FINAL

Conda/Woodall Mountain Mine
Pedro Creek Overburden Disposal Area
Early Action

Engineering Evaluation/Cost Analysis

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LIST OF ACRONYMS/ABBREVIATIONS

AMSL	above mean sea level
AOC	Administrative Order on Consent
ARAR	Applicable and/or Relevant and Appropriate Requirement
ATV	All Terrain Vehicle
bgs	below ground surface
BLM	Bureau of Land Management
BMP	Best Management Practice
CCR	Construction Completion Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Cfs	cubic feet per second
COPC	Contaminant of Potential Concern
cy	cubic yard
DOE	Department of Energy
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
ET	Evapotranspiration
GCL	Geosynthetic Clay Liner
GDN	Geosynthetic Drainage Net
GM	Geomembrane
HELP	Hydrologic Evaluation of Landfill Performance
IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
LLDPE	Linear Low Density Polyethylene
MCL	Maximum Contaminant Level
mg/kg	milligram per kilogram
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetlands Inventory
ODA	Overburden Disposal Area
O&M	operations and maintenance
PRSC	Post-Removal Site Control

PVC	Polyvinylchloride
QA/QC	Quality Assurance/Quality Control
RA	Removal Action
RAO	Removal Action Objective
RI/FS	Remedial Investigation/Feasibility Study
SARA	Superfund Amendment and Reauthorization Act
SRE	Streamlined Risk Evaluation
TBC	To Be Considered
T/E	Threatened and Endangered
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service

EXECUTIVE SUMMARY

This Engineering Evaluation/Cost Analysis (EE/CA) has been prepared by the J.R. Simplot Company to identify and evaluate removal action alternatives for the Pedro Creek Overburden Disposal Area (ODA) at the former Conda/Woodall Mountain Phosphate Mine Site (the Site). A Remedial Investigation/Feasibility Study (RI/FS) is ongoing at the Site, and Early Action has been identified as appropriate for the Pedro Creek ODA to address ongoing contaminant releases associated with this source into the Pedro Creek drainage sub-basin soil, groundwater, surface water, and sediment.

Scope - For the purposes of this EE/CA, the Pedro Creek ODA is defined as the unreclaimed overburden pile, and the adjacent upslope overburden (upslope area) within the headwaters area of Pedro Creek. The scope of the EE/CA is to evaluate source-control alternatives that stabilize the external overburden pile from an erosion and seismic standpoint, and reduce releases and exposure of human and ecological receptors to selenium and other contaminants of potential concern (COPCs) in environmental media from the ODA, while being consistent with the potential final remedy for the Site.

Risk - A streamlined risk evaluation found that complete exposure pathways exist for the receptors (e.g., livestock, wildlife, and humans) frequenting the area in and around the Pedro Creek ODA. With maximum concentrations of the risk-driving COPCs measured in the overburden at one to three orders of magnitude greater than levels protective of human health and the environment, the ODA poses potential current and future risk to human and ecological receptors, if not addressed. The elevated maximum concentrations of the potential-risk-driving COPCs in soil, vegetation, surface water, sediment, and groundwater downgradient of the Pedro Creek ODA indicate transport and potential risk to human and ecological receptors. Consequently, there is the need for a response action to control releases. A failure of the unreclaimed overburden pile would result in additional releases of COPCs to downgradient areas.

Removal Action Objectives - The following Removal Action Objectives were identified:

- Stabilize the ODA from an erosion and seismic standpoint and minimize the potential for future erosion, slumping, and mass-wasting of ODA materials.
- Reduce the releases and migration of selenium and other COPCs from the ODA that currently result in exceedances of Maximum Contaminant Levels (MCLs) in groundwater and water quality criteria in surface water.
- Reduce releases and migration of selenium and other COPCs from the ODA that result in unacceptable risks to wildlife receptors of concern due to elevated concentrations in soils, sediment, and fish in the Pedro Creek sub-basin.

- Reduce risks to livestock and humans due to exposure to selenium and other COPCs in surface water, soils, and sediments. Reduce concentrations of COPCs in alluvial groundwater which may be used for livestock watering.

Alternatives - Six removal action alternatives were developed for the Pedro Creek ODA:

- Alternative 1: No Action (as required for consideration by the NCP).
- Alternative 2: In-Place Consolidation/Regrading in Side Slope Area, with Direct Revegetation on Amended Overburden Materials on the ODA.
- Alternative 3: In-Place Consolidation/Regrading in Side Slope Area, with Soil Cover[1] and Revegetation on the ODA.
- Alternative 4: In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Soil Cover and Revegetation on the ODA.
- Alternative 5: In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Thick ET Soil Cover and Revegetation on the ODA.
- Alternative 6: In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Geosynthetic-Soil Cover System and Revegetation on the ODA.

Comparative Analysis and Preferred Alternative - The removal action alternatives 2 through 6 were evaluated against the criteria of effectiveness, implementability and cost. There are no significant differences between the alternatives in terms of implementability, therefore, the evaluation focused on cost and effectiveness. The estimated net present value of the action alternatives are as follows:

- Alternative 2: $2.5 million;
- Alternative 3: $5.3 million;
- Alternative 4: $7.0 million;
- Alternative 5: $11.7 million; and
- Alternative 6: $18.1 million.

Under current conditions, water infiltrates into the ODA material either from direct precipitation or run-on. Collection of snow drifts and spring melt pooling on the flat areas of the ODA also provides a source of infiltrating water. This infiltrated water becomes elevated in selenium and other COPCs, and is released to groundwater and surface water with the Pedro Creek sub-basin. Reducing the release and migration of selenium and other COPCs is a key goal of the

[1] Soil cover would consist of non-seleniferous low-permeability Dinwoody Formation or Salt Lake Formation enhanced with fertilizer and mulch for improved growing ability.

Early Action. The action alternatives, by implementation of surface water run-on controls and by direct revegetation and/or vegetated soil covers, are predicted to provide reductions of surface water infiltration into the ODA as follows:

- Alternative 2: 53 percent reduction in infiltration;
- Alternative 3: 62 percent reduction in infiltration;
- Alternative 4: 85 percent reduction in infiltration;
- Alternative 5: 96 percent reduction in infiltration; and
- Alternative 6: 99 percent reduction in infiltration.

These reductions in infiltration would be expected to result in a corresponding decrease in releases from the ODA. Reduction of the release of selenium and other COPCs will contribute to meeting MCLs in groundwater and surface water quality standards in Pedro Creek.

Table ES-1 provides a comparison of the alternatives in terms of estimated infiltration reduction against the estimated present worth costs. As can be seen from Table ES-1, Alternative 2 would be the most cost-effective at reducing infiltration into the ODA. However, Alternative 2 would not significantly improve seismic stability of the ODA and would therefore not be fully effective at meeting the Removal Action Objectives (RAOs). Of the alternatives that can meet all of the RAOs effectively (Alternatives 3, 4, 5, and 6), Alternatives 3 and 4 are the most cost-effective at reducing infiltration through the ODA, with Alternative 4 being slightly more cost-effective. Alternatives 5 and 6 would entail significantly higher costs than Alternative 4 with relatively small incremental benefits.

Table ES-1 Cost Effectiveness of Pedro Creek EE/CA Alternatives

Alternative	Estimated Present Worth Cost	Estimated Reduction in Infiltration (AF/Yr)[a]	Cost Effectiveness ($/AF Reduced)
1	$0	0	$0
2	$2.5 Million	35.2	$72,000
3	$5.3 Million	40.9	$129,000
4	$7.0 Million	55.9	$124,000
5	$11.7 Million	63.2	$185,000
6	$18.1 Million	65.6	$276,000

[a] From EE/CA Appendix C, Table C-5

Based on the comparative analysis, Alternative 4 is the recommended removal action alternative for the Pedro Creek ODA. Alternative 4 includes in-place consolidation and regrading the existing steep slopes to 3:1, the top area to between 5:1 to 10:1, and the upslope area to 20:1 to 30:1. A soil cover system will be placed over the regraded areas, comprised of 18 inches on the side slopes and 12 inches on the top and upslope areas. Although plant uptake of selenium is not an RAO, the disturbed areas will be revegetated with non-selenium-accumulator plant species. Run-on and runoff diversion ditches and other erosion and sedimentation controls will be installed to improve run-on and runoff conditions. Further, interim controls may be implemented in consultation with the Agencies to control access and allow the new vegetation to establish without livestock grazing or disturbance.

Alternative 4 is predicted to reduce infiltration significantly (reduction of 85 percent compared to current conditions) due to surface water run-on/runoff controls and installation of a vegetated soil cover. Grading to reduce slopes improves seismic stability and this, and the vegetated soil cover will reduce the potential for erosion of ODA materials and subsequent transport into the Pedro Creek sub-basin. The soil cover will reduce the potential for direct contact with ODA soils.

Alternative 4 will be protective of human health and the environment, can meet the action and location-specific ARARs, will contribute toward meeting the chemical-specific ARARs, and will meet the RAOs. This alternative is effective in both the long term and short term, and would likely not be inconsistent with the long term remedy at the site. However, it may be necessary to augment the removal action with additional response actions in the future as a result of information from the RI/FS and/or performance monitoring. Alternative 4 is implementable from both a technical and administrative standpoint, and would be the most cost-effective alternative at reducing infiltration and release of COPCs among the alternatives that can meet all of the RAOs.

1.0 INTRODUCTION

The J.R. Simplot Company (Simplot) has prepared this Engineering Evaluation/Cost Analysis (EE/CA) to identify a potential Early Action for the Pedro Creek Overburden Disposal Area (ODA) at the former Conda/Woodall Mountain Phosphate Mine Site (the Site), pursuant to an Administrative Order on Consent (AOC) between Simplot and Idaho Department of Environmental Quality (IDEQ), the United States Environmental Protection Agency (USEPA), and the Bureau of Land Management (BLM) (hereinafter collectively referenced as the Agencies) (IDEQ 2008). The former Site is located approximately 8 miles northeast of Soda Springs in Caribou County, Idaho (Figure 1-1). A Remedial Investigation/Feasibility Study (RI/FS) is ongoing at the Site, and Early Action has been identified as appropriate for the Pedro Creek ODA to address ongoing contaminant releases associated with this source into the Pedro Creek drainage sub-basin soil, groundwater, surface water, and sediment (collectively, "media").

1.1 Purpose

The purpose of the EE/CA is to identify and evaluate removal action alternatives for the Pedro Creek ODA. The removal action described in this EE/CA will be conducted pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). This EE/CA has been prepared in accordance with the National Contingency Plan (NCP) and USEPA's *Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA* (EPA 1993).

1.2 Scope

For the purposes of this EE/CA, the Pedro Creek ODA (Figure 1-2) is defined as the unreclaimed overburden pile, and the adjacent upslope overburden (upslope area) within the headwaters area of Pedro Creek (i.e., within the upper reach of the Pedro Creek draw, based on the pre-mining topography). It is Simplot's goal to evaluate source-control alternatives that stabilize the external overburden pile from an erosion and seismic standpoint, and reduce releases and exposure of human and ecological receptors to selenium and other contaminants of potential concern (COPCs)[2] in media from the ODA, while being consistent with the potential final remedy for the Site. Response action for the other ODAs in the Pedro Creek headwaters area (e.g., the previously revegetated mass-waste area to the north, and the smaller ODA to the south with naturally reestablished vegetative growth), will be evaluated in the FS. The overall

[2] The Conda COPCs include the main, risk-driving constituents (i.e., selenium, arsenic, cadmium, chromium, nickel, vanadium and zinc), as well as other constituents as identified in the Final Conda Work Plan and Sampling and Analysis Plan (SAP) (NewFields 2008a, 2008b).

performance of the early action in meeting the response objectives for Conda will be evaluated in the RI/FS and the five-year review process.

1.3 Document Organization

This report is organized as follows:

- Section 1 – Introduction: A general description of the purpose and scope of the EE/CA as well as the content/organization of the document.
- Section 2 – Site Description and Background: A description of the history, physical setting, and previous actions in the Pedro Creek ODA.
- Section 3 – Site Model and Characterization: A summary of the Site model describing the fate and transport at the ODA and a summary of available information on nature and extent and fate and transport of elevated selenium and other COPCs in media in and around the Pedro Creek ODA.
- Section 4 – Streamlined Risk Evaluation: A summary of current potential human health and ecological risks made through comparisons of Site data to conservative risk-based benchmarks.
- Section 5 – Identification of Removal Action Objectives (RAOs) and Applicable and/or Relevant and Appropriate Requirements (ARARs): Presentation of the RAOs as well as ARARs and risk-based goals.
- Section 6 – Technology Screening and Identification and Analysis of Removal Action Alternatives: A summary of technologies screened and justifications as to why some technologies are not carried forward as removal action alternatives, along with identification and evaluation of removal action alternatives.
- Section 7 – Comparative Analysis of Removal Action Alternatives: Comparison of the removal action alternatives based on criteria presented in the USEPA (1993) Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA.
- Section 8 – Recommended Removal Action Alternative: Identification of the recommended removal action alternative, based on the results of the comparative analysis.
- Section 9 – References: A summary of the documentation referenced in the EE/CA.

2.0 SITE BACKGROUND AND SETTING

This section provides general background information regarding the Pedro Creek ODA and a synopsis of the ODA setting. Land use and ownership are also discussed, along with other related activities that are occurring at the Pedro Creek ODA and the Site as part of the RI/FS.

2.1 Background

The Pedro Creek ODA is one of several ODAs located along the eastern slope of Woodall Mountain, and is the most significant in terms of impact to the environment. During open-pit mining operations along Woodall Mountain, surface material (termed "overburden") was excavated from the mining pits to expose the phosphate ore. Overburden material was either backfilled into the pits or placed in external ODAs. The overburden-rock units generally consist of Rex Chert, Hanging Wall Mudstone, Hanging Wall Phosphatic Shale, Middle Waste Shale, and some Footwall[3] Mudstone. The Mudstone and Middle Waste Shale naturally contain elevated levels of selenium and other trace metals. Handling and disposal of the overburden accelerated both physical and chemical weathering processes, resulting in releases of selenium and other COPCs to the environment.

As previously mentioned, the Pedro Creek ODA is located within the draw forming the headwaters of Pedro Creek. The Pedro Creek ODA (approximately 60 acres) includes an upslope area, two backfilled pits, and an external overburden pile area (Figure 2-1). The upslope area (approximately 14.2 acres) of the ODA extends from the Woodall Mountain saddle (to the west) to the upper road across the ODA (Figure 2-1). Two backfilled pits extend within the footprint of the Pedro Creek ODA. These backfilled pits were part of South Woodall (SW) Panels SW-1 and SW-2. The backfilled pits (SW-1 [approximately 2.5 acres] and SW-2 [approximately 5.5 acres]) and the external overburden pile with steep and potentially unstable slopes are located east from the former upper-haul road across the ODA. The area of the ODA east of the road covers approximately 46.5 acres. The top of the Pedro Creek ODA has terraces and negatively-sloped areas, promoting infiltration. Infiltrated precipitation released at the base of the ODA can get channeled by the draw, contributing flow at the seep (NES-5) located at the toe of the ODA.

Historical exploration boreholes and cross-sections documentation indicate that there is a transverse fault zone across the draw within the footprint of the ODA (discussed in Section 2.3.3). As a result of the steeply dipping angle (40 to 60 degrees) of the Phosphoria Formation (discussed in Section 2.3.3) in the area, and the amount of benching required to mine the ore,

[3] Hanging wall and footwall are mining terms. Hanging wall describes the fault block towards which an inclined fault dips (i.e., overhead block in a tunnel advanced along an inclined fault). Footwall describes the block from which an inclined fault dips (i.e., under foot block in a tunnel advanced along an inclined fault).

the pits (SW-1 and SW-2) were therefore only approximately 150 feet below ground surface (bgs) deep. As mining proceeded deeper into the pits, it would have continued until having reached the transverse fault zone in the draw, and not continued across the draw.[4] The ore from SW-1 pit was hauled south across the draw and up to the elevation of the present road to the area of the Woodall Mountain saddle. The ore from SW-2 was hauled out of the southern end of the pit, following the same route toward the Woodall Mountain saddle. The overburden from SW-1 and SW-2 was placed on the west side of SW-2 panel. Some of the overburden from SW-2 was also placed in an area southeast of the panel. Mining of SW-1 and SW-2 Panels ended in late 1970s. Overburden from SW-3 (towards the south from SW-2) was likely used to backfill the SW-1 and SW-2 pits and create the unreclaimed pile of the ODA.

Photographs showing the features of the Pedro Creek ODA and historical exploration boreholes and cross sections are included in Appendix A.

2.2 Previous Actions

No previous cleanup activities have been performed at the Pedro Creek ODA. The top of the ODA was graded to form minor terraces and a predominantly flat area. Grading activities or erosion control measures did not occur on the potentially unstable east-facing slopes of the external overburden pile. After completion of overburden placement and grading, the top area was seeded and a vegetated cover has developed over portions of the area.

The mass-waste area to the north, not included in the scope of this EE/CA, was revegetated following the mass-waste event in the early 1980s. During recent road maintenance activities, Simplot corrected surface drainage issues on the road at the top of the mass-waste area, reducing the potential for continued drilling and erosion of the mass-waste area.

2.3 Setting

The Pedro Creek ODA (upslope area, backfilled pits, and the external overburden pile) overlies the steeply eastwardly dipping western limb of the Trail Creek Syncline. The elevation of the Pedro Creek ODA ranges from approximately 6,830 feet above mean sea level (AMSL) at the toe to approximately 7,200 feet AMSL in the upslope area. The backfilled SW-1 Panel Pit is located on the north side of the Pedro Creek draw, and the backfilled SW-2 Panel Pit is on the south side of the draw (Figure 2-1). Historical cross sections (Appendix A) indicate that the SW-1 Pit extended to approximately 6,850 feet AMSL and SW-2 Pit to approximately 6,800 feet AMSL. The Pedro Creek ODA seep (sampling location NES-5) emanates at the toe of the ODA at an approximate elevation of 6,800 feet AMSL.

[4] According to a former Chief Mining Geologist at Conda, the Pit boundaries were often based on where fault zones were encountered.

The steep-unreclaimed portion of the ODA predominantly overlies Rex Chert outcrop in the draw with steep slopes. The natural ground surface decreases in slope toward the valley floor east of the ODA. The overburden materials in the backfilled pits overlie Rex Chert and Meade Peak Members of the Phosphoria and the Wells Formation exposed during mining. The overburden in the upslope area overlies the Wells Formation.

2.3.1 Climate

The climate is dominated by cool and dry weather, with prevailing winds and weather patterns moving from west to east. The western mountain ranges cause Pacific storms to drop much of their moisture before they reach the Site, resulting in moderate precipitation of approximately 19 inches annually in the area (Western Regional Climate Center 2006). The greatest amount of precipitation occurs during the early winter (November, December, and January) and spring (May and June) periods with average monthly precipitation totals of 2.11 inches and 1.64 inches, respectively. In the winter months, total snowfall averages almost 110 inches each year, and snow cover typically remains on the ground from November to March. Snow accumulation is greatest along the east-facing slopes compared to the west-facing slopes. This is as a result of snow drifting from west- to east-facing slopes. Summer temperatures are mild, normally ranging from 42 to 80 degrees Fahrenheit, with the highest temperatures occurring in July. Winter temperatures normally range from 9 to 40 degrees Fahrenheit, while spring and fall months range from 16 to 72 and 9 to 70 degrees Fahrenheit, respectively.

2.3.2 Hydrology

Pedro Creek generally flows intermittently from the headwaters to the mouth, with most of the flow occurring during spring snow melt. The snow pack in the Pedro Creek headwaters is generally deep, compared to the snow pack in the drainages on the west side, due to the snow drifting from the western slopes to the eastern slopes. During baseflow conditions, flow in Pedro Creek is generally lost to the subsurface in the uppermost reaches and resurfaces in the lowermost reaches downstream. Pedro Creek does not exhibit a defined creek channel downgradient from the ODA until near the confluence with its uppermost tributary. Pedro Creek flows into Trail Creek, which enters the Blackfoot River just outside of the Site boundary. The Blackfoot River flows into the Blackfoot River Reservoir located approximately 10 miles northwest of the Site. Below the reservoir, the Blackfoot River joins the Snake River, which ultimately enters the Columbia River.

Pedro Creek does not have any special state or federal designations that significantly restrict its use. The U.S. Forest Service (USFS) did not note this creek to be eligible for designation as a Wild and Scenic River (USFS 1998). However, Pedro Creek is subject to IDEQ's water quality criteria (standards) for designated cold-water biota use.

2.3.3 Geology and Seismicity

The general surface geology and structural features at the Pedro Creek ODA are shown on Figure 2-2. The stratigraphic sequence (from youngest to oldest) along the eastern slope of Woodall Mountain, including the Pedro Creek ODA, is as follows:

- Alluvium/Colluvium (Quaternary);
- Dinwoody Formation (Triassic);
- Phosphoria Formation, Rex Chert Member (Permian);
- Phosphoria Formation, Meade Peak Member (Permian); and
- Wells Formation (Pennsylvanian/Permian).

The Meade Peak Member of the Phosphoria Formation includes from top to bottom, the Hanging Wall Phosphatic Shale, Mudstone and Middle Waste Shale, Footwall Phosphatic Shale, and Footwall Mudstone and Limestone lithologic units. The bedrock units underlying the Pedro Creek ODA generally dip in an easterly direction at 40 to 60 degrees (Figure 2-2). The Salt Lake and the Thaynes Formations also exist on the east side of Woodall Mountain, though they do not outcrop in the areas adjacent to the Pedro Creek ODA; such outcrops occur only in the foothills to the east.

The most significant structural features along the Woodall Mountain ridgeline are a northwest-trending anticline and syncline and associated fault zones. Woodall Mountain is part of the western limb of the north-northwest trending Trail Creek Syncline. The anticlines and synclines in this area are postulated to plunge to the north based on the decrease in formation outcrop as mapped along the axial trace, as well as measured strikes and dips of bedding (Figure 2-2). Surface geology maps generated through exploratory drilling during the mine operation, indicate a transverse fault zone across the Pedro Creek draw in the area of the ODA. The transverse fault is oriented southeast-northwest and the Meade Peak Member offset along the fault zone suggests a vertical displacement of approximately 150 to 200 feet.

The Pedro Creek ODA and the Site lie within a Zone III seismic region (Uniform Building Code 1991) extending from northern Arizona through the Wasatch Front in Utah to the Yellowstone and Hebgen Lake regions in Wyoming and Montana. The Idaho Geological Survey has mapped the southeastern part of Idaho, east of the Snake River Plain, as having the highest of three seismic shaking rankings (USFS and BLM 2007). Approximately 20 earthquakes capable of damaging structures, greater than 5.0 on the Richter Scale, have occurred within this seismic region from 1880 through 1994 (USFS and BLM 2007). Although several earthquakes have occurred in recent years, there is no reported evidence they have caused surface features such as scarps, displacement of streams, or creation of sag ponds (USFS and BLM 2007). The near-future earthquake activity is expected to be similar to observations during the past 100 years (BLM and USFS 2002).

A detailed description of the geology is provided in Evaluation of Groundwater Monitoring Network East Side of Woodall Mountain (Formation 2009).

2.3.4 Hydrogeology

Groundwater on the east side of Woodall Mountain, including the Pedro Creek ODA, can occur in unconsolidated deposits (alluvium/colluvium) as well as in all of the deeper consolidated formations (also described as bedrock). The consolidated formations are generally the most capable of yielding the amount of groundwater necessary for potential domestic water-supply use.[5] Shallow alluvium/colluvium groundwater contributes to baseflow in the creeks (predominantly in the lower reaches) and water in livestock watering ponds (e.g., Pedro Creek pond [PCP-2] [Figure 3-1]). The general hydrogeologic properties of the potentially impacted units downgradient of the ODA are as follows:

- Shallow alluvium/colluvium: present downgradient of the ODA and in the valley floor. These deposits are not vertically extensive in close proximity to the ODA. The limited vertical extent would likely not be adequate to yield the volumes of groundwater necessary to serve as a potential source for domestic-water supply. The hydraulic conductivity in the area is estimated to range between 3 to 55 feet/day (Table 2-1).

- The Dinwoody Formation: can locally contain highly jointed and fractured zones that transmit considerable amounts of groundwater. The hydraulic conductivity is estimated to range from 0.02 to 2.5 feet/day (based on single-well permeability tests at MW-6D and MW-11Db [BLM 2009]). The Dinwoody Formation would be capable of yielding sufficient water for potential use as a domestic-water supply.

- The Rex Chert: a massive[6] unit with lower hydraulic conductivity, estimated at 0.23 feet/day in the area (based on single-well permeability test at MW-2R [BLM 2009]). The Rex Chert also contains the Cherty Shale (considered to have very low hydraulic conductivity [Corbet 1980]). Previous investigations by Ralston et al. (1977, 1983) and Winter (1979) concluded that groundwater flow in the Rex Chert is limited and that the unit generally can only transmit significant amounts of groundwater where highly fractured (i.e., in faulted zones). Fracturing in the Rex Chert, where present, could be a significant factor in the fate and transport of COPCs at the Site.

- The Meade Peak Member: considered an aquitard (Department of Energy [DOE] 1983) with hydraulic conductivity estimated to be as low as 0.07 feet/day (Table 2-1). The Meade Peak Member is of sufficiently low hydraulic conductivity to preclude development as a drinking water source.

[5] On average, a single-family household demands 194 gallons per day, based on water-demand estimates calculated for the populations of Ada and Canyon counties (IDWR 2001).

[6] Few or no joints, cracks, foliation, or bedding; with a homogeneous appearance.

- The Wells Formation: highly fractured and exhibits the highest bulk hydraulic conductivity in the area (estimated to range from 4.2 to 44 feet/day based on single-well permeability tests at nearby Monsanto wells MW-1W, MW-4W and MW-8W [BLM 2009]). The Wells Formation is the major “regional” aquifer at the Site. Local recharge to the Wells Formation along Woodall Mountain contributes to the regional Wells Formation groundwater system. The Wells Formation is capable of yielding sufficient groundwater to serve as a drinking water supply. However, the great depths to Wells Formation groundwater (estimated at over 1,000 feet bgs [NewFields 2008a]) along the east side of Woodall Mountain, and the cost of accessing this deep aquifer, make its use as a potable water source very unlikely.

The groundwater flow within these units is controlled by hydraulic head differences, geologic structure, topography, and locations and extent of local areas of recharge. Groundwater recharge occurs where the consolidated formations are exposed (outcrop) along the Woodall Mountain ridgeline. Groundwater-flow paths in bedded formations, such as those at the Site, tend to follow bedding planes (DOE 1983), with within-bedding hydraulic conductivity being much higher than cross-bedding hydraulic conductivity (i.e., the formation is anisotropic). High hydraulic conductivity zones (e.g., Dinwoody Formation) can form preferential groundwater pathways, and relatively lower hydraulic conductivity zones (e.g., the Meade Peak Member of the Phosphoria Formation) can limit groundwater flow. Within the alluvial/colluvial units, groundwater flow typically mimics the topography.

The uppermost water-bearing zone downgradient from the Pedro Creek ODA is within the alluvium/colluvium. Within the underlying bedrock, the Dinwoody Formation comprises the uppermost water-bearing zone. Deeper water-bearing zones stratigraphically below the Dinwoody Formation exist in the Phosphoria Formation (Rex Chert and Meade Peak) and the Wells Formation. As previously mentioned, the Wells Formation is the major “regional” aquifer in the area and is most capable of yielding significant amounts of groundwater. The potential water-bearing zones in Salt Lake and the Thaynes formations have their recharge areas along the undisturbed foothills east of Woodall Mountain.

2.3.5 Ecology

The general ecological setting presented in this subsection is based on field observations and is supplemented with information from other regional investigations (BLM 2009, BLM/USFS 2007, NewFields 2005, USFS 2003, Maxim Technologies, Inc. [Maxim] 2004a, Maxim 2004b, Maxim 2002a, Maxim 2002b, TetraTech EM, Inc. [TTEMI] 2002, BLM/USFS 2002) when applicable.

Vegetation Communities - The vegetation community in the Pedro Creek sub-basin is predominantly comprised of conifer-aspen, mountain brush, and sagebrush-grass communities. Higher and mid-elevation locations at the Site are represented by conifers (e.g., Douglas-fir [*Pseudotsuga menziesii*]), Rocky Mountain maple (*Acer glabrum*), and aspen (*Populus tremuloides*), with an understory of sticky geranium (*Geranium viscossimum*), silver lupine

(*Lupinus argenteus*), common snowberry (*Symphoricarpos alba*), Indian paintbrush (*Castilleja miniata*), and Kentucky bluegrass (*Poa pratensis*). Forest openings are dominated by a mixed shrub component that includes species such as common snowberry (*Symphoricarpos alba*) and antelope bitterbrush (*Purshia tridentata*) with an understory consisting of yarrow (*Achillea millefolium*), bluebunch wheatgrass (*Agropyron spicatum*), and Idaho fescue (*Festuca idahoensis*). The lower elevation areas are typified by mixed shrub communities such as mountain big sagebrush (*Artemisia tridentata*) and grassland species such as bluebunch wheatgrass (*Pseudoroegnaria spicata*), smooth brome (*Bromus inermis*), and thickspike wheatgrass (*Elymus lanceolatus*). Forbs commonly found in this cover type include yarrow (*Achillea millefolium*) and leafy aster (*Aster foliaceus*).

Riparian areas surrounding Pedro Creek are dominated by willows (*Salix* spp.), sedges and rushes (*Carex* sp., *Juncus* sp., *Eleocharis* sp.), cinquefoil (*Potentilla* sp.), and wheatgrasses (e.g., *Elymus* sp., *Agropyron* sp.). There are no wetlands in the Pedro Creek sub-basin, as included on the National Wetlands Inventory (NWI) coverage (USFWS 2009a; with classifications according to Cowardin et al. 1979).

Terrestrial Biota - The vegetation types in the area potentially provide habitat for a variety of wildlife species. Potential mammal species include bats, lagomorphs (rabbits), rodents, carnivores and ungulates. Rodent species that may be found in the area include: meadow vole (*Microtus pennsylvanicus*), long-tailed vole (*Microtus longicaudus*), southern red-backed vole (*Clethrionomys gapperi*), montane vole (*Microtus montanus*), deer mouse (*Peromyscus maniculatus*), chipmunk (*Tamias spp*.), pine squirrel (*Tamiasciurus hudsonicus*), yellow-bellied marmot (*Marmota flaviventris*), porcupine (*Erithizon dorsatum*), and northern flying squirrel (*Glaucomys abrinus*). Lagomorphs are primarily represented by Nuttall's cottontail (*Sylvilagus nuttalli*) and jackrabbit (*Lepus* spp).

Carnivores potentially inhabiting the area include black bear (*Ursus americanus*), mountain lion (*Felis concolor*), bobcat (*Lynx rufus*), striped skunk (*Mephitis mephitis*), red fox (*Vulpes vulpes*), coyote (*Canis latrans*), grey wolf (*Canis lupus*), badger (*Taxidea taxus*), marten (*Martes americana*), long-tailed weasel (*Mustela frenata*), and ermine. Ungulates frequenting the area, primarily during spring through fall, include mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), and moose (*Alces alces*), as cited in regional documents.

Several species of birds can occur in or near the area, including raptors, upland gamebirds, passerines, waterfowl, and shorebirds, as cited in regional documents. Raptors that may use the general area for hunting and/or nesting include: Bald Eagle (*Haliaeetus leucocephalus*), Red-tailed Hawk (*Buteo jamaicensis*), Swainson's Hawk (*Buteo swainsonii*), Northern Goshawk (*Accipiter gentilis*), Cooper's Hawk (*Accipiter cooperii*), Northern Harrier (*Circus cyaneus*), American Kestrel (*Falco sparverius*), Boreal Owl (*Aegolius funereus*), Great Horned Owl (*Bubo virginianus*), and Great Gray Owl (*Strix nebulosa*). With the exception of northern harriers, these raptor species may be expected to nest in aspen or conifer stands. Northern harriers prefer to nest and hunt in grassland habitat near meadows and marshes.

Game birds potentially found in the area are Hungarian Partridges (*Perdix perdix*), Chukar Partridges (*Alectoris chukar*), Blue Grouse (*Dendragapus obscurus*), and Ruffed Grouse (*Bonasa umbellus*), as cited in regional documents. Blue Grouse and Ruffed Grouse typically are found in dense conifer and aspen stands.

Based on regional documents, additional bird species including migratory species that might be present in the area are Hairy Woodpecker (*Picoides villosus*), American Robin (*Turdus migratorius*), Tree Swallow (*Tachycineta bicolor*), Western Wood-pewee (*Contopus sordidulus*), House Wren (*Troglodytes aedon*), Song Sparrow (*Melospiza meoldia*), Gray-headed Junco (*Junco hyemalis*), and Chipping Sparrow (*Spizella passerina*). A variety of additional resident and migratory bird species, including passerines, shorebirds, and waterfowl are expected to occur within the region, such as tanagers, warblers, sparrows, swallows, wrens, hummingbirds, curlews, killdeer, thrushes, flycatchers, ducks, grebes, jays, teal, among others (USFS 2003).

Potential reptiles in the area include rubber boa (*Charina bottae*), and western terrestrial garter snake (*Thamnophis elegans*). Amphibian species potentially inhabiting the area include tiger salamander (*Ambystoma tigrinum*) and boreal chorus frog (*Pseudacris maculata*).

Aquatic Biota - Fish species recorded in Pedro Creek consist of speckled dace (*Rhinichthys osculus*) and redside shiners (*Richardsonius balteatus*), with some presence of sculpin (*Cottus* sp.) and suckers (*Catostomus* sp.) as well. While no trout were observed during an aquatic biota survey completed in the summer of 2009, presence of cold water species, such as Cottids and Cyprinids, is consistent with those species observed with trout in other regional streams. Habitat and temperature factors, among others, may be limiting Pedro Creek for salmonid species.

Special-Status Species - Table 2-2 provides a summary of potential threatened and endangered (T/E) and special-status species present in the region, as identified through correspondence with USFWS, USFS, Idaho Department of Fish and Game (IDFG), and BLM (USFWS 2009b, USFS 2009, BLM 2009b, and IDFG 2009a). The USFWS indicates that the only listed species that occurs in the vicinity of the Site is Canada lynx (*Lynx canadensis*), which is listed as threatened. There is no designated critical habitat for the Canada lynx within the Site or nearby. The nearest critical habitat is in Lincoln County in southwestern Wyoming. However, patches of potentially suitable habitat are present in mixed conifer forests in southeastern Idaho. IDFG lists several State-listed T/E species in Idaho Administrative Procedures Act (IDAPA) 13.01.06 (IDAPA 2009) (Table 2-2). Although the bald eagle is listed as threatened in IDAPA (2009), it was recommended by IDFG for delisting from T/E species to non-game wildlife species (IDFG 2009a). The USFS also indicates that there is potential habitat for Canada lynx (listed as threatened) as well as the grey wolf (currently de-listed).

2.4 Land Use and Ownership

The land associated with the Pedro Creek ODA Early Action is owned by Simplot and BLM (Figure 2-3). Current potential land uses in the area are recreational (all terrain vehicle [ATV] riding, snowmobiling, and hunting). As most of the main overburden pile is private, hunting and other recreation uses are primarily by invitation only. To help with the management of Site access, Simplot is in the process of installing new fencing along the perimeter of Conda. The perimeter fence is being installed separate from the early action activities.

Grazing is currently not allowed on the Pedro Creek ODA, as the BLM has restricted grazing to portions of the Woodall Mountain allotment impacted by mining-related activities.[7] Per the BLM's Draft 2006 Pocatello Resource Management Plan and Environmental Impact Statement (BLM 2006), the Conda Mine grazing allotments are to remain closed until selenium can be reduced to acceptable levels. The new perimeter fence will restrict access to the impacted areas on the grazing allotments within the Pedro Creek ODA. Land ownership in the downstream portions of Pedro Creek is predominantly private, with ranching being the primary land use. No residents live within the Pedro Creek sub-basin. Residential use in nearby surrounding private lands is typically comprised of seasonal use by ranchers.

[7] Per September 24, 2010 e-mail communication with Colleen O'Hara, Woodall Mountain allotment #04454 is partially closed. It is closed on all contaminated ground with a ¼ mile buffer around any contaminated ground.

3.0 SITE MODEL AND CHARACTERIZATION

This section summarizes the Site model and Site characterization, including descriptions of the source and nature and extent of elevated concentrations of selenium and other COPCs in the area of the Pedro Creek ODA.

3.1 Site Model

The setting of the Pedro Creek ODA, as previously described, is conducive to mobilization and transport of selenium and other COPCs to soil, surface water, sediment and groundwater, as well as uptake by vegetation. Key factors affecting mobilization and transport are as follows:

- Steep and potentially unstable ODA slopes without proper erosion control are subject to ongoing erosion, and potential mass wasting, with downstream transport of ODA material;
- Terraces located in portions of the main pile (and upslope area) promote pooling of spring snowmelt, rainfall and runoff, contributing to infiltration into the ODA;
- The position of the ODA across the Pedro Creek draw creates a preferential path for downgradient movement of ODA releases, contributing to the seep (NES-5) discharge (0.002 to 0.03 cubic feet per second [cfs]) at the toe; and
- Direct plant uptake of COPCs depends on the plant species and the abundance of adequate substrate.

Transport of waste shale dust is expected to be limited, considering the coarse grain size distribution of the ODA. Eroded materials transported as suspended solids in surface runoff are generally only transported a short distance overland as runoff water is quickly lost to infiltration. Eroded materials at the toe and in the drainage channel may act as secondary sources.

Spring runoff has a flushing effect on the transport of selenium and other COPCs released from the ODA. Correspondingly, concentrations of selenium and other COPCs in the ODA seep and surface water runoff are greatest during the spring runoff pulse and decrease over the remaining seasons. The transport and partitioning of COPCs released from the ODA between the surface water pathway and the underlying groundwater is dependent predominantly upon the topography and the receptivity of the underlying units to infiltration. Water released from the ODA that is not transmitted into the underlying units is channeled by the buried draw and emerges as seep flow at the toe of the ODA. The controlling factors for the magnitude of transport via the surface water and groundwater pathways are:

- The slope of the ODA contact with the underlying natural ground surface (i.e., less infiltration occurs in areas where the contact is steep);

- The hydraulic conductivity of the unit underlying the ODA (i.e., less infiltration occurs into units of lower hydraulic conductivity);

- The proportion of ODA materials overlying higher hydraulic conductivity units (e.g., Wells Formation and alluvium/colluvium deposits) versus lower hydraulic conductivity units (e.g., Rex Chert); and

- The proportion of overburden material located atop consolidated formation outcrop areas external to mine pits versus on consolidated formations in pit floors. Releases from ODAs external to the mine pits and atop Rex Chert have a relatively large component of flow transported as surface water.[8] Releases from ODAs (both in-pit and external) atop the Wells Formation predominantly infiltrate the formation, with limited releases to surface water. The bottoms of the pits are below the elevation of the draws which channel runoff near the top of the drainage basin, consequently limiting the potential for pit releases to surface water.[9]

As previously mentioned, the Pedro Creek ODA overlies Rex Chert, Meade Peak and Wells Formation. The upslope area of the ODA (approximately 14.2 acres) and portions of the top of the ODA overlie steeply sloped[10] (2.5:1, horizontal:vertical) Wells Formation outcrop (Figure 2-2). ODA releases in this area would likely have a higher component of infiltration into the Wells Formation, relative to the component of flow along the contact between the ODA and the Wells Formation. A portion of the top of the ODA (7 to 8 acres) overlies the backfilled pits. ODA releases into the backfilled pits would travel towards the pit bottom. The ODA material atop the Meade Peak at the bottom of the pit is likely saturated with flow reporting to the Wells Formation along the western Pit wall or fractures in the Rex Chert along the eastern Pit wall. The remainder of the ODA (approximately 38.5 acres) overlies Rex Chert outcrop sloping at a 2.5:1, (horizontal:vertical) angle. The steep contact between the ODA and the unmined portions of the Rex Chert limits infiltration and thus likely contributes to the seep (NES-5) observed near the toe of the ODA.[11] Potential fracture flow along the transverse fault zone could also contribute flow to seep NES-5. Additional information supporting the observation that releases from the ODA predominantly move along the steep contact with the consolidated formations is provided in the Evaluation of Groundwater Monitoring Network East Side of Woodall Mountain (Formation 2009).

Groundwater flow in the unconsolidated alluvial/colluvial deposits and the consolidated formations is generally expected to be in an easterly direction (Formation 2009). In the consolidated formations, groundwater flow predominantly follows the easterly dip of the bedding (greater flow expected parallel to bedding than across formations), with a potential for a northerly flow component along the axis of the anticline/syncline structures as result of their

[8] Groundwater potentially entering fractures into the Rex Chert along the eastern pit wall would remain in the steeply dipping Rex Chert and could not report at the NES-5 seep, which is situated atop Dinwoody Formation.
[9] The bottom of SW-1 pit elevation (6,850 to 6,875 feet amsl) is below the draw channeling runoff near the top of the Pedro Creek drainage basin (6,940 to 6,960 feet amsl). The pit bottom also sloped towards the north. Infiltration into the pit likely enters the exposed Wells Formation, or becomes perched atop the Meade Peak Formation.
[10] Slope based on pre-mine topography and the slopes of undisturbed adjacent outcrop areas.
[11] A small spring flow may naturally exist in the location of NES-5 at the contact between the Rex Chert Member of the Phosphoria and the Dinwoody Formation, as a result of fracture flow in the Rex Chert coming into contact with the Dinwoody Formation.

northerly plunge. Correspondingly, COPC transport across bedding from the Dinwoody Formation into the lower-hydraulic-conductivity Rex Chert is limited. The aquitard characteristics of the Meade Peak Member of the Phosphoria Formation would also further impede transport into the underlying Wells Formation aquifer.

The extent of undisturbed-area recharge, relative to recharge influenced by ODA seepage, controls the rate at which concentrations change with distance from the source areas. The distribution of consolidated-formation outcrop areas in the Pedro Creek sub-basin is as follows:

- 445 acres of Dinwoody Formation;
- 99 acres of Rex Chert; and
- 131 acres of Wells Formation.

The overburden in the Pedro Creek sub-basin (the ODA evaluated for Early Action and other ODAs in the sub-basin) covers approximately 103 acres (54 reclaimed acres [11 in pit] and 49 unreclaimed acres) and is distributed relative to the surface geology described above as follows:

- 16 acres of Dinwoody Formation;[12]
- 38 acres of Rex Chert; and
- 49 acres of Wells Formation.

3.2 Site Characterization

The distributions of selenium and other COPCs in the media in the Pedro Creek sub-basin, including the area of the Pedro Creek ODA, have been characterized in a series of sampling events conducted from 2001 through 2009. As previously mentioned in Section 1.2, the Conda-specific COPCs were selected through evaluating the existing Site data relative to risk-based benchmarks, while considering the potential risk drivers identified for the region[13] in the planning stages of the project (as documented in the Final Work Plan [NewFields 2008a] and the SAP [NewFields 2008b]).

Site-specific data indicate that selenium has the widest distribution and greatest exceedances of risk-based benchmarks and therefore serves as an indicator or bounding constituent that can be used to characterize the nature and extent of mining-related impacts. The following subsections summarize the conditions in the media of the ODA and areas downgradient of the ODA, using

[12] The area is based on the area of ODA overlying the limited alluvium/colluvium deposits on top of the Dinwoody Formation.

[13] The Area-Wide human health and ecological risk assessments identified selenium, cadmium, chromium, nickel, selenium, vanadium, and zinc as the potential risk drivers for the entire region (TTEMI/IDEQ 2002).

selenium as the indicator constituent. Summaries of selenium data in the Pedro Creek sub-basin, including the Pedro Creek ODA, are presented in Table 3-1 and Figure 3-1.

3.2.1 Soil and Vegetation Conditions

Soil and overburden material samples collected in the Pedro Creek sub-basin indicate that selenium concentrations in the overburden material (including all depth ranges) range from 1 to 252 mg/Kg, with an average concentration of 55 mg/Kg. The selenium concentrations in soil samples (including all depth ranges) downgradient of the ODA range from 0.2 to 96 mg/Kg, with an average concentration of 14 mg/Kg.

Selenium concentrations in vegetation growing on overburden material ranged from 0.2 to 1,404 mg/Kg, with an average concentration of 56 mg/Kg. The selenium concentrations in vegetation growing downgradient of the ODA range from 0.03 to 106 mg/Kg, with an average concentration of 20 mg/Kg.

The Pedro Creek ODA extent is well defined based on the detailed documentation on panel development and ODA construction, and the easily discernible waste material and panel boundaries. The locations sampled (Figure 3-1) allow for spatial characterization of COPC concentration levels and extent of transport.

3.2.2 Surface Water Conditions

Surface water sampling locations including seep NES-5 within the Pedro Creek sub-basin (Figure 3-1) were sampled predominantly during the spring and fall seasons.

Seep water quality – As noted previously, there are a number of locations along the top of the ODA where pooling of rainfall and runoff occurs, promoting infiltration and resulting in the seep (NES-5) at the toe. The NES-5 seep flows year-round, ranging between 0.002 to 0.03 cfs. Most of the seep flow is lost to subsurface infiltration within 100 feet of its initial surface expression. Selenium concentrations in NES-5 average 3 mg/L and range from 0.5 to 6.9 mg/L (Table 3-1), exceeding the Idaho Water Quality Standard for surface water (IDAPA 58.01.02.210.1) (0.005 mg/L).

Pedro Creek water quality – Pedro Creek is an intermittent stream with portions of the creek, downgradient of the confluence between the mainstem and tributary 1, flowing all year round (e.g., around PC-2). Under baseflow conditions, Pedro Creek loses flow downgradient of NES-5 (average flow 0.004 cfs) and goes dry before gaining flow in the vicinity of PC-5 (average flow 0.001 cfs). Between NES-5 and PC-5, Pedro Creek loses flow and does not gain any flow until around PC-2 (average flow 0.18 cfs), loosing flow again towards the mouth of the creek (Figure 3-1). Depending on the seasons, during baseflow conditions Pedro Creek at the mouth (PC-1) ranges from dry to 0.3 cfs (average 0.18 cfs). During spring-runoff conditions, Pedro Creek ranges in flow from 0.007 to 1.9 cfs. During high-flow conditions, selenium concentrations in Pedro Creek exceeded the Idaho Water Quality Standard for surface water from its headwaters to its confluence with Trail Creek (Figure 3-1 and Table 3-1), ranging from 0.3 to 5 mg/L.

3.2.3 Sediment Conditions

Average selenium concentrations for sediment in Pedro Creek range from 1 to 717 mg/Kg (Table 3-1). A general decreasing trend in selenium concentration was observed in the Pedro Creek samples from upstream to downstream, with the most-upstream selenium concentration (PC-5) measuring 717 mg/Kg and the concentration at the mouth of Pedro Creek (PC-1) measuring 1.2 mg/Kg.

3.2.4 Groundwater Conditions

Two shallow alluvium/colluvium monitoring wells (GW-28 and GW-30), and one Dinwoody Formation (GW-29) well exist downgradient of the Pedro Creek ODA. These wells are situated along the groundwater flow direction and pathway of COPC migration. The Pedro Creek ODA sits in a draw that drains into a single basin downgradient of the ODA, effectively channeling releases towards the monitoring wells. Monitoring wells GW-28 and GW-29 are located in close proximity to the ODA, and monitoring well GW-30 is located further downgradient of the ODA (Figure 3-1).

Alluvium/colluvium Groundwater Conditions in Close Proximity to the ODA – Selenium concentrations in close proximity to the ODA range from 0.94 mg/L and 1.2 mg/L, based on samples from GW-28 (Table 3-1). These concentrations exceed the Federal Maximum Contaminant Level (MCL; 0.05 mg/L), but are less than the maximum levels measured in the seep NES-5 which emanates from the toe of the Pedro Creek ODA (6.89 mg/L).

Alluvium/colluvium groundwater quality in close proximity to the ODA can also be evaluated at the first appearance of gain in Pedro Creek flow under base-flow conditions. Surface water sampling location PC-5 was the most upgradient location on Pedro Creek where groundwater was emerging in the summer of 2009. PC-5 is located within 300 feet upgradient from monitoring well GW-28 (Figure 3-1). With no additional sources of selenium or tributary flow between the seep and this location, station PC-5 provides data indicative of alluvial system load to surface water. The selenium concentration at PC-5 under base-flow conditions in the summer of 2009 was measured at 1.13 mg/L, similar to levels measured in GW-28 (1.2 mg/L) in the summer. These concentrations exceed the MCL (0.05 mg/L) and the Idaho Water Quality Standard for surface water (0.005 mg/L).

Alluvium/colluvium Groundwater Conditions along the Flow Path from the ODA – The average total selenium concentration in GW-30, at 0.0039 mg/L, is below the MCL (0.05 mg/L). The selenium concentration in GW-30 ranged from 0.002 to 0.0048 mg/L, and is significantly less than levels measured in GW-28 (0.94 mg/L and 1.2 mg/L) (Table 3-1).

Dinwoody Formation Groundwater Conditions in Close Proximity to the ODA – The average total selenium concentration in the Dinwoody Formation in close proximity to the ODA (GW-29), at 0.03 mg/L, is below the MCL (0.05 mg/L). Ranging from 0.03 to 0.032 mg/L (Table 3-1), the selenium concentrations in GW-29 are an order of magnitude lower than levels measured in the overlying shallow alluvium/colluvium (GW-28, 0.9 to 1.2 mg/L).

3.2.5 Ongoing Site Characterization Activities

Data gathering activities continue at the Pedro Creek ODA to complement the existing data, help refine current observations and to support future effectiveness monitoring of a response action. These data gathering activities include:

- Monthly sampling of GW-28, GW-29, GW-30, NES-5, PC-2, PC-3A, PC-4, and PC-5 (May through September, 2010) to obtain additional paired surface water groundwater data;

- Flow measurements at the Pedro Creek seep (NES-5) with a dedicated flume to obtain accurate flow data for use in future water-balance and mass-balance evaluations;

- Continuous water level measurements at GW-28 and GW-29;

- Drilling of three boreholes and advancement of four test pits to obtain geotechnical information (Formation 2010); and

- Installing temporary piezometers to collect groundwater samples and confirm conditions in the ODA and bedrock underlying the ODA.

4.0 STREAMLINED EVALUATION OF POTENTIAL RISK

A streamlined screening risk evaluation (SRE) was performed to assess the potential threats to human and ecological receptors associated with the Pedro Creek ODA and to evaluate potential benefits of the removal action alternatives. The SRE focused on the likely risk-driving COPCs (arsenic, cadmium, chromium, selenium, vanadium, and zinc) as identified in the RI/FS Work Plan (NewFields 2008b), and the concentrations of these COPCs in the media in and around the Pedro Creek ODA.

Potentially complete exposure pathways for ecological receptors (e.g., terrestrial, riparian, and aquatic species) in the vicinity of the Pedro Creek ODA include:

- Ingestion of surface water and incidental ingestion of overburden soil, riparian soil, and sediment;
- Plant uptake of COPCs from overburden soil, riparian soil, sediment, and surface water;
- Dermal contact with surface water (fish and non-fish aquatic life);
- Dermal contact with sediment (non-fish aquatic life only); and
- Dietary uptake (food web transfer).

Potentially complete exposure pathways for human receptors in the vicinity of the Pedro Creek ODA include:

- Incidental ingestion of, dermal contact with, and radiation from overburden materials;
- Inhalation of overburden-derived particulates;
- Ingestion of wild game;
- Incidental ingestion and dermal contact of sediments;
- Ingestion and dermal contact with surface water and groundwater;
- Ingestion of Site-derived livestock (beef and/or mutton); and
- Ingestion of teas brewed from Site-derived terrestrial plants (Native American).

To provide a conservative assessment of potential risks to human and ecological receptors, concentrations for the aforementioned risk-driving COPCs in each of the media were compared to appropriate human and ecological risk-based benchmarks (Table 3-1). The conservative risk-based benchmarks represent concentrations believed to provide for adequate protection of potential receptors. Therefore, potential threat to human or ecological receptors is indicated, when COPC concentrations exceed risk-based screening benchmarks[14] for complete exposure pathways. It should be noted that the exposure assumptions used to develop screening benchmarks could overstate risk for receptors using the Pedro Creek area. For example, the default drinking water assumptions are not likely plausible for Pedro Creek. The data were evaluated for usability consistent with the approach set forth in the RI/FS Work Plan (NewFields 2008b), and only data assigned a quality level of 5 (i.e., considered suitable for use in risk assessments) were used in this SRE. The following subsections present the SRE.

4.1 Concentrations of Risk-Driving COPCs

The following sub-sections describe how concentrations (Table 3-1) of risk-driving COPCs are clearly elevated with respect to background levels typical of the region, exceed State and Federal standards, and indicate potential for unacceptable risk to human and ecological receptors of concern exposed to the media in and around the Pedro Creek ODA. The plausibility and frequency of exposure is highest for ecological receptors using the Pedro Creek ODA area. Therefore, for the purpose of this EE/CA, screening results described in the following subsections focus on the potential ecological risks from exposure to site media. Complete risk estimates for all plausible exposure scenarios will be evaluated during the RI.

4.1.1 Pedro Creek ODA

The data for the Pedro Creek ODA show that the risk-driving COPCs are present at concentrations significantly exceeding conservative benchmarks (Table 3-1) considered protective of human health and ecological receptors in one or more of the media. All COPCs evaluated during this SRE exceed at least one screening benchmark, although selenium most consistently exceeds relevant benchmarks. The highest exceedances of ecological benchmarks are as follows:

- In ODA soils, chromium and selenium had the greatest exceedances of ecological screening benchmarks with maximum factors of exceedances of 2,100 and 485, respectively.

- In vegetation growing on top of the ODA, selenium had the greatest exceedance of the ecological benchmark for vegetation with a maximum factor of exceedance of 540.

- In the ODA seep, selenium had the greatest exceedance of the ecological benchmark for waters with a maximum factor of exceedance of 1,380.

[14] The human health soil benchmarks used for screening represent the lower of one tenth the non-carcinogenic screening level and a carcinogenic screening level based on a 10^{-6} excess lifetime cancer risk. These assumptions are used to address the potential cumulative risks from multiple chemicals and exposure media.

Although the screening benchmarks may not equate to cleanup levels and natural background levels have not been considered in this SRE, the significantly elevated concentrations of COPCs in the overburden material can adversely affect flora and fauna. Specifically, elevated selenium concentrations in vegetation (e.g., the hyper accumulators) and surface water can pose potential risk to livestock and wildlife through the ingestion pathway, depending on the frequency of exposure.

4.1.2 Downgradient of the Pedro Creek ODA

The elevated concentrations of the risk-driving COPCs in the media downgradient of the Pedro Creek ODA indicate releases and transport from the ODA.

Soil – All of the risk-driving COPCs exceed their respective benchmarks in soils immediately adjacent to the Pedro Creek ODA (Table 3-1). Chromium and selenium had the greatest exceedances of ecological screening benchmarks with maximum factors of exceedances of 1,640 and 184, respectively.

Vegetation – Selenium concentrations exceed its benchmark values protective of ecological health in vegetation immediately adjacent to the Pedro Creek ODA (Table 3-1) with a maximum factor of exceedance of 41.

Surface Water – Arsenic, cadmium, selenium and zinc exceed their respective benchmarks in surface water downgradient of the Pedro Creek ODA. Selenium had the greatest exceedance of its ecological benchmark (Idaho Water Quality Standard) with a maximum factor of exceedance of 1,000.

Sediment – All of the risk-driving COPCs exceed their respective benchmarks in sediment immediately adjacent to the Pedro Creek ODA (Table 3-1). Cadmium had the greatest exceedance of its ecological benchmark with a maximum factor of exceedance of 74.

Groundwater – Arsenic, cadmium, selenium and zinc exceed their respective benchmarks in groundwater immediately adjacent to the Pedro Creek ODA (Table 3-1). Selenium had the greatest exceedance of its ecological benchmark with a maximum factor of exceedance of 238.

The significantly elevated concentrations of the COPC in the media downgradient of the overburden material can adversely affect flora and fauna in the area. Specifically, elevated selenium concentrations in vegetation (e.g., the hyper accumulators), soil, surface water (e.g., seeps and creeks) and groundwater (e.g., ponds) can pose potential risk to livestock and wildlife frequenting the area. Slope failures or mass wasting of the steep unreclaimed overburden pile could result in additional release of COPCs to downgradient areas.

4.2 Streamlined Potential Risk Evaluation Conclusion

Complete exposure pathways exist for the receptors (e.g., aquatic biota, livestock, wildlife and humans) frequenting the area in and around the Pedro Creek ODA. With consideration of the most plausible exposure scenarios in the vicinity of the Pedro Creek ODA, maximum concentrations of mine-related contaminants were measured in the overburden at levels one to three orders of magnitudes greater than screening benchmarks protective of human health and the environment. Therefore, the ODA could pose current and future potential risk to human and ecological receptors, if not addressed. Additionally, the significantly elevated maximum concentrations of the risk-driving COPCs in soil, vegetation, surface water, sediment, and groundwater downgradient of the Pedro Creek ODA indicate transport of mine-related contaminants has occurred and potential unacceptable risk to human and ecological receptors. Consequently, there is the need for a response action to control releases and reduce exposure to the Pedro Creek ODA media. Releases of COPCs, if not addressed by implementing a response action, will continue to migrate and presents a potential unacceptable risks to human health and the environment. Slope failures or mass wasting of the steep unreclaimed overburden pile could result in additional release of COPCs to downgradient areas.

5.0 IDENTIFICATION OF REMOVAL ACTION OBJECTIVES AND ARARS

This section presents the RAOs for the Pedro Creek ODA, along with ARARs. The presence of significantly elevated concentrations of the potential-risk-driving COPCs in the exposure media at and downgradient of the Pedro Creek ODA indicate potential risk to human and ecological receptors. Current conditions at the ODA contribute to continued releases and migration of selenium and other COPCs in the future. The goal of a removal action at the Pedro Creek ODA is source control to stabilize the ODA and reduce COPC migration.

The selected removal action is intended to be consistent with a potential final remedy for the Site. However, it may be necessary to augment the removal action with additional response actions in the future as a result of information from the RI/FS and/or performance monitoring. The removal action will be designed to be consistent with ARARs to the extent practicable. The RAOs and potential ARARs are described in this section.

5.1 Removal Action Objectives

The following RAOs are identified for the removal action:

- Stabilize the ODA from an erosion and seismic standpoint and minimize the potential for future erosion, slumping, and mass-wasting of ODA materials.
- Reduce the releases and migration of selenium and other COPCs from the ODA that currently result in exceedances of MCLs in groundwater and water quality criteria in surface water.
- Reduce releases and migration of selenium and other COPCs from the ODA that result in unacceptable risks to wildlife receptors of concern due to elevated concentrations in soils, sediment, and fish in the Pedro Creek sub-basin.
- Reduce risks to livestock and humans due to exposure to selenium and other COPCs in surface water, soils, and sediments. Reduce concentrations of COPCs in alluvial groundwater which may be used for livestock watering.

By addressing the RAOs, releases and migration of selenium and other COPCs to the environment will be reduced. The removal action alternative will be selected to address these RAOs and to meet the ARARs.

5.2 ARARs

The development of removal action alternatives under CERCLA relies, in part, on the identification of ARARs which any action must meet, unless the requirement(s) are waived.

These requirements can be either applicable or relevant and appropriate. Applicable requirements are cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal or state laws that specifically address a hazardous substance, constituent, removal action, location, or other circumstance found at a site. Section 300.415(i) of the NCP provides that removal actions pursuant to CERCLA section 106 attain ARARs under Federal or State environmental laws or facility siting laws, to the extent practicable considering the urgency of the situation and the scope of the removal. Relevant and appropriate requirements, while not applicable to a hazardous substance, pollutant, contaminant, removal action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the site that their use is well-suited to the site (40 CFR 300.5).

In addition to ARARs, many federal and state environmental and public health programs also have criteria, advisories, and guidance that are not legally binding but may provide useful information or recommended procedures. These To-Be-Considered (TBC) standards complement ARARs and are identified for use in guiding remedial actions.

In the Site RI/FS Work Plan (NewFields 2008b), Simplot conducted a preliminary identification of potential state, federal, and tribal ARARs (chemical-specific, location-specific, and action-specific). This analysis has been refined relative to specific conditions found in the Pedro Creek ODA and the scope of potential actions to be performed. A summary of potential ARARs is presented in Table 5-1.

The source-control action at the Pedro Creek ODA would be intended to reduce the risks of erosion and mass wasting of the ODA materials, and to reduce the potential risks to wildlife and livestock from direct contact and ingestion. The Early Action will also reduce the concentrations of selenium and other COPCs being released into groundwater, surface water, and sediments downgradient from the ODA; however, the goal of the Early Action is not necessarily to meet the chemical-specific ARARs identified in Table 5-1. If chemical-specific or location-specific ARARs are not achieved by the Early Action, then additional actions to meet these ARARs will be addressed as part of the RI/FS.

6.0 TECHNOLOGY SCREENING AND IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

This section identifies the removal action alternatives and summarizes the process by which the alternatives were developed. Consistent with EE/CA guidance, a limited number of relevant and viable alternatives, appropriate for addressing the RAOs, are selected for evaluation and comparison. A large information base of technologies is available regarding the control of releases from historical mining and milling sites under CERCLA. Considerable information on specific options to control selenium releases to the environment has also been developed for the southeast Idaho phosphate mines.

Section 6.1 provides a review of the technologies and approaches that have been further considered based on specific conditions in the area of the Pedro Creek ODA. Justification is presented for technologies that were screened and not carried forward into removal action alternatives. The technologies identified for consideration are assembled into removal action alternatives in Section 6.2. The removal action alternatives are evaluated individually with respect to the specific evaluation criteria set forth in USEPA's 1993 guidance.

6.1 Technology Screening

This section uses the information provided in previous sections to identify and preliminarily evaluate technologies to be used in the development of the removal action alternatives. Technologies were selected for evaluation based on potential application to conditions at the Pedro Creek ODA and experience implementing the technologies at other similar sites, while considering technologies presented in the *Best Management Practices Guidance Manual for Active and Future Phosphate Mines* (Montgomery Watson 2000). The discussion is structured by the technology types evaluated for specific conditions in the area of the Pedro Creek ODA. Fundamental considerations regarding the selection of technologies for removal action alternative development are presented, including general implementability, effectiveness, and cost.

6.1.1 Excavation and Disposal

Complete excavation of the ODA materials with disposal at a repository (either on-Site or off-Site) would result in extensive short-term environmental impacts. The material volume in the ODA is large (several million cubic yards [cy]) and a suitable repository for disposal of this volume of material would have to be developed. There would be significant short-term impacts associated with construction of the repository and transportation of the material. The cost for relocation would be very high, and there are other technologies that would be effective at meeting the RAOs of the Early Action at significantly lower cost. Therefore, complete excavation and relocation is not retained for further consideration for the Pedro Creek ODA.

Excavation and disposal of source materials is a viable option for mining features in the area that are of relatively small volume, such as erosion deposition areas. The implementability of disposal options would depend on the timing relative to large-scale regrading or backfill consolidation activities. If regrading of backfill materials is implemented, then excavated materials could be consolidated with other materials as required by other removal action plans, depending on requirements and schedule. Excavation and disposal is retained as an option for small-volume mine features (e.g., accumulated erosion deposition).

6.1.2 Surface Water Management

Surface water management techniques are commonly used as a component of source control technologies for remediation of mining wastes. As discussed above, there is a comprehensive set of controls for the development of phosphate mining sites in southeast Idaho, including the management of water to reduce infiltration through overburden, thus reducing releases of selenium to the environment. Some of the surface water management controls that have been developed are described below.

Diversion Ditches for Run-on and/or Runoff Control – A diversion ditch is constructed to divert an influx of surface water runoff away from or around an area or reduce the surface erosion potential from runoff resulting from excess precipitation on a land or closure surface. Implementing this option, in combination with grading and reshaping, would minimize contact with ODA materials by reducing pooling and infiltration into the ODA. Diversion ditches can be used to divert “clean water” (run-on) from undisturbed areas around a mine disturbance area, or to route flow (runoff) from a particular portion of the disturbance area around a particular facility or to a control structure. Diversion ditches would be effective upgradient of certain backfilled pits and external ODAs to reduce clean surface water run-on from the adjacent slopes by diverting it into existing creeks or drainage collection areas. Also, channels, drains, terraces, and detention basins would be effective to control runoff and sedimentation from closure areas. The diversion ditches option is retained for the development of removal action alternatives for the Pedro Creek ODA.

Stream Alteration – Altering a stream refers to obstructing, diminishing, modifying, or otherwise relocating the natural existing shape or direction of flow of any stream channel within or below the mean high watermark. Stream alteration or diversion should be considered when natural flow needs to be diverted away from a mine pit, overburden pile, sedimentation pond, or other mine facility.

The first evidence of flow to the Pedro Creek stream channel exists immediately downgradient from the ODA toe, where the seep NES-5 emanates. The channel continues downstream (to the east) away from the Pedro Creek ODA. Stream alteration would not be applicable here because the downstream reaches have no contact with the ODA. Therefore, this option is screened out from further consideration in the EE/CA.

6.1.3 Grading and Reshaping

Grading and reshaping techniques are commonly used as a component of surface water management and surface modification for remediation of mining wastes. As discussed above, there is a comprehensive set of controls for the development of phosphate mining sites in southeast Idaho, including slope shaping to improve runoff and reduce erosion potential along with terracing of slopes to reduce slope lengths and, therefore, erosion potential. Some of the grading and reshaping techniques that have been developed are described below.

Slope Shaping – Slope shaping involves modifying cut and fill slopes to reduce soil erosion and potential erosion from surface water runoff. This technique can be highly effective and practical when applied correctly to the specific conditions of the Pedro Creek ODA. For the best application of slope shaping, grading should result in slopes and lengths that will be stable, with minimal erosion, in the long term. Also, the slope shaping activities should be implemented, to re-establish a hydrologic system, as feasible, similar to the pre-mining condition. Slope lengths should be minimized and areas with low slopes maximized to control erosion potential in areas of slope shaping. Where slopes steeper than 3:1 are unavoidable, other erosion control measures are required such as contour terracing, benches, and erosion control/turf reinforcement mats. Slope shaping is retained for the development of removal action alternatives.

Contour Terraces – Contour terraces are earth embankments and channels constructed along the contour on the slope face. This technique is primarily intended to reduce overland runoff flow lengths, thus decreasing the potential for erosion on long hill slopes and/or in highly erodible soils. Contour terraces can be designed as benches, steps, or serrations. In addition to providing reduced erosion potential, contour terraces can provide access for maintenance equipment after the area has been reclaimed. These terraces should be constructed to allow runoff to freely occur by including a slight gradient to prevent flow accumulation or ponding. Contour terraces can be used on any slope, but are generally increasingly effective for areas with steeper slopes. Typically, terraces or benches vary in width from approximately 4 to 10 feet, with vertical spacing varying from 30 to 100 feet. The contour terrace option is retained for the development of removal action alternatives.

6.1.4 Surface Modification and Cover

Surface modification and cover refers to actions on source areas that provide a physical barrier to reduce exposure of ODA materials to weathering conditions, prevent contact with materials of concern, or modify surface conditions to address environmental concerns (such as reducing water infiltration). These actions are applicable to large surface areas such as the surface of ODAs. These actions can be used alone or in conjunction with the surface water management and grading and reshaping technologies discussed above. Some of the surface modification and cover actions that have been developed are described below.

Capping – There are a variety of capping techniques that are available for reclamation of overburden. Capping systems can be simple or complex, consist of one or multiple layers, and can be designed with natural or synthetic materials. Examples include soil cover, geosynthetics such as geomembrane (GM), geosynthetic clay liner (GCL), or local materials such as fragments of Chert, Dinwoody Formation, and/or Salt Lake Formation. Such covers can prevent direct contact in situations where source materials are present at the surface. If a low permeability cover such as GM or GCL is used, an overlying natural or geosynthetic drainage layer must be placed just below the soil or rock cover and the closure slope generally needs to be flatter than 3:1 to achieve stability of the cover over the geosynthetic materials. Textured GMs or GCLs with high internal shear strength are needed to provide stability of geosynthetic materials on side slopes steeper than 5:1. Final slopes of 4:1, or flatter, are not feasible at the Site, therefore geosynthetics would need to be designed for final side slopes of 3:1. For side slopes of 3:1, additional anchoring of the geosynthetics is also required and angular gravel or rock is required above a geotextile (over a textured GM or top surface of a GCL) for stability of this layer. The use of geosynthetics is retained as a possible capping technology for the Pedro Creek ODA.

Chert barriers are used as a Best Management Practice (BMP) in current phosphate mining in southeast Idaho, but this is only feasible because sufficient Chert is locally generated by active mining. For large historical mining features, it may be difficult to find sufficient Chert from a separate local borrow source without increasing the potential of exposing the Meade Peak to weathering, depending on the volume of material required. Covering with Chert can be an effective method of preventing direct contact with water, sediment, and associated vegetation in seep flow areas. It would be implemented in conjunction with source controls which are designed to reduce or eliminate seep flow. This action is retained for further consideration for covering relatively small mining features such as the ODA seep and for larger features such as the ODA.

The Dinwoody and Salt Lake Formations can have the right properties for use as low-permeability soil covers. The Dinwoody Formation is comprised of interbedded siltstone, shale, and limestone that grades into a calcareous shale and siltstone with depth. The silty limestone weathers into dense clayey soils with the appropriately low hydraulic conductivity for use as a low-permeability cover. The Salt Lake Formation is comprised of limestone, calcareous siltstone, sandstone, and conglomerate. The siltstone in the Salt Lake Formation also has the appropriately low hydraulic conductivity for use as a low-permeability cover.

Capping is retained for the development of removal action alternatives for the Pedro Creek ODA.

Soil Cover – A soil cover can function as a “reservoir” in which soil moisture can be replenished during wet periods (e.g., snowmelt) for later use by vegetation. This type of cover is typically called an evapotranspiration (ET) cover and is typically 4 feet or more in thickness. An ET soil cover typically has a thick enough soil layer to prevent roots, and possibly burrowing animals, from entering into an underlying granular capillary break layer. ET covers have been shown to be effective in limiting infiltration in semi-arid climates.

A soil cover can provide a physical barrier between the vegetation root zone and ODA materials, thus reducing selenium uptake by the plants along with preventing direct contact by potential receptors. As a component of a capping system, a soil cover should be designed to provide a suitable growth medium for long-term sustainability of vegetation as described below. conventional soil covers with vegetation are 12 to 18 inches in thickness. The conventional soil cover and thicker ET cover are retained for the development of removal action alternatives.

Vegetative Cover – Establishing vegetative cover is a standard surface reclamation technique for backfilled pits and external ODAs. In addition to stabilizing surface materials by reducing erosion potential, a well-vegetated cover increases evapotranspiration at the surface and reduces water infiltration into overburden and subsequent release of selenium. Planting of native species that have low affinity for selenium uptake may be effective in reducing potential risks to grazing livestock and to ecological receptors. Also, a vegetative cover improves aesthetics. With time, the vegetation will help build up the organic material at the surface which will help remove oxygen from infiltrating water, further reducing the potential for oxidation and the release of selenium from underlying overburden material. Vegetative cover is retained for development of removal action alternatives.

Soil Amendment and Fertilization – The use of soil amendments and fertilizers, in combination with proper seedbed preparation, topsoiling, planting methods, selection of species, and moisture, greatly enhance the chance of revegetation success. Fertilizers add nutrients to the soil which encourage plant establishment, speed up plant growth, and maintain plant productivity. On overburden shales, fertilizer will accelerate the production of biomass, which will provide long-term nutrients that enhance vegetative growth. The soil amendment and fertilization option is retained for development of removal action alternatives.

Species Modification – Modifying the vegetation to reduce the proportion of selenium-accumulator species would help reduce the average selenium content in vegetation. Higher concentrations of selenium in forage samples collected from the Site may have been due to the presence of known selenium-accumulating species in the samples (Kabata-Pendias 2001). Long-term monitoring of seeded areas is required to maintain an appropriate and diverse vegetation community and prevent invasion of undesirable species; in some cases, application of selective herbicide may be needed to control weeds. Reducing or eliminating the presence of selenium-accumulator species and replacement with low level selenium-accumulator species is retained for development of removal action alternatives. The use of non-selenium accumulating species to revegetate graded areas is consistent with future actions to be considered at Conda. However, selenium uptake to vegetation will be fully addressed in the RI/FS.

6.1.5 Institutional/Access Controls

Interim institutional controls (ICs)[15] and access controls can be effective methods of preventing contact with materials that pose a potential risk while removal action selection is ongoing, or means of preserving the physical integrity of constructed removal actions. ICs would limit vehicle traffic to designated roadways and trails. Some of the ICs and access controls that have been successfully developed are described below.

Range Management – The BLM has grazing management plans in place for the grazing allotments in the area of the Pedro Creek ODA. Grazing management plans are tools used by land managers to protect water quality, forage, and beneficial use. Traditionally, grazing control is the practice of managing forage harvest levels by cows, horses, and sheep, so that the plant cover and community composition are maintained and erosion and sedimentation are not accelerated. Grazing controls are included as a BMP at reclaimed mine facilities. The practice can also be implemented to limit the location, timing, and duration of livestock grazing at reclaimed mine facilities. Controlling domestic livestock grazing would help to reduce the potential for unacceptable exposure and, therefore, is retained for further consideration as an interim measure for the Pedro Creek ODA Early Action. The long-term plan for BLM land is to return the area affected by this action, as well as the entire Site, to the historically established grazing allotment.

Fencing – Fencing can be used to prevent access to reclaimed areas to allow adequate establishment of a vegetative cover without disturbance. Fencing is retained for further consideration as an interim measure for the area of the Pedro Creek ODA. When adequate vegetative cover is present, fencing on all public land will be removed, if determined appropriate.

Alternative Water Supply – The purpose of this practice is to provide water sources to domestic livestock and wildlife that are impacted by activities at the mine. It is appropriate for areas in which there are significant water sources used by livestock and wildlife, and these sources would be affected by construction activities for proposed removal action. However, only limited undeveloped water sources are present at the ODA that could be affected by construction activities. Access to the detention pond at seep NES-5 will be reduced, however access to other areas where water is present along Pedro Creek would remain. This option,

[15] Permanent ICs such as administrative and legal controls that limit land or resource use at the Site may be implemented as part of the Remedial Action to address any risks of exposures that may remain following cleanup.

involving provision of alternative water supplies, is not retained for further consideration as part of the early actions. Proposed actions will result in significantly improved conditions in the water quality for Pedro Creek, as well as the detention pond. If alternative water supplies are to be considered at this Site, they will be considered and evaluated during the FS.

Habitat Management – Like soil, water, and vegetation, wildlife is a resource that must be protected. While wildlife control can be difficult, there are certain practices that can be applied to reduce the potential for exposure. In particular, modifying vegetation can change the species that will forage on reclaimed areas (see above). This option is not being retained for the Early Action; however, habitat management may be considered during development and evaluation of alternatives during the FS.

Deed Restrictions, Covenants, Environmental Easements, Land Use Ordinances or Administrative Rule-Making – IDEQ (2004) recommends precautionary measures to prohibit residential development of any phosphate mining waste units or impacted areas that may present potential public health risks in the future. The consideration of measures to preclude future residential use of the Pedro Creek ODA will be made during the FS; therefore, this option is not retained for further consideration as part of the Early Action.

6.1.6 Groundwater Capture/Control

Groundwater capture/control technologies can include pump and treat using extraction wells, or interception trenches. Installation of groundwater extraction wells to intercept the groundwater for treatment (i.e., pump and treat) is not readily implementable or cost effective due to accessibility. Installation of interception trenches for passive treatment is implementable for capture and treatment of shallow alluvial groundwater. However, the Early Action at the Pedro Creek ODA is intended as a source control measure. Source control provides a more practical and long-term effective approach. Therefore, groundwater capture/control is not considered further for the Early Action. Consideration of groundwater capture/control technologies as a long-term measure to address groundwater conditions will be deferred to the FS.

6.1.7 Water Treatment

Water treatment is a potentially viable option for seeps. However, it is a less desirable alternative to source control, surface water management, and other measures to reduce the volume and concentration of impacted waters. The Early Action at the Pedro Creek ODA is intended as a source control measure. Source control provides a more practical and long-term effective approach to eliminate seeps from ODAs. Therefore, this option is not considered further for the Early Action. Consideration of water treatment as a long-term measure to address water quality conditions will be deferred to the FS.

6.2 Removal Action Alternatives

Six removal action alternatives were developed for the Pedro Creek ODA, which includes the main overburden pile and the area upslope from the main pile. The six alternatives are:

- Alternative 1: No Action (as required for consideration by the NCP);
- Alternative 2: In-Place Consolidation/Regrading in Side Slope Area, with Direct Revegetation on Amended Overburden Materials on the ODA;
- Alternative 3: In-Place Consolidation/Regrading in Side Slope Area, with Soil Cover[16] and Revegetation on the ODA;
- Alternative 4: In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Soil Cover and Revegetation on the ODA;
- Alternative 5: In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Thick ET Soil Cover and Revegetation on the ODA; and
- Alternative 6: In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Geosynthetic-Soil Cover System and Revegetation on the ODA.

A summary of the removal action measures for each of these alternatives is provided in Table 6-1. These alternatives are described further, below, and individually evaluated with respect to the criteria of effectiveness, implementability, and cost, per USEPA's 1993 guidance:

- Effectiveness – Protectiveness of public health and community, workers during removal action implementation, and the environment due to reduced mobility of contaminants as well as compliance with ARARs and the ability to achieve RAOs.
- Implementability – Technical feasibility, availability of equipment and services, the extent of post-removal Site control (PRSC), and administrative feasibility.
- Cost – Capital costs, PRSC costs, and present worth costs.

Detailed cost estimate information for the six removal action alternatives is provided in Appendix B. As part of Appendix B, a summary of the present worth estimates for each removal action alternative is presented on Table B-1. Detailed cost estimate information for the components used for the removal action alternatives is presented on Tables B-2 through B-6. Note that the cost estimates for the removal action alternative components, as presented on Tables B-2 through B-6, do not reflect present worth, or the cost associated with the new perimeter fence Simplot is currently installing as part of Site maintenance. The detailed cost estimates are based on USEPA guidance (USEPA 1988, 2000). The present worth estimates are for comparative purposes.

[16] The soil cover would be comprised of either approved Dinwoody Formation, or Salt Lake Formation material, to provide a low-permeability soil cover system.

6.2.1 Alternative 1: No Action

This alternative includes leaving the ODA as is. Site maintenance activities would continue, including the installation of a fence[17] along the property boundary, which is being installed regardless of the potential early action. This alternative is required by the NCP to provide a baseline against which action alternatives are compared.

Effectiveness – The no-action alternative would not provide long-term or short-term effectiveness and permanence because it does not meet the RAOs identified for this removal action. Since the ODA would remain in place as is, it would continue to present a threat to human health and the environment. The no-action alternative will not meet ARAR requirements.

Implementability – The no-action alternative is technically easy to implement. There would be no additional risks posed to the community, the workers, or the environment as a result of implementing this alternative, since no action would be taken.

Cost - No costs are associated with the no-action alternative.

6.2.2 Alternative 2: In-Place Consolidation/Regrading in Side Slope Area, with Direct Revegetation on Amended Overburden Materials on the ODA

Alternative 2 includes in-place consolidation and regrading of the consolidated materials on the steep side slopes, direct revegetation with non-accumulator species after amending the overburden surface, installation of run-on and runoff diversion ditches and other erosion and sedimentation controls, and implementation of interim ICs. Components of Alternative 2 are described below and summarized on Table 6-1.

- <u>Grading and reshaping</u> (Figure 6-1)
    - Grade the existing steep slopes to achieve slopes no steeper than 2:1. Establish the toe of the regraded pile in the same approximate location as the existing toe. A total cut volume of 360,000 cy is estimated to reduce the existing slope to 2:1. The 2:1 slope will require benches to reduce the potential for erosion.
    - For areas on the top of the ODA (top area), above the new 2:1 slope, grade where pooling occurs to promote drainage and prevent pooling of rainfall and snowmelt water.
    - Grade the upslope area where pooling occurs to promote drainage and prevent pooling of rainfall and snowmelt water.

[17] Simplot is in the process of installing a new perimeter fence around the Conda Mine property, to help with the management of access to mining-impacted areas.

- Small-scale excavation with consolidation (Figure 6-1)

    - Small areas of ODA materials will be removed from drainages, detention ponds, or other areas near the ODA. The small-scale excavation materials will be consolidated within the area to be regraded.

- Surface water management, including control of run-on/runoff and erosion (Figure 6-2)

    - Install riprap, grouted-riprap, or equivalent-armored chutes to convey higher velocity runoff in areas with steeper gradients.
    - Construct ditches/swales to convey runoff from the ODA surface, with erosion control measures for the ditches/swales and outfall area.
    - Construct a runoff conveyance ditch along the new toe of the ODA to convey clean runoff flow to Pedro Creek channel.
    - Construct run-on control ditches along the upgradient perimeter of the upslope area to prevent drainage from the upgradient Woodall Mountain ODA from entering the upslope area.
    - Construct run-on control ditches along the downgradient perimeter of the upslope area to prevent drainage from the upslope area from entering the rest of the ODA, with erosion control measures for the ditches and outfall areas.

- Surface modification and cover

    - Perform surface amendment and seeding in the regraded areas.
    - Amend overburden surface materials with composted manure at a rate of 40-50 dry tons per acre. Incorporate the amendment into the overburden to a depth of 12-18 inches.
    - Seed vegetation directly on the amended overburden materials. Use modified species with low potential for selenium uptake (i.e., non-hyper-accumulator species) to control erosion and establish a diverse community of native species.

- Institutional/access controls

    - Fencing will be installed around the seep and settlement basins.
    - Range management will be performed to limit cattle grazing until such time as re-vegetation success is achieved. Temporary fencing around revegetated areas may be utilized as necessary, and in consultation with the Agencies, to allow for adequate establishment of the vegetative cover.

- BMPs during construction. BMPs would be implemented during construction to protect workers, the community, and the environment from short-term construction impacts such as erosion, fugitive dust, and other similar potential impacts. Such BMPs may include structural practices such as silt fences, straw bales, fuel storage containment areas and sedimentation ponds, and other non-structural BMPs such as watering haul roads and excavation areas to reduce fugitive dust emissions.

- Long-term monitoring. As long as ODA materials remain on-Site above actionable concentrations, a long-term monitoring program (e.g., annual or episodic events) would be implemented to ensure the continuing effectiveness of the removal action and to monitor conditions in the area and downgradient of the Pedro Creek ODA. The effectiveness monitoring program can include:

- Operation and maintenance of the consolidated materials as well as drainage systems (i.e., functionality inspections);
- Monitoring the discharge and water quality of the NES-5 seep;
- Monitoring the surface water and sediment quality in Pedro Creek;
- Monitoring the groundwater quality in unconsolidated deposits and the uppermost consolidated formation;
- Monitoring the levels of selenium in revegetated species; and
- Monitoring the integrity of the modified species composition (e.g., monitor for invasion of hyper accumulator species)

6.2.2.1 Effectiveness

Alternative 2 would be effective at reducing the threats to human health and the environment and would provide for long-term effectiveness and permanence. Run-on/runoff controls and grading will reduce the quantity of water available for infiltration into the ODA. ODA source materials would be subject to less infiltration, transport via surface water runoff, and soil erosion than under current conditions. Infiltration would be reduced through run-on/runoff controls and regrading areas of pooling that exist on the ODA. Direct revegetation would increase evapotranspiration and reduce erosion. Although reducing the plant uptake of selenium is not one of the RAOs for this early action, the disturbed areas will be revegetated with non-selenium-accumulator plant species. Use of non-selenium-accumulator plant species is expected to be effective in reducing selenium levels in vegetation compared to current conditions. It is anticipated that, once revegetation with non-selenium-accumulator species is fully established, the revegetation will tend to discourage re-growth of the selenium accumulator species. The long-term effectiveness of the revegetation will be assured through a routine monitoring program to evaluate the revegetated areas and to spray or otherwise modify the vegetation as necessary to keep selenium accumulator species from becoming re-established.

Alternative 2 would also provide for short-term effectiveness. There would be no risks to the community during implementation. Construction would be implemented using standard equipment and procedures that would be protective of workers. Overburden materials moved as part of regrading activities can release additional selenium and other COPCs in the short-term due to weathering. Under Alternative 2 approximately 350,000 cy of overburden would be moved during regrading activities. This alternative could be implemented in a single construction season.

Run-on/runoff controls, regrading and surface vegetation would reduce infiltration of rainfall and snowmelt into the ODA subsurface materials. As shown in Appendix C, it is estimated that Alternative 2 would result in a reduction in water entering the ODA materials by 53 percent compared to current conditions. This would be expected to have a corresponding reduction in selenium releases from the ODA by this pathway and will contribute to meeting MCLs in groundwater and surface water quality standards in Pedro Creek. However, direct revegetation may be difficult to maintain on the steep ODA slopes such that erosion of materials and transport to surface water and sediments may still occur.

Protectiveness – Alternative 2 would provide overall protection of human health and the environment. The ODA materials would be stable compared to current conditions. Benching and revegetation would reduce erosion.

Alternative 2 is also expected to reduce release of selenium and other COPCs to downgradient surface water and groundwater due to the reduction of infiltration (i.e., removal of pooling areas and increased runoff). Monitoring of conditions on and downgradient from the ODA would be used to determine the effectiveness of this alternative at reducing releases to groundwater, surface water, and sediments.

Compliance with ARARs – A summary of how Alternative 2 meets the key (i.e. with most stringent requirements) applicable and the key relevant and appropriate requirements is discussed in the following text. Table 6-2 summarizes how the alternative meets the remaining ARARs. Compliance with the ARARs would be achieved by consultation with the agencies and documentation generated as part of the design and implementation of the action.

Applicable ARARs – The key applicable ARARs include the promulgated federal and State surface water and groundwater quality standards (Table 5-1) and National Pollutant Discharge Elimination System (NPDES) Permit Regulations. Run-on/runoff controls, regrading and surface vegetation would reduce infiltration of rainfall and snowmelt into the ODA by an estimated 53 percent compared to current conditions. This reduction of infiltration into the ODA would reduce the release of COPCs to groundwater and surface water and would contribute toward meeting the requirements of these ARARs. Post-construction monitoring would be implemented to assess progress toward compliance with these requirements and any additional actions necessary to meet these ARARs will be addressed as part of the RI/FS.

Relevant and Appropriate ARARs – The key relevant and appropriate ARARs include National Emission Standards for Hazardous Air Pollutants Rules, NOAA Freshwater Sediment Benchmarks, etc as summarized in Table 5-1. Standard dust control methods during implementation would minimize the potential for release of overburden material to the air and provide for compliance with the substantive requirements of the National Emission Standards for Hazardous Air Pollutants Rules. The regrading, revegetating and stormwater management controls would minimize erosion and would contribute toward meeting the requirements of the NOAA Freshwater Sediment Benchmarks. No discharge to surface water is contemplated by the removal action and substantive requirements of the NPDES regulations would be met by meeting surface water quality standards and by continued compliance with existing stormwater permit. Dust and storm water controls can be implemented during construction to minimize releases and provide for compliance with pertinent regulations. This would be addressed in detail in the removal action design.

Ability to Achieve RAOs – The in-place consolidation and regrading of the consolidated materials on the steep side slopes; direct revegetation; and installation of run-on, runoff, erosion and sedimentation controls under Alternative 2 allow for stabilization of the ODA and reduction of releases and exposures to elevated COPCs. Alternative 2 meets the requirements of the RAOs by reducing erosion and sedimentation, infiltration, and COPC releases to surface water and groundwater.

Consistency with Potential Future Remedial Actions – Similar RI/FS projects are on-going throughout the Southeast Idaho Phosphate Mining Resource Area. Based on these and other EE/CAs that have been completed, a basic range of appropriate remedial technologies has been developed for phosphate mines. This range is consistent with the remedial technologies identified and evaluated above in Section 6.1 and focuses on: (1) excavation and disposal; (2) surface water management; (3) grading and reshaping; (4) surface water modification and cover; (5) institutional/access controls and (6) water treatment. As such, the actions in this alternative are consistent with potential future remedial actions. Depending on the final site remedial action objectives and the results of removal action performance monitoring (primarily groundwater, surface water, and vegetation) and inspections of the surface water controls and stability of ODA slopes and covers, it may be necessary to augment the removal alternative with additional actions. Examples could be additional grading and capping, surface water controls, and potentially treatment of the seep (if it continues to flow after the removal action is completed) or of captured shallow groundwater.

6.2.2.2 Implementability

Alternative 2 is implementable because it would be both technically and administratively feasible, and all goods and services required to implement such construction are expected to be readily available.

Technical Feasibility – Alternative 2 is technically feasible. It would not require unconventional construction techniques or special access logistics. All goods and services required to implement Alternative 2 are expected to be readily available for use. Engineering controls are easily implementable during construction activities to prevent impacts to adjoining property. This alternative could be implemented in a single construction season.

Availability – The excavation of overburden material would be accomplished using heavy equipment (e.g., scrapers, excavators, dozers, and trucks) provided by Simplot. Surface water in the New Tailings Pond can be used for construction water. Adequate space is available for establishing temporary construction office trailers, portable sanitary services and refuse disposal services. Composted manure for amending the soil for vegetation is locally available. Trained and experienced labor is available for site work activities.

Administrative Feasibility – Alternative 2 would be administratively feasible because it would require relatively simple administrative and construction management controls. The work can be performed without impacting adjoining properties. Interim ICs would be implementable because the Pedro Creek ODA is situated on Simplot and BLM-managed land, where restrictive covenants are enforceable.

6.2.2.3 Cost

The net present value of Alternative 2, including 30-year O&M, is estimated to be $2.5 million (Appendix B; Table B-1). Capital costs for Alternative 2 are estimated at $2.4 million. Details on the cost estimate for Alternative 2 are provided in Table B-2.

6.2.3 Alternative 3: In-Place Consolidation/Regrading in Side Slope Area, with Soil Cover and Revegetation on the ODA

Alternative 3 includes in-place consolidation and regrading of the consolidated materials on the steep side slopes, placement of a soil cover over the ODA, revegetation, installation of run-on and runoff diversion ditches and other erosion and sedimentation controls, and implementation of interim ICs. Components of Alternative 3 are described below and summarized on Table 6-1.

- Grading and reshaping (Figures 6-3 and 6-5 through 6-7)
    - Grade the existing steep slopes to achieve slopes of 2.5:1 to 3:1 (with benches to provide slope breaks). Re-establish the toe of the ODA to the east of the existing toe, no closer than approximately 100 feet from the property boundary. A total cut and balanced fill volume of 800,000 cy is estimated for grading to reduce the existing slope to 2.5:1 to 3:1. This regraded slope is substantially more feasible than attempting a regraded slope with all 3:1 slopes, or flatter, as the 3:1 slope would require twice the cut volume than a 2.5:1 slope due to limits to avoid encroachment of the toe on the property boundary thus requiring significantly more cut in the area above the existing steep slopes. The planned cut volume would be used as fill down slope from the existing steep slopes, in the area between the existing toe and the new toe, and as fill in the exposed pit to the south of the main pile.
    - For areas on top of the ODA, above the new 2.5:1 to 3:1 slope, where pooling of runoff tends to occur, grade to promote drainage.
    - Grade the upslope area where pooling of runoff occurs to promote positive drainage.

- Small-scale excavation with consolidation (Figure 6-3)
    - Small areas of ODA materials will be removed from drainages, detention ponds, or other areas near the ODA. The small-scale excavation materials will be consolidated within the area to be regraded.

- Surface water management, including run-on/runoff and erosion control
    - On the new 2.5:1 to 3:1 slopes of the ODA regraded area, install slope breaks at a spacing of 50 to 100 feet, along the slope, and provide drainage for runoff occurring on each break.
    - Install riprap, grouted-riprap, or equivalent-armored chutes to convey higher velocity runoff in areas with steeper gradients.
    - Construct ditches/swales to convey runoff from the ODA surface, with erosion control measures for the ditches/swales and outfall areas.
    - Construct a runoff conveyance ditch along the new toe of the ODA to convey clean runoff flow to Pedro Creek channel and to a small drainage to the south which also contributes flow to Pedro Creek further downstream.
    - Construct run-on control ditches along the upgradient perimeter of the upslope area to prevent drainage from the upgradient Woodall Mountain ODA from entering the upslope area.
    - Construct run-on control ditches along the downgradient perimeter of the upslope area to prevent drainage from the upslope area from entering the rest of the ODA, with erosion control measures for the ditches and outfall areas.

- Surface modification and cover
    - Install a soil cover in the regraded areas (i.e., side slopes and regraded pooling areas).
    - Soil cover would involve use of only non-seleniferous Dinwoody Formation or Salt Lake Formation material. This material would be obtained from local sources. Cover soil would be placed at a thickness of 6 inches over the regraded and consolidated overburden materials (Figure 6-8).
    - Revegetation would be accomplished using native non-selenium-accumulator species to control erosion and establish a diverse community of native species.
    - Soil amendment with composted manure would not be included in this alternative, although application of fertilizer and mulch would be included in all revegetation areas.

- Institutional/access controls would be the same as for Alternative 2.

- BMPs during construction would be the same as for Alternative 2.

- Long-term monitoring would be the same as for Alternative 2.

6.2.3.1 Effectiveness

Alternative 3 would be effective at reducing the threats to human health and the environment and would provide for long-term effectiveness and permanence. Run-on/runoff controls and grading will reduce the quantity of water available for infiltration into the ODA. Grading would also reduce ODA slopes, which would increase long-term stability. Lower slope gradient and placed cover soil would provide conditions that would allow establishment and maintenance of an appropriate vegetative cover, further increasing stability and reducing the long-term potential for erosion. Although reducing the plant uptake of selenium is not one of the RAOs for this early action, the disturbed areas will be revegetated with non-selenium-accumulator plant species. Use of non-selenium-accumulator plant species is expected to be effective in reducing selenium levels in vegetation compared to current conditions. It is anticipated that, once revegetation with non-selenium-accumulator species is fully established, the revegetation will tend to discourage re-growth of the selenium accumulator species. The long-term effectiveness of the revegetation will be assured through a routine monitoring program to evaluate the revegetated areas and to spray or otherwise modify the vegetation as necessary to keep selenium accumulator species from becoming re-established.

Alternative 3 would also provide for short-term effectiveness. There would be no risks to the community during implementation. Construction would be implemented using standard equipment and procedures that would be protective of workers. Overburden materials moved as part of regrading activities can release additional selenium and other COPCs in the short-term due to weathering. Under Alternative 3 approximately 800,000 cy of overburden would be moved during regrading activities. In addition, approximately 32,000 cy of cover soil would be required. This would have a short-term impact on the on-Site borrow area. This alternative would require one or two construction seasons for implementation of the majority of the work.

Run-on/runoff controls, grading and vegetated soil cover would reduce infiltration of rainfall and snowmelt into the ODA materials. As shown in Appendix C, it is estimated that water entering the ODA materials will be reduced by 62 percent relative to current conditions. This would be expected to have a corresponding reduction in selenium releases from the ODA by this pathway and will contribute to meeting MCLs in groundwater and surface water quality standards in Pedro Creek.

Alternative 3 is expected to reduce loading of selenium to downgradient waters due to reduction of infiltration, increased stability (i.e., reduced potential for erosion due to lower gradient slopes and vegetated soil cover). Monitoring downgradient from the ODA would be used to determine the effectiveness of this alternative at reducing COPC loadings to groundwater, surface water, and sediments.

Protectiveness – Alternative 3 would provide overall protection of human health and the environment. The ODA materials would be stable compared to current conditions. Placement of the soil cover and revegetation with non-accumulator species would provide for a reduction of exposure to selenium compared to current conditions. Alternative 3 would provide for reduction of infiltration relative to existing conditions, through improved run-on and runoff management, ultimately resulting in reduction of pooling and infiltration and corresponding releases of COPC to surface water and groundwater. Construction can be accomplished using standard earth-moving methods and associated BMPs that should not impose unacceptable risks to workers or other receptors. A moderate amount of grading of ODA materials would be performed that could increase selenium releases in the short term. In addition, borrow areas for cover materials would be impacted in the short term.

Compliance with ARARs – A summary of how Alternative 3 meets the key applicable and the key relevant and appropriate requirements is discussed in the following text. Table 6-2 summarizes how the alternative meets the remaining ARARs. Compliance with the ARARs would be achieved by consultation with the agencies and documentation generated as part of the design and implementation of the action.

Applicable ARARs – The applicable ARARs include the promulgated federal and State surface water and groundwater quality standards (Table 5-1) and NPDES Permit Regulations. Run-on/runoff controls, regrading and surface vegetation would reduce infiltration of rainfall and snowmelt into the ODA by an estimated 62 percent compared to current conditions. This reduction of infiltration into the ODA would reduce the release of COPCs to groundwater and surface water and would contribute toward meeting the requirements of these ARARs. Post-construction monitoring would be implemented to assess progress toward compliance with these requirements and any additional actions necessary to meet these ARARs will be addressed as part of the RI/FS.

Relevant and Appropriate ARARs – The key relevant and appropriate ARARs include National Emission Standards for Hazardous Air Pollutants Rules, NOAA Freshwater Sediment Benchmarks, etc as summarized in Table 5-1. Standard dust control methods during implementation would minimize the potential for release of overburden material to the air and provide for compliance with the substantive requirements of the National Emission Standards for Hazardous Air Pollutants Rules. The regrading, revegetating and stormwater management controls would minimize erosion and would contribute toward meeting the requirements of the NOAA Freshwater Sediment Benchmarks. No discharge to surface water is contemplated by the removal action and substantive requirements of the NPDES regulations would be met by meeting surface water quality standards and by continued compliance with existing stormwater permit. Dust and storm water controls can be implemented during construction to minimize releases and provide for compliance with pertinent regulations. This would be addressed in detail in the removal action design.

Ability to Achieve RAOs – The in-place consolidation and regrading, placement of a soil cover, revegetation, and installation of run-on, runoff, and erosion and sedimentation controls under Alternative 3 allow for stabilization of the ODA and reduction of releases and exposures to elevated COPCs. Alternative 3 meets the requirements of the RAOs by reducing erosion and sedimentation, infiltration, and COPC releases to surface water and groundwater.

Consistency with Potential Future Remedial Actions – Similar RI/FS projects are on-going throughout the Southeast Idaho Phosphate Mining Resource Area. Based on these and other EE/CAs that have been completed, a basic range of appropriate remedial technologies has been developed for phosphate mines. This range is consistent with the remedial technologies identified and evaluated above in Section 6.1 and focuses on: (1) excavation and disposal; (2) surface water management; (3) grading and reshaping; (4) surface water modification and cover; (5) institutional/access controls and (6) water treatment. As such, the actions in this alternative are consistent with potential future remedial actions. Depending on the final site remedial action objectives and the results of removal action performance monitoring (primarily groundwater, surface water, and vegetation) and inspections of the surface water controls and stability of ODA slopes and covers, it may be necessary to augment the removal alternative with additional actions. Examples could be additional grading and capping, surface water controls, and potentially treatment of the seep (if it continues to flow after the removal action is completed) or of captured shallow groundwater.

6.2.3.2 Implementability

Alternative 3 is implementable because it would be both technically and administratively feasible, and all goods and services required to implement such construction are expected to be readily available.

Technical Feasibility - Alternative 3 is technically feasible. It would not require unconventional construction techniques or special access logistics. All goods and services required to implement Alternative 3 are expected to be readily available for use. Engineering controls are easily implementable during construction activities to prevent impacts to adjoining property. This alternative would require one or two construction seasons for implementation of the majority of the work.

Availability – The excavation of overburden material and soil cover would be accomplished using heavy equipment (e.g., scrapers, excavators, dozers, and trucks) provided by Simplot. The New Tailings Pond can be used for construction water. Adequate space is available for establishing temporary construction office trailers, portable sanitary services and refuse disposal services. Alternative 3 would require approximately 32,000 cy of borrow soils from a location approximately 2 miles south of the ODA. This volume of material is available from the delineated borrow areas. A few thousand cubic yards of rock for erosion control required for Alternative 3 are available from a chert outcrop approximately 1,500 feet north of the ODA. Trained and experienced labor is available for site work activities.

Administrative Feasibility – Alternative 3 would be administratively feasible because it would require relatively simple administrative and construction management controls. The work can be performed without impacting adjoining properties. Interim ICs would be implementable because the Pedro Creek ODA is situated on Simplot and BLM-managed land, where restrictive covenants are enforceable.

6.2.3.3 Cost

The net present value of Alternative 3, including 30-year O&M, is estimated to be $5.2 million (Appendix B; Table B-1). Capital costs for Alternative 3 are estimated at $5.0 million. Details on the cost estimate for Alternative 3 are provided in Table B-3.

6.2.4 Alternative 4: In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Soil Cover and Revegetation on the ODA

Alternative 4 includes in-place consolidation and regrading of the consolidated materials, placement of a soil cover system over the overburden in low slope gradient and steeper side slope areas, placement of soil cover in all regraded areas, revegetation with non-selenium-accumulator species, installation of run-on and runoff diversion ditches and other erosion and sedimentation controls, and implementation of interim ICs. Components of Alternative 4 are described below and summarized on Table 6-1.

- Grading and reshaping would be the same as for Alternative 3, except for additional grading of the entire top area to 5:1 to 10:1 slopes and the entire upslope area to 20:1 to 30:1 slopes.

- Small-scale excavation with consolidation would be the same as for Alternative 3.

- Surface water management, including run-on/runoff and erosion control would be the same as for Alternative 3.

- Surface modification and cover
    - Cover soil would be placed at a thickness of 18 inches on regraded side slope areas of 2.5:1 to 3:1 along with associated drainage-control benches (Figure 6-8).
    - The top area (between the side slopes and the upslope area), would be regraded to slopes of approximately 5:1 to 10:1, and a 12-inch thick soil cover would be placed on this area.
    - The upslope area would be regraded to approximately 20:1 to 30:1, and a 12-inch thick soil cover would be placed on this area.
    - The total excavation and fill volume for Alternative 4 is estimated to be approximately 830,000 cy for regrading the side slopes, top area and upslope area.
    - Only non-seleniferous material would be used for the cover soil. These materials would be obtained from local sources.

  - The general cover soil would be a sandy silty soil with some gravel and would typically serve as growth medium.
  - Cover soil would not be amended with composted manure, although application of fertilizer and mulch would be included in all revegetation areas.

- Revegetation would be the same as for Alternative 3.

- Institutional/access controls would be the same as for Alternatives 2 and 3.

- BMPs during construction would be the same as for Alternatives 2 and 3.

- Long-term monitoring would be the same as for Alternatives 2 and 3.

6.2.4.1 Effectiveness

Alternative 4 would be effective at reducing the threats to human health and the environment and would provide for long-term effectiveness and permanence. Run-on/runoff controls and grading will reduce the quantity of water available for infiltration into the ODA. Grading will also reduce ODA slopes, which will increase long-term stability. Lower slope gradient and placed cover soil will provide conditions that would allow establishment and maintenance of an appropriate vegetative cover, further increasing stability and reducing the long-term potential for erosion. Although reducing the plant uptake of selenium is not one of the RAOs for this early action, the disturbed areas will be revegetated with non-selenium-accumulator plant species. Use of non-selenium-accumulator plant species is expected to be effective in reducing selenium levels in vegetation compared to current conditions. It is anticipated that, once revegetation with non-selenium-accumulator species is fully established, the revegetation will tend to discourage re-growth of the selenium accumulator species. The long-term effectiveness of the revegetation will be assured through a routine monitoring program to evaluate the revegetated areas and to spray or otherwise modify the vegetation as necessary to keep selenium accumulator species from becoming re-established.

Alternative 4 would also provide for short-term effectiveness. There would be no risks to the community during implementation. Construction would be implemented using standard equipment and procedures that would be protective of workers. Overburden materials moved as part of regrading activities can release additional selenium and other COPCs in the short-term due to weathering. Under Alternative 4 approximately 830,000 cy of overburden would be moved during regrading activities. In addition, approximately 142,000 cy of cover soil would be required. This would have a short-term impact on the on-Site borrow area. This alternative would require one or two construction seasons for implementation of the majority of the work.

Run-on/runoff controls, grading and vegetated soil cover, would reduce infiltration of rainfall and snowmelt into the ODA materials. As shown in Appendix C, it is estimated that water entering the ODA materials will be reduced by 85 percent relative to current conditions. This would be expected to have a corresponding reduction in selenium releases from the ODA by this pathway and will contribute to meeting MCLs in groundwater and surface water quality standards in Pedro Creek.

Alternative 4 is expected to reduce loading of selenium to downgradient waters due to reduction of infiltration, increased stability and reduced erosion. Monitoring downgradient from the ODA would be used to determine the effectiveness of this alternative at reducing concentrations of selenium and other COPCs in groundwater, surface water, and sediments.

Protectiveness – Alternative 4 would provide overall protection of human health and the environment. The ODA materials would be stable compared to current conditions. Placement of the soil cover and revegetation with non-accumulator species would provide for a reduction in selenium exposure via direct contact and ingestion. Alternative 4 would provide for reduction of infiltration relative to existing conditions, through improved run-on and runoff management, ultimately resulting in reduction of pooling and infiltration and corresponding releases of COPCs to surface water and groundwater. Construction can be accomplished using standard earth-moving methods and associated BMPs that should not impose unacceptable risks to workers or other receptors.

Compliance with ARARs – A summary of how Alternative 4 meets the key applicable and the key relevant and appropriate requirements is discussed in the following text. Table 6-2 summarizes how the alternative meets the remaining ARARs. Compliance with the ARARs would be achieved by consultation with the agencies and documentation generated as part of the design and implementation of the action.

Applicable ARARs – The applicable ARARs include the promulgated federal and State surface water and groundwater quality standards (Table 5-1) and NPDES Permit Regulations. Run-on/runoff controls, regrading and surface vegetation would reduce infiltration of rainfall and snowmelt into the ODA by an estimated 85 percent compared to current conditions. This reduction of infiltration into the ODA would reduce the release of COPCs to groundwater and surface water and would contribute toward meeting the requirements of these ARARs. Post-construction monitoring would be implemented to assess progress toward compliance with these requirements and any additional actions necessary to meet these ARARs will be addressed as part of the RI/FS.

Relevant and Appropriate ARARs – The key relevant and appropriate ARARs include National Emission Standards for Hazardous Air Pollutants Rules, NOAA Freshwater Sediment Benchmarks, etc as summarized in Table 5-1. Standard dust control methods during implementation would minimize the potential for release of overburden material to the air and provide for compliance with the substantive requirements of the National Emission Standards for Hazardous Air Pollutants Rules. The regrading, revegetating and stormwater management controls would minimize erosion and would contribute toward meeting the requirements of the NOAA Freshwater Sediment Benchmarks. No discharge to surface water is contemplated by the removal action and substantive requirements of the NPDES regulations would be met by meeting surface water quality standards and by continued compliance with existing stormwater permit. Dust and storm water controls can be implemented during construction to minimize releases and provide for compliance with pertinent regulations. This would be addressed in detail in the removal action design.

Ability to Achieve RAOs – The in-place consolidation and regrading, placement of a soil cover, revegetation; installation of run-on, runoff, erosion and sedimentation controls; and implementation of interim ICs under Alternative 4 allow for stabilization of the ODA and reduction of releases and exposures to elevated COPCs. Alternative 4 meets the requirements of the RAOs by reducing erosion and sedimentation, infiltration, and COPC releases to surface water and groundwater.

Consistency with Potential Future Remedial Actions – Similar RI/FS projects are on-going throughout the Southeast Idaho Phosphate Mining Resource Area. Based on these and other EE/CAs that have been completed, a basic range of appropriate remedial technologies has been developed for phosphate mines. This range is consistent with the remedial technologies identified and evaluated above in Section 6.1 and focuses on: (1) excavation and disposal; (2) surface water management; (3) grading and reshaping; (4) surface water modification and cover; (5) institutional/access controls and (6) water treatment. As such, the actions in this alternative are consistent with potential future remedial actions. Depending on the final site remedial action objectives and the results of removal action performance monitoring (primarily groundwater, surface water, and vegetation) and inspections of the surface water controls and stability of ODA slopes and covers, it may be necessary to augment the removal alternative with additional actions. Examples could be additional grading and capping, surface water controls, and potentially treatment of the seep (if it continues to flow after the removal action is completed) or of captured shallow groundwater.

6.2.4.2 Implementability

Alternative 4 is implementable because it would be both technically and administratively feasible, and all goods and services required to implement such construction are expected to be readily available.

Technical Feasibility – Alternative 4 is technically feasible. It would not require unconventional construction techniques or special access logistics. All goods and services required to implement Alternative 4 are expected to be readily available for use. Engineering controls are easily implementable during construction activities to prevent impacts to adjoining property. In addition, relevant BMPs as easily implemented such as not to impose unacceptable risks to workers or other receptors. This alternative would require one or two construction seasons for implementation of the majority of the work.

Availability – The excavation of overburden material and soil cover would be accomplished using heavy equipment (e.g., scrapers, excavators, dozers, and trucks) provided by Simplot. The surface water in the New Tailings Pond can be used for construction water. Adequate space is available for establishing temporary construction office trailers, portable sanitary services and refuse disposal services. Alternative 4 would require approximately 142,000 cy of borrow soils. This volume of material is available from borrow areas approximately 2 miles south of the ODA. A few thousand cubic yards of rock for erosion control required for Alternative 4 are available from the chert outcrop approximately 1,500 feet north of the ODA. Trained and experienced labor is available for site work activities.

Administrative Feasibility – Alternative 4 would be administratively feasible because it would require relatively simple administrative and construction management controls. The work can be performed without impact on adjoining properties. Interim ICs would be implementable because the Pedro Creek ODA is situated on Simplot and BLM-managed land, where restrictive covenants are enforceable.

6.2.4.3 Cost

The net present value of Alternative 4, including 30-year O&M, is estimated to be $6.8 million (Appendix B; Table B-1). Capital costs for Alternative 4 are estimated at $6.6 million. Details on the cost estimate for Alternative 4 are provided in Table B-4.

6.2.5 Alternative 5: In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Thick ET Soil Cover and Revegetation on the ODA

Alternative 5 includes in-place consolidation and regrading of the consolidated materials, placement of an ET soil-Chert cover system over the overburden, revegetation, installation of run-on and runoff diversion ditches and other erosion and sedimentation controls, and implementation of interim ICs. Components of Alternative 5 are described below and summarized on Table 6-1.

- Grading and reshaping would be the same as for Alternatives 3 and 4.
- Small-scale excavation with consolidation would be the same as for Alternatives 3 and 4.
- Surface water management, including run-on/runoff and erosion control would be the same as for Alternatives 3 and 4.

- Surface modification and cover
  - An ET soil cover system would be used on the ODA on the regraded side slope, top, and upslope areas. The ET soil cover system would include: 48 inches of cover soil over 3 inches of Chert capillary break (Figure 6-8).
    - Only non-seleniferous material would be used for the soil cover and Chert layer. These materials would be obtained from local sources.
  - Soil amendment with composted manure would not be required for Alternative 5, but fertilizer and mulch would be included in revegetated areas.

- Revegetation with native plant species. Plant species would not have to be limited to non-selenium-accumulating species as a result of the thick cover.

- Institutional/access controls would be the same as for Alternatives 2, 3, and 4.

- BMPs during construction would be the same as for Alternatives 2, 3, and 4.

- Long-term monitoring would be the same as for Alternatives 2, 3, and 4.

6.2.5.1 Effectiveness

Alternative 5 would be effective at reducing the threats to human health and the environment and would provide for long-term effectiveness and permanence. Run-on/runoff controls and grading will reduce the quantity of water available for infiltration into the ODA. Grading will also reduce ODA slopes, which will increase long-term stability. The lower slope gradient and thick ET cover soil will provide conditions that would allow establishment and maintenance of an appropriate vegetative cover, further increasing stability and reduce the long-term potential for erosion. Because of the thickness of the ET cover system and the presence of a capillary break, there would be minimal potential for plant roots to reach the ODA materials and therefore planting of species with low potential for selenium uptake would not be necessary. Long-term monitoring of the cover would be necessary to verify that vegetation was sufficient to maintain cover stability and that erosion was not occurring.

Alternative 5 would also provide for short-term effectiveness. There would be no risks to the community during implementation. Construction would be implemented using standard equipment and procedures that would be protective of workers. Overburden materials moved as part of regrading activities can release additional selenium and other COPCs in the short-term due to weathering. Under Alternative 5, approximately 830,000 cy of overburden would be moved during regrading activities. In addition, approximately 452,000 cy of cover soil and 28,000 cy of Chert would be required. This would have a short-term impact on the on-Site borrow area. This alternative would require two or three construction seasons for implementation of the majority of the work.

Run-on/runoff controls, regrading and the vegetated thick ET cover would reduce infiltration of rainfall and snowmelt into the ODA materials. As shown in Appendix C, it is estimated that water entering the ODA materials will be reduced by 96 percent relative to current conditions. This would be expected to have a corresponding reduction in selenium releases from the ODA by this pathway and will contribute to meeting MCLs in groundwater and surface water quality standards in Pedro Creek.

Protectiveness – Alternative 5 would provide overall protection of human health and the environment. The ODA materials would be stable compared to current conditions. Alternative 5 would provide for reduction of infiltration relative to existing conditions, through improved run-on and runoff management, ultimately resulting in reduction of pooling and infiltration and corresponding releases of COPC to surface water and groundwater. Construction can be accomplished using standard earth-moving methods and associated BMPs that should not impose unacceptable risks to workers or other receptors. A moderate amount of grading of ODA materials would be performed that could increase selenium releases in the short term. In addition, larger borrow area disturbances would be necessary to obtain the cover materials.

Compliance with ARARs – A summary of how Alternative 5 meets the key applicable and the key relevant and appropriate requirements is discussed in the following text. Table 6-2 summarizes how the alternative meets the remaining ARARs. Compliance with the ARARs would be achieved by consultation with the agencies and documentation generated as part of the design and implementation of the action.

Applicable ARARs – The applicable ARARs include the promulgated federal and State surface water and groundwater quality standards (Table 5-1) and NPDES Permit Regulations. Run-on/runoff controls, regrading and surface vegetation would reduce infiltration of rainfall and snowmelt into the ODA by an estimated 96 percent compared to current conditions. This reduction of infiltration into the ODA would reduce the release of COPCs to groundwater and surface water and would contribute toward meeting the requirements of these ARARs. Post-construction monitoring would be implemented to assess progress toward compliance with these requirements and any additional actions necessary to meet these ARARs will be addressed as part of the RI/FS.

Relevant and Appropriate ARARs – The key relevant and appropriate ARARs include National Emission Standards for Hazardous Air Pollutants Rules, NOAA Freshwater Sediment Benchmarks, etc as summarized in Table 5-1. Standard dust control methods during implementation would minimize the potential for release of overburden material to the air and provide for compliance with the substantive requirements of the National Emission Standards for Hazardous Air Pollutants Rules. The regrading, revegetating and stormwater management controls would minimize erosion and would contribute toward meeting the requirements of the NOAA Freshwater Sediment Benchmarks. No discharge to surface water is contemplated by the removal action and substantive requirements of the NPDES regulations would be met by meeting surface water quality standards and by continued compliance with existing stormwater permit. Dust and storm water controls can be implemented during construction to minimize releases and provide for compliance with pertinent regulations. This would be addressed in detail in the removal action design.

Ability to Achieve RAOs – The in-place consolidation and regrading, placement of a thick ET cover, and revegetation; installation of run-on, runoff, erosion and sedimentation controls; and implementation of interim ICs under Alternative 5 allow for stabilization of the ODA and reduction of releases and exposures to elevated COPCs. Alternative 5 meets the requirements of the RAOs by reducing erosion and sedimentation, infiltration, and COPC releases to surface water and groundwater.

Consistency with Potential Future Remedial Actions – Similar RI/FS projects are on-going throughout the Southeast Idaho Phosphate Mining Resource Area. Based on these and other EE/CAs that have been completed, a basic range of appropriate remedial technologies has been developed for phosphate mines. This range is consistent with the remedial technologies identified and evaluated above in Section 6.1 and focuses on: (1) excavation and disposal; (2) surface water management; (3) grading and reshaping; (4) surface water modification and cover; (5) institutional/access controls and (6) water treatment. As such, the actions in this alternative are consistent with potential future remedial actions. Depending on the final site remedial action objectives and the results of removal action performance monitoring (primarily groundwater, surface water, and vegetation) and inspections of the surface water controls and stability of ODA slopes and covers, it may be necessary to augment the removal alternative with additional actions. Examples could be additional grading and capping, surface water controls, and potentially treatment of the seep (if it continues to flow after the removal action is completed) or of captured shallow groundwater.

6.2.5.2 Implementability

Alternative 5 is implementable because it would be both technically and administratively feasible, and all goods and services required to implement such construction are expected to be readily available.

Technical Feasibility – Alternative 5 is technically feasible. It would not require unconventional construction techniques or special access logistics. All goods and services required to implement Alternative 5 are expected to be readily available for use. Engineering controls are easily implementable during construction activities to prevent impacts to adjoining property. In addition, relevant BMPs as easily implemented such as not to impose unacceptable risks to workers or other receptors. This alternative would require two or three construction seasons for implementation of the majority of the work.

Availability – The excavation of overburden material and soil cover would be accomplished using heavy equipment (e.g., scrapers, excavators, dozers, and trucks) provided by Simplot. The surface water in the New Tailings Pond can be used for construction water. Adequate space is available for establishing temporary construction office trailers, portable sanitary services and refuse disposal services. It is estimated that approximately 452,000 cy of borrow soils would be required for Alternative 5. This volume of material may be available from borrow areas approximately 2 miles south of the ODA. Because these volumes of borrow soils are substantially higher than other alternatives, many acres (possibly over 50 ac) of potential borrow areas would require disturbance. Approximately 28,000 cy of Chert rock for the capillary break layer under the cap and for erosion control would be required for Alternative 5. Although not yet investigated, it is believed that this volume may be available from a Chert outcrop approximately 1,500 feet north of the ODA.

Administrative Feasibility – Alternative 5 would be administratively feasible because it would require relatively simple administrative and construction management controls. The work can be performed without impact on adjoining properties. Interim ICs would be implementable because the Pedro Creek ODA is situated on Simplot and BLM-managed land, where restrictive covenants are enforceable.

6.2.5.3 Cost

The net present value of Alternative 5, including 30-year O&M, is estimated to be $11.8 million (Appendix B; Table B-1). Capital costs for Alternative 5 are estimated at $11.4 million. Details on the cost estimate for Alternative 5 are provided in Table B-5.

6.2.6 Alternative 6: In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Geosynthetic-Soil Cover System and Revegetation on the ODA

Alternative 6 includes in-place consolidation and regrading of the consolidated materials, placement of a layered geosynthetic and soil cover system over the overburden, revegetation, installation of run-on and runoff diversion ditches and other erosion and sedimentation controls, and implementation of interim ICs. Components of Alternative 6 are described below and summarized on Table 6-1.

- <u>Grading and reshaping</u> (Figures 6-4 and 6-9)
    - On the main pile, grade the existing steep slopes to achieve slopes of 3:1 (with benches to provide slope breaks). Re-establish the toe to the east of the existing toe, no closer than approximately 100 feet from the property boundary. A total cut and balanced fill volume of 1,800,000 cy is estimated for grading to reduce the existing slope to 3:1. This regraded slope requires substantially more earthwork than a 2.5:1 slope due to limits to avoid encroachment of the toe on

the property boundary thus requiring significantly more cut in the area above the existing steep slopes. The planned cut volume would be used as fill down slope from the existing steep slopes, in the area between the existing toe and the new toe, and as fill in the exposed pit to the south of the main pile.
    - For the top area of the ODA, above the new 3:1 slope, grade to a 5:1 to 10:1 slope to promote drainage. Also, grade the upslope area to a slope of 20:1 to 30:1 to promote drainage. The estimated volume of grading in the top and upslope areas is approximately 30,000 cy.

- <u>Small-scale excavation with consolidation</u> would be the same as for Alternatives 3, 4 and 5.

- <u>Surface water management, including run-on/runoff and erosion control</u>

    - On the new 3:1 slopes of the ODA regraded area, install slope breaks at a spacing of 30 to 80 feet, along the slope, and provide drainage for runoff occurring on each break. More frequent benches are required to anchor sections of geosynthetics on the steep slopes.
    - Install riprap, grouted-riprap, or equivalent-armored chutes to convey higher velocity runoff in areas with steeper gradients.
    - Construct ditches/swales to convey runoff from the ODA closure surface.
    - Construct ditches/swales to convey runoff from the ODA closure surface, with erosion control measures for the ditches/swales and outfall areas.
    - Construct a runoff conveyance ditch along the new toe of the ODA to convey runoff flow to Pedro Creek channel and to a small drainage to the south which also contributes flow to Pedro Creek further downstream.
    - Construct run-on control ditches along road at toe of upslope area to prevent upslope drainage from entering the ODA, with erosion control measures for the ditches and outfall areas.

- <u>Surface modification and cover</u>

    - Install a geosynthetic liner system consisting of either a 40-mil linear low density polyethylene (LLDPE) or 30-mil polyvinyl chloride (PVC) geomembrane on the top area, upslope area, and side slopes of the regraded ODA. The geomembrane on the side slopes would need to be textured to provide sufficient sliding stability on the steep slopes. Periodic anchoring would be required in anchor trenches constructed on benches along the slope and a protective thick non-woven geotextile on the top.
    - Install a drainage layer over the liner system consisting of either a geosynthetic drainage net (GDN) or a 6 to 8-inch thick sand-gravel drainage layer on the top area. This drainage layer would need to be designed for stability on the steep slopes as well as worst-case hydraulic conditions. This will likely require a gravel (Chert) drainage layer for the side slopes for stability. A non-woven geotextile would be placed on top of the gravel drainage layer to separate the drainage layer from overlying soil cover materials.
    - Install a soil cover in the ODA steep slope, top, and upslope regraded areas.
    - Soil cover would involve use of only non-seleniferous material. This material would be obtained from local sources. Cover soil would be placed at a thickness

of 12 inches over the geosynthetic liner system on the regraded areas and consolidated overburden materials (Figure 6-9).
  - Revegetation would be accomplished using native species to control erosion and establish a diverse community of native species. Vegetation with a low potential for selenium uptake would not be required because the potential for plant roots to enter the overburden materials through the drainage layer and geomembrane liner is limited.
  - Soil amendment with composted manure would not be included in this alternative, although application of fertilizer and mulch would be included in all revegetation areas.

- Institutional/access controls would be the same as for Alternatives 2, 3, 4, and 5.

- BMPs during construction would be the same as for Alternatives 2, 3, 4, and 5.

- Long-term monitoring would be the same as for Alternatives 2, 3, 4, and 5.

6.2.6.1 Effectiveness

Alternative 6 would be effective at reducing the threats to human health and the environment and would provide for long-term effectiveness and permanence. Run-on/runoff controls and grading will reduce the quantity of water available for infiltration into the ODA. Placement of a layered geosynthetic and soil cover system will improve runoff and reduce infiltration. Grading will also reduce ODA slopes, which will increase long-term stability. Lower slope gradient and the placed cover soil will provide conditions that would allow establishment and maintenance of an appropriate vegetative cover, further increasing stability and reducing the long-term potential for erosion. Because of the layered geosynthetic, drainage and soil cover system, there would be minimal potential for plant roots to reach the ODA materials and therefore planting of species with low potential for selenium uptake would not be necessary. Long-term monitoring of the cover would be necessary to verify that vegetation was sufficient to maintain cover stability and that erosion was not occurring.

Alternative 6 would also provide for short-term effectiveness. There would be no risks to the community during implementation. Construction would be implemented using standard equipment and procedures that would be protective of workers. Overburden materials moved as part of regrading activities can release additional selenium and other COPCs in the short-term due to weathering. Under Alternative 6, approximately 1,830,000 cy of overburden would be moved during regrading activities. In addition, approximately 113,000 cy of cover soil and 56,000 cy of Chert would be required. This would have a short-term impact on the on-Site borrow area. This alternative would require three construction seasons for implementation of the majority of the work.

Run-on/runoff controls, regrading and the geosynthetic liner system would reduce infiltration of rainfall and snowmelt into the ODA materials. As shown in Appendix C, it is estimated that water entering the ODA materials will be reduced by 99 percent relative to current conditions. This would be expected to have a corresponding reduction in selenium releases from the ODA by this pathway and will contribute to meeting MCLs in groundwater and surface water quality standards in Pedro Creek.

Protectiveness – Alternative 6 would provide overall protection of human health and the environment. The ODA materials would be stable compared to current conditions. Alternative 6 would provide for reduction of infiltration relative to existing conditions, through improved run-on and runoff management, ultimately resulting in reduction of pooling and infiltration and corresponding releases of COPCs to surface water and groundwater. Construction can be accomplished using standard earth-moving methods and associated BMPs that should not impose unacceptable risks to workers or other receptors.

Compliance with ARARs – A summary of how Alternative 6 meets the key applicable and the key relevant and appropriate requirements is discussed in the following text. Table 6-2 summarizes how the alternative meets the remaining ARARs. Compliance with the ARARs would be achieved by consultation with the agencies and documentation generated as part of the design and implementation of the action.

Applicable ARARs – The applicable ARARs include the promulgated federal and State surface water and groundwater quality standards (Table 5-1) and NPDES Permit Regulations. Run-on/runoff controls, regrading and surface vegetation would reduce infiltration of rainfall and snowmelt into the ODA by an estimated 99 percent compared to current conditions. This reduction of infiltration into the ODA would reduce the release of COPCs to groundwater and surface water and would contribute toward meeting the requirements of these ARARs. Post-construction monitoring would be implemented to assess progress toward compliance with these requirements and any additional actions necessary to meet these ARARs will be addressed as part of the RI/FS.

Relevant and Appropriate ARARs – The key relevant and appropriate ARARs include National Emission Standards for Hazardous Air Pollutants Rules, NOAA Freshwater Sediment Benchmarks, etc as summarized in Table 5-1. Standard dust control methods during implementation would minimize the potential for release of overburden material to the air and provide for compliance with the substantive requirements of the National Emission Standards for Hazardous Air Pollutants Rules. The regrading, revegetating and stormwater management controls would minimize erosion and would contribute toward meeting the requirements of the NOAA Freshwater Sediment Benchmarks. No discharge to surface water is contemplated by the removal action and substantive requirements of the NPDES regulations would be met by meeting surface water quality standards and by continued compliance with existing stormwater permit. Dust and storm water controls can be implemented during construction to minimize releases and provide for compliance with pertinent regulations. This would be addressed in detail in the removal action design.

Ability to Achieve RAOs – The in-place consolidation and regrading, placement of a layered geosynthetic and soil cover system, and revegetation; installation of run-on, runoff, erosion and sedimentation controls; and implementation of interim ICs under Alternative 6 allow for stabilization of the ODA and reduction of releases and exposures to elevated COPCs. Alternative 6 meets the requirements of the RAOs by reducing erosion and sedimentation, infiltration, and COPC releases to surface water and groundwater.

Consistency with Potential Future Remedial Actions – Similar RI/FS projects are on-going throughout the Southeast Idaho Phosphate Mining Resource Area. Based on these and other EE/CAs that have been completed, a basic range of appropriate remedial technologies has been developed for phosphate mines. This range is consistent with the remedial technologies identified and evaluated above in Section 6.1 and focuses on: (1) excavation and disposal; (2) surface water management; (3) grading and reshaping; (4) surface water modification and cover; (5) institutional/access controls and (6) water treatment. As such, the actions in this alternative are consistent with potential future remedial actions. Depending on the final site remedial action objectives and the results of removal action performance monitoring (primarily groundwater, surface water, and vegetation) and inspections of the surface water controls and stability of ODA slopes and covers, it may be necessary to augment the removal alternative with additional actions. Examples could be additional grading and capping, surface water controls, and potentially treatment of the seep (if it continues to flow after the removal action is completed) or of captured shallow groundwater.

6.2.6.2 Implementability

Alternative 6 is implementable because it would be both technically and administratively feasible, and all goods and services required to implement such construction are expected to be readily available.

Technical Feasibility – Alternative 6 is technically feasible. It is estimated that the volume of excavation and fill required will be approximately 1,830,000 million cy. Installation of geosynthetics such as geomembranes, GDNs, and geotextiles would be difficult on long, relatively steep slopes. Approximately 45 acres of 3:1 side slopes and approximately 25 acres in the upslope and top areas would require geosynthetic liner systems including geomembrane, geotextile and GDN (top area).

Alternative 6 does not require unconventional construction techniques or special access logistics, although installation of a geosynthetic liner in Alternative 6 would require a specialized subcontractor and specialized construction expertise (at least in terms of construction supervision). All goods and services required to implement Alternative 6 are expected to be readily available regionally, if not locally. Engineering controls are easily implementable during construction activities to prevent impacts to adjoining property. In addition, relevant BMPs as easily implemented such as not to impose unacceptable risks to workers or other receptors. This alternative would require three construction seasons for implementation of the majority of the work.

Availability – The excavation of overburden material and soil cover would be accomplished using heavy equipment (e.g., scrapers, excavators, dozers, and trucks) provided by Simplot. The surface water in the New Tailings Pond can be used for construction water. Adequate space is available for establishing temporary construction office trailers, portable sanitary services and refuse disposal services. The volume of borrow soils required for Alternative 6 would be approximately 113,000 cy. Approximately 56,000 cy of graded Chert rock (gravel) would be required for the drainage layer on the 3:1 side slope, top, and upslope areas over the liner system. Although not investigated, it is believed that these may be available from a Chert outcrop approximately 1,500 feet north of the ODA.

Administrative Feasibility – Alternative 6 would be administratively feasible because it would require relatively simple administrative and construction management controls. Because of the volumes of materials involved in Alternative 6, the construction management procedures would be more extensive. Interim ICs would be implementable because the Pedro Creek ODA is situated on Simplot and BLM-managed land, where restrictive covenants are enforceable.

6.2.6.3 Cost

The net present value of Alternative 6, including 30-year O&M, is estimated to be $18.2 million (Appendix B; Table B-1). Capital costs for Alternative 6 are estimated at $17.9 million. Details on the cost estimate for Alternative 6 are provided in Table B-5.

7.0 COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

The removal action alternatives are compared in the following discussion based on the criteria of effectiveness, implementability, and cost. The comparative analysis identifies the advantages and disadvantages of each removal action alternative relative to one another so that key trade offs that would affect remedy selection can be identified. The comparison focuses on the significant areas of difference to, therefore, identify any alternative that is clearly superior in meeting a criterion. Table 7-1 presents a summary of the comparative analysis for the removal action alternatives.

Alternative 1 (No Action) would not meet RAOs nor comply with ARARs, so this alternative is not discussed further. The remaining removal action alternatives under evaluation in this comparative analysis are:

- Alternative 2: In-Place Consolidation/Regrading in Side Slope Area, with Direct Revegetation on Amended Overburden Materials on the ODA.
- Alternative 3: In-Place Consolidation/Regrading in Side Slope Area, with Soil Cover and Revegetation on the ODA.
- Alternative 4: In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Soil Cover and Revegetation on the ODA.
- Alternative 5: In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Thick ET Soil Cover and Revegetation on the ODA.
- Alternative 6: In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Geosynthetic-Soil Cover System and Revegetation on the ODA.

7.1 Effectiveness

The comparative analysis for effectiveness evaluates overall protection of human health and the environment, short- and long-term effectiveness.

7.1.1 Protection of Human Health and the Environment

Reduction of Releases - Under current conditions water infiltrates into the ODA material either from direct precipitation or run-on. Collection of snow drifts and spring melt pooling on the flat areas of the ODA also provides a source of infiltrating water. This infiltrated water becomes elevated in selenium and other COPCs, and is released to groundwater and surface water within the Pedro Creek sub-basin. Reducing the release and migration of selenium and other COPCs is a key goal of the Early Action. The action alternatives, by implementation of surface water run-on controls and by direct revegetation and/or vegetated soil covers, are predicted to provide reductions of surface water infiltration into the ODA as follows:

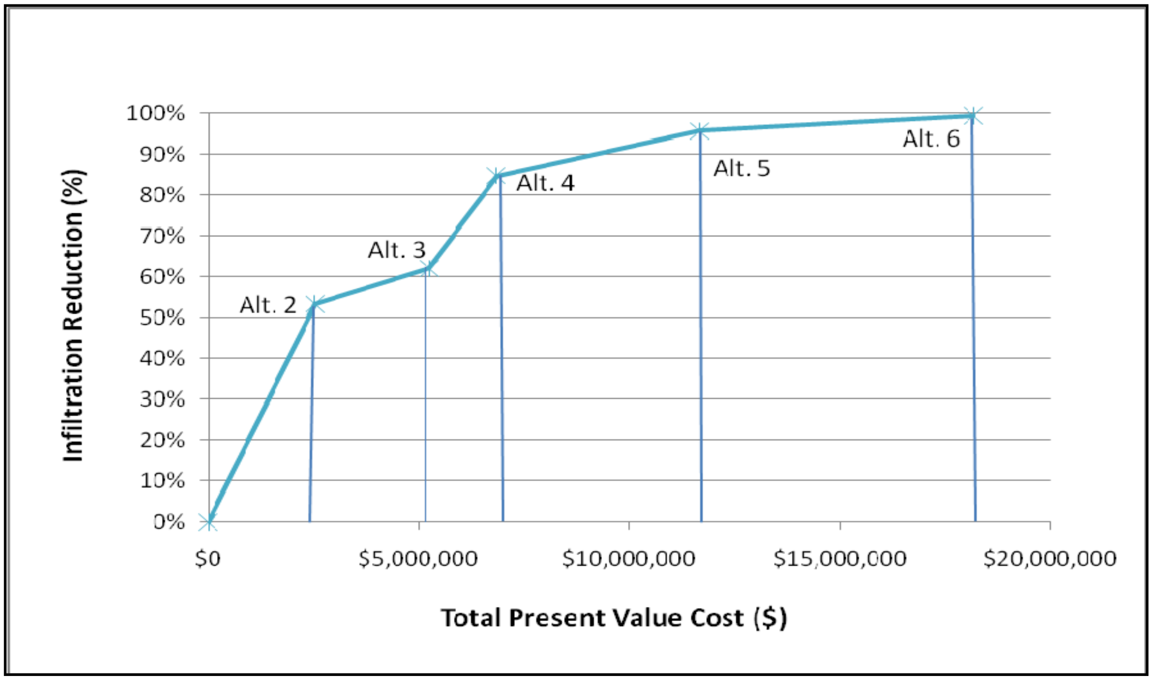
- Alternative 2: 53 percent reduction in infiltration;
- Alternative 3: 62 percent reduction in infiltration;
- Alternative 4: 85 percent reduction in infiltration;
- Alternative 5: 96 percent reduction in infiltration; and
- Alternative 6: 99 percent reduction in infiltration.

These reductions would be expected to result in a corresponding decrease in releases from the ODA by this transport pathway. Reduction of the release of selenium and other COPCs will contribute to meeting MCLs in groundwater and surface water quality standards in Pedro Creek.

Table 7-2 and Figure 7-1 provide a comparison of the alternatives in terms of estimated infiltration reduction against the estimated present worth costs. As can be seen from Table 7-2, Alternative 2 would be the most cost-effective at reducing infiltration into the ODA. However, Alternative 2 would not significantly improve seismic stability of the ODA and would therefore not be fully effective at meeting that RAO. Of the alternatives that can meet all of the RAOs effectively (Alternatives 3, 4, 5, and 6), Alternatives 3 and 4 are the most cost-effective at reducing infiltration through the ODA, with Alternative 4 being slightly more cost-effective. Alternatives 5 and 6 would entail significantly higher costs than Alternative 4 with relatively small incremental benefits.

Erosion and Seismic Stability – Release of selenium and other COPCs currently occurs due to erosion of ODA materials from steep slope areas that are poorly vegetated and subsequent sediment transport to the Pedro Creek drainage. Under Alternative 2, surface water run-on/runoff controls and direct vegetation of the ODA surface are expected to significantly improve conditions and reduce erosion. However, because existing steep slopes would remain, seismic stability would not be improved over current conditions. Alternatives 3, 4 and 5 all contain the same scope of grading/consolidation to reduce slopes and provide greater stabilization of the ODA. Installation of a vegetated soil cover under each of these alternatives will significantly reduce the potential for erosion of the underlying ODA material, providing the same high level of performance. Alternative 6 would include slightly flatter finished slopes and a geosynthetic liner, which would provide a slight improvement over Alternatives 3, 4, and 5 in terms of seismic stability and risk of erosion of the ODA materials.

Figure 7-1 Summary of Infiltration Reduction Relative to Cost



Direct Exposure to Soil and Vegetation – The SRE identified that concentrations of selenium and other COPCs in soils and vegetation on the ODA exceed their respective conservative risk-based benchmarks. Under Alternative 2, the potential for direct contact with ODA materials would remain. Under Alternatives 3 through 6 this would be prevented by installation of a soil cover.

Alternative 2 includes direct revegetation of the ODA surface with plant species with a low affinity for selenium uptake. The addition of a soil cover and re-grading to reduce slopes under Alternatives 3 and 4 would provide slightly improved growth conditions for non-accumulator species. The thicker cover under Alternative 5 and the geosynthetic cover layers under Alternative 6 would discourage plant roots from reaching into the ODA materials. Although there are differences among the alternatives regarding covers which may result in differences in plant uptake of selenium and other contaminants, this exposure pathway is not specifically addressed by this EE/CA and early response action. Evaluation of the plant uptake pathway will occur in the RI/FS, and may require further remedial action.

7.1.2 Compliance with ARARs

The following paragraphs summary the relative performance of each alternatives with respect to the key ARARs. The greater the reduction of infiltration of precipitation into the ODA, the greater the contribution of the action to meeting ARARs (see Section 7.1.1 for the relative performance of each alternative). Post-construction monitoring would be implemented to assess progress toward compliance with chemical- and location-specific ARARs and any additional actions required to meet these ARARs will be addressed as part of the RI/FS.

Applicable ARARs – As previously mentioned in Section 6, the applicable ARARs include the promulgated federal and State surface water and groundwater quality standards, and NPDES Permit Regulations. All alternatives will meet these key ARARS, except for the no-action alternative. The relative contribution towards meeting the requirements of these key ARARS increases as the alternatives increase in number. Run-on/runoff controls, regrading and surface vegetation would reduce infiltration of rainfall and snowmelt into the ODA compared to current conditions. This reduction of infiltration into the ODA would reduce the release of COPCs to groundwater and surface water and would contribute toward meeting the requirements of these ARARs.

Relevant and Appropriate ARARs – As previously mentioned in Section 6, the key relevant and appropriate ARARs include National Emission Standards for Hazardous Air Pollutants Rules, and NOAA Freshwater Sediment Benchmarks. All alternatives will meet these Key ARARS, except for the no-action alternative. Standard dust control methods during implementation would minimize the potential for release of overburden material to the air and provide for compliance with the substantive requirements of the National Emission Standards for Hazardous Air Pollutants Rules. Alternatives 2 and 3 would require the least amount of BMPs to meet the National Emission Standards for Hazardous Air Pollutants Rules for remediation, since they involve the least amount of construction. Alternatives 4, 5, and 6 would require more BMPs since they involve more construction. The regrading, revegetating and stormwater management controls would minimize erosion and would contribute toward meeting the requirements of the NOAA Freshwater Sediment Benchmarks. Substantive requirements of the NPDES regulations would be met by meeting surface water quality standards and by continued compliance with existing stormwater permit. The relative contribution towards meeting the requirements of the NOAA Freshwater Sediment Benchmarks and NPDES ARARS increases as the alternatives increase in number.

7.1.3 Short-Term and Long-Term Effectiveness

Short-Term Effectiveness – Overburden that is moved as a result of grading activities can release additional selenium and other COPCs due to weathering conditions. Alternative 2, including grading of approximately 360,000 cy on the side slope area, would provide the lowest potential for release during implementation. Alternative 3 would entail grading of approximately

800,000 cy of ODA material on the side slope area and would have increased potential for releases during implementation. Alternatives 4 and 5 would entail grading of an additional 30,000 cy of material in the top area and upslope area, for a total grading volume of approximately 830,000 cy. Alternative 6 would entail grading of approximately 1.8 million cy of ODA material and would therefore have the greatest potential for releases. Potential risks to workers during implementation correspondingly increase as the scope of the work increases.

Cover soil will be taken from on-Site borrow areas. The greater the quantity of cover soil needed, the greater the short-term impacts on the borrow areas and need for reclamation. Alternative 5 would require approximately 452,000 cy of cover and would result in the greatest borrow area disturbance. Alternatives 4, 6 and 3 would require approximately 142,000 cy, 113,000 cy and 32,000 cy of cover, respectively. Alternative 2 would not entail placement of cover and would have no impact on potential borrow areas.

The time required to implement an alternative will affect the time to achieve removal action objectives. Alternative 2 would require one year to implement; Alternatives 3 and 4 one or two years; Alternative 5 two or three years and Alternative 6 three years.

Overall, therefore, Alternative 2 has the highest level of short-term effectiveness because it is quickest to implement and has lowest impact during implementation. Alternatives 3, 4, and 5 have moderate levels of short-term effectiveness, and Alternative 6, the lowest because of the extensive scope of regrading and covering and the associated potential for selenium releases during implementation, increased impact in borrow areas, increased risks to workers and longer time to implement.

Long-Term Effectiveness – Alternative 2 has the lowest level of long-term effectiveness and permanence due to remaining steep slopes. There are no significant differences between Alternatives 3, 4, 5, and 6 in terms of long-term effectiveness and permanence. Run-on/runoff controls and grading will reduce the quantity of water available for infiltration into the ODA. Grading will also reduce ODA slopes for Alternatives 3 through 6, which will increase long-term stability. Lower slope and covers systems will provide conditions that would allow establishment and maintenance of an appropriate vegetative cover, further increasing stability and reducing the long-term potential for erosion.

7.1.4 Consistency with Potential Future Remedial Actions

As discussed in Section 6, similar RI/FS projects are on-going throughout the Southeast Idaho phosphate resource area. Based on these and other EE/CAs that have been completed, a basic range of appropriate remedial technologies has been developed for phosphate mines. This range is consistent with the remedial technologies identified and evaluated above in Section 6.1 and focuses on: (1) excavation and disposal; (2) surface water management; (3) grading and reshaping; (4) surface water modification and cover; (5) institutional/access controls and (6) water treatment. As such, the actions in the range of alternatives evaluated in this EE/CA are consistent with potential future remedial actions.

Depending on the final site remedial action objectives and the results of removal action performance monitoring (primarily groundwater, surface water, and vegetation) and inspections of the surface water controls and stability of ODA slopes and covers, it may be necessary to augment any removal alternative with additional actions. Examples could be additional grading and capping, surface water controls, and potentially treatment of the seep (if it continues to flow after the removal action is completed) or of captured shallow groundwater. In general, the removal action alternatives increase in scope (amount of grading, complexity of cover) from Alternative 2 to 6. The reduction in infiltration also increases from Alternative 2 to 6. Therefore the potential for the need for additional actions would be lowest for Alternative 6, followed in order by Alternatives 5, 4, and 3. Alternative 2 would have the greatest potential for the need for additional actions.

7.2 Implementability

Compared to the differences in cost and effectiveness of the alternatives, there are no significant differences in terms of their implementability. While the scope of activities increases from Alternative 2 to 6, none of the alternatives require unconventional construction techniques or special access logistics, although installation of a geosynthetic liner in Alternative 6 would require a specialized subcontractor and specialized construction expertise (at least in terms of construction supervision). All goods and services required to implement them are expected to be readily available regionally, if not locally. Engineering controls are easily implementable during construction activities to prevent impacts to adjoining property. In addition, relevant BMPs as easily implemented such as not to impose unacceptable risks to workers or other receptors. Also, none of the alternatives require permits or easements or impact adjoining property. Actions would be conducted on Simplot or BLM-managed land and therefore interim ICs, such as restrictive covenants are enforceable.

Alternatives 5 and 6 may be more difficult to implement because of the requirement for large quantities of cover material (which is expected to be found on-Site, but this needs to be confirmed) or geosynthetic liner materials, and due to the relatively large amount of grading required.

7.3 Cost

The estimated net present value of the action alternatives are as follows:

- Alternative 2: $2.5 million;
- Alternative 3: $5.2 million;
- Alternative 4: $6.9 million;
- Alternative 5: $11.8 million; and
- Alternative 6: $18.2 million.

8.0 RECOMMENDED REMOVAL ACTION ALTERNATIVE

The recommended removal action alternative is identified based on results of the comparative analysis which highlights the effectiveness, implementability, and cost considerations relevant to identifying the preferred removal action for the Pedro Creek ODA. Alternative 4 is the recommended removal action alternative for the Pedro Creek ODA (Figure 8-1) for the following reasons:

- Alternative 4 would be protective of human health and the environment. The flatter slopes of the regraded ODA would significantly reduce the potential for seismic instability or mass wasting of the ODA materials. The cover soils and revegetation would greatly reduce the erosion potential. Placement of the soil cover and revegetation with non-selenium-accumulating species would also provide for a reduction in selenium exposure via direct contact and ingestion. Alternative 4 would also reduce the infiltration through the ODA by an estimated 85 percent which would significantly decrease the potential for exceedances of groundwater and surface water standards downgradient from the ODA.

- Alternative 4 would meet the action and location-specific ARARs, would contribute toward meeting the chemical-specific ARARs, and would meet all of the RAOs. Alternative 4 would likely be consistent with the future remedial actions at the site. In addition, if collection and treatment of springs and seeps is required as part of the remedial actions, these measures could be readily implemented downgradient from the ODA.

- Alternative 4 would be effective in the short term. The regrading of approximately 800,000 cubic yards of ODA materials and the cover construction of approximately 142,000 cubic yards of borrow soils would have the potential for releases during construction, but this potential would be mitigated through best management practices. This alternative would have a moderate amount of disturbance at the borrow area south of the ODA, which can be mitigated through reclamation following completion of the cover at the ODA. Alternative 4 would not have any significant short term risks to the public during implementation and there would be no unusual risks to construction workers. Alternative 4 can be implemented in a reasonable time frame, likely one to two years.

- Alternative 4 is implementable from both a technical and administrative standpoint. The construction of this alternative would utilize standard construction equipment and techniques, and experienced contractors and skilled workers are available locally. There would be no significant administrative implementability issues associated with this alternative.

- Alternative 4 would likely be consistent with potential future remedial actions.

The estimated present worth cost for Alternative 4 is $6.9 million, which is in the middle of the range of costs among the alternatives evaluated. While Alternative 4 is not the lowest cost alternative, it is the most cost-effective alternative at infiltration reduction among those alternatives that can effectively meet all of the RAOs.

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TABLES

Table 2-1
Summary of Hydraulic Conductivity Data for Formations in the Southeast Idaho Phosphate Region

Formation	Unit	Symbol	Study Area	Test Procedure	Transmissivity T		Conductivity K		Storage S
					ft^2/day	m^2/day	ft/day	m/day	
Alluvium	Alluvium	Qal	Diamond Creek	Field-Pump Test	3,200	300	55	17	-
	Alluvium	Qal	Blackfoot Bridge EIS	Single Well Permeability	18 to 630	2 to 58	3 to 43	2 to 13	
Dinwoody	Middle of Formation	Trd	Little Long Valley	Field-Slug Test	83	7.7	-	-	-
	Middle of Formation	Trd	Blackfoot Bridge EIS	Single Well Permeability	2.3 to 370	0.2 to 34	0.02 to 2.5	0.012 to 0.75	-
Phosphoria	Rex Chert Member	Ppr	Blackfoot Bridge EIS	Single Well Permeability	57	5.2	0.23	0.07	
	Rex Chert Member (fractured)	Ppr	Lower Dry Valley	Field-Pump Test	12,000	1,100	75	23	0.0003
					2,300	210	28	8.5	0.001
	Rex Chert Member	Ppr	Lower Dry Valley	Field-Pump Test	450	42	2.2	0.67	-
			Diamond Creek	Field-Pump Test	750	70	2.5	0.76	0.007
	Meade Peak Phosphatic Shale Member (fractured)	Ppm	Lower Dry Valley	Field-Pump Test	2,000	190	25	7.6	0.0005
	Meade Peak Phosphatic Shale Member (unfractured)	Ppm	Lower Dry Valley	Field-Slug Test	8	0.74	0.3	0.09	-
			Lower Dry Valley	Field-Slug Test	64	5.9	1.6	0.49	-
			Lower Dry Valley	Field-Slug Test	23	2.1	0.4	0.1	-
			Lower Dry Valley	Field-Slug Test	16	1.5	0.14	0.0043	-
			Lower Dry Valley	Field-Slug Test	63	5.9	0.44	0.13	-
			Lower Dry Valley	Field-Slug Test	6	0.56	0.07	0.02	-
	Meade Peak Phosphatic Shale Member (middle waste)	Ppm	Lower Dry Valley	Field-Pump Test	300	28	4	1.2	0.0013
	Meade Peak Phosphatic Shale Member (ore)	Ppm	Little Long Valley	Field-Slug Test	11	1	2.2	0.67	-
	Meade Peak Phosphatic Shale Member (middle waste with bedding)	Ppm	Little Long Valley	Lab	-	-	5.2	1.6	-
	Meade Peak Phosphatic Shale Member (middle waste across bedding)	Ppm	Little Long Valley	Lab	-	-	0.4	0.12	-
Wells Formation	Wells Formation	PPw	Blackfoot Bridge EIS	Single Well Permeability	260 to 5,500	24 to 510	4.2 to 44	2.5 to 13	-

Note:
1. Adapted from Ralston (1979) Table 1.

Table 2-2
Summary Information of Special Status Species Potentially Present at Conda

Common Name	Scientific Name	USFWS[1]	IDAPA[2, a]	USFS[3, c]	BLM[4]
Birds					
American White Pelican	*Pelecanus erythrorhynchos*				Rangewide/Globally Imperiled Species
Bald Eagle	*Haliaeetus leucocephalus*		Threatened[b]		Threatened
Columbian Sharp-Tailed Grouse	*Tympanchus phasianellus columbianus*			Sensitive and Manangement Indicator Species	
Flammulated Owl	*Otus flammeolus*			Sensitive and Manangement Indicator Species	
Greater Sage-Grouse	*Centrocercus urophasianus*			Sensitive and Manangement Indicator Species	Rangewide/Globally Imperiled Species
Great Gray Owl	*Strix nebulosa*			Sensitive and Manangement Indicator Species	
Northern Goshawk	*Accipiter gentilis*			Sensitive and Manangement Indicator Species	
Peregrine Falcon	*Falco peregrinus anatum*		Threatened		
Three-Toed Woodpecker	*Picoides tridactylus*			Sensitive and Manangement Indicator Species	
Yellow-Billed Cuckoo	*Coccyzus americanus*				Candidate
Mammals					
Gray Wolf	*Canis lupus*			Threatened, Endangered, Proposed, and Candidate species - not currently listed[e]	Experimental Population
Rock Squirrel	*Spermophilus variegatus*		Protected Non Game		
North American Wolverine	*Gulo gulo luscus*		Protected Non Game	Sensitive and Manangement Indicator Species	
Pygmy Rabbit	*Brachylagus idahoensis*				Rangewide/Globally Imperiled Species
Woodland Caribou	*Rangifer tarandus caribou.*		Endangered		
Canada Lynx	*Lynx canadensis*	Threatened	Threatened	Threatened, Endangered, Proposed, and Candidate species	
Grizzly Bear	*Ursus arctos horribilis*		Threatened		
Northern Idaho Ground Squirrel	*Spermophilus brunneus brunneus*		Threatened		
American Pika	*Ochotona princeps*		Protected Non Game		
Bats	*all species*		Protected Non Game		
Chipmunks	*Neotamias spp*		Protected Non Game		
Columbia Plateau (Merriam's) Ground Squirrel	*Spermophilus canus vigilis*		Protected Non Game		
Golden-Mantled Ground Squirrel	*Spermophilus lateralis*		Protected Non Game		
Great Basin (piute) Ground Squirrel	*Spermophilus canus vigilis*		Protected Non Game		
Kit Fox	*Vulpes macrotis*		Protected Non Game		
Northern Flying Squirrel	*Glaucomys sabrinus*		Protected Non Game		
Red Squirrel	*Tamiasciurus hudsonicus.*		Protected Non Game		
Southern Idaho Ground Squirrel	*Spermophilus brunneus endemicus.*		Protected Non Game		
Wyoming Ground Squirrel	*Spermophilus elegans nevadensis*		Protected Non Game		
Fish					
Bear Lake Cutthroat Trout	*Oncorhynchus clarki pop 3*				Rangewide/Globally Imperiled Species
Bear Lake Sculpin	*Cottus extensus*		Protected Non Game		Rangewide/Globally Imperiled Species
Bear Lake Whitefish	*Prosopium abyssicola*				Rangewide/Globally Imperiled Species
Bonneville Cisco	*Prosopium gemmifer*				Rangewide/Globally Imperiled Species
Bonneville Cutthroat Trout	*Oncorhynchus clarki Utah*			Sensitive and Manangement Indicator Species[d]	Rangewide/Globally Imperiled Species
Bonneville Whitefish	*Prosopium spilonotus*				Rangewide/Globally Imperiled Species
Burbot, Ling	*Lota lota.*		Endangered		
Bull Trout	*Salvelinus confluentus*		Threatened		
Chinook Salmon (spring, summer, and fall)	*Oncorhynchus tshawytscha*		Threatened		
Leatherside Chub	*Gila copei*		Protected Non Game		
Northern Leatherside Chub	*(Lepidomeda copei)*			Other Wildlife and Rare Plants[d]	
Pacific Lamprey	*Lampetra tridentata*		Endangered		
Sand Roller	*Percopsis transmontana*		Protected Non Game		
Shoshone Sculpin	*Cottus greenei*		Protected Non Game		
Sockeye Salmon	*Oncorhynchus nerka*		Endangered		
Snake River Fine Spotted Cutthroat Trout	*Oncorhynchus clarki ssp.*			Sensitive and Manangement Indicator Species - no habitat or presence[d]	
Steelhead Trout (Snake River)	*Oncorhynchus mykiss gairdneri*		Threatened		
White Sturgeon (Kootenai River population)	*Acipenser transmontanus*		Endangered		
Wood River Sculpin	*Cottus leiopomus*		Protected Non Game		
Yellowstone Cutthroat Trout	*Oncorhynchus clarki Bouvieri*				Rangewide/Globally Imperiled Species
Amphibians					
Boreal Toad	*Bufo boreas boreas*				Rangewide/Globally Imperiled Species (Southeast Idaho population only)
Northern Leopard Frog	*Rana pipiens*				Rangewide/Globally Imperiled Species
Invertebrates					
Utah Valvata Snail	*Valvata utahensis*				Endangered
Bliss Rapids Snail	*Taylorconcha serpenticola*				Threatened

Notes:

U.S. Fish and Wildlife Service (USFWS)

1 - A letter was sent to USFWS on June 16, 2009 seeking feedback on which federally-listed T/E species they expect could occur at the Site and should be specifically included in the SSERA. Table reflects response letter, dated July 21, 2009.

Idaho Administrative Procedures Act (IDAPA)

2- Idaho Administrative Procedures Act (IDAPA). 2009. 13.01.06 – Rules Governing Classification and Protection of Wildlife. Idaho Department of Fish and Game. Available at http://adm.idaho.gov/adminrules/rules/idapa13/0106.pdf.

a - A letter was sent to IDFG on October 21, 2009 seeking feedback on which T/E species they expect could occur at the Site and should be specifically included in the SSERA. Response letter has not been received.

b - Although the bald eagle is listed as threatened in IDAPA (2009), it was recommended by IDFG biologists for delisting from T/E species to big-game and non-game wildlife species; recommendations were reportedly to be made to their commission on July 23, 2009 (pers. comm., R. Sallabanks at IDFG, July 21, 2009).

definitions from IDAPA (2009)

Endangered: Any native species in danger of extinction throughout all or a significant portion of its Idaho range. (4-6-05)

Threatened Species: Any native species likely to be classified as Endangered within the foreseeable future throughout all or a significant portion of its Idaho range.

U.S. Forest Service (USFS)

3 - A letter was sent to USFS on October 21, 2009 seeking feedback on which federally-listed T/E species they expect could occur at the Site and should be specifically included in the SSERA. Table reflects response letter, dated October 30, 2009.

c - Information was provided as to whether "Suitable habitat for species or prey occurs in the project or analysis area" and "Occurrence is known, expected, probable, or possible in the project or analysis area determined by the amount, distribution, and quality of suitable habitat in and around the project area; reviewing file information of suitable habitat, sightings; survey data; site visits; and/or personal knowledge of species and habitat." Only species with either suitable habitat or possible occurrence are listed on this table.

d - Caribou NF Fish Biologist Jim Capurso needs to be contacted to verify correct fish information.

e - the wolf may be relisted and should be considered as a listed species.

definitions and information from letter:

Threatened, Endangered, Proposed, and Candidate species identified by U.S. Fish and Wildlife Services on the 180-Day Species List Number (or update) and date of transmittal letter: Species List # 14420 2009-SL-0358 – 6-01-09

Sensitive species identified by the Regional Forester are known or suspected to occur on the Caribou NF (USDA 2009). Population viability is a concern for these species as evidenced by current or expected downward trends in population numbers and/or habitat.

Management Indicator Species – Caribou National Forest FEIS (USDA 2003a D-40) and Revised Forest Plan (USDA 2003b 3-25)

Bureau of Land Management (BLM)

4 - An email was sent to BLM on October 29, 2009 seeking feedback on which T/E species they expect could occur on BLM lands within the Study Area and should be specifically included in the SSERA. Table reflects info for the Pocatello Field Office only. The email did not indicate which species were expected to occur specifically on BLM lands within the Conda Study Area.

definitions

Rangewide / Globally Imperiled Species: Includes species that are experiencing significant declines throughout their range with a high liklihood of being listed under the Endangered Species Act in the forseeable future due to their rarity and/or significant endangerment factors.

Regional / State Imperiled Species: Includes species that are experiencing declines in population or habitat and are in danger of regional or local extinctions in Idaho in the foreseeable future.

Peripheral Species in Idaho: Includes species that are generally rare in Idaho with the majority of their breeding range outside the state.

Watch List Species: Includes species that are not considered Idaho BLM sensitive species but current population or habitat information suggests that species may warrant sensitive species status in the future.

Table 3-1
Summary of Risk-Driving COPC Concentrations in Pedro Creek ODA Media[1]

Risk-Driving COPCs with Conservative Risk-Based Benchmarks															
	Arsenic in Soil[2] (mg/Kg)			**Arsenic in Vegetation[3] (mg/Kg)**			**Arsenic in Sediment (mg/Kg)**			**Arsenic in Surface Water (mg/L)**			**Arsenic in Groundwater (mg/L)**		
	HH - 0.39 mg/Kg (EPA RSL) ECO - 18 mg/Kg (EPA SSL)			ECO - 30 mg/Kg (NRC MTL)			HH - 0.39 mg/Kg (EPA RSL) ECO - 6 mg/Kg (SQUIRT)			HH - 0.010 mg/L (EPA MCL) ECO - 0.15 mg/L (EPA Freshwater CCC)			HH - 0.010 mg/L (EPA MCL) ECO - 0.15 mg/L (EPA Freshwater CCC)		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Pedro Creek ODA	***11***	***19***	***14.9***	0.32	0.6	0.426		NA			NA			NA	
Pedro Creek ODA Seep (NES-5)		*NA*			NA		***19***	***23***	***21***		NA		***0.089***	***0.252***	***0.167***
Downgradient of ODA	***3***	***30***	***9***	0.05	2.85	0.36		NA			NA		0.001	***0.065***	***0.014***
Reach 1		NA			NA		***3***	***40***	***11***	0.001	***0.296***	***0.096***	***0.034***[a]	***0.065***[a]	***0.0495***[a]
													0.0011[b]	0.0019[b]	0.00156[b]
Tributary #5		NA			NA			NA			0.003			NA	
Reach 2		NA			NA		***12***	***20***	***16***	0.001	***0.022***	***0.013***	0.001[c]	0.0026[c]	0.0016[c]
Tributary #4		NA			NA			NA		0.001	0.0006	0.001		NA	
Reach 3		NA			NA		***3***	***5.8***	***5***	0.001	0.006	0.002		NA	
	Cadmium in Soil[2] (mg/Kg)			**Cadmium in Vegetation[3] (mg/Kg)**			**Cadmium in Sediment (mg/Kg)**			**Cadmium in Surface Water (mg/L)**			**Cadmium in Groundwater (mg/L)**		
	HH - 7 mg/Kg (EPA RSL) ECO - 32 mg/Kg (EPA SSL)			ECO - 5.1 mg/Kg (AWRMP)			HH - 7 mg/Kg (EPA RSL) ECO - 0.6 mg/Kg (SQUIRT)			HH - 0.005 mg/L (EPA MCL) ECO - 0.00025 mg/L (EPA Freshwater CCC)			HH - 0.005 mg/L (EPA MCL) ECO - 0.00025 mg/L (EPA Freshwater CCC)		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Pedro Creek ODA	4	***101***	***26***	0.14	9.1	2.15		NA			NA			NA	
Pedro Creek ODA Seep (NES-5)		NA			NA		***27.4***	***30.2***	***28.8***		NA		***0.0089***	***0.0130***	***0.0103***
Downgradient of ODA	0.35	***29.50***	***8.28***	0.30	3.78	1.11		NA			NA		0.00003	0.00034	0.00017
Reach 1		NA			NA		3.7	***44.6***	***16.0***	0.001	***0.013***	***0.005***	0.00025[a]	0.00026[a]	0.000255[a]
													0.000034[b]	0.00006[b]	0.0000513[b]
Tributary #5		NA			NA			NA			0.0001			NA	
Reach 2		NA			NA		***11.5***	***17.7***	***14.7***	0.001	0.002	0.001	0.000159[c]	0.00034[c]	0.0002296[c]
Tributary #4		NA			NA			NA		0.00006	0.00010	0.00009		NA	
Reach 3		NA			NA		0.8	4.4	2.8	0.00002	0.00033	0.00008		NA	
	Chromium in Soil[2] (mg/Kg)			**Chromium in Vegetation[3] (mg/Kg)**			**Chromium in Sediment (mg/Kg)**			**Chromium in Surface Water (mg/L)**			**Chromium in Groundwater (mg/L)**		
	HH - 280 mg/Kg (EPA RSL) ECO - 0.4 mg/Kg (Efyomson)			ECO - 100 mg/Kg (AWRMP)			HH - 280 mg/Kg (EPA RSL) ECO - 26 mg/Kg (SQUIRT)			HH - 0.1 mg/L (EPA MCL) ECO - 0.074 mg/L (EPA, IDAPA)			HH - 0.1 mg/L (EPA MCL) ECO - 0.074 mg/L (EPA, IDAPA)		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Pedro Creek ODA	94	***843***	***474***	0.22	6.4	1.79		NA			NA			NA	
Pedro Creek ODA Seep (NES-5)		NA			NA		***364***	***609***	***487***		NA		0.001	0.014	0.006
Downgradient of ODA	19	***657***	142	0.20	13.0	0.72		NA			NA		0.0008	0.0248	0.005275
Reach 1		NA			NA		19	***595***	202	0.0002	0.0135	0.0034	0.0008[a]	0.001[a]	0.0009[a]
													0.001[b]	0.0033[b]	0.0019[b]
Tributary #5		NA			NA			NA			0.0002			NA	
Reach 2		NA			NA		115	238	181	0.0002	0.0010	0.0005	0.0026[c]	0.0248[c]	0.01156[c]
Tributary #4		NA			NA			NA		0.0003	0.0006	0.0004		NA	
Reach 3		NA			NA		25	66.2	38	0.0002	0.0013	0.0007		NA	
	Selenium in Soil[2] (mg/Kg)			**Selenium in Vegetation[3] (mg/Kg)**			**Selenium in Sediment (mg/Kg)**			**Selenium in Surface Water (mg/L)**			**Selenium in Groundwater (mg/L)**		
	HH - 39 mg/Kg (EPA RSL) ECO - 0.52 mg/Kg (EPA SSL)			ECO - 2.6 mg/Kg (AWRMP)			HH - 39 mg/Kg (EPA RSL) ECO - NA			HH - 0.050 mg/L (EPA MCL) ECO - 0.005 mg/L (EPA, IDAPA)			HH - 0.050 mg/L (EPA MCL) ECO - 0.005 mg/L (EPA, IDAPA)		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Pedro Creek ODA	1	***252***	***55***	0.19	555 (1404)[4]	43.7 (56.3)		NA			NA			NA	
Pedro Creek ODA Seep (NES-5)		NA			NA		***124***	***225***	***175***		NA		***0.54***	***6.89***	***3.32***
Downgradient of ODA	0.2	***95.7***	14.1	0.03	106.0	20		NA			NA		0.002	***1.190***	***0.279***
Reach 1		NA			NA		1	***717***	***77***	***0.3***	***5.0***	***2.5***	***0.935***[a]	***1.19***[a]	***1.0625***[a]
													0.03[b]	0.032[b]	0.03103[b]
Tributary #5		NA			NA			NA			***0.16***			NA	
Reach 2		NA			NA		***93***	***207***	***132***	***0.42***	***0.97***	***0.64***	0.0022[c]	0.0048[c]	0.00393[c]
Tributary #4		NA			NA			NA		0.0005	0.0030	0.0020		NA	
Reach 3		NA			NA		1	29.6	13	0.0005	***0.3460***	0.0330		NA	

Table 3-1
Summary of Risk-Driving COPC Concentrations in Pedro Creek ODA Media[1]

Risk-Driving COPCs with Conservative Risk-Based Benchmarks	Zinc in Soil[2] (mg/Kg)			Zinc in Vegetation[3] (mg/Kg)			Zinc in Sediment (mg/Kg)			Zinc in Surface Water (mg/L)			Zinc in Groundwater (mg/L)		
	HH - 2300 mg/Kg (EPA RSL) ECO - 120 mg/Kg (EPA SSL)			ECO - 210 mg/Kg (AWRMP)			HH - 2300 mg/Kg (EPA RSL) ECO - 120 mg/Kg (SQAG)			HH - 5 mg/L (EPA RSL) ECO - 0.12 mg/L (EPA, IDAPA)			HH - 5 mg/L (EPA RSL) ECO - 0.12 mg/L (EPA, IDAPA)		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Pedro Creek ODA	133	1620	783	13	312.0	90	NA			NA			NA		
Pedro Creek ODA Seep (NES-5)	NA			NA			504	1290	897	NA			0.42	0.69	0.51
Downgradient of ODA	59	1310	341	13	173.0	46	NA			NA			0.002	0.051	0.012
Reach 1	NA			NA			115	1420	535	0.012	0.677	0.227	0.0104[a] 0.0019[b]	0.0512[a] 0.0083[b]	0.02543[a] 0.00426[b]
Tributary #5	NA			NA			NA			0.01			NA		
Reach 2	NA			NA			493	824	657	0.003	0.030	0.015	0.0104[c]	0.0512[c]	0.02543[c]
Tributary #4	NA			NA			NA			0.0004	0.0100	0.0041	NA		
Reach 3	NA			NA			91	240.0	142	0.001	0.019	0.005	NA		

Notes:

BOLD - indicates exceedance of HH screening level

Highlight - indicates exceedance of ECO screening level

Risk-Based Preliminary Regional Screening Levels are reflective of the most conservative value of the various risk-based action levels, with source presented in paranthesis.

Human health screening benchmarks used are based on the lower of 10^{-6} excess lifetime cancer risk or a non-cancer hazard quotient of 0.1

a - Based on GW-28

b - Based on GW-29

c - Based on GW-30

1- Based on 2001 and more recent data; including 2009 data.

2- Includes 0-12 inches results. Includes riparian soil sample results within stream reaches.

3- Includes riparian vegetation sample results within stream reaches.

4- Preliminary results for Aug 2009 Aster sample collected by USDA Agricultural Research Service around NES-5.

--A single value in a row indicates that only one result is available for that location and media type.

NA - Not Available, HH - Human Health, RSL - Regional Screening Level, SSL - Soil Screening Level, ECO - Ecological, CCC - Chronic Criteria, MTL - Maximum Tolerable Level, NRC-National Research Counsel

Sources:

Efroymson, R. A., M. E. Will, and G. W. Suter II. 1997b. Toxicologial Benchmarks for Screening Contaminants of Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process. ES/ER/TM-126/R2. Oak Ridge National Laboratory, Environmental Sciences Division.

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Table 5-1
Summary of Potential Applicable or Relevant and Appropriate Requirements (ARARs)

	Standard, Limitation, or Requirement Criteria	Citation	Description	Comments	Category
Federal					
Chemical-Specific	Safe Drinking Water Act	42 U.S.C. §§ 300f et seq.	Protection of public water systems and underground sources of drinking water	Groundwater is not a drinking water source.	Relevant and Appropriate
	National Primary Drinking Water Regulations	40 C.F.R. Part 141	Establishes health-based standards (Maximum Contaminant Levels, MCLs) for public water systems	MCLs and nonzero Maximum Contaminant Level Goals (MCLGs) may be applicable or relevant and appropriate as groundwater contaminant concentration goals depending on whether the water in question is to be used for drinking water supply. MCLs are applicable if the water is or will be used for drinking. MCLs are relevant and appropriate if the water could be used for drinking. MCLGs set above zero levels are relevant and appropriate for current or potential sources of drinking water.	Relevant and Appropriate
	National Secondary Drinking Water Regulations	40 C.F.R. Part 143	Establishes welfare-based standards (secondary MCLs) for public water systems		TBC
	Clean Water Act	33 U.S.C. §§ 1251 et seq.	Water Pollution Prevention and Control		Applicable
	Water Quality Standards	40 C.F.R. Part 131	Sets criteria for water quality based on toxicity to aquatic organisms and human health		Applicable
	National Recommended Water Quality Criteria November 2002	Section 304(a) of CWA	Recommended water quality criteria for the protection of aquatic life and human health in surface water		Applicable
	National Emission Standards for Hazardous Air Pollutants	40 CFR 61	Recommended air pollutant restrictions		Relevant and Appropriate
	NOAA Freshwater Sediment Benchmarks	(Buchman 1999)	Benchmarks for freshwater sediments	Benchmarks are not promulgated, therefore do not rise to the level of an ARAR.	TBC
	National Pollutant Discharge Elimination System (NPDES) Permit Regulations	40 CFR § 122 to 125	Permitting requirements for the discharge of "pollutants" from any "point source"	No discharge permit is contemplated under the early action	Relevant and Appropriate
Action-Specific	Surface Mining Control and Reclamation Act	30 U.S.C. § 1201 30 C.F.R. Part 816 30 C.F.R. Part 784	Permanent program performance standards – surface mining activities. Minimum requirements for reclamation and operations.		Relevant and Appropriate
	Resource Conservation and Recovery Act	42 U.S.C. §§ 6901 et seq. 40 C.F.R. Parts 260-265 and 268	Sets criteria for hazardous waste management	Would be applicable if hazardous wastes were identified in the early action area. None have been identified based on sampling data and are not expected based on site history.	Applicable
	Archaeological and Historic Preservation Act	40 C.F.R. § 6.301	Data recovery and preservation activities.		Applicable
	National Historic Preservation Act	16 U.S.C. §§ 470f, 36 C.F.R. Parts 60, 63 and 800, 40 C.F.R. § 6.301	Section 106 of NHPA process balances needs of Federal undertaking with effects the undertaking may have on historic properties		Applicable
	Historic Sites, Building and Antiquities Act	16 U.S.C. § 461	Procedures to preserve archaelogical or historical sites.		Applicable
	Migratory Bird Treaty Act	16 U.S.C. §§ 703 et seq.	Taking, killing, possessing migratory game unlawful		Applicable
	Fish and Wildlife Coordination Act	16 U.S.C. § 661 40 C.F.R. § 6.302	Fish and wildlife protection: requires federal agencies involved in actions that will result in the control or structural modification of any natural stream or body of water for any purpose, to take action to protect the fish and wildlife resources that may be affected by the action.		Applicable
	Endangered Species Act	16 U.S.C. §§ 1531 et seq. 50 C.F.R. Part 402 40 C.F.R. § 6.302	Requires consultation with Services charged with protecting listed species.		Applicable
	Bald and Golden Eagle Protection Act	16 U.S.C. §§ 668	Protection of the Bald and Golden Eagles		Applicable
	Mineral Leasing Act	30 USC § 181et seq.,43 CFR 3500- 3599	Regulates discovery, mining, processing and reclamation on Federal phosphate leases.		Applicable
	Clean Air Act	33 U.S.C. §§ 1251	Protection of the nation's air quality		Relevant and Appropriate
	American Indian Religious Freedom Act	42 U.S.C. §§1996 et seq.	Protection of traditional culture and religious rights and practices of Native Americans		TBC

Table 5-1
Summary of Potential Applicable or Relevant and Appropriate Requirements (ARARs)

	Standard, Limitation, or Requirement Criteria	Citation	Description	Comments	Category
Location-Specific	Protection of Floodplains	40 C.F.R. § 6.302 and Appendix A	Regulates construction in Floodplains	No floodplains present in early action area.	Not an ARAR
	Protection of Wetlands	40 C.F.R. § 6.302	Wetlands Protection: Executive Order 11990 requires agencies conducting certain activities to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists.	No wetlands present in early action area	Not an ARAR
	Pocatello Field Office Proposed Resource Management Plan and Final Environmental Impact Statement	US BLM FES 10-12	This Proposed Resource Management Plan and Final Environmental Impact Statement describes and analyzes the impacts of four alternatives for managing the public lands administered by the Pocatello Field Office in southeastern Idaho.		Relevant and Appropriate
	Conda Mining Reclamation Plan				Relevant and Appropriate
	Federal Land Policy and Management Act of 1976 (FLPMA)	43 USC 1701	Provides for multiple use and inventory, protection, and planning for resources on public lands.		Applicable
	Considering Wetlands at CERCLA Sites Guidance	OSWER 9280.03	Guidance to evaluate potential impacts on wetlands	No wetlands present in early action area	Not an ARAR
	Native American Graves Protection and Repatriation Act	25 U.S.C. §§ 3001 et seq.	Protects Native American cultural items -- human remains, funerary objects, sacred objects, and objects of cultural patrimony		TBC
State of Idaho					
Chemical-Specific	Idaho Water Quality Standards	IDAPA 58.01.02	Water quality standards and wastewater treatment requirements, including but not limited to: water quality criteria for aquatic life use designations (.250) Designations of surface waters found within Salmon Basin (.130) General surface water quality criteria (.200) Mixing zone policy (.060)		Applicable
	Idaho Ground Water Quality Rule	IDAPA 58.01.11.200	Numerical and narrative standards that apply to all groundwater of the state		Applicable
	Rules and Standards for Hazardous Waste	IDAPA 58.01.05	Rules and standards for hazardous waste		Applicable
Action-Specific	Solid Waste Management Rules	IDAPA 58.01.06	Establishes requirements applicable to all solid waste and solid waste management facilities		Applicable
	Idaho Non-Point Source Management Plan		Guidance to protect or restore (where possible) the benficial uses of the State's surface and groundwater		TBC
	Idaho Surface Mining Act	Idaho Code, Title 47, Chapter 15	Procedures for reclamation and vegetative planning.		Relevant and Appropriate
	Exploration and Surface Mining Rules	IDAPA 20.03.02	Best management practices and reclamation for surface mining operations.		Relevant and Appropriate
	Well Construction Standard Rules	IDAPA 37.03.09	Well construction and abandonment.		Applicable
	Appropriation of State Water	Idaho Code, Title 42, Chapters 1 and 2, Sections 101-250	Water rights and reclamation		Applicable
	Air Pollution Control Rules	IDAPA 58.01.01	These rules provide for the control of air pollution in Idaho		Relevant and Appropriate
	Catalog of Stormwater Best Management Practices for Idaho Cities and Counties		Procedures to control erosion and sediment during and after construction		TBC
	Idaho Classification and Protection of Wildlife Rule	IDAPA 13.01.06.300	Classifies fish and wildlife species; identifies species of special concern, and protection of wildlife species from taking and possessing.		Applicable
Location-Specific	Preservation of Historical Sites	Idaho Statutes Title 67, Chapters 46 and 41	Guidance to preserve historical, acrcheological, architectural, andcultural heritage		Applicable
	Safety of Dams Rules	IDAPA 37.03.06	Guidance to establish acceptable standards for construction and to provide for safety evaluation of new or existing dams.	No dams in early action area.	Not an ARAR
	Stream Channel Alteration Rules	IDAPA 37.03.07	Prevent alterations which will be a hazard to the stream channel and its environment.	No stream channel alteration in early action	Not an ARAR
	Idaho Water Quality Act	Idaho Code, Title 39, Chapter 36	Procedures to preserve water quality		Relevant and Appropriate
	Selenium Area Wide Investigation Area Wide Risk Management Plan		Discretionary guidance document to assist in mine-specific risk management		TBC
	Mine Tailings Impoundment Structure Rules	IDAPA 37.03.05	Applies to structures upon which construction, lift construction, enlargement, or alteration is underway on or after July 1, 1978. Establishes design criteria.	No tailings impoundments in early action area	Not an ARAR

Table 6-1
Summary of Removal Action Alternatives

Alternative	Pedro Creek ODA Removal Action Area	
	Side Slopes	Top Area/Upslope Area
1 - No Action	No action.	
2 - In-Place Consolidation/Regrading in Side Slope Area, with Direct Revegetation on Amended Overburden Materials on the ODA	Grade 360,000 cubic yards (cy) of ODA material to achieve slopes no steeper than 2:1. Amend existing overburden surface materials with composted manure.	Regrade only as needed to prevent pooling. Amend existing overburden surface materials with composted manure.
3 - In-Place Consolidation/Regrading in Side Slope Area, with Soil Cover and Revegetation on the ODA	Grade 800,000 cy of ODA material to achieve slopes from 2.5:1 to 3:1 and relocate cut material into area between existing toe and new toe (100 ft minimum from property boundary) and into exposed pit to the south. Place 6-inch soil cover as growth medium.	Regrade only as needed to prevent pooling. Place 6-inch soil cover as growth medium.
4 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Soil Cover and Revegetation on the ODA	Implement Alternative 3 grading of the ODA. Place 18-inch soil cover.	Regrade (30,000 cy) area to 10% slope (Top Area) and 3% (Upslope Area). Place 12-inch soil cover as growth medium.
5 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Thick ET Soil Cover and Revegetation on the ODA	Implement Alternative 3 grading of the ODA. Place thick ET cover onto overburden including 48-inch soil cover and 3-inch chert capillary break layer.	Implement Alternative 4 grading. Place thick ET cover onto overburden including 48-inch soil cover and 3-inch chert capillary break layer.
6 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Geosynthetic-Soil Cover System and Revegetation on the ODA	Grade 1.8 million cy of ODA material to achieve slopes no steeper than 3:1 and relocate cut material into area between existing toe and new toe (100 ft minimum from property boundary) and into exposed pit to the south. Place 12-inch soil cover over 6-inch chert drainage layer and geomembrane liner.	Implement Alternative 4 grading. Place 12-inch soil cover over 6-inch chert drainage layer and geomembrane liner.

For Alternatives 2-4 only, seed vegetation with a low potential for selenium uptake to control erosion and establish a diverse community of native species. Native species can be used for revegetation in Alternatives 5 and 6 without consideration of potential for selenium uptake.

For side slope areas, for Alternatives 2-6, install riprap, grouted riprap, or equivalent-armored chutes to convey higher velocity runoff in areas with steeper gradients. Construct runoff conveyance ditch along toe of the ODA to convey runoff flow to Pedro Creek channel. Install erosion control measures.

For top area and upslope area, construct ditches/swales to prevent run-on into these areas and to convey runoff off the ODA, with erosion control measures for the ditches/swales and outlet area.

Table 6-2

Summary of Alternative Performance Against Potential Applicable or Relevant and Appropriate Requirements

Standard, Limitation, or Requirement Criteria		Alternatives					
		1 - No Action	**2 - In-Place Consolidation/Regrading in Side Slope Area, with Direct Revegetation on Amended Overburden Materials on the ODA**	**3 - In-Place Consolidation/Regrading in Side Slope Area, with Soil Cover and Revegetation on the ODA**	**4 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Soil Cover and Revegetation on the ODA**	**5 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Thick ET Soil Cover and Revegetation on the ODA**	**6 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Geosynthetic-Soil Cover System and Revegetation on the ODA**
Federal							
Chemical-Specific	National Primary Drinking Water Regulations, Clean Water Act , Water Quality Standards, National Recommended Water Quality Criteria November 2002. (**Applicable**) Safe Drinking Water Act (**Relevant and Appropriate**)	Does not meet requirements. Current conditions are not protective of groundwater that can potentially serve as sources of drinking water	The regrading, installation of run-on and runoff controls, and revegetation would result in an estimated 53% reduction in infiltration. The reduction in infiltration and increase of runoff with reduced direct contact with overburden contribute to the reduction of subsequent release of COPCs, and meeting requirements.	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in an estimated 62% reduction in infiltration. Meets requirements (See Alternative 2)	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in an estimated 85% reduction in infiltration. Meets requirements (See Alternative 2)	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in an estimated 96% reduction in infiltration. TMeets requirements (See Alternative 2)	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in an estimated 99% reduction in infiltration. Meets requirements (See Alternative 2)
	National Emission Standards for Hazardous Air Pollutants (**Relevant and Appropriate**)	The no action alternatives meets the requirements of NESHAP.	Standard dust control methods during implementation would minimize the potential for release of overburden material to air and provide for compliance with the substantive requirements of the rule.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.
	NOAA Freshwater Sediment Benchmarks (**Relevant and Appropriate**)	Does not meet requirements. Allows for continued erosion and transport into sediments	The regrading, installation of run-on and runoff controls, and revegetation would result in a reduction of erosion. The reduction of erosion would be expected to reduce COPC concentrations in down-gradient sediments and provide for reducing concentrations below the benchmarks.	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in a reduction of erosion. The reduction of erosion would be expected to reduce COPC concentrations in down-gradient sediments and provide for reducing concentrations below the benchmarks.	See Alternative 3.	See Alternative 3.	See Alternative 3.
	National Pollutant Discharge Elimination System (NPDES) Permit Regulations. (**Applicable**)	Simplot holds a stormwater NPDES permit for the Site and has a stormwater management plan which allows for the inspection and maintenance of stromwater control structures to ensure compliance with that permit.	The regrading, installation of run-on and runoff controls, and revegetation would result in a reduction of stormwater with elevated COPCs. No discharge to surface water is intended through the implementation of stormwater controls and the substantive requirements of these regulations would be met by meeting surface water quality standards and by continued compliance by Simplot with its stormwater permit.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.

Table 6-2
Summary of Alternative Performance Against Potential Applicable or Relevant and Appropriate Requirements

Standard, Limitation, or Requirement Criteria		Alternatives					
		1 - No Action	**2 - In-Place Consolidation/Regrading in Side Slope Area, with Direct Revegetation on Amended Overburden Materials on the ODA**	**3 - In-Place Consolidation/Regrading in Side Slope Area, with Soil Cover and Revegetation on the ODA**	**4 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Soil Cover and Revegetation on the ODA**	**5 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Thick ET Soil Cover and Revegetation on the ODA**	**6 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Geosynthetic-Soil Cover System and Revegetation on the ODA**
Action-Specific	Surface Mining Control and Reclamation Act. (**Relevant and Appropriate**)	Does not meet requirements and unreclaimed areas will remain in place.	Requirements for reclamation would be met by the grading, revegetation, and the run-on/runoff controls.	Requirements for reclamation would be met by the grading, cover installation, revegetation, and the run-on/runoff controls.	See Alternative 3.	See Alternative 3.	See Alternative 3.
	Resource Conservation and Recovery Act (**Applicable**)	No hazardous wastes were identified in the early action area, and none are not expected based on site data and history.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.
	Archaeological and Historic Preservation Act (**Applicable**)	No actions would be implemented.	No historic items have been identified in the early action area. If any are encountered during implementation then actions will be taken to meet the substantive requirements.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.
	National Historic Preservation Act (**Applicable**)	No actions would be implemented.	No historic items have been identified in the early action area. If any are encountered during implementation then actions will be taken to meet the substantive requirements.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.
	Historic Sites, Building and Antiquities Act (**Applicable**)	No actions would be implemented.	No historic items have been identified in the early action area. If any are encountered during implementation then actions will be taken to meet the substantive requirements.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.
	Migratory Bird Treaty Act (**Applicable**)	Does not meet requirements as unreclaimed conditions will remain.	Regrading and revegetation would improve habitat for bird.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.
	Fish and Wildlife Coordination Act (**Applicable**)	Does not meet requirements and unreclaimed areas will remain in place.	Regrading and revegetation would improve habitat for fish and wildlife.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.
	Endangered Species Act (**Applicable**)	Does not meet requirements and unreclaimed areas will remain in place.	Regrading and revegetation would improve habitat for potentially endangered species.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.
	Bald and Golden Eagle Protection Act (**Applicable**)	Does not meet requirements and unreclaimed areas will remain in place.	Regrading and revegetation would improve habitat for birds.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.
	Mineral Leasing Act (**Applicable**)	Does not meet requirements and unreclaimed areas will remain in place.	Regrading and revegetation would meet requirements of reclamation on Federal Phosphate Leases.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.
	Clean Air Act (**Relevant and Appropriate**)	Meets the requirements there are no emissions at the Site.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.

Table 6-2
Summary of Alternative Performance Against Potential Applicable or Relevant and Appropriate Requirements

Standard, Limitation, or Requirement Criteria		Alternatives					
		1 - No Action	**2 - In-Place Consolidation/Regrading in Side Slope Area, with Direct Revegetation on Amended Overburden Materials on the ODA**	**3 - In-Place Consolidation/Regrading in Side Slope Area, with Soil Cover and Revegetation on the ODA**	**4 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Soil Cover and Revegetation on the ODA**	**5 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Thick ET Soil Cover and Revegetation on the ODA**	**6 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Geosynthetic-Soil Cover System and Revegetation on the ODA**
Location-Specific	Pocatello Field Office Proposed Resource Management Plan and Final Environmental Impact Statement (**Relevant and Appropriate**)	Does not meet requirements and unreclaimed areas will remain in place.	The regrading, installation of run-on and runoff controls, and revegetation would contribute to containment and control of COPCs and that future land use would be safe and productive.	The regrading, installation of ad cover system, run-on and runoff controls, and revegetation would contribute to containment and control of COPCs and that future land use would be safe and productive.	See Alternative 3.	See Alternative 3.	See Alternative 3.
	Conda Mining Reclamation Plan (**Relevant and Appropriate**)	Does not meet requirements and unreclaimed areas will remain in place.	The regrading, installation of run-on and runoff controls, and revegetation would contribute to containment and control of COPCs and that future land use would be safe and productive.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.
	Federal Land Policy and Management Act of 1976 (FLPMA) (**Applicable**)	Does not meet requirements and unreclaimed areas will remain in place.	The regrading, installation of run-on and runoff controls, and revegetation would contribute to containment and control of COPCs and that future land use would be safe and productive.	The regrading, installation of cover system, run-on/runoff controls, and revegetation would contribute to containment and control of COPCs as well asq safe/productive future land use.	See Alternative 3.	See Alternative 3.	See Alternative 3.
State of Idaho							
Chemical-Specific	Idaho Water Quality Standards, Idaho Ground Water Quality Rule. (**Applicable**)	Does not meet requirements. Current conditions are not protective of groundwater that can potentially serve as sources of drinking water	The regrading, installation of run-on and runoff controls, and revegetation would result in an estimated 53% reduction in infiltration. The reduction in infiltration and increase of runoff with reduced direct contact with overburden contribute to the reduction of subsequent release of COPCs, and meeting requirements.	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in an estimated 62% reduction in infiltration. The reduction in infiltration and increase of runoff with no direct contact with overburden contribute to the reduction of subsequent release of COPCs, and meeting requirements.	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in an estimated 85% reduction in infiltration. The reduction in infiltration and increase of runoff with no direct contact with overburden contribute to the reduction of subsequent release of COPCs, and meeting requirements.	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in an estimated 96% reduction in infiltration. The reduction in infiltration and increase of runoff with no direct contact with overburden contribute to the reduction of subsequent release of COPCs, and meeting requirements.	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in an estimated 99% reduction in infiltration. The reduction in infiltration and increase of runoff with no direct contact with overburden contribute to the reduction of subsequent release of COPCs, and meeting requirements.
	Rules and Standards for Hazardous Waste (**Relevant and Appropriate**)	No hazardous wastes were identified in the early action area, and none are expected based on site data and history.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.

Table 6-2

Summary of Alternative Performance Against Potential Applicable or Relevant and Appropriate Requirements

Standard, Limitation, or Requirement Criteria		Alternatives: 1 - No Action	2 - In-Place Consolidation/Regrading in Side Slope Area, with Direct Revegetation on Amended Overburden Materials on the ODA	3 - In-Place Consolidation/Regrading in Side Slope Area, with Soil Cover and Revegetation on the ODA	4 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Soil Cover and Revegetation on the ODA	5 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Thick ET Soil Cover and Revegetation on the ODA	6 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Geosynthetic-Soil Cover System and Revegetation on the ODA
Action-Specific	Solid Waste Management Rules (**Applicable**)	Would be applicable if solid wastes were contained in the area. Leaving pile as is would not meet requirements.	Consolidating, regrading, and installation of controls would meet requirements.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.
	Idaho Surface Mining Act (**Relevant and Appropriate**)	Does not meet requirements and unreclaimed areas will remain in place.	Requirements for reclamation would be met by the grading, revegetation, and the run-on/runoff controls.	Requirements for reclamation would be met by the grading, cover installation, revegetation, and the run-on/runoff controls.	See Alternative 3.	See Alternative 3.	See Alternative 3.
	Exploration and Surface Mining Rules (**Relevant and Appropriate**)	Does not meet requirements and unreclaimed areas will remain in place.	Requirements for reclamation would be met by the grading, revegetation, and the run-on/runoff controls.	Requirements for reclamation would be met by the grading, cover installation, revegetation, and the run-on/runoff controls.	See Alternative 3.	See Alternative 3.	See Alternative 3.
	Well Construction Standard Rules (**Applicable**)	No actions would be implemented.	Any wells installed as part of the alternative would be designed to meet the requirements of the rule.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.
	Appropriation of State Water (**Applicable**)	Does not meet requirements. Current conditions are not protective of the state's waters.	The regrading, installation of run-on and runoff controls, and revegetation would result in an estimated 53% reduction in infiltration. The reduction in infiltration and increase of runoff with reduced direct contact with overburden contribute to the reduction of subsequent release of COPCs, and meeting requirements.	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in an estimated 62% reduction in infiltration. The reduction in infiltration and increase of runoff with no direct contact with overburden contribute to the reduction of subsequent release of COPCs, and meeting requirements.	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in an estimated 85% reduction in infiltration. The reduction in infiltration and increase of runoff with no direct contact with overburden contribute to the reduction of subsequent release of COPCs, and meeting requirements.	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in an estimated 96% reduction in infiltration. The reduction in infiltration and increase of runoff with no direct contact with overburden contribute to the reduction of subsequent release of COPCs, and meeting requirements.	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in an estimated 99% reduction in infiltration. The reduction in infiltration and increase of runoff with no direct contact with overburden contribute to the reduction of subsequent release of COPCs, and meeting requirements.
	Air Pollution Control Rules (**Relevant and Appropriate**)	Meets the requirements there are no emissions at the Site.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.
	Idaho Classification and Protection of Wildlife Rule (**Applicable**)	Does not meet requirements as unreclaimed conditions will remain.	Regrading and revegetation would improve habitat for bird.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.

Table 6-2
Summary of Alternative Performance Against Potential Applicable or Relevant and Appropriate Requirements

Standard, Limitation, or Requirement Criteria		Alternatives					
		1 - No Action	**2 - In-Place Consolidation/Regrading in Side Slope Area, with Direct Revegetation on Amended Overburden Materials on the ODA**	**3 - In-Place Consolidation/Regrading in Side Slope Area, with Soil Cover and Revegetation on the ODA**	**4 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Soil Cover and Revegetation on the ODA**	**5 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Thick ET Soil Cover and Revegetation on the ODA**	**6 - In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Geosynthetic-Soil Cover System and Revegetation on the ODA**
Location-Specific	Preservation of Historical Sites (**Applicable**)	No actions would be implemented.	No historic items have been identified in the early action area. If any are encountered during implementation then actions will be taken to meet the substantive requirements.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.
	Idaho Water Quality Act (**Relevant and Appropriate**)	Does not meet requirements. .	The regrading, installation of run-on and runoff controls, and revegetation would result in an estimated 53% reduction in infiltration. The reduction in infiltration and increase of runoff with reduced direct contact with overburden contribute to the reduction of subsequent release of COPCs, and meeting requirements.	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in an estimated 62% reduction in infiltration. The reduction in infiltration and increase of runoff with no direct contact with overburden contribute to the reduction of subsequent release of COPCs, and meeting requirements.	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in an estimated 85% reduction in infiltration. The reduction in infiltration and increase of runoff with no direct contact with overburden contribute to the reduction of subsequent release of COPCs, and meeting requirements.	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in an estimated 96% reduction in infiltration. The reduction in infiltration and increase of runoff with no direct contact with overburden contribute to the reduction of subsequent release of COPCs, and meeting requirements.	The regrading, installation of run-on and runoff controls, clean cover soil, and revegetation would result in an estimated 99% reduction in infiltration. The reduction in infiltration and increase of runoff with no direct contact with overburden contribute to the reduction of subsequent release of COPCs, and meeting requirements.

Table 7-1
Summary of Comparative Analysis of Alternatives

Criterion	Alternative 1 No Action	Alternative 2 In-Place Consolidation/Regrading in Side Slope Area Regrade Upslope and Top Areas Where Pooling Occurs No Soil Cover Direct Revegetation on Amended Overburden with Non-Selenium Accumulator Plant Species Infiltration Reduction 53% Regrade Volume 360,000 cy Cover Volume 0 cy	Alternative 3 In-Place Consolidation/Regrading in Side Slope Area Regrade Upslope and Top Areas Where Pooling Occurs 6-inch Soil Cover on Side Slopes No Soil Cover on Upslope or Top Areas Revegetation with Non-Selenium Accumulator Plant Species Infiltration Reduction 62% Regrade Volume 800,000 cy Cover Volume 32,000 cy	Alternative 4 In-Place Consolidation/Regrading in Side Slope Area Complete Regrade of Upslope and Top Areas 18-inch Soil Cover on Side Slopes 12-inch Soil Cover on Upslope and Top Areas Revegetation with Non-Selenium Accumulator Plant Species Infiltration Reduction 85% Regrade Volume 830,000 cy Cover Volume 142,000 cy	Alternative 5 In-Place Consolidation/Regrading in Side Slope Area Complete Regrade of Upslope and Top Areas 48-inch Soil Cover (ET Cover) and 3-inch Capillary Break Layer on all of ODA Revegetation with Native Plant Species Infiltration Reduction 96% Regrade Volume 830,000 cy Cover Volume 452,000 cy Capillary Break Volume 28,000 cy	Alternative 6 In-Place Consolidation/Regrading in Side Slope Area Complete Regrade of Upslope and Top Areas 12-inch Soil Cover, 6-inch Drainage Layer, Geomembrane Liner on all of ODA Revegetation with Native Plant Species Infiltration Reduction 99% Regrade Volume 1,830,000 cy Cover Volume 113,000 cy Drainage Layer Volume 56,000 cy
Overall Protection	N	Y	Y+	Y+	Y+	Y+
Compliance with ARARs and Achieves RAOs	N	Y	Y	Y+	Y+	Y+
Long-Term Effectiveness	5	3	2	1	1	1
Reduction of Toxicity, Mobility or Volume Through Treatment	N/A	N/A	N/A	N/A	N/A	N/A
Short-term Effectiveness	N/A	1	2	2	4	5
Implementability	N/A	1	1	2	4	5
Net Present Value Cost	$0	$2.5 million	$5.3 million	$7.0 million	$11.7 million	$18.1 million

Notes:
5 = least satisfies criterion, 1 = best satisfies criterion
Y = Yes, meets criterion; Y+ = Best meets criterion; N = No, does not meet criterion
N/A = Not Applicable, none of the alternatives includes treatment.
% - Percent
cy - Cubic Yard

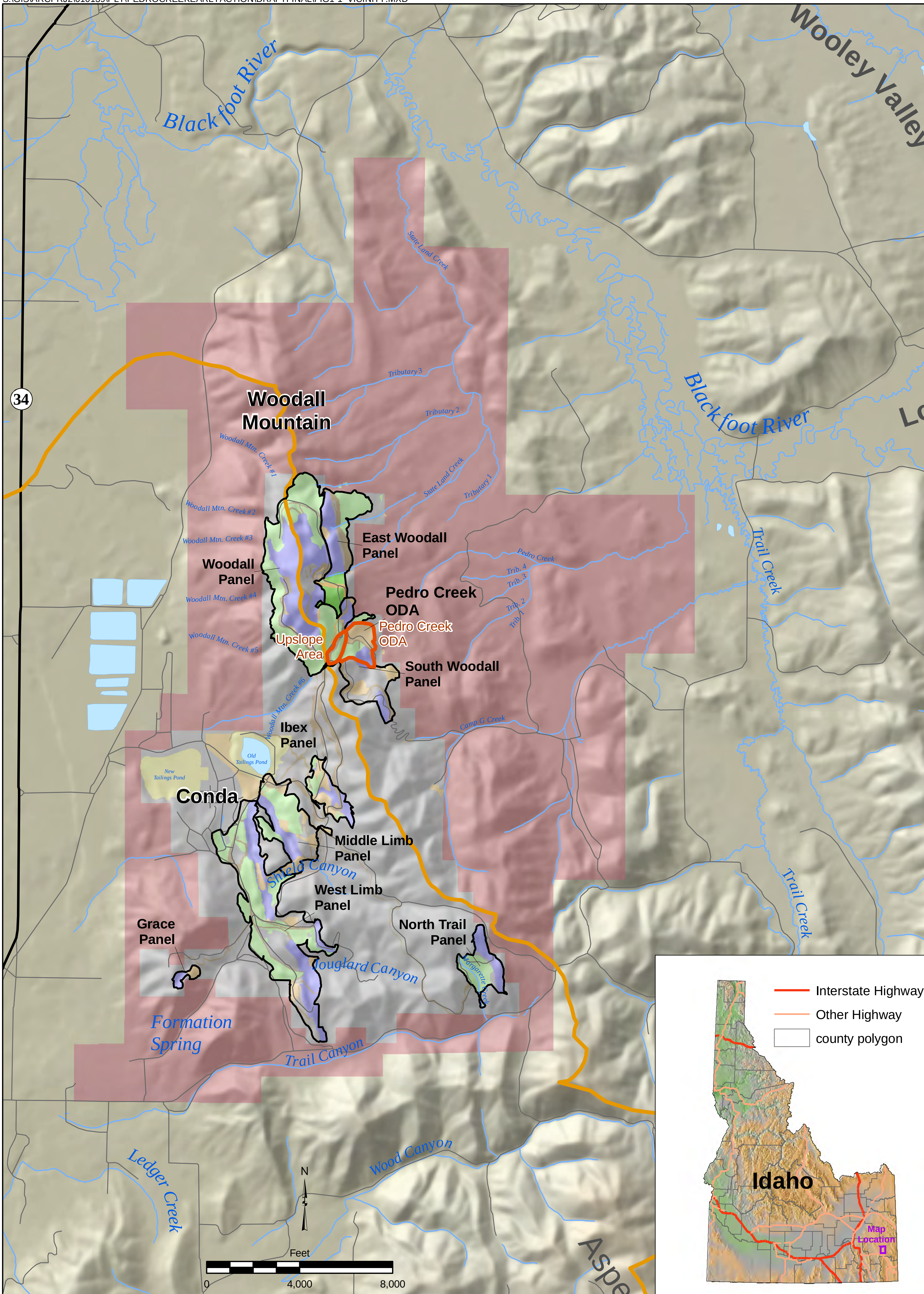
Table 7-2. Cost Effectiveness of Pedro Creek EE/CA Alternatives

Alternative	Estimated Present Worth Cost	Estimated Reduction in Infiltration (acre-ft/year)[a]	Cost Effectiveness ($/acre-ft reduced)
1	$0	0	$0
2	$2,525,940	35.2	$72,000
3	$5,260,583	40.9	$129,000
4	$6,957,858	55.9	$124,000
5	$11,662,300	63.2	$185,000
6	$18,109,426	65.6	$276,000

[a] From EE/CA Appendix C, Table C-5

FIGURES

S:\GIS\ARCPRJ2\010139\PLT\PEDROCREEKEARLYACTION\DRAFTFINAL\FIG1-1_VICINITY.MXD



Legend

Mine Panels	Pedro Creek ODA	Disturbed Overburden Disposal Area
BLackfoot / Bear River Drainage Divide	Reclaimed Overburden Disposal Area	Disturbed Pit
Primary Road	Reclaimed Pit	Disturbed Road
Secondary Road	Reclaimed Road	Disturbed Tailings
Water Body		Mine Area
NHDFlowline		Study Area

J.R. SIMPLOT COMPANY
CONDA/WOODALL MOUNTAIN MINE
PEDRO CREEK EARLY ACTION

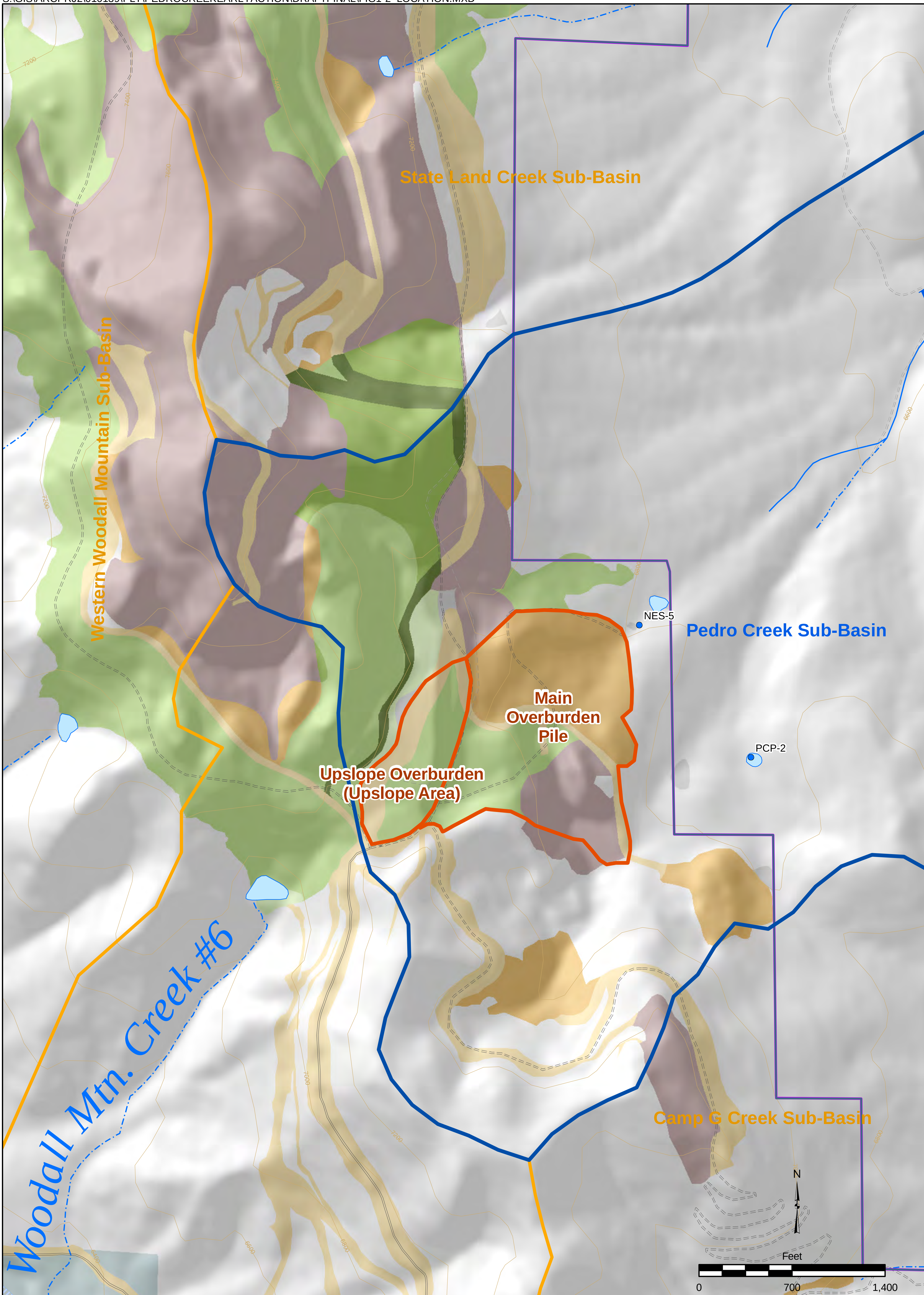
FIGURE 1-1

CONDA / WOODALL MOUNTAIN PHOSPHATE MINE LOCATION

PRJ: 0442-001-900	DATE: MAY 26, 2010	
REV: 0	BY: CRL	CHECKED: RPS

FORMATION ENVIRONMENTAL

S:\GIS\ARCPRJ2\010139\PLT\PEDROCREEKEARLYACTION\DRAFTFINAL\FIG1-2_LOCATION.MXD



Legend

- Seep Location
- Mine Area
- Pedro Creek ODA
- Pedro Creek Sub-basin
- Other Sub-Basins
- Disturbed Overburden Disposal Area
- Reclaimed Overburden Disposal Area
- Miscellaneous Disturbed
- Miscellaneous Reclaimed
- Disturbed Pit
- Reclaimed Pit
- Disturbed Road
- Reclaimed Road
- Disturbed Tailings

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CONDA/WOODALL MOUNTAIN MINE
PEDRO CREEK EARLY ACTION

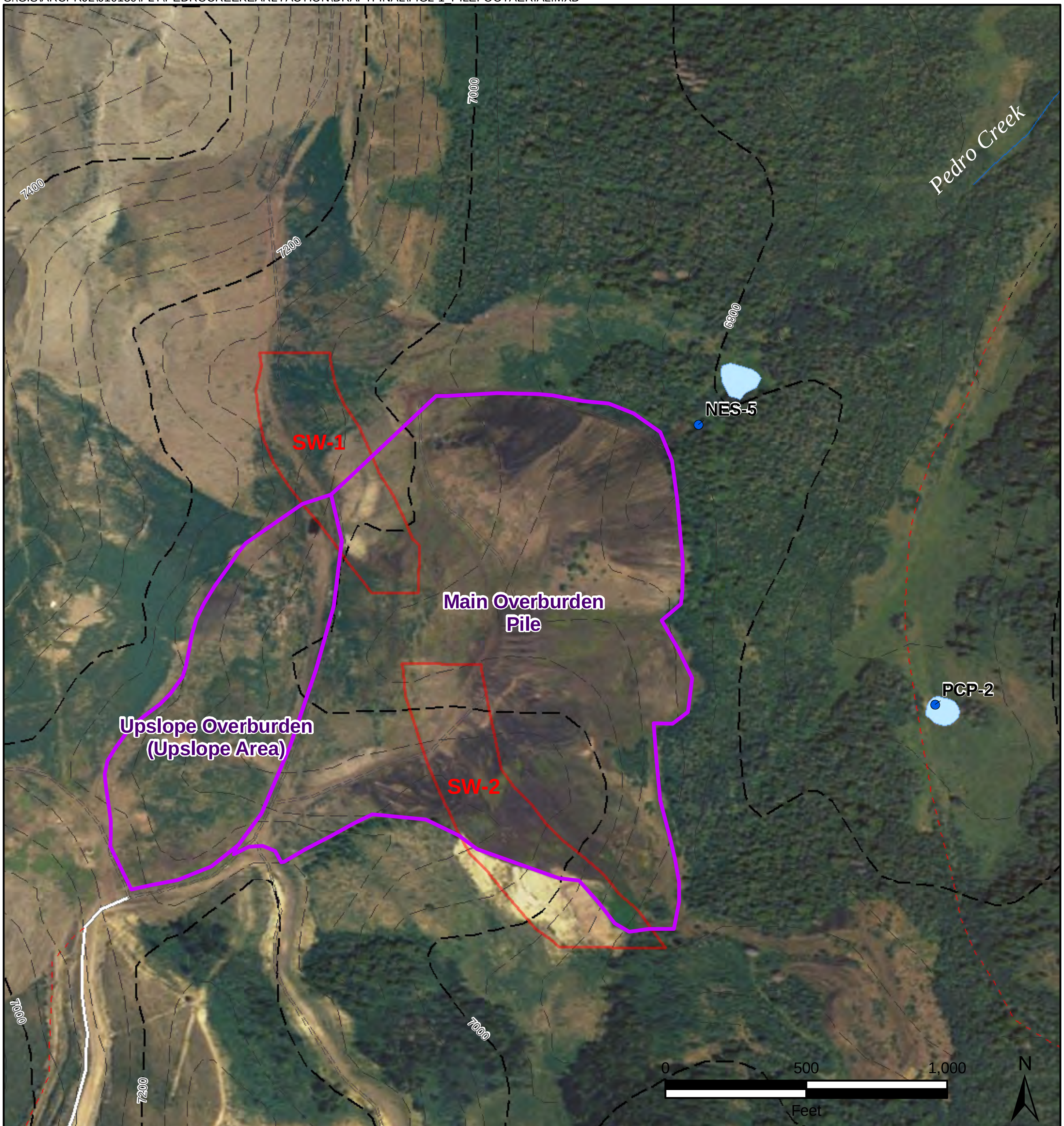
FIGURE 1-2

PEDRO CREEK ODA BOUNDARY

PRJ: 0442-001-900	DATE: MAY 26, 2010	
REV: 0	BY: CRL	FOR: ACK

FORMATION ENVIRONMENTAL

S:\GIS\ARCPRJ2\010139\PLT\PEDROCREEKEARLYACTION\DRAFTFINAL\FIG2-1_PILEFOOTAERIAL.MXD



Legend

- 200 ft Contour (pre-mine)
- 40 ft Contour (pre-mine)
- Road
- Unimproved Road
- TRAIL, 4WD
- TRAIL, OTHER THAN 4WD
- Intermittent Stream
- Perennial Stream
- Pedro Creek ODA
- Approximate Pit Boundaries

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CONDA/WOODALL MOUNTAIN MINE
PEDRO CREEK EARLY ACTION

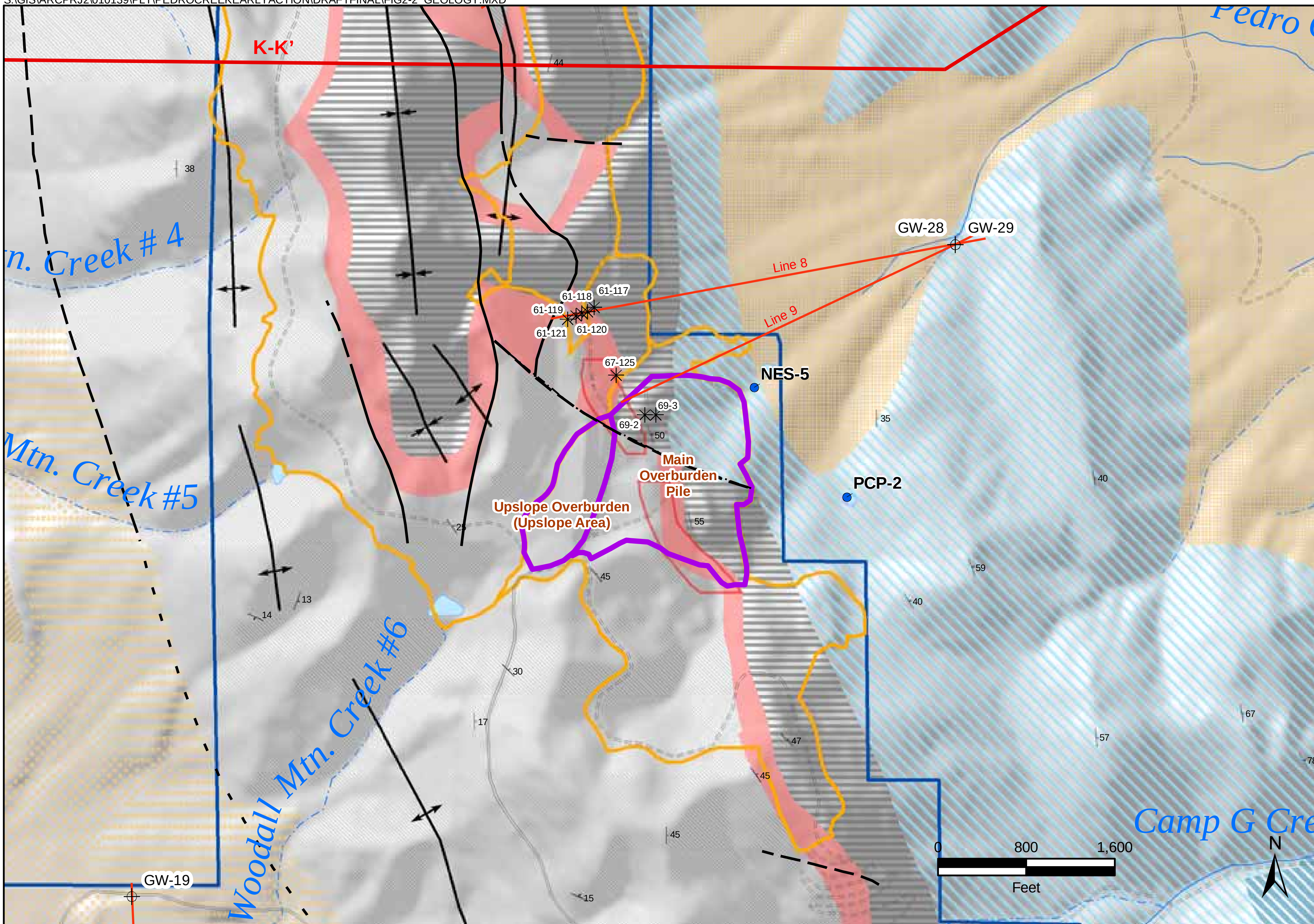
FIGURE 2-1

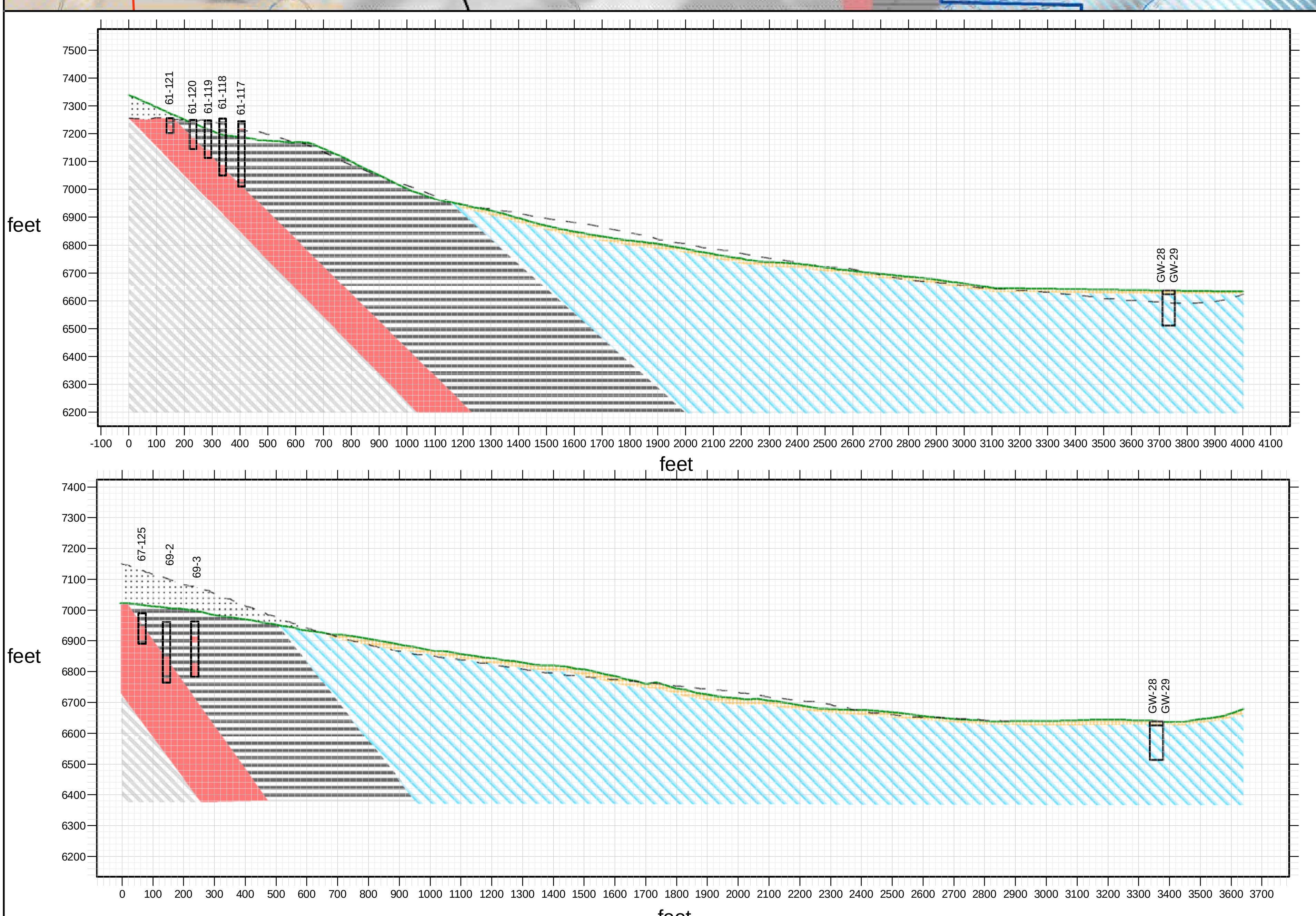
PEDRO CREEK ODA AERIAL PHOTO AND FEATURES

PRJ: 0442-001-900	DATE: MAY 26, 2010
REV: 0	BY: CRL / FOR: FLC

FORMATION ENVIRONMENTAL

S:\GIS\ARCPRJ2\010139\PLT\PEDROCREEKEARLYACTION\DRAFTFINAL\FIG2-2_GEOLOGY.MXD





Legend

- Exploration Boreholes ("Year-Number")
- Wells
- Cross-section lines
- Spring or Seep
- Pond
- Intermittent Stream
- Perennial Stream
- Railroad
- Highway
- Road
- Unimproved Road
- Mine Area
- Pedro Creek ODA
- Approximate Pit Boundaries
- Strike/Dip
- Anticline
- AnticlineOT
- Syncline
- Fault, Buried
- Fault, Confirmed
- Fault, Inferred

Stratigraphy

Geologic Formation

- Qls - Gravel, sand, and silt (landslide deposits)
- Qf - Gravel, sand, and silt (fan deposits)
- Qal - Gravel, sand, and silt (alluvium)
- Qw - Sand, gravel, and silt (hill wash/alluvium)
- Qt - Calcareous tufa and travertine
- Qbc - Olivine basalt cinders
- Qb - Olivine basalt
- Ql - Lake deposits
- Tsl - Salt Lake Formation
- TRt - Thaynes Limestone
- TRd - Dinwoody Formation
- Cpa - Meade Peak Member
- Cpb - Rex Chert
- Cw - Wells Formation - Park City Formation, undifferentiated
- Cb - Chesterfield Range Group (Brazer Limestone)
- Fill (overburden material)
- Pre-Mining Surface
- Post-Mining Surface

Source: Geology compiled from mine exploration records and USGS 1927 geologic maps of the Henry, James, and Slug Creek quadrangle and the 1969 Soda Springs quadrangle.

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CONDA/WOODALL MOUNTAIN MINE
PEDRO CREEK EARLY ACTION

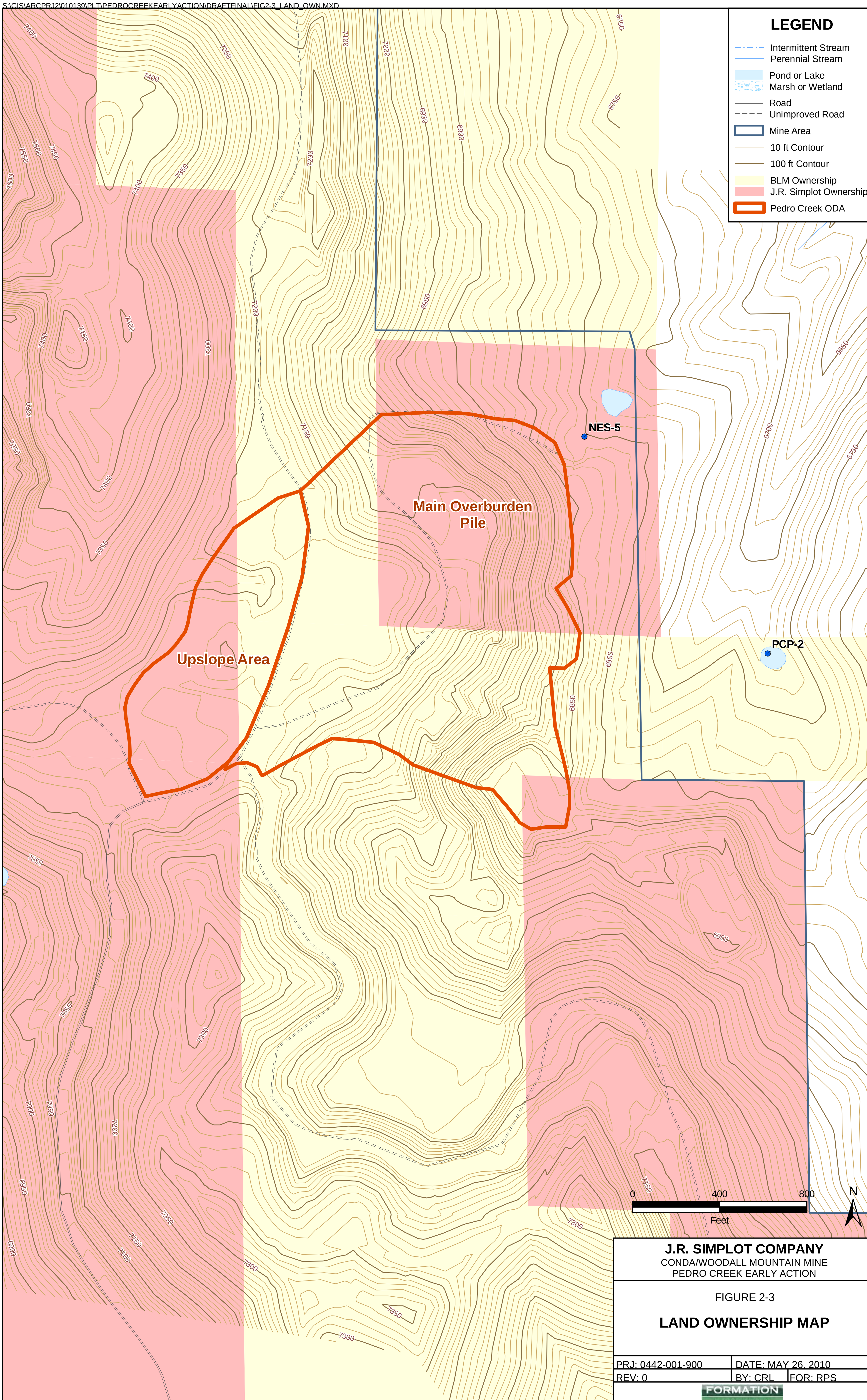
FIGURE 2-2

SURFACE GEOLOGY MAP

PRJ: 0442-001-900	DATE: AUG 10, 2010
REV: 0	BY: CRL FOR: RPS

FORMATION ENVIRONMENTAL

S:\GIS\ARCPRJ\010139\PLT\PEDROCREEKEARLYACTION\DRAFTFINAL\FIG2-3_LAND_OWN.MXD



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CONDA/WOODALL MOUNTAIN MINE
PEDRO CREEK EARLY ACTION

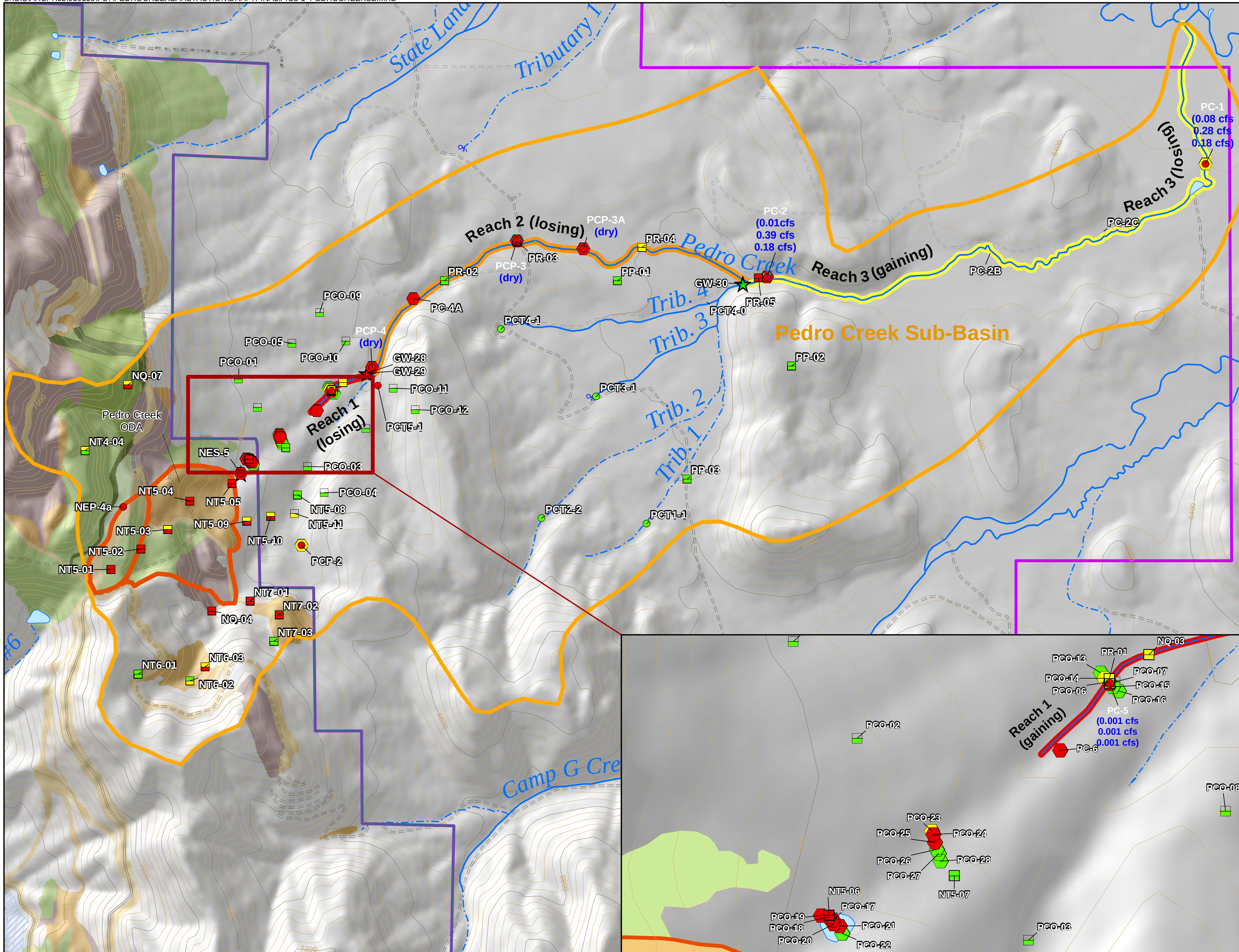
FIGURE 2-3

LAND OWNERSHIP MAP

PRJ: 0442-001-900	DATE: MAY 26, 2010	
REV: 0	BY: CRL	FOR: RPS

FORMATION ENVIRONMENTAL

S:\GIS\ARCPRJ2\010139\PLT\PEDROCREEKEARLYACTION\DRAFTFINAL\FIG3-1_PEDROCREEKSE.MXD



Legend

- Study Area
- Mine Area
- Pedro Creek ODA
- Reach 1
- Reach 2
- Reach 3

Sediment
- 2.6 mg/kg
- 2.6 - 26 mg/kg
- > 26 mg/kg

Groundwater
- < 0.05 mg/L
- 0.05 - 0.5 mg/L
- > 0.5 mg/L

Surface Water
- < 0.005 mg/L
- 0.005 - 0.05 mg/L
- > 0.05 mg/L

Vegetation
- < 5 mg/kg
- 5 - 50 mg/kg
- > 50 mg/kg

Soil
- < 5 mg/kg
- 5 - 13 mg/kg
- > 13 mg/kg

- Disturbed Overburden Disposal Area
- Reclaimed Overburden Disposal Area
- Miscellaneous Disturbed
- Miscellaneous Reclaimed
- Disturbed Pit
- Reclaimed Pit
- Disturbed Road
- Reclaimed Road
- Disturbed Tailings

PC-2
(min. flow
max. flow
avg. flow)

Vegetation Data
Soil Data

Notes:
Breakpoints for each media are the AWRMP Removal Action Levels for that particular media, excluding soil. The breakpoint value of 13 mg/kg for soil is the Permissible Level for use in Reclamation.
Based on data from 2001 through 2009.

N

Feet
0 1,500 3,000

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CONDA/WOODALL MOUNTAIN MINE
PEDRO CREEK EARLY ACTION

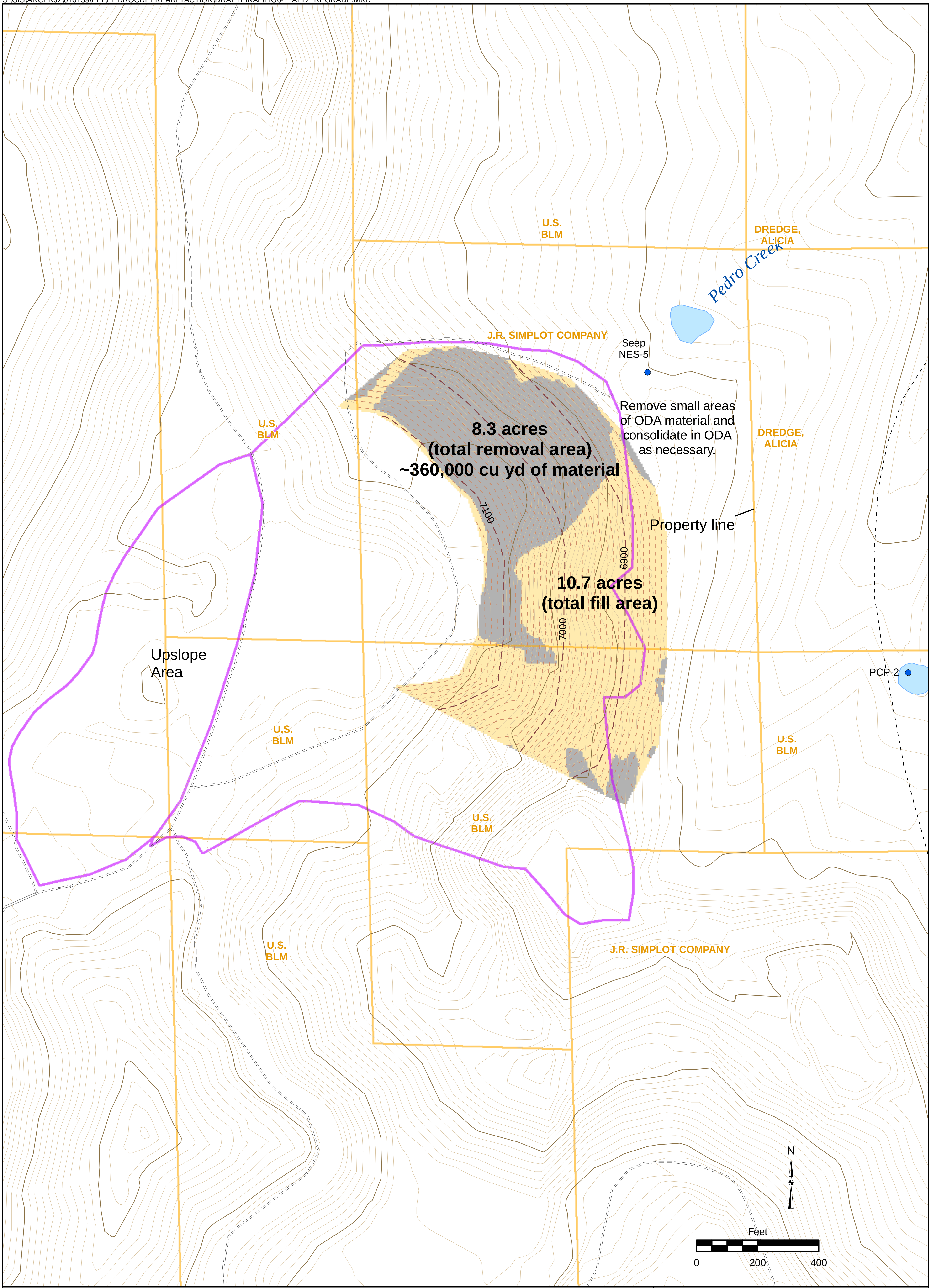
FIGURE 3-1

PEDRO CREEK SUB-BASIN SELENIUM CONCENTRATIONS

PRJ: 009-001	DATE: AUG 06, 2010
REV: 0	BY: KAM CHECKED: RPS

FORMATION ENVIRONMENTAL

S:\GIS\ARCPRJ2\010139\PLT\PEDROCREEKEARLYACTION\DRAFTFINAL\FIG6-1_ALT2_REGRADE.MXD



Legend

Pond	Regrade 10 ft Contour	Fill Area
Road	Regrade 100 ft Contour	Removal Area
Unimproved Road	Existing 10 ft Contour	Pedro Creek ODA
Trail, Other than 4WD	Existing 100 ft Contour	Surface Ownership

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CONDA/WOODALL MOUNTAIN MINE
PEDRO CREEK EARLY ACTION

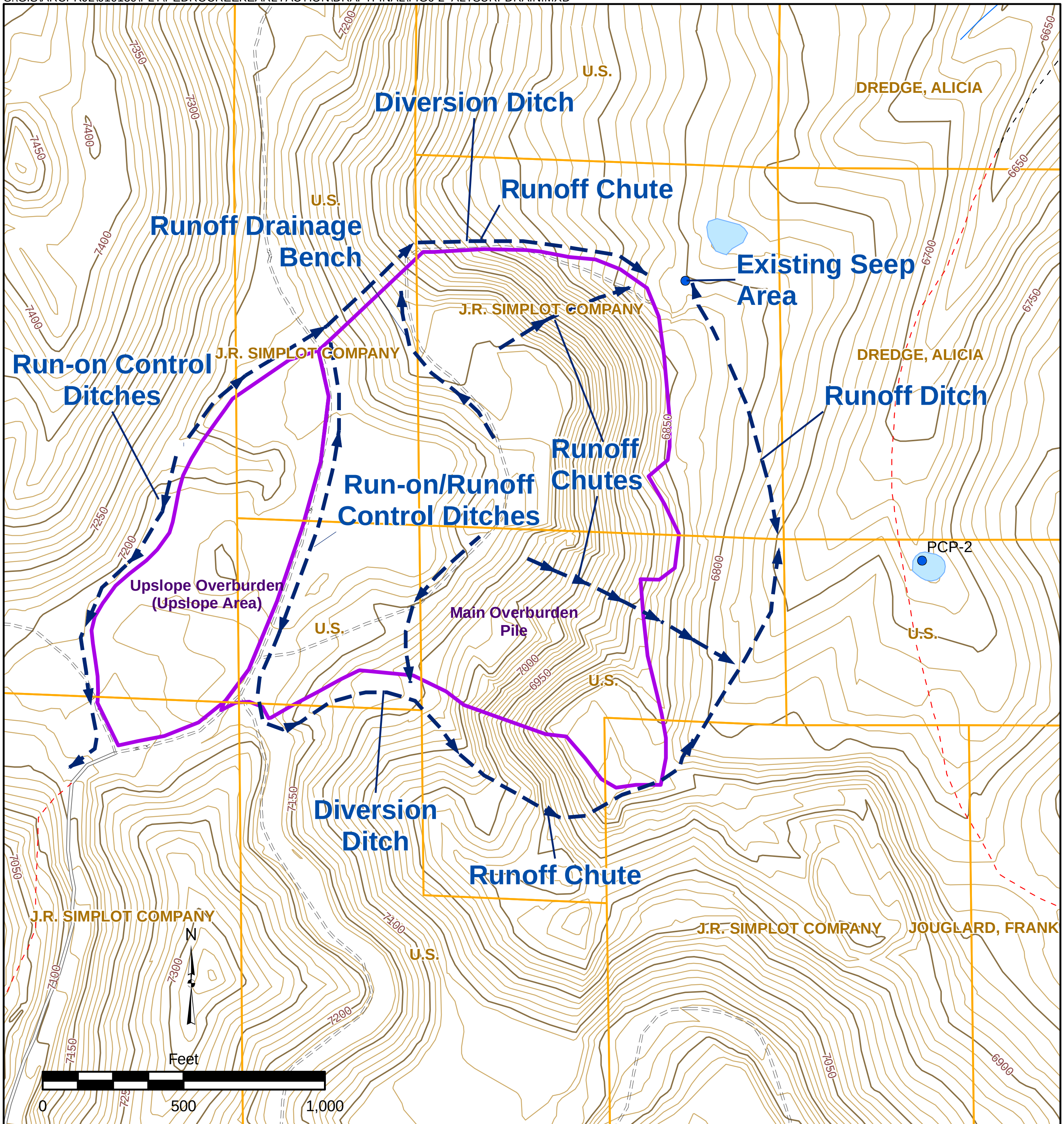
FIGURE 6-1

ALTERNATIVE 2
REGRADE PLAN
2:1 SLOPE

PRJ: #	DATE: MAY 27, 2010	
REV: 1	BY: CRL	FOR: FLC

FORMATION ENVIRONMENTAL

S:\GIS\ARCPRJ2\010139\PLT\PEDROCREEKEARLYACTION\DRAFTFINAL\FIG6-2_ALTSURFDRAIN.MXD



Legend

- Drainage Direction
- Surface Ownership
- Pedro Creek ODA Boundary
- 50 ft Contour
- 10 ft Contour
- Road
- Unimproved Road
- TRAIL, 4WD
- TRAIL, OTHER THAN 4WD

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CONDA/WOODALL MOUNTAIN MINE
PEDRO CREEK EARLY ACTION

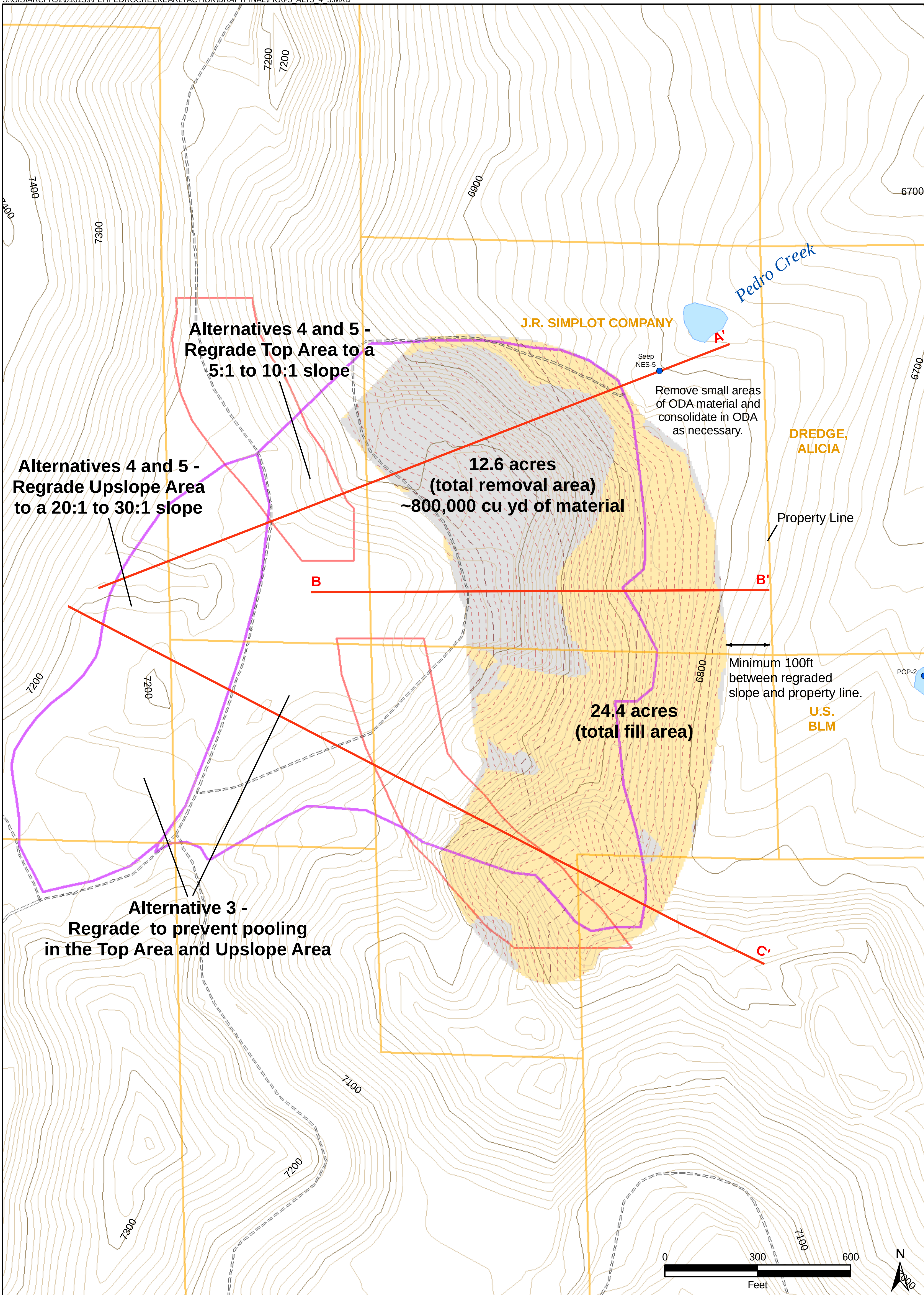
FIGURE 6-2

PEDRO CREEK ODA REMOVAL ACTION ALTERNATIVES SURFACE DRAINAGE PLAN

PRJ: 0442-001-900	DATE: MAY 26, 2010	
REV: 0	BY: CRL	CHECKED: FLC

FORMATION ENVIRONMENTAL

S:\GIS\ARCPRJ2\010139\PLT\PEDROCREEKEARLYACTION\DRAFTFINAL\FIG6-3_ALT3_4_5.MXD



Legend

Cross-Section Lines	Pond
Surface Ownership	Existing 100 ft Contour
Road	Existing 10 ft Contour
Unimproved Road	Regrade 100 ft Contour
	Regrade 10 ft Contour
Fill Area	
Cut Area	
Pedro Creek ODA Boundary	
Approximate Pit Boundaries	

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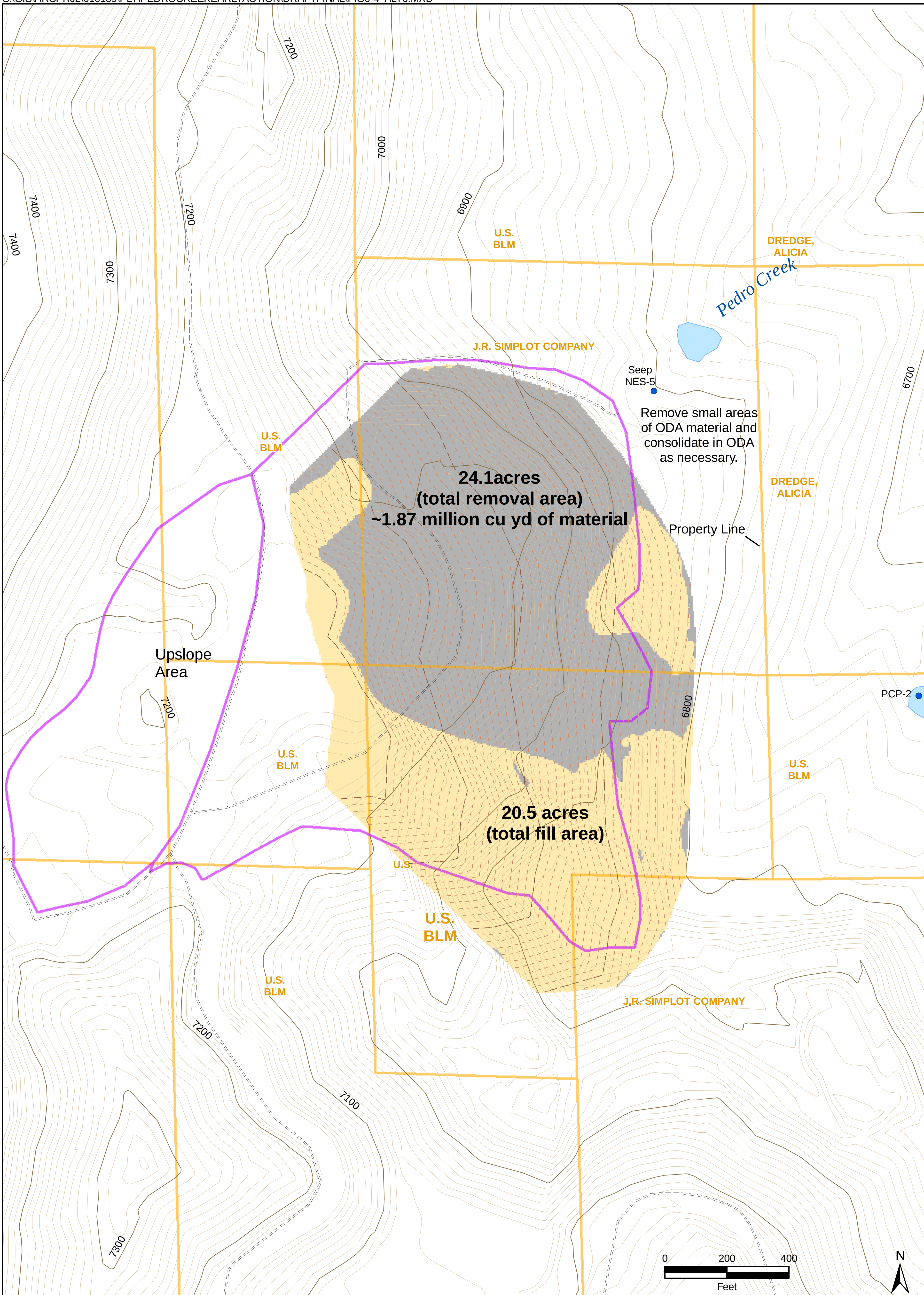
CONDA/WOODALL MOUNTAIN MINE
PEDRO CREEK EARLY ACTION

FIGURE 6-3

**ALTERNATIVES 3, 4, AND 5
REGRADE PLAN
2.5:1 TO 3:1 SLOPES**

PRJ: #	DATE: MAY 27, 2010	
REV: 2	BY: CRL	FOR: FLC

FORMATION ENVIRONMENTAL



Legend

Unimproved Road	Pedro Creek ODA Boundary	Regrade Contour 100 ft
TRAIL, 4WD	Surface Ownership	Regrade Contour 10 ft
Pond	Fill Area	Existing 10 ft Contour
	Removal Area	Existing 50 ft Contour

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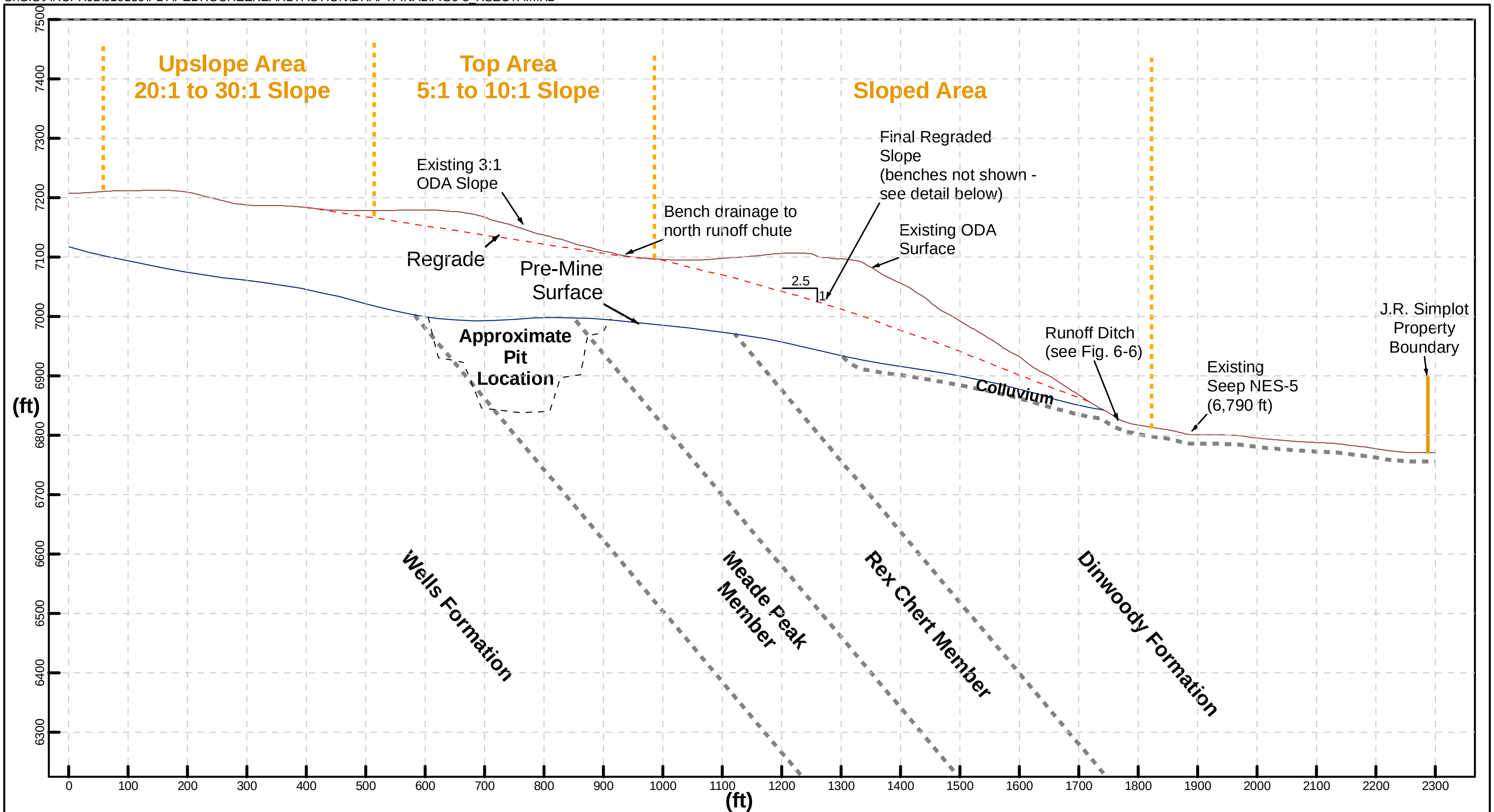
CONDA/WOODALL MOUNTAIN MINE
PEDRO CREEK EARLY ACTION

FIGURE 6-4

ALTERNATIVE 6
REGRADE PLAN
3:1 SLOPES

PRJ: #	DATE: MAY 27, 2010
REV: 0	BY: CRL FOR: FLC

FORMATION ENVIRONMENTAL



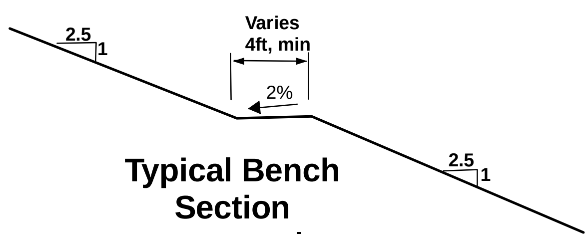
Legend

Pre-Mine Surface

Existing Surface

Regrade Surface

Approximate Geologic Contact



Typical Bench Section
not to scale

See Figure 6-3 For Regrade Plan

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CONDA/WOODALL MOUNTAIN MINE
PEDRO CREEK EARLY ACTION

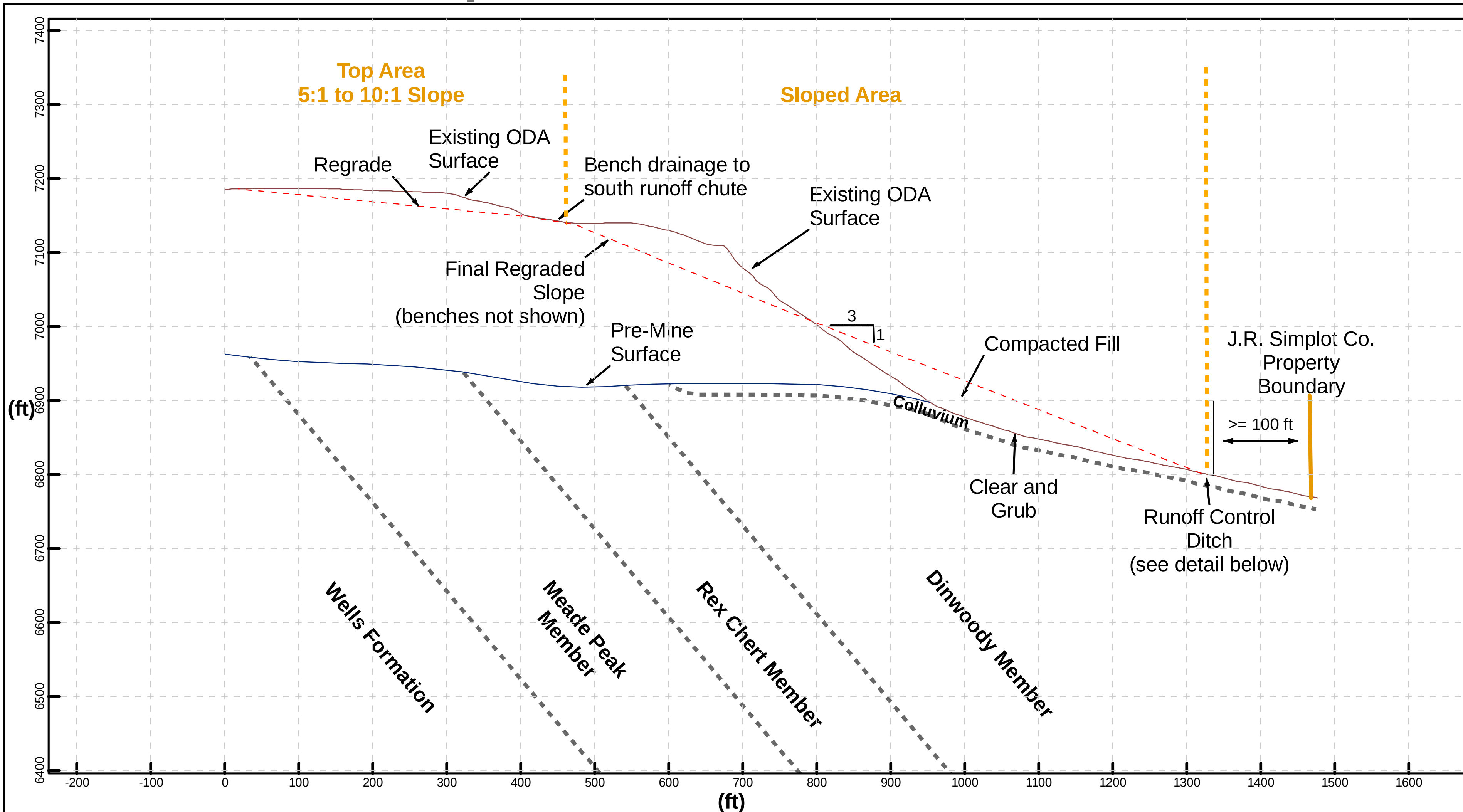
FIGURE 6-5

ALTERNATIVES 3, 4, AND 5 REGRADE CROSS-SECTION A - A'

PROJECT: #	DATE: MAY 27, 2010	
REV: 2	BY: CRL	CHECKED: FLC

FORMATION ENVIRONMENTAL

S:\GIS\ARCPRJ2\010139\PLT\PEDROCREEKEARLYACTION\DRAFTFINAL\FIG6-6_XSECTB.MXD



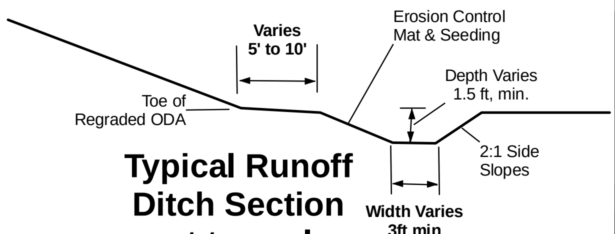
Legend

Pre-Mine Surface

Existing Surface

Regrade Surface

Approximate Geologic Contact



Typical Runoff Ditch Section not to scale

See Figure 6-3 For Regrade Plan

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CONDA/WOODALL MOUNTAIN MINE
PEDRO CREEK EARLY ACTION

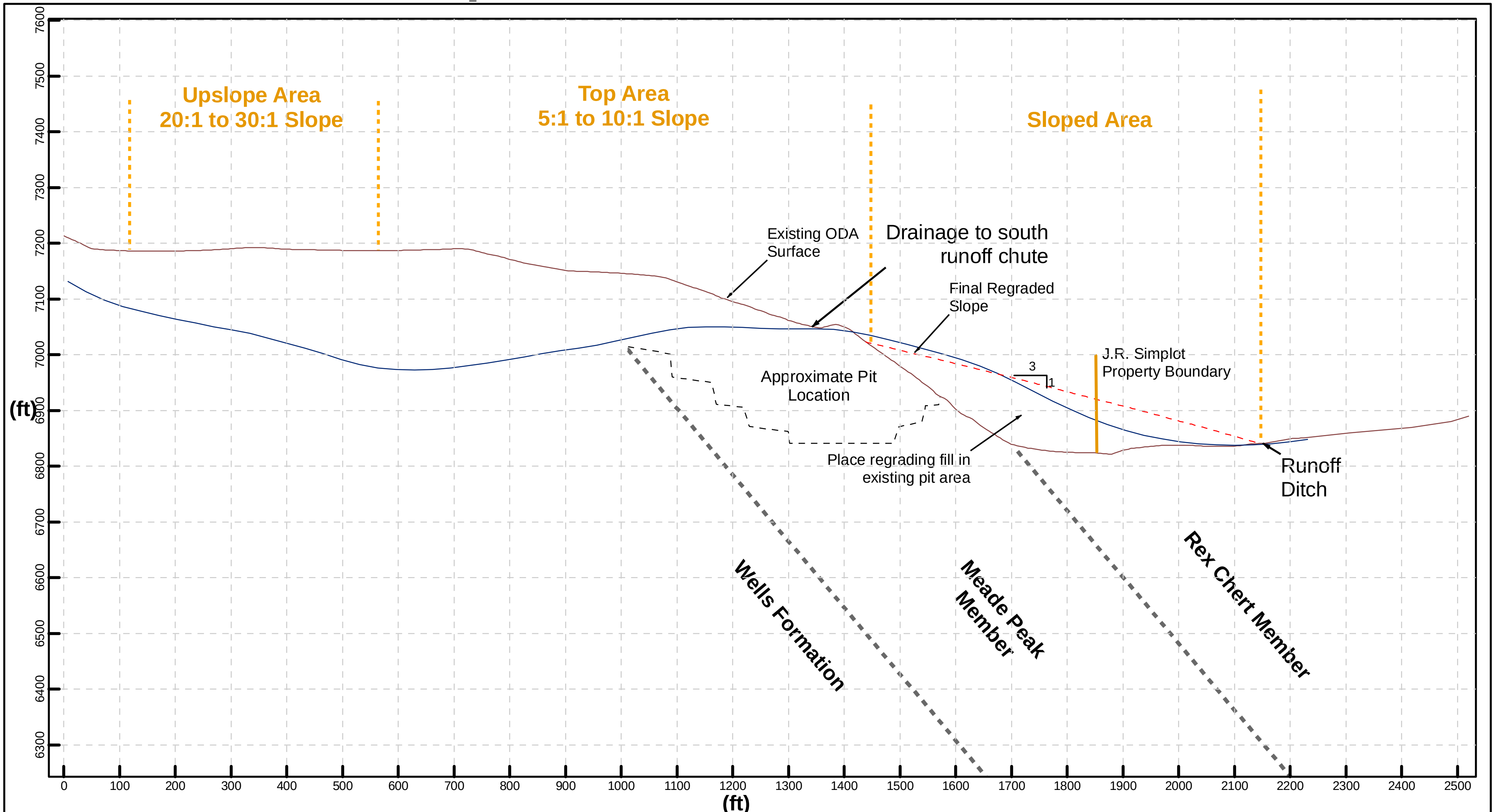
FIGURE 6-6

ALTERNATIVES 3, 4, AND 5 REGRADE CROSS-SECTION B - B'

PROJECT: #	DATE: MAY 27, 2010	
REV: 2	BY: CRL	CHECKED: FLC

FORMATION ENVIRONMENTAL

S:\GIS\ARCPRJ2\010139\PLT\PEDROCREEKEARLYACTION\DRAFTFINAL\FIG6-7_XSECTC.MXD



Legend

- Approximate Geologic Contact
- Pre-Mine Surface
- Existing Surface
- Regrade Surface

See Figure 6-3 For Regrade Plan

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CONDA/WOODALL MOUNTAIN MINE
PEDRO CREEK EARLY ACTION

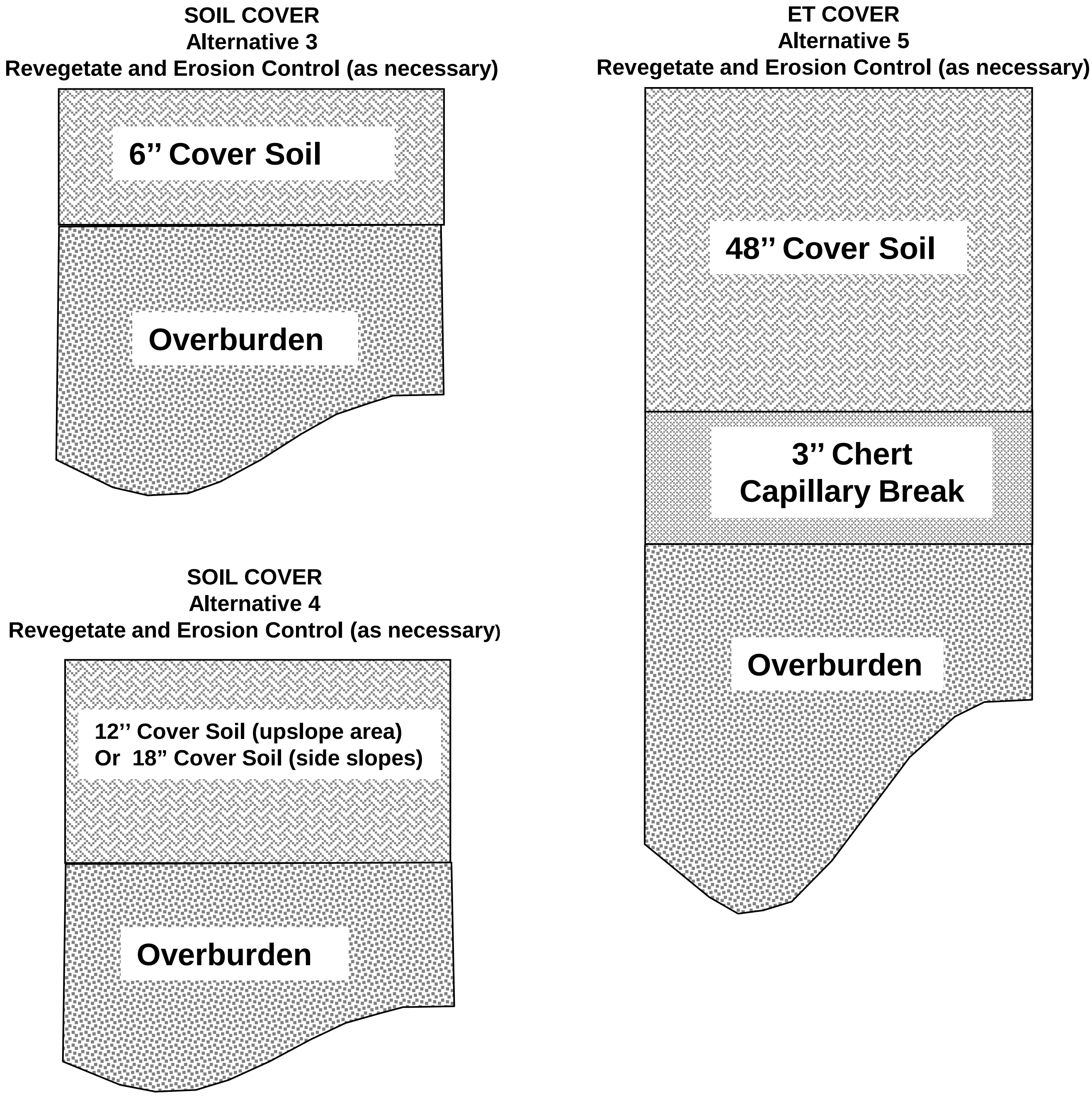
FIGURE 6-7

ALTERNATIVES 3, 4, AND 5
REGRADE CROSS-SECTION
C - C'

PROJECT: #	DATE: MAY 27, 2010	
REV: 1	BY: CRL	CHECKED: FLC

FORMATION ENVIRONMENTAL

S:\GIS\arcprj2\010139\plt\PedroCreekEarlyAction\Fig6-8_CoverSystems.ppt

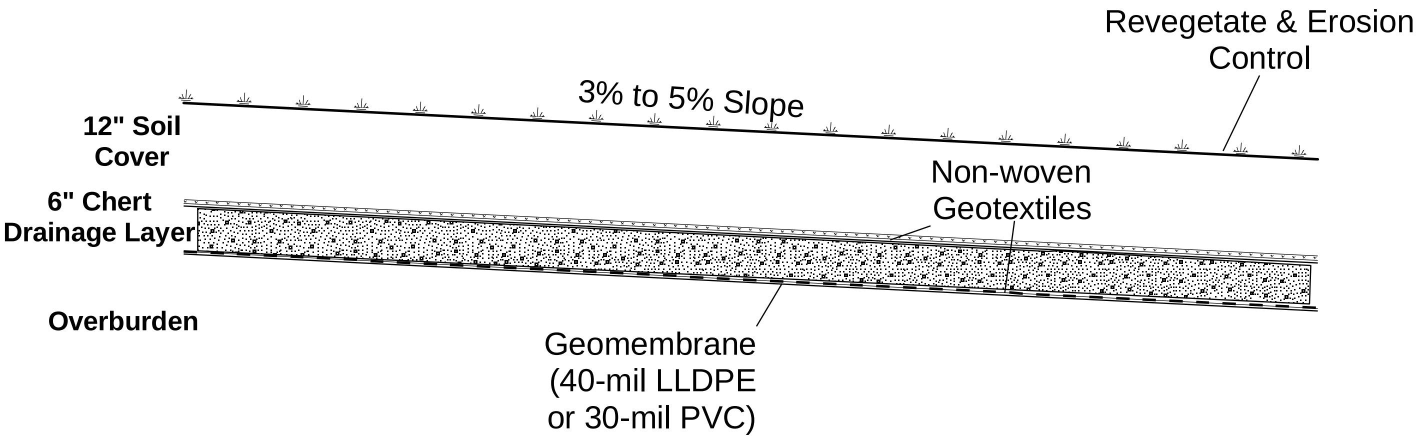


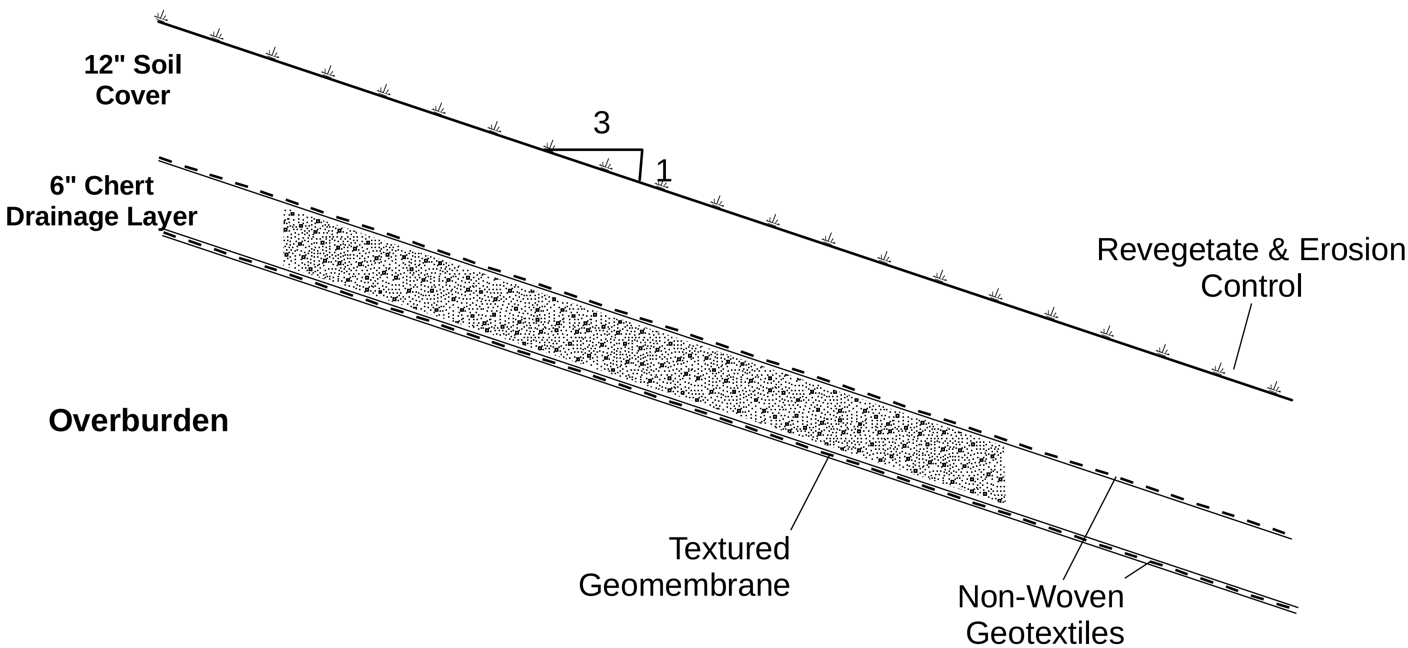
NOT TO SCALE

J.R. Simplot Company Conda/Woodall Mountain Mine Pedro Creek Early Action	
Figure 6-8 **Soil Cover and Layered Cover System Profiles Alternatives 3, 4, & 5**	
PRJ: 009-001	DATE: May 3, 2010
REV: 1	BY: KAM CHK: FLC

FORMATION ENVIRONMENTAL

S:\GIS\ARCPRJ2\010139\PLT\PEDROCREEKEARLYACTION\DRAFTFINAL\FIG6-9_LINERSOILCOV.MXD





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CONDA/WOODALL MOUNTAIN MINE
PEDRO CREEK EARLY ACTION

FIGURE 6-9

COVER SYSTEMS FOR ALTERNATIVE 6

PRJ: 0442-001-900	DATE: MAY 26, 2010	
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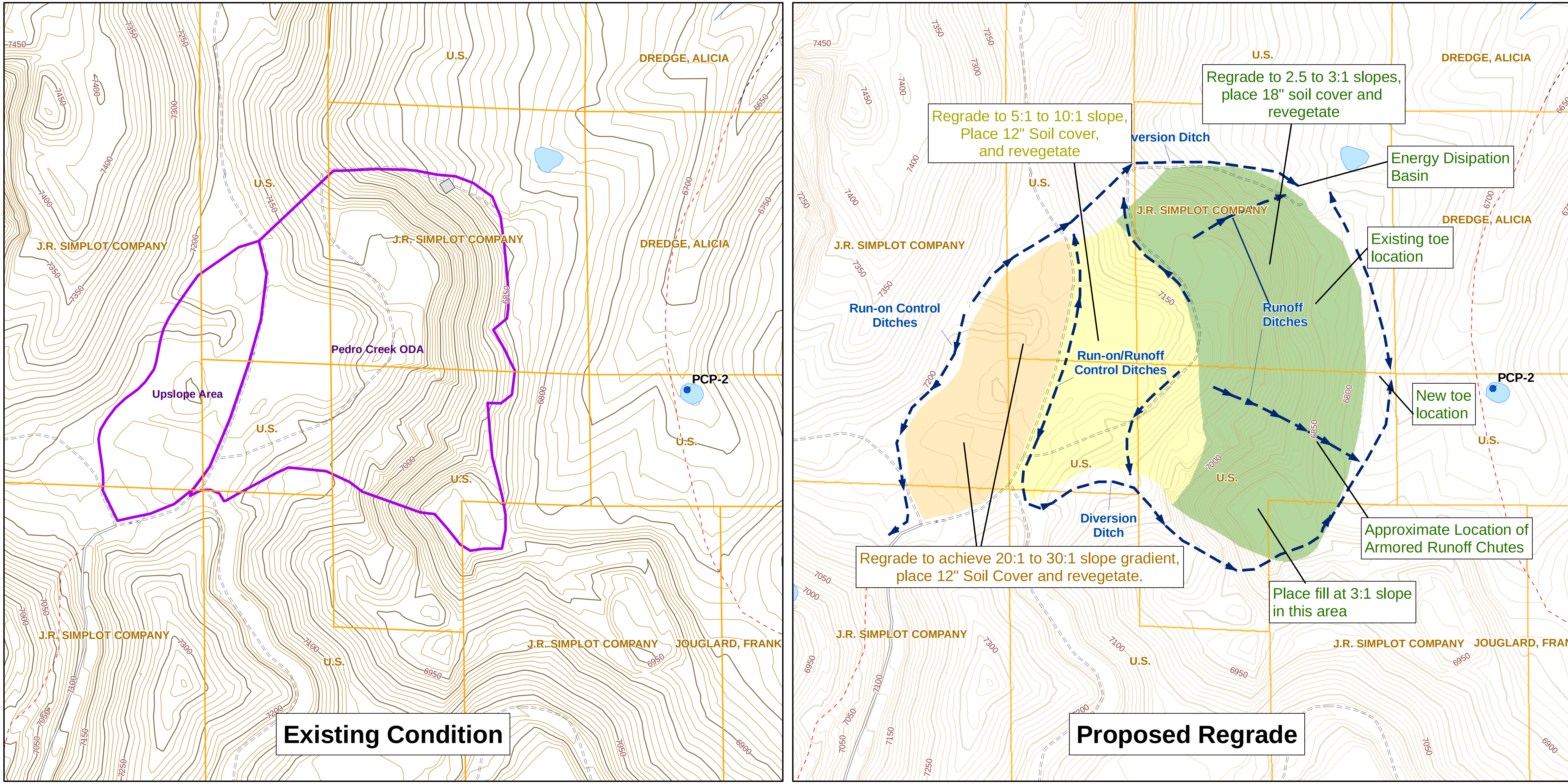
FORMATION ENVIRONMENTAL

S:\GIS\ARCPRJ2\010139\PLT\PEDROCREEKEARLYACTION\DRAFTFINAL\FIG8-1_RECOMREMOVACT.MXD



Legend

Surface Ownership	Road
Pedro Creek ODA Boundary	Unimproved Road
Pond	TRAIL, 4WD
50 ft Contour (existing)	TRAIL, OTHER THAN 4WD
10 ft Contour (existing)	

0 500 1,000
Feet

N

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CONDA/WOODALL MOUNTAIN MINE
PEDRO CREEK EARLY ACTION

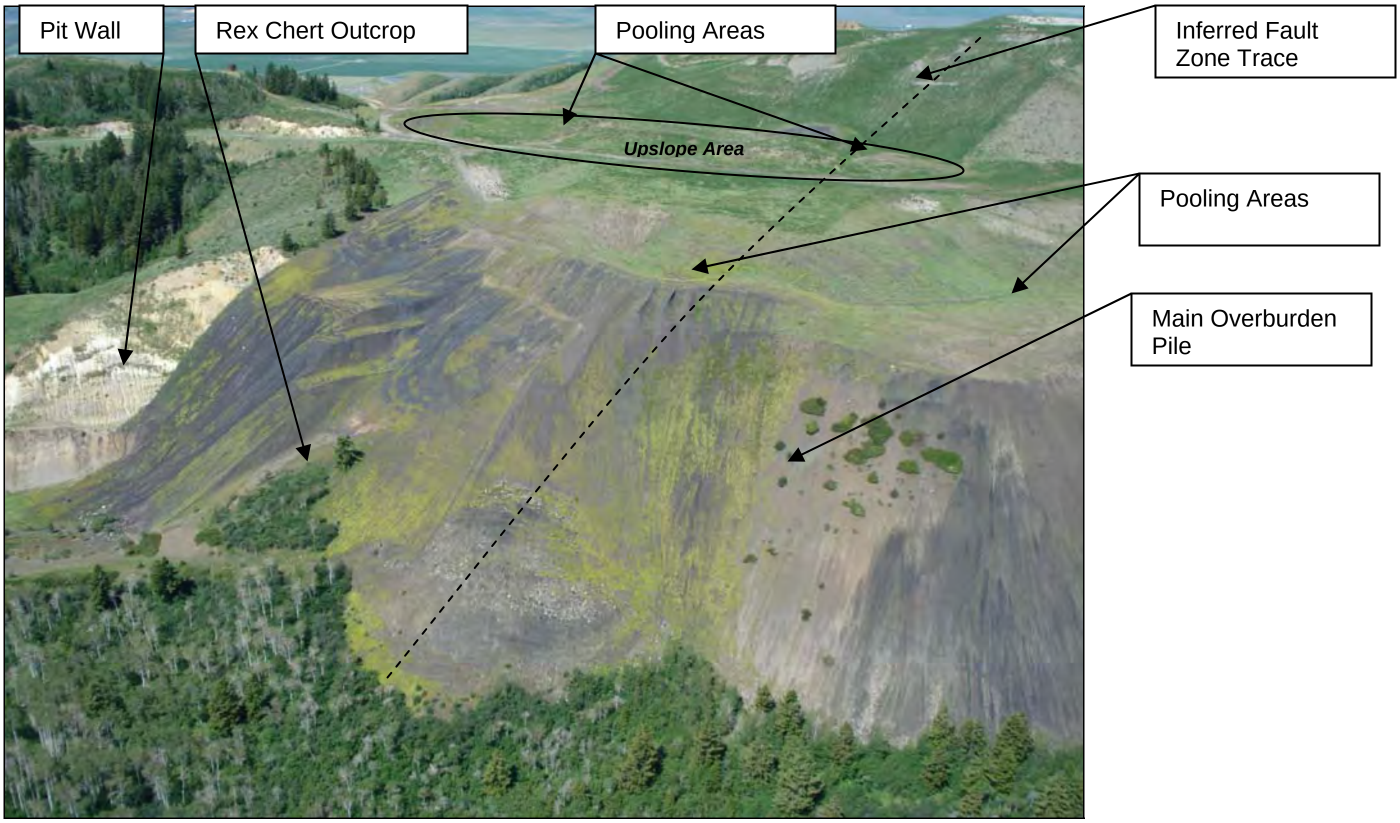
FIGURE 8-1

RECOMMENDED REMOVAL ACTION - ALTERNATIVE 4

PRJ: 0442-001-900	DATE: MAY 27, 2010	
REV: 1	BY: CRL	FOR: FLC

FORMATION ENVIRONMENTAL

APPENDIX A
SITE PHOTOS AND HISTORICAL EXPLORATION BOREHOLES AND CROSS SECTIONS



Pedro Creek ODA (southern half), view looking west

Pedro Creek ODA (northern half), view looking west

Pit floor at south end of main overburden pile, view looking west

Top of main overburden pile, view looking south

Northernmost snowdrift in upslope area resulting in pooling, view looking south

Close-up view of northernmost snowdrift in upslope area resulting in pooling, view looking west

Close-up view of southernmost snowdrift in upslope area resulting in pooling, view looking southwest

Main overburden pile, view looking west

Main overburden pile seep (NES-5), view looking southwest

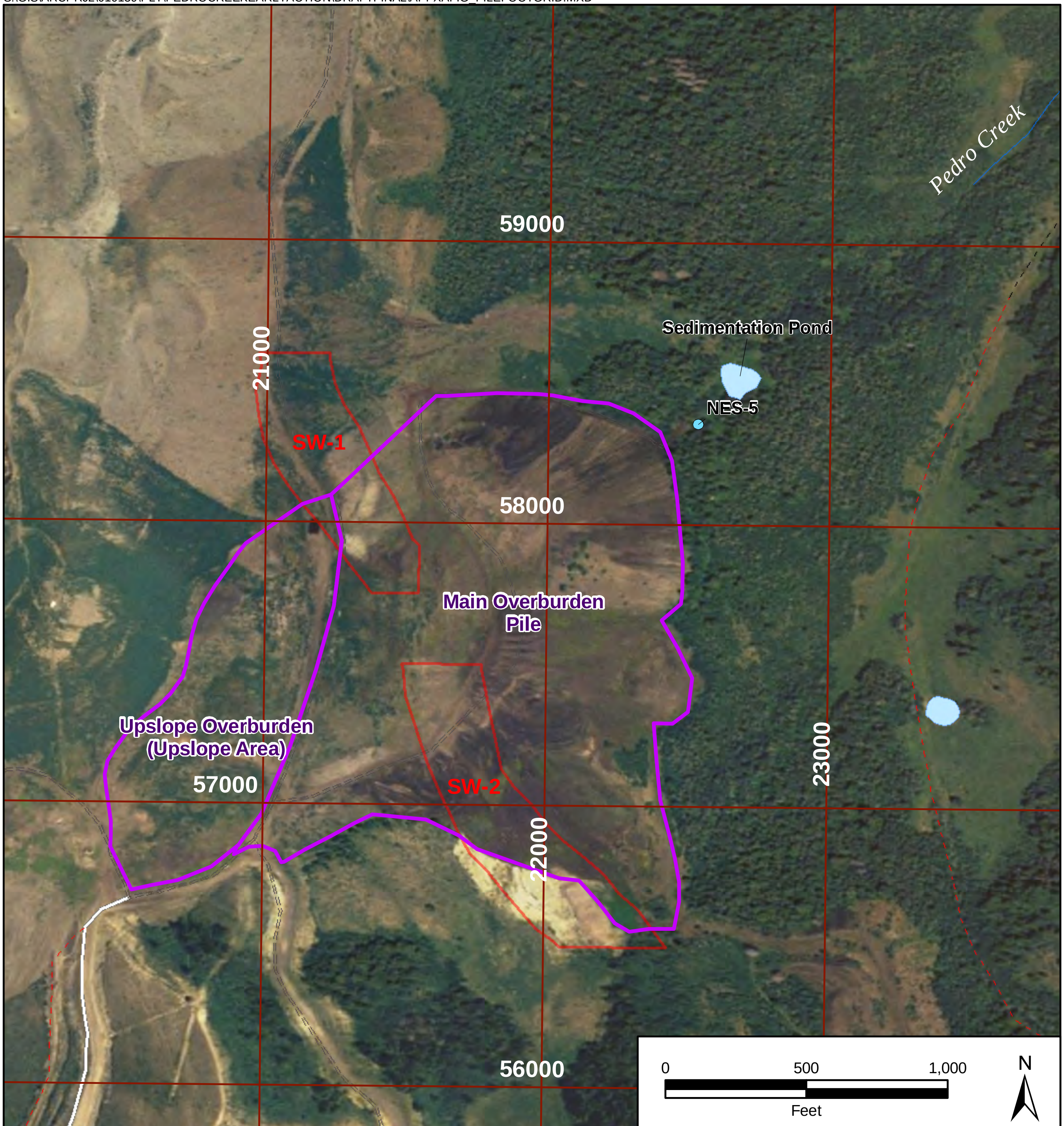
Pedro Creek ODA Looking North

Pedro Creek ODA Looking North

Southern end of SW-2 Panel Pit

Pedro Creek ODA looking west from Area near Monitoring Wells GW-28 and GW-29

S:\GIS\ARCPRJ2\010139\PLT\PEDROCREEKEARLYACTION\DRAFTFINAL\APPXAFIG_PILEFOOTGRID.MXD



Legend

- Road
- Unimproved Road
- TRAIL, 4WD
- TRAIL, OTHER THAN 4WD
- Intermittent Stream
- Perennial Stream
- Pedro Creek ODA
- Approximate Pit Boundaries
- Conda Mine Grid (provided by Simplot)\

J.R. SIMPLOT COMPANY

CONDA/WOODALL MOUNTAIN MINE
PEDRO CREEK EARLY ACTION

FIGURE A1

PEDRO CREEK ODA MINE GRID, AND FEATURES

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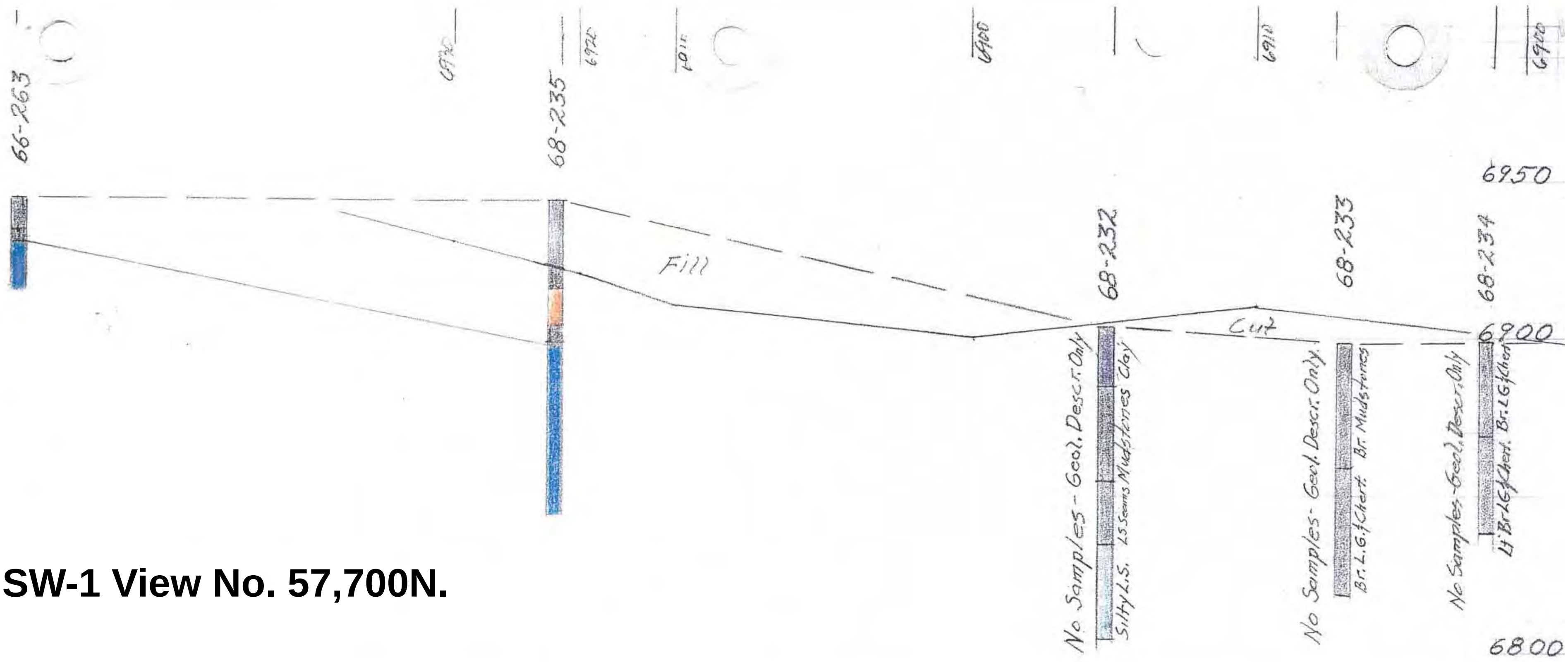
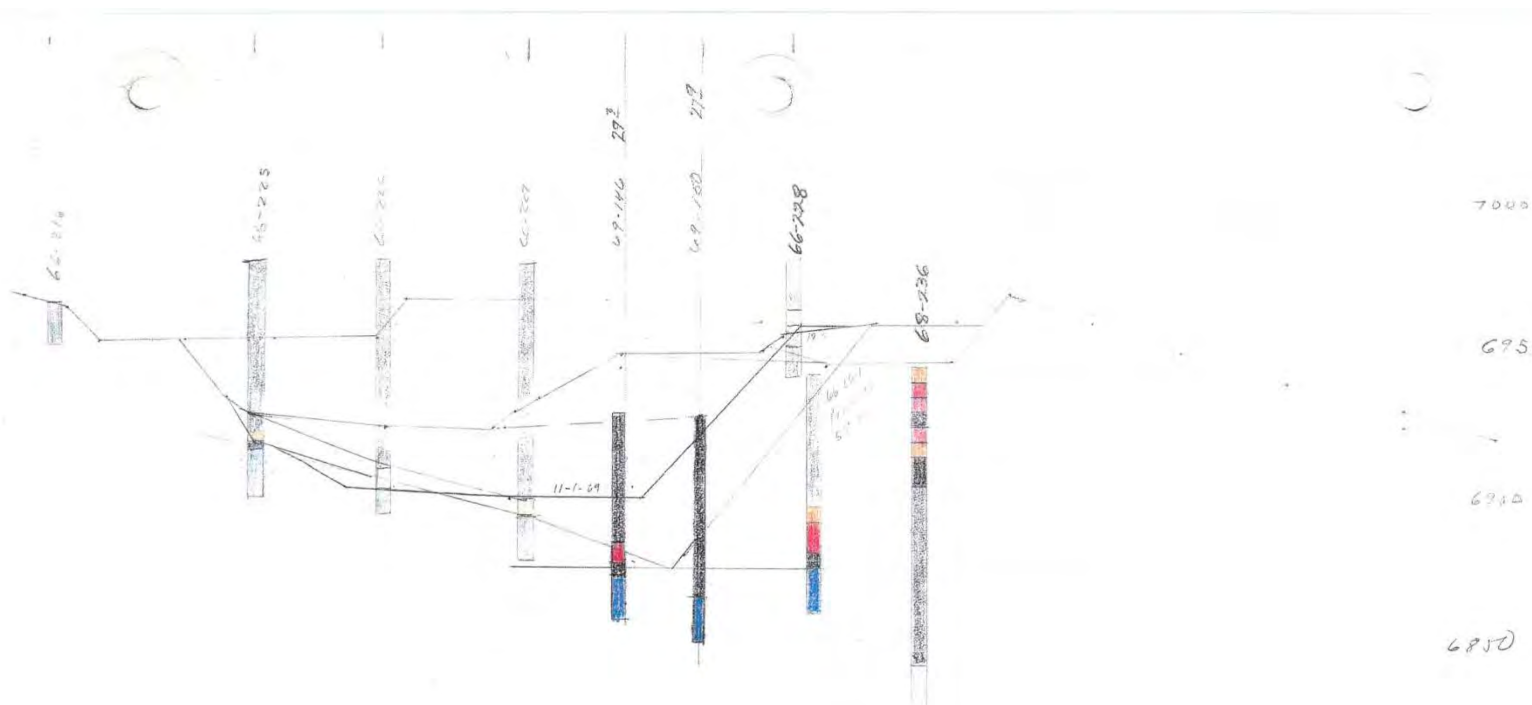
REV: 0	BY: CRL FOR: FLC

FORMATION ENVIRONMENTAL



SW-1 View No. 57,700N.

SW-1 View No. 57,700N.



SW-1 View No. 57,750N.

J.R. Simplot Company Conda/Woodall Mountain Mine Pedro Creek Early Action	
Appendix A **SW-1 Cross-Sections**	
PRJ: 009-001	DATE: May 14, 2010
REV: 0	BY: --- CHK: RPS

FORMATION ENVIRONMENTAL

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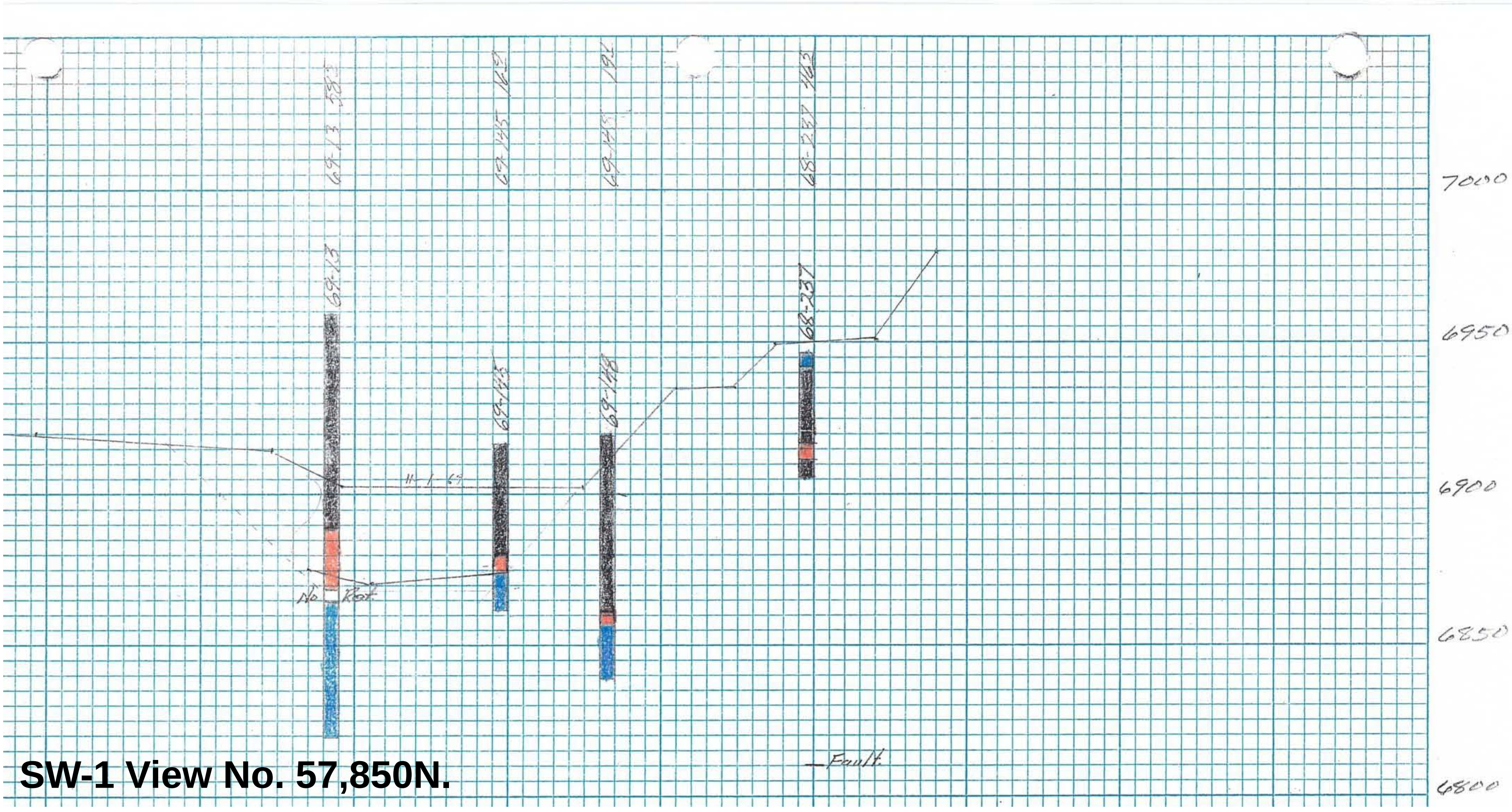

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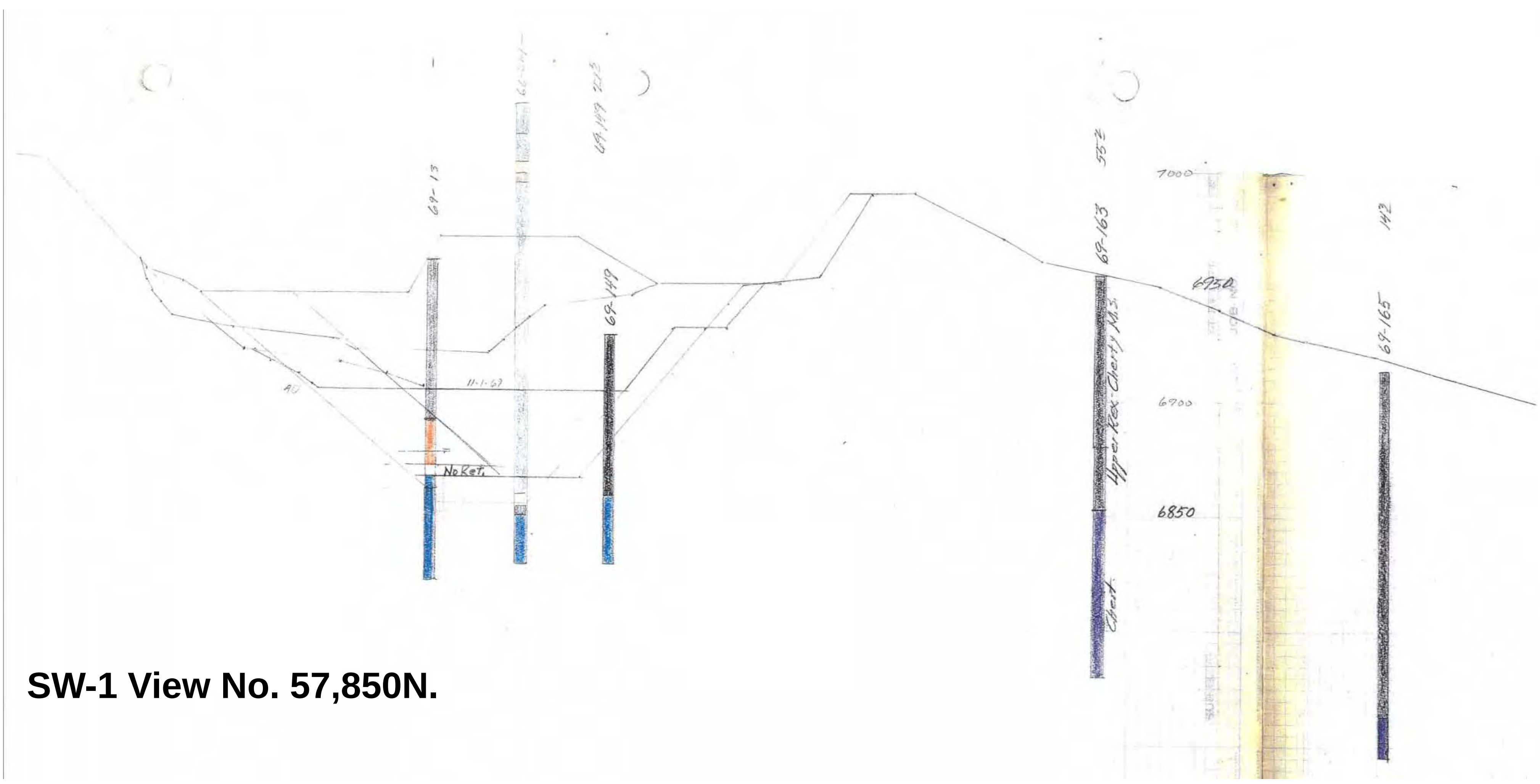

SW-1 View No. 57,850N.

J.R. Simplot Company Conda/Woodall Mountain Mine Pedro Creek Early Action	
Appendix A **SW-1 Cross-Sections**	
PRJ: 009-001	DATE: May 14, 2010
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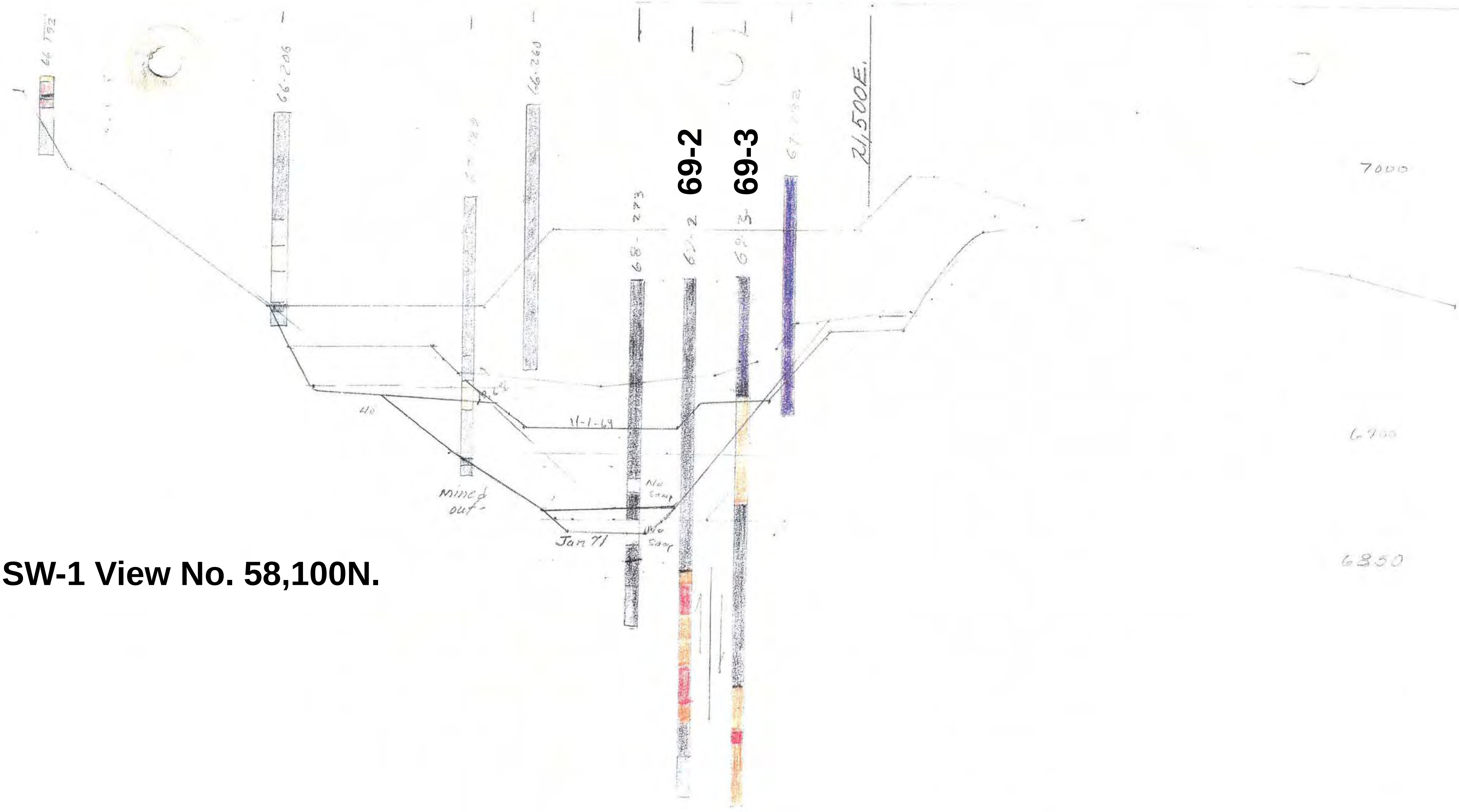

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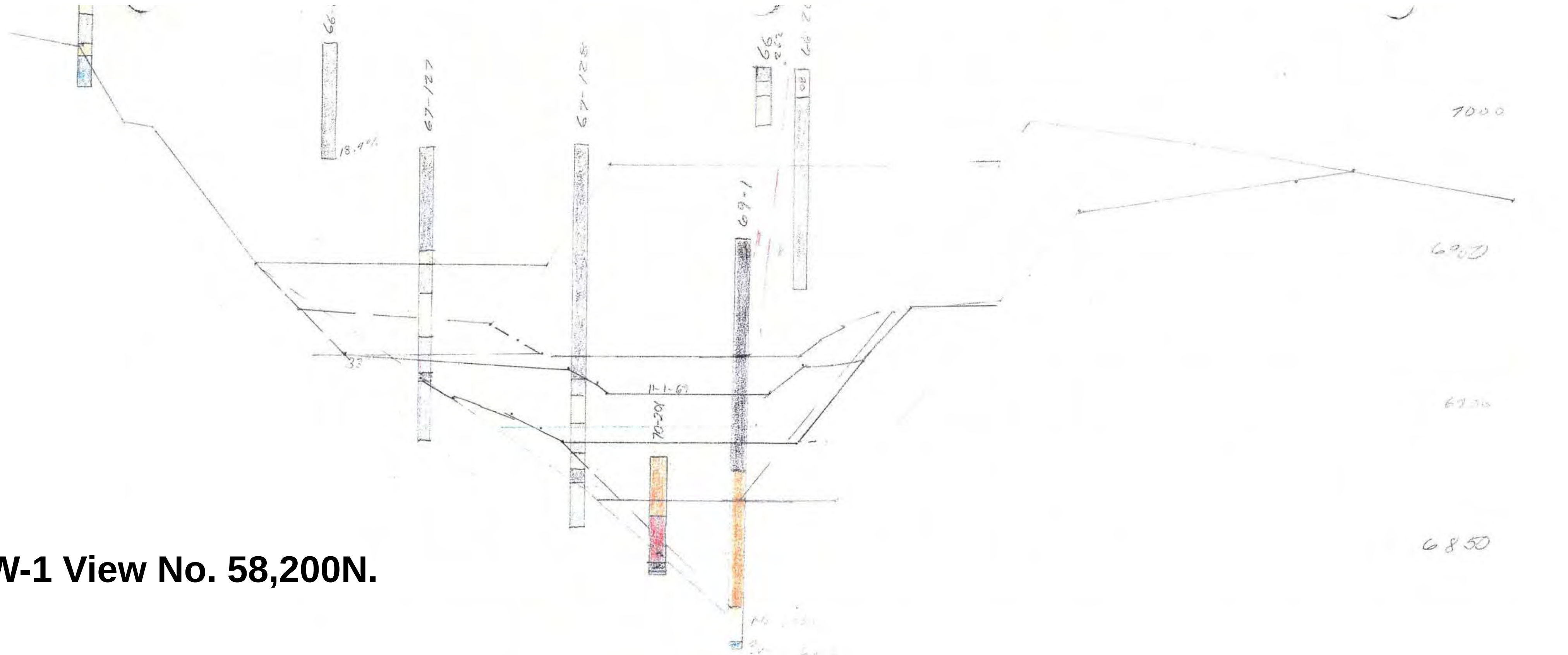

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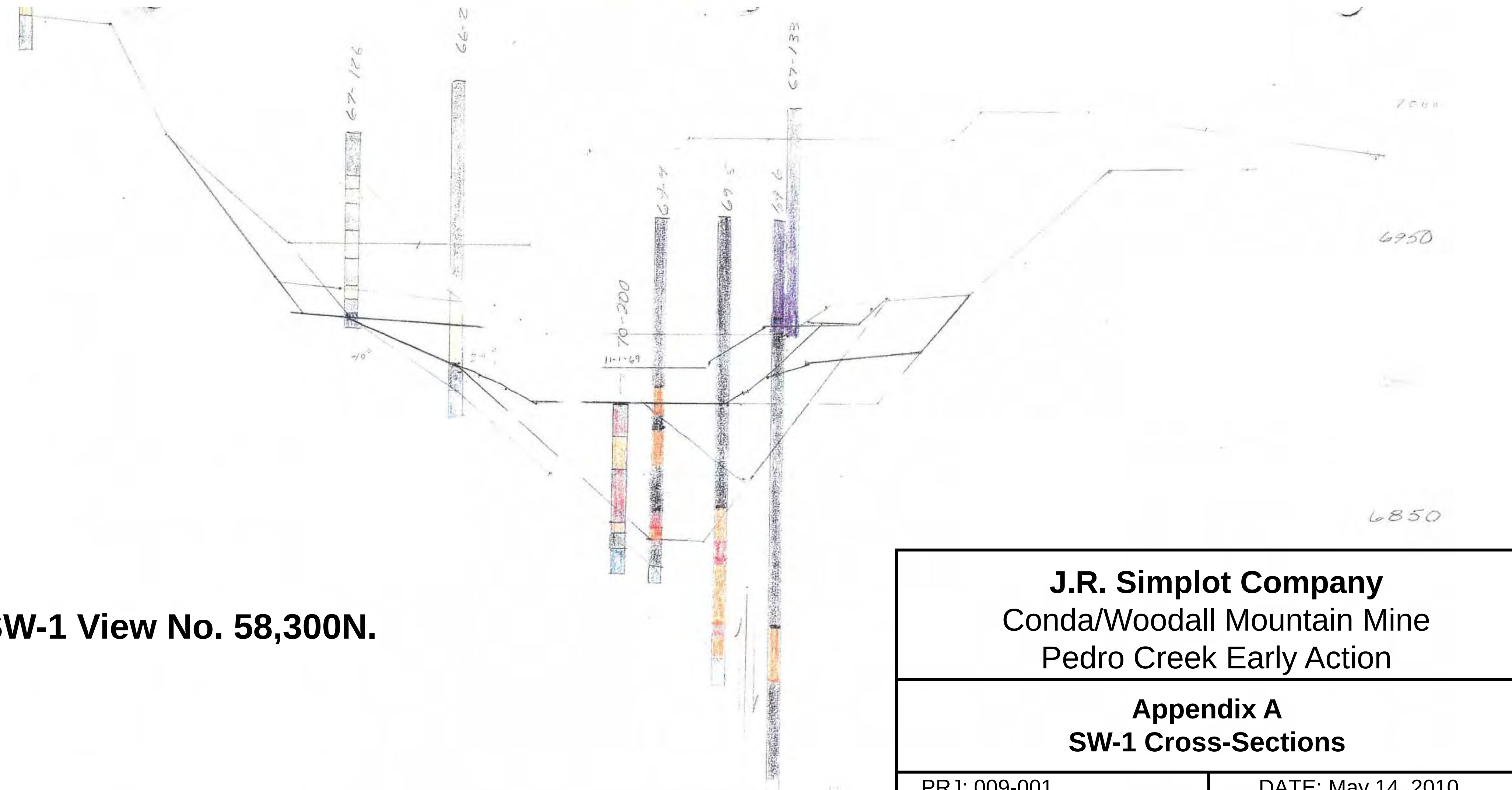

SW-1 View No. 58,300N.

J.R. Simplot Company
Conda/Woodall Mountain Mine
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Appendix A
SW-1 Cross-Sections

PRJ: 009-001	DATE: May 14, 2010	
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FORMATION ENVIRONMENTAL

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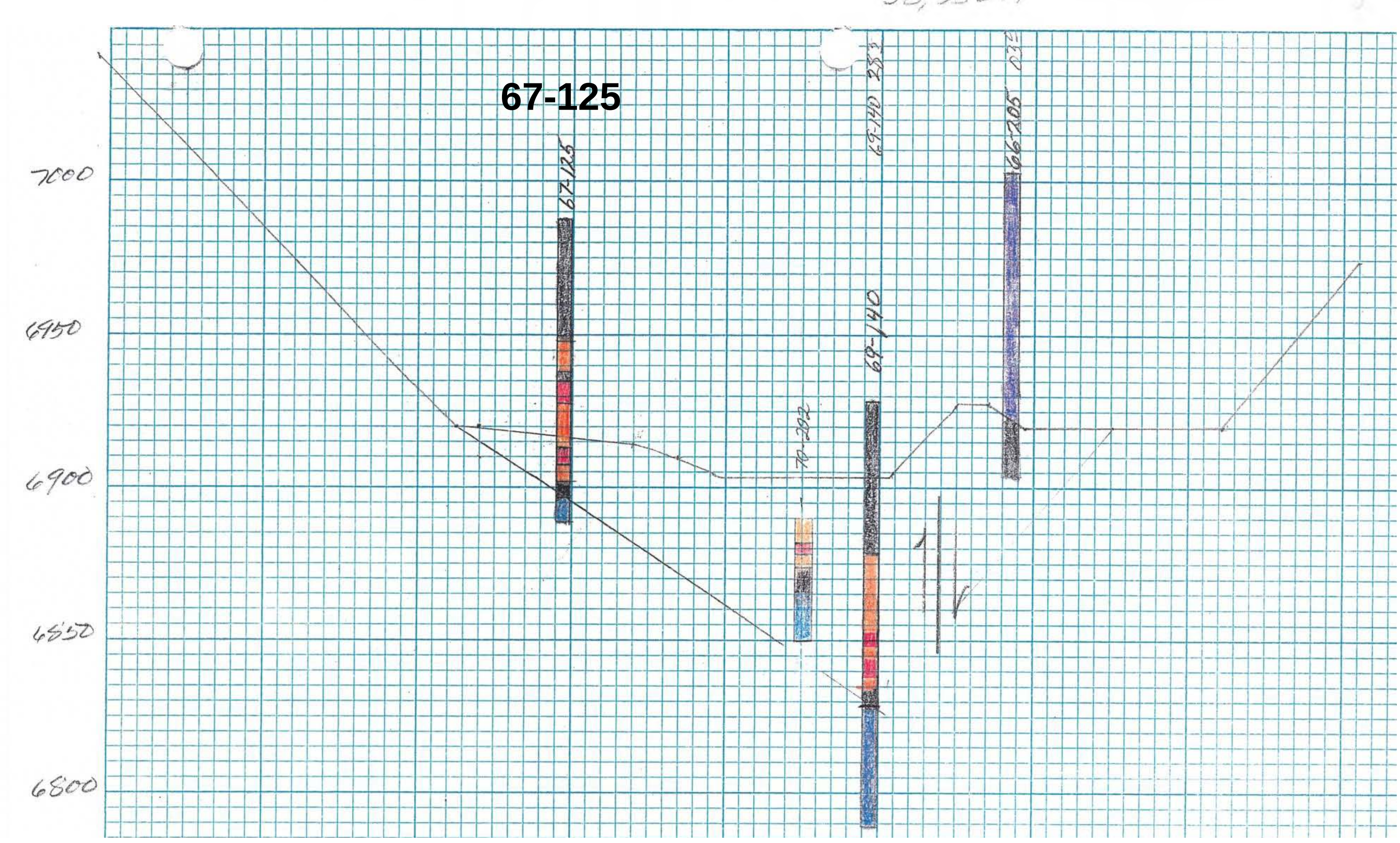

SW-1 View No. 58,400N.

J.R. Simplot Company
Conda/Woodall Mountain Mine
Pedro Creek Early Action

Appendix A
SW-1 Cross-Sections

PRJ: 009-001	DATE: May 14, 2010
REV: 0	BY: --- CHK: RPS

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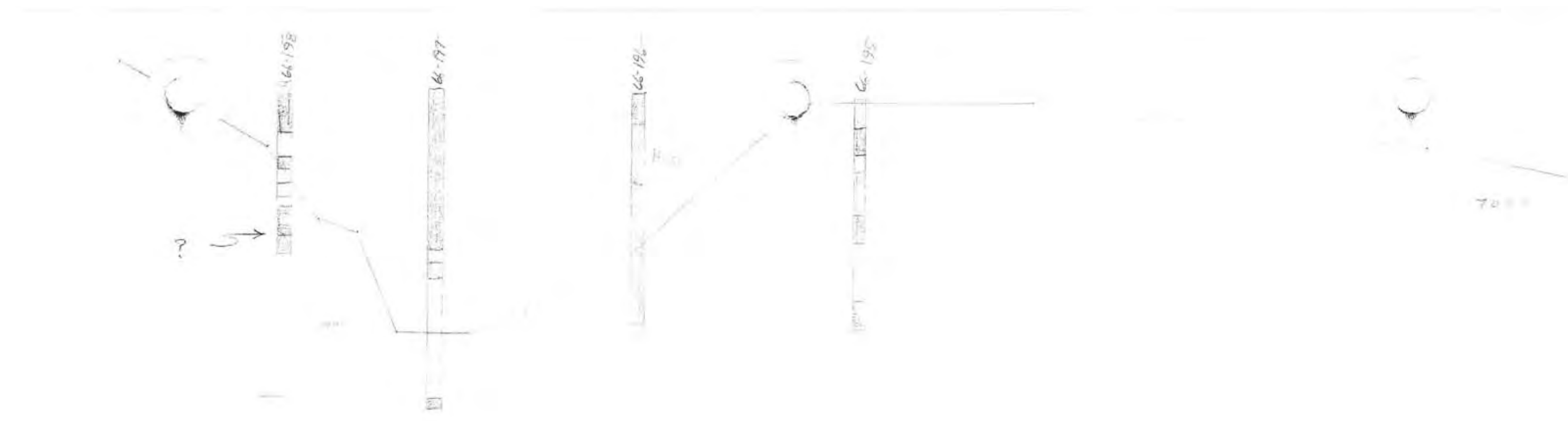
SW-1 View No. 58,500N.

SW-1 View No. 58,600N.



SW-1 View No. 58,600N.

J.R. Simplot Company Conda/Woodall Mountain Mine Pedro Creek Early Action		
Appendix A **SW-1 Cross-Sections**		
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REV: 0	BY: ---	CHK: RPS
FORMATION ENVIRONMENTAL		

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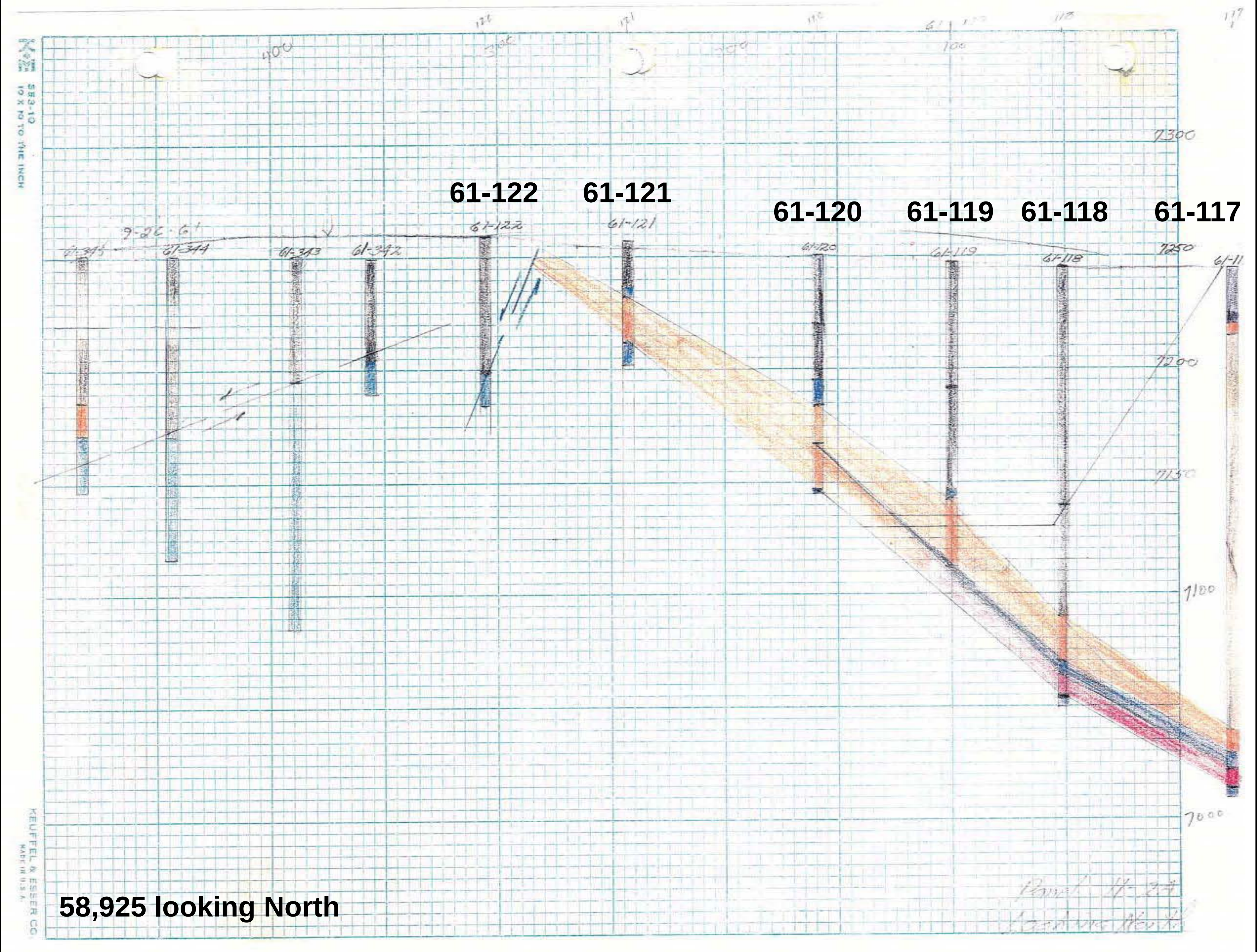

J.R. Simplot Company
Conda/Woodall Mountain Mine
Pedro Creek Early Action

Appendix A
SW-1 Cross-Sections

PRJ: 009-001	DATE: July 2010
REV: 0	BY: --- CHK: RPS

FORMATION ENVIRONMENTAL

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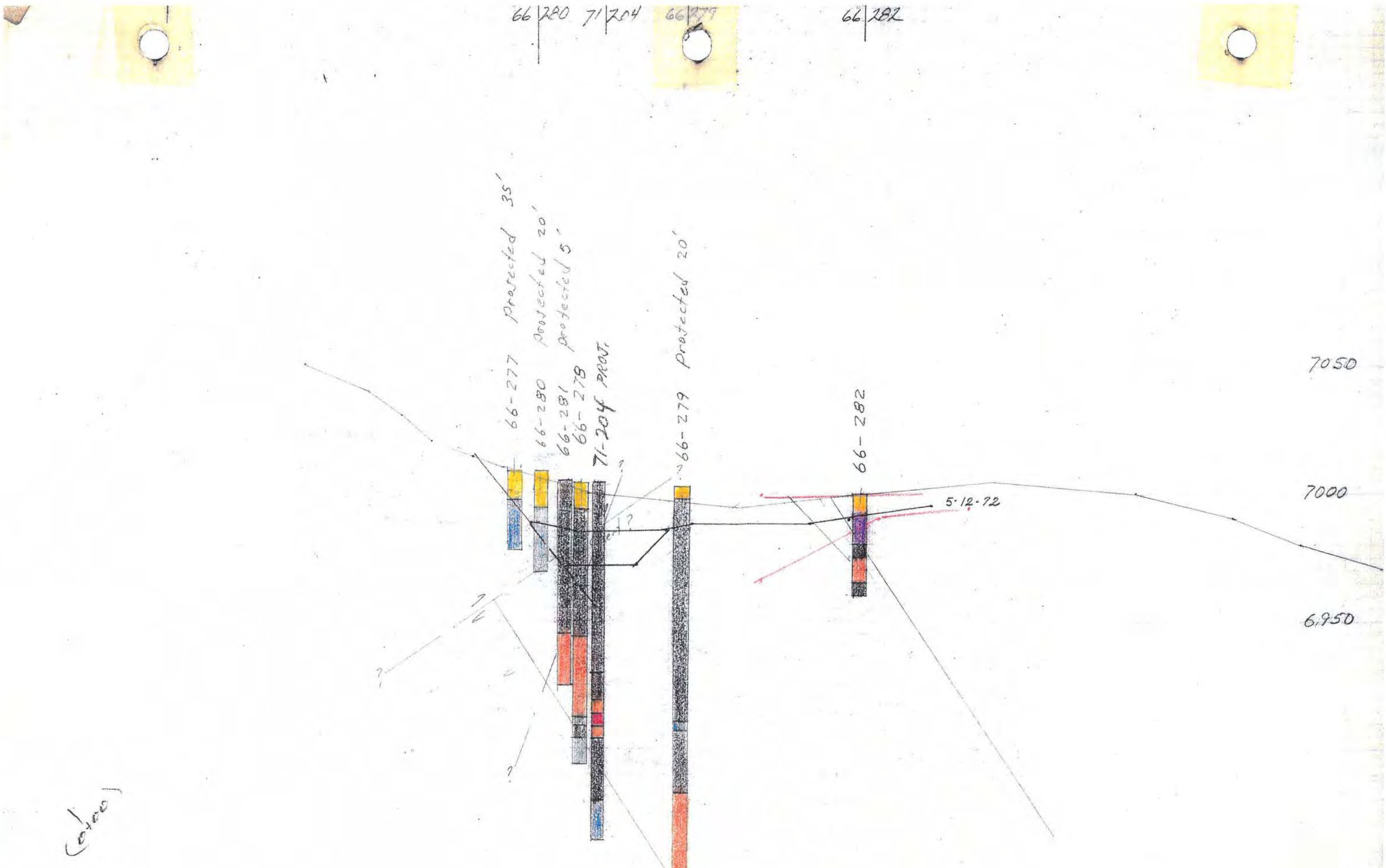

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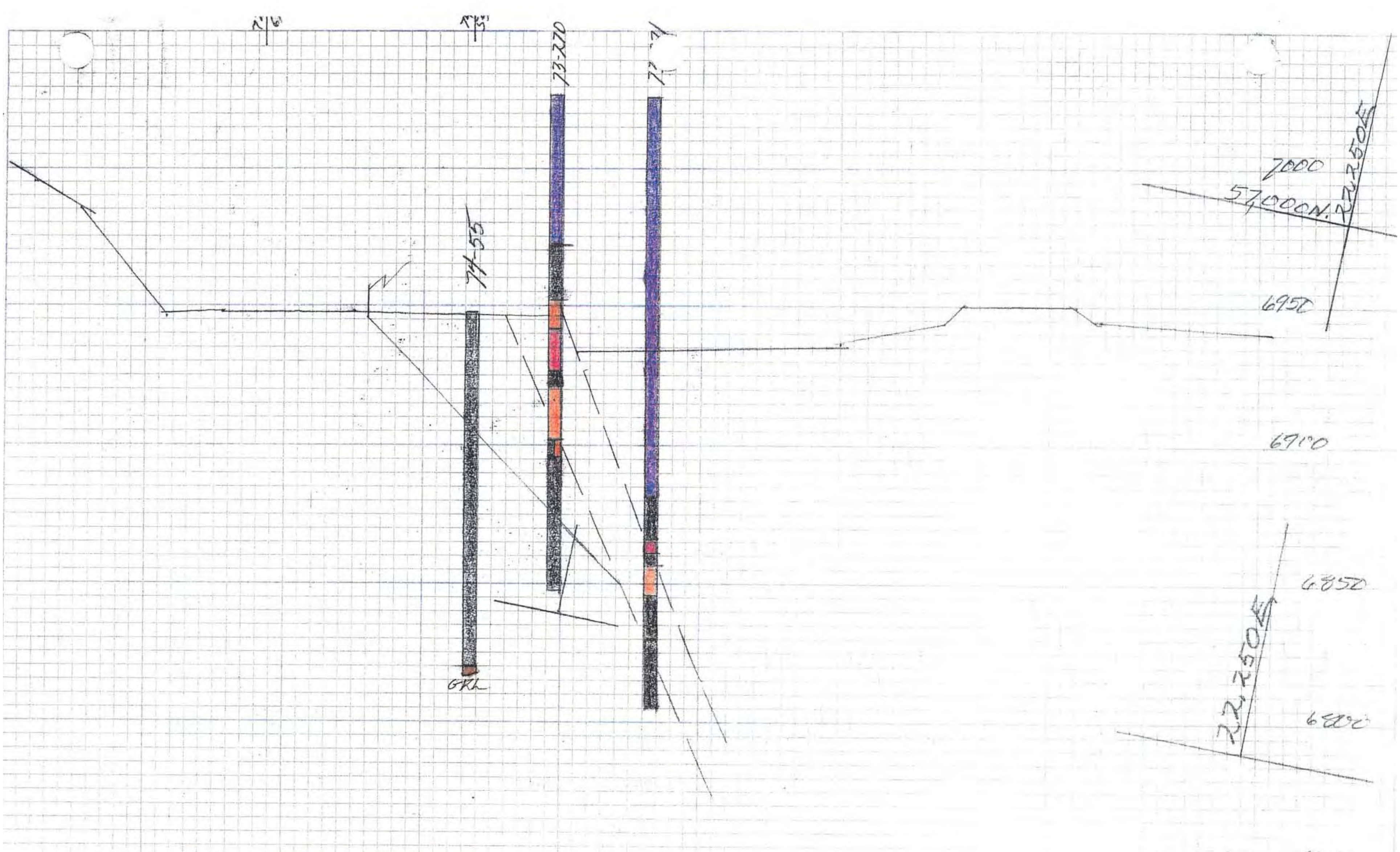

SW-2 View North.

J.R. Simplot Company
Conda/Woodall Mountain Mine
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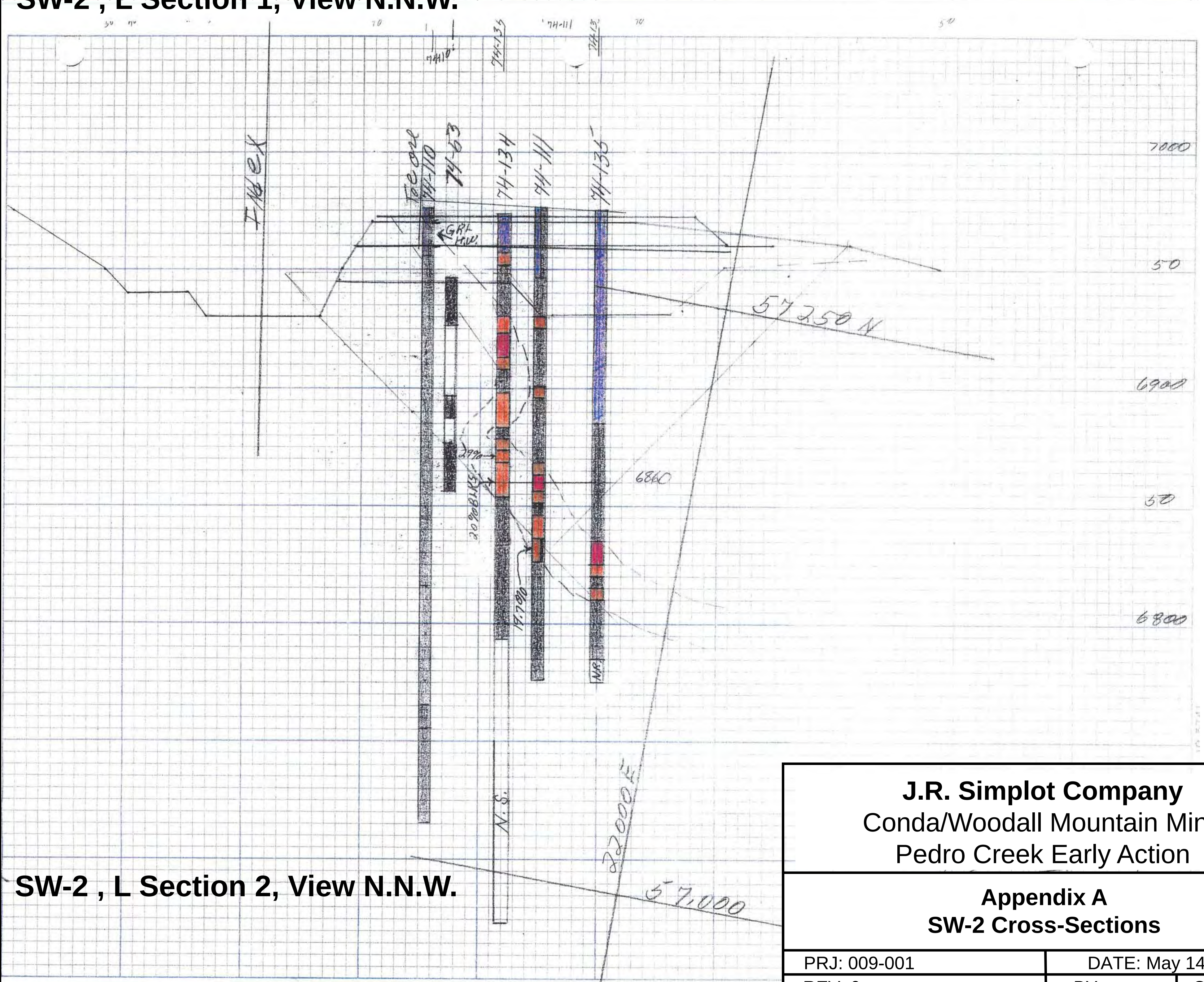
Appendix A
SW-2 Cross-Sections

PRJ: 009-001	DATE: May 14, 2010
REV: 0	BY: --- CHK: RPS

FORMATION ENVIRONMENTAL

S:\GIS\arcprj2\010139\cov\simplot\HistoricalBoreholes\EastWoodall_SouthWoodall

SW-2 , L Section 1, View N.N.W.



SW-2 , L Section 2, View N.N.W.

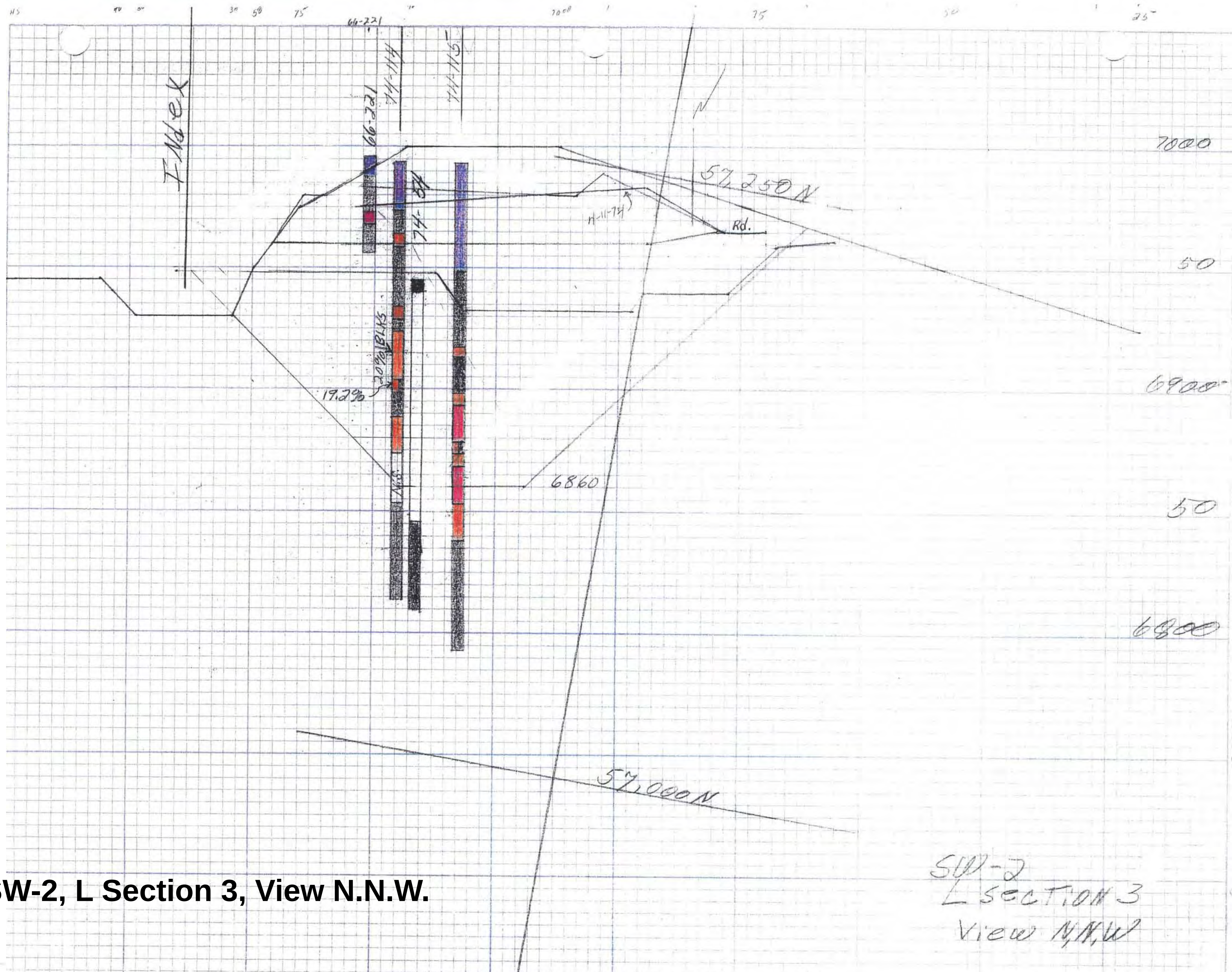
J.R. Simplot Company
Conda/Woodall Mountain Mine
Pedro Creek Early Action

Appendix A
SW-2 Cross-Sections

PRJ: 009-001	DATE: May 14, 2010	
REV: 0	BY: ---	CHK: RPS

FORMATION ENVIRONMENTAL

S:\GIS\arcprj2\010139\cov\simplot\HistoricalBoreholes\EastWoodall_SouthWoodall



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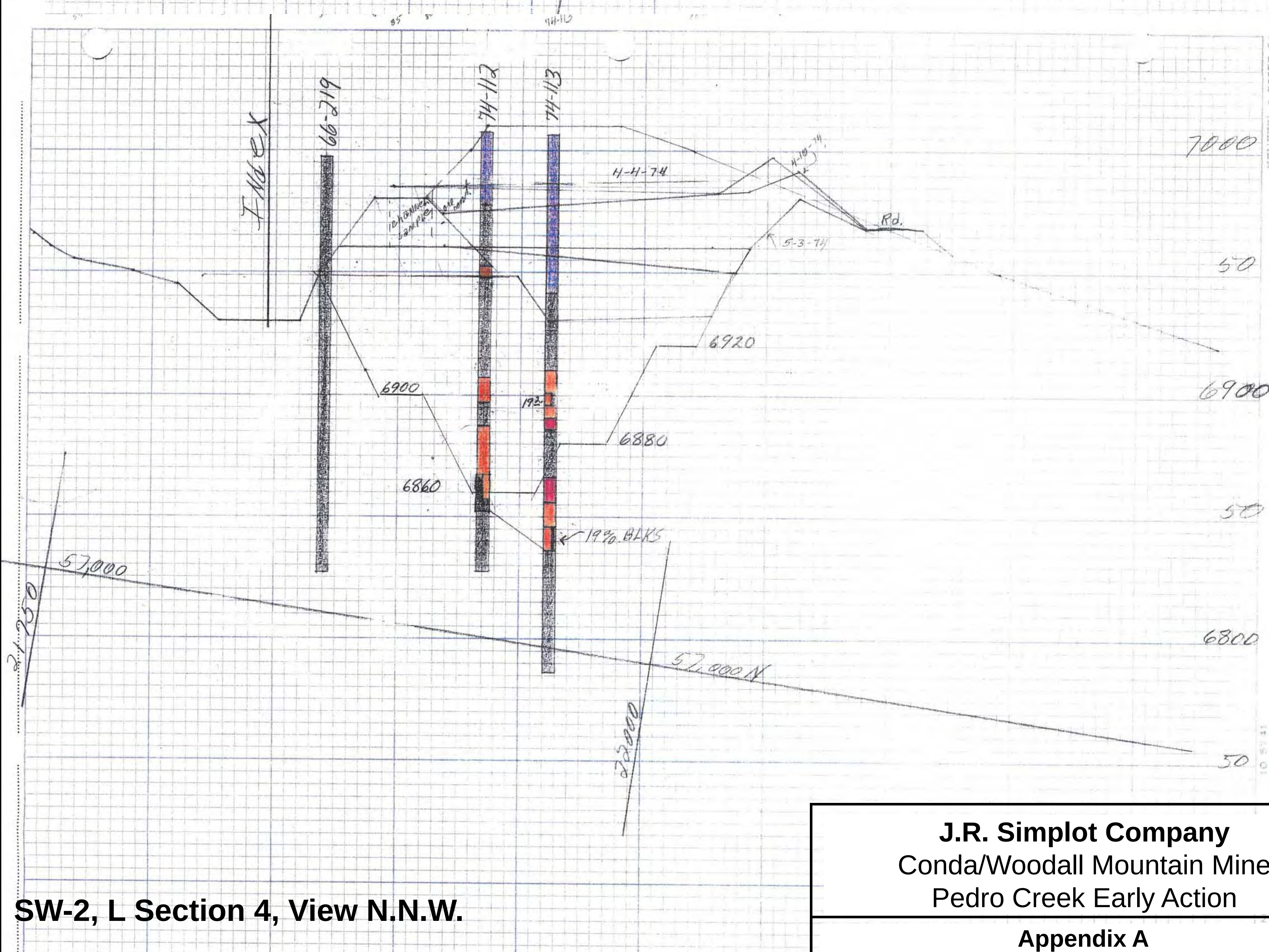

SW-2, L Section 4, View N.N.W.

J.R. Simplot Company
Conda/Woodall Mountain Mine
Pedro Creek Early Action

Appendix A
SW-2 Cross-Sections

PRJ: 009-001	DATE: May 14, 2010
REV: 0	BY: --- / CHK: RPS

FORMATION ENVIRONMENTAL

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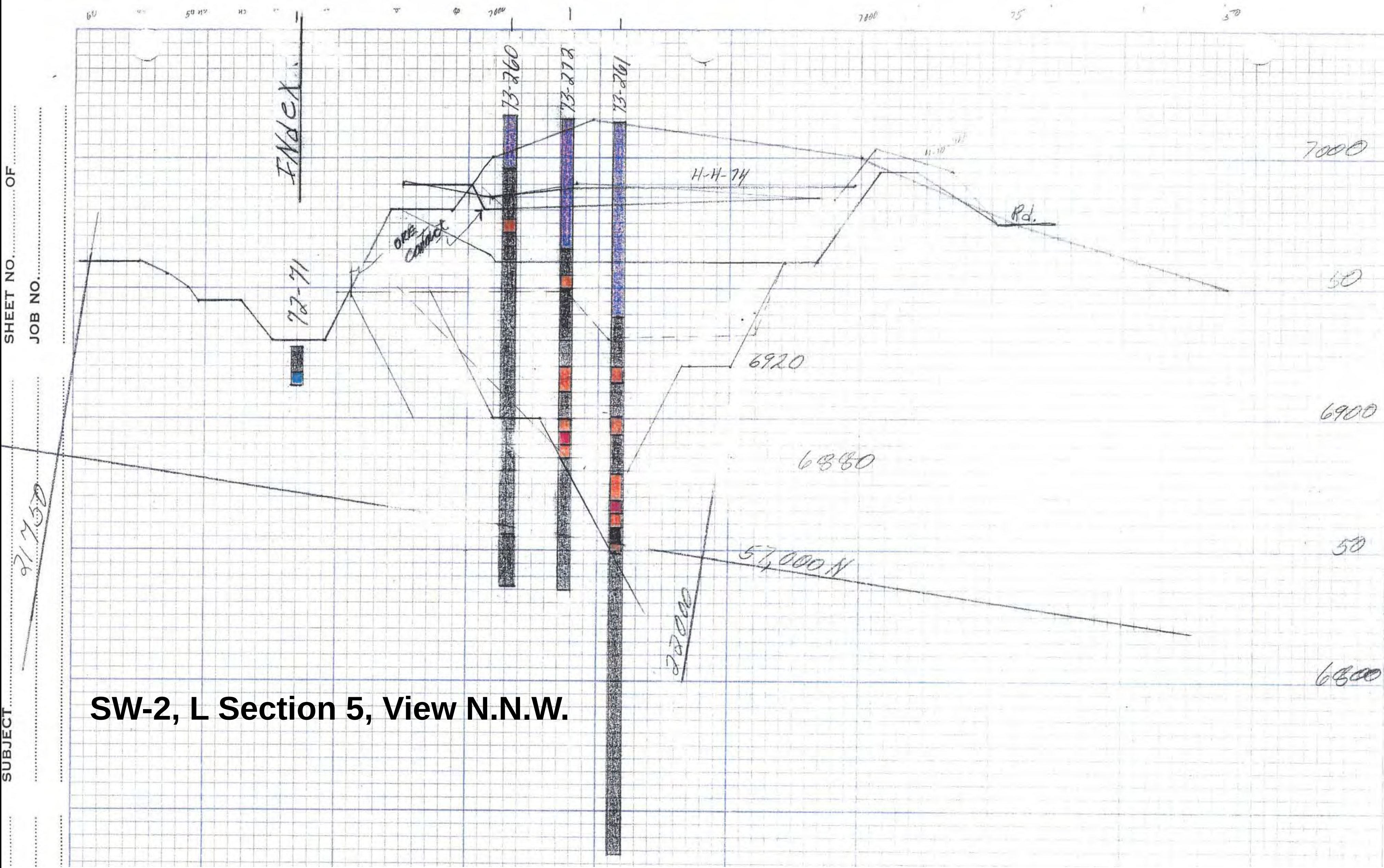
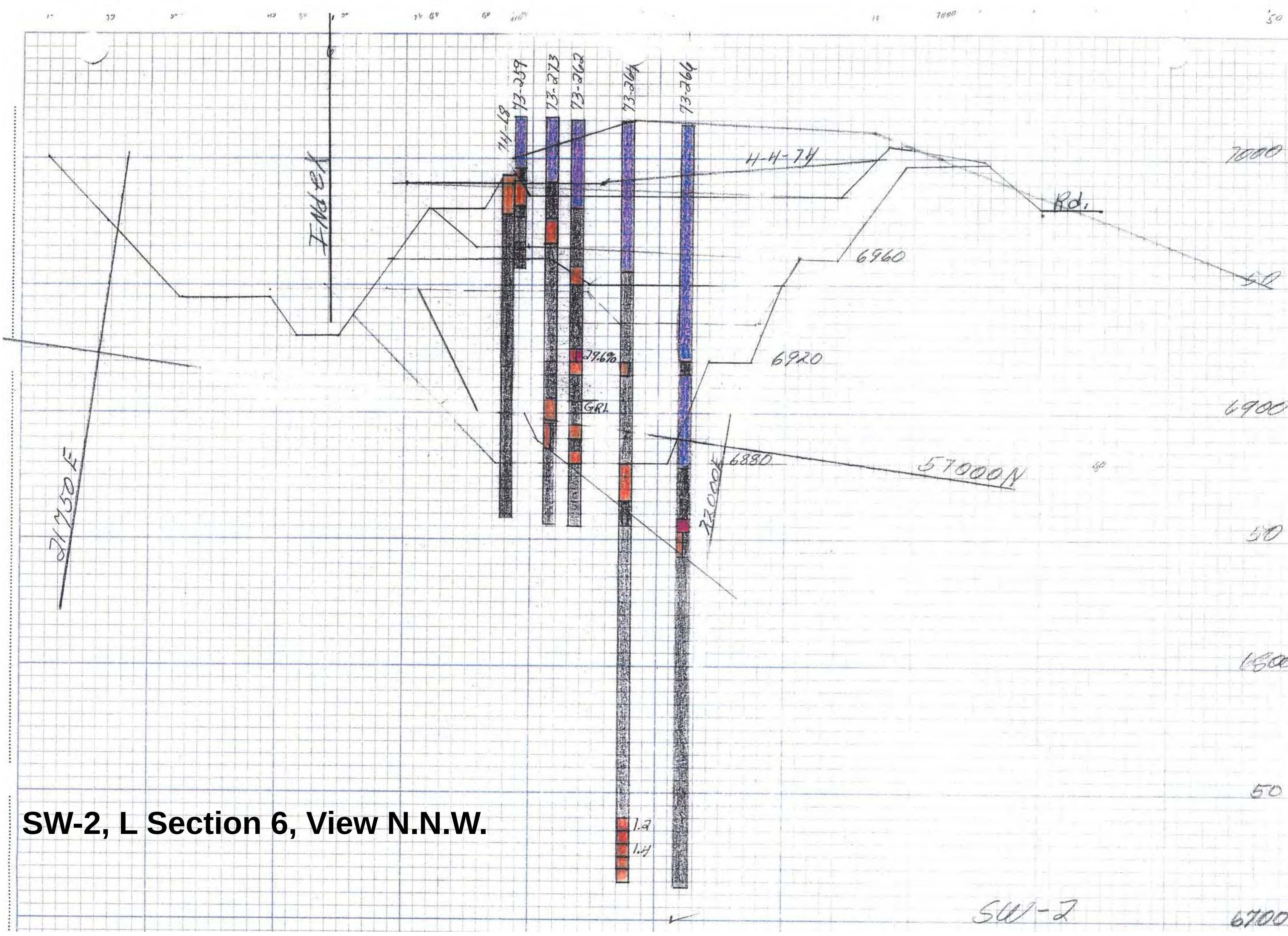


SW-2, L Section 5, View N.N.W.



SW-2, L Section 6, View N.N.W.

J.R. Simplot Company
Conda/Woodall Mountain Mine
Pedro Creek Early Action

Appendix A
SW-2 Cross-Sections

PRJ: 009-001	DATE: May 14, 2010	
REV: 0	BY: ---	CHK: RPS

FORMATION ENVIRONMENTAL

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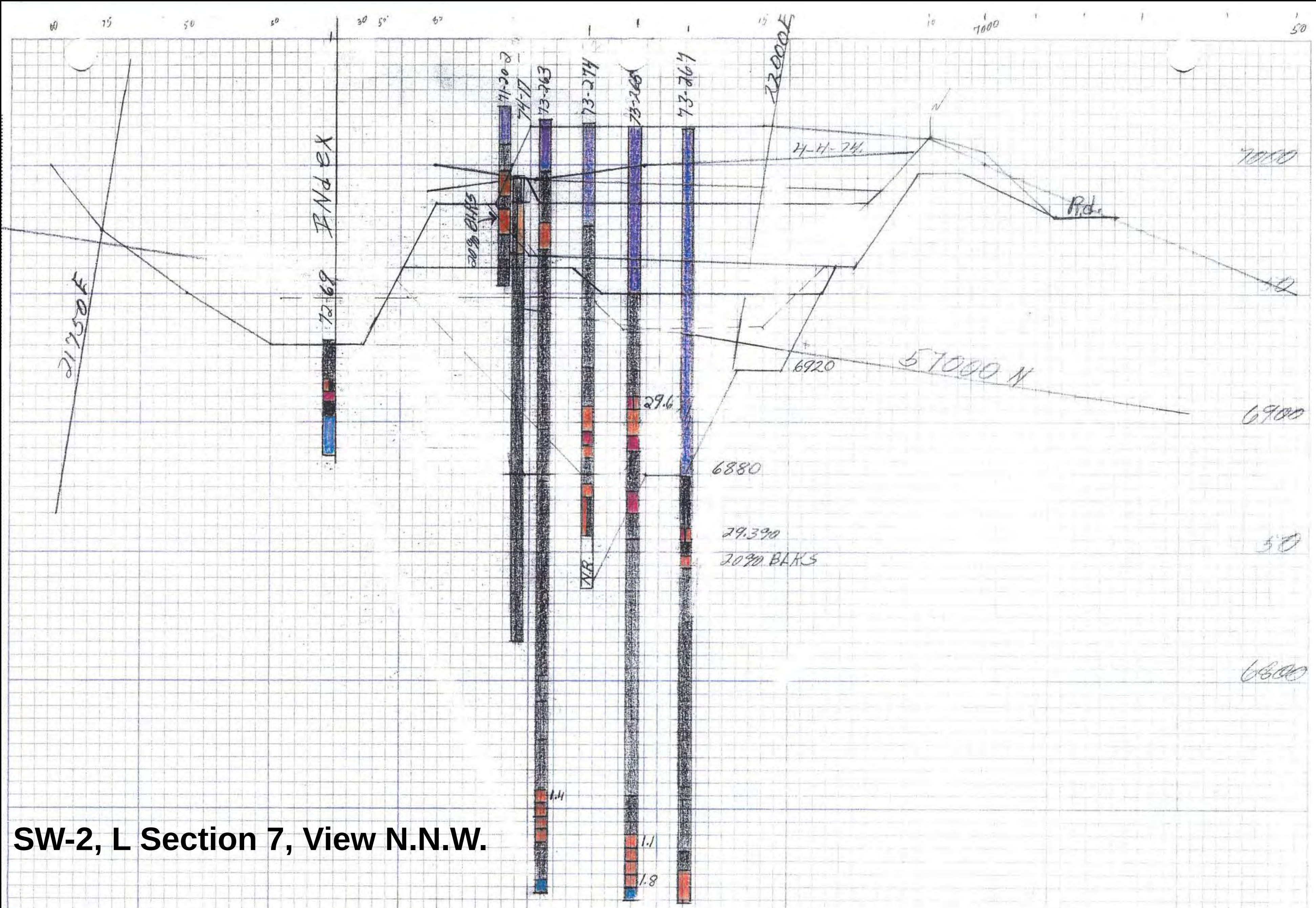
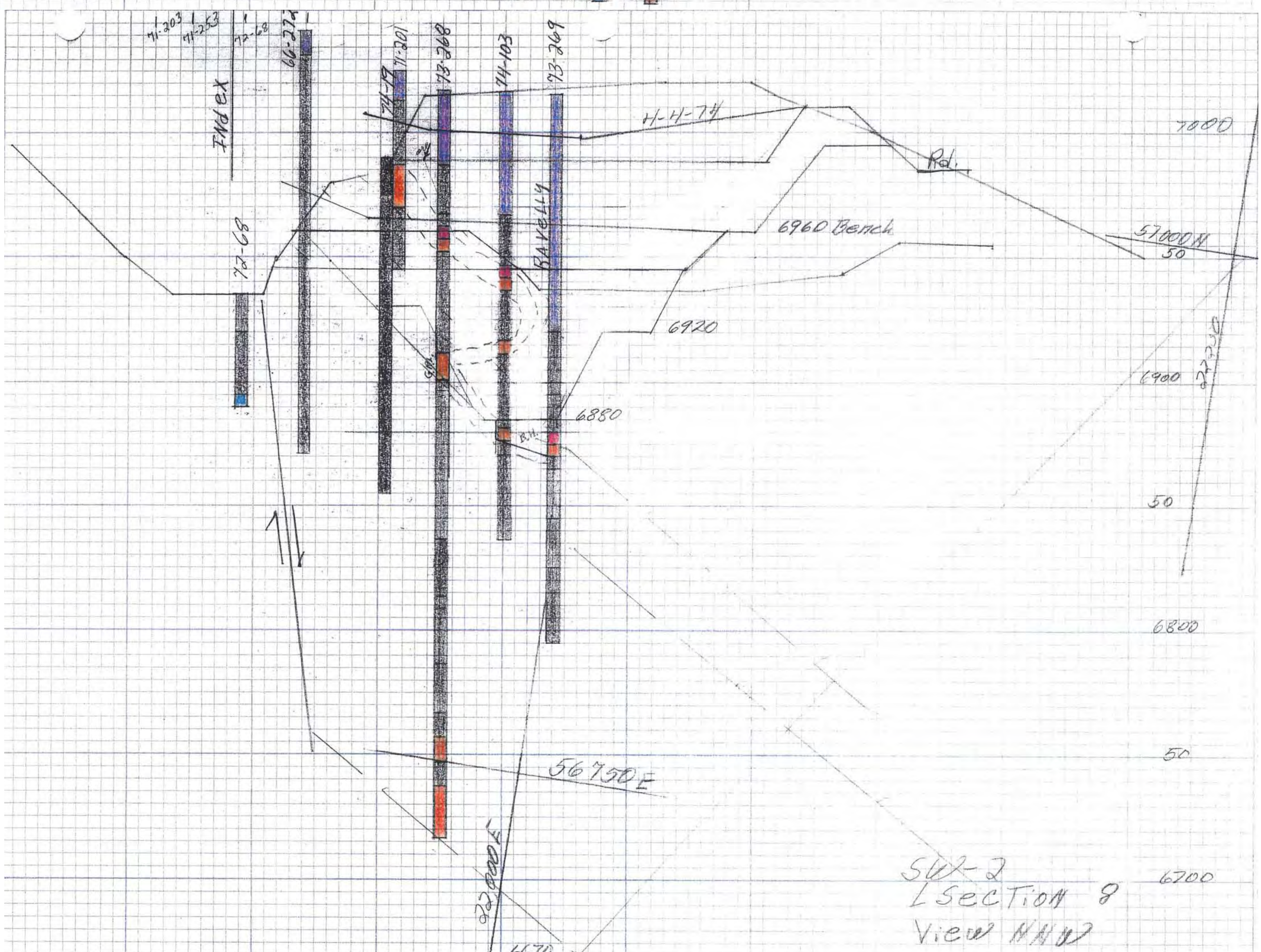


SW-2, L Section 7, View N.N.W.



SW-2, L Section 8, View N.N.W.

J.R. Simplot Company
Conda/Woodall Mountain Mine
Pedro Creek Early Action

Appendix A
SW-2 Cross-Sections

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REV: 0	BY: --- CHK: RPS

FORMATION ENVIRONMENTAL

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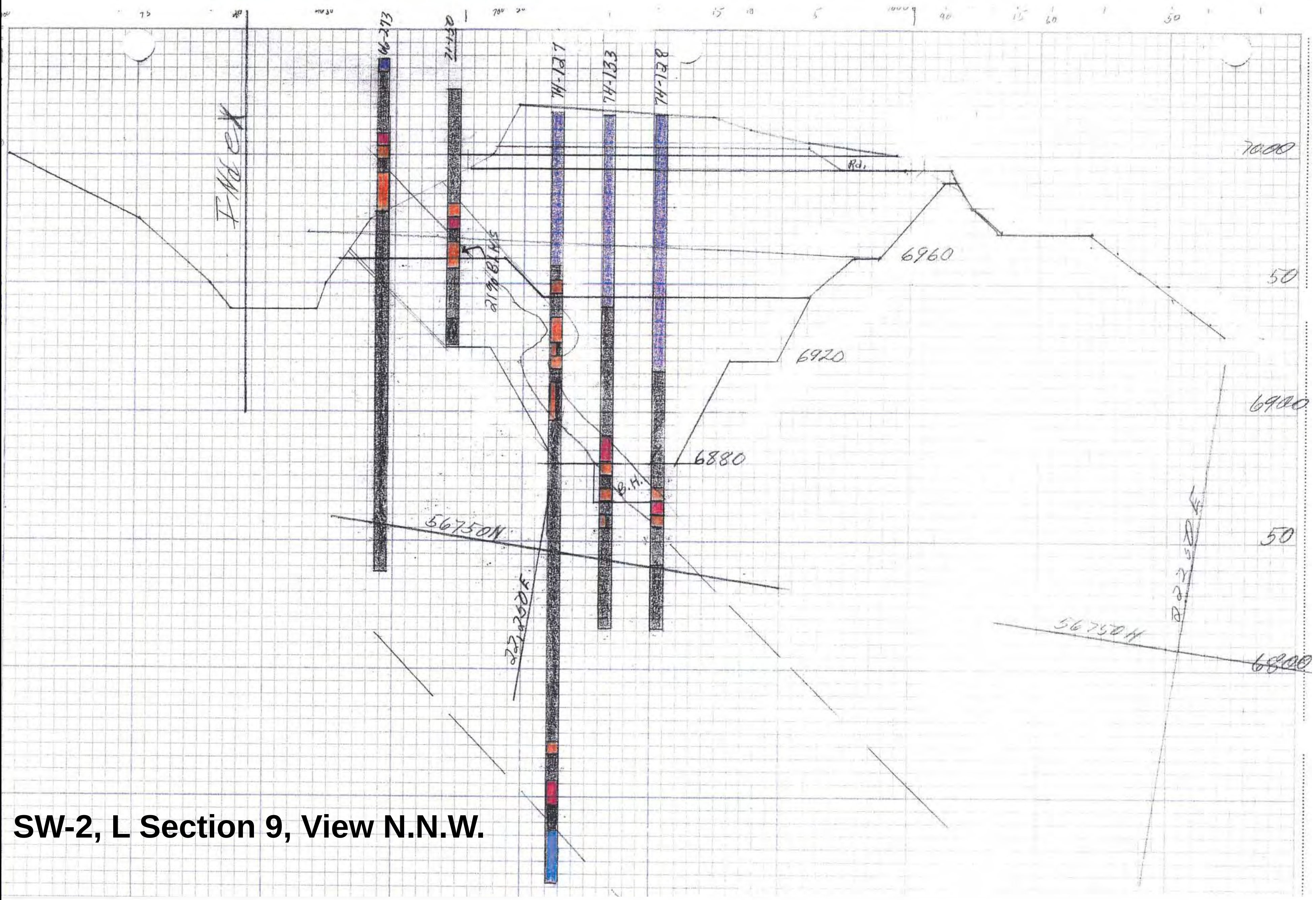

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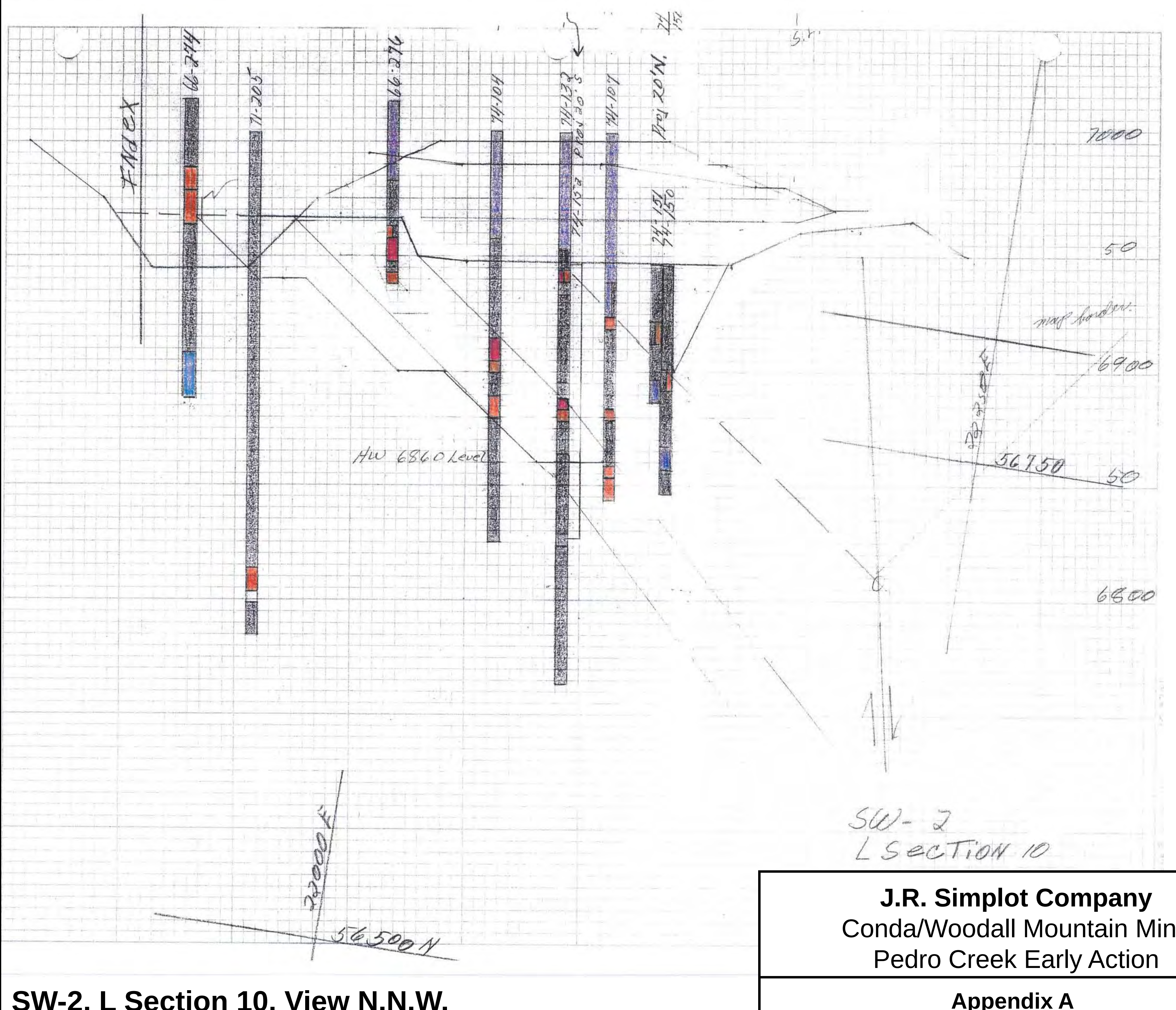

SW-2, L Section 10, View N.N.W.

J.R. Simplot Company
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Appendix A
SW-2 Cross-Sections

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REV: 0	BY: --- / CHK: RPS

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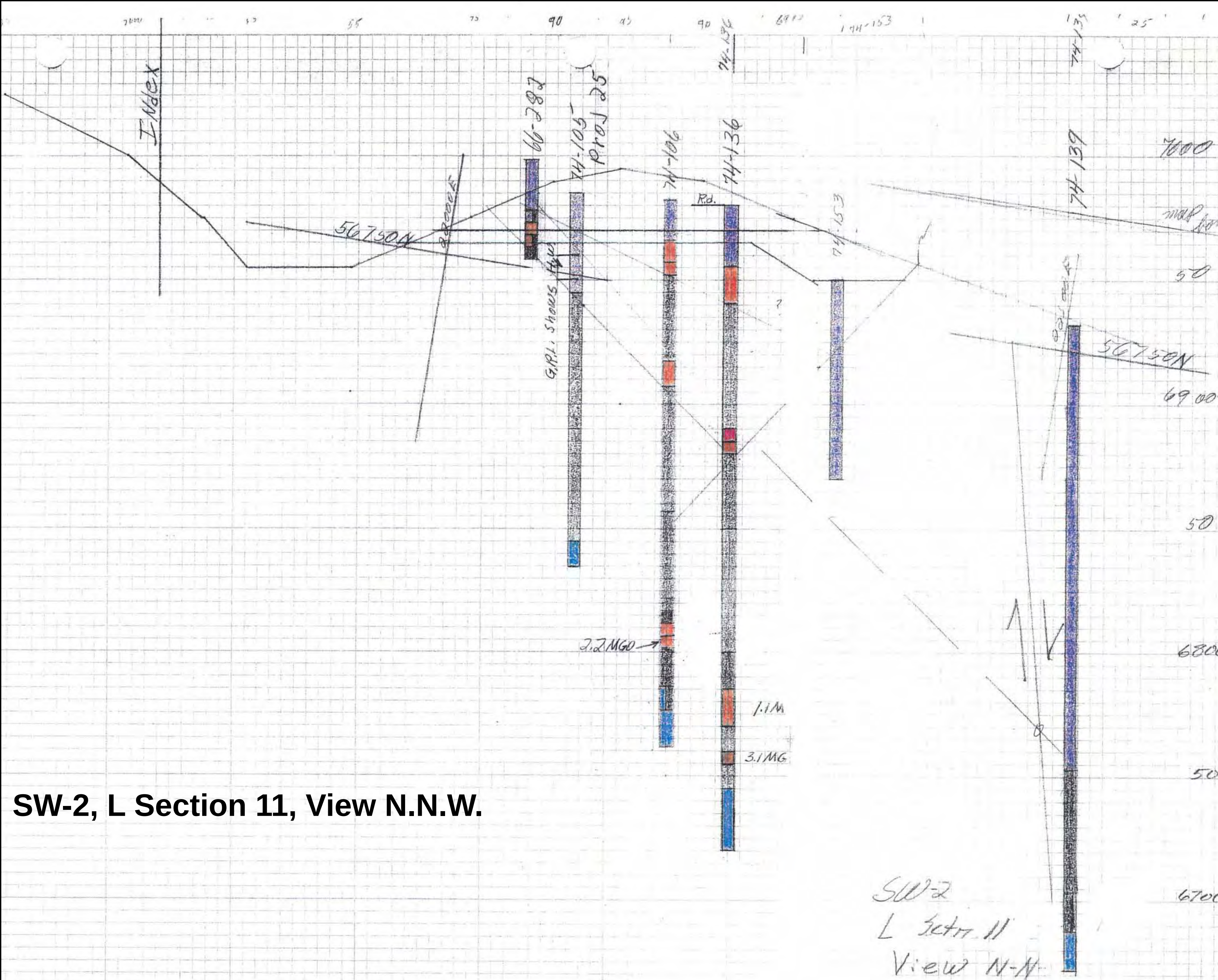
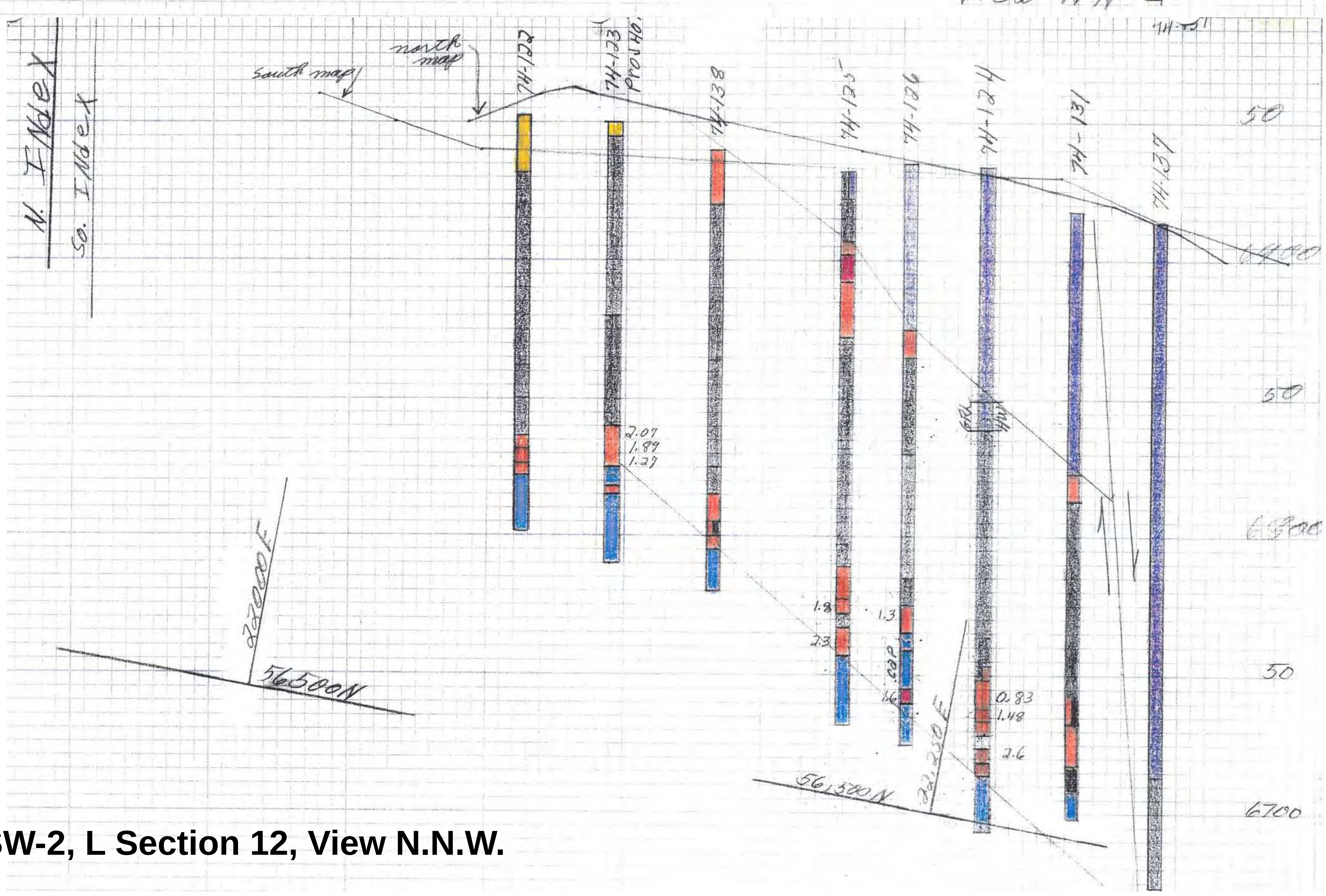


SW-2, L Section 11, View N.N.W.



SW-2, L Section 12, View N.N.W.

J.R. Simplot Company
Conda/Woodall Mountain Mine
Pedro Creek Early Action

Appendix A
SW-2 Cross-Sections

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REV: 0	BY: ---	CHK: RPS

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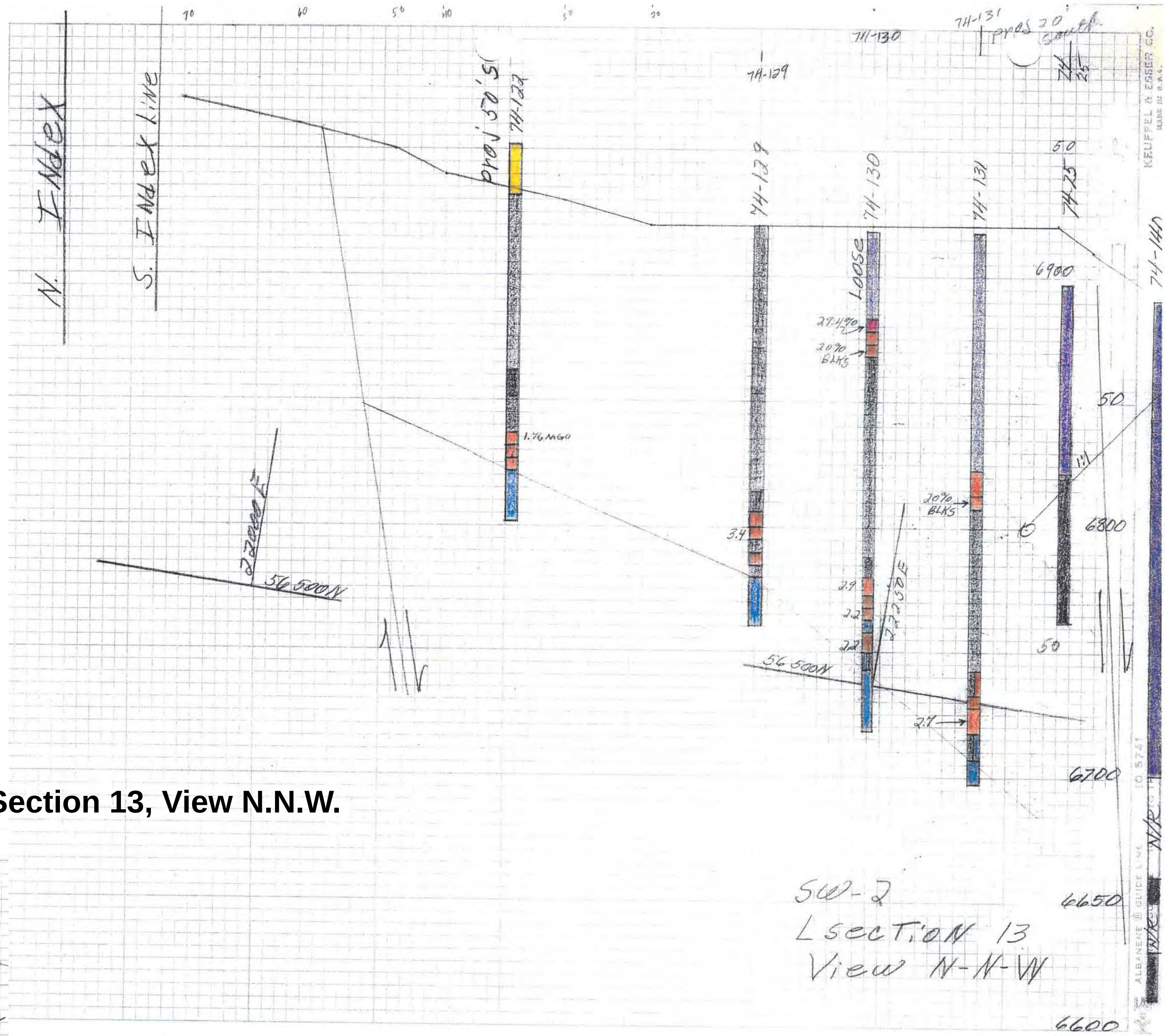

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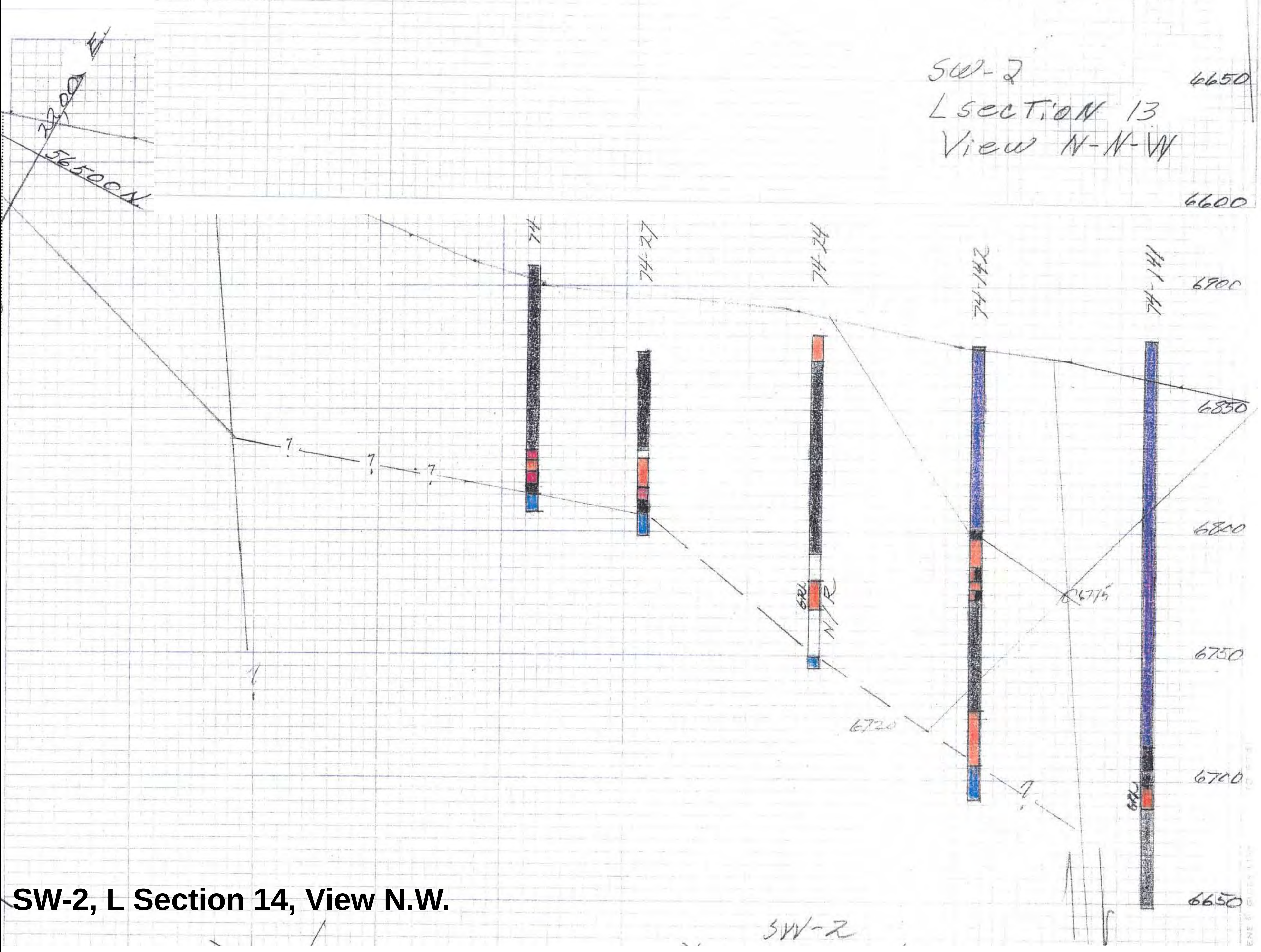

SW-2, L Section 14, View N.W.

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Appendix A
SW-2 Cross-Sections

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REV: 0	BY: ---	CHK: RPS

FORMATION ENVIRONMENTAL

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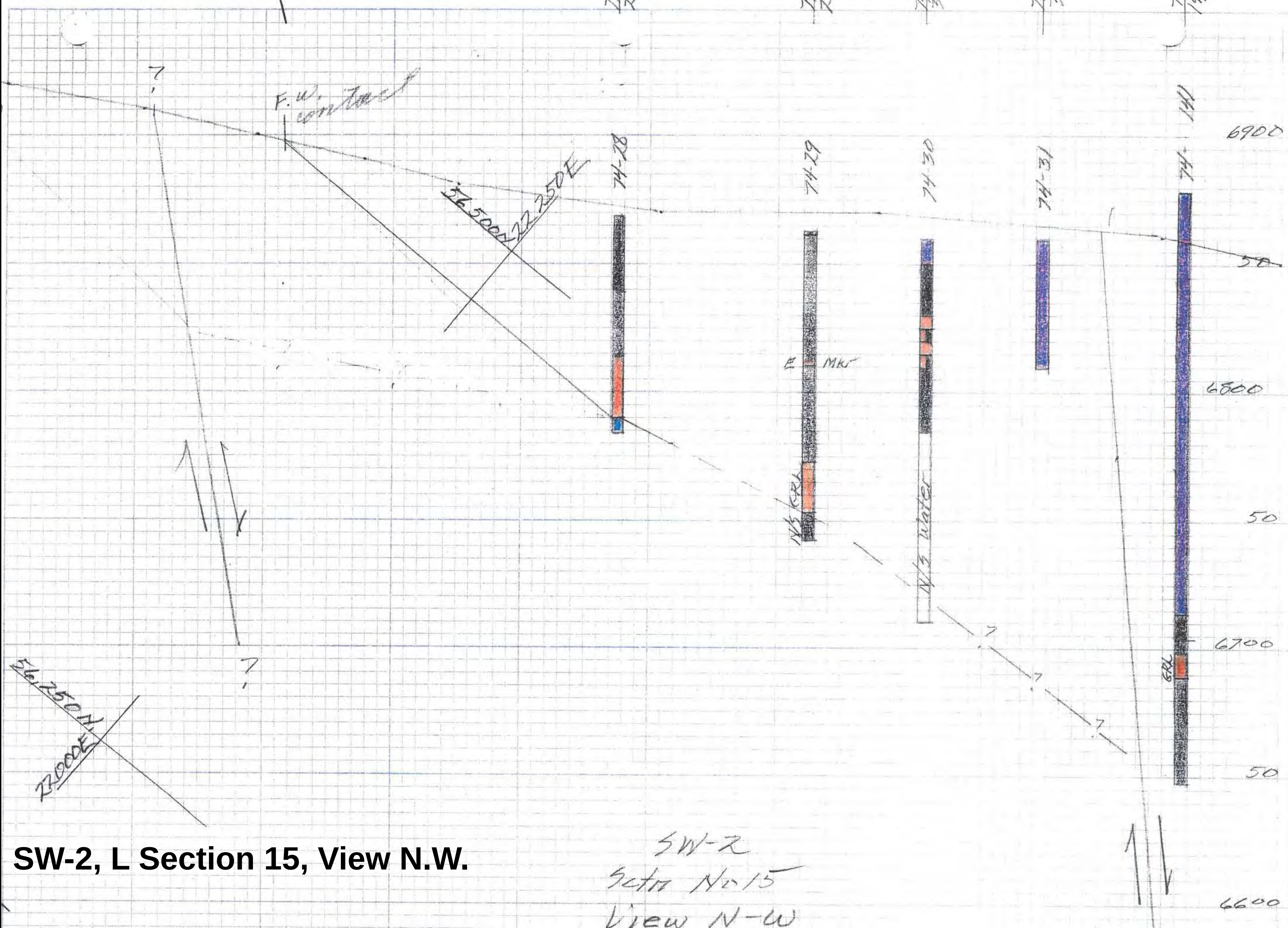

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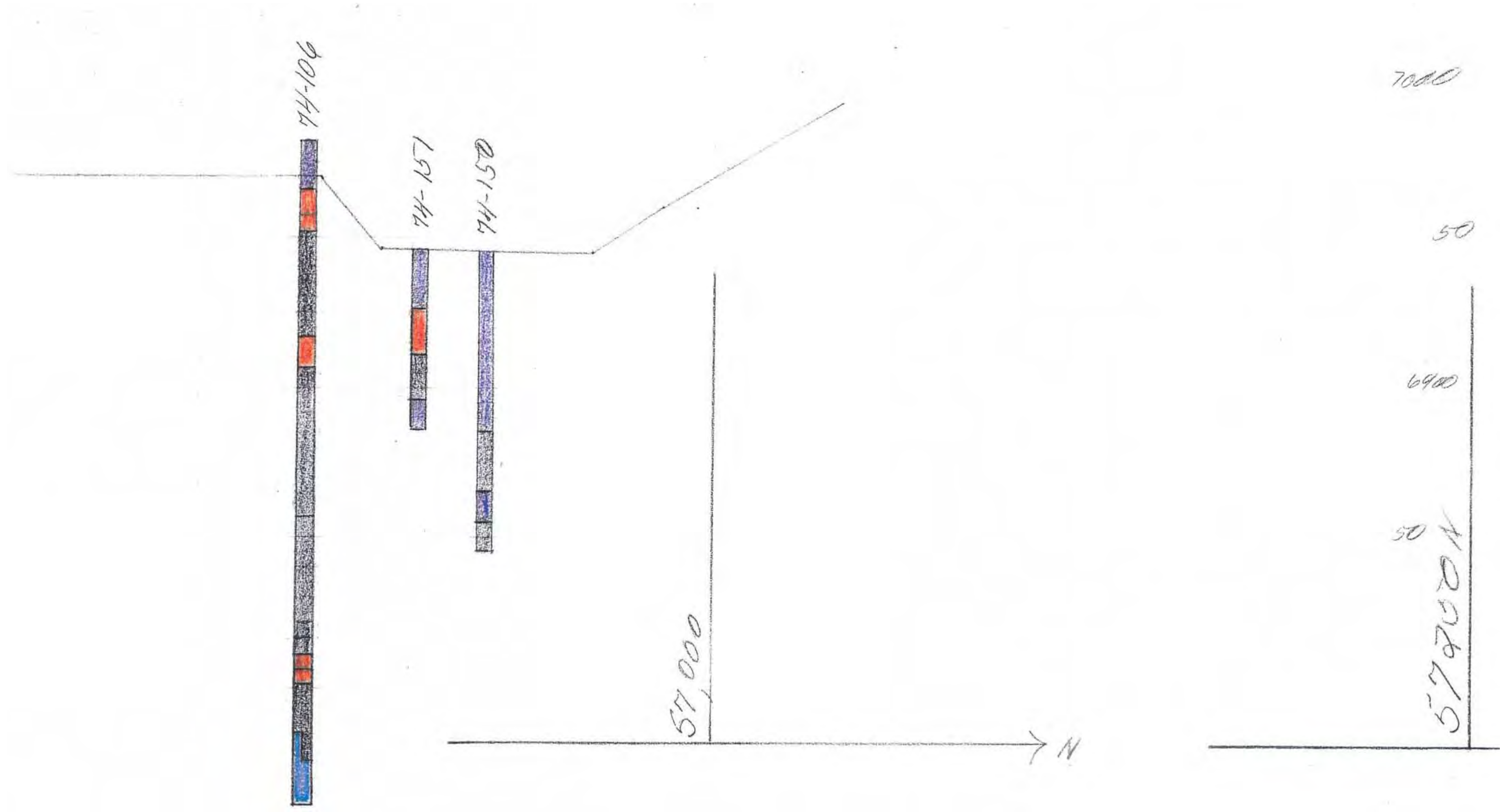

SW-2, N-S Section, View West

J.R. Simplot Company
Conda/Woodall Mountain Mine
Pedro Creek Early Action

Appendix A
SW-2 Cross-Sections

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REV: 0	BY: --- CHK: RPS

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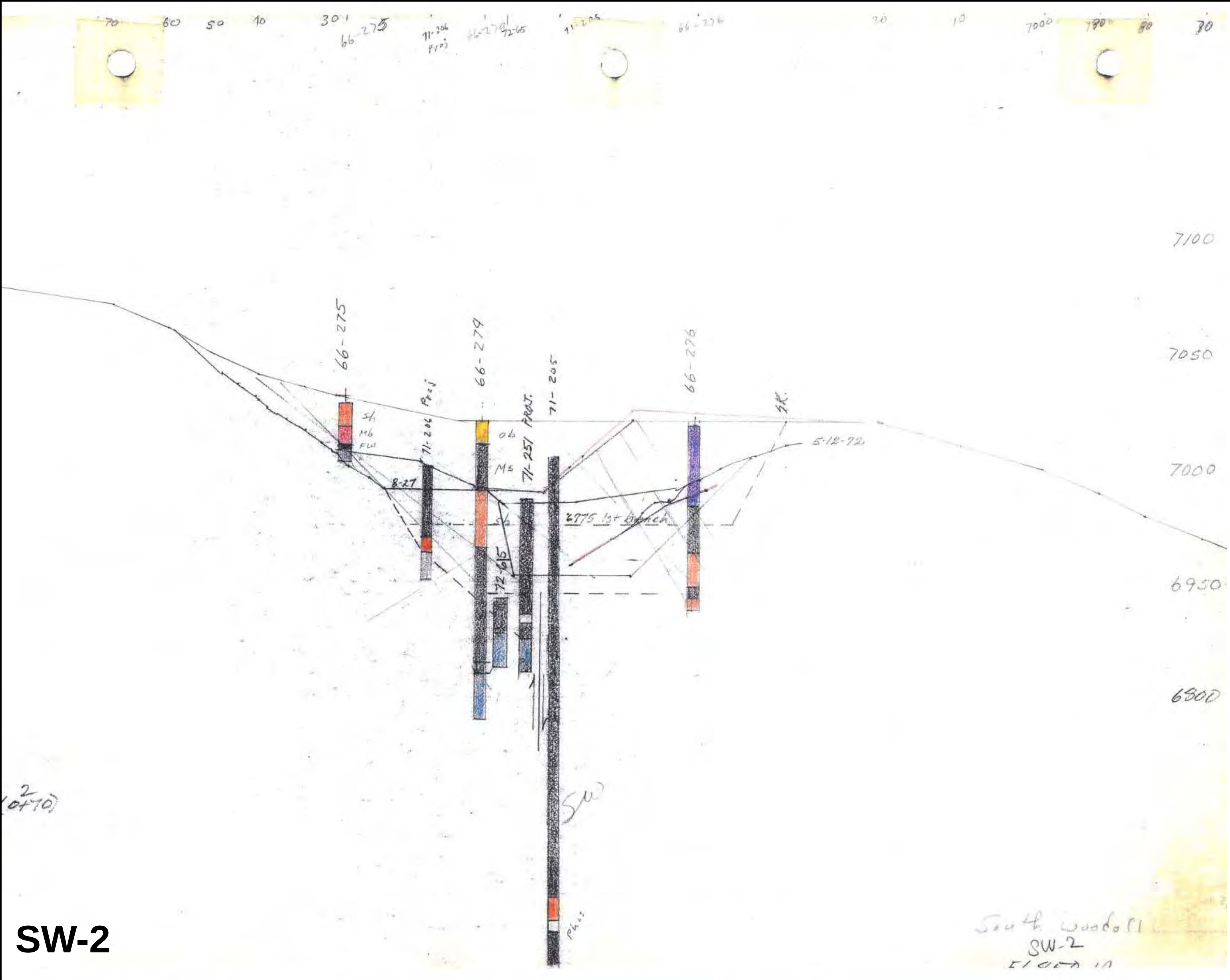
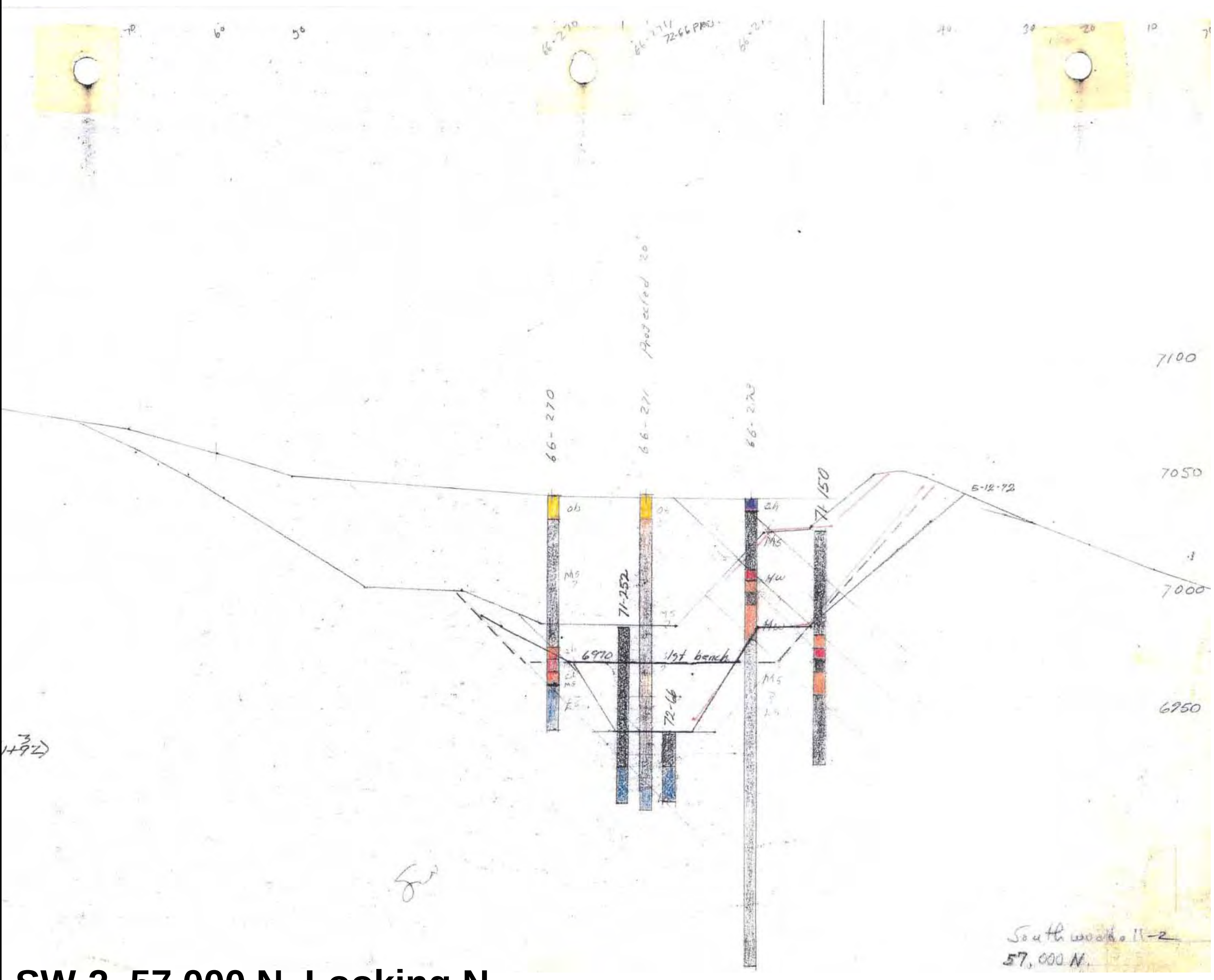


SW-2



SW-2, 57,000 N, Looking N

J.R. Simplot Company
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Appendix A
SW-2 Cross-Sections

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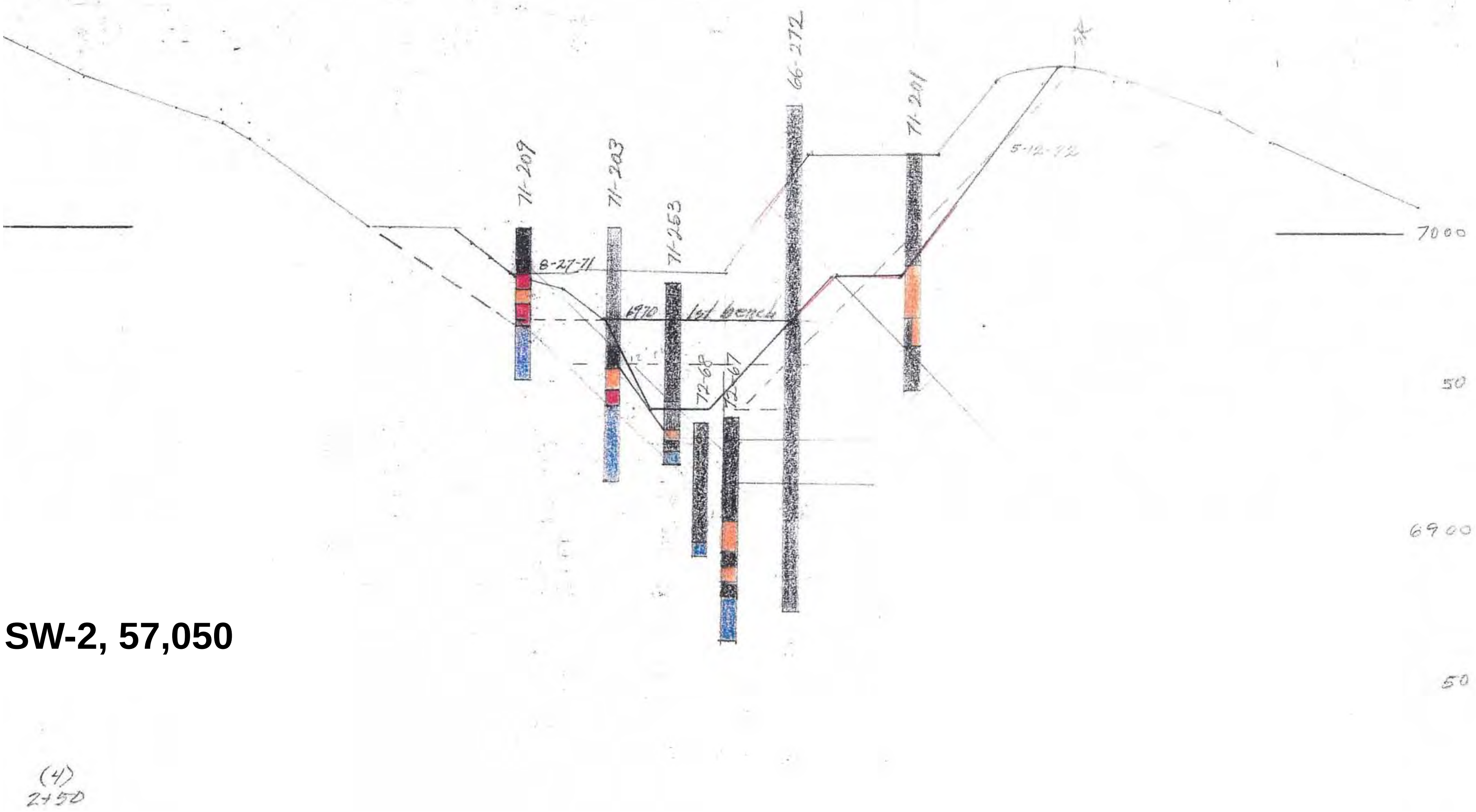

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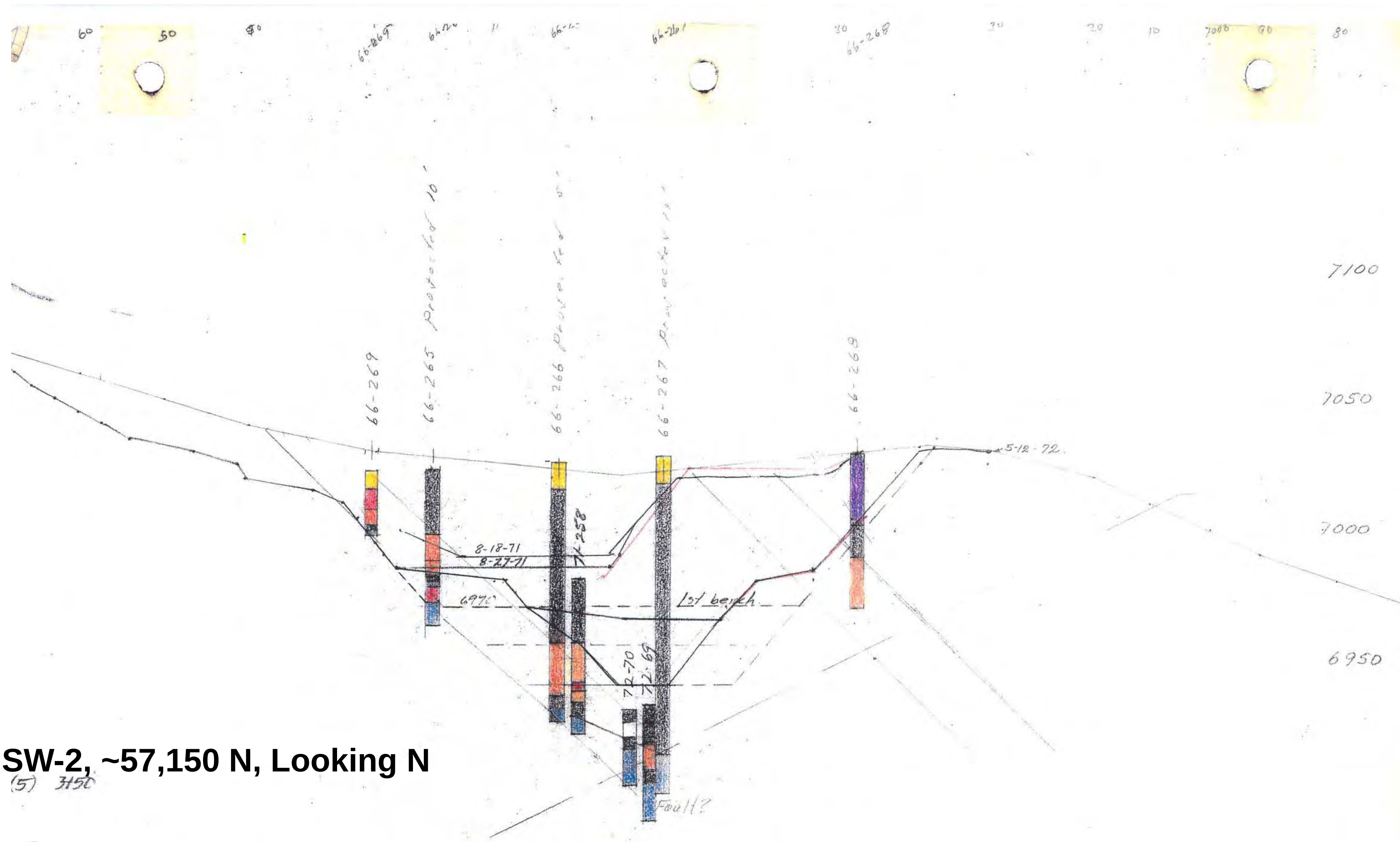

SW-2, ~57,150 N, Looking N

SW-2, ~57,170 N

J.R. Simplot Company Conda/Woodall Mountain Mine Pedro Creek Early Action		
Appendix A **SW-2 Cross-Sections**		
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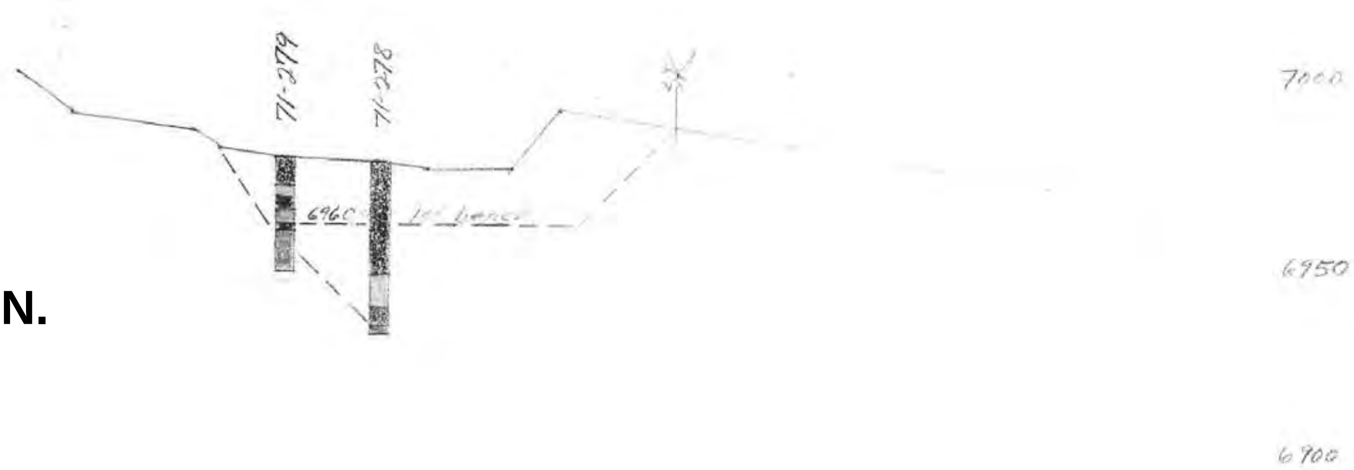

SW-2, ~57,300 N, Looking N.

J.R. Simplot Company
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Appendix A
SW-2 Cross-Sections

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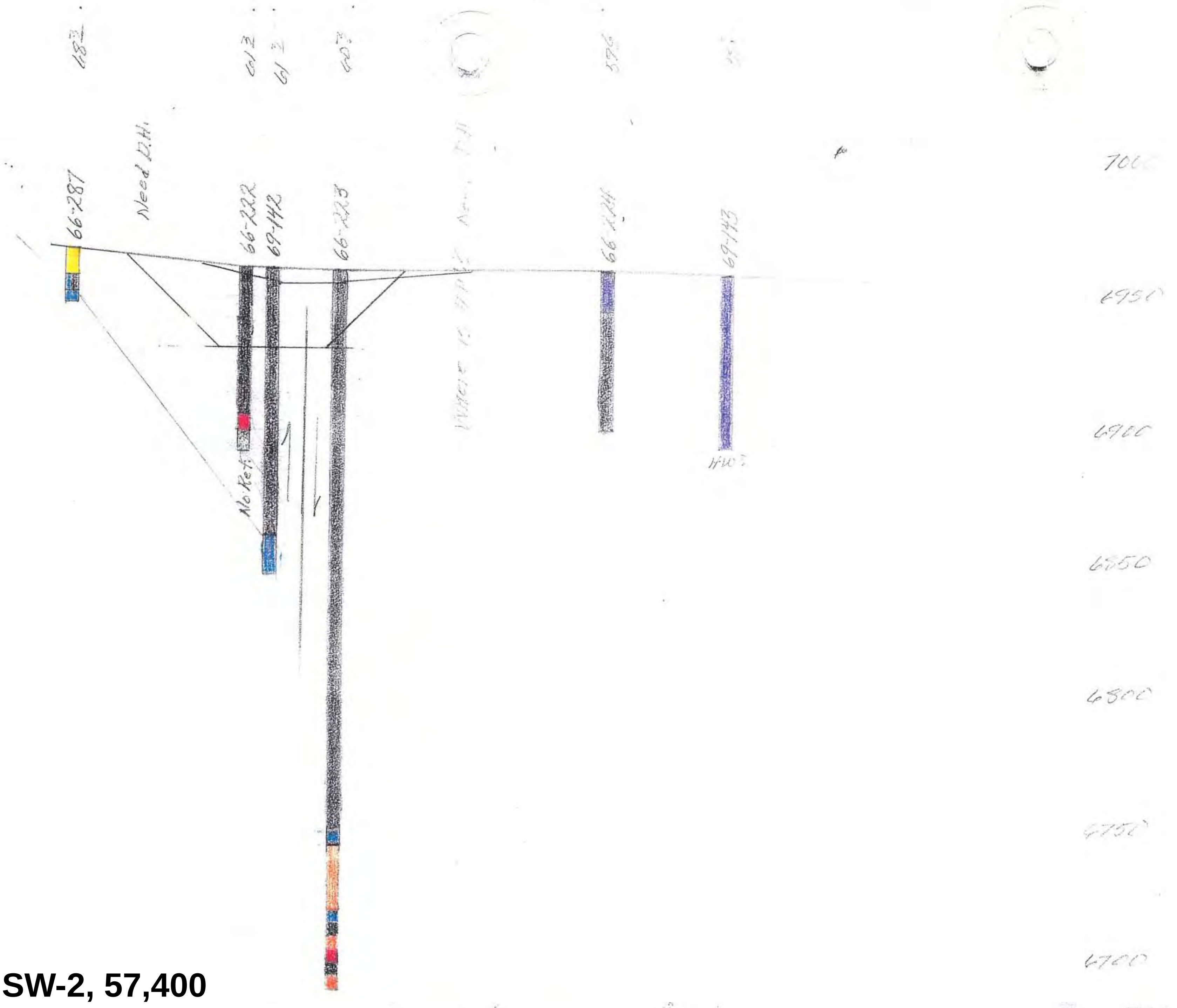

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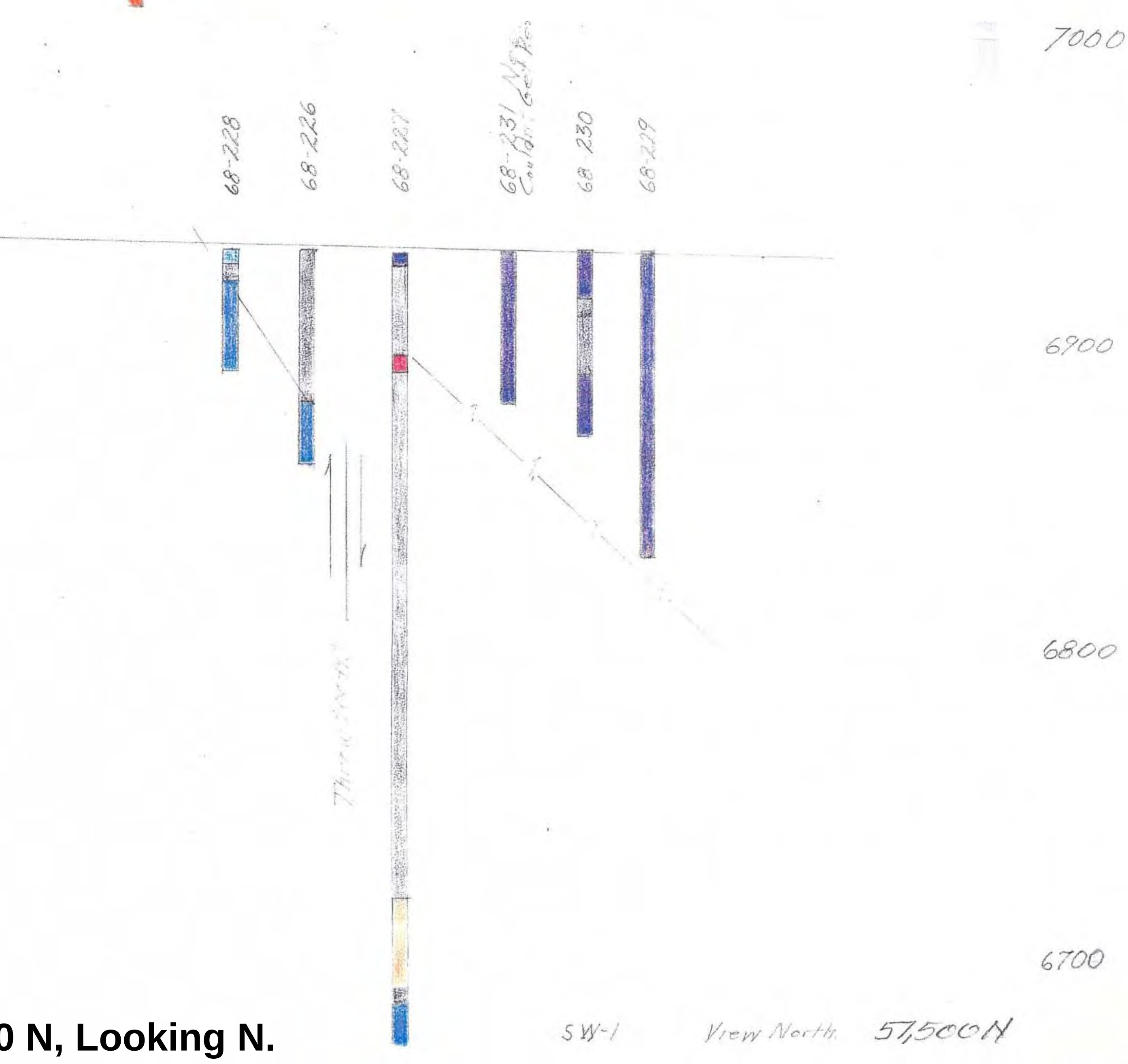

SW-2, ~57,500 N, Looking N.

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J.R. Simplot Company
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Appendix A
SW-2 Cross-Sections

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FORMATION ENVIRONMENTAL

APPENDIX B
DETAILED COST ESTIMATES

APPENDIX B
DETAILED COST ESTIMATES

This appendix provides discussion and supporting cost estimate tables for the removal action alternatives developed for the Pedro Creek ODA area. As detailed in the Engineering Evaluation/Cost Analysis (EECA) text, the removal action alternatives are:

- Alternative 1: No Action (as required for consideration by the NCP).
- Alternative 2: In-Place Consolidation/Regrading in Side Slope Area, with Direct Revegetation on Amended Overburden Materials on the ODA.
- Alternative 3: In-Place Consolidation/Regrading in Side Slope Area, with Soil Cover and Revegetation on the ODA.
- Alternative 4: In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Soil Cover and Revegetation on the ODA.
- Alternative 5: In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Thick ET Soil Cover and Revegetation on the ODA.
- Alternative 6: In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Geosynthetic-Soil Cover System and Revegetation on the ODA.

These cost estimates were developed consistent with procedures in the G*uide to Developing and Documenting Cost Estimates During the Feasibility Study* (EPA, 2000) and are expected to result in estimates that are within a range of -30 percent to +50 percent of what actual costs may be. The estimates include capital costs, operations and maintenance (O&M) costs, and periodic costs. These cost categories are described below.

B.1 Capital Costs

Capital costs are those expenditures that are required to design and construct a removal action. They exclude costs required to operate or maintain the action throughout its lifetime. Capital costs consist primarily of expenditures initially incurred to build or install the removal action (e.g., construction of a soil cover system and related site work). Capital costs include all labor, equipment, and material costs, including contractor markups such as overhead and profit, associated with activities such as mobilization/demobilization; monitoring; site work; and installation of cover systems. Capital costs also include expenditures for professional/technical services necessary to support construction of the removal action.

B.2 Annual O&M Costs

Operation and maintenance (O&M) costs are those post-construction costs necessary to ensure or verify the continued effectiveness of a removal action. These costs are typically estimated on an annual basis. Some EPA guidance documents refer to O&M as post-removal site control (PRSC). Annual O&M costs include all labor, equipment, and material costs, including contractor markups such as overhead and profit, associated with activities such as monitoring; and operating and maintaining revegetated cover systems. Annual O&M costs also include expenditures for professional/technical services necessary to support O&M activities.

For cost estimation, O&M activities are assumed to occur each year for a 30-year period. For Years 1-5, it is assumed that maintenance/additional revegetation will be performed each year as required in previously seeded areas. The annual maintenance revegetation cost, for Years 1-5, was estimated by assuming this would be required on 10-15% (average of 12.5%) of the total area at a revegetation unit cost of $2400 per acre, yielding a post-construction O&M revegetation unit rate for the entire area of $300 per acre. In addition, the cost for inspections in all areas was estimated by assuming an average inspection frequency of twice per year (annually and after severe storm events) with limited repair required. These inspection activities are assumed to occur on two days each year, at an estimated cost of $150 per day, for a total annual inspection cost of $300 per acre. Therefore, the total annual O&M cost for Years 1-5 is estimated at $600 per acre.

For Years 6-30, it is assumed that the additional revegetation activities of Years 1-5 will no longer be required, but inspections of all areas will occur at an average frequency of twice per year (annually and after severe storm events) with limited repair required. The annual O&M cost for Years 6-30 is assumed at $300/acre.

B.3 Periodic Costs

Periodic costs are those costs that occur only once every few years (e.g., five-year reviews, equipment replacement) or expenditures that occur only once during the entire O&M period or removal timeframe (e.g., site closeout, remedy failure/replacement). These costs may be either capital or O&M costs, but because of their periodic nature, it is more practical to consider them separately from other capital or O&M costs in the estimating process. For the Pedro Creek ODA area, none of the removal action alternatives entail periodic costs though routine review would be required as part of the O&M process.

B.4 Present Value Analysis

For each alternative, a -30 to +50 percent cost estimate is developed in accordance with procedures in the G*uide to Developing and Documenting Cost Estimates During the Feasibility Study* (EPA, 2000). Cost estimates for each alternative are based on conceptual engineering and design and are expressed in terms of 2009 dollars. This analysis is used to evaluate the capital, O&M, and periodic costs of a removal action alternative based on its present value. A present value analysis compares expenditures for various alternatives where those expenditures occur over different time periods. By discounting all costs to a common base year, the costs for different removal action alternatives can be compared based on a single cost figure for each alternative.

The total present value for a single alternative is equal to the full amount of all costs incurred through the end of the first year of operation, plus the series of expenditures in following years reduced by the appropriate future value/present value discount factor. This analysis allows the comparison of removal action alternatives on the basis of a single cost representing an amount that, if invested in the base year and disbursed as needed, would be sufficient to cover all costs associated with the removal action over its planned life. The present value calculations are based on the following fundamental equation:

$$P = F / (1+i)^n$$

Where: P = present worth ($)
F = future worth ($)
i = discount rate (%)
n = time period (years)

A discount rate of 7 percent is used for the present worth calculations, consistent with EPA guidance and directives (EPA, 1988 and 2000). The discount rate represents the anticipated difference between the rate of inflation and investment return.

B.5 Cost Estimates

Present value cost estimates for removal action alternatives are presented on Table B-1. Detailed cost estimate information for Alternatives 2 through 6 is presented on Tables B-2 through B-6, respectively. Note that the cost estimates presented in Tables B-2 through B-6 do not reflect present worth; the present value calculations are applied to the compilation of estimated costs presented on Table B-1.

Alternative 1 – No Action

- No costs are associated with the No Action alternative.

Alternative 2 – In-Place Consolidation/Regrading in Side Slope Area, with Direct Revegetation on Amended Overburden Materials on the ODA

- The area requiring clearing and grubbing is assumed to include the work area in the vicinity of the existing toe of the Pedro Creek ODA = 4 acres.
- The mass-waste area, north of the ODA, is excluded from this alternative.
- The regrading cut volume for overburden is estimated at 360,000 cy to achieve ODA side slopes at approximately 2:1 covering an area of 19 acres.
- The 2:1 slope will likely require benches to reduce the potential for erosion.
- Where pooling occurs in the area on the top of the ODA (top area) and upslope area, grade as needed to promote drainage and prevent pooling of rainfall and snowmelt water. A total of 4 acres is assumed for this minor grading in the top area and upslope area.
- Riprap, grouted riprap, or equivalent armored chutes are assumed for the regraded 2:1 slopes to convey higher velocity runoff in these areas. A total length of 2,000 feet is estimated.

- Unlined, vegetated ditches and swales will be constructed at the upper boundary of the ODA (adjacent to the road), above the upslope area, along the sides of the ODA, and along the toe of the ODA to control run-on and runoff in the ODA area. These ditches will be routed to Pedro Creek or other existing drainages. A total length of 6,000 feet is estimated.
- The top 12-18 inches of overburden will be amended with composted manure at a rate of 40-50 tons per acre. A total area of 23 acres will be treated with this amendment, including the new 2:1 slope regraded area, along with the regraded top area and upslope area.
- Vegetation will be seeded directly on the amended overburden materials. Species with low potential for selenium uptake will be used to control erosion and establish a diverse community of native species. The total acreage of seeding is estimated to be 23 acres (19 acres of new 2:1 slope and 4 acres in the top area and upslope area).
- Institutional/access controls are assumed to require $20,000 in costs to negotiate with private property owners and the BLM, and capital costs for replacement fencing to be installed around the seep and settlement basins (portions of the existing fencing will have to be removed to facilitate construction activities in the area), along with temporary fencing and other measures to limit cattle grazing in revegetation areas.

<u>Alternative 3 – In-Place Consolidation/Regrading in Side Slope Area, with Soil Cover and Revegetation on the ODA</u>

- The area requiring clearing and grubbing is assumed to include the area between the existing toe of the Pedro Creek ODA and the new toe location directly to the east = 5 acres.
- The mass-waste area, north of the ODA, is excluded from this alternative.
- The regrading cut volume for overburden is estimated at 800,000 cy to achieve ODA side slopes no steeper than 2.5:1 to 3:1 over an area of 36 acres. The cut volume will be used as fill in the exposed pit area south of the main pile and as compacted fill in the area downslope from the existing steep slopes between the existing toe and the new toe; the new toe will be located no closer than approximately 100 feet from the property boundary.
- The regraded slope will likely require benches to reduce the potential for erosion on the long slopes.
- Where pooling occurs in the area on the top of the ODA (top area) and upslope area, grade as needed to promote drainage and prevent pooling of rainfall and snowmelt water. A total of 4 acres is assumed for this minor grading in the top area and upslope area.
- Riprap, grouted riprap, or equivalent armored chutes are assumed for the regraded slopes to convey higher velocity runoff in these areas. A total length of 3,000 feet is estimated.
- Unlined, vegetated ditches and swales will be constructed at the upper boundary of the ODA (adjacent to the road), above the upslope area, along the sides of the ODA, and

along the toe of the ODA to control run-on and runoff in the ODA area. These ditches will be routed to Pedro Creek or other existing drainages. A total length of 6,000 feet is estimated.

- Cover soil will be placed at a thickness of 6 inches over the overburden materials in the regraded ODA (36 acres) and in regraded areas currently prone to pooling (4 acres). Soil cover, comprised of only non-seleniferous material, will be obtained from local sources.
- The borrow area(s) from which cover soil is obtained will be developed for the volume required and reclaimed at the completion of construction.
- Soil amendment with composted manure would not be required, but fertilizer and mulch would be included in revegetated areas.
- Vegetation will be seeded in the areas of cover soil placement. Species with low potential for selenium uptake will be used to control erosion and establish a diverse community of native species. The total acreage of seeding is estimated to be 40 acres.
- Institutional/access controls are assumed to require $20,000 in costs to negotiate with private property owners and the BLM, and capital costs for replacement fencing to be installed around the seep and settlement basins (portions of the existing fencing will have to be removed to facilitate construction activities in the area), along with temporary fencing and other measures to limit cattle grazing in revegetation areas.

<u>Alternative 4 – In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Soil Cover and Revegetation on the ODA</u>

- The area requiring clearing and grubbing is assumed to include the area between the existing toe of the Pedro Creek ODA and the new toe location directly to the east = 5 acres.
- The mass-waste area, north of the ODA, is excluded from this alternative.
- The regrading cut volume for overburden is estimated at 800,000 cy to achieve ODA side slopes no steeper than 2.5:1 to 3:1 over an area of 36 acres. The cut volume will be used as fill in the exposed pit area south of the main pile and as compacted fill in the area downslope from the existing steep slopes between the existing toe and the new toe; the new toe will be located no closer than approximately 100 feet from the property boundary.The regraded slope will likely require benches to reduce the potential for erosion on the long slopes.
- The flat/low gradient top area of the ODA, and upslope area, will be graded to promote drainage. A total regrading volume of 30,000 cy is assumed for these areas. The top area will be regraded to achieve a 5:1 to 10:1 slope gradient, and the upslope area to achieve a 3-5% slope gradient. A total of 34 acres is estimated for the grading in the top area and upslope area.
- Riprap, grouted riprap, or equivalent armored chutes are assumed for the regraded slopes to convey higher velocity runoff in these areas. A total length of 3,000 feet is estimated.

- Unlined, vegetated ditches and swales will be constructed at the upper boundary of the ODA (adjacent to the road), above the upslope area, along the sides of the ODA, and along the toe of the ODA to control run-on and runoff in the ODA area. These ditches will be routed to Pedro Creek or other existing drainages. A total length of 6,000 feet is estimated.
- An 18-inch soil cover will be placed on the main pile where slopes are regraded to 2.5:1 to 3:1, covering an area of approximately 36 acres. A 12-inch soil cover will be placed on the regraded top area and upslope area, covering an area of approximately 34 acres. Cover soil borrow areas are estimated at 2.5 miles (1 way) from the Pedro Creek ODA.
- Only non-seleniferous material would be used for the soil cover.
- The borrow areas from which cover soil is obtained will be developed for the volume required and reclaimed at the completion of construction.
- Soil amendment with composted manure would not be required, but fertilizer and mulch would be included in revegetated areas.
- Vegetation will be seeded on the cover soil areas of the ODA and on the top area and upslope area. Species with low potential for selenium uptake will be used to control erosion and establish a diverse community of native species. The total acreage of seeding is estimated to be 70 acres.
- Institutional/access controls are assumed to require $20,000 in costs to negotiate with private property owners and the BLM, and capital costs for replacement fencing to be installed around the seep and settlement basins (portions of the existing fencing will have to be removed to facilitate construction activities in the area), along with temporary fencing and other measures to limit cattle grazing in revegetation areas.

<u>Alternative 5 – In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Thick ET Soil Cover and Revegetation on the ODA</u>

- The area requiring clearing and grubbing is assumed to include the area between the existing toe of the Pedro Creek ODA and the new toe location directly to the east = 5 acres.
- The mass-waste area, north of the ODA, is excluded from this alternative.
- The regrading cut volume for overburden is estimated at 800,000 cy to achieve ODA side slopes no steeper than 2.5:1 to 3:1 over an area of 36 acres. The cut volume will be used as fill in the exposed pit area south of the main pile and as compacted fill in the area downslope from the existing steep slopes between the existing toe and the new toe; the new toe will be located no closer than approximately 100 feet from the property boundary.
- The regraded slope will likely require benches to reduce the potential for erosion on the long slopes.
- The flat/low gradient top area of the ODA, and upslope area, will be graded to promote drainage. A total regrading volume of 30,000 cy is assumed for these areas. The top area will be regraded to achieve a 5:1 to 10:1 slope gradient, and the upslope area to

achieve a 3-5% slope gradient. A total of 34 acres is estimated for the grading in the top area and upslope area.

- Riprap, grouted riprap, or equivalent armored chutes are assumed for the regraded slopes to convey higher velocity runoff in these areas. A total length of 3,000 feet is estimated.
- Unlined, vegetated ditches and swales will be constructed at the upper boundary of the ODA (adjacent to the road), above the upslope area, along the sides of the ODA, and along the toe of the ODA to control run-on and runoff in the ODA area. These ditches will be routed to Pedro Creek or other existing drainages. A total length of 6,000 feet is estimated.
- An ET soil cover system will be utilized for this alternative, and includes: 48 inches of cover soil and 3 inches of crushed chert capillary break. The ET soil cover system will be placed on the main pile where slopes are regraded to 2.5:1 to 3:1 and in the regraded top area and upslope area, covering a total of 70 acres (36 acres of the new 2.5:1 to 3:1 slopes and 34 acres of the regraded top area and in the upslope area). Cover soil sources are estimated at 2.5 miles (1 way) from the Pedro Creek ODA. Chert is available approximately 0.5 mile to the north of the ODA.
- Only non-seleniferous material would be used for the soil cover layer and chert material.
- The borrow areas from which cover soil and chert are obtained will be developed for the volume required and reclaimed at the completion of construction.
- Soil amendment with composted manure would not be required, but fertilizer and mulch would be included in revegetated areas.
- Vegetation will be seeded on the areas of the layered cover system. The total acreage of seeding is estimated to be 70 acres.
- Institutional/access controls are assumed to require $20,000 in costs to negotiate with private property owners and the BLM, and capital costs for replacement fencing to be installed around the seep and settlement basins (portions of the existing fencing will have to be removed to facilitate construction activities in the area), along with temporary fencing and other measures to limit cattle grazing in revegetation areas.

Alternative 6 – In-Place Consolidation/Regrading in Side Slope Area, Regrading in Top Area and Upslope Area, with Geosynthetic-Soil Cover System and Revegetation on the ODA

- The area requiring clearing and grubbing is assumed to include the area between the existing toe of the Pedro Creek ODA and the new toe location directly to the east = 10 acres.
- The mass-waste area, north of the ODA, is excluded from this alternative.
- The regrading cut volume for overburden is estimated at 1,800,000 cy to achieve ODA side slopes no steeper than 3:1 covering an area of 45 acres. The cut volume will be used as fill in the exposed pit area south of the main pile and as compacted fill in the area downslope from the existing steep slopes between the existing toe and the new toe; the new toe will be located no closer than approximately 100 feet from the property boundary.

- The regraded slope will likely require benches to reduce the potential for erosion on the long slopes.
- The flat/low gradient top area of the ODA, and upslope area, will be graded to promote drainage. A total regrading volume of 30,000 cy is assumed for these areas. The top area will be regraded to achieve a 5:1 to 10:1 slope gradient, and the upslope area to achieve a 3-5% slope gradient. A total of 25 acres is estimated for the grading in the top area and upslope area. The top area will likely require a crown with a back slope draining to a west run-on/runoff control ditch.
- Riprap, grouted riprap, or equivalent armored chutes are assumed for the regraded slopes to convey higher velocity runoff in these areas. A total length of 3,500 feet is estimated.
- Unlined, vegetated ditches and swales will be constructed at the upper boundary of the ODA (adjacent to the road), above the upslope area, along the sides of the ODA, and along the toe of the ODA to control run-on and runoff in the ODA area. These ditches will be routed to Pedro Creek or other existing drainages. A total length of 6,500 feet is estimated.
- A geosynthetic-soil cover system will be utilized for this alternative, and includes: a textured geomembrane (GM) such as a 40-mil LLDPE-T on the 3:1 side slopes with a non-woven geotextile (10 oz/sy) on top of the GM for puncture resistance followed by a 6-inch crushed chert drainage layer with a second non-woven geotextile for separation and a vegetated 12-inch soil cover. The liner system on the upslope and top area will be a smooth geomembrane with drainage layer and vegetated 12-inch soil cover. The area of 3:1 side slopes is estimated to cover 45 acres and the top area and upslope area cover approximately 25 acres. Cover soil sources are estimated at 2.5 miles (1 way) from the Pedro Creek ODA. Chert is available approximately 0.5 mile to the north of the ODA.
- Only non-seleniferous material would be used for the soil cover layer and chert capillary break.
- The borrow areas from which cover soil and chert are obtained will be developed for the volume required and reclaimed at the completion of construction.
- Soil amendment with composted manure would not be required, but fertilizer and mulch would be included in revegetated areas.
- Vegetation will be seeded on the cover system. The total acreage of seeding is estimated to be approximately 70 acres.
- Institutional/access controls are assumed to require $20,000 in costs to negotiate with private property owners and the BLM, and capital costs for replacement fencing to be installed around the seep and settlement basins (portions of the existing fencing will have to be removed to facilitate construction activities in the area), along with temporary fencing and other measures to limit cattle grazing in revegetation areas.

TABLE B-1
PRESENT VALUE OF REMOVAL ACTION ALTERNATIVES
PEDRO CREEK ODA EE/CA

Item	Notes	Start Year [1]	End Year [2]	Estimated Cost [3]	Present Value [4]
Alternative 2: Regrading to 2:1 with Surface Amendment					
Capital Costs	Table B-2	0	0	$2,412,026	$2,412,026
O&M Costs - Years 1-5 (post-construction)	Table B-2	1	5	$13,800	$56,583
O&M Costs - Years 6-30	Table B-2	6	30	$6,900	$57,331
Periodic Costs	Table B-2	0	0	$0	$0
Total Present Value					**$2,525,940**
Alternative 3: Regrading to 2.5:1 with Soil Cover					
Capital Costs	Table B-3	0	0	$5,062,472	$5,062,472
O&M Costs - Years 1-5 (post-construction)	Table B-3	1	5	$24,000	$98,405
O&M Costs - Years 6-30	Table B-3	6	30	$12,000	$99,706
Periodic Costs	Table B-3	0	0	$0	$0
Total Present Value					**$5,260,583**
Alternative 4: Regrading to 2.5:1, and Regrading in Top/Upslope Areas, with Soil Cover					
Capital Costs	Table B-4	0	0	$6,611,164	$6,611,164
O&M Costs - Years 1-5 (post-construction)	Table B-4	1	5	$42,000	$172,208
O&M Costs - Years 6-30	Table B-4	6	30	$21,000	$174,486
Periodic Costs	Table B-4	0	0	$0	$0
Total Present Value					**$6,957,858**
Alternative 5: Regrading to 2.5:1, and Regrading in Top/Upslope Areas, with ET Soil Cover					
Capital Costs	Table B-5	0	0	$11,315,606	$11,315,606
O&M Costs - Years 1-5 (post-construction)	Table B-5	1	5	$42,000	$172,208
O&M Costs - Years 6-30	Table B-5	6	30	$21,000	$174,486
Periodic Costs	Table B-5	0	0	$0	$0
Total Present Value					**$11,662,300**
Alternative 6: Regrading to 3:1, and Regrading in Top/Upslope Areas, with Soil/Chert/Geomembrane Cover System					
Capital Costs	Table B-6	0	0	$17,762,732	$17,762,732
O&M Costs - Years 1-5 (post-construction)	Table B-6	1	5	$42,000	$172,208
O&M Costs - Years 6-30	Table B-6	6	30	$21,000	$174,486
Periodic Costs	Table B-6	0	0	$0	$0
Total Present Value					**$18,109,426**

Notes:

For Present Value calculations, the Discount Rate used is…. 7%

Costs and Present Value are based on "constant" or "real" 2010 dollars not adjusted for future inflation.

Unless identified separately, burden and profits are included in unit costs.

(1) Start Year is the year during which the capital construction or the O&M activities begin. Costs are assumed to be incurred on the first day of the year indicated.

(2) End Year is the year during which the capital construction or the O&M activities are completed. Costs are assumed to be incurred on the first day of the year indicated.

(3) Capital Costs are totals for the activity, not annualized; Annual O&M Costs are annualized to represent one year only; Periodic Costs are one-time or repeating (not annual) costs.

(4) Present Value represents the total cost over the project life based on a discount rate applied to the estimated cost for each year after Year 0 (2010).

TABLE B-2
ALTERNATIVE 2
Regrading to 2:1 with Surface Amendment

Item	Notes	Quantity	Unit	Unit Cost	Total Cost
Capital Costs					
Direct Construction					
Clear and grub	a	4	acre	$3,900	$15,600
Regrade side slopes to 2:1 (incl compaction)	a, b	360,000	cy	$3.25	$1,170,000
Construct unlined, vegetated runon/runoff ditches	a, c	6,000	ft	$20	$120,000
Construct lined runoff chutes and stabilize gullies	a, c	2,000	ft	$50	$100,000
Amend existing overburden/soils	d	23	acre	$1,200	$27,600
Seed ODA area with vegetation, incl minor upslope	a	23	acre	$2,400	$55,200
Institutional controls	c	1	each	$20,000	$20,000
Direct Construction Subtotal					**$1,508,400**
Indirect Construction					
Mobilization/Demobilization	c	5%			$75,420
Water/Sediment Control	c	2.5%			$37,710
Indirect Construction Subtotal					$113,130
Construction Subtotal					**$1,621,530**
Contingencies					
Scope	e	15%			$243,230
Bid	e	10%			$162,153
Subtotal					$2,026,913
Project Management	e	5%			$101,346
Remedial Design	e	8%			$162,153
Construction Management	e	6%			$121,615
TOTAL CAPITAL COSTS					**$2,412,026**
Annual O&M Costs					
Maintenance of seeded areas + inspections (Yr 1-5)	f	23	acre	$600	$13,800
Inspections only (Years 6-30)	g	23	acre	$300	$6,900
TOTAL ANNUAL O&M COSTS - Years 1-5					**$13,800**
TOTAL ANNUAL O&M COSTS - Years 6-30					**$6,900**
TOTAL PERIODIC COSTS					**$0**

Notes

Volumes and areas were estimated based on grading plans developed from site topographic data (10-ft contour interval).

a Unit cost developed from RS Means data - 2009. Cat D11 dozers are assumed for large grading volume, at 400-500 cy/hr/dozer.
b Based on reduced productivity on steep slopes and compaction.
c Assumed values/professional judgment.
d Proposed in Smoky Canyon Mine EE/CA (2006) for Pole Canyon ODA.
e Based on EPA FS Cost Guidance.
f For Years 1-5, annual O&M is assumed to involve maintenance/additional revegetation as required in 10-15% of previously seeded areas, along with inspections of all areas an average of twice per year (annually and after severe storm events), at a cost of $150/acre per inspection, with limited repair required.
g For Years 6-30, annual O&M is assumed to involve inspections of all areas at an average frequency of twice per year (annually and after severe storm events), at a cost of $150/acre per inspection, with limited repair required.

TABLE B-3
ALTERNATIVE 3
Regrading to 2.5:1 with Soil Cover

Item	Notes	Quantity	Unit	Unit Cost	Total Cost
Capital Costs					
Direct Construction					
Clear and grub	a	5	acre	$3,900	$19,500
Regrade ODA materials to 2.5-3:1 (incl compaction)	b	800,000	cy	$3.15	$2,520,000
Construct unlined, vegetated runon/runoff ditches	a, c	6,000	ft	$20	$120,000
Construct lined runoff chutes and stabilize gullies	a, c	3,000	ft	$50	$150,000
Place 6-inch soil cover on ODA (36+4 ac)	a	32,000	cy	$7.20	$230,400
Seed ODA area with vegetation, incl minor upslope	a	40	acre	$2,400	$96,000
Reclaim borrow area (1)	c	1	each	$10,000	$10,000
Institutional controls	c	1	each	$20,000	$20,000
Direct Construction Subtotal					**$3,165,900**
Indirect Construction					
Mobilization/Demobilization	c	5%			$158,295
Water/Sediment Control	c	2.5%			$79,148
Indirect Construction Subtotal					$237,443
Construction Subtotal					**$3,403,343**
Contingencies					
Scope	d	15%			$510,501
Bid	d	10%			$340,334
Subtotal					$4,254,178
Project Management	d	5%			$212,709
Remedial Design	d	8%			$340,334
Construction Management	d	6%			$255,251
TOTAL CAPITAL COSTS					**$5,062,472**
Annual O&M Costs					
Maintenance of seeded areas + inspections (Yr 1-5)	e	40	acre	$600	$24,000
Inspections only (Years 6-30)	f	40	acre	$300	$12,000
TOTAL ANNUAL O&M COSTS - Years 1-5					**$24,000**
TOTAL ANNUAL O&M COSTS - Years 6-30					**$12,000**
TOTAL PERIODIC COSTS					**$0**

Notes

Volumes and areas were estimated based on grading plans developed from site topographic data (10-ft contour interval).

a Unit cost developed from RS Means data - 2009. Cat D11 dozers are assumed for large grading volume, at 400-500 cy/hr/dozer.
b Based on reduced productivity on steep slopes and compaction.
c Assumed values/professional judgment.
d Based on EPA FS Cost Guidance.
e For Years 1-5, annual O&M is assumed to involve maintenance/additional revegetation as required in 10-15% of previously seeded areas, along with inspections of all areas an average of twice per year (annually and after severe storm events), at a cost of $150/acre per inspection, with limited repair required.
f For Years 6-30, annual O&M is assumed to involve inspections of all areas at an average frequency of twice per year (annually and after severe storm events), at a cost of $150/acre per inspection, with limited repair required.

TABLE B-4
ALTERNATIVE 4
Regrading to 2.5:1 on Side Slopes, and Regrading of Top Area and Upslope Area, with Soil Cover

Item	Notes	Quantity	Unit	Unit Cost	Total Cost
Capital Costs					
Direct Construction					
Clear and grub	a	5	acre	$3,900	$19,500
Regrade ODA materials to 2.5-3:1 (incl compaction)	a,b	830,000	cy	$3.15	$2,614,500
Construct unlined, vegetated runon/runoff ditches	a, c	6,000	ft	$20	$120,000
Construct lined runoff chutes and stabilize gullies	a, c	3,000	ft	$50	$150,000
Place 18-inch soil cover on regraded ODA side slopes (36 ac)	a	87,000	cy	$7.20	$626,400
Place 12-inch soil cover on regraded top/upslope areas (34 ac)	a	55,000	cy	$7.20	$396,000
Seed ODA area with vegetation	a	70	acre	$2,400	$168,000
Reclaim borrow areas (2)	c	2	each	$10,000	$20,000
Institutional controls	c	1	each	$20,000	$20,000
Direct Construction Subtotal					**$4,134,400**
Indirect Construction					
Mobilization/Demobilization	c	5%			$206,720
Water/Sediment Control	c	2.5%			$103,360
Indirect Construction Subtotal					$310,080
Construction Subtotal					**$4,444,480**
Contingencies					
Scope	e	15%			$666,672
Bid	e	10%			$444,448
Subtotal					$5,555,600
Project Management	e	5%			$277,780
Remedial Design	e	8%			$444,448
Construction Management	e	6%			$333,336
TOTAL CAPITAL COSTS					**$6,611,164**
Annual O&M Costs					
Maintenance of seeded areas + inspections (Yr 1-5)	f	70	acre	$600	$42,000
Inspections only (Years 6-30)	g	70	acre	$300	$21,000
TOTAL ANNUAL O&M COSTS - Years 1-5					**$42,000**
TOTAL ANNUAL O&M COSTS - Years 6-30					**$21,000**
TOTAL PERIODIC COSTS					**$0**

Notes
Volumes and areas were estimated based on grading plans developed from site topographic data (10-ft contour interval).
- a Unit cost developed from RS Means data - 2009. Cat D11 dozers are assumed for large grading volume, at 400-500 cy/hr/dozer.
- b Based on reduced productivity on steep slopes and compaction.
- c Assumed values/professional judgment.
- e Based on EPA FS Cost Guidance.
- f For Years 1-5, annual O&M is assumed to involve maintenance/additional revegetation as required in 10-15% of previously seeded areas, along with inspections of all areas an average of twice per year (annually and after severe storm events), at a cost of $150/acre per inspection, with limited repair required.
- g For Years 6-30, annual O&M is assumed to involve inspections of all areas at an average frequency of twice per year (annually and after severe storm events), at a cost of $150/acre per inspection, with limited repair required.

TABLE B-5
ALTERNATIVE 5
Regrading to 2.5:1, and Regrading of Top Area and Upslope Area, with ET Soil Cover

Item	Notes	Quantity	Unit	Unit Cost	Total Cost
Capital Costs					
Direct Construction					
Clear and grub	a	5	acre	$3,900	$19,500
Regrade ODA materials to 2.5-3:1 (incl compaction)	b	830,000	cy	$3.15	$2,614,500
Construct unlined, vegetated runon/runoff ditches	a, c	6,000	ft	$20	$120,000
Construct lined runoff chutes and stabilize gullies	a, c	3,000	ft	$50	$150,000
Place 48-inch soil cover (70 ac)	a	452,000	cy	$7.20	$3,254,400
Place 3-inch chert capillary break (70 ac)	a	28,000	cy	$25	$700,000
Seed ODA area with vegetation	a	70	acre	$2,400	$168,000
Reclaim borrow areas (3)	c	3	each	$10,000	$30,000
Institutional controls	c	1	each	$20,000	$20,000
Direct Construction Subtotal					**$7,076,400**
Indirect Construction					
Mobilization/Demobilization	c	5%			$353,820
Water/Sediment Control	c	2.5%			$176,910
Indirect Construction Subtotal					$530,730
Construction Subtotal					**$7,607,130**
Contingencies					
Scope	d	15%			$1,141,070
Bid	d	10%			$760,713
Subtotal					$9,508,913
Project Management	d	5%			$475,446
Remedial Design	d	8%			$760,713
Construction Management	d	6%			$570,535
TOTAL CAPITAL COSTS					**$11,315,606**
Annual O&M Costs					
Maintenance of seeded areas + inspections (Yr 1-5)	e	70	acre	$600	$42,000
Inspections only (Years 6-30)	f	70	acre	$300	$21,000
TOTAL ANNUAL O&M COSTS - Years 1-5					**$42,000**
TOTAL ANNUAL O&M COSTS - Years 6-30					**$21,000**

TOTAL PERIODIC COSTS			**$0**

Notes

Volumes and areas were estimated based on grading plans developed from site topographic data (10-ft contour interval).

a Unit cost developed from RS Means data - 2009. Cat D11 dozers are assumed for large grading volume, at 400-500 cy/hr/dozer.

b Based on reduced productivity on steep slopes and compaction.

c Assumed values/professional judgment.

d Based on EPA FS Cost Guidance.

e For Years 1-5, annual O&M is assumed to involve maintenance/additional revegetation as required in 10-15% of previously seeded areas, along with inspections of all areas an average of twice per year (annually and after severe storm events), at a cost of $150/acre per inspection, with limited repair required.

f For Years 6-30, annual O&M is assumed to involve inspections of all areas at an average frequency of twice per year (annually and after severe storm events), at a cost of $150/acre per inspection, with limited repair required.

TABLE B-6
ALTERNATIVE 6
Regrading to 3:1, and Regrading of Top Area and Upslope Area, with Geosynthetic/Chert Drainage/Soil Cover System

Item	Notes	Quantity	Unit	Unit Cost	Total Cost
Capital Costs					
Direct Construction					
Clear and Grub	a	10	ac	$3,900	$39,000
Regrade ODA Materials to 3:1 & Compact	a,b	1,830,000	cy	$3.15	$5,764,500
Construct Unined, Vegetated Runoff Chutes	a,c	6,500	lf	$20	$130,000
Construct Lined Runoff Chutes and Stabilize Gullies	a,c	3,500	lf	$50	$175,000
Geomembrane 40-mil LLDPE-T; Side Slopes (45 ac)	d	2,000,000	sf	$0.45	$900,000
Geotextile - NW (10 oz/sy; 2 layers) (70 ac x 2)	a	680,000	sy	$2.10	$1,428,000
Geomembrane 40-mil LLDPE (top/upslope area) (25 ac)	d	1,100,000	sf	$0.40	$440,000
Crushed Chert Drainage Layer - 6" (70 ac)	a	56,000	cy	$25	$1,400,000
Place 12" Cover Soil (70 ac)	a	113,000	cy	$7.20	$813,600
Seed 12" Cover Soil (70 ac)	a	70	ac	$2,400	$168,000
Reclaim Borrow Areas (2)	c	2	each	$10,000	$20,000
Institutional controls	c	1	each	$20,000	$20,000
Direct Construction Subtotal					**$11,298,100**
Indirect Construction					
Mobilization/Demobilization	c	5%			$564,905
Water/Sediment Control	c	2.5%			$282,453
Indirect Construction Subtotal					$847,358
Construction Subtotal					**$12,145,458**
Contingencies					
Scope	e	15%			$1,821,819
Bid	e	10%			$1,214,546
Subtotal					$15,181,822
Project Management	e	5%			$759,091
Remedial Design	e	6%			$910,909
Construction Management	e	6%			$910,909
TOTAL CAPITAL COSTS					**$17,762,732**
Annual O&M Costs					
Maintenance of seeded areas + inspections (Yr 1-5)	f	70	acre	$600	$42,000
Inspections only (Years 6-30)	g	70	acre	$300	$21,000
TOTAL ANNUAL O&M COSTS - Years 1-5					**$42,000**
TOTAL ANNUAL O&M COSTS - Years 6-30					**$21,000**
TOTAL PERIODIC COSTS					**$0**

Notes
Volumes and areas were estimated based on grading plans developed from site topographic data (10-ft contour interval).
- a Unit cost developed from RS Means data - 2009. Cat D11 dozers are assumed for large grading volume, at 400-500 cy/hr/dozer.
- b Based on reduced productivity on steep slopes.
- c Assumed values/professional judgment.
- d Recent quotes from Northwest Linings.
- e Based on EPA FS Cost Guidance.
- f For Years 1-5, annual O&M is assumed to involve maintenance/additional revegetation as required in 10-15% of previously seeded areas, along with inspections of all areas an average of twice per year (annually and after severe storm events), at a cost of $150/acre per inspection, with limited repair required.
- g For Years 6-30, annual O&M is assumed to involve inspections of all areas at an average frequency of twice per year (annually and after severe storm events), at a cost of $150/acre per inspection, with limited repair required.

APPENDIX C
RESULTS OF WATER BALANCE CALCULATIONS USING
HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE (HELP) MODEL

Appendix C

Infiltration Estimates for Pedro Creek ODA

Removal Action Alternatives

C.1 Background

The existing Pedro Creek ODA is located at Simplot's Conda mine and covers approximately 28 acres, with additional adjacent areas also containing overburden. The ODA is on the east side of the Conda Site and is underlain by Dinwoody formation shales dipping to the east. The ODA has not been resloped or reclaimed, so it retains a flat top area with side slopes at the angle of repose or steeper due to erosion, with only sparse vegetation and deep erosion runnels. A seep is present near the toe of the ODA with flows that vary seasonally between 0.002 to 0.03 cubic feet per second (cfs).

The seep flow at the base of the ODA is believed to originate largely from the infiltration going through the ODA and adjacent overburden materials. Therefore, a water balance model is used to estimate reductions in the movement of infiltrated water, and potential elimination of the seep flow, resulting from possible removal action alternatives considered as part of the Pedro Creek ODA Engineering Evaluation/Cost Analysis (EE/CA).

In addition to the infiltration estimated through water balance modeling for the ODA surface, as described in this appendix, run-on from upgradient areas also infiltrates into the ODA under current (No Action) conditions. The average annual infiltration from upgradient areas was estimated by calculating the runoff generated from the upgradient areas to the west of the ODA. The Soil Conservation Service (SCS), now Natural Resources Conservation Service, curve number method was used to calculate runoff volume (presented by Haan et al. 1994).

An upgradient drainage area of 23.5 acres was estimated from topographic data. An average annual precipitation depth of 21 inches was applied to the area, and a runoff curve number of 75 was assumed based on poor quality moderate- to low-permeability soils, poor quality vegetation, and rangeland conditions. From this information, an annual runoff depth of 17.5 inches was calculated. For the 23.5-acre area, the annual runoff volume was calculated at 35 acre-feet. This represents current conditions of uncontrolled runoff infiltrating into the ODA. Removal action alternatives would each involve eliminating this source of infiltration into the ODA through the use of run-on control ditches.

C.2 Model Description

The U.S. Army Corps of Engineers (USACE) Hydrologic Evaluation of Landfill Performance (HELP) Model, version 3.07, was used to evaluate the water balance, including infiltration, for current conditions and for each of the removal action alternatives. The HELP model was developed by the USACE to conduct water balance analyses for landfills, cover systems, and other solid waste containment facilities (Schroeder et al., 1994). The HELP model requires weather and soil data and calculates the water balance taking into account the effects such as soil moisture storage, evapotranspiration (ET), vegetative cover area, vegetation root depth, and runoff potential. It can synthetically generate weather for up to 100 years based on monthly mean precipitation, temperature, and solar radiation. There are built-in coefficients for particular cities within the U.S. to aid in generating synthetic weather data which is adjusted based on existing site data; Pocatello is the closest city to the Site included in the model.

C.3 Model Inputs

The model inputs for comparison of infiltration differences for the Pedro Creek ODA removal action alternatives included climate, soil/material properties (i.e., hydraulic conductivity, porosity, etc), and cover characteristics as shown in Tables C-1, C-2, and C-3, respectively.

Input parameters for temperature and precipitation are presented in Table C-1. Mean monthly precipitation and temperature values for the Conda Site were entered manually and utilized internally by the HELP Model to synthetically generate daily data for use during model simulations. Other parameters were based on Pocatello but adjusted by the HELP Model to better represent the site.

Soil property input data (Table C-2) included porosity, field capacity, wilting point, and saturated hydraulic conductivity. For all material types the initial moisture content was assumed to be in steady state and was calculated by the HELP Model. The soil properties for the existing or amended overburden, Alternatives 1 and 2, respectively, were generally based on data utilized by Knight Piésold (2005) for HELP modeling performed for the Smoky Canyon Phosphate Mine site. For Alternatives 3, 4, 5, and 6, each involving different depths of local borrow materials placed over the overburden, the soil properties for the cover materials were also based on data utilized for previous HELP modeling performed by Knight Piésold (2005).

The hydraulic conductivity used for cover soil was similar to values from recent work in the Blackfoot Bridge area, whereas, hydraulic conductivities for chert and overburden are larger than those from Blackfoot Bridge work. Also, available water-holding capacities (field capacity minus wilting point) for cover soil, chert, and overburden are higher than values from recent work for Blackfoot Bridge. Reasons for these differences are likely related to spatial variability, though this cannot be determined without further information collection at the Pedro Creek ODA area; determination of hydraulic conductivity is planned as part of geotechnical data collection activities in the Pedro Creek ODA area.

Geomembrane materials, as infiltration barriers, include materials such as textured liners, for example, linear low-density polyethylene (LLDPE-T) or high-density polyethylene (HDPE-T). Hydraulic conductivity is estimated at a maximum of 1.0E-09 cm/sec. The hydraulic conductivitiy for geomembrane materials, used in Alternative 6, was set at this value to account for potentially reduced effectiveness, relative to the default HELP Model values, due to installation factors that could result in increased hydraulic conductivity.

Cover characteristics for the HELP Model simulations (Table C-3) were assigned based on the cover concepts for each alternative. The HELP Model utilized input data for the surface material, vegetation quality, and evaporative zone depth, along with internal data including the Leaf Area Index (LAI), the start and end of the growing season, average annual wind speed, average quarterly relative humidity, to calculate ET. Runoff was estimated based on SCS runoff curve numbers that were assigned based on the surface material, vegetation cover, and slope gradient.

C.4 Model Output

Simulations of the water balance for the alternatives resulted in output for runoff, ET, and percolation into the overburden, as briefly summarized in Table C-4 and listed on the attached output file printouts for the cover conditions simulated for No Action and Alternatives 2 through 6. These results are based on simulation over a 100-year period using model generated daily weather conditions. The water balance for a given cover is calculated on a daily basis, accounting for rainfall, runoff, evapotranspiration, stored water in the ET zone, and percolation through the ET zone. The model also utilizes daily air temperature and soil temperature to simulate conditions below freezing. Results are also presented in Table C-5 for average annual volume (acre-feet) and for the percentage reduction in infiltration into the overburden, for comparison of the effects of each alternative relative to existing condtions.

C.5 References

Haan, C.T., B.J. Barfield and J.C. Hayes. 1994. *Design Hydrology and Sedimentology for Small Catchments*. Academic Press, San Diego, California.

Knight Piésold and Co., 2005. JBR Environmental Consultants, Inc. - HELP Model Analyses – Smoky Canyon Mine Panels F and G - Caribou County, Idaho. Project DV10200174.01. Prepared for JBR Consultants, Inc., August 11.

Schroeder, P.R., T.S. Dozier, P.A. Zappi, B.M. McEnroe, J.W. Sjostrom, and R.L. Peyton. 1994. The Hydrologic Evaluation of Landfill Performance (HELP) Model: Engineering Documentation for Version 3. EPA/600/R-94/168b. U.S. Environmental Protection Agency Office of Research and Development, Washington, D.C. September.

Table C-1
Climate Input Parameters

Month	Mean Monthly Data for Conda Site (1971-2000)	
	Precipitation (inches)	Temperature (deg. F)
January	2.25	19.0
February	1.97	21.1
March	2.06	27.7
April	1.74	36.6
May	1.86	47.4
June	1.41	56.6
July	1.21	63.3
August	1.42	61.2
September	1.47	51.1
October	1.70	41.5
November	1.82	28.5
December	2.26	19.4

Other Parameters (Assigned by Model Based on Site Location):

Parameter	Value
Solar Radiation	Varies with time
Start of Growing Season (Julian Date)	150
End of Growing Season (Julian Date)	240
Average Annual Wind Speed (miles/hour)	10.1
Average 1st Quarter Relative Humidity (%)	72
Average 2nd Quarter Relative Humidity (%)	53
Average 3rd Quarter Relative Humidity (%)	44
Average 4th Quarter Relative Humidity (%)	62

Table C-2
Material Properties

Material Type	Soil/Material Properties [1]				Initial Soil Water Content
	Hydraulic Conductivity, K (cm/sec)	Porosity (vol/vol)	Field Capacity (vol/vol)	Wilting Point (vol/vol)	
Cover Soil	8.9E-05	0.491	0.354	0.238	Model Calculated
Chert (backfill, drain layer, capillary break)	2.0E-02	0.238	0.162	0.056	Model Calculated
Geomembrane [2]	1.0E-09	Not applicable for geomembrane liner			
Overburden	2.60E-02	0.365	0.239	0.102	Model Calculated

[1] Soil/material properties are generally based on data utilized by Knight Piésold (2005) for HELP modeling performed for the Smoky Canyon Phosphate Mine site. The hydraulic conductivity used for cover soil is similar to values from recent work in the Blackfoot Bridge area, whereas, hydraulic conductivities for chert and overburden are larger than those from Blackfoot Bridge work. Also, available water-holding capacities (field capacity minus wilting point) for cover soil, chert, and overburden are higher than values from recent work for Blackfoot Bridge. Reasons for these differences are likely related to spatial variability, though this cannot be determined without further information collection at the Pedro Creek ODA area; determination of hydraulic conductivity is planned as part of geotechnical data collection activities in the Pedro Creek ODA area.

[2] Geomembrane materials, used as infiltration barriers, include textured liners LLDPE-T (or HDPE-T), etc. Hydraulic conductivity (K) is estimated at a maximum of 1.0E-09 cm/sec, though K may be lower for some materials.

Table C-3.
Cover Characteristic Input Parameters

ODA Setting	Location in ODA	Simulated Cover	Slope Gradient (horizontal: vertical)	Evaporative Zone Depth (inches)	Vegetation Quality	SCS Curve Number (from USDA Soil Conservation Service) [a]
Current Conditions	Side Slope Area	existing conditions, no action taken	1.5:1	12	poor	85
	Top Area		0	12	poor	0 (no runoff) [b]
	Upslope Area		0	12	poor	0 (no runoff) [b]
Alternative 2	Side Slope Area	amended overburden	2:1	12	fair	82
	Top Area		0	12	fair	80
	Upslope Area		0	12	fair	80
Alternative 3	Side Slope Area	6-inch cover soil on overburden	2.5:1	6	fair	80
	Top Area		0	6	good	70
	Upslope Area		0	6	good	70
Alternative 4	Side Slope Area	18-inch cover soil on overburden	2.5:1	18	good	80
	Top Area	12-inch cover soil on overburden	5:1 to 10:1	12	good	74
	Upslope Area		20:1 to 30:1	12	good	74
Alternative 5	Side Slope Area	48-inch cover soil on overburden	2.5:1	48	good	80
	Top Area		5:1 to 10:1	48	good	74
	Upslope Area		20:1 to 30:1	48	good	74
Alternative 6	Side Slope Area	12-inch cover soil over chert drain layer and geomembrane liner on overburden	3:1	12	good	80
	Top Area		5:1 to 10:1	12	good	74
	Upslope Area		20:1 to 30:1	12	good	74

Removal Action Alternatives are defined as follows:

2 - In-Place Consolidation/Regrading in Side Slope Areas, with Direct Revegetation on Amended Overburden Materials on the ODA

3 - In-Place Consolidation/Regrading in Side Slope Areas, with Soil Cover and Revegetation on the ODA

4 - Alternative 3 Grading plus Increased Soil Cover in Side Slope Areas and Regrading of Top Area and Upslope Area, with Soil Cover and Revegetation on the ODA

5 - Alternative 4 Grading plus ET Soil Cover and Revegetation

6 - In-Place Consolidation/Regrading with Soil Cover and Revegetation, Drainage Layer, and Geomembrane Liner

[a] Curve Numbers are estimated from information presented in Appendix 3C (tables from the USDA-Soil Conservation Service) of Haan et al. (1994) along with engineering judgment.

[b] For current conditions, a Curve Number of zero reflects the existing condition of pooling on the surface with no runoff.

Table C-4.
HELP Model Output for Removal Action Alternatives

ODA Setting	Location in ODA	Simulated Cover	Slope Gradient (horizontal: vertical)	Average Annual Depth (inches)		
				Surface Runoff	Evapo-transpiration	Percolation in Overburden
Current Conditions	Side Slope Area	existing conditions, no action taken	1.5:1	6.1	10.1	4.9
	Top Area		0	5.5	10.0	5.7
	Upslope Area		0	5.5	10.0	5.7
Alternative 2	Side Slope Area	amended overburden	2:1	6.1	10.1	5.0
	Top Area		0	6.1	10.1	5.0
	Upslope Area		0	6.1	10.1	5.0
Alternative 3	Side Slope Area	6-inch cover soil on overburden	2.5:1	7.1	10.8	3.3
	Top Area		0	6.9	10.8	3.4
	Upslope Area		0	6.9	10.8	3.4
Alternative 4	Side Slope Area	18-inch cover soil on overburden	2.5:1	6.2	13.7	1.3
	Top Area	12-inch cover soil on overburden	5:1 to 10:1	6.1	12.8	2.2
	Upslope Area		20:1 to 30:1	6.1	12.8	2.2
Alternative 5	Side Slope Area	48-inch cover soil on overburden	2.5:1	5.3	15.5	0.3
	Top Area		5:1 to 10:1	3.8	16.7	0.7
	Upslope Area		20:1 to 30:1	3.8	16.7	0.7
Alternative 6	Side Slope Area	12-inch cover soil over chert drain layer and geomembrane liner on overburden	3:1	6.5	12.9	0.02
	Top Area		5:1 to 10:1	6.1	13.0	0.08
	Upslope Area		20:1 to 30:1	6.1	13.2	0.2

Note: Infiltration estimates developed by the HELP Model cannot account for run-on from the area above Upslope Area (35 ac-ft/yr). This should be taken into account when interpreting the results of the HELP Model because Alternatives 2-6 include run-on control whereas Alternative 1 does not include run-on control.

[a] For Alternatives 1-5, precipitation is the input to the water balance simulated by the HELP model, and surface runoff, evapotranspiration, and percolation are outputs. For Alternative 6, lateral drainage is an additional output (at approximately 1.6 inches per year) due to the use of a chert drain layer. The set of output values for each alternative (for a given location in the ODA) are additive and equal to the precipitation depth (i.e., input value).

Table C-5.
Infiltration Volume Summary

ODA Setting	Location in ODA	Simulated Cover	Slope Gradient (horizontal: vertical)	Conditions Represented by Areas (acres) [a]						Average Annual Percolation Volume (acre-feet)	Percent Reduction (relative to No Action)
				No Action	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6		
Current Conditions	Run-on from Upgradient Areas [b]	existing conditions, no action taken	---	---						35.0	---
	Side Slope Area		1.5:1	33.4	0	0	0	0	0	13.8	
	Top Area		0	22.4	0	0	0	0	0	10.6	
	Upslope Area		0	14.2	0	0	0	0	0	6.7	
Alternative 2	Side Slope Area	amended overburden	2:1	14.4	19	0	0	0	0	13.8	53%
	Top Area		0	20.4	2	0	0	0	0	10.5	
	Upslope Area		0	12.2	2	0	0	0	0	6.6	
Alternative 3	Side Slope Area	6-inch cover soil on overburden	2.5:1	0	0	36	0	0	0	9.9	62%
	Top Area		0	17.8	0	2	0	0	0	9.0	
	Upslope Area		0	12.2	0	2	0	0	0	6.3	
Alternative 4	Side Slope Area	18-inch cover soil on overburden	2.5:1	0	0	0	36	0	0	3.8	85%
	Top Area	12-inch cover soil on overburden	5:1 to 10:1	0	0	0	19.8	0	0	3.7	
	Upslope Area		20:1 to 30:1	0	0	0	14.2	0	0	2.7	
Alternative 5	Side Slope Area	48-inch cover soil on overburden	2.5:1	0	0	0	0	36	0	0.9	96%
	Top Area		5:1 to 10:1	0	0	0	0	19.8	0	1.2	
	Upslope Area		20:1 to 30:1	0	0	0	0	14.2	0	0.8	
Alternative 6	Side Slope Area	12-inch cover soil over chert drain layer and geomembrane liner on overburden	3:1	0	0	0	0	0	44.6	0.1	99%
	Top Area		5:1 to 10:1	0	0	0	0	0	11.2	0.1	
	Upslope Area		20:1 to 30:1	0	0	0	0	0	14.2	0.3	

[a] A total area of 70 acres, based on the estimated final footprint following completion of a removal action, is used for infiltration volume calculations under current conditions and Alternatives 2-6.
[b] Run-on from upgradient areas (current conditions) is estimated using the runoff curve number. Percent reduction values for Alternatives 2-6 include elimination of 35.0 acre-feet/year of uncontrolled run-on.

APPENDIX D
Comments and Comments Responses to the Draft Pedro Creek Overburden Disposal Area Early Action Engineering Evaluation and Cost Analysis

Concerns regarding Responses to Previous Comments

1) Response to Draft Comment # 11

The text should describe the fence that Simplot is currently planning in the vicinity of Pedro Creek that will restrict livestock access to the ODA. In addition, see Specific Comment # 11.

Response to Comment: The last sentence of the first paragraph in Section 2.4 describes that Simplot is in the process of installing new fencing along the perimeter of the Conda Mine to help with management of Site access. However, the following text will be added to the second paragraph following the second sentence:

"The new fencing along the Site perimeter will restrict access to the closed grazing allotments within the Pedro Creek ODA."

Resolution: The text will added to the second paragraph following the second sentence was revised to the following:

"The new perimeter fencing will restrict access to the impacted areas on the grazing allotments within the Pedro Creek ODA."

2) Response to Comment # 63

The Agencies' previously commented on the Draft version of this document that this section should include a discussion of the differences among the alternatives in terms of meeting ARARs. The discussion of ARARs was not included in the Draft Final version of the document. A subsection should be added under the Effectiveness section to address the differences among the alternatives in terms of the potential to meet ARARs.

Response to Comment: The following edits are proposed to address the comment:

a) Edit to last sentence in Section 5.1:

"If chemical-specific <u>or location-specific</u> ARARs are not achieved by the Early Action, then additional actions to meet these ARARs will be evaluated in the RI/FS."

b) Subsection added to Sections 6.2.2.1, 6.2.3.1, 6.2.4.1, 6.2.5.1 and 6.2.6.1:

"Compliance with ARARs – Reduction of water infiltration into the ODA will lessen the release of COPCs to groundwater and surface water and will contribute toward meeting chemical-specific ARARs (in particular surface water and groundwater quality standards). The alternative can be designed to meet action-specific ARARs during implementation. The action will also contribute to meeting the requirements of the Federal Land Policy and Management Act of 1976, in particular multiple use including livestock grazing. As noted above, revegetating the surface with plant species with low potential for selenium uptake and maintaining the vegetation is expected to be effective in reducing risks to grazing livestock over the long term. Post-construction monitoring would be implemented to assess progress toward compliance with chemical- and location-specific ARARs and any additional actions required to meet these ARARs will be evaluated in the FS."

c) Subsection 7.1.2 Compliance with ARARs has been added to comparative analysis, and includes the following language:

"Reduction of water infiltration into the ODA will reduce the release of COPCs to groundwater and surface water and will contribute toward meeting chemical-specific ARARs (in particular surface water and groundwater quality standards). The greater the reduction of infiltration onto the ODA, the greater the contribution to meeting standards (see Section 7.1.1 for the relative performance of each alternative). Actions under each of the alternatives will also contribute to meeting the requirements of the Federal Land Policy and Management Act of 1976, in particular for multiple uses including livestock grazing. As noted above, revegetating the surface with plant species with low potential for selenium uptake and maintaining the vegetation is expected to be effective in reducing risks to grazing livestock over the long term. Post-construction monitoring would be implemented to assess progress toward compliance with chemical- and location-specific ARARs and any additional actions required to meet these ARARs will be evaluated in the FS."

3) Response to Draft Comment # 82

The institutional control cost was not increased from $5000 in the cost estimates as requested. Please modify the document according to the response.

Response to Comment: The document will be modified accordingly. A revised institutional control cost of $20,000 will be used for the estimated cost that includes negotiation with private property owners and the BLM, along with capital costs.

4) Response to Draft Comment # 90(d)

Comment 90) d) states that *"...sensitivity runs should be considered using somewhat higher hydraulic conductivity values that may be more reasonably achieved (based on Smoky Canyon findings) for Alternative 5, with accompanying explanation in the text."* Simplot's initial response to comment 90) d) states *"The sensitivity to hydraulic conductivity will be assessed and discussed, as requested."* It does not appear that Simplot has addressed this comment as stated. There is no reference in the text discussion in Section 6 of the EE/CA nor in the text of Appendix C. Table C-2 has been altered removing the Dinwoody/Salt Lake Soil line completely from the February 2010 version of the EE/CA and eliminating the language in note 2. The May 2010 version of Table C-2 has a lengthy explanation of the use of hydraulic conductivities in the HELP model. A sensitivity study is not addressed nor is there an explanation body of text in the EE/CA document. Please provide the sensitivity study and description in the text.

Response to Comment: Draft Comment #90(d) questioned the hydraulic conductivity estimated for compacted Dinwoody (1.0E-06 cm/s) when used as a lower permeability layer below the soil cover. At the time when the comment was prepared, Simplot planned to perform sensitivity analysis of hydraulic conductivity to reflect somewhat higher hydraulic conductivity values that may be more reasonably achieved (based on Smoky Canyon findings). However, upon further review and refinement of the alternatives during preparation of the draft final EE/CA, Simplot eliminated use of compacted Dinwoody below the soil cover. Therefore, a sensitivity analysis was no longer needed for the compacted material.

General Comments

1) (a) BLM has concerns regarding Simplot's preferred Alternative 4. The concerns regard the actual effectiveness of the alternative and the analysis that went into developing and modeling the effectiveness of the alternative. Based on the analysis performed, after eliminating the run-on from the upgradient areas, the cover will only reduce infiltration by 67% from the current ODA condition. Alternative 5 would provide a 90% reduction. Given that only 12 inches of cover material would be placed on the flatter areas of the ODA, BLM has questions whether a 67% reduction would even be achieved. BLM would like to see more information to support this.

(b) BLM also questions why only 12 inches of cover soil is proposed on the top area and upslope area, but 18 inches is proposed for the slopes. It would seem that a greater amount of infiltration would occur on the flatter areas than on the slopes, especially since the majority of the slopes are north or east facing. Please provide more information on the reasoning behind this design.

(c) The discussion of effectiveness of Alternative 4 states that the cover design is expected to be effective in reducing plant uptake of selenium and risks to grazing livestock and to ecological receptors. Because BLM desires to return the area to future grazing, long-term protection against plant uptake is of great interest. BLM views with great skepticism that a cover of only 12-18 inches will protect against plant uptake at levels that will pose an unacceptable risk to ecological receptors/livestock over the long-term. 12-18 inches will not prevent rooting of plants into the overburden material. The effectiveness discussion states that long-term effectiveness would be achieved by sampling vegetation and modifying as necessary to keep selenium concentrations below remedy goals. This might be a short-term solution, but it is not a reasonable long-term solution. The text should explain and clarify why Simplot believes the proposed design adequately mitigates this exposure pathway.

(d) An extensive amount of work at Smoky Canyon Mine went into developing covers for Panel B as well as covers for future Panels F and G. It is recommended that the Smoky Canyon research be carried over to Conda before spending $7 million dollars on a cover that may not be effective in accomplishing the removal action objectives. For Smoky Canyon Panel B, as well as, Panels F &G, a cover thickness of 5-6 feet was determined to address the issue of plant uptake. Since Simplot is proposing only 12-18 inches for Pedro Creek ODA, please provide information to support this large reduction in cover thickness and how this will be protective against plant uptake.

Response to General Comment 1: It is important to note that the process for evaluating non-time-critical removal actions under CERCLA is intended to select the most appropriate and cost-effective removal action for the specific circumstances at individual sites. Therefore, the evaluation of non-time-critical removal actions at sites with differing circumstances could result in alternatives that are different yet are best suited to meet specific objectives.

Consistent with the EE/CA guidance under CERCLA, the alternatives developed for the potential Early Action at the Pedro Creek ODA appropriately considered specific conditions at the ODA and the Conda Mine as a whole (e.g., average annual precipitation, goals for infiltration reduction and availability of materials for reclamation at an inactive mine, etc.). The mining plan developed for Panels B, F and G at Smoky Canyon was selected based on the EIS process considering specific conditions for each panel. The EIS process was appropriately followed and developed a closure plan based on the availability of materials during active mining and goals for minimizing infiltration through seleniferous overburden to reduce releases and transport of selenium to nearby springs and creeks. The closure plan was not selected through the CERCLA process, for a situation where active mining has ended, as is the case for Pedro Creek.

The cover systems evaluated are intended to minimize infiltration into the overburden material while providing a clean growth medium for vegetation and reduce average plant-selenium concentrations. Within the setting of the Conda Mine, the combination of cover and revegetation with appropriate non-selenium accumulating plant species will meet the objective for grazing. Increasing the quantity of materials for a cover system has negative impacts on borrow areas (currently estimated at 30 to 40 acres for Alternative 4 and 100 to 110 acres for Alternative 5) and entails additional short-term risks. Therefore, as documented in the EE/CA, and discussed further below, the CERCLA analysis for the potential early action at the Pedro Creek ODA balances performance against short-term impacts and cost.

Alternative Development - The alternatives developed represent a comprehensive range of options which were evaluated as to how they meet the Early Action objectives with respect to implementability, effectiveness and cost.

The removal action alternatives developed for the Pedro Creek ODA include single and multi-layer cover systems with thicknesses of 6, 12, 18, and 51 inches. The cover systems proposed considered site-specific circumstances including:

- Access to cover material (i.e., top soil, low permeability soils, coarse-grained soils);
- Haul distance to borrow areas;
- Size of borrow areas needed;
- Factors currently contributing to infiltration (i.e., large areas of pooling, flat areas, negatively slope benches);
- Improved drainage following in-place consolidation (i.e., 5:1 to 10:1 slopes for top areas, and 2.5:1 to 3:1 slopes on the sides);
- Selenium concentration in the typical reclamation plant species growing directly on overburden material at Conda ODAs; and

- Portion of the Pedro Creek ODA forming part of the currently closed BLM grazing allotments (approximately 30 acres of BLM lands) relative to the overall size of the grazing allotments east of Woodall Mountain in un-disturbed areas (approximately 545 acres).

Significant reduction of risks for all pathways is provided by the combined effects of the components forming part of the alternative. Improved drainage promoted by the regrade and water-management controls increases runoff and reduces infiltration. The low permeability of the cover system also increases runoff and reduces infiltration, while it's fine-grained property keeps infiltrated moisture in the cover and out of the gravelly overburden material.[1] The clean cover soil and non-selenium accumulator plant species, reduces the average selenium concentration in vegetation. To assess potential effectiveness of infiltration reduction and plant uptake of selenium relative to existing conditions, the benefits of water-management controls, the cover system, and plant-species composition must be considered together, not separate.

Effectiveness of Infiltration Reduction – Infiltration estimates were made using the HELP model, which is the industry standard. Additional information regarding the model set up and runs has been provided, per comments on Appendix C, below. The model estimates that the 12 to 18 inch cover of Alternative 4 would provide for 85 percent reduction in infiltration over current conditions, through improved drainage (e.g., proper sloping low-permeability cover, and removal of the large areas of pooling and negatively-sloped benches) and moisture retention in the cover (i.e., minimizing percolation into the overburden). Alternative 4 provides this significant amount of reduction in infiltration, compared to existing conditions, at a cost of approximately $6.8 million. Alternative 5, with 51 inches of soil cover and the same water-management controls, would only provide an additional 11 percent of reduction but at significant higher cost ($11.7 million).

Increasing the thickness of the proposed cover systems (e.g., to a thickness similar to the Smoky panel B cover) to achieve additional reduction in infiltration will significantly increase cost and reduce cost effectiveness. In addition, it would entail significant negative short-term impacts, including:

- Increase in potential adverse environmental impacts as a result of construction and implementation (e.g., larger borrow areas needed to provide cover material, more material needed to reclaim borrow areas, and additional excavation[2] necessary during consolidation);
- Increase in short-term risks to workers; and

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[1] The capillary forces hold the water in the finer-grained layer and minimize percolation into the coarse-grained overburden material.

[2] Deeper overburden material in the pile is expected to be less weathered than the surface of the ODA. Therefore, disturbance of the deeper overburden material, and exposure to the elements, could result in additional releases.

- Increase in short-term release of selenium from ODA material exposed to the elements during implementation.

Important factors to keep in mind with respect to infiltration reduction are:

- Most of the infiltration into the ODA results from poor drainage and pooling areas atop the ODA;
- Releases from the main pile travel along the steep contact with the underlying Rex Chert and weathered Dinwoody and get channeled by the draw;
- Average selenium concentrations (0.03 mg/L) in the uppermost aquifer capable of functioning as a domestic or industrial water supply (i.e., Dinwoody Formation) are below MCL (0.05 mg/L); and
- Selenium concentrations in the shallow alluvium/colluvium groundwater would decrease as a result of reduced seepage from the ODA and increased mixing with clean runoff.

The thickness of the soil cover proposed for the side slopes was increased from 12 to 18 inches to provide additional protection against initial erosion and potential for the uncovering of overburden material along cattle trails across the pile, rather than due to infiltration considerations. The text will be revised to clarify the placement of 18 inches of soil cover on the side slopes.

Effectiveness of Reduction in Average Plant Uptake – Selenium concentrations in vegetation is dependent on the plant species, soil, environment, and the fraction of bio-available selenium in soils for uptake (Mackowiak and Amacher 2005). A soil-cover system of 12 – 18 inches vegetated with shallow- and lateral-rooted non-selenium-accumulating species (e.g., grasses and forbs) is expected to effectively reduce average selenium concentration in vegetation on the ODA. Grasses tend to out-compete establishment of selenium accumulators such as the alfalfa and aster (Mackowiak and Amacher, 2010), minimizing the potential for increase in the average selenium concentration in vegetation over time. Furthermore, maintenance and monitoring to control hyperaccumulators on the ODA would ensure that average concentrations remain below the AWRMP removal action level of 5 mg/Kg across the grazing allotment.

Even under current conditions, with vegetation growing directly on overburden (i.e., minimal to no cover soils present), plants can have selenium concentrations below the AWRMP removal action level. The average selenium concentrations in the grasses growing on the ODAs at Conda are relatively low, at 16.9 mg/Kg. Grasses with selenium concentrations below 5 mg/Kg had corresponding average selenium in soil concentrations of 24.6 mg/Kg (ranging between 0.15 mg/Kg to 156 mg/Kg). Longer-rooted non-selenium-accumulating species (e.g., pubescent wheatgrass, white clover, smoothbrome, etc.), had average selenium concentrations ranging from 3.9 mg/Kg to 11 mg/Kg. Even hyper-accumulator plant species can have selenium concentrations blow 5 mg/Kg when growing directly on overburden. Over 25 hyper-accumulator plant samples with selenium concentrations below 5 mg/Kg have been collected from the ODAs at Conda, with corresponding soil concentrations averaging 24.6 mg/Kg (ranging between 0.15 mg/Kg to 91.8 mg/Kg).

Where selenium concentrations in grasses and hyperaccumulators were greater or equal to 5 mg/Kg, soil concentrations averaged 64.5 mg/Kg (ranging between 3.9 mg/Kg to 401 mg/Kg) and 54.54 mg/Kg (ranging between 1.4 mg/Kg to 401 mg/Kg), respectively.

These data indicate that acceptable selenium concentrations in non-accumulating species (i.e., grasses and forbs) could be achieved if surface and near-surface soil selenium concentrations are below 25 mg/Kg.[3] Preliminary data from the potential cover-soil-borrow areas indicate selenium concentrations in the soil cover material ranging between of 0.1 to 4.5 mg/Kg (average 1.06 mg/Kg).

As the Agencies are aware, plant-uptake of the bio-available selenium is greatest when the bulk of the root mass is in soil comprised of the seleniferous shale and mudstones, or when soil moisture has elevated selenium concentrations. In general, the bulk of the root mass for temperate grassland plants (including selenium accumulators) tends to occur in the first 20-inches (or shallower).[4] Roots tend to concentrate in parts of the soil in which resources (i.e., nutrient and moisture) are abundant, such as in the upper organic horizons (De Kroon and Visser 2003). Even plants that have vertically extensive roots have a high density of roots in the surface soil so as to acquire mineral nutrients and water from the surface (Sun et al. 1997). The downward growth of roots can be limited by a variety of factors, such as soil bulk density or shallow bedrock, but probably the most efficient barriers are horizontally stratified layers of shale or clay, permafrost, and water table (Canadell et all, 1996). When plant roots can't grow downwards due to the above-mentioned factors, roots tend to grow laterally in search of nutrients and moisture. Therefore, a key characteristic of the proposed cover system is that the soil cover would retain most of the nutrient and moisture, so that the bulk of the root mass for any plant would remain within the soil, where selenium concentrations are low.

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[3] Although the recommended selenium soil level for capping material is 13 mg/Kg, Forest Service research suggests that soils with selenium levels between 13 and 50 mg/Kg could be used for cover, but should be tested for plant uptake (Mackowiak and Amacher, 2004).

[4] Data on the minimum depth of soil (in inches) required for good growth indicate that of all the species currently used for reclamation in the region, most have minimum root depths of less than or equal to 18 inches. Only three have species have minimum root depths between18 and 20 inches.

Simplot agrees that certain plant species could root deeper than 12-18 inches and could come into contact with overburden materials. However, because plants can have the capacity to send roots deep, it doesn't mean that individual plants always do. Included below, following the list of references, are pictures of the root biomass for some grasses and asters growing on the West Limb Panel ODA at Conda.

As described above, because most of the moisture would be retained in the cover soil, relative to the overburden[5], plants would not have to send roots into the overburden in search of water. Even if individual plants with the bulk of their roots in clean soil extend roots into overburden, they won't accumulate selenium to levels proportional to when the bulk of the root mass is growing directly in shale and mudstones. Multi-lift placement of the soil cover material would ensure that any blending of the cover soil with overburden material that could occur during implementation would be limited. Considering the low levels of selenium in the potential borrow areas, the concentrations in the blended material are expected to be significantly lower compared to current surface conditions at the ODAs.

Other key elements of the proposed cover systems are use of a plant mix that would only consist of non-selenium accumulators (i.e., alfalfa, aster, curlycup gumweed, etc will not be part of the mix) and maintenance to reduce the presence of selenium accumulators, especially in the short term while plants are becoming established. Accumulator species existing on the ODA would be eliminated prior to beginning construction. The mix of vegetation species chosen for the project would include short-lived pioneer plant species and more long-lived slower-establishing species (with root systems that could extend beyond 18 inches). The plant species mix will be based on species recommended for other mines (Figure 1), available uptake information from USFS and other sources (e.g., greenhouse testing and field studies from Smoky Canyon Mine), and information regarding the establishment and growth of species/varieties in the region.

As previously mentioned, it is anticipated that, once revegetation with non-selenium-accumulator species is fully established, the vegetation will tend to discourage re-growth of the selenium accumulator species. The long-term effectiveness of the revegetation will be assured through a routine monitoring program to evaluate the revegetated areas and to spray or otherwise modify the vegetation as necessary to keep selenium-accumulator species from becoming

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[5] The coarse-grained gravelly overburden materials have low water-holding capacities, compared to the sandy silts of the weathered Dinwoody Formation. The boreholes advanced into the ODA during the geotechnical evaluation in May 2010 were predominantly dry. The first encounter of moisture was at 20 feet below ground surface, in a silty-gravel lens, with a moisture content of 6%.

re-established. This can be incorporated into the routine maintenance of the Site, which will be needed regardless of the remedy selected.

Summary – The range of alternatives were developed consistent with the EE/CA guidance under CERCLA. In-place stabilization, water-management controls and placement of a fine-grained soil cover system would significantly reduce infiltration and resultant seep flow. The use of shallow-rooted non-selenium-accumulating plant species would reduce average selenium concentrations in vegetation across the grazing allotment. Moisture retention capacity of soil cover would keep bulk of root mass of the proposed non-selenium accumulators in clean soil and rooting into the overburden in search of water to a minimal. Eradication of accumulators prior to construction will help prevent reintroduction of these species. The long-term effectiveness of the revegetation will be assured through a routine monitoring program to evaluate the revegetated areas and to spray or otherwise modify the vegetation as necessary to keep selenium accumulator species from becoming re-established.

Resolution: The Agencies determined that there is insufficient information to support or refute whether selenium uptake by non-selenium-accumulating plant species growing on the proposed cover system would reduce average exposure concentrations for the grazing pathway. Since the main reason for the early action was to stabilize the main pile, reduce infiltration and release of selenium and other COPCs to surface water, sediment and groundwater, reduction of plant uptake of selenium was excluded as an RAO and deferred to the FS.

2) There are several locations in the Revised Draft that describe "risks" to human health or the environment. The risk assessment has not yet been completed for the Conda site; therefore any potential risks (and the magnitude of those potential risks) to human health and the environment has not yet been established. Therefore, when discussing risks to human health and the environment, the text should always be qualified and indicate that the risks are "potential" risks.

Response to Comment: The text will be modified to refer to potential risks per the comment.

3) To help keep track of the various versions of documents, the referenced document, and all other Conda site documents, should be dated with the day of the month that the document was submitted.

Response to Comment: This report and subsequent reports will be dated with the day of the month of submittal.

4) Please add the additional ARAR: Federal Land Policy and Management Act of 1976 (FLPMA), 43 USC 1701, Provides for multiple use and inventory, protection, and planning for resources on public lands.

Response to Comment: The ARAR will be added and discussed in the ARAR sections provided in the response to General Comment 2, above.

Specific Comments

1) Executive Summary, "Comparative Analysis and Preferred Alternative, page x, paragraph after bulleted items

Pending adequate resolution of General Comment # 1, the Agencies may concur with the conclusion that Alternative 4 is the most cost effective among the alternatives that are most likely to result in significant reduction of COPCs in groundwater and surface water downgradient from the ODA. However, the presentation of cost-effectiveness in Figure ES-1 is not the best method for demonstrating cost effectiveness among the alternatives. The attached Table 7-2 (which should be duplicated as Table ES-1 for the Executive Summary) provides an alternative demonstration of cost-effectiveness that would better justify Alternative 4 as the Recommended Alternative. As can be seen from Table 7-2, Alternative 4 is the most cost-effective alternative in terms of infiltration reduction among the action alternatives that meet the RAOs (only Alternatives 3 through 6 meet all RAOs; Alternative 2 does not address the RAO to improve seismic stability of the ODA). Figure ES-1 and the text after the first two sentences in the paragraph following the bulleted items on page x should therefore be deleted. Table ES-1 should replace Figure ES-1, and the deleted text in this paragraph replaced with the following:

"Table ES-1 provides a comparison of the alternatives in terms of estimated infiltration reduction against the estimated present worth costs. As can be seen from Table ES-1, Alternative 2 would be the most cost-effective at reducing infiltration into the ODA. However, Alternative 2 would not significantly improve seismic stability of the ODA and would therefore not be fully effective at meeting the Removal Action Objectives (RAOs). Of the alternatives that can meet all of the RAOs effectively (Alternatives 3, 4, 5, and 6), Alternatives 3 and 4 are the most cost-effective at reducing infiltration through the ODA, with Alternative 4 being slightly more cost-effective. Alternatives 5 and 6 would entail significantly higher costs than Alternative 4 with relatively small incremental benefits."

Response to Comment: Table ES-1 will be added and the paragraph will be replaced as requested.

2) **Executive Summary, page xi, first paragraph, last sentence**
Replace *"the action to take hold"* with *"the new vegetation to establish without livestock grazing or disturbance."*

Response to Comment: The text will be modified as requested.

3) **Executive Summary, page xi, first complete paragraph on page**
If General Comment # 1 can be adequately resolved, the last sentence of this paragraph should be deleted. The following paragraph should be added after the first complete paragraph:

"Alternative 4 will be protective of human health and the environment, can meet the action and location-specific ARARs, will contribute toward meeting the chemical-specific ARARs, and will meet the RAOs. This alternative is effective in both the long term and short term, and would likely be consistent with the long-term remedy at the Site. Alternative 4 is implementable from both a technical and administrative standpoint, and would be the most cost-effective alternative at reducing infiltration and release of COPCs among the alternatives that can meet all of the RAOs.

Response to Comment: The text will be modified as requested.

4) **Section 2.3.3, page 6, paragraph 3; Figure 2-2, and Appendix A**

a) DEQ appreciates the effort to provide site-specific geologic interpretation based on exploration borings, mining records, and observations. This greatly improves our understanding of natural conditions, and hydrogeologic features at Pedro Creek. The text indicates that a significant structural feature underlying the Pedro Creek ODA is a SE-NW trending transverse fault, with a vertical offset of 150 to 200 feet. The description in Section 2.1 of historical mining operations in this part of Woodall Mountain suggests that the fault controlled the progression of mining, and suggests that it may contribute to channeling of recharge waters within the ODA and bedrock. However, the fault is not well depicted on Figure 2-2. There is a SE-NE trending fault trace bisecting the ODA in plan view, but the apparent motion is not depicted, nor is there any visible offset of section in plan view or in the cross sections. Cross Section Line # 9 appears to intersect this fault, but the fault is not depicted in the cross section. The map and cross sections need to be updated to better depict this fault, based on all available data. In addition, it would be helpful to sketch in the trace of the fault on the site photos presented in Appendix A.

Response to Comment: Figure 2-2 will be revised to better depict the fault zone and the resultant offset to bedding. Cross section line 9 does not intersect the fault; therefore the fault is not depicted in the section. Appendix A will be revised to include a trace of the fault on the relevant photos.

b) Cross Sections 8 and 9 depict the locations of several exploration boreholes completed in 1961, 1967, and 1969. The Figures in Appendix A should be updated to identify the boreholes that are depicted in Figure 2-2; it is very hard to read the penciled labels in Appendix A. Additionally, the boreholes/wells on Figure 2-2 should be shown as narrow columns or lines, not wide boxes. Any offsets to the Meade Peak Member or Wells Formation based on the boreholes that are mapable based on the scale should be shown as offsets to bedding in the cross sections. (see Comment # 20, for other concerns regarding Figure 2-2).

Response to Comment: The boreholes that are depicted in Figure 2-2 will be identified on the Appendix A figures. Figure 2-2 will be revised to show narrower columns for the exploration boreholes. The exploration holes do not indicate offsets to the Meade Peak Member or Wells Formation that would need to be depicted on the cross sections.

5) Section 3.1, page 13, third bullet

The parenthetical needs to be re-worded or assumptions clarified. It is unclear that the pit floors are at or beneath the water table. Therefore, it is unknown whether releases from in-pit ODA/s can move into both groundwater and surface water.

Response to Comment: The referenced bullet will be revised as follows:

"The proportion of overburden material located atop consolidated formation outcrop areas external to mine pits versus on exposed consolidated formations in pit floors (i.e., releases from external ODAs atop consolidated formations have a relatively large component transported to surface water through seeps; whereas releases of in-pit overburden materials predominantly would infiltrate into groundwater).[6]

Resolution: The referenced bullet will be revised as follows:

"The proportion of overburden material located atop consolidated formation outcrop areas external to mine pits versus on consolidated formations in pit floors. Releases from ODAs external to the mine pits and atop Rex Chert have a relatively large component of flow transported as surface water.[7] Releases from ODAs (both in-pit and external) atop the Wells Formation predominantly infiltrate the formation, with limited releases to surface water. The pit-bottom elevations are below the elevation of the pre-mine draw.[8]

6) **Section 3.2.2, page 15, *Pedro Creek Water Quality*; and Figure 2-2**

The text states, *"Between NES-5 and PC-5, Pedro Creek loses flow and does not gain any flow until around PC-2 . . ."* However, Figure 2-2 depicts a gaining portion in reach 1, upstream/upgradient from wells GW-28 and GW-29. Check for accuracy and correct this inconsistency.

Response to Comment: The figure will be revised to indicate that reach 1 loses flow.

6) **Section 4.0.** This section should be deleted in its entirety, and replaced with the following:

"4.0 STREAMLINED SCREENING RISK EVALUATION"

"A streamlined screening risk evaluation (SRE) was performed to assess the potential threats to human and ecological receptors associated with the Pedro Creek ODA and to evaluate potential benefits of the removal action alternatives. The SRE focused on the likely risk-driving COPCs (arsenic, cadmium, chromium, selenium, vanadium, and zinc) as identified in the RI/FS Work Plan (New Fields 2008b), and the concentrations of these COPCs in the media in and around the Pedro Creek ODA.

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6 The bottom of SW-1 pit plunged towards the north, ranging between 6,875 feet amsl along the southern end to 6,850 feet near the northernmost end. Infiltration into the pit likely enters the exposed Wells Formation, or becomes perched atop the Meade Peak Formation at elevations below the pre-mine draw (6,940 to 6,960 feet amsl). Groundwater potentially entering fractures into the Rex Chert along the eastern pit wall would remain in the steeply dipping Rex Chert and could not report at the NES-5 seep, which is situated atop Dinwoody Formation.

7 Groundwater potentially entering fractures into the Rex Chert along the eastern pit wall would remain in the steeply dipping Rex Chert and could not report at the NES-5 seep, which is situated atop Dinwoody Formation.

8 The bottom of SW-1 pit elevation (6,850 to 6,875 feet amsl) is below the pre-mine draw (6,940 to 6,960 feet amsl). The pit bottom also sloped towards the north. Infiltration into the pit likely enters the exposed Wells Formation, or becomes perched atop the Meade Peak Formation.

Potentially complete exposure pathways for ecological receptors (e.g., terrestrial, riparian, and aquatic species) in the vicinity of the Pedro Creek ODA include:

- Ingestion of surface water and incidental ingestion of overburden soil, riparian soil, and sediment;
- Plant uptake of COPCs from overburden soil, riparian soil, sediment, and surface water;
- Dermal contact with surface water (fish and non-fish aquatic life);
- Dermal contact with sediment (non-fish aquatic life only); and
- Dietary uptake (food web transfer).

Potentially complete exposure pathways for human receptors in the vicinity of the Pedro Creek ODA include:

- Incidental ingestion of, dermal contact with, and radiation from overburden materials;
- Inhalation of overburden-derived particulates;
- Ingestion of wild game;
- Incidental ingestion and dermal contact of sediments;
- Ingestion and dermal contact with surface water and groundwater;
- Ingestion of Site-derived livestock (beef and/or mutton); and
- Ingestion of teas brewed from Site-derived terrestrial plants (Native American).

To provide a conservative assessment of potential risks to human and ecological receptors, concentrations for the aforementioned risk-driving COPCs in each of the media were compared to appropriate human and ecological risk-based benchmarks (Table 3-1). The conservative risk-based benchmarks represent concentrations believed to provide for adequate protection of potential receptors. Therefore, potential threat to human or ecological receptors is indicated, when COPC concentrations exceed risk-based screening benchmarks[9] for complete exposure pathways. It should be noted that the exposure assumptions used to develop screening benchmarks could overstate risk for receptors using the Pedro Creek area. For example, the default drinking water assumptions are not likely plausible for Pedro Creek. The data were evaluated for usability consistent with the approach set forth in the RI/FS Work Plan (NewFields 2008b), and only data assigned a quality level of 5 (i.e., considered suitable for use in risk assessments) were used in this SRE. The following subsections present the SRE.

4.1 Concentrations of Risk-Driving COPCs

The following sub-sections describe how concentrations (Table 3-1) of risk-driving COPCs are clearly elevated with respect to background levels typical of the region, exceed State and Federal standards, and indicate potential for unacceptable risk to human and ecological receptors of concern exposed to the media in and around the Pedro Creek ODA. The plausibility and frequency of exposure is highest for ecological receptors using the Pedro Creek ODA area. Therefore, for the purpose of this EE/CA, screening results described in the following subsections focus on the potential ecological risks from exposure to site media. Complete risk estimates for all plausible exposure scenarios will be evaluated during the RI.

4.1.1 Pedro Creek ODA

The data for the Pedro Creek ODA show that the risk-driving COPCs are present at concentrations significantly exceeding conservative benchmarks (Table 3-1) considered protective of human health and ecological receptors in one or more of the media. All COPCs evaluated during this SRE exceed at least one screening benchmark, although selenium most consistently exceeds relevant benchmarks. The highest exceedances of ecological benchmarks are as follows:

- In ODA soils, chromium and selenium had the greatest exceedances of ecological screening benchmarks with maximum factors of exceedances of 2,100 and 485, respectively.

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[9] The human health soil benchmarks used for screening represent the lower of one tenth the non-carcinogenic screening level and a carcinogenic screening level based on a 10^{-6} excess lifetime cancer risk. These assumptions are used to address the potential cumulative risks from multiple chemicals and exposure media.

- In vegetation growing on top of the ODA, selenium had the greatest exceedance of the ecological benchmark for vegetation with a maximum factor of exceedance of 540.

- In the ODA seep, selenium had the greatest exceedance of the ecological benchmark for waters with a maximum factor of exceedance of 1,380.

Although the screening benchmarks may not equate to cleanup levels and natural background levels have not been considered in this SRE, the significantly elevated concentrations of COPCs in the overburden material can adversely affect flora and fauna. Specifically, elevated selenium concentrations in vegetation (e.g., the hyper accumulators) and surface water can pose risk to livestock and wildlife through the ingestion pathway, depending on the frequency of exposure.

4.1.2 Downgradient of the Pedro Creek ODA

The elevated concentrations of the risk-driving COPCs in the media downgradient of the Pedro Creek ODA indicate releases and transport from the ODA.
Soil – All of the risk-driving COPCs exceed their respective benchmarks in soils immediately adjacent to the Pedro Creek ODA (Table 3-1). Chromium and selenium had the greatest exceedances of ecological screening benchmarks with maximum factors of exceedances of 1,640 and 184, respectively.

Vegetation – Selenium concentrations exceed its benchmark values protective of ecological health in vegetation immediately adjacent to the Pedro Creek ODA (Table 3-1) with a maximum factor of exceedance of 41.

Surface Water - Arsenic, cadmium, selenium and zinc exceed their respective benchmarks in surface water downgradient of the Pedro Creek ODA. Selenium had the greatest exceedance of its ecological benchmark (Idaho Water Quality Standard) with a maximum factor of exceedance of 1,000.

Sediment - All of the risk-driving COPCs exceed their respective benchmarks in sediment immediately adjacent to the Pedro Creek ODA

(Table 3-1). Cadmium had the greatest exceedance of its ecological benchmark with a maximum factor of exceedance of 74.

Groundwater - Arsenic, cadmium, selenium and zinc exceed their respective benchmarks in groundwater immediately adjacent to the Pedro Creek ODA (Table 3-1). Selenium had the greatest exceedance of its ecological benchmark with a maximum factor of exceedance of 238.

The significantly elevated concentrations of the COPC in the media downgradient of the overburden material can adversely affect flora and fauna in the area. Specifically, elevated selenium concentrations in vegetation (e.g., the hyper accumulators), soil, surface water (e.g., seeps and creeks) and groundwater (e.g., ponds) can pose risk to livestock and wildlife frequenting the area. Slope failures or mass wasting of the steep unreclaimed overburden pile could result in additional release of COPCs to downgradient areas.

4.2 Streamlined Screening Risk Evaluation Conclusion

Complete exposure pathways exist for the receptors (e.g., aquatic biota, livestock, wildlife and humans) frequenting the area in and around the Pedro Creek ODA. With consideration of the most plausible exposure scenarios in the vicinity of the Pedro Creek ODA, maximum concentrations of mine-related contaminants were measured in the overburden at levels one to three orders of magnitudes greater than screening benchmarks protective of human health and the environment. Therefore, the ODA could pose current and future risk to human and ecological receptors, if not addressed. Additionally, the significantly elevated maximum concentrations of the risk-driving COPCs in soil, vegetation, surface water, sediment, and groundwater downgradient of the Pedro Creek ODA indicate transport of mine-related contaminants has occurred and potential unacceptable risk to human and ecological receptors. Consequently, there is the need for a response action to control releases and reduce exposure to the Pedro Creek ODA media. Releases of COPCs, if not addressed by implementing a response action, will continue to migrate and presents a potential unacceptable risks to human health and the environment. Slope failures or mass wasting of the steep unreclaimed overburden pile could result in additional release of COPCs to downgradient areas.”

Response to Comment: Simplot's review of the proposed section indicates that only minor changes have been made to the draft final version. The section will be replaced as requested.

7) Section 5.1, page 21, last bullet

Although the early action may help reduce concentrations of COPCs in PCP-2, this pond may be more directly affected by the unreclaimed ODA located to the southeast of the Pedro Creek ODA. Any shallow alluvial groundwater at locations PCP-3 and PCP-4, although shown as dry on Figure 3-1, should be more directly influenced by the early action. Therefore, we recommend removing the reference to PCP-2.

Response to Comment: The reference to PCP-2 will be removed, as recommended.

8) Sections 6, 7, and 8, General Comment

The EE/CA Guidance (*Guidance on Conducting Non Time-Critical Removal Actions Under CERCLA*, August 1993) indicates that the alternatives should be evaluated in terms of consistency with potential future remedial actions. Therefore, potential future remedial actions in the Pedro Creek ODA area should be discussed in the text. This should include a discussion of potential future actions on the ODA itself (i.e. the low potential for needing additional runon/runoff control, additional grading, additional capping, etc.) and on the area surrounding the ODA, particularly downgradient from the ODA (i.e. the potential need for future groundwater/seep capture, treatment, etc.). The "Effectiveness" subsections in Section 6 should provide an evaluation of each of the alternatives in terms of consistency with potential future remedial actions. The comparative evaluation in Section 7 should note any differences among the alternatives in terms of consistency with potential future remedial actions. The text in Section 8 should include a statement that the recommended alternative would likely be consistent with potential future remedial actions.

Response to Comment: The following edits are proposed to address the comment:

The following sentence will be added as the second sentence to the first paragraph of section 6.2: "The removal action alternatives are consistent with any future remedial action activities remaining for the Site."

Subsection added to Sections 6.2.2.1, 6.2.3.1, 6.2.4.1, 6.2.5.1 and 6.2.6.1:

"**Consistency with Potential Future Remedial Actions –** Similar RI/FS projects are on-going throughout the Southeast Idaho phosphate patch. Based on these and other EE/CAs that have been completed, a basic range of appropriate remedial technologies has been developed for phosphate mines. This range is consistent with the remedial technologies identified and evaluated above in Section 6.1 and focuses on: (1) excavation and disposal; (2) surface water management; (3) grading and reshaping; (4) surface water modification and cover; (5) institutional/access controls and (6) water treatment. As such, the actions in this alternative are consistent with potential future remedial actions. Depending on the final site remedial action objectives and the results of removal action performance monitoring (primarily groundwater, surface water, and vegetation) and inspections of the surface water controls and stability of ODA slopes and covers, it may be necessary to augment the removal alternative with additional actions. Examples could be additional grading and capping, surface water controls, and potentially treatment of the seep (if it continues to flow after the removal action is completed) or of captured shallow groundwater."

Resolution: The proposed sentence to be added to section 6.2 will be removed as requested by the Agencies. The following subsection will also be added to Sections 6.2.2.1, 6.2.3.1, 6.2.4.1, 6.2.5.1 and 6.2.6.1.

Compliance with ARARs – A summary of how Alternative 2 meets the key (i.e. with most stringent requirements) applicable and the key relevant and appropriate requirements is discussed in the following text. Table 6-2 summarizes how the alternative meets the remaining ARARs. Compliance with the ARARs would be achieved by consultation with the agencies and documentation generated as part of the design and implementation of the action.

Applicable ARARs – The key applicable ARARs include the promulgated federal and State surface water and groundwater quality standards (Table 5-1). Run-on/runoff controls, regrading and surface vegetation would reduce infiltration of rainfall and snowmelt into the ODA by an estimated 53 percent compared to current conditions. This reduction of infiltration into the ODA would reduce the release of COPCs to groundwater and surface water and would contribute toward meeting the requirements of these ARARs. Post-construction monitoring would be implemented to assess progress toward compliance with these requirements and any additional actions necessary to meet these ARARs will be addressed as part of the RI/FS.

Relevant and Appropriate ARARs – The key relevant and appropriate ARARs include National Emission Standards for Hazardous Air Pollutants Rules, NOAA Freshwater Sediment Benchmarks, National Pollutant Discharge Elimination System (NPDES) Permit Regulations, etc as summarized in Table 5-1. Standard dust control methods during implementation would minimize the potential for release of overburden material to the air and provide for compliance with the substantive requirements of the National Emission Standards for Hazardous Air Pollutants Rules. The regrading, revegetating and stormwater management controls would minimize erosion and would contribute toward meeting the requirements of the NOAA Freshwater Sediment Benchmarks. No discharge to surface water is contemplated by the removal action and substantive requirements of the NPDES regulations would be met by meeting surface water quality standards and by continued compliance with existing stormwater permit. Dust and storm water controls can be implemented during construction to minimize releases and provide for compliance with pertinent regulations. This would be addressed in detail in the removal action design.

Subsection added to Section 7:

"7.1.4 Consistency With Potential Future Remedial Actions

As discussed in Section 6, similar RI/FS projects are on-going throughout the Southeast Idaho phosphate patch. Based on these and other EE/CAs that have been completed, a basic range of appropriate remedial technologies has been developed for phosphate mines. This range is consistent with the remedial technologies identified and evaluated above in Section 6.1 and focuses on: (1) excavation and disposal; (2) surface water management; (3) grading and reshaping; (4) surface water modification and cover; (5) institutional/access controls and (6) water treatment. As such, the actions in the range of alternatives evaluated in this EE/CA are consistent with potential future remedial actions.

Depending on the final site remedial action objectives and the results of removal action performance monitoring (primarily groundwater, surface water, and vegetation) and inspections of the surface water controls and stability of ODA slopes and covers, it may be necessary to augment any removal alternative with additional actions. Examples could be additional grading and capping, surface water controls, and potentially treatment of the seep (if it continues to flow after the removal action is completed) or of captured shallow groundwater. In general, the removal action alternatives increase in scope (amount of grading, complexity of cover) from Alternative 2 to 6. The reduction in infiltration also increases from Alternative 2 to 6. Therefore the potential for the need for additional actions would be expected to be lowest for Alternative 6 and highest for Alternative 2."

The following bullet added to Section 8.

"Alternative 4 would likely be consistent with potential future remedial actions."

9) Section 6.1.4 Surface Modification and Cover, Species Modification, pages 27 – 28

The technology to use vegetative cover that resists selenium uptake (non-selenium accumulator vegetation) is retained for the removal action alternative screening/selection. No specific species of vegetation (which can grow in the Pedro Creek environment) were identified that can serve as non-selenium accumulator vegetation. The selected alternative (Alternative 4) in the Draft Final EE/CA uses this technology. Simplot needs to identify the types of non-selenium accumulator vegetation species that can be established at Pedro Creek, and provide supporting information confirming that these species do not accumulate selenium if their roots reach ODA materials.

Response to Comment: Simplot is currently evaluating multiple plant species for potential revegetation use, and looks forward to collaborating with the Agencies on the selection of an appropriate plant mix. Simplot will propose a preliminary list of species to the Agencies in a technical memorandum by the end of August. It is proposed that the revegetation details, to be approved by the Agencies, be included in the removal action design.

10) Section 6.1.5, page 28, subsection titled "Fencing"

The text in this subsection should describe the fencing that Simplot is currently constructing along the east side of Woodall Mountain, and differentiate the east side fencing from the fencing described with the various alternatives (fencing around the seep and settlement basins). The text should also indicate that the east side fencing will be completed, regardless of the alternative selected through the EE/CA process, and that therefore the costs for the east side fence are not included in the costs for the various alternatives.

Response to Comment: Section 6.1 is intended to identify and evaluate potential technologies to be used in the development of the removal action alternatives. Section 6.1 is not the place to differentiate between the property boundary fencing currently being installed and the potential fencing for the purposes of the Pedro Creek early action. The intent of the second sentence of the first paragraph of Section 6.2.1 was to indicate that fencing along the Conda property as part of maintenance activities will take place irrespective of the alternatives evaluation under the EE/CA process. The following changes will be made to address the comment.

The forth sentence of the last paragraph of Section 6.2 will be revised as follows: "Note that the cost estimates for the removal action alternative components, as presented on Tables B-2 through B-6, do not reflect present worth, or cost associated with the new boundary fence Simplot is currently installing as part of Site maintenance."

The second sentence of Section 6.2.1 will be revised as follows: "Site maintenance activities would continue, including the installation of a fence[10] along the property boundary, which is being installed regardless of the potential early action".

11) Sections 6.2.2.1, 6.2.3.1, and 6.2.4.1, first paragraph in each section

The last sentence in each of these paragraphs should be deleted and replaced with the following: "It is anticipated that, once revegetation with non-selenium-accumulator species is fully established, the revegetation will tend to discourage re-growth of the selenium accumulator species. The long-term effectiveness of the revegetation will be assured through a routine monitoring program to evaluate the revegetated areas and to spray or otherwise modify the vegetation as necessary to keep selenium accumulator species from becoming re-established."

Response to Comment: The text will be modified as requested.

13) Sections 6.2.3.1 and 6.2.4.1, third paragraph in each section, first sentence

There is missing text or a typographical error in each of these sentences.

Response to Comment: The text will be modified as follows:

"Run-on/runoff controls, grading and vegetated soil cover would reduce infiltration of rainfall and snowmelt into the ODA materials."

---

[10] Simplot is in the process of installing a new fence around the Conda Mine property, to help with the management of Site access

14) Section 6.2.5, bulleted item "Surface modification and cover"

To be consistent with the descriptions of Alternatives 3, 4, and 6, the text should indicate that soil amendment with composted manure would not be required for Alternative 5, but that application of fertilizer and mulch would be included in revegetated areas.

Response to Comment: A new bullet will be added under the "Surface modification and cover" bullet in Section 6.2.5, as follows: "Soil amendment with composted manure would not be required for Alternative 5, but fertilizer and mulch would be included in revegetated areas."

15) Sections 6.2.6.2 and 7.2

These sections should include a brief discussion that the installation of the geosynthetic liner would require a specialty subcontractor and specialized construction expertise (at least in terms of construction supervision), and that this specialized experience is available regionally, but not likely available locally.

Response to Comment: The text will be revised in these two sections, as follows: "... or special access logistics, although installation of a geosynthetic liner in Alternative 6 would require a specialized subcontractor and specialized construction expertise (at least in terms of construction supervision). ...be readily available ~~for use~~ regionally, if not locally."

16) Section 7.1.1, pages 49 through 51

Pending adequate resolution of General Comment # 1, the Agencies may concur with the conclusion that Alternative 4 is the most cost effective among the alternatives that are most likely to result in significant reduction of COPCs in groundwater and surface water downgradient from the ODA. However, the presentation of cost-effectiveness in Figure 7-1 is not the best method for demonstrating cost effectiveness among the alternatives. The attached Table 7-2 provides an alternative demonstration of cost-effectiveness that would better justify Alternative 4 as the Recommended Alternative. As can be seen from Table 7-2, Alternative 4 is the most cost-effective alternative in terms of infiltration reduction among the alternatives that best meet the RAOs (Alternatives 3 through 6). Figure 7-2 and the text after the first two sentences in the paragraph following the bulleted items on page 50 should therefore be deleted. Table 7-2 should replace Figure 7-1, and the deleted text in this paragraph replaced with the following:

"Table 7-2 provides a comparison of the alternatives in terms of estimated infiltration reduction against the estimated present worth costs. As can be seen from Table 7-2, Alternative 2 would be the most cost-effective at reducing infiltration into the ODA. However, Alternative 2 would not significantly improve seismic stability of the ODA and would therefore not be fully effective at meeting that RAO. Of the alternatives that can meet all of the RAOs effectively (Alternatives 3, 4, 5, and 6), Alternatives 3 and 4 are the most cost-effective at reducing infiltration through the ODA, with Alternative 4 being slightly more cost-effective. Alternatives 5 and 6 would entail significantly higher costs than Alternative 4 with relatively small incremental benefits."

Response to Comment: The text will be modified as requested.

17) Section 7.1.1, subsection "Erosion and Seismic Stability", page 51, last sentence in first incomplete paragraph on page

The flatter slope and installation of the geosynthetic liner would result in a slight improvement in seismic stability and a reduced risk of erosion of the ODA materials (particularly if rilling were to develop on the regraded slopes) compared to Alternatives 3, 4, and 5. The text in the last sentence in this paragraph should therefore be changed to read: "Alternative 6 would include slightly flatter finished slopes and a geosynthetic liner, which would provide a slight improvement over Alternatives 3, 4, and 5 in terms of seismic stability and risk of erosion of the ODA materials."

Response to Comment: The text will be modified as requested.

18) Section 8, page 54

If General Comment # 1 is adequately resolved to the Agencies' satisfaction, the text after the first sentence of this section should be deleted and replaced with the following:

"Alternative 4 is the recommended removal action alternative for the Pedro Creek ODA (Figure 8-1) for the following reasons:

- Alternative 4 would be protective of human health and the environment. The flatter slopes of the regraded ODA would significantly reduce the potential for seismic instability or mass wasting of the ODA materials. The cover soils and revegetation would greatly reduce the erosion potential and would effectively control the selenium accumulator species, substantially reducing the risks to livestock and terrestrial species. Alternative 4 would also reduce the infiltration through the ODA by an estimated 85 percent which would significantly decrease the potential for exceedances of groundwater and surface water standards downgradient from the ODA.

- Alternative 4 would meet the action and location-specific ARARs, would contribute toward meeting the chemical-specific ARARs, and would meet all of the RAOs. Alternative 4 would likely be consistent with the future remedial actions at the site because it is unlikely that additional source control measures at this ODA would be necessary. In addition, if collection and treatment of springs and seeps is required as part of the remedial actions, theses measures could be readily implemented downgradient from the ODA.
- Alternative 4 would be effective in the short term. The regrading of approximately 800,000 cubic yards of ODA materials and the cover construction of approximately 142,000 cubic yards of borrow soils would have the potential for releases during construction, but this potential would be mitigated through best management practices. This alternative would have a moderate amount of disturbance at the borrow area south of the ODA, which can be mitigated through reclamation following completion of the cover at the ODA. Alternative 4 would not have any significant short term risks to the public during implementation and there would be no unusual risks to construction workers. Alternative 4 can be implemented in a reasonable time frame, likely one to two years.
- Alternative 4 is implementable from both a technical and administrative standpoint. The construction of this alternative would utilize standard construction equipment and techniques, and experienced contractors and skilled workers are available locally. There would be no significant administrative implementability issues associated with this alternative.

The estimated present worth cost for Alternative 4 is $6.9 million, which is in the middle of the range of costs among the alternatives evaluated. While Alternative 4 is not the lowest cost alternative, it is the most cost-effective alternative at infiltration reduction among those alternatives that can effectively meet all of the RAOs."

Response to Comment: The text will be modified as requested.

19) Table 3-1

a) A footnote should be added to this table to indicate that the human health screening benchmarks used are based on the lower of 10^{-6} excess lifetime cancer risk or a non-cancer hazard quotient of 0.1.

b) For the purpose of this EE/CA, the human health screening levels in Table 3-1 for surface water, groundwater and seeps should be changed to MCLs rather than the tapwater screening levels.

Response to Comment: Table 3-1 will be modified as requested.

20) Figure 2-2

a) **Line 8:** This cross section shows a repeat of the Rex Chert section without any faulting or folding. This is incorrect. Revise the cross section by adding the appropriate structural features/geologic interpretations.

Response to Comment: The Rex Chert section on the left side of Line 8 will be replaced with Wells Formation.

b) The dashed line shown on the cross sections (pre-mining topographic surface?) and the green line (current topographic surface?) should be defined in the legend.

Response to Comment: Legends will be added to the figure defining the lines for pre- and post-mining topography.

c) The stippled pattern in the cross sections used to depict ODA materials should be added to the legend.

Response to Comment: The stippled pattern in the cross sections depicts hill/wash/alluvium and is defined in the legend.

d) The mine pit depths and locations should be estimated from the exploration boreholes/mining maps, and added to the cross section.

Response to Comment: The section lines do not cross SW-1 and SW-2 pits. Therefore, the pits cannot be added to the cross sections.

e) Different symbols should be used for intermittent stream and fault traces on the plan view. Typically, intermittent streams are depicted as shown with dots and dashes, and faults are shown as solid where observed, dashed where inferred, dotted where covered with quaternary deposits, and with question marks if the location is uncertain. Please also depict relative movement across the fault trace by adding “U” or “D”, arrows (for transverse faults), or other appropriate symbols.

Response to Comment: The fault trace will be revised to a dashed pattern.

f) Directions (NE, SW) should be added to the cross sections.

Response to Comment: Directions will be added to the cross sections as suggested.

g) Vertical exaggeration should be identified on the cross sections.

Response to Comment: There is no vertical exaggeration on the cross sections. This will be noted on the figures.

i) Please see additional concerns identified in Specific Comment # 4 regarding Figure 2-2.

Response to Comment: Comment noted.

21) Appendix A, Figure A1

a) Please add a light background color under the scale and north arrow, as these are very difficult to read.

Response to Comment: Figure A1 will be revised to make the scale and the north arrow more legible.

b) Likewise use a brighter, more discernible, symbol for NES-5. In addition, the pond symbol downgradient of NES-5 should be defined. It is assumed this is depicting the former sediment pond.

Response to Comment: Figure A1 will be revised to make the symbol for NES-5 more legible and the sedimentation pond will be added to the legend.

c) Define the source of the grid (e.g., Simplot mining grid) on the legend.

Response to Comment: The source of the mine grid will be added to the legend.

22) Appendix B, Section B.5, cost assumptions for Alternatives 3, 4, 5, and 6. The cost assumptions should include descriptions that composted manure would not be required for Alternatives 3, 4, 5, and 6, but that application of fertilizer and mulch would be included in revegetated areas. The descriptions of composted manure amendment for Alternatives 5 and 6 should be deleted.

Response to Comment: The following text will be added as a new bullet in the cost assumptions for Alternatives 3, 4, 5, and 6: "Soil amendment with composted manure would not be required, but fertilizer and mulch would be included in revegetated areas." Also, the descriptions of composted manure amendment for Alternatives 5 and 6 will be deleted.

23) Appendix B, Tables B-5 and B-6. The costs for composted manure amendment of the 12-inch surface cover should be deleted from these tables.

Response to Comment: The costs for composted manure amendment will be removed from the cost tables for Alternatives 5 and 6 (Tables B-5 and B-6, respectively).

24) **Appendix C, Table C-3.** The Top Area and Upslope Area for Alternatives 2 and 3 are shown as having SCS Curve Numbers of 80 and 70, respectively, for a slope gradient of zero; whereas, the Alternative 1 runoff curve value is zero for a zero slope gradient. Please explain why the Alternatives 2 and 3 runoff curve values are so high for a zero slope gradient.

Response to Comment: A Curve Number of zero reflects the existing condition of pooling on the surface with no runoff. However, after the backfilling/regrading actions of Alternatives 2 and 3, runoff will occur from these areas though the slope gradient of these areas will not change. In Alternatives 2 and 3, the Curve Number used for these regraded areas reflects the surface material that would be present, hence the higher Curve Number. A footnote will be added to Table C-3, as follows: "For current conditions, a Curve Number of zero reflects the existing condition of pooling on the surface with no runoff."

25) **Appendix C, Table C-3, SCS Runoff Curve Numbers**

The infiltration rates calculated by HELP depend on the SCS runoff curve numbers used as inputs to the HELP model. The SCS curve numbers appear to be reasonable; however, the source of the curve numbers is not provided. Please add a footnote to Table C-3 that provides a basis for the values.

Response to Comment: A footnote will be added to Table C-3, as follows: "Curve Numbers are estimated from information presented in Appendix 3C (tables from the USDA-Soil Conservation Service) of Haan et al. (1994) along with engineering judgment."

26) **Appendix C, Table C-4.** The Average Annual Depth (sum of runoff, evapotranspiration, and percolation) for Alternatives 1 through 5 is approximately equivalent to the annual precipitation (21.12 inches). However, Alternative 6 shows this Average Annual Depth to be approximately 19.5 inches. The Alternative 6 model output sheets shows that the missing 1.6 inches is accounted for as lateral drainage collected. Please include the lateral drainage value as a footnote to Table C-4.

Response to Comment: A footnote will be added to Table C-4, as follows: "For Alternatives 1-5, precipitation is the input to the water balance simulated by the HELP model, and surface runoff, evapotranspiration, and percolation are outputs. For Alternative 6, lateral drainage is an additional output (at approximately 1.6 inches per year) due to the use of a chert drain layer. The set of output values for each alternative (for a given location in the ODA) are additive and equal to the precipitation depth (i.e., input value)."

27) **Appendix C, Table C-4.** For each Alternative, Table C-4 provides Surface Runoff, Evapotranspiration, and Percolation in Overburden values for Side Slope, Top, and Upslope Areas. However, the attached model output sheets only show Surface Runoff, Evapotranspiration, and Percolation calculations as entered into the Side Slope Areas of Table C-4. That is, it is not obvious on the model output sheets how the Surface Runoff, Evapotranspiration, and Percolation values were calculated for Top and Upslope Areas. Please explain and provide documentation for these values.

Response to Comment: Documentation for the surface runoff, evapotranspiration, and percolation calculations is provided in Appendix C for all alternatives and for the Side Slope, Top, and Upslope Areas. The naming convention is as follows: Side Slope Area model runs for Alternatives 1-6 are titled SSA1 through SSA6; Top Area model runs for Alternatives 1-6 are titled TPA1 through TPA6; and Upslope Area model runs for Alternatives 1-6 are titled UPSA1 through UPSA6.

28) **Appendix C, Table C-4.** The footnote to this table, which reads: "Note: Infiltration estimates developed by the HELP Model do not include uncontrolled run-on from the area above Upslope Area (35 ac-ft/yr)" is potentially confusing, given the configuration of the alternatives. This is because Alternatives 2-6 include run-on control whereas Alternative 1 does not include run-on control. The text of the footnote should therefore be changed to read: "Note: Infiltration estimates developed by the HELP Model cannot account for run-on from the area above Upslope Area (35 ac-ft/yr). This should be taken into account when interpreting the results of the HELP Model because Alternatives 2-6 include run-on control whereas Alternative 1 does not include run-on control."

Response to Comment: The text of the footnote will be modified as requested.

References Cited

BLM, October 2006; *Draft Pocatello Resource Management Plan and Environmental Impact Statement*

EPA, 1993; *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA,* OSWER 9360.0-32, EPA540-R-93-057.

O'Kane, January, 2009; *Blackfoot Bridge Mine Proposed Mine Development—Modeling of Soil Cover System Alternatives.*

Ralston and others, 1977; *Solutions to Water Resource Problems Associated with Open Pit Mining in the Phosphate Area of Southeastern Idaho.* A report prepared for the Idaho Bureau of Mines and Geology.

Jackson, R.B., Canadell, J., Ehleringer, J.R., Mooney, H.A., Sala, O.E., and Schulze, E.D. 1996. A global analysis of root distributions for terrestrial biomes. Oecologia 108(3): 389-411.

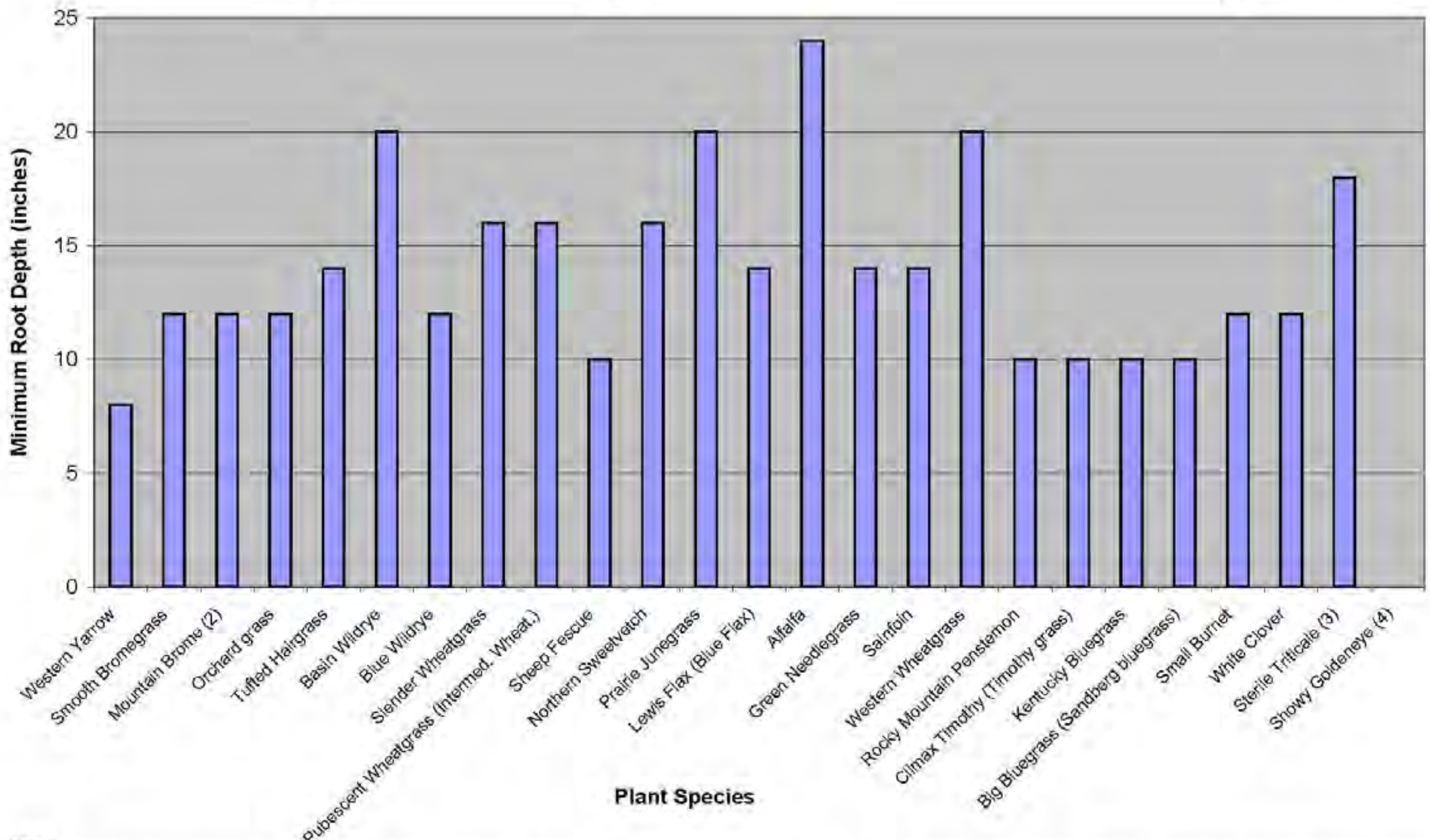
De Kroon, H. and E.J.W. Visser (Eds). 2003. Root Ecology. Ecological Studies 168. Springer-Verlag Berlin Heidelberg.

Mackowiak, C. L., M. C. Amacher, J. O. Hall and J. R. Herring. 2004. Uptake of selenium and other contaminant elements into plants and implications for grazing animals in southeast Idaho. pp. 527-555. In: J. R. Hein (ed.) Life Cycle of the Phosphoria Formation: From Deposition to the Post-Mining Environment. Elsevier B. V. Amsterdam, The Netherlands.

Mackowiak, C.L. and Amacher, M.C. 2005. Plant uptake of selenium from soils overlying unmined sedimentary rock units and potential use of these soils as capping materials for revegetated waste rock dumps. University of Florida, North Florida Research and Education Center, Quincy, FL and US Forest Service Rocky Mountain Research Station, Logan, UT. April.

Mackowiak, C.L. and Amacher, M.C. 2010. Selenium uptake by western mountain aster at Wooley Valley Unit 4 Waste Rock Dump. e-Report for ECAP/AML Project: Phosphate mining remediation feasibility studies. Logan, UT: US Forest Service Rocky Mountain Research Station. May.

Figure 1 - Minimum Root Depth[1] Information for Potential Reclamation Plant Species



Notes:
1- As defined by USDA (2010), minimum root depth is the minimum depth of soil (in inches) required for good growth; 2- Based on the variety Bromar; 3- Based on data for common wheat; 4- No data.

Sample Root Depth Pictures for Grasses and Aster Growing on West Limb Panel ODA at Conda

Aster Plant sample prior to excavation.

Root biomass for Aster sample with soil.

Root biomass for Aster sample with soils removed.

Grass sample area prior to excavation.

Root biomass for grass sample.

Root biomass for grass sample.

Root biomass for grass sample.

Root biomass in walls of excavation.

1. **Executive Summary, Page ix, first bullet on page**

   The word “vegetation” should be deleted from this bullet, in accordance with discussions held during the September 28, 2010 conference call. However, the remainder of the RAO, as it pertains to surface water, soils, sediments, and alluvial groundwater, remains valid for the early action and should be retained.

Response to Comment: The text will be modified as requested.

2. **Executive Summary, Page xi, Figure ES-1**

   It is unclear whether this figure is intended to remain in the document or be replaced by Table ES-1. Currently, there is no reference to the figure in the text, and the figure title is redlined, but it is identified in the List of Figures (appearing both in the Executive Summary and Section 7). The figure should be either deleted from the document and List of Figures, or appropriately labeled and referenced in the text.

Response to Comment: The figure will be removed. The list of figures will be revised.

3. **Executive Summary, Page xi, first paragraph, last sentence**

   A fence is generally considered an engineering control, not an institutional control. In addition, it was discussed and agreed during a previous conference call that the need for additional fencing would be presented in an “if and when needed” format rather than as an activity that will definitely be performed. Therefore, please modify the referenced sentence as follows:

   “Further interim controls may be implemented in consultation with the Agencies to control access and allow the new vegetation to establish without livestock grazing or disturbance.”

Response to Comment: The text will be modified as requested.

4. **Executive Summary, Page xii, first paragraph**

   As agreed during a September 28, 2010 conference call, all predictions regarding selenium uptake into vegetation as a result of the removal action should be removed from this EE/CA. Therefore, delete the following sentence in the Executive Summary and elsewhere throughout the document:

"Although plant uptake of selenium is not an RAO, revegetation with non-selenium accumulator plant species will reduce selenium concentrations in vegetation, compared to current conditions."

This sentence should be replaced with the following sentence that simply describes the work that will be performed:

"Although plant uptake of selenium is not an RAO, the disturbed areas will be revegetated with non-selenium accumulator plant species."

Response to Comment: The text will be modified as requested.

5. **Executive Summary, page xii, first full paragraph on page, second sentence**

This sentence should be modified as follows:

"This alternative is effective in both the long and short term and would likely not be inconsistent with the long term remedy at the site. However, it may be necessary to augment the removal action with additional response actions in the future as a result of information from the RI/FS and/or performance monitoring."

Response to Comment: The text will be modified as requested.

6. **Section 1.0, page 1, Introduction, Last sentence**

Remove the word "vegetation" from the sentence. Vegetation is not a part of the media addressed by this EECA.

Response to Comment: The text will be modified as requested.

7. **Section 1.2, page 2, last sentence in section**

Insert "RI/FS and the" prior to "five-year review process."

Response to Comment: The referenced sentence will be revised as follows: "The overall performance of the early action in meeting the response objectives for Conda, will be evaluated in the RI/FS and the five-year review process."

8. **Section 2.4, Page 11, Land Use and Ownership, Second paragraph, first sentence**

   The grazing allotments have not been closed, they have been restricted. Please replace the word “closed” with “restricted”.

Response to Comment: The text will be modified as requested.

9. **Section 3.1, page 13, last bulleted item, and footnote 9.** It is not clear what is meant by “pre-mine draw.” This term should be clarified.

Response to Comment: The last sentence in the referenced bullet will be revised as follows: “The bottoms of the pits are below the elevation of the draws which channel runoff near the top of the drainage basin, consequently limiting the potential for pit releases to surface water.[1]

10. **Section 5.0, page 25, paragraph 2, first sentence**
    Add the following to the referenced sentence: “however, it may be necessary to augment the removal action with additional response actions in the future.”

Response to Comment: The text will be modified as requested.

11. **Section 5.1, page 25, last bullet**

    The word “vegetation” should be deleted from this bullet, in accordance with discussions held during the September 28, 2010 conference call. However, the remainder of the RAO, as it pertains to surface water, soils, sediments, and alluvial groundwater remains valid for the early action and should be retained.

Response to Comment: The text will be modified as requested.

12. **Section 5.2, page 26, 4th paragraph, first sentence**

    Delete “and vegetation currently growing” from this sentence.

Response to Comment: To maintain consistency with the requested language in comment 26, the text will be modified as follows: “The source-control action at the Pedro Creek ODA would be intended to reduce the risks of erosion and mass wasting of the ODA materials, and to reduce the potential risks to wildlife and livestock from direct contact and ingestion, compared to current conditions.”

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[1] The bottom of SW-1 pit elevation (6,850 to 6,875 feet amsl) is below the draw channeling runoff near the top of the Pedro Creek drainage basin (6,940 to 6,960 feet amsl). The pit bottom also sloped towards the north. Infiltration into the pit likely enters the exposed Wells Formation, or becomes perched atop the Meade Peak Formation.

Resolution: The text will be revised as follows:

"The source-control action at the Pedro Creek ODA would be intended to reduce the risks of erosion and mass wasting of the ODA materials, and to reduce the potential risks to wildlife and livestock from direct contact and ingestion."

13. Section 6.1.4, Page 31, Soil Cover, last two sentences

Replace the words "typical" and "standard" with "conventional." There is no basis for the 12-18" soil cover to be considered a "standard."

Response to Comment: The text will be modified as requested.

14. Section 6.1.4, Page 31, Vegetative Cover, third sentence

Replace "is" with "may be" in the referenced sentence.

Response to Comment: The text will be modified as requested.

15. Section 6.1.4, Page 31, Soil Amendment and Fertilization, fourth and fifth sentences

These sentences, which present conclusions regarding Smoky Canyon plant uptake studies, should be deleted. Agency staff have not reviewed and concurred with conclusions presented in these documents.

Response to Comment: The referenced sentences will be deleted as requested.

16. Section 6.1.4, Page 31, Species Modification, last sentence

Add the following text: "… although selenium uptake to vegetation will be fully addressed in the RI/FS. However, the use of non-accumulator species to re-vegetate graded areas is consistent with future actions to be considered at the site."

Response to Comment: The reference sentence will be modified as follows: "The use of non-selenium accumulating species to revegetate graded areas is consistent with future actions to be considered at Conda. However, selenium uptake to vegetation will be fully addressed in the RI/FS."

17. Section 6.1.5, page 32, Fencing, last sentence

The referenced sentence should be modified as follows: "When adequate vegetative cover is present, the use of fencing will be removed on all public land, if determined appropriate."

Response to Comment: The text will be modified as requested.

18. Section 6.2, page 34, first paragraph, second sentence

The text regarding consistency with future remedial actions at the site is not appropriate for the paragraph introducing the alternatives. The evaluation of consistency with future remedial actions is covered later in the EE/CA. This sentence should be removed from the text in this section.

Response to Comment: The referenced sentence will be removed as requested.

19. Section 6.2.2, page 36, Institutional/Access Controls, second bullet under this heading

In accordance with agreements reached during a previous conference call that the need for additional fencing should be presented in an "if and when needed" format. Therefore, please modify the second sentence of this bullet as follows: "Temporary fencing around revegetated areas may be utilized, in consultation with the Agencies, to allow for adequate establishment of the vegetative cover."

Response to Comment: The text will be modified as requested.

20. Section 6.2.2.1, page 37, sixth sentence

See Comment #4.

Response to Comment: The text will be modified as requested.

21. Section 6.2, Compliance with ARARs discussions, Section 7.1.2, and Table 6-2

There is an inconsistency between the text and Table 6-2 in terms of the NPDES applicability. Table 6-2 indicates that NPDES requirements are applicable at the site, whereas the text describes the NPDES requirements as relevant and appropriate. Table 6-2 is correct in that the NPDES requirements are applicable at this site. Therefore, the text in Sections 6.2 and 7.1.2 regarding NPDES should be moved from the "Relevant and Appropriate" subsections to the "Applicable" subsections.

Response to Comment: The text will be modified as requested.

22. Section 6.2.2.1, page 39, Consistency with Potential Future Remedial Actions, first sentence

For consistency with previous documents, please refer to the "Southeast Idaho Phosphate Mining Resource Area". [Capitalize phosphate and add "mining"]

Response to Comment: The text will be modified as requested.

23. Section 6.2.3, page 41, last bullet

As previously indicated, a fence is generally considered an engineering control, not an institutional control. Therefore, please modify this bullet heading to read: "Institutional/Access Controls". This comment also applies to subsequent description of alternatives sections.

Response to Comment: The text will be modified as requested.

24. Section 6.2.4.1, page 42, sixth sentence

See Comment #4.

Response to Comment: The text will be modified as requested.

25. Section 6.2.4.1, page 46, fifth and sixth sentences

a) Delete the fifth sentence regarding expected effectiveness of the removal action in reducing plant uptake of selenium.

Response to Comment: The referenced sentence will be deleted as requested.

b) See Comment #4.

Response to Comment: The text will be modified as requested.

26. Section 6.2.4.1, page 47, Protectiveness, third sentence

Modify the referenced sentence as follows: "Placement of the soil cover and revegetation with non-accumulator species would provide for a reduction in selenium exposure via direct contact and ingestion".

Response to Comment: The text will be modified as requested.

27. Section 6.2.4.1, page 48, Consistency with Potential Future Remedial Actions, first sentence

For consistency with previous documents, please refer to the "Southeast Idaho Phosphate Mining Resource Area". [Capitalize phosphate and add "mining"]

Response to Comment: The text will be modified as requested.

28. Section 6.2.5, page 50, sixth bullet

As previously indicated, a fence is generally considered an engineering control, not an institutional control. Therefore, please modify this bullet heading to read: "Institutional/Access Controls."

Response to Comment: The text will be modified as requested.

29. Section 6.2.5.1, page 52, Consistency with Potential Future Remedial Actions, first sentence

For consistency with previous documents, please refer to the "Southeast Idaho Phosphate Mining Resource Area." [Capitalize phosphate and add "mining"]

Response to Comment: The text will be modified as requested.

30. Section 6.2.5, page 55, second bullet

As previously indicated, a fence is generally considered an engineering control, not an institutional control. Therefore, please modify this bullet heading to read: "Institutional/Access Controls."

Response to Comment: The text will be modified as requested.

31. Section 7.1.1, Page 62, Direct Exposure to Soil and Vegetation

As agreed during a September 28, 2010 conference call, this early action will not include an RAO to reduce plant uptake. Therefore, all predictions regarding selenium uptake into vegetation as a result of the removal action should be removed from this EE/CA. The paragraph should be modified to only address direct exposure to contaminated soil. A short second paragraph may be added to the section as a clarification:

"Although there are differences among the alternatives regarding covers which may result in differences in plant uptake of selenium and other contaminants, this exposure pathway is not specifically addressed by this EE/CA and early response action. Evaluation of the plant uptake pathway will occur in the RI/FS, and may require further remedial action."

Response to Comment: The text will be modified as requested.

Resolution: The subsection will be revised as follows:

"**Direct Exposure to Soil and Vegetation** - The SRE identified that concentrations of selenium and other COPCs in soils and vegetation on the ODA exceed their respective conservative risk-based benchmarks. Under Alternative 2, the potential for direct contact with ODA materials would remain. Under Alternatives 3 through 6 this would be prevented by installation of a soil cover. Alternative 2 includes direct revegetation of the ODA surface with plant species with a low affinity for selenium uptake. The addition of a soil cover and re-grading to reduce slopes under Alternatives 3 and 4 would provide slightly improved growth conditions for non-accumulator species. The thicker cover under Alternative 5, and the geosynthetic cover layers under Alternative 6 would discourage plant roots from reaching into the ODA materials. Although there are differences among the alternatives regarding covers which may result in differences in plant uptake of selenium and other contaminants, this exposure pathway is not specifically addressed by this EE/CA and early response action. Evaluation of the plant uptake pathway will occur in the RI/FS, and may require further remedial action."

32. Section 7.1.4, page 65, last paragraph, last sentence

The wording in this sentence is potentially confusing. The text should be changed to read: "Therefore, the potential for the need for additional actions would be lowest for Alternative 6, followed in order by Alternatives 5, 4, and 3. Alternative 2 would have the greatest potential for the need for additional actions."

Response to Comment: The text will be modified as requested.

33. Section 7.2, page 65, second paragraph, last sentence

The discussion of time to implement the actions is a short-term effectiveness issue and is covered in Section 7.1.3. Therefore, this sentence should be deleted.

Response to Comment: The referenced sentence will be deleted as requested.

34. Table 7-1, Implementability Criteria Ratings

As noted in Section 7.2 of the text, there is little difference among the alternatives in terms of implementability. The only significant differences are in terms of borrow material requirements and the need for specialized expertise for the liner for Alternative 6. Therefore the Implementability ratings in Table 7-1 should be:

Alternatives 2 and 3—rating of 1
Alternative 4—rating of 2
Alternative 5—rating of 4
Alternative 6—rating of 5

Response to Comment: Table 7-1 will be modified as requested.

35. Section 8.0, page 67, first bullet, third sentence

Modify the referenced sentence as follows: "The cover soils and revegetation would greatly reduce the erosion potential. Placement of the soil cover and revegetation with non-accumulator species would also provide for a reduction in selenium exposure via direct contact and ingestion."

Response to Comment: The referenced sentence will be modified as requested.

36. Section 8.0, page 67, second bullet, third sentence

Replace the sentence "Alternative 4 would likely be consistent with the future remedial actions at the site because it is unlikely that additional source control measures at this ODA would be necessary" with "Alternative 4 would likely be consistent with the future remedial actions at the site."

Response to Comment: The text will be modified as requested.

37. Appendix B, pages 5 through 9, Detailed Cost Estimates for Alternatives 2 through 6, last bullet under each alternative

a) As previously indicated, a fence is generally considered an engineering control, not an institutional control. Therefore, please replace Institutional controls" with "institutional/access controls."

Response to Comment: The text will be modified as requested.

b) Additionally, it is unclear why fencing around the seep and settlement basin is included in this cost estimate since the fencing around the seep and the settlement basin has been in place for several years. The description of alternatives sections indicate only that fencing was to be constructed around the newly graded surface of the ODA's. Please include information in the EE/CA explaining and supporting these costs.

Response to Comment: Portions of the fencing will need to be removed to facilitate construction activities. In addition, the existing fencing around the seep and settlement basin is in need of replacement. The text will be modified as follows:" Institutional/access controls are assumed to require $20,000 in costs to negotiate with private property owners and the BLM, and capital costs for replacement fencing to be installed around the seep and settlement basins (portions of the existing fencing will have to be removed to facilitate construction activities in the area), along with temporary fencing and other measures to limit cattle grazing in revegetation areas."