Proposed Plan for Rio Tinto Mine Site

October, 2010

This Proposed Plan specifies how the Nevada Division of Environmental Protection (NDEP), as the lead agency, in cooperation with the U.S. Environmental Protection Agency (EPA) in a supporting role, proposes to protect people and the environment from contamination from the inactive mine site known as the Rio Tinto Mine in Elko County, Nevada. It describes the cleanup alternatives that the NDEP is considering and identifies the preferred alternative that the NDEP is proposing to implement. The Proposed Plan also provides information on public participation including where to find more information and the date and location of a public hearing. The NDEP asks for public comment on the plan and will accept comments at the public hearing and in writing.

PROPOSED PLAN AT A GLANCE

Statement of the problem:

The historic Rio Tinto Mine site located south of Mountain City in Elko County has been identified as a source of contaminants to the east fork of the Owyhee River. The quality of Mill Creek, a tributary of the Owyhee River, has been impacted by acidic, metal rich waters. The metals are being released to the surface water from historic mine-related materials deposited on the site during historic mining activities.

Proposed solution:

The NDEP proposes to eliminate or otherwise manage the release of metals from the site by: (i) excavating the mine-related materials determined to be the major source of contamination and placing them in an engineered and capped on-site repository designed to prevent surface or groundwater infiltration; (ii) improving the condition of the Mill Creek channel, and (iii) monitoring water quality to confirm successful remediation. Other site reclamation activities have been taken or will be undertaken in conjunction with the removal to stabilize materials and control the flow of surface water at the site. NDEP plans to work with former operators of the site to implement the remedy once it has been selected.

Your comments:

You can provide your comments on this Proposed Plan either verbally during our public meeting on November 9, 2010 or in writing via letter, fax, or e-mail (*see page 16 for contact information*). The NDEP will consider your comments as we develop our final decision on how to clean up the Rio Tinto Mine site, and we will respond to all comments in a final written document.

Public Comment Period

The public comment period runs for 30 days from Friday, October 22, 2010 to Monday, November 22, 2010.

Community Meeting

A public meeting will be held on Tuesday, November 9th at 7:00 pm at the Nevada Department of Wildlife conference room, 60 Youth Center Road, Elko, NV. The purpose of this meeting is to give the community the opportunity to ask questions and provide comment regarding the proposed cleanup program. In addition to the public meeting, the public is invited to send their comments via letters, faxes, and e-mails to the NDEP.

Cleanup Framework

The cleanup of the Rio Tinto mine site discussed in this proposed plan is being undertaken by the State of Nevada under Nevada Revised Statute 445A and in a manner determined to be consistent with Federal requirements under the Comprehensive Environmental Response, Compensation and Liability Act and the National Contingency Plan by the US Environmental Protection Agency. The NDEP anticipates that the cleanup will be implemented by former site owners identified as responsible parties.

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SITE BACKGROUND

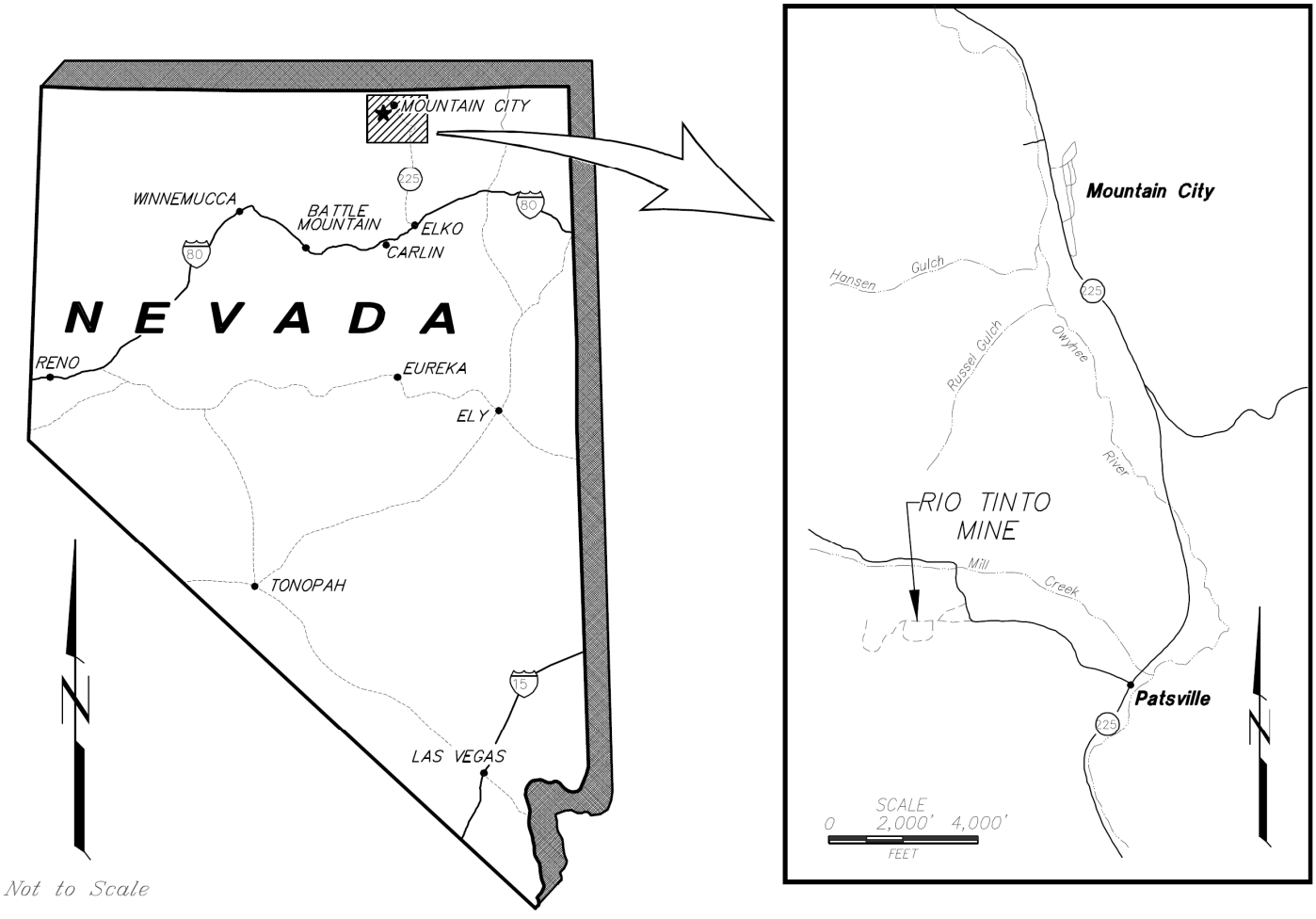
The Rio Tinto Mine is an abandoned copper mine covering approximately 280 acres of private land located 2.5 miles south of Mountain City, in northern Elko County, Nevada. Underground mining, using conventional underground mining methods, of a rich, copper-sulfide ore deposit occurred between 1932 and 1947. Concentrate and high-grade ores were shipped off site. Low grade ores were milled on site, and the mill tailings were placed on the hillside above Mill Creek and in the upper portion of the original Mill Creek channel. Waste rock from underground mining was placed in a pile on the eastern slope of Rio Tinto Gulch.

Beginning in 1965, and performed by various operators, there were a number of operations at the site that involved the re-working of the tailings material in the Mill Creek valley, leaching of ore stockpiles, leaching of the underground workings, and exploration for additional mineral deposits. These activities resulted in the construction of a water-treatment sludge pond and heap-leach pads and were responsible for the current configuration of the tailings piles in the Mill Creek valley. Other than reclamation work, the property has been mostly dormant since 1976. No mining related activities have occurred at the Site since 1976.

Features in the Mill Creek valley consist of a fresh water pond (Pond 1), fresh water pond embankment, north diversion channel, sludge pond (Pond 2), with an engineered embankment, upper tailings pile (Pond 3), main tailings pile (Pond 4), and Pond 4 embankment. Ponds 3 and 4 tailings piles cover about 25 acres at the site. In the 1930s, prior to the start of mill tailings placement, Mill Creek was diverted into a channel along the south side of the valley. This channel is referred to as the Mill Creek Diversion.

The historic townsite and former plant area are located on the hillside south of the Mill Creek valley. The townsite and plant area consist of several abandoned buildings and structures. In addition, there are several concrete foundations and structures at the Site associated with the mill (e.g., storage tanks, crusher, process ponds). Prior to cleanup activi-

Figure 1: Site Location Map of Rio Tinto Mine Site, Elko County, NV



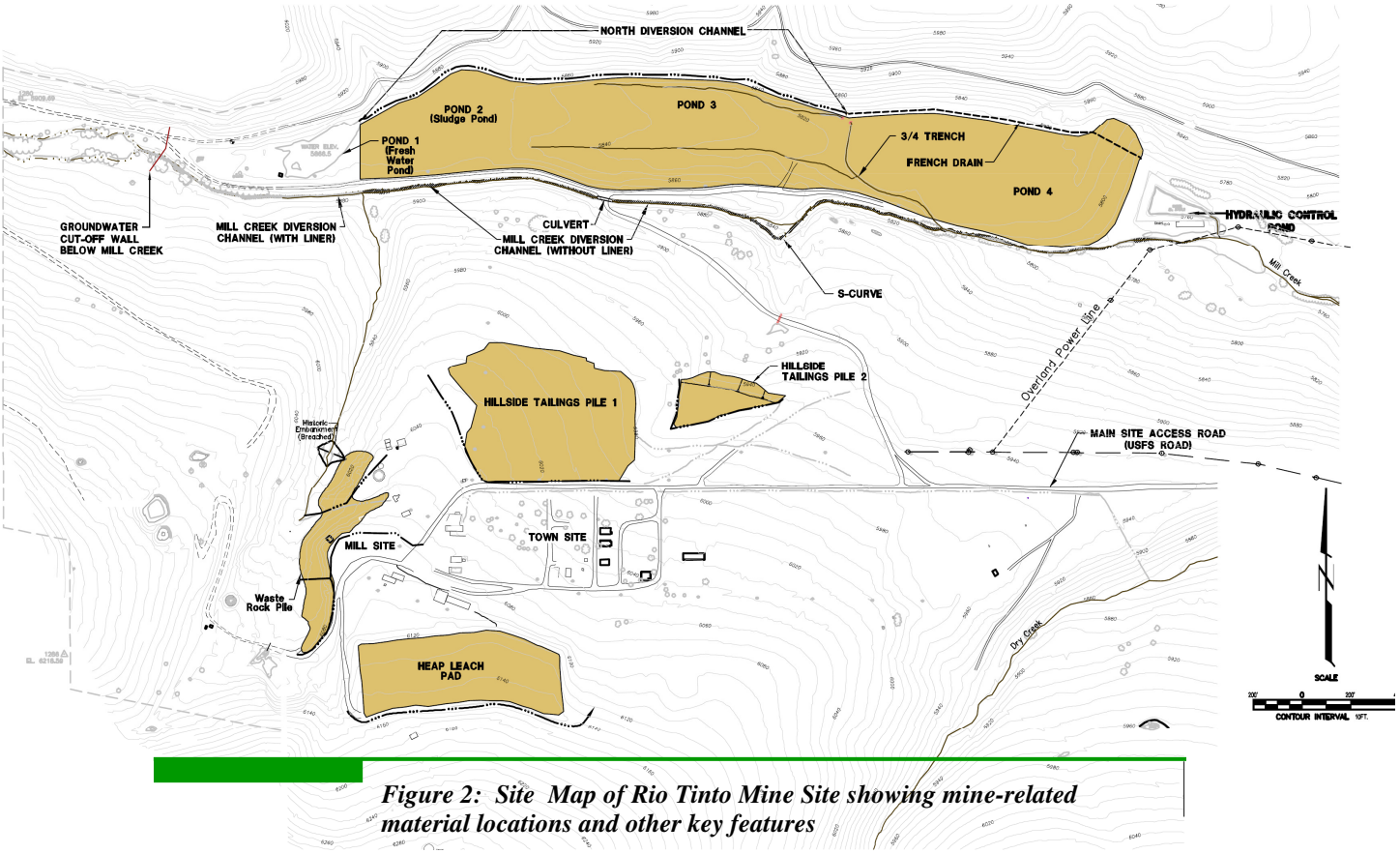


Figure 2: Site Map of Rio Tinto Mine Site showing mine-related material locations and other key features

ties in in the 1990's, the main mine shaft was caved and located just west of the plant area. The personnel shaft and/or ventilation shaft was located farther to the west across Rio Tinto Gulch. Prior to cleanup efforts, scrap and debris, including abandoned cars, littered the general area.

Historically, there were two heap leach pads on the property. The Western Heap Leach Pad was located immediately south of the townsite and covers approximately 5 acres. The material on the pad was ore removed from the south orebody of the underground mine workings in the early 1970s. The Eastern Heap Leach Pad covered approximately 0.5 acres near the Dry Creek drainage.

Prior to remedial activities in the 1990's, four hillside tailings piles were located on the hillside between the plant area and Mill Creek. The largest of the hillside tailings piles, Hillside Tailings No. 1, was approximately 8 acres in area and approximately 5 to 6 feet in depth. Erosional features were prevalent on the surface. Hillside Tailings No. 2, slightly less than an acre in size, was located east of Hillside Tailings No. 1. It included an embankment along the northern margin of the pile. The depth of the tailings material at the embankment was approximately 15 feet. The remaining two small tailings piles, Hillside Tailings No. 3 and No. 4, were located north of Hillside Tailings No. 2. These piles appeared to be eroded material from No. 1 and No. 2 deposited by surface runoff. Together, these two tailings piles covered less than 0.5 acres in area.

HISTORY OF CLEANUP ACTIONS

Several site investigations, regulatory actions, and remedial construction activities have occurred at the site since the early 1970s. In 1986, the Nevada Mining Association, on behalf of NDEP, developed several suggestions to reduce discharges from the Rio Tinto site. Subsequently, the NDEP entered into an agreement with two of the former site operators for the construction of the "S-curve" in the Mill Creek diversion along Pond 3 to reduce flow velocities, control erosion, minimize potential flow onto the tailings piles, and protect the stability of tailings piles in the Mill Creek valley.

In 1993, the NDEP issued a Finding of Alleged Violation and Order based on conditions at the Rio Tinto site and discharges of mining-impacted waters to Mill Creek and the Owyhee River. The NDEP entered into an Administrative Order on Consent in 1996 with the four companies comprising the Rio Tinto Working Group. The intent of the Order in 1996 was to address the site safety and water quality problems identified in the Finding. Between 1996 and

1997, the Rio Tinto Working Group completed 18 remedial elements specified in the Order including the grading and covering of tailings and heap leach piles, installation of drainage structures to capture seeps above Pond 4, the backfilling and regrading of Pond 2, construction of an upstream groundwater cut-off wall and construction of diversion ditches for the main waste rock pile and hillside tailings piles to reduce or eliminate infiltration of water into tailings in the Mill Creek valley, securing all open mine shafts and boreholes, limited plant site clean-up, and the installation of a downgradient groundwater monitoring well. The Rio Tinto Working Group also undertook a five-year surface water monitoring program involving monthly field parameter testing and quarterly water quality sampling.

In September of 2001, the NDEP and Rio Tinto Working Group signed an Administrative Order on Consent to address continuing Owyhee River and Mill Creek water quality concerns. The 2001 Order divided the Rio Tinto Mine site into two areas of study, designated Area A and Area B. The purpose of the 2001 Order was to collect data and conduct studies on remedial options for Area A in order to develop a Remedial Alternatives Study and to facilitate additional studies for Area B. NDEP is also a party to a 2002 Memorandum of Agreement with EPA and the Shoshone-Paiute Tribes that has ensured the opportunity for input from these stakeholders on site investigations and remedial planning. These entities have also coordinated with the Nevada Department of Wildlife, the U.S. Forest Service and the Department of Interior on their respective interests in the area of the mine site.

Area A includes the mine site proper including all areas of historic operation and mine-related materials placement. The study boundary of Area A also includes areas of suspected impact where mine-related materials are known to have been dispersed over time. This includes the Mill Creek valley from the Pond 4 embankment to the confluence with the Owyhee River where surface water flows over time mobilized and dispersed some mining-related materials downstream. The 2001 Order required the Rio Tinto Working Group to identify and fill data gaps, conduct studies on treatment options, and present cleanup alternatives for Area A that would meet cleanup objectives in a Remedial Alternatives Study. A draft Remedial Alternatives Study was prepared by the Rio Tinto Working Group and submitted in January 2006; this was updated in September 2006 in response to comments from governmental and tribal authorities, and after consideration of additional data. Additional data collection activities and evaluations have been completed in Area A since that time.

Area B includes the Owyhee River upstream and downstream of the confluence of the Mill Creek. While there was no record of waste disposal or tailings deposition in Area B, the Rio Tinto Working Group agreed to undertake studies to confirm that mining related activities had not produced conditions in the area requiring remediation.

Results of Area B characterization were submitted in the *Area B Report* and *Area B Screening Level Assessment Report* in 2002 and 2003. In addition, in April 2006, technical representatives from various regulatory agencies, the Tribes and the Rio Tinto Working Group reviewed additional data at a 2-day Area B Data Summit. No areas of concern requiring remediation were discovered in the Owyhee River. Based on the findings, it was determined that Area B should be addressed by eliminating discharges from the mine site through the implementation of a final remedy for Area A.

In 2007, after consultation with the EPA, the NDEP and Rio Tinto Working Group companies entered into an Administrative Order on Consent to implement a final remedy for the hillside tailings, heap leach pads, and waste rock pile. These cleanup actions were determined to be appropriate for implementation independent of the other decisions to be made for the final remedy in the Mill Creek valley. Consistent with State of Nevada requirements for the reclamation of mine sites, the remedy for these features included regrading the waste rock pile; the addition of cover material to 18 inches in thickness for the hillside tailings piles, heap leach pad, and waste rock pile; and reseeding the covers with native vegetation. The NDEP approved the constructed remedy for the hillside features in January 2009.

What is an Administrative Order on Consent?

An Administrative Order on Consent, commonly shortened to Order, is a legal agreement signed by an environmental agency and an individual, business, or other entity through which the responsible party agrees to pay for site remediation and/or correction of violations, take the required corrective or cleanup actions, or refrain from an activity. It describes the actions to be taken, may be subject to a comment period, applies to civil actions, and can be enforced in court.

The NDEP and the Rio Tinto Working Group have entered into three important Administrative Orders on Consent:

- The 1996 Order required the implementation of site cleanup and reclamation efforts;
- The 2001 Order required characterization of continuing releases and off-site impacts and resulted in the development of the Remedial Alternatives Study;
- The 2007 Order required the implementation of a final remedy for all mine-related materials that were not located in the Mill Creek valley.

SUMMARY OF SITE RISKS

Previous remedial efforts at the Rio Tinto Mine have resulted in the reduction or elimination of many site risks. Physical risks such as open mine shafts, unstable structures, debris, and steep grades were addressed under the 1996 Order. This included the physical stabilization of mine-related materials located in Mill Creek Valley. Efforts to study potential mine-related impacts at the site under the 1996 and 2001 Orders provided valuable data for the assessment of remedial alternatives. These studies have found localized alluvial groundwater impact associated with the tailings in the Mill Creek valley bottom. The localized alluvial groundwater comes to the surface in Mill Creek.

Metals of Concern

Copper and Zinc

Copper and zinc are naturally occurring elements that are considered a micronutrient for both plants and animals at low concentrations and are recognized as essential to virtually all plants and animals. However, they may become toxic to some forms of aquatic life at elevated concentrations and have therefore been designated a primary pollutant for surface waters by the US Environmental Protection Agency. Human activities, such as mining, may result in the elevation of copper and zinc concentrations in surface water.

Iron and Manganese

Iron and manganese are naturally occurring elements that are considered a micronutrient for both plants and animals at low concentrations and are recognized as essential to virtually all plants and animals. However, at high concentrations these elements can impair health of natural ecosystems and have been designated non-priority pollutants for surface water by the US Environmental Protection Agency.

In addition, mine-related materials have been reclaimed in accordance with State of Nevada regulations and guidance through grading, the placement of soil covers and revegetation with native plants and grasses. The soil covers and vegetation serve to prevent direct contact with the mine-related materials by people or wildlife, control dispersion of contaminants by high winds or mobilization by erosion, and limit infiltration of precipitation. Through these and other activities over the years, many of the site risks associated with the mine-related materials have been controlled. However, previous remedial efforts have not eliminated the infiltration of a small volume of water into waste materials and the generation of acidic discharges to Mill Creek.

Mine tailings and some other mine wastes at the Rio Tinto Mine site have acid generating potential. When these materials come into contact with air and water, a chemical reaction can result in the water's acidification, as well as increased concentrations of metals and other parameters in the affected water. The acidified water can adversely affect ecosystems, including some terrestrial plants, wildlife and aquatic organisms. The primary metal of concern associated with the Rio Tinto wastes is copper, although iron, manganese and zinc are also identified as contaminants of concern. These metals have been found in tailings ponds at the site and at concentrations sometimes exceeding water quality standards in Mill Creek and occasionally in the East Fork Owyhee River. Copper concentrations in the East Fork Owyhee River do not exceed standards established for the protection of human health but do occasionally exceed aquatic life standards.

Because of these residual risks, NDEP believes that additional remedial action at the Site is necessary to fully protect public health and the environment from actual or threatened releases of hazardous substances into the environment.

REMEDIAL ACTION OBJECTIVES

The Remedial Action Objective is to protect human health and the environment by minimizing exposure of human, terrestrial, and aquatic receptors to affected media through the development and implementation of a final site remedy. To accomplish this, the following two goals have been established:

- Minimize any significant loading of contaminants of concern from the Mill Creek Valley mining material impoundments to Mill Creek and the Owyhee River, and
- Minimize potential human, terrestrial biota, and aquatic biota exposures to low-pH, metal-bearing surface water at the Rio Tinto Mine site, as well as in downstream receiving waters.

The remedial alternatives presented in this Proposed Plan address the Remedial Action Objective and goals by using process technologies that focus on reducing exposure.

The Remedial Action Objectives can be measured against State and Federal standards for the protection of human health and the environment. For the Rio Tinto Mine site, where the discharge of contaminants to waters of the State, specifically Mill Creek and the Owyhee River, has been identified as the pathway of exposure and the primary site risk, the relevant laws and regulations come from the Nevada Water Pollution Control Law and the federal Clean Water Act. These laws establish standards for water quality and health-based concentrations for toxic contaminants based on the beneficial uses of a surface water body.

Beneficial uses of the Owyhee River are municipal or domestic supply, or both, with treatment by disinfection only, aquatic life, propagation of wildlife, irrigation, watering of livestock, recreation including contact with the water and recreation not involving contact with the water. Of these uses, the standards for the protection of aquatic life are typically the strictest and have been relied upon to develop cleanup goals for this remediation.

DESCRIPTION OF ALTERNATIVES

NDEP has selected four remedial actions for evaluation based on the data collected pursuant to the 2001 Order, the 2006 Remedial Alternative Study, and subsequent data collection and analyses by the Rio Tinto Working Group, various governmental agencies and the Tribes:

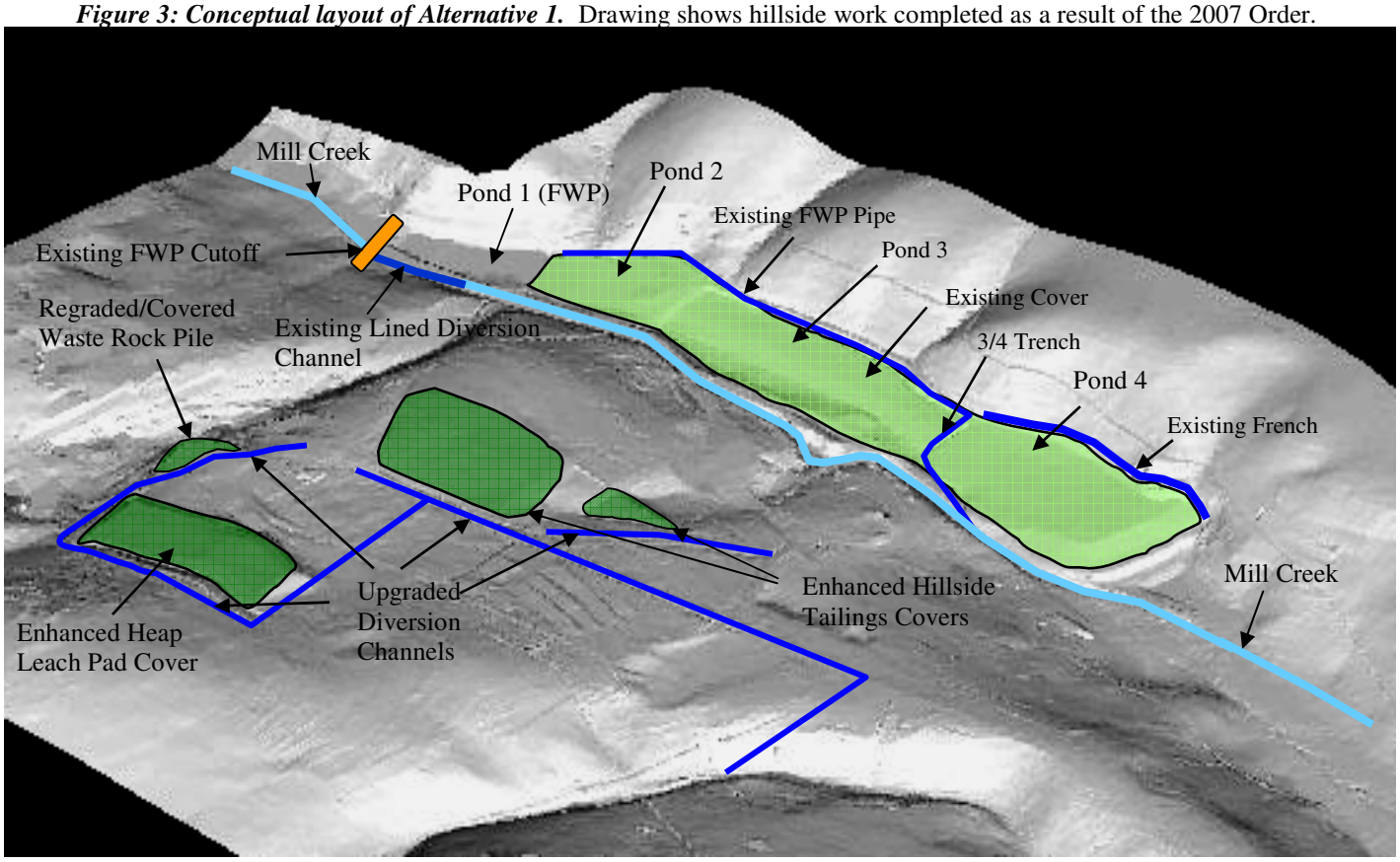
Alternative 1—No Further Action Alternative
Alternative 2: Improve Existing Source Control and Long-Term Water Treatment
Alternative 3—Full Removal of Mine-Related Materials from Mill Creek Valley to On-site Repository and Long-term Water Treatment
Alternative 3A (Preferred Alternative)—Partial Removal of Mine-Related Materials from Mill Creek Valley to On-site Repository and Seasonal Water Treatment or Management During Remedy Construction

Each of these alternatives (other than the No Further Action Alternative) is intended to address the discharge of acidic, metal bearing waters from the mine-related materials deposited in the Mill Creek valley. All four alternatives include the completed Hillside Remediation work. A figure is presented for each alternative.

Alternative 1 - No Further Action Alternative

The No Further Action Alternative provides a baseline for comparing other alternatives. The installation of fencing and signage and long-term monitoring and maintenance would be the only additional remedial activities associated with this alternative. Fencing would total approximately 13,800 feet at the private property perimeter and will consist of steel post and barbed wire. The purpose of fencing is to prevent livestock grazing, which will reduce the potential for erosion of existing vegetated covers. Deed restrictions or other land use controls would limit the future use of the property. In addition, requirements related to maintaining the completed remedial actions would be implemented.

Figure 3: Conceptual layout of Alternative 1. Drawing shows hillside work completed as a result of the 2007 Order.

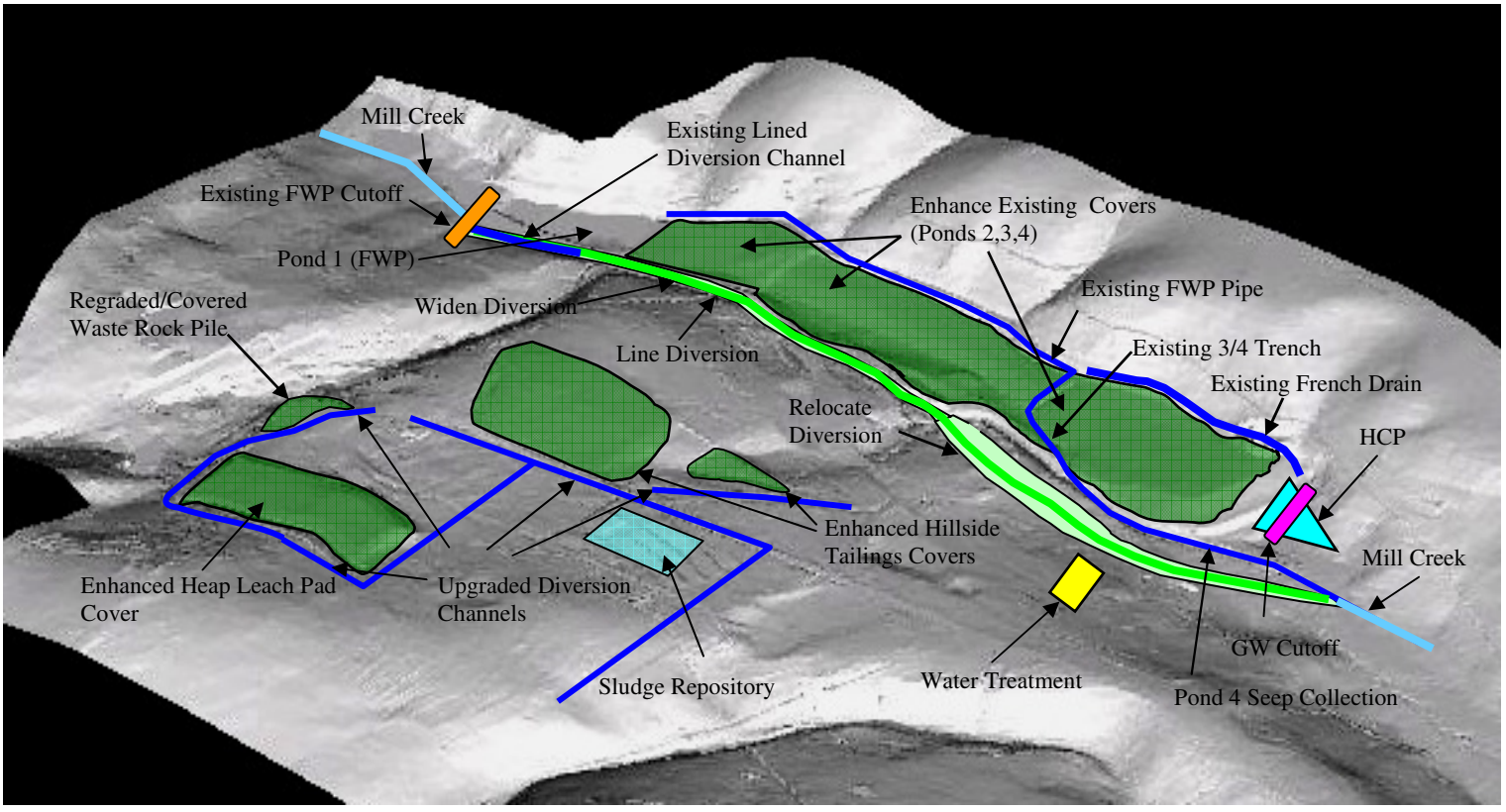


Alternative 2—Improve Existing Source Control and Long-term Water Treatment

Alternative 2 in this Proposed Plan includes all of the remedial components included in Alternative 2 in the Remedial Alternatives Study, plus certain enhancements. Alternative 2, as presented in the Remedial Alternative Study, would have improved the existing containment components and provided for water collection, conveyance, and long-term treatment. Mine-related materials would remain in their current location within the Mill Creek Valley. An enhanced soil cover would be installed at Pond 3 in order to achieve revegetation success similar to those already on Ponds 2 and 4. Mill Creek would continue to be diverted out of its native channel, and diversion ditches would be upgraded to prevent surface water run-on and minimize potential infiltration into the reclaimed mining material areas. Water would be captured for treatment below Pond 4 through the installation of a groundwater cutoff wall. Any surface water seeps from Pond 4 would be captured before they enter Mill Creek and would be treated along with the captured groundwater. Water treatment would be conducted for the period of the analysis, which is 30 years for the purposes of the Alternatives Study. Treated water would be required to meet water standards and will be discharged to either Mill Creek or the Owyhee River. Water treatment would most likely consist of mixing with lime to neutralize the water's pH and precipitate metals. The resulting treatment sludge would be disposed of on-site away from Mill Creek.

Alternative 2 as presented in this Proposed Plan improves on Alternative 2 from the Remedial Alternatives Study by adding additional containment and control. Alternative 2 in this Proposed Plan now requires enhanced covers on Ponds 2 and 4 and improves on the originally proposed Pond 3 cover enhancement. This alternative would also include relocation of the Mill Creek Diversion Channel to the south of the existing channel below the S-Curve. The Diversion Channel would be widened and lined from upgradient of Pond 1 to below Pond 4.

Figure 4: Conceptual drawing of Alternative 2. This alternative focuses on enhancing existing water diversion structures while keeping mine-related materials in their current location. Mill Creek flows roughly left to right in this drawing. Mine-related materials start below the fresh water pond (FWP) also known as Pond 1. Water collection and treatment is located below Pond 4 at the Hydraulic Control Pond (HCP). The sludge repository is intended for disposal of water treatment solids.



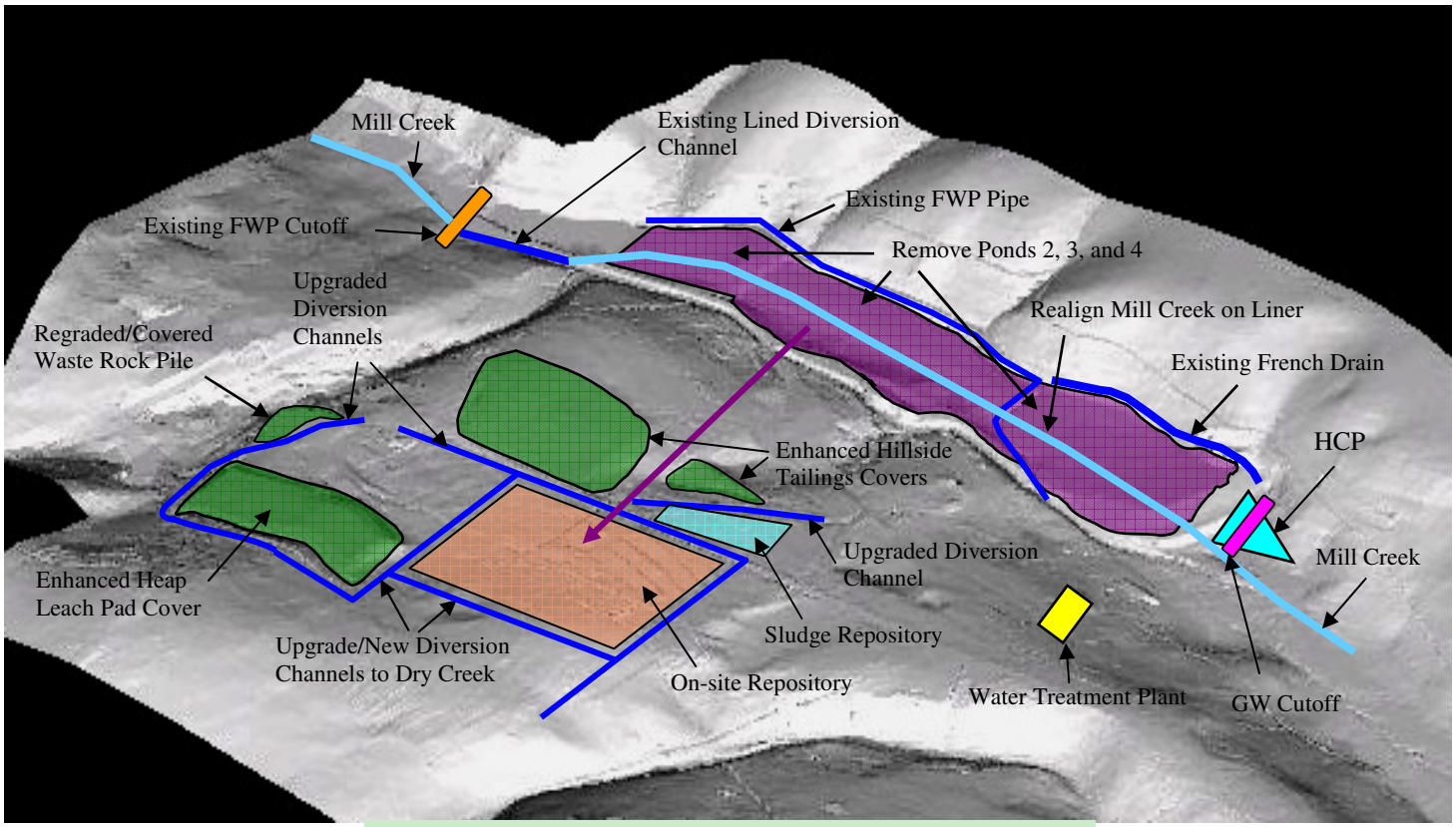
Details for Alternative 2

Cost to complete construction	**$13.4 million**
Operation and maintenance cost	**$11.4 million**
Time to complete construction	**2 years**
Time to achieve cleanup standards in Owyhee River post-construction	**3 years**

Alternative 3—Full Removal of Mine-Related Materials from Mill Creek Valley to On-site Repository and Long-term Water Treatment

Alternative 3 would remove mining materials from Mill Creek Valley by excavating Ponds 2, 3, and 4 and some amount of underlying material and depositing them in an on-site repository on the hillside above Mill Creek to the south. The unlined repository will be located on the ridge to the east and south of the former townsite and will include an evapotranspiration cover to prevent or reduce infiltration of meteoric water and snowmelt. A cut-off wall would be installed east of Pond 4 to capture groundwater in the Mill Creek Valley that had been impacted historically by the mining materials. Water treatment of alluvial groundwater and active management of associated treatment sludge would occur over a period of time, estimated at the period of analysis (30 years) after remedial activities have been completed. This is based on conservative assumptions about the quality of groundwater that will remain after removal of the tailings; however, water treatment could be discontinued at any point when treatment is no longer necessary to meet water quality objectives.

Figure 5: Conceptual drawing of Alternative 3. All mining waste materials located in Mill Creek Valley (shading in purple in the drawing) will be excavated and deposited in a repository on the hillside (shaded in orange). This alternative shares most of the same features for the treatment of groundwater as Alternative 2 including a cutoff wall at the Hydraulic Control Pond (HCP) below Pond 4. The sludge repository on the hillside is for disposal of water treatment solids.



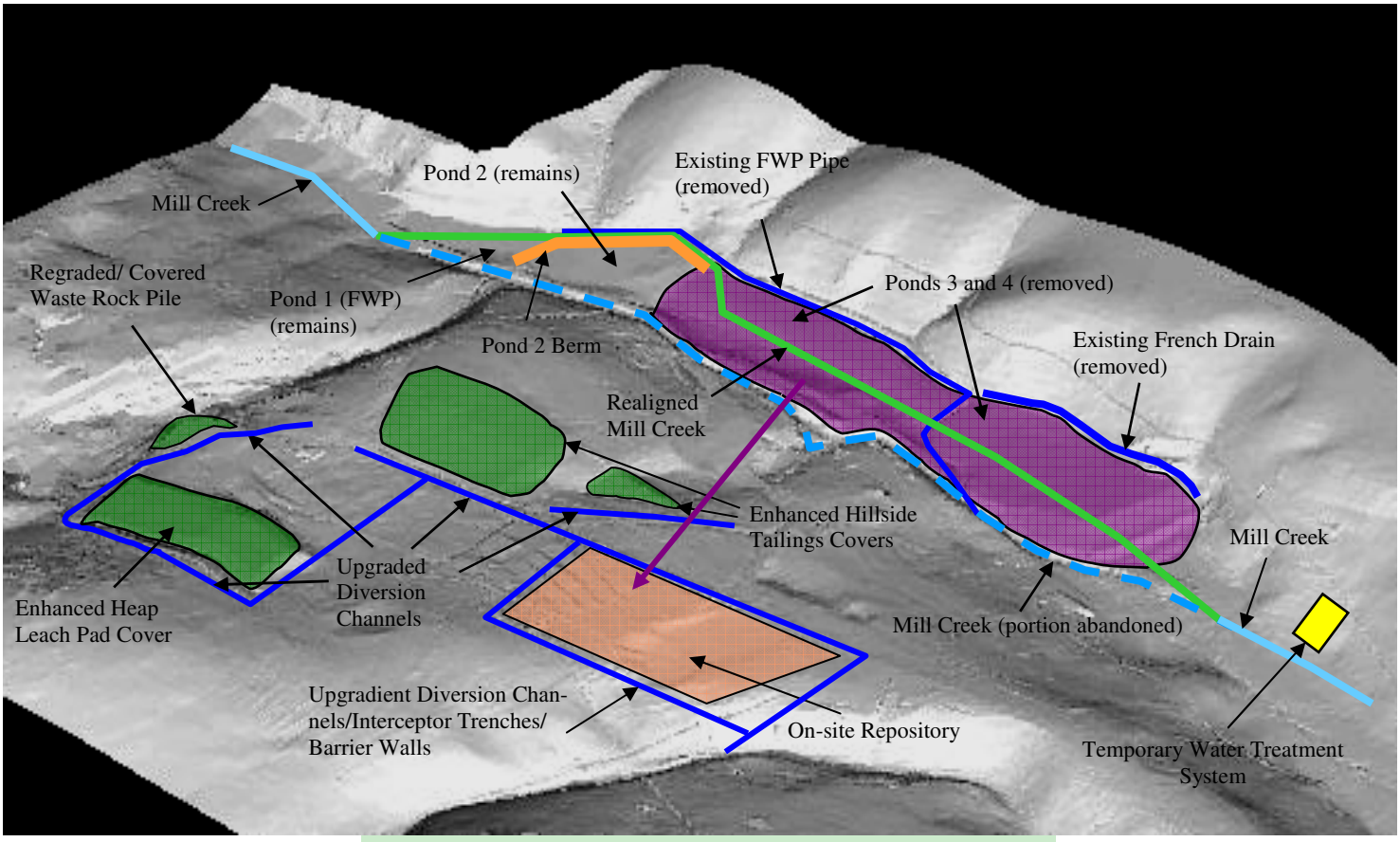
Details for Alternative 3

Cost to complete construction	**$29 million**
Operation and maintenance cost	**$11.4 million**
Time to complete construction	**3 years**
Time to achieve cleanup standards in Owyhee River post-construction	**3 years**

Alternative 3A (Preferred Alternative)—Partial Removal of Mine-Related Materials from Mill Creek Valley to On-site Repository and Seasonal Water Treatment or Management During Remedy Construction

Alternative 3A will remove mining materials from Ponds 3 and 4 and some amount of underlying materials to a hillside repository to the east and south of the former townsite. Pond 2 (Sludge Pond) will remain in place, behind an engineered berm to ensure the pond's long-term stability. During construction activities a temporary, seasonal water treatment system or other appropriate practices will be utilized to manage water associated with the removal of Ponds 3 and 4 and underlying materials. Following the removal, a three-foot-thick layer of clean, on-site soils will be placed within the footprints of Ponds 3 and 4. Mill Creek will then be realigned to the center of Mill Creek Valley east of Pond 2. Attenuation of metals in the Mill Creek alluvium will be achieved through the removal of Ponds 3 and 4 and the placement of a liner in Mill Creek post-removal to isolate alluvial groundwater from surface water and allow for neutralization in alluvial soils. Water quality in Mill Creek and the Owyhee River will be monitored for several years after completion of the remedy to measure progress toward meeting water quality standards.

Figure 6: Conceptual drawing of Alternative 3A. In this alternative, Ponds 3 & 4 (shaded in purple) are removed. Pond 2 remains in place, since even though it consists of waste material, it is not considered acid-generating or a source of metals to Mill Creek, and it can be stabilized in place with appropriate engineering methods. The preferred alternative includes less water treatment while requiring a longer timeframe to meet remedial objectives.



Details for Alternative 3A

Cost to complete construction	**$17.98 million**
Operation and maintenance cost	**$3.6 million**
Time to complete construction	**4 years**
Time to achieve cleanup standards in Owyhee River post-construction	**5-10 years**

EVALUATION OF ALTERNATIVES

The 2001 Order included seven criteria for remedy evaluation. The evaluation criteria are used as a method to compare the remedial alternatives against each other and assess the advantages and disadvantages of each alternative by looking at a number of important factors. The seven criteria, including two primary and five secondary criteria, used for evaluating the remedial alternatives are:

Primary Criteria

1) Water Quality Objectives and Requirements

This criterion addresses how the alternative performs relative to water management objectives, requirements, and water quality laws.

2) Overall Protection of Human Health and Environment

This criterion addresses how the alternative achieves and maintains protection of human health and the environment. It focuses on whether a specific alternative achieves adequate protection from site risks.

Secondary Criteria

3) Short-term Impacts

This criterion addresses the impacts of the alternative during construction and implementation until the project's initial objectives and goals are met. The criterion is also used as a measure of how quickly an alternative can meet remedial action objectives.

4) Long-term Effectiveness and Performance

This criterion addresses the long-term effectiveness of alternatives in maintaining protection of human health and the environment and their relative permanence. It is an assessment of how the system will perform years into the future.

5) Reduction of Toxicity, Mobility, and Volume of Constituents

This criterion addresses the ability of the alternative to permanently or significantly reduce toxicity, mobility or volume of contaminants. It addresses the type and quantity of treatment residuals remaining at the site, and the degree to which treatment reduces the inherent hazards posed by principal threats at the site.

6) Implementability

This criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of services and materials, including technical difficulties and unknowns associated with the construction and operation of a technology and the ability to monitor the effectiveness of the remedy.

7) Economics (Cost)

This criterion addresses the capital and operations and maintenance costs of each alternative.

In the evaluation of remedial alternatives by the NDEP and US EPA, an alternative must satisfy both Primary Criteria in order to be considered for implementation. The Secondary Criteria are used to further evaluate alternatives that satisfy the Primary Criteria, with preference given to those alternatives that demonstrate the greatest long-term effectiveness and permanent reduction of toxicity, mobility and volume of constituents.

Federal Role in Remedy Selection

The US EPA uses an evaluation process that consists of nine criteria for the selection of remedies on their Superfund sites. Each of the seven evaluation criteria listed in the 2001 Order and this Proposed Plan is intended to correspond to one of the federal criteria. The application of the criteria and the concept of threshold and balancing criteria have been used to ensure that the evaluation conducted in the Remedial Alternatives Study and this Proposed Plan is equivalent to one that would be done under federal authorities and considers all applicable, relevant, and appropriate requirements; however, the phrasing of the criteria has been retained from the 2001 Order. The only two federal criteria that are not listed in this Proposed Plan are 1) State acceptance and 2) Public acceptance. State acceptance does not need to be evaluated since the State is the lead agency at the site. Public acceptance is evaluated through public comments received in response to this Proposed Plan and public meetings. The US EPA and the Tribes participated in the ranking of alternatives in this Proposed Plan and concur with NDEP's conclusion that Alternative 3A is the preferred alternative.

This Proposed Plan provides a narrative summary of the evaluation for all the alternatives, highlighting the strengths and weaknesses of each in terms that correspond to the ranking criteria. Also included is a table that provides a numeric ranking of the alternatives for each criterion.

Alternative 1 (No Further Action Alternative) Discussion

The no further action alternative fails to meet either of the Primary Criteria. While water quality in Mill Creek and the Owyhee River has improved since 1996 and the no further action alternative would take some steps to maintain and protect those improvements, Alternative 1 does not address the on-going mobilization of heavy metals identified in the Mill Creek valley. Acidic, metal-rich seeps are evident along the faces of Pond 4. These seeps periodically contribute to violations of water quality objectives. Alternative 1 does not adequately address these conditions, and the discharges are not likely to abate or diminish over time without further action. Therefore, the no further action alternative

fails to meet the criteria of Water Quality Objectives and the Overall Protection of Human Health and Environment. While this alternative is the least expensive and most easily implemented of the four alternatives being analyzed, since it fails to meet the Primary Criteria it cannot be considered for implementation as the preferred alternative.

Alternative 2 Discussion

Alternative 2 satisfies the Primary Criteria by collecting and treating the acidic, metal-bearing waters from the mine-related materials in Mill Creek valley prior to their discharge to Mill Creek or the Owyhee River. As the main source of loading identified at the site, the segregation and treatment of these waters, combined with the additional elements of source control, institutional controls, and maintenance, would lead to the satisfaction of Water Quality Objectives and the Overall Protection of Human Health. This Alternative would have the fewest short-term impacts as a result of the shorter construction period and less intensive handling and transporting of wastes. Alternative 2 has lower costs than Alternative 3 and 3A. However, this Alternative rates poorly as to the Long-term Effectiveness and Reduction of Toxicity, Mobility, or Volume criteria, since it does not include the isolation of mine-related materials from Mill Creek. This Alternative relies on the long-term operation of a water treatment plant, which will be subject to potential operational upsets and other uncertainties, especially given the remote location and severe winter conditions. Alternative 2's reliance on long-term, and effectively perpetual, water treatment and sludge management in such a remote location makes it an unreliable permanent solution and results in greater secondary impacts to the environment due to the increased energy requirement and potential effluent management issues. Leaving Ponds 3 and 4 as-is in the Mill

Figure 7: Alternatives Evaluation Table. This table summarizes the ranking of alternatives using the seven criteria. Alternatives are rated as either meeting or failing to meet Primary Criteria. Rankings from 1st (Best) to 3rd (Worst) are given for all Secondary Criteria based on the anticipated performance of each alternative.

	Alternative 1: No Further Action	*Alternative 2: Water Treatment*	*Alternative 3: Full Tailings Removal*	*Alternative 3A: Preferred Alternative*	**Comments/Rationale for 1st Ranking**
Primary Criteria					
1) Water Quality Objectives and Requirements	Fails	Meets	Meets	Meets	It is believed that water quality standards can be meet by all the alternatives other than the no-further action alternative.
2) Overall Protection of Human Health and the Environment	Fails	Meets	Meets	Meets	The no further action alternative would not address the site risks that have been identified. Because Alternative 1 does not satisfy either of the two primary criteria, it is not further evaluated.
Secondary Criteria					
3) Short-term Impacts	—	1st	3rd	2nd	Alternative 2 ranks first because it will not involve excavation and removal of material or have other significant short-term impacts.
4) Long-term Effectiveness and Performance	—	3rd	2nd	1st	Alternatives 3A ranks 1st because it involves removal of mining-related material from the natural Mill Creek drainage area. Alternative 3A provides a more reliable remedy because it does not rely on long-term water treatment. Alternative 3A also avoids significant impacts to the environment from the construction and operation of permanent treatment plant.
5) Reduction of Toxicity, Mobility and Volume	—	3rd	1st	2nd	Alternative 3 best addresses the issue of mobility by removing the greatest amount of mine-related materials from the Mill Creek channel and treating residual groundwater contamination.
6) Implementability	—	1st	3rd	2nd	Alternative 2 ranks first because it is the most easily implemented since mine-related materials would remain in place
7) Economics (Cost)	—	1st	3rd	2nd	Initial construction costs and operation and maintenance costs have been included for each alternative in the alternative summary discussion.

Creek valley, without additional engineered protection, also leaves them susceptible to infiltration and mobilization in a catastrophic flood event.

Alternative 3 Discussion

Alternative 3 satisfies the Primary Criteria by removing mine waste materials from the natural valley and placing those materials in an on-site repository that would not be within a natural drainage channel and where infiltration and runoff could be better controlled. This Alternative would also provide for long-term treatment of mine-waste-impacted residual water that may continue to discharge from the Mill Creek alluvial system. Treatment and associated sludge management would continue for many years, until no longer necessary to meet applicable standards, particularly in Mill Creek. This Alternative ranks second in the Long-term Effectiveness criterion because the Ponds 3 and 4 materials will be placed in a location that will naturally reduce infiltration and will not be as reliant on engineering controls. However, this alternative is less reliable than Alternative 3A because it relies on long-term water treatment and requires ongoing sludge management. Alternative 3 will also have significant secondary impacts on the environment due to the greater energy consumption required for long-term water treatment and also raises potential effluent management issues.

Because of the additional component of water treatment, Alternative 3 may achieve water quality standards and remedial objectives in a shorter period than Alternative 3A. However, there are significant uncertainties under Alternative 3 as to whether and when improvements in Mill Creek water quality would occur. There are also significant uncertainties associated with the long-term operation and maintenance of the water treatment component which may affect its implementability. These include possible equipment and power failures and the difficulty of operation and maintenance at a remote, rugged site – particularly in winter.

This alternative has greater short-term impacts than Alternative 2 and is harder to implement because of the construction efforts necessary to move 687,200 cubic yards of wetted material. Construction activities would need to rely on best management practices to prevent or reduce discharges during construction.

Alternative 3 is the most expensive of the four alternatives considered.

Alternative 3A (Preferred) Discussion

Alternative 3A satisfies the Primary Criteria by removing mine-related materials from the Mill Creek Valley and isolating those materials in an on-site repository on the south hillside outside of the natural drainage channel, where infiltration and runoff will be controlled. This Alternative ranks the highest in the Long-term Effectiveness and Performance and second highest in the Reduction of Toxicity, Mobility, and Volume criteria because the materials will be placed in a location that will naturally reduce infiltration and will not be as reliant on engineering controls. This Alternative's inclusion of a liner in Mill Creek within the excavated Ponds' footprint provides surface water isolation and allows metals to attenuate in alluvial soils thereby mitigating the need for long term water treatment. Because it does not rely on long-term water treatment it is more reliable, more easily implemented in the long-term, and avoids significant secondary impacts to the environment due to the increased energy use associated with a treatment plant. Alternative 3A also avoids potential issues associated with managing treatment sludge.

This alternative has greater short-term impacts than Alternative 2 because of the construction efforts necessary to move approximately 578,100 cubic yards of wetted material. Construction activities would need to rely on best management practices to prevent or reduce discharges during construction. This alternative ranks lower than Alternative 2, for Short Term Impacts because without water treatment after construction, it may take a longer time to achieve water quality requirements. Alternative 3A ranks ahead of Alternative 3 for short-term impacts due to the smaller quantity of valley bottom material removed.

This alternative is more expensive than Alternative 2 and less expensive than Alternative 3.

THE PREFERRED ALTERNATIVE

This section of the Proposed Plan is intended to provide a more detailed description of the remedial actions that would be taken if Alternative 3A, which has been identified by the NDEP as the preferred alternative, were implemented. Based on information currently available, the NDEP believes that the Preferred Alternative meets the primary evaluation criteria and provides the best balance of tradeoffs among the other alternatives with respect to the secondary evaluation criteria. The NDEP expects that the Preferred Alternative will satisfy State laws and the following statutory requirements of CERCLA §121(b): 1) be protective of human

health and the environment; 2) comply with all applicable or relevant and appropriate regulations; 3) be cost-effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element (or justify not meeting the preference).

Description of Preferred Alternative

Alternative 3A would remove mining materials from Ponds 3 and 4 and some amount of underlying materials to an on-site repository. Pond 2 (Sludge Pond) will remain in place, behind a newly constructed, engineered berm on the Pond's north and west to assure long-term stability. An unlined repository will be located on the ridge to the east and south of the former townsite and will include an evapotranspiration cover. During construction activities, a temporary, seasonal water treatment system or other appropriate water management practices will treat or manage water associated with the removal of Ponds 3 and 4 materials and underlying materials. Following the removal, a layer of clean, on-site soils will be placed within the footprint of Ponds 3 and 4. Mill Creek will subsequently be realigned to a channel located near the center of Mill Creek Valley east of Pond 2 and lined with a geosynthetic clay liner designed to isolate surface water from alluvial groundwater along the length of the realigned channel.

Materials Removed to On-site Repository

Approximately 578,100 cubic yards of mining materials in Ponds 3 and 4 and 39,300 cubic yards of underlying materials will be removed to the on-site repository for a total of 617,400 cubic yards of materials. The volume of over-excavation materials beneath Ponds 3 and 4 is based on an over-excavation thickness of one foot. The amount of wet materials within Ponds 3 and 4 will impact the cost of removal. Materials that are wet will either be dewatered in place or require placement in a staging area at the ponds to allow them to drain and/or dry prior to their ultimate transport to and placement in the on-site repository. Approximately half of the total combined volume of mining materials in Ponds 3 and 4 is expected to be in a wet condition.

On-site Mining Materials and Sludge Repository

The on-site repository for the storage of mining materials and sludge from the temporary water treatment plant will be located to the east and south of the former townsite and to the northeast of the reclaimed Heap Leach Pad. The unlined repository will include an 18-inch thick evapotranspiration cover consisting of clean, on-site screened soils, and stormwater controls. The cover will be vegetated with an approved seed mix. The repository will be excavated into native ground. Materials excavated during the development of the repository will be used, as appropriate, for constructing the repository's embankment and cover. A geotechnical investigation was performed during November 2007 to evaluate and confirm the suitability of the repository location

A Glossary of Mine-Related Materials

Tailings

At hard rock mines, tailings refer to the material that remains after milling and processing of a mineral ore has removed the valuable fraction. Efficient processing of an ore requires that it be crushed (through milling) to a very small size, usually smaller than a grain of sand. The resulting tailings are composed of very fine material that is usually deposited as a liquid slurry behind a tailings dam. Tailings may contain trace quantities of metals found in the host ore along with residual compounds used in the extraction of the valuable fraction during processing.

Heap Leach Pads

Heap leaching is an extraction process that does not require the milling of an ore to a fine powder. Rather, the ore is crushed to small rock size and placed on a liner to form a heap leach pad. A liquid solution (sulfuric acid in the case of copper extraction) is placed at the top of the pad and allowed to travel through the crushed ore. The solution is collected at the bottom of the pad and the dissolved metals in the solution can be recovered. At the end of operation, a heap leach pad may be left in place with steps taken to prevent continued leaching of metals.

Waste Rock

Waste Rock, or overburden, refers to all the earth material that must be excavated and removed to reach a mineral-rich ore deposit. While this material does not contain high concentrations of recoverable minerals, it may present some site risks depending on its composition and deposition.

Water Treatment Sludges

A sludge generally refers to the solid material that is separated from suspension in a liquid. At mine sites, sludges may be generated as a result of the treatment of metal rich waters prior to their discharge to the environment. Toxic metals that are dissolved in mine water may be removed by altering the pH of the water (generally from an acidic solution to an alkaline solution through the addition of lime), which causes the metals to form an indissoluble solid that can settle out as a sludge. While metal rich, the resulting sludge is generally no longer a source of metal contamination because the metals are not in a form that is readily dissolved.

and to assess the requirements for moving and placing the mining materials.

Diversion and Ground Water Inflow Channels

Upgradient diversion channels, interceptor trenches or barrier walls will be constructed at the repository to isolate it from stormwater run-on and/or alluvial groundwater flow. Diversion channels will be designed to the 100-year, 24-hour storm event, which is approximately 2.8 inches of precipitation in the region of the Rio Tinto mine.

Temporary Water Treatment Plant

Drained water from the removal of Ponds 3 and 4 and underlying materials will either be managed to prevent discharges that would impair water quality in the Owyhee River (including infiltration and evaporation) or collected and treated at a temporary water treatment system, located in the valley east of Pond 4, that operates seasonally during construction. If deployed, the temporary water treatment system will consist of a metals precipitation/aeration plant using hydrated lime, aeration/agitation and a settling basin. Treated water will then be discharged to Mill Creek or the Owyhee River. A similar type of system was successfully operated on a pilot-scale basis for a five-week period in 2002 and then again during summer months between 2003 and 2006. Sludge generated by the treatment system will be placed in the on-site repository. Existing power at the site should be adequate for the treatment system. Road access to the plant area will be developed, as necessary.

Mill Creek Realignment

The area of Mill Creek Valley within the footprint of Ponds 3 and 4 will be regraded after removal of materials. An approximately three-foot thick layer of clean, on-site soils will be placed within the footprint of removed materials. The new Mill Creek Channel likely will be directed through Pond 1, north of Pond 2 and through the former Ponds 3 and 4, and tie into the existing upstream and downstream reaches of Mill Creek. A geosynthetic clay liner will be positioned in the channel and covered with protective layers of soil and rip-rap as needed to avoid erosion. The purpose of the liner is to minimize mixing of surface water and alluvial groundwater along the length of the realigned channel. An engineered rip-rapped earthen berm will also be constructed around the western and northern sides of Pond 2 to stabilize it against high flows in Mill Creek. Post-construction surface reclamation will include revegetation and some riparian restoration extending east of Pond 4 into the lower Mill Creek valley to improve habitat and support seasonal fish passage.

Institutional Controls and Maintenance

Additional perimeter fencing, consisting of steel post and barbed wire, and signs will be installed to ensure site access is controlled. The fencing will prevent livestock grazing, which will reduce the potential for erosion of new and existing vegetated covers. Deed restrictions or other land use controls will control the future use of the property.

After completion of remedy implementation, covers placed on the Heap Leach Pad, Waste Rock Pile, Pond 2, on-site repository, diversion channels, and Mill Creek valley will be monitored by field personnel on a regular schedule to assess vegetative performance and erosion. Mill Creek and Owyhee River water quality will be monitored for a prescribed time period. Written reports will be developed following monitoring events.

Information Repositories for Additional Information

Pertinent documents related to the Rio Tinto Mine can be found at the locations listed below. Documents at these repositories are part of the Administrative Record for the site. Any study or order referenced in this Proposed Plan can be found in the Administrative Record.

NDEP Office
900 South Stewart St.
Carson City, NV 89701
Hours: Mon - Fri, 8a-5p
(most extensive collection)

Environmental Office of the Shoshone-Paiute Tribes
Duck Valley Reservation
PO Box 219/State Hwy 51
Owyhee, NV 89832
Hours: Mon - Fri, 8a-5p

Public Participation and Solicitation of Comments

The Nevada Division of Environmental Protection will accept public comment for thirty (30) days following the release of this Proposed Plan. Persons providing comments should be aware that this public comment period is an opportunity to comment not only on this proposed action, but also on all the alternatives that were considered by the agencies. Comments will be accepted by mail, e-mail, or fax. Comments should be submitted to the following contact:

Mr. Scott Smale
NDEP Rio Tinto Project Manager
901 S. Stewart Street, Suite 4001
Carson City, NV 89701
Email: ssmale@ndep.nv.gov
Fax: 775-687-8335

The comment period will run from October 22nd to November 19th.

Announcement of Public Meeting

The NDEP has scheduled a public meeting to present its Proposed Plan and solicit comments from interested parties. The meeting date coincides with the comment period for this Proposed Plan. Comments will be accepted during the meeting but may also be submitted at any time during the comment period.

PUBLIC MEETING DETAILS

Tuesday, November 9, 2010
7:00 pm
Nevada Department of Wildlife,
Conference Room
60 Youth Center Road
Elko, NV 89801