for Anaconda Minerals Company by Steffen Robertson and Kirsten (Colorado) Inc., Lakewood, CO.

SRK, 1984, Summary of Water Quality Sampling and Modeling Dolores River, 1980-1983. Prepared for Anaconda Minerals Company by Steffen Robertson and Kirsten (Colorado) Inc., Lakewood, CO, in association with Chadwick & Associates, Littleton, CO.

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Walsh, 1995, Phase I and Phase II Environmental Site Assessment, Rico, Colorado, prepared for Davis, Graham, and Stubbs, Denver, CO, dated 1995.