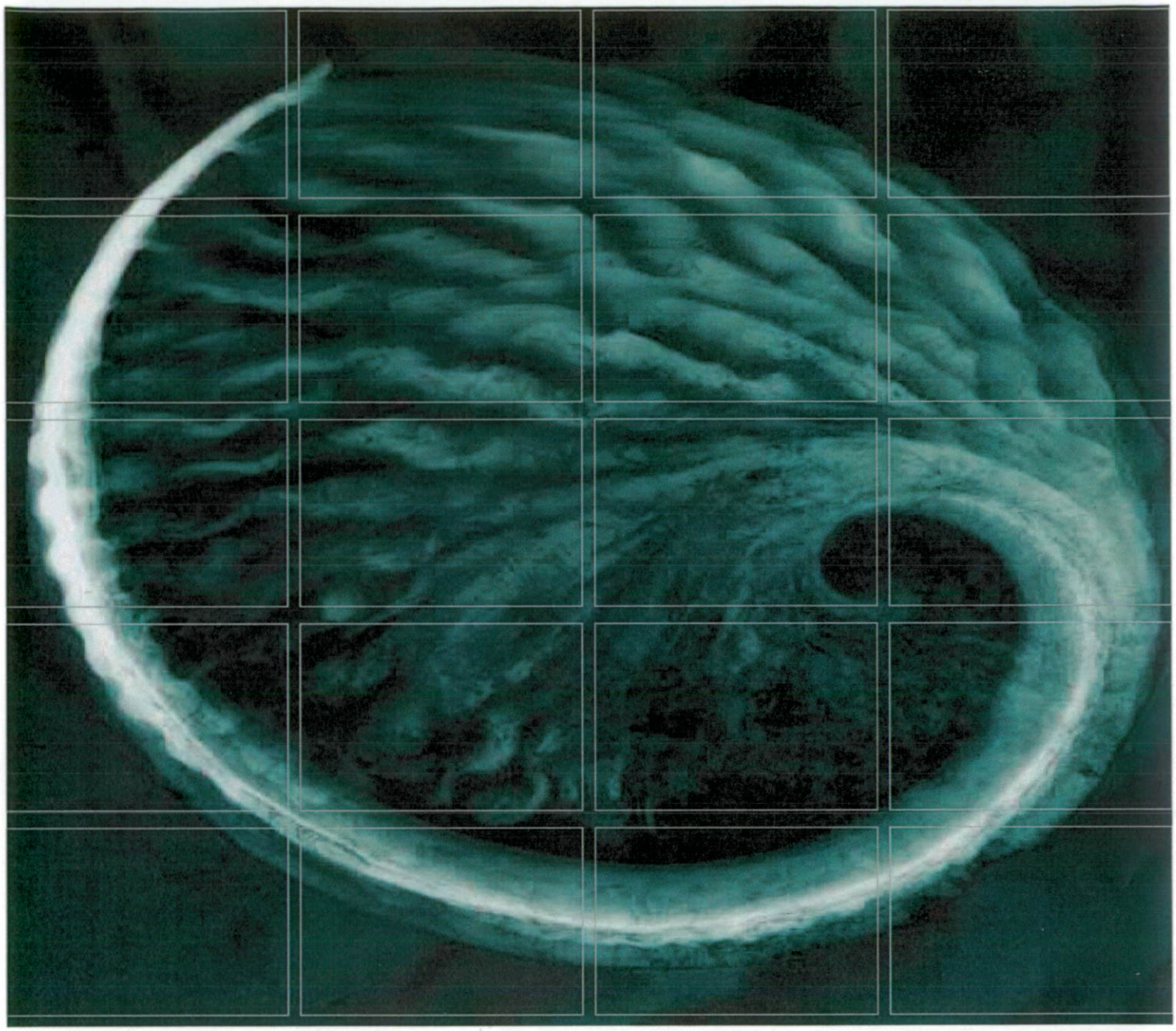

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Postclosure Plan and Financial Assurance

Richmond Hill Mine
Surface Mine Permit Nos. 445 and 460
Central City, South Dakota

May 28, 2015

Presented to:
LAC Minerals (USA), LLC
11457 Bobtail Gulch Street
Central City, South Dakota 57754

ENVIRONMENTAL RESOURCES MANAGEMENT
555 17th Street, Suite 1700
Greenwood Village, Colorado 80111
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LAC Minerals (USA), LLC
11457 Bobtail Gulch Street
Central City, South Dakota 57754

Postclosure Plan and Financial Assurance Cost Estimate

Richmond Hill Mine
Surface Mine Permit Nos. 445 and 460
Central City, South Dakota

May 28, 2015

Ted Cota, P.G.
Project Manager

Environmental Resources Management
555 17th Street, Suite 1700
Denver, Colorado 80202
(303) 741-5050

TABLE OF CONTENTS

TABLE OF CONTENTS I

LIST OF TABLES III

LIST OF FIGURES III

LIST OF APPENDICES III

EXECUTIVE SUMMARY 1

1.0 INTRODUCTION 1

1.1 DOCUMENT PREPARATION 4

1.2 SITE SETTING AND MINE FEATURES 4

1.3 MINE OWNERSHIP AND ENVIRONMENTAL STEWARDSHIP 5

2.0 PERMITTED POST-MINING LAND USE AND RECLAMATION OVERVIEW 6

2.1 SUMMARY OF COMPLETED RECLAMATION ACTIVITIES 7

2.2 WATER QUALITY SUMMARY 9

2.2.1 Surface Water Quality 9

2.2.2 Groundwater Quality 10

2.2.3 Aquatic Biological Monitoring 14

3.0 RECLAMATION AND POSTCLOSURE STATUS 16

3.1 FACILITIES UNDER THE 100-YEAR POSTCLOSURE MONITORING PERIOD 16

3.2 RECLAMATION OF WATER MANAGEMENT FACILITIES 17

3.2.1 General Reclamation Release Criteria and Activities 18

3.2.2 Facility-Specific Reclamation Activities 21

3.3 RECLAMATION PLANNED FOR THE SHORT TERM 23

3.4 RECLAMATION OF ROADS 23

4.0 POSTCLOSURE ACTIVITIES 25

4.1 POSTCLOSURE ACTIVITIES 25

4.1.1 Operation and Maintenance 25

4.1.2 Water Management 26
4.1.3 Postclosure Monitoring Program 28
4.1.4 Postclosure Status Review 32

4.2 GROUNDWATER QUALITY CONTINGENCY PLAN 32

4.3 FUTURE PIT IMPOUNDMENT AND LEACH PAD CAPPING SYSTEM MITIGATION 36

5.0 FINANCIAL ASSURANCE 37

5.1 ENGINEERING COST ESTIMATE 37

5.2 PERIODIC UPDATES TO COST ESTIMATES AND FINANCIAL ASSURANCE INSTRUMENTS 37

6.0 REFERENCES 39

LIST OF TABLES

Table 1	*Summary of Permitted Affected, Disturbed and Reclaimed Acreage*
Table 2a	*Postclosure Surface Water and Groundwater Monitoring Program Summary*
Table 2b	*Post Closure Sampling Parameter Lists*
Table 3	*Proposed Site-Specific Performance Criteria; Surface Water and Groundwater Monitoring Locations*

LIST OF FIGURES

Figure 1	*Site Location Map*
Figure 2	*Reduced Permit Area and Surface Facilities*
Figure 3	*Reduced Permit Area and Surface Facilities Under 100-Year Postclosure Care*
Figure 4	*Surface Drainages and Proposed Surface Water Sample Locations*
Figure 5	*Proposed Groundwater Sample Locations*
Figure 6	*Conceptual Final Reclamation Topography – Process Area*
Figure 7	*Conceptual Final Reclamation Topography – Pit Impoundment and Spruce Gulch*
Figure 8	*Topsoil Stockpiles*

LIST OF APPENDICES

Appendix A	*Postclosure Financial Assurance Cost Estimate*
Appendix B	*Photolog of the Richmond Hill Mine*
Appendix C	*Groundwater Quality Contingency Plan*
Appendix D	*Pit Impoundment and Leach Pad Capping System Failure Contingency Plan*

LAC Minerals (USA) LLC (LAC Minerals) and its predecessors operated and reclaimed the Richmond Hill Mine in the Black Hills of South Dakota under Surface Mine Permit Nos. 445 and 460 (SMPs 445 and 460) from 1988 to present. Active mining occurred from 1988 to 1993. LAC Minerals began reclamation actions at the Richmond Hill Mine in 1995.

The majority of the acreage disturbed during mining has been reclaimed and reestablished as viable wildlife habitat thus meeting the permitted post-mining land use of wildlife habitat. Site erosion is controlled, and a self-sustaining and diverse vegetative cover has been established across the mine permit area. Site surveys have shown wildlife use throughout the reclaimed areas.

The water quality at the Richmond Hill Mine is meeting all applicable surface water quality standards at permitted discharge points and applicable groundwater quality standards with the exception of sulfate, metals and pH in localized areas around the former Process Area, Pit Impoundment and Spruce Gulch. LAC Minerals actively manages water quality in these areas with two water management/treatment systems. Several years of surface water and groundwater monitoring results indicate that groundwater impacted from past mining operations is not migrating off of the permitted mine boundary or impacting surface water quality at permitted discharge points.

SMP 445 and the 1994 Permit Amendment reclamation release criteria (Reclamation Surety Condition 2 and Postclosure Conditions 4 and 5, respectively) require that the surface and groundwater quality within the permitted mine boundary meet the South Dakota surface and groundwater quality standards. However, the Permit Amendment also allows for the development of site-specific release criteria. The site-specific criteria are presented in the Postclosure Plan. The criteria also require LAC Minerals to develop and implement a Contingency Plan if a reclaimed facility begins to generate acid rock drainage (ARD) and a site-specific mitigation plan if ARD results in exceedances of South Dakota surface water and groundwater quality standards. Although the groundwater performance criteria are not met in small, localized areas within the permitted mine boundary, the performance criteria of the reclaimed surface in these areas have been achieved. Therefore, LAC Minerals is requesting to release the reclaimed acreage and to manage groundwater quality in postclosure as described in this Postclosure Plan and Financial Assurance (Postclosure Plan).

To address the reclamation surety release criteria, LAC Minerals will continue site-wide surface and groundwater monitoring, and add groundwater management activities during postclosure. Additionally, LAC Minerals will implement a Contingency Plan to conduct further assessment only if monitoring indicates a change in conditions that has the potential to cause an exceedance of the newly proposed site-specific water quality standards (i.e. performance criteria).

For the reclaimed acreage that meets the permitted post-mining land use of wildlife habitat, LAC Minerals is submitting this Postclosure Plan as a comprehensive package with the Petition for the Release of Reclamation Obligations (Petition) and an Updated Reclamation Plan and Financial Assurance (Updated Reclamation Plan). In the Petition, LAC Minerals is requesting that the South Dakota Board of Minerals and Environment (the Board) approve release of the reclaimed surface acreage meeting the permitted post-mining land use and allow LAC Minerals to continue groundwater management under a Board-approved Postclosure Plan.

Specifically, the Petition seeks the Board's approval on the following four actions:

(1) Release the reclamation bond and postclosure monitoring period for reclaimed and undisturbed acreage/facilities meeting the post-mining land use and South Dakota surface and groundwater quality standards. Once released, postclosure monitoring of these areas will not be required. These areas/facilities include:

- Richmond Hill Access Road, Spearfish Fire Trail and reclaimed mine roads;
- Reclaimed Topsoil Stockpiles along Richmond Hill Road;
- Land Application Area; and
- Limestone Quarry on SMP 460.

(2) Release the reclamation bond for reclaimed acreage/facilities in groundwater management areas that meet the surface reclamation obligations and the post-mining land use. Upon release, this acreage and associated facilities will enter into a 100-year postclosure monitoring period, which includes a Contingency Plan for further assessment, if needed, and financial assurance. These areas/facilities include:

- Former Spruce Gulch Waste Rock Facility;
- Pit Impoundment;
- V-Notch Area;

- Former Process Area (Leach Pads 1, 2 and 3);
- Passive Treatment Cell;
- Crusher Area;
- Carbonate Road;
- Turnaround Area;
- Administrative Area; and
- Limestone Quarry on SMP 445 and its access road as discussed in more detail below.

(3) Reclaim water management facilities after completion of water management activities during the 100-year postclosure period. The estimated reclamation costs for these are included in the Financial Assurance cost estimate. These facilities include:

- Spruce Gulch Water Management Facilities;
- South Gulch Water Collection and Transfer System;
- Process Area Water Management System including the water treatment plant, Lower Discharge Pond, Barren (Sludge Disposal), Pregnant and Storm Water ponds and adjacent areas;
- Fuel and ANFO Storage Areas;
- Maintenance Building Area;
- Geo Building Area;
- Reclaimed Topsoil Stockpile Areas on mine site;
- Front Gate and Guard Shack; and
- Water Management Roads including portions of the main Haul Road unless the road is transferred to an interested third party.

(4) Update the Reclamation Plan for facilities that will be reclaimed in the short term (within five years) as discussed in the Updated Reclamation Plan. Once the reclaimed facilities meet the reclamation release criteria and post-mining land use, the facilities will either be released with no postclosure monitoring or will be incorporated into the postclosure monitoring and activities as appropriate. Facilities to be reclaimed under the Updated Reclamation Plan include:

- Original Sludge Basin;
- Water Tank Area; and
- Upper Discharge Pond.

This Postclosure Plan summarizes the facility monitoring and maintenance, water quality monitoring and the groundwater management activities that will be conducted during the postclosure period. The Contingency Plan describes the site-specific groundwater performance criteria that would trigger additional assessment if groundwater monitoring indicates a change in conditions that could cause an exceedance of the surface water quality standards at permitted discharge points. The site-specific groundwater performance criteria take into consideration the effectiveness of groundwater protective measures already in place, the multi-year monitoring results and the conclusions of a hydrogeologic investigation of the Pit Impoundment Area.

The estimated costs to implement the postclosure activities over a 100-year postclosure period are summarized in the financial assurance cost estimate provided in Appendix A. Based on the postclosure activities and remaining reclamation, the engineering cost estimate to complete the tasks described in this Postclosure Plan has a Net Present Value (NPV) cost of $19,667,216. This includes an allowance of $200,000 to implement the Contingency Plan and a $100,000 allowance for the mitigation of a failure a Pit Impoundment or Leach Pad capping system, if needed.

In coordination with the South Dakota Department of Environment and Natural Resources (DENR), LAC Minerals will review the postclosure mine status and financial assurance every five years, or as needed, to evaluate whether the postclosure activities, cost estimate or postclosure term warrant modification.

1.0 *INTRODUCTION*

LAC Minerals (USA) LLC (LAC Minerals) and its predecessors operated and reclaimed the Richmond Hill Mine under Surface Mine Permit Nos. 445 and 460 (SMPs 445 and 460) from 1988 to present. During the active mining period (1988-93), a total of 172,294 ounces of gold and 212,610 ounces of silver were produced. LAC Minerals began reclamation actions at the Richmond Hill Mine in 1995.

Since 1995, the majority of the acreage disturbed during mining has been reclaimed and reestablished as a viable wildlife habitat thus meeting the permitted post-mining land use of wildlife habitat. Site erosion is controlled, and a self-sustaining and diverse vegetative cover has been established across the mine permit area. Site surveys have shown wildlife use throughout the reclaimed areas.

Water quality at the Richmond Hill Mine is meeting applicable surface water quality standards at permitted discharge points and applicable groundwater quality standards with the exception of sulfate, metals and pH in localized areas around the former Process Area, Pit Impoundment and Spruce Gulch. LAC Minerals actively manages water quality in these areas with two water management/treatment systems. Several years of surface water and groundwater monitoring results indicate that groundwater impacted from past mining operations is not migrating off of the permitted mine boundary or impacting permitted discharge points or downstream surface water quality.

Reclamation of the Richmond Hill Mine is governed by the South Dakota Board of Minerals and Environment (the Board) and the Department of Environment and Natural Resources (DENR) under SMPs 445 and 460. The South Dakota statutes, regulations, and LAC Minerals' mining permits, as amended through a 1994 permit amendment (Permit Amendment), technical revisions, and DENR and Board approvals, establish approved post-mining land uses, reclamation obligations and reclamation release criteria that must be achieved prior to surety release.

SMP 445 Reclamation Surety Condition No. 2, and the Permit Amendment Postclosure Conditions Nos. 4 and 5 require that:

- The mine's National Pollutant Discharge Elimination System (NPDES) effluent water quality limits, and South Dakota Surface Water and Ground Water Standards are met prior to reclamation surety and liability release;

- Submittal of a Contingency Plan if any completed component of the facility, including the Pit Impoundment and the waste rock left in the former Spruce Gulch Waste Rock Facility, begin to generate acid rock drainage (ARD); and

- Submittal of a site-specific mitigation plan if any completed component of the facility is generating ARD to the point where water quality-based performance criteria are exceeded.

Although the groundwater release criteria have not been achieved in localized areas within the permit boundary, the surface reclamation meets regulatory and permitted performance criteria and is suitable for wildlife habitat. Therefore, LAC Minerals is requesting the Board's approval to release the reclaimed acreage/facilities and allow LAC Minerals to continue management of groundwater quality under the postclosure period. To address the water quality reclamation surety release criteria, LAC Minerals will continue site-wide surface and groundwater monitoring, and groundwater management during postclosure. Additionally, LAC Minerals has developed a Contingency Plan to conduct further assessment if water quality monitoring indicates a change in groundwater conditions that has the potential to cause an exceedance of South Dakota surface water quality standards at permitted discharge points. The Contingency Plan is described in Section 4.2.

For the reclaimed acreage/facilities that meet the permitted post-mining land use of wildlife habitat, LAC Minerals is submitting this Postclosure Plan and Financial Assurance (Postclosure Plan) as a comprehensive package with the Petition for Release of Reclamation Obligations for Permits (Petition), and the Updated Reclamation Plan and Financial Assurance (Updated Reclamation Plan) to the Board for approval. A more detailed summary of Richmond Hill Mine reclamation performance criteria and of the reclamation completed to date is provided in the Petition.

The Petition requests the Board's approval to:

- Release reclaimed and undisturbed acreage/facilities meeting the surface reclamation requirements and South Dakota surface and groundwater quality standards without postclosure monitoring.

- Release reclaimed acreage/facilities in groundwater management areas meeting the surface reclamation requirements and continue monitoring these areas under a 100-year postclosure period and Contingency Plan.

- Reclaim water management acreage/facilities at the end of water management activities during the postclosure period.

- Update the Reclamation Plan for the facilities that will be reclaimed in the near term (within next five years).

This Postclosure Plan summarizes the activities that will be conducted at the Richmond Hill Mine during the postclosure period and the associated costs. The postclosure activities include routine maintenance and monitoring of the reclaimed acreage/facilities, Pit Impoundment monitoring, leak detection monitoring at the leach pads, Barren and Pregnant ponds and the former processing plant, water quality monitoring, and water management in the former Process Area, Pit Impoundment and Spruce Gulch.

The Contingency Plan describes the site-specific performance criteria that would trigger additional assessment if water quality monitoring indicates a change in groundwater conditions that could cause an exceedance of the surface water quality standards at permitted discharge points. The site-specific performance criteria take into consideration the effectiveness of groundwater protective measures already in place, the multi-year monitoring results and the conclusions of the Pit Impoundment area hydrogeologic investigation (ERM, April 2010).

The estimated costs to implement the postclosure activities over a 100-year postclosure period are summarized in the financial assurance cost estimate provided in Appendix A. These costs include a $200,000 allowance to implement the Contingency Plan and a $100,000 allowance for the mitigation of a failure a Pit Impoundment or Leach Pad capping system, if needed.

In coordination with DENR, LAC Minerals will review the postclosure status and financial assurance every five years, or as needed, to evaluate whether the postclosure activities, estimated costs or postclosure period warrant modification.

As part of the comprehensive package, LAC Minerals has also requested to retain access roads and buildings that will be needed for water management during the postclosure period (LAC Minerals, July 2014). The roads are needed to access water quality monitoring locations and management facilities. The buildings are needed to house water management equipment, and associated maintenance and storage facilities. Following water management activities, some of these roads will be returned to their pre-mining use for forest, private property and fire control access, and the remaining roads will be reclaimed as discussed in

Section 3.4. Similarly, the buildings will be reclaimed at the end of water management activities.

1.1 *DOCUMENT PREPARATION*

Environmental Resources Management (ERM) was retained by LAC Minerals to review and summarize the reclamation release criteria, the reclamation status for SMP's 445 and 460, and prepare the Petition, Postclosure Plan and Updated Reclamation Plan.

ERM's scope of work included conducting site visits to observe conditions within the permitted mine boundary, reviewing documents provided by LAC Minerals regarding its mining permits, the Permit Amendment and technical revision requirements, and conducting a hydrogeologic investigation of the Pit Impoundment Area (ERM, April 2010).

1.2 *SITE SETTING AND MINE FEATURES*

The Richmond Hill Mine lies within Lawrence County and is located approximately five miles west-northwest of Lead, South Dakota (Sections 10, 11, 14, 15, 22, 23 and 26, T5N, R2E, Black Hills Meridian). The mine is accessed via U.S. Highway 85 and 14A out of Lead, then west on Nevada Gulch Road (State Highway 473), then north on Richmond Hill Access Road into the permitted mine boundary.

A site location map is provided as Figure 1. The permit area and mine facilities are shown on Figure 2. The reclaimed acreage, water management facilities and access roads that will be monitored under the 100-year postclosure period are shown on Figure 3. A photo log of the mine site is provided as Appendix B.

The mine is largely surrounded by undeveloped pine forest with a few private residences along Richmond Hill Access Road, Spearfish Fire Trail, in the former Land Application area and in a new development in the Maitland area, two miles to the east. The Wharf Mine, a Large Scale Surface Gold Mine operated by Wharf Resources, and the reclaimed Golden Reward Mine, lie approximately two miles to the south. In 2014, new mining operations will begin at a portion of the Golden Reward Mine near Terry Peak under an expansion of the Wharf Mine permit. The nearest communities to the mine are Central City, South Dakota (population approximately 143) and Lead, South Dakota (population approximately 3,136), which are approximately five miles to the east-southeast (City-Data.com, August 2013).

1.3 *MINE OWNERSHIP AND ENVIRONMENTAL STEWARDSHIP*

The Richmond Hill Mine was developed by St. Joe Gold Corporation in 1988, and was acquired by Bond Gold Corporation in 1988. Construction of the mine facilities began in April 1988, and production began in the fall of 1988 with the first bar of gold and silver dore' poured in December 1988. LAC Minerals acquired Bond Gold Corporation in November 1989. In 1994, LAC Minerals became a wholly owned-subsidiary of Barrick Gold Corporation (Barrick). Barrick is a leading gold producer engaged in gold mining and related activities including exploration, extraction, processing and reclamation with a portfolio of operating mines and projects located across five continents (Barrick, August 2013).

The Environmental Policy Statement adopted by Barrick, LAC Minerals' parent corporation, commits the company to implement environmentally sound management practices because they are in the best interests of its business, its employees, its shareholders and the communities in which it operates. LAC Minerals has both the technical expertise and financial resources necessary to properly complete the postclosure obligations at the Richmond Hill Mine (Barrick, August 2013).

2.0 *PERMITTED POST-MINING LAND USE AND RECLAMATION OVERVIEW*

South Dakota mine land reclamation statute SDCL 45-6B-45 requires agreement by the operator, landowner and the Board on the designated post-mining uses for affected lands. Additionally, mine land reclamation regulations (ARSD 74:29:07:01) require that all affected lands be rehabilitated to a condition that meets the permitted post-mining land uses.

The permitted post-mining use for the Richmond Hill Mine is wildlife habitat. All of the areas within the permitted mine boundary are suitable for wildlife habitat with the exception of the facilities to be reclaimed in the near future (within the next five years) and those that will remain in service for water management during the postclosure period (Section 3.0).

To comply with the mine land reclamation requirements for wildlife habitat (ARSD 74:29:07:22), reclamation must optimize habitat diversity for game and non-game species, and provide vegetative cover appropriate for wildlife species that will benefit from the reclamation. Reclamation is considered complete when:

- Surviving vegetation is capable of supporting wildlife species identified in the Reclamation Plan;
- Understory is adequate to control erosion; and
- Stream fisheries approximate or exceed baseline conditions of the stream.

LAC Minerals and/or its predecessors have conducted the required baseline studies, and completed post-mining wildlife inventories, vegetative success evaluations, tree and shrub density surveys, and aquatic resources monitoring to document the achievement of wildlife habitat as a post-mining land use within the permitted mine boundary (Bar XX Environmental Service, LLC [Bar XX],2013; Cedar Creek Associates, Inc. [Cedar Creek], March 2009; GEI Consultants, Inc. [GEI], April 2013 and Appendix G of the Petition; Gilbert, September 2010). The Petition provides a more detailed summary of these studies.

Richmond Hill Mine reclamation is complete for approximately 78 percent of the affected acreage and has achieved a sustainable wildlife habitat. The mine's reclaimed areas consist primarily of open meadows and the post-mining topography include flat areas, three to one and steeper slopes, and

highwalls at the Pit Impoundment and Limestone Quarry, providing habitat diversity. The reclaimed meadows have improved wildlife habitat by providing relatively large foraging areas with interspersed cover that were otherwise lacking within the surrounding forested areas. In particular, the success of vegetative growth since 2002 and related increase in use by wildlife in the reclaimed mine area has been outstanding based upon independent vegetation surveys (Bar XX,2013; Cedar Creek, March 2009; GEI, April 2013) and wildlife surveys (Gilbert, September 2010).

2.1 *SUMMARY OF COMPLETED RECLAMATION ACTIVITIES*

Reclamation activities that have contributed to a successful wildlife habitat post-mining land use are as follows:

- The Limestone Quarry and V-Notch Area were graded, topsoil placed and re-vegetated to prevent erosion and maintain a self-sustaining vegetative cover.

- Following cessation of spraying activities in the Land Application Area, lysimeter/tensiometer stations were removed. This area has a well-established, self-sustaining vegetative cover to prevent erosion, as was necessary for proper land application operations, and no additional reclamation is required.

- The Richmond Hill Mine pit (Pit Impoundment) has been backfilled, capped with a multi-layered cover, graded, topsoil placed and re-vegetated to stabilize highwalls, prevent erosion and maintain a self-sustaining vegetative cover.

- In Spruce Gulch, the waste rock with ARD potential was returned to the mine pit and the Spruce Gulch area was graded, topsoil placed and re-vegetated to prevent erosion and maintain a self-sustaining vegetative cover.

- LAC Minerals has and continues to implement a weed management program to prevent noxious weed infestations.

- A French drain, cutoff trench and water treatment facility were constructed to capture and treat ARD runoff in Spruce Gulch prior to discharge to Cleopatra Creek.

- A portion of the sulfidic spent ore from Leach Pad 3 was relocated to the Pit Impoundment and limestone was blended into the spent ore remaining on the pad as a further ARD mitigation. Subsequently, Leach Pads 1, 2 and 3 were capped with a multi-

layered cover, graded, topsoil placed and re-vegetated to prevent erosion and maintain a self-sustaining vegetative cover. The Leach Pad 3 French drains were also capped, and the drainage from Leach Pads 1, 2 and 3 is captured and treated prior to discharge into Rubicon Gulch.

- A pump-back system was installed and continues to operate as needed to capture effluent from the French drain below the Barren, Pregnant and Storm Water ponds. The water is pumped back to the Storm Water Pond for subsequent treatment.

- Highwalls were mined in accordance with approved plans and inspected annually by DENR. Highwalls are reduced, fenced and/or access is otherwise controlled in accordance with the approved Reclamation Plan.

- Adequate surface water controls have been established to prevent erosion and are maintained in accordance with the mine's Surface Water Discharge (SWD) Permit.

- Roads have been reclaimed, will be reclaimed at the end of water management activities or will remain in their current configurations for long-term access to private property, forest service land and fire control as discussed in Section 3.4. LAC Minerals is requesting the Board's approval to retain certain roads in accordance with ARSD 74:29:07:12 (10) (LAC Minerals, July 2014).

- The former Administration Building, Crusher, and Maintenance Area Contractor Building were removed. The disturbed areas were graded, covered with topsoil and re-vegetated to prevent erosion and maintain a self-sustaining vegetative cover. The Maintenance and Geo buildings, and the water treatment facilities remain and will be reclaimed after water management activities are completed in the postclosure period. LAC Minerals requested the Board's approval to retain these buildings in accordance with ARSD 74:29:07:13 (LAC Minerals, July 2014).

- Water quality meets applicable standards at permitted surface water discharge locations and in groundwater with the exception of localized groundwater impacts in the former Process Area, Pit Impoundment, and Spruce Gulch. The Pit Impoundment was constructed to mitigate elevated sulfate and metals concentrations, and depressed pH values in groundwater in these areas.

- Surface and groundwater monitoring, Pit Impoundment monitoring and leak detection monitoring at the reclaimed leach pads and the Barren Pond (Sludge Disposal Pond), Pregnant Pond and process plant will continue through the postclosure period. Additionally, the Postclosure Plan includes a Contingency Plan and $200,000 allowance in the event that additional water quality assessment is needed.

Section 2.2 provides a detailed summary of the historical and current surface water and groundwater quality at the Richmond Hill Mine. Section 4.0 summarizes the future postclosure water management activities, monitoring programs and Contingency Plan.

2.2 *WATER QUALITY SUMMARY*

Surface and groundwater quality monitoring results are summarized and reported to DENR in the Annual Water Quality Report. A summary of the 2013 monitoring results (LAC Minerals, March 2014) is provided herein. For reference, the surface water and groundwater quality monitoring locations sampled over the last several years are depicted in Figures 3 and 7 of the Petition, and the sample schedule and parameter list are summarized in Tables 4a and 4b, in the Petition. The postclosure surface and groundwater sample locations are shown in Figures 4 and 5, respectively, and the postclosure sampling schedule and parameter list are provided in Tables 2a and Table 2b, respectively. Note that the sample locations and the sampling schedule have been reduced for the postclosure care period. Historical water quality graphs for selected surface water and groundwater sampling locations are included in Appendix F of the Petition.

2.2.1 *Surface Water Quality*

In accordance with the SWD Permit, surface water quality is monitored at four compliance points designated #001, #002, #003 and #004 and two instream monitoring points in Cleopatra Creek designated OEA-1 (STR-1) and OEA-3B (STR-2) (Figure 3, Petition). The monitoring results show that water at these locations is of consistently high quality, and meets all permitted numeric effluent limitations and South Dakota Surface Water Quality Standards (SDSWQS).

Under the Hydrologic Monitoring Plan (Technical Revision No. 50) and Technical Revision No. 67, water quality in Cleopatra Creek, which lies south of the Pit Impoundment and former Spruce Gulch Waste Rock Facility areas, is monitored at four surface water sample locations designated OEA-1, OEA-2, OEA-3, and OEA-3B, and water quality in

Spruce Gulch is monitored at two locations designated the "Waste Dump Toe" and "Retention Pond Below" (Figure 3, Petition). Cleopatra Creek receives flow from Spruce Gulch, South Gulch, West Gulch and North Gulch. The "Waste Dump Toe" location monitors the effluent at the south end of the French drain and the "Retention Pond Below" location monitors the effluent from the toe of the Retention Pond. The 2013 Annual Water Quality Report indicates that water quality meets numeric SDSWQS at all sampling locations along Cleopatra Creek (LAC Minerals, March 2014).

Sulfidic waste rock from the Richmond Hill pit was used in the construction of the French drain for Leach Pad 3. The water quality of the effluent from the French drain, which is monitored at FD-2, was impacted by the sulfidic waste rock. These impacts included high sulfate and metals concentrations, and low pH. As part of the Leach Pad Closure Plan, these drains were capped and the surface water flow was diverted to the southwest, away from the inlets to the drains. Since completion of these mitigation measures in 1996, water quality in FD-2 has significantly improved with downward trends in the concentrations of sulfate and metals, and stabilization of pH levels. Water quality at FD-2 currently meets SDSWQS, except for pH (LAC Minerals, March 2014). Water at FD-2 flows through SWD Compliance Point #004, and as noted above, water quality at SWD Compliance Point #004 meets all permitted numeric effluent limitations and SDSWQS.

FD-1 is situated at the toe of the western embankment of the Storm Water Pond, and monitors effluent from the French drain below the Barren, Pregnant and Storm Water ponds. FD-1 has shown increases in sulfate, TDS, nitrate and trace metals in the past. These increases are most likely the result of decreased spring flows in the area along with possible leakage through the single HDPE liner in the Storm Water Pond (LAC Minerals, March 2014). A collection system was constructed in 1997 to capture effluent from FD-1 and, as necessary, pump it back to the Storm Water Pond. The collection system was modified in 2013 to pump the effluent to the Pregnant Pond.

2.2.2 *Groundwater Quality*

LAC Minerals monitors groundwater quality at the Richmond Hill Mine in accordance with the requirements of the Hydrologic Monitoring Plan and Technical Revision No. 67 at 13 groundwater monitoring wells and one spring (Figure 7, Petition). Upon completion of mining operations in the Richmond Hill Mine pit in 1993, groundwater quality concerns were identified in the alluvial/colluvial aquifer of South Gulch. Subsequently, an interceptor trench and lined retention pond were constructed to

capture surface and groundwater flows to prevent this water from migrating past South Gulch Spring. Upgrades of the South Gulch collection facility, including a concrete foundation, new HDPE lined pond in a metal building, new pumps and electrical system were completed in the spring of 2009.

Pit Impoundment Area

Two main aquifers are present in this area, a shallow alluvial/colluvial aquifer and a deeper bedrock aquifer (LAC Minerals, March 2014). The deeper bedrock aquifer is present beneath the entire area and consists primarily of Precambrian amphibolite and meta-sediments, which are intruded by Tertiary igneous rocks that consist primarily of monzonite and quartz monzonite porphyries. Along slopes and drainages, the Precambrian bedrock is covered by a thin layer of colluvium or alluvium that is 20 feet or more thick in topographic lows. Groundwater flow in the deeper aquifer occurs mainly in fractures in the upper part of the metamorphic and igneous bedrock. Groundwater flow in the alluvial/colluvial aquifer is downslope and along the surface water drainages, with most of the flow occurring beneath the stream valleys.

Groundwater quality in the North Gulch, West Gulch and South Gulch drainages is assessed through a network of seven monitoring wells and one spring location that are sampled quarterly or semi-annually in accordance with the Hydrologic Monitoring Plan and Technical Revision No. 67 (Table 4a, Petition). Water quality in the alluvial/colluvial aquifer is monitored in in South Gulch in wells MW-17, MW-29 and the South Gulch spring (Figure 7, Petition). Water quality in the bedrock aquifer is monitored in North Gulch in wells MW-9B and MW-24; in West Gulch in wells MW-25 and MW-30, and in South Gulch in well MW-26 (Figure 7, Petition).

Groundwater in the alluvial/colluvial and bedrock aquifers in the area immediately surrounding the Pit Impoundment has been impacted by past mining activities and disposal of sulfidic waste rock and spent ore in the pit. Impacts to the alluvial/colluvial aquifer are limited to South Gulch. Impacts to the bedrock aquifer are limited to the upper portions of the North Gulch, West Gulch and South Gulch drainages. These impacts have included elevated concentrations of sulfate, metals and low pH. However, groundwater quality in these drainages currently meets all groundwater quality standards except for cadmium and pH in South Gulch, and pH in West Gulch (LAC Minerals, March 2014).

The sulfate and metals concentrations in the South Gulch alluvial/colluvial monitoring wells MW-17, MW-29 and in the South Gulch spring have shown significant improvement since completion of

construction of the Pit Impoundment in 1995, and currently meet SDGWQS, except for cadmium (LAC Minerals, March 2014). The pH values in MW-17, MW-29 and the South Gulch spring have been stable or improving over the past few years, but remain below SDGWQS.

The sulfate and metals concentrations in bedrock monitoring wells MW-24 in North Gulch and MW-25 in West Gulch, have declined over time, and currently meet SDGWQS. The pH values in MW-25 have been stable or improving over the past few years, but remain below SDGWQS in MW-25 (LAC Minerals, March 2014).

The sulfate concentrations in the South Gulch bedrock monitoring well MW-26 have declined over the past couple of years, and are currently below SDGWQS (LAC Minerals, March 2014). Since 2006 there has been an increase in the groundwater elevation in this well, and a corresponding increase in metals concentrations and decline in pH values. In 2013, SDGWDS for cadmium and pH were exceeded in this well. MW-26 is completed in an un-mined remnant of the Richmond Hill ore body and these water quality impacts may be related to sulfide mineralization in this area combined with the infiltration of surface water runoff that flows from the Pit Impoundment capping system to the South Gulch drainage.

The groundwater quality in bedrock monitoring well MW-30 in West Gulch is good and all parameters meet SDGWQS (LAC Minerals, March 2014). There have been no significant changes in water quality in this well since it was installed in 1995.

Spruce Gulch Area

Similar to the Pit Impoundment Area, the hydrology of Spruce Gulch consists of a shallow alluvial aquifer and a deeper bedrock aquifer. However, the alluvial aquifer is perched and is not in communication with the bedrock aquifer, which is situated approximately 165 feet below the ground surface. The alluvial aquifer varies from 5 to 20 feet in thickness with some thicker areas located directly in drainage channels (LAC Minerals, March 2014).

Groundwater quality in Spruce Gulch is assessed through a network of four monitoring wells in the alluvial/colluvial aquifer that are sampled quarterly in accordance with the Hydrologic Monitoring Plan (Petition, Table 4). The Spruce Gulch monitoring wells are designated MW-19, MW-20, MW-27, and MW-28. MW-27 and MW-28 are located within the footprint of the former Spruce Gulch Waste Rock Facility, and MW-19 and MW-20 are located downgradient of the Retention Pond dam (Figure 7, Petition).

Groundwater quality in the alluvial/colluvial aquifer in Spruce Gulch has been impacted by the past disposal of sulfidic waste rock in the former Spruce Gulch Waste Rock Facility. Sulfate concentrations have exceeded the groundwater quality standard in wells MW-19, MW-20, MW-27 and MW-28 in past monitoring events. However, the sulfate groundwater quality standard is currently met in wells MW-19, MW-27 and MW-28. In well MW-20, which is completed in the bedrock aquifer downgradient of the Spruce Gulch treatment ponds, sulfate concentrations exceeded groundwater quality standards in April and June of 2008, but remained below groundwater standards during monitoring events in 2013.

The lower pH water quality standard has been exceeded in wells MW-19, MW-27 and MW-28 during past monitoring events. Currently MW-19 meets groundwater quality standards, while MW-27 and MW-28 below the pH standard. Since removal of the waste rock from the former Spruce Gulch Waste Rock Facility and construction of the Pit Impoundment in 1995, pH values have exhibited a stable trend. In well MW-20 and at the Retention Pond Below monitoring station, the pH water quality criteria have been continually met since January 1995.

Historically, metals including arsenic, cadmium, copper, nickel and zinc have been detected in wells MW-19, MW-20, MW-27 and MW-28, and concentrations have exhibited downward or stable trends. The groundwater quality criteria for these metals have been continually met in these four wells since January 1995, with the exception of cadmium in MW-28.

Leach Pad and Process Area

The hydrology of the Leach Pad and former Process Area, which is located at the uppermost reach of the Rubicon Gulch drainage, consists of a shallow alluvial/weathered bedrock aquifer and a deeper bedrock aquifer (Golder Associates, Inc. and Schafer & Associates, December 1992). However, the alluvial/weathered bedrock aquifer is perched and not in communication with the deeper bedrock aquifer, which is situated approximately 140 to 300 feet below the surface. The alluvial/weathered bedrock aquifer varies from 10 to 20 feet in thickness with some thicker areas located directly in drainage channels.

Groundwater quality in the Leach Pad and former Process Area is monitored in two wells that are sampled quarterly or semi-annually in accordance with the Hydrologic Monitoring Plan and Technical Revision No. 67. Water quality in the alluvial/weathered bedrock aquifer is monitored in wells MW-14 and LP3-MW (Figure 5).

The groundwater in the alluvial/weathered bedrock aquifer has been impacted in the former Process Area (LAC Minerals, March 2014). These impacts have included elevated concentrations of sulfate and metals, and low pH. In addition, minor impacts to the pH in monitoring well MW-14 have occurred periodically since 2001.

LP3-MW monitors water quality in the alluvial/weathered bedrock aquifer downgradient of surface water monitoring location FD-2. The water quality in this monitoring well has been impacted by the sulfidic waste rock used in the construction of the French drain for Leach Pad 3. However, since completion of capping of the French drain in 1996, water quality in LP3-MW has significantly improved with downward trends in the concentrations of sulfate and metals, and stabilization of pH levels. Water quality at LP3-MW currently meets SDGWQS, except for pH (LAC Minerals, March 2014).

MW-14 monitors water quality in the alluvial aquifer at the head of Rubicon Gulch below the northwestern corner of the Storm Water Pond. Since 2001, water quality in this well has periodically had pH values slightly below South Dakota groundwater quality standards. pH values in MW-14 are currently meeting groundwater quality standards (LAC Minerals, March 2015).

2.2.3 *Aquatic Biological Monitoring*

Aquatic biological monitoring is conducted in Cleopatra Creek, Labrador Gulch and Rubicon Gulch in accordance with the requirements of the SWD Permit. The Aquatic Biological Monitoring Plan (Chadwick Ecological Consultants, Inc., August 2006) was developed in consultation and accordance with the requirements of the South Dakota Department of Game, Fish and Parks. Under this plan, five study sites were established with three locations on Cleopatra Creek (SQ-1, SQ-2, and SQ-3), one location on Labrador Gulch (LB-4) upstream of the confluence with Cleopatra Creek and one location on Rubicon Gulch (RB-1) downstream of SWD Compliance Point #004 (Figure 5, Petition). At each monitoring site habitat, benthic invertebrate populations and periphyton algae populations were assessed annually, and fish populations were assessed every three years beginning with the 2005 survey year.

The 2012 aquatic biological monitoring of Cleopatra Creek, Labrador Gulch and Rubicon Gulch found that healthy aquatic communities were present in all five study sites (GEI, April 2013). Benthic invertebrate communities were diverse and contained a number of different invertebrate groups at relatively high abundances with the survey sites rated as "excellent," "very good" or "good" with respect to

macroinvertebrate communities. Periphyton algae populations at most sites were "robust" and were rated as "good" with respect to number of periphyton taxa.

All five study sites supported fish populations with brook trout the only species captured (GEI, April 2013). The high number of individuals captured at all sites indicates that populations are fairly robust. Fish density and biomass varied between sites; however, this appeared to be a function of stream size rather than the effects of mining operations.

Although past mining activities have had some impacts on aquatic biota, the 2012 and previous benthic invertebrate, periphyton, and fish population data indicate that these impacts have been mitigated and did not have a long-term effect on aquatic resources.

3.0 *RECLAMATION AND POSTCLOSURE STATUS*

The reclamation status of the affected lands within the mine permit boundary is summarized in Table 1 and depicted in Figure 3. Of the combined 341.03 total affected acres from SMP #445 and SMP #460, 265.94 reclaimed acres (approximately 78 percent) meet the surface reclamation release criteria and post-mining land use of wildlife habitat. Of the 265.94 acres, 45.29 acres will not require monitoring under a postclosure period and 220.65 acres will require postclosure monitoring. Of the 74.99 acres not yet reclaimed, 73.33 acres will be reclaimed at completion of water management operations during postclosure and 1.76 acres will be reclaimed within the next five years. This Postclosure Plan, therefore, applies only to the 220.65 acres entering postclosure care monitoring and the 73.33 acres that will be reclaimed after completion of water treatment.

For long-term planning and consistent with South Dakota reclamation statutes (SDCL 45-6B-91), the postclosure period will be 100 years, subject to LAC Minerals' adjustments as approved by DENR and the Board during periodic postclosure review.

Table 1 – Summary of Permitted Affected, Disturbed and Reclaimed Acreage

Permitted Affected Acreage (Includes Permit Nos. 445 & 460)	460.20
Total Acreage Affected as of December 31, 2014	341.03
Total Surface Mining Disturbed Acreage	205.68
Acreage Meeting Post-Mining Land Use, Water Quality Standards and Releasable without Postclosure Monitoring	45.29
Acreage Meeting Post-Mining Land Use and entering a 100-year Postclosure Monitoring Period	220.65
Acreage that will be Reclaimed at the Completion of Water Treatment and during the 100-year Postclosure Period	73.33
Acreage that will be Reclaimed in the Short Term under the Updated Reclamation Plan	1.76

3.1 *FACILITIES UNDER THE 100-YEAR POSTCLOSURE MONITORING PERIOD*

Figure 3 shows the reclaimed facilities within the permit area that will be monitored and maintained under a 100-year postclosure period. These facilities include:

- Former Spruce Gulch Waste Rock Facility;

- Pit Impoundment;
- V-Notch Area;
- Former Process Area including Leach Pads 1, 2 and 3;
- Passive Treatment Cell;
- Former Crusher Area.
- Carbonate Road;
- Turnaround Area;
- Administrative Area; and
- Limestone Quarry on SMP 445 and its access road.

Activities that will be conducted during postclosure at these facilities are described in Section 4.0.

3.2 *RECLAMATION OF WATER MANAGEMENT FACILITIES*

Water management facilities and facilities that are no longer in service or that will be replaced in the short term comprise the only remaining unreclaimed acreage (74.99 acres) at the Richmond Hill Mine. Of the remaining 74.99 acres, 73.33 acres will be reclaimed at the completion of water management activities and 1.76 acres will be reclaimed within five years. Reclamation of remaining roads is discussed in Section 3.4.

The following facilities will be reclaimed at the completion of water management activities during the postclosure period:

- Spruce Gulch Water Management Facilities and water pipeline from Spruce Gulch to Water Treatment Plant inside Haul Road berm;
- South Gulch Water Collection and Transfer System;
- Process Area Water Management System including the water treatment operations building, Lower Discharge Pond, the Barren (Sludge Disposal Pond), Pregnant and Storm Water ponds, and adjacent areas;
- Fuel and ANFO Storage Areas;

- Maintenance Building and surrounding area;
- Front Gate and Guard Shack;
- Reclaimed Topsoil Stockpile Areas on mine site;
- Geo Building Area; and
- Water Management Access Roads including portions of the main Haul Road unless the road is transferred to an interested third party.

Reclamation of these facilities will be consistent with the requirements specified in SMPs 445 and 460, as amended by the Permit Amendment and technical revision. General and specific reclamation activities are discussed in Sections 3.2.1 and 3.2.2, respectively. The conceptual final reclamation topography and roads in the Process Area, and the Pit Impoundment and Spruce Gulch area are shown in Figures 6 and 7, respectively. Reclamation costs for these facilities are included in the postclosure financial assurance cost estimate (Appendix A).

As the reclamation meets the performance criteria and permitted post-mining land use of wildlife habitat, LAC Minerals, in coordination with DENR, will request the Board for release of further reclamation obligations under this Postclosure Plan. Upon release, the reclaimed acreage will not require further postclosure monitoring or will continue to be part of the Postclosure Plan.

In compliance with South Dakota mined land reclamation regulation ARSD 74:29:07:13, LAC Minerals has also submitted a request to the Board to retain the buildings and structures needed for water management during the postclosure period (LAC Minerals, July 2014). The regulation requires reclamation of buildings and structures unless it can be demonstrated that the improvements will be consistent with the approved post-mining land use. The buildings are necessary to house the water management systems, and to store maintenance equipment and supplies during the postclosure period.

3.2.1 *General Reclamation Release Criteria and Activities*

LAC Minerals will reclaim the 73.33 acres consistent with the requirements specified in SMPs 445 and 460, as amended through the Permit Amendment and technical revision. These are the same methods demonstrated to achieve successful reclamation of the majority of the Richmond Hill Mine (Petition).

Grading

The affected acreage will be graded to achieve visually and functionally compatible contours with the surrounding landscape (ARSD 74:29:07:03), and final grades will be completed in a manner that controls erosion and sedimentation (ARSD 74:29:07:04) and meet the contour and slope requirements of the Reclamation Plan. The final grades will therefore be compatible with the post-mining land use of wildlife habitat (SDCL 45-6B-37).

Revegetation

Graded areas will be revegetated with the grass mixture approved in Technical Revision No. 41, which modified the permitted seed mixture to improve the survival success rate by field fitting the plants in environments similar to their natural occurrence in the Black Hills. The seed mix is capable of providing a long-lasting vegetative and self-regenerating cover to increase stability and erosion control. The seed mixture was developed in consultation with the South Dakota Department of Game Fish and Parks (ARSD 74:29:07:06).

The 73.33 acres will be reseeded with the following seed mixture:

- Western Wheatgrass (Agropyron smithii);
- Thickspike Wheatgrass (Agropyron dasystachyum);
- Slender Wheatgrass (Agropyron trachycaulum);
- Durar Hard Fescue (Festuca ovina var. Duriuscula);
- Kentucky Bluegrass (Poa pratensis);
- Timothy (Phleum pratensis);
- White Dutch Clover (Trifolium repens); and
- Nurse Crop (rye, oats, or barley).

The site-specific performance release criteria established in the mine permit Reclamation Plan and Technical Revision No. 41 apply to the 73.33 acres. The performance release criteria require the reclaimed areas to meet the following criteria:

- Achievement of at least forty 40 percent total live ground cover by grasses, legumes, and forbs;

- Adequate understory to control erosion;
- Control of noxious weeds;
- Establishment of vegetative cover that is permanent and self-generating;
- Vegetation composition (i.e., cover, density, and diversity) shall be appropriate for post-mining land use of Wildlife Habitat; and
- Surviving vegetative species composition is capable of supporting wildlife species identified in the Reclamation Plan.

Trees and shrubs will also be planted in the Process Area after water treatment is completed. These plantings will be consistent with the requirements of the Reclamation Plan and Technical Revision No. 41. The trees and shrubs will be beneficial to wildlife, especially along the restored drainages in the area. Forbs will also be added to the seed mix as they were during the seeding of other reclaimed areas of the mine.

Disposal of Refuse

All solid waste, including trash, debris, building demolition waste and rubble that may be generated during reclamation will be transported off site, and disposed of at permitted facilities in accordance with all local, state and federal regulations.

Erosion and Sediment Control

During the reclamation period, LAC Minerals will comply with the Richmond Hill Mine SWD Permit and site-wide Storm Water Pollution Prevention Plan (SWPPP) to eliminate or minimize contact of storm water with materials or activities that may result in pollution of runoff. Where contact cannot be eliminated or reduced, the SWPPP specifies how storm water will be managed with Best Management Practices (BMPs) for erosion and sediment control.

The BMPs are identified in the SWPPP, which is updated when changes in facility layout or activities occur at the mine that could affect storm water quality. LAC Minerals submitted a SWD Permit renewal on November 23, 2009 to the DENR Surface Water Quality Program and DENR's response is pending.

3.2.2 *Facility-Specific Reclamation Activities*

Front Gate and Guard Shack

The front gate and guard shack will be demolished, and the disturbed footprint will be backfilled or ripped as needed, covered with topsoil and revegetated with the grass seed mix approved in Technical Revision No. 41. The estimated earthwork and topsoil required for the reclamation of the front gate and guard shack are summarized in Attachment A, Table A2-3.

Water Management Facilities - Buildings

The water management facilities include the Spruce Gulch Water Management Facilities, South Gulch Water Collection and Transfer System and Process Area Water Management System. At the time these treatment systems are decommissioned, LAC Minerals will determine what, if any, equipment, materials or wastes generated from closure activities will require testing for waste characterization and management in accordance with state and federal requirements.

Once decommissioning is complete and equipment is removed, the buildings will be demolished and any generated debris will be managed in accordance with state and federal regulations. The disturbed footprint will be backfilled, graded, covered with topsoil and revegetated with the grass seed mix approved in Technical Revision No. 41. The estimated earthwork and topsoil required for the reclamation of the water management buildings are summarized in Attachment A, Table A2-3.

Water Management Facilities - Ponds

The water management ponds include the Spruce Gulch treatment and retention ponds, South Gulch Water Collection pond and the Process Area Water Management System ponds (Barren, Pregnant and Storm Water Ponds). At the end of water management activities, LAC Minerals will develop a Pond Closure Plan specifying the methodology for pond dewatering and sampling. Sludge from the ponds will be dewatered and deposited in the Barren Pond (Sludge Disposal Pond). Where possible, pond liners will be perforated and buried in place. Liners that cannot be left in place will be shredded and disposed of at permitted off-site facilities in accordance with all local, state and federal regulations. Pond berms will be removed to restore drainage, and the disturbed footprint will be backfilled and graded, covered with topsoil, fertilized and seeded with the grass seed mix approved in Technical Revision No. 41. The estimated earthwork and topsoil required for the reclamation of the ponds are summarized in Attachment A, Table A2-3.

Original Sludge Basin

The original Sludge Basin will be closed and reclaimed within the next five years as described in the Updated Reclamation Plan. The Barren Pond has been converted into a Sludge Disposal Pond as a replacement for the original Sludge Basin. The estimated earthwork and topsoil required for the reclamation of the original sludge basin are summarized in Attachment A of the Updated Reclamation Plan, Table A2-3.

Sludge Disposal Pond

Closure and reclamation requirements for the Sludge Disposal Pond will be consistent with those described in Technical Revision No. 64. These requirements include covering the Sludge Disposal Pond with a minimum of a minimum of 1 foot of clay or a geosynthetic liner. Random fill to achieve proper shedding of water will then be placed over the clay or liner followed by six inches of topsoil capable of sustaining vegetation and seeding to allow the vegetation to become established. The clay and random fill will be derived from recontouring the area around the pond during reclamation. The estimated earthwork and topsoil required for the reclamation of the sludge disposal pond are summarized in Attachment A, Table A2-3.

The placement of the cover will be completed when the sludge is sufficiently dry to allow construction equipment to operate on the material in the pond.

Monitoring Well Abandonment

Monitoring wells will be abandoned in accordance with South Dakota statutes and regulations.

Topsoil Stockpiles for Reclamation Activities

Approximately 69,763 cubic yards (yd^3) of topsoil have been stockpiled for reclamation activities. There are three remaining topsoil stockpiles in the former Process Area. Approximately 30,000 yd^3 of topsoil are located west of the Pregnant Pond; 15,000 yd^3 are located north of Leach Pad 3 and 22,263 yd^3 are located east of Leach Pad 3 for a total volume of 67,263 yd^3 in the Process Area. In addition, there are approximately 2,500 yd^3 of topsoil remaining west of the Spruce Gulch Water Management Facility. The locations of the remaining topsoil stockpiles are shown in Figure 8.

The topsoil from the stockpiles in the Process Area will be used to reclaim that area including, but not limited, to the pond and treatment plant areas. The topsoil in the Spruce Gulch area will be used to reclaim that area. Topsoil will be hauled from one area to another if additional topsoil is needed in a particular area.

3.3 *RECLAMATION PLANNED FOR THE SHORT TERM*

The following facilities are planned to be reclaimed within the next five years:

- Original Sludge Basin;
- Water Tank; and
- Upper Discharge Pond.

Reclamation activities and associated costs for these facilities are summarized in the Updated Reclamation Plan. Reclamation of these areas will also be consistent with the requirements specified in SMPs 445 and 460, as amended by the Permit Amendment and technical revisions. As the reclamation meets the performance criteria and permitted post-mining land use of wildlife habitat, LAC Minerals, in coordination with DENR, will petition the Board for release of further reclamation obligations for these facilities. Upon release, the reclaimed facilities will not require postclosure monitoring or will become part of the Postclosure Plan.

3.4 *RECLAMATION OF ROADS*

Former mine and Process Area roads have been reclaimed, will be reclaimed at the end of water management activities or will remain for long-term functional use. The reclamation and post-mining status of the roads are depicted in Figure 3.

In the request to the Board to retain the water management buildings and structures, LAC Minerals' has also requested to retain roads needed for water management during the postclosure period. ARSD 74:29:07:12(10) requires reclaiming roads within the mine permit area unless it can be demonstrated that these improvements will be consistent with the approved post-mining land use. The roads are necessary to access water quality monitoring stations and water management facilities through the postclosure period (LAC Minerals, July 2014).

Per ARSD 74:29:07:12(10), a road may be permitted to remain unreclaimed if the surface landowner has requested that the road remain unreclaimed and agrees to be responsible for future maintenance. Roads included in this request are those needed to access water quality monitoring stations and water management facilities during the postclosure period. The roads include the Richmond Hill Access Road, Main Haul Road, Carbonate Road, Spearfish Fire Trail, Rubicon Gulch Access Road, Limestone Quarry Road and Water Management Roads in the former Process, Spruce Gulch

and South Gulch areas. With the exceptions of the Richmond Hill Access Road, Main Haul Road, Carbonate Road, Spearfish Fire Trail, Rubicon Gulch Access Road and Limestone Quarry Road, all roads will be reclaimed after water management activities are completed.

The Richmond Hill Access Road, the Rubicon Gulch Access Road through the process area, the Carbonate Road along the southwestern edge of the process area and the Spearfish Fire Trail along the southeastern edge of the process area will remain after water management activities are completed. These roads will have long-term functional use for access to private residences and US Forest Service lands north and west of the mine and for fire control. The southern portion of the Haul Road will be realigned along the original Carbonate Road to the west or the Haul Road will be transferred to an interested third party who will assume responsibility and liability for the road. If realigned, the Haul Road will be fully reclaimed and if transferred, the footprint will be reduced to a 26-foot wide right-of-way. The Limestone Quarry access road will remain in place, as permitted under Technical Revision 40 to Mine Permit No. 445, to allow for future excavation and study of the paleontological fossils.

4.0 *POSTCLOSURE ACTIVITIES*

Postclosure activities within the permit area will ensure continued effectiveness of the reclamation measures and compliance with applicable performance standards during the postclosure period. The postclosure activities will commence upon the Board's release of the affected acreage meeting the post-mining land use of wildlife habitat and approval of this Postclosure Plan in conjunction with the Petition and Updated Reclamation Plan.

4.1 *POSTCLOSURE ACTIVITIES*

Postclosure activities include operation and maintenance, water management, water quality monitoring and periodic postclosure status reviews.

4.1.1 *Operation and Maintenance*

Routine Site Inspections

Site inspections of the reclaimed acreage, water treatment and support facilities will be conducted on a monthly basis. The frequency of inspections will be assessed periodically. Changes in the inspection frequency will be reflected in the financial assurance at the five-year review, as needed (Section 4.1.4). Observations will be logged to document inspection dates, conditions and routine maintenance conducted.

Annual visual inspections of the leach pad and Pit Impoundment covers will be performed to monitor for stability, erosion control and deep rooting vegetation, including pine trees and ceanothus. Visual inspections will include observations for potential surface cracking, subsidence, stressed vegetation, erosion rills or slumping. If field inspections identify any of these conditions, LAC Minerals will evaluate the need for a more detailed assessment. Deep rooting vegetation will be removed to prevent penetration into the leach pad and Pit Impoundment caps.

Fencing and Signage

Fencing and signage along the remaining highwalls and along mine access roads will be monitored routinely, and maintained as needed to restrict access and provide public warning.

Final Vegetative Cover

During postclosure care, LAC Minerals will perform visual monitoring to identify areas that may require repair and/or maintenance of the vegetative cover. Repair and maintenance may include regrading and reseeding areas disturbed by reclamation activities, storm water maintenance or significant storm events. Approved seed mixes will be used, if needed.

Sediment and Erosion Control Structures

Storm water management structures will be monitored and repaired as needed to prevent extensive erosion and sediment loading in drainages. Repair activities may include localized reseeding or enhancement of storm water management controls, as appropriate, and would be determined based on the results of inspections. LAC Minerals will maintain a SWPPP as part of their SWD Permit.

Inspection and Localized Treatment of Noxious Weeds

Reclamation and routine weed management have effectively controlled noxious weeds and prevented infestations within the mine property. Noxious weed treatment will continue during postclosure as needed.

Access Roads and Buildings

Roads will be graded and sediment control structures will be maintained as needed in accordance with the storm water control requirements in the SWD Permit. Buildings will be maintained as needed during the postclosure period and public access to buildings will continue to be restricted to LAC Minerals employees, their contractors and to DENR upon request.

4.1.2 *Water Management*

Impacted groundwater in the former Process Area, Pit Impoundment and Spruce Gulch is actively managed by two water management/treatment systems. These systems will continue to operate during the postclosure period.

The Spruce Gulch Water Management Facility treats the storm water runoff from the former Spruce Gulch Waste Rock Facility, and water that is collected and piped from South Gulch. Caustic (sodium hydroxide) is added to the Spruce Gulch pond to raise the pH of the water, allowing metals to precipitate. The resulting sludge is placed in the on-site approved Sludge Disposal Pond. The treated water is then discharged to Spruce Gulch and monitored at surface water discharge compliance point 001.

The Process Area Water Management System treats water from the reclaimed leach pads and Storm Water Pond. The collected water may be treated in one of two ways before release to the permitted surface water discharge compliance point 004 and Rubicon Gulch. A more detailed description of the water management processes is provided in Attachment 1 of the SWD Permit renewal application submitted on November 23, 2009. Currently, treatment may be completed under the following options:

1. Reverse osmosis (RO) with biological treatment utilizing molasses and nutrients, and the use of the Pregnant Pond and Storm Water Pond for staging and temporary storage. In this treatment option, the water from the leach pads first flows into the Pregnant Pond, then to the Storm Water Pond, and then to the water management system for treatment. The flows entering the treatment plant are initially filtered. Following the filtration, the flow is pumped to a RO treatment unit. An antiscalent is added to the flow prior to it entering the RO unit. The brine from the RO unit is sent to the bioreactors for selenium removal. There are two anaerobic bioreactors in series, followed by an aerobic unit and fine-bubble water column. Molasses and nutrients are added as needed to enhance the treatment in the anaerobic units. After treatment in the anaerobic and aerobic units, the treated brine flow is sent to polishing filters and either combined with RO permeate and discharged to Rubicon Gulch (Outfall 004) or returned to the Pregnant or Storm Water Pond for future treatment. This treatment scenario is operated, as needed, on a seasonal basis.

2. Biological treatment without RO utilizing the Pregnant Pond and Storm Water Pond as needed for staging and temporary storage. LAC Minerals can operate the biological treatment system on a seasonal or continuous basis.

3. A third option outlined in the SWD Permit renewal application to utilize the chemical precipitation treatment system is no longer a viable option as the chemical precipitation system (i.e., selenium treatment circuit) has been shut down and dismantled.

The Postclosure Financial Assurance cost estimate (Appendix A) includes the water treatment operation and maintenance costs for a 100-year postclosure period. The cost estimate accounts for utilities, plant operator salary, equipment maintenance and periodic replacement, chemicals, materials, and the cost to remove and reclaim these areas at the end of water management during the postclosure period.

4.1.3 *Postclosure Monitoring Program*

During the postclosure period, LAC Minerals will perform surface water and groundwater quality monitoring, aquatic biological monitoring, Pit Impoundment monitoring, and leach pad monitoring consistent with the Hydrologic Monitoring Plan, Technical Revision No. 50, Technical Revision No. 52, Technical Revision No. 62, Technical Revision No. 67 and the SWD Permit. However, based on several years of monitoring data, the monitoring and reporting schedule and monitoring parameters will be modified for the postclosure period. The postclosure water quality monitoring schedule is summarized in Table 2a and the associated parameter lists are summarized in Table 2b. The modified postclosure surface water and groundwater sampling locations are shown in Figures 4 and 5, respectively.

Surface Water Discharge Permit Monitoring

The SWD Permit is effective through June 30, 2010 and LAC Minerals submitted a permit renewal application on November 23, 2009 to the DENR Surface Water Quality Program. Issuance of the permit renewal is pending DENR review and approval. The permit renewal application proposes the following modifications to the SWD Permit:

- Reduce the monitoring frequency of Outfalls 002 and 003 to quarterly on the basis that these outfalls do not show water quality impacts due to mining and have been consistently stable with good water quality since 1994; and

- Eliminate Whole Effluent Toxicity (WET) testing at Outfalls 002 and 003 as these locations have passed the Ceriodaphnia and fathead minnow WET test permit criteria, and water quality is good showing stable trends since 1994.

The permit renewal application also requests confirmation that all storm water discharges from the mine site, including those associated with any on-site construction projects, are covered by the SWD Permit and that additional coverage under SWD General Permit for Storm Water Discharges Associated with Industrial or Construction Activities are not required for construction or reclamation projects.

As required, LAC Minerals will continue to follow the existing SWD Permit monitoring requirements until the permit renewal is issued.

Hydrologic Monitoring Plan

In addition to conducting SWD Permit monitoring, LAC Minerals will continue to implement the Hydrologic Monitoring Plan during the

postclosure period. This includes monitoring at 13 groundwater monitoring wells and 10 surface water locations to assess water quality, and trends in pH, sulfate and metal concentrations. The monitoring locations are shown on Figures 4 and 5, and the postclosure monitoring schedule is summarized in Tables 2a and 2b.

Ten surface water locations (SWD Compliance Points #001, #002, #003, and #004, surface water sites OEA-1, OEA-3B, Waste Dump Toe, Retention Pond Below and FD-2) and 13 groundwater monitoring wells/sites (MW-9B, 14, 17, 19, 20, 24, 25, 26, 27, 28, 29, 30 and LP3MW) and South Gulch spring are identified as sentinel monitoring locations. The sentinel monitoring locations are positioned at surface and groundwater flow locations that are downgradient of historical mining operation areas (e.g., Pit Impoundment, Spruce Gulch, and Leach Pads), and are representative of the quality of water in those locations.

In addition, monitoring will continue to be performed at surface water locations OEA-2, OEA-3, OEA-4 and S-5 in conjunction with the Aquatic Biological Monitoring Plan (Chadwick Ecological Consultants, Inc., August 2006).

Surface water monitoring will be discontinued at locations OEA-1B-S7, OEA-2A, OEA-2B, and OEA-3A-S4 along Cleopatra Creek, and S-3 along Cole Creek (Petition, Figure 3). Since completion of the Pit Impoundment and reclamation of the former Spruce Gulch Waste Rock facility, monitoring results have shown that the surface water at the monitoring locations along Cleopatra Creek and Cole Creek meet South Dakota surface water quality standards (LAC Minerals, February 2013).

Groundwater monitoring at MW-2, MW-4B, MW-5, MW-11, MW-13, MW-15, MW-22, MW-23, SW-2, SW-8, and SW-15 will be discontinued during the postclosure period (Petition, Figure 6). Water quality in monitoring wells MW-2, MW-4B, MW-5, MW-11, MW-15 and MW-23 has met South Dakota groundwater quality standards in recent years. MW-22 has been dry since its inception. Water quality in supply wells SW-2, SW-8 and SW-15 is also good, except for MW-13 and SW-2, which has had periodic detections of arsenic above South Dakota groundwater quality standards. The arsenic levels in SW-2 are similar to pre-mining levels and are believed to be from natural leaching of arsenic from the deep water supply aquifer (LAC Minerals, February 2013).

As necessary, LAC Minerals will collect and treat affected waters prior to discharge under the SWD Permit. Facilities, buildings, and associated access roads will be operated and maintained, including:

- Process Area Water Management System – Barren (Sludge Disposal) Pond, Pregnant Pond, Water Treatment Plant;
- Storm Water Pond;
- South Gulch Water Collection And Transfer System; and
- Spruce Gulch Water Treatment System and Ponds.

As described in Section 4.2, a Contingency Plan has been prepared as part of the Postclosure Plan that identifies site-specific performance criteria LAC Minerals proposes to use for triggering additional actions in the event water quality at defined "sentinel" monitoring locations indicate a change in groundwater conditions that could cause an exceedance of the surface water quality standards at permitted discharge points (Table 3).

Aquatic Biological Monitoring

Aquatic biological monitoring will also continue to be conducted in Cleopatra Creek, Labrador Gulch and Rubicon Gulch in accordance with the requirements of the SWD Permit. The Aquatic Biological Monitoring Plan (Chadwick Ecological Consultants, Inc., August 2006) was developed in consultation and accordance with the requirements of the South Dakota Department of Game, Fish and Parks. Under this plan, five study sites were established with three locations on Cleopatra Creek (SQ-1, SQ-2, and SQ-3), one location on Labrador Gulch (LB-4) upstream of the confluence with Cleopatra Creek and one location on Rubicon Gulch (RB-1) downstream of SWD Compliance Point #004 (Petition, Figure 5). As agreed to by DENR, LAC Minerals will perform the aquatic biological monitoring every other year for the first 10 years and then every five years for the next 20 years. No aquatic biological monitoring will be performed after 30 years.

Pit Impoundment Monitoring

In addition to surface and groundwater quality monitoring, LAC Minerals will conduct monitoring at the Pit Impoundment in accordance with Technical Revision No. 52 as modified below:

- Quarterly download and review of temperature and heat dissipation unit (HDU) data;
- Quarterly monitoring of Barrel Lysimeter #5;
- Annual monitoring of Barrel Lysimeters 1, 3, 4 and 6;

- Annual monitoring of the Basin Lysimeters and piezometers; and,
- Annual visual inspections of the cap and surroundings (settlement surveys will be discontinued); and
- Monitoring of O_2/CO_2 levels in the backfill by neutron probe measurements every five years.

The Pit Impoundment monitoring program and the location of the monitoring systems are described in the annual mine pit backfill monitoring reports (Tetra Tech, March 2013). The monitoring systems were installed in 1995 and were designed to last a minimum of 10 years (Schafer and Associates, April 1998). Monitoring will continue to be performed during the postclosure period as long as the monitoring systems remain operational.

Leach Pad and LDCRS Monitoring

Leach Pad and Leak Detection Collection Recovery System (LDCRS) monitoring will continue in accordance with Technical Revision No. 52 and Technical Revision No. 62 as modified below:

- Weekly Leach Pad effluent flow measurements;
- Semi-annual Leach Pad effluent water quality analysis;
- Annual visual inspections of the cap and surroundings (settlement surveys will be discontinued); and
- Weekly LDCRS readings.

Inspection and Monitoring of Other Facilities

Periodic inspections of other facilities will be performed by site personnel during normal operation and maintenance activities. These inspections will include the condition of the cover and vegetative growth on the original sludge basin, water management facilities and other buildings retained for the postclosure period, and fencing.

Annual Reporting

Results of the surface water and groundwater quality monitoring, Pit Impoundment monitoring, and Leach Pad and LDCRS monitoring along with site meteorological data will be summarized in an Annual Report submitted to the DENR.

4.1.4 *Postclosure Status Review*

Every five years, or as needed, LAC Minerals will complete postclosure financial assurance review. The review will evaluate the effectiveness of reclamation with regard to the applicable release criteria of SMPs 445 and 460, such as highwall stability, fencing and signage, sediment and erosion control, sustainability of vegetative cover, noxious weed management, surface water quality, groundwater quality and management, and the post-mining land use as wildlife habitat. The review schedule and frequency may be adjusted as warranted based on site conditions and as agreed to by LAC Minerals and DENR.

LAC Minerals will develop deed restrictions, in conjunction with DENR, for the former Process Area (including Leach Pads 1, 2 and 3), original Sludge Basin and Pit Impoundment within two years of entering the Postclosure Period.

4.2 *GROUNDWATER QUALITY CONTINGENCY PLAN*

DENR approved the Amendment to Mine Permit No. 445 (dated December 2, 1993) with a condition stating that if any completed component of the facility is generating ARD to the point where water quality-based performance criteria are exceeded, then a mitigation or a Contingency Plan will be required. The Contingency Plan described in this subsection and included as Appendix C takes into consideration the effectiveness of groundwater protective measures already in place, the multi-year surface and groundwater monitoring results and the conclusions of the hydrogeologic investigation of the Pit Impoundment area (ERM, April 2010).

Groundwater Protective Measures

The Richmond Hill Mine pit was mined from December 1988 through October 1993. During mining operations, approximately 3.75 million tons of waste rock from the mine pit was placed in the upper reaches of Spruce Gulch. In July 1992, ARD was detected in the toe of the waste rock backfill, and in February 1994, a permit amendment was approved to return the waste rock to the mine pit and to cap the waste rock with a multi-layer protective cover.

Approximately 2.7 million tons of ARD waste rock from Spruce Gulch and 727,000 tons of sulfidic spent ore from Leach Pad 3 were placed and capped in the Pit Impoundment. The backfill materials were constructed in 3-foot lifts and contoured at 2.5H:1V and 3H:1V slopes. A multi-layer capping system was placed over the waste rock, which consists of a 0.5-foot crushed limestone buffer, 1.5-foot bentonite clay amended soil, 4.5-

foot thermal protection layer of spent ore and 0.5-foot of topsoil. The cap area was seeded with a mixture consisting of grasses and legumes that was specifically formulated to provide stability while preventing penetration of the clay liner system by deep-rooting plants (e.g., trees and shrubs).

The non-reactive waste rock remaining in Spruce Gulch was reclaimed in place and regraded to 2H:1V slope. Removal of the waste rock uncovered natural soil along the original topographic contour of Spruce Gulch. The exposed natural soils were amended with limestone to neutralize acidification from the ARD waste rock by disking in limestone to a depth of approximately 6 inches. The area was topsoiled and revegetated in accordance with the mine permit, as amended and with Technical Revision No. 41.

Upon cessation of gold refining operations, LAC Minerals began reclaiming the leach pads in accordance with the Permit Amendment conditions and the Heap Leach Pad Cover and Reclamation Design (Golder Associates Inc., May 1996). Leach Pads 1 and 2 were neutralized using hydrogen peroxide to oxidize the cyanide, cyanide compounds and complexes. Neutralization continued until testing verified the treated water met the DENR approved off-load standards.

As discussed above, sulfidic spent ore with a high potential to produce ARD was placed in the upper three lifts of Leach Pad 3 during mining operations. Under the revised Reclamation Plan, approximately 727,000 tons of this material was removed and placed in the Pit Impoundment and capped with the waste rock from Spruce Gulch. The spent ore remaining in Leach Pad 3 was amended with limestone and limestone-bearing rock to mitigate the potential to produce ARD.

All three leach pads were covered with a multi-layer capping system consisting of a 1.0-foot bentonite clay amended soil, a 4-foot thermal protection layer of material excavated from the V-Notch area and 6inches of topsoil. The leach pad caps were graded to 3H:1V slopes and revegetated in accordance with the requirements of SMPs 445 and 445, the Permit Amendment and Technical Revision No 41. Construction of the leach pad caps was completed in October 1997.

Surface and Groundwater Quality

Since construction of the Pit Impoundment, the Spruce Gulch groundwater interception and treatment system and Leach Pad 3 cap, surface and groundwater quality at the Richmond Hill Mine has shown significant and continuing improvement. The surface water quality at the mine permit boundary (as measured at monitoring locations in Cleopatra

Creek and Rubicon Gulch) meets applicable standards. However, groundwater quality standards for pH and cadmium are not consistently met in groundwater monitoring wells MW-17, MW-25, MW-26, MW-29 and the South Gulch spring.

Pit Impoundment monitoring data indicates a slow movement of stored water within the backfill from two major precipitation events that occurred during construction of the Pit Impoundment and is likely the cause of the increased sulfate levels (LAC Minerals, February 2010). Sulfate can be generated from the oxidation of sulfide-bearing minerals, such as pyrite, which occurs in the mined ore-bearing rocks as well as the un-mined Precambrian metamorphic rocks in the area.

Hydrogeologic Investigation of Pit Impoundment Area

In 2010, LAC Minerals conducted a hydrologic and geochemical modeling study to evaluate groundwater quality in the Pit Impoundment area and determine the potential source(s) of sulfate in the bedrock groundwater. The objectives of the hydrologic and geochemical modeling investigation were to:

- Assess the geology, hydrogeology and current groundwater quality; and
- Develop spreadsheet-based geochemical mixing cell models to estimate future sulfate concentrations in the bedrock aquifer in the Pit Impoundment area.

A report summarizing the findings of this investigation was submitted to DENR in April 2010 (ERM, April 2010).

The results of the investigation indicated that the primary source of the elevated sulfate concentrations in the bedrock aquifer is probably drainage from the waste rock backfill in the Pit Impoundment. Leaching of sulfate from an un-mined remnant of an oxidized and mineralized zone of the Richmond Hill ore deposit in South Gulch may also be a secondary source of sulfate in the groundwater in this area.

The geochemical model simulations indicate that the sulfate concentrations have reached maximum levels in most of the bedrock monitoring wells and the South Gulch spring, and will continue to decline over time and remain below the 500 mg/L regulatory standard for sulfate in groundwater. The model simulations indicate that the sulfate concentrations in monitoring well MW-9B would probably continue to increase and will remain above the 500 mg/L regulatory standard for the next 10 to 15 years. However, the sulfate concentrations in this well began

to decline in 2011 and are currently below 200 mg/L. The long-term sulfate concentrations in bedrock monitoring well MW-26 could not be predicted by the model simulations because of the presence of a secondary source of sulfate in South Gulch. The continued leaching of sulfate from the altered bedrock above the water table in this area will probably result in elevated sulfate concentrations in this well for an indeterminate period of time.

Contingency Plan Site-Specific Performance Criteria

Based on the results of the hydrologic and geochemical studies, it was concluded that the impact of the drainage from the backfill on bedrock groundwater quality in the Pit Impoundment area was limited and that no immediate mitigation measures are needed other than continued groundwater quality monitoring. Additional assessment will be implemented in the future if water quality parameters at "sentinel" monitoring locations in the Pit Impoundment area exceed the proposed site-specific performance criteria presented in Table 3 in two successive sampling events. The proposed performance criteria are the current regulatory standards, except for pH, sulfate and cadmium. These performance criteria should provide an adequate amount of time for additional assessment to be conducted before an exceedance of the surface water quality standards at permitted discharge points occurs. Postclosure financial assurance includes a financial allowance of $200,000 to conduct further investigation of this area, if needed in the future, as described in more detail in the Groundwater Quality Contingency Plan (Appendix C).

The pH values in monitoring wells MW-17, MW-25, MW-26, MW-27, MW-28, MW-29 and the South Gulch spring are currently below the minimum regulatory standard of 6.5 S.U. for groundwater (Section 2.2). Since the water quality in these wells has been relatively stable or improving in recent sampling events, except for MW-26, a pH performance criterion of less than 5.5 S.U. is proposed for MW-25, less than 6.0 S.U. for MW-27, less than 3.5 S.U. for MW-26 and MW-28, and less than 3.0 S.U. for monitoring wells MW-17, MW-29 and the South Gulch spring (Table 3). The proposed pH performance criterion for the other monitoring wells in the Pit Impoundment area is the minimum regulatory standard of 6.5 S.U. for groundwater.

The sulfate concentrations in monitoring wells MW-9B, MW-17, MW-19, MW-20, MW-25, MW-26, MW-27, MW-28, MW-29 and the South Gulch spring have exceeded the 500 mg/L regulatory standard for groundwater during past sampling events (Section 2.2). The cadmium concentrations in MW-17, MW-19, MW-20, MW-26, MW-27, MW-28, MW-29 and the South Gulch spring also currently exceed or have exceeded the 0.005 regulatory standard for groundwater during past sampling events. However, the

water quality in all of these wells has been relatively stable or improving in recent sampling events. Therefore, a sulfate performance criterion of 700 mg/L is proposed for monitoring wells MW-9B, MW-17 and MW-26, a sulfate performance criterion of 600 mg/L is proposed for monitoring well MW-25, and a sulfate performance criterion of 1,000 mg/L is proposed for monitoring well MW-29 and the South Gulch spring (Table 3). A cadmium performance criterion of 0.100 mg/L is proposed for monitoring wells MW-17, MW-29 and the South Gulch spring, and a cadmium performance criterion of 0.015 mg/L is proposed for monitoring well MW-26 and 0.010 mg/L is proposed for monitoring well MW-28 (Table 3). The proposed sulfate and cadmium performance criterion for the other monitoring wells in the Pit Impoundment area are the groundwater regulatory standards of 500 mg/L and 0.005 mg/L, respectively.

For the surface water locations #001, #002 and #003 a pH less than 6.5 S.U., a cadmium concentration of more than 0.005 mg/L, a sulfate concentration of more than 200 mg/L for #002 and #003, and a sulfate concentration of more than 500 mg/L for #001 (Table 3) are proposed as site-specific performance criteria for implementing additional assessment activities.

4.3 FUTURE PIT IMPOUNDMENT AND LEACH PAD CAPPING SYSTEM MITIGATION

The Pit Impoundment and Leach Pad capping systems have met or exceeded original design specifications. The covers are also stable and have been in place with self-generating vegetation for more than 15 years. However, in the event of a failure of either of these capping systems in the future, a Pit Impoundment and Leach Pad Capping System Failure Contingency Plan has been developed (Appendix D) and a $100,000 allowance for the mitigation of a capping system failure has been added to the engineering cost estimate (Section 5.1).

5.0 *FINANCIAL ASSURANCE*

Financial assurance is required for postclosure activities subject to SDCL 45-6B-91, and constitutes an important safeguard to protect the environment from unplanned impacts that may have occurred during mining and reclamation. The following is a description of the financial assurance cost estimate, the methodology used to prepare the cost estimate, the detailed engineering cost estimate and periodic reviews to ensure adequate funds if LAC Minerals is unable to complete the required activities.

LAC Minerals will submit proposed financial assurance instrument(s) as part of the Petition, Updated Reclamation Plan, Postclosure Plan, and financial assurance submittal package to the Board.

5.1 *ENGINEERING COST ESTIMATE*

ERM prepared a detailed engineering cost estimate for each of the Postclosure Plan activities described above. The estimate includes labor, expense and administration unit costs in the event that DENR needed to contract with third parties to complete the work.

Standard engineering cost estimating methods were used for both unit costs and quantities (contractor labor hours, equipment rental hours, supplies, etc.). Other assumptions built into the costs include periodic replacement of water treatment system components to ensure the systems are operable and well maintained.

Postclosure cost estimates were input into the State of South Dakota's "BONDCALC" spreadsheet program as a framework to track each unit cost. An engineering cost estimate for the post-closure period is presented in Appendix A. This appendix includes details of unit costs, volume/quantities, assumptions and contingencies. Based on the postclosure activities and remaining reclamation, the engineering cost estimate to complete the tasks described in this Postclosure Plan has a Net Present Value (NPV) cost of $19,667,216. This includes a $200,000 allowance for implementation the groundwater assessment Contingency Plan, and a $100,000 allowance for the mitigation of a failure a Pit Impoundment or Leach Pad capping system, if needed.

5.2 *PERIODIC UPDATES TO COST ESTIMATES AND FINANCIAL ASSURANCE INSTRUMENTS*

The engineering cost estimate and financial assurance will be reviewed every five years, or as needed, to ensure a reasonable basis for any

adjustments (increases or decreases) required by LAC Minerals, DENR or the Board. Such reviews shall consider the following information obtained during the previous observational period:

- Change in the reclamation release status of reclaimed acreage;
- Need to implement the Contingency Plan based on monitoring data;
- Actual costs to date for implementing the Postclosure Plan activities;
- Significant changes to the engineering cost estimate; and
- Unusual inflation or other unanticipated potential under-funding of the Financial Assurance instruments.

6.0 *REFERENCES*

Bar XX Environmental Service, LLC,2013. LAC Minerals (USA) LLC, Richmond Hill Mine Reclamation Success Monitoring.

Barrick, August 2013. Company Profile http://www.barrick.com/Company/Profile/default.aspx

Cedar Creek Associates, Inc., March 2009. Richmond Hill Mine, 2008 Revegetation Success Sampling – Bond Release Evaluation.

Chadwick Ecological Consultants, Inc., August 2006. Aquatic Biological Monitoring Plan for Cleopatra Creek, Labrador Gulch, and Rubicon Gulch, South Dakota.

City-Data.com, August 2013. http://www.city-data.com/city/Lead-South-Dakota.html

Environmental Resources Management, Inc., July 2014. Petition for Release of Reclamation Obligations, Richmond Hill Mine, Surface Mine Permit Nos. 445 and 460, Lead, South Dakota.

Environmental Resources Management, Inc., July 2014. Updated Reclamation Plan and Financial Assurance, Richmond Hill Mine, Surface Mine Permit Nos. 445, Lead, South Dakota.

Environmental Resources Management, Inc., July 2014. Postclosure Plan and Financial Assurance, Richmond Hill Mine, Surface Mine Permit Nos. 445 and 460, Lead, South Dakota.

Environmental Resources Management, Inc., April 2010. Hydrogeoloic Investigation of Bedrock Water Quality in Engineered Pit Backfill Facility Area, Richmond Hill Mine, Lead, South Dakota.

GEI Consultants, Inc., April 2013. 2012 Aquatic Biological Monitoring for Cleopatra Creek, Labrador Gulch, and Rubicon Gulch, South Dakota.

Golder Associates, Inc. and Schafer & Associates, 1992. Richmond Hill, Inc., Mined Land Reclamation Permit Amendment, Mine Permit No. 455.

Gilbert, Steve, September 2010. 2010 Richmond Hill Mine Game Bird, Raptor, and Breeding Bird Surveys.

Golder Associates Inc. May 1996. Richmond Hill Mine, Heap Leach Pad Cover and Reclamation Design.

LAC Minerals (USA) Inc., October 2014. Technical Revision No. 67 to Richmond Hill Mine Permit Nos. 445 and 460, Modify Surface Water and Groundwater Monitoring Plans.

LAC Minerals (USA) LLC, February 2015. Richmond Hill Mine 2014 Annual Water Quality Report.

LAC Minerals (USA) LLC, July 2014. Request to Extend the Mine Reclamation Period.

LAC Minerals (USA) LLC, July 2014. Request to Retain the Water Management Access Roads and Buildings.

LAC Minerals (USA) LLC, February 2013. Richmond Hill Mine 2012 Annual Water Quality Report.

LAC Minerals (USA) Inc., April 2011. Technical Revision #64 to Richmond Hill Mine Permit #445, Modification and Relining of Barren Pond into a Sludge Disposal Pond.

LAC Minerals (USA) LLC, February 2010, Richmond Hill Mine 2009 Annual Water Quality Report.

LAC Minerals (USA) LLC, November 2009. Surface Water Discharge Permit No. SD0026883 Renewal Application.

LAC Minerals (USA) Inc., Septermber 2001. Technical Revision #52 to Richmond Hill Mine Permit #445, Request to Modify Monitoring Schedule for Mine Pit Backfill Monitoring Plan and Leach Pad Monitoring Plan.

LAC Minerals (USA) Inc., April 2001. Technical Revision #50 to Richmond Hill Mine Permit #445, Request to Reduce Frequency of Water Quality Monitoring at Richmond Hill Mine Site.

LAC Minerals (USA) Inc., July 1996. Technical Revision #41 to Richmond Hill Mine Permit #445, Request to change the Permanent Reclamation Revegetation mixture.

LAC Minerals (USA) Inc., June 1996. Technical Revision #40 to Richmond Hill Mine Permit #460, Request to Modify Reclamation Plan For Limestone Quarry To Continue Fossil Excavation.

LAC Minerals (USA) Inc., October 1994. Technical Revision #32 to Richmond Hill Mine Permit #445, Construct a Sludge Pond in Limestone Quarry No. 2.

LAC Minerals (USA), Inc., 1993. Richmond Hill Inc., Reclamation Plan Permit Amendment (Permit #445).

Schafer and Associates, April 1998. LAC Minerals (USA), Inc. Richmond Hill Mine Mine Pit Backfill Monitoring Recommendations.

South Dakota Department of Environment and Natural Resources, June 2005. LAC Minerals (USA) Inc., Surface Water Discharge System Permit No. SD0026883.

South Dakota Department of Environment and Natural Resources, February 1995. LAC Minerals (USA) Inc., Large Scale Mine Permit #460.

South Dakota Department of Environment and Natural Resources, December 1993. LAC Minerals (USA) Inc., Mine Permit 445 Amendment Conditions.

South Dakota Department of Water and Natural Resources, March 1988. Mining Permit No. 445 for St. Joe Gold Corporation Richmond Hill Mine.

Tetra Tech, March 2013. LAC Minerals (USA) LLC Richmond Hill Mine, Mine Pit Backfill Monitoring, 2012 Annual Report.

Tables

Table 1
Summary of Permitted Affected, Disturbed and Reclaimed Acreage
(Located in Section 3.0, Page 16)

Table 2
Postclosure Water Quality Monitoring Program

Table 2a
Postclosure Surface Water and Groundwater Monitoring Program Summary
Richmond Hill Mine
Surface Mine Permit Nos. 445 and 460
Lead, South Dakota

Monitoring Site	*Location*	*Parameter List*	*Sampling Frequency*					
			Bi-Weekly	*Bi-Monthly*	*Monthly*	*Quarterly*	*Semi-Annually*	*Annually*
Surface Water								
#001	Spruce Gulch	SWD #2	X		X			
#002	West Gulch	SWD #2				X[1]		
#003	North Gulch	SWD #2				X[1]		
#004	Rubicon Gulch	SWD #2	X		X			
FD-1	Below Stormwater Pond	LP Surface Water				X		
FD-2	Below Leach Pad 3	LP Surface Water					X	
OEA-1 (STR 1)	Cleopatra Creek	SWD #1/Aquatic Biological			X			
OEA-3B (STR 2)	Cleopatra Creek	SWD #1			X			
OEA-2	Cleopatra Creek	Aquatic Biological						X[2]
OEA-3	Cleopatra Creek	Aquatic Biological						X[2]
OEA-4	Cleopatra Creek	Aquatic Biological						X[2]
S-5	Rubicon Gulch	Aquatic Biological						X[2]
WASTE DUMP TOE	Spruce Gulch	RH Surface Water				X		
RETENTION POND BELOW	Spruce Gulch	RH Surface Water				X		
Groundwater								
SOUTH GULCH	South Gulch	RH Groundwater				X		
LP3MW	Below Leach Pad 3	LP Groundwater					X	
MW-9B	Northwest of Pit Impoundment	RH Groundwater				X		
MW-14	South of Spruce Gulch	LP Groundwater				X		
MW-17	South Gulch	RH Groundwater				X		
MW-19	Spruce Gulch	RH Groundwater				X		
MW-20	Spruce Gulch	RH Groundwater				X		
MW-24	North Gulch	RH Groundwater				X		
MW-25	West Gulch	RH Groundwater				X		
MW-26	South Gulch	RH Groundwater				X		
MW-27	Spruce Gulch	RH Groundwater				X		
MW-28	Spruce Gulch	RH Groundwater				X		
MW-29	South Gulch	RH Groundwater				X		
MW-30	West Gulch	RH Groundwater				X		
Leach Pad Effluent								
Pad 1	Leach Pad 1-2 Effluent	LP Effluent					X	
Pad 3	Leach Pad 3 Effluent	LP Effluent					X	

Notes:
[1]Quarterly sampling frequency proposed in SWD Permit No. SD0026883 renewal application.
[2]Samples collected in conjunction with Aquatic Biological Monitoring, which will be performed every other year for first 10 years and then every five years the next 20 years. No aquatic biological monitoring will be performed after 30 years.
Bi-Weekly/Monthly samples collected Bi/Weekly April 1 to September 30 and Monthly October 1 to March 31.
Quarterly samples collected in April/May, June, August, October/November.
Semi-Annual samples collected in April/May and August/September.
Annual samples collected in August/September.

Table 2b
Postclosure Sampling Parameter Lists
Richmond Hill Mine
Surface Mine Permit Nos. 445 and 460
Lead, South Dakota

Parameter	*Richmond Hill Surface Water List (RH Surface Water)*	*Richmond Hill Groundwater List (RH Groundwater)*	*Surface Water Discharge List #2*[1] *(SWD #2)*	*Surface Water Discharge Permit List #1*[1] *(SWD #1)*	*Leach Pad Groundwater List (LP Groundwater)*	*Leach Pad Surface Water List (LP Surface Water)*	*Leach Pad Effluent List (LP Effluent)*	*Aquatic Biological List (Aquatic Biological)*
Physical Parameters								
Dissolved Oxygen			X[4]					
Field EC	X	X	X	X	X	X		X
Field pH	X	X	X	X	X	X	X	X
Flow	X		X	X		X	X	X
Hardness			X	X				X
Static Water Level		X			X			
Total Dissolved Solids	X	X	X[5]	X	X	X	X	X
Total Suspended Solids			X	X				X
Water Temperature	X	X	X	X	X	X	X	X
Non-Metallics								
Acidity	X	X			X	X	X	
Alkalinity	X	X			X	X	X	
BOD 5-Day			X[2]					
Nitrogen, Ammonia			X[5]	X				
Nitrogen, Nitrate	X	X	X[5]	X	X	X	X	X
Phosphorous, Dissolved								X
Sulfate	X	X	X[3]		X	X	X	
Dissolved Metals								
Aluminum		X			X			
Arsenic		X			X			
Cadmium		X			X			
Calcium	X		X	X		X	X	X
Copper		X			X			
Iron		X			X			
Lead		X			X			
Magnesium	X		X	X		X	X	X
Nickel		X			X			
Selenium		X			X			
Sodium			X[3]					
Silver								
Zinc		X			X			
Total Recoverable Metals								
Aluminum	X		X[5]	X		X	X	
Arsenic	X		X	X		X	X	X
Cadmium	X		X	X		X	X	X
Chromium	X		X	X		X	X	X
Copper	X		X	X		X	X	X
Iron	X		X[5]	X		X	X	X
Lead	X		X	X		X		X
Mercury			X	X			X	X
Nickel	X		X	X		X	X	X
Selenium	X		X	X		X	X	X
Silver			X	X				X
Zinc	X		X	X		X	X	X

Note:
[1]Proposed changes to surface water sampling parameters will require approval of Richmond Hill Surface Water Discharge Permit modification.
[2]BOD, 5-Day sampled monthly at Compliance Point #001 and #004 only.
[3]Sodium and sulfate sampled quarterly.
[4]Dissolved oxygen sampled monthly at #004 only.
[5]Sampled monthly.

Table 3
Proposed Site-Specific Performance Criteria

Table 3
Proposed Site-Specific Performance Criteria
Surface Water and Groundwater Monitoring Locations
Richmond Hill Mine
Surface Mine Permit Nos. 445 and 460
Lead, South Dakota

Monitoring Location	*Area*	*Parameter*	*Units*	*Sampling Period*	*Number of Detections*	*Minimum*	*Maximum*	*Mean*	*Standard Deviation*	*Most Recent*	*Regulatory Standard*	*Proposed Action Level*	
MW-9B	North Gulch												
		Field pH	S.U.	1986 - 2012	115	6.38	7.96	7.15	0.37	6.79	6.5 - 8.5	BPJ	< 6.0
		Sulfate	mg/L	1986 - 2012	116	43.30	585.00	159.29	139.89	191.00	500	BPJ	700
		Cadmium	mg/L	1986 - 2012	10	0.0007	0.002	0.001	0.0005	< 0.001	0.005	Reg. Std.	0.005
MW-17	South Gulch												
		Field pH	S.U.	1993 - 2012	87	3.33	7.64	4.58	1.22	3.83	6.5 - 8.5	BPJ	< 3.0
		Sulfate	mg/L	1993 - 2012	87	25.00	2576.00	629.89	502.65	490.00	500	BPJ	700
		Cadmium	mg/L	1993 - 2012	77	0.001	0.429	0.078	0.086	0.035	0.005	BPJ	0.070
MW-19	Spruce Gulch												
		Field pH	S.U.	1992 - 2012	116	5.40	7.80	6.49	0.35	6.67	6.5 - 8.5	BPJ	< 6.0
		Sulfate	mg/L	1992 - 2012	117	140.00	1712.00	569.05	285.51	365.00	500	Reg. Std.	500
		Cadmium	mg/L	1992 - 2012	21	0.001	0.010	0.003	0.002	< 0.001	0.005	Reg. Std.	0.005
MW-20	Spruce Gulch												
		Field pH	S.U.	1992 - 2012	119	5.8	8.52	7.12	0.42	7.14	6.5 - 8.5	BPJ	< 6.5
		Sulfate	mg/L	1992 - 2012	120	70.00	585.00	303.02	157.62	423.00	500	Reg. Std.	500
		Cadmium	mg/L	1992 - 2012	4	0.001	0.115	0.032	0.056	< 0.001	0.005	Reg. Std.	0.005
MW-24	North Gulch												
		Field pH	S.U.	1995 - 2012	85	6.10	8.26	6.82	0.37	7.07	6.5 - 8.5	BPJ	< 6.0
		Sulfate	mg/L	1995 - 2012	85	71.10	338.00	173.83	64.47	124.00	500	Reg. Std.	500
		Cadmium	mg/L	1995 - 2012	6	0.001	0.002	0.002	0.001	< 0.001	0.005	Reg. Std.	0.005
MW-25	West Gulch												
		Field pH	S.U.	1995 - 2012	97	5.31	7.00	5.92	0.31	6.22	6.5 - 8.5	BPJ	< 5.5
		Sulfate	mg/L	1995 - 2012	97	92.10	882.00	366.93	164.76	197.00	500	BPJ	600
		Cadmium	mg/L	1995 - 2012	6	0.001	0.004	0.003	0.001	< 0.001	0.005	Reg. Std.	0.005
MW-26	South Gulch												
		Field pH	S.U.	1995 - 2012	106	4.08	7.50	5.52	0.88	4.26	6.5 - 8.5	BPJ	< 3.5
		Sulfate	mg/L	1995 - 2012	106	236.00	673.00	470.42	106.35	496.00	500	BPJ	700
		Cadmium	mg/L	1995 - 2012	96	0.001	0.011	0.004	0.003	0.006	0.005	BPJ	0.012
MW-27	Spruce Gulch												
		Field pH	S.U.	1995 - 2012	77	5.85	7.91	6.34	0.37	6.18	6.5 - 8.5	BPJ	< 6.0
		Sulfate	mg/L	1995 - 2012	77	38.60	630.00	213.75	95.41	130.00	500	Reg. Std.	500
		Cadmium	mg/L	1995 - 2012	12	0.001	0.007	0.003	0.002	< 0.001	0.005	Reg. Std.	0.005
MW-28	Spruce Gulch												
		Field pH	S.U.	1995 - 2012	77	3.56	4.90	4.07	0.25	4.03	6.5 - 8.5	BPJ	< 3.5
		Sulfate	mg/L	1995 - 2012	77	194.00	983.00	419.86	182.93	298.00	500	Reg. Std.	500
		Cadmium	mg/L	1995 - 2012	77	0.003	0.022	0.010	0.004	0.008	0.005	Max.	0.010
MW-29	South Gulch												
		Field pH	S.U.	1995 - 2012	70	3.16	5.61	3.90	0.42	4.19	6.5 - 8.5	BPJ	< 3.0
		Sulfate	mg/L	1995 - 2012	70	249.00	2135.00	611.71	354.40	401.00	500	2 x Reg. Std.	1000
		Cadmium	mg/L	1995 - 2012	70	0.012	0.318	0.054	0.057	0.016	0.005	BPJ	0.060
MW-30	West Gulch												
		Field pH	S.U.	1995 - 2012	86	6.77	8.43	7.17	0.28	7.06	6.5 - 8.5	Reg. Std.	< 6.5
		Sulfate	mg/L	1995 - 2012	87	75.30	129.00	101.33	13.25	118.00	500	Reg. Std.	500
		Cadmium	mg/L	1995 - 2012	37	0.001	0.003	0.002	0.001	< 0.001	0.005	Reg. Std.	0.005
South Gulch	South Gulch												
		Field pH	S.U.	1997 - 2012	101	2.78	6.60	4.06	0.84	3.64	6.5 - 8.5	BPJ	< 3.0
		Sulfate	mg/L	1997 - 2012	101	242.00	3000.00	792.24	579.84	342.00	500	2 x Reg. Std.	1000
		Cadmium	mg/L	1997 - 2012	101	0.011	0.742	0.094	0.140	0.017	0.005	BPJ	0.100
NPDES #001	Cleopatra Creek												
		Field pH	S.U.	1997 - 2012	392	3.50	8.93	7.49	0.60	7.64	6.5 - 8.8	Reg. Std.	< 6.5
		Sulfate	mg/L	1997 - 2012	393	96.80	2212.00	445.07	331.30	340.00	--	BPJ	500
		Cadmium	mg/L	1997 - 2012	88	0.001	0.204	0.025	0.047	< 0.001	Hard. Dep.[1]	Reg. Std.	0.005
NPDES #002	Cleopatra Creek												
		Field pH	S.U.	1997 - 2012	245	6.41	9.30	7.22	0.39	7.46	6.5 - 8.8	Reg. Std.	< 6.5
		Sulfate	mg/L	1997 - 2012	247	39.00	164.00	96.84	22.82	104.00	--	BPJ	200
		Cadmium	mg/L	1997 - 2012	5	0.001	0.001	0.001	0.000	< 0.001	Hard. Dep.[1]	Reg. Std.	0.005
NPDES #003	Cleopatra Creek												
		Field pH	S.U.	1997 - 2012	252	6.23	10.20	7.57	0.46	7.76	6.5 - 8.8	Reg. Std.	< 6.5
		Sulfate	mg/L	1997 - 2012	253	18.80	225.00	54.33	26.52	36.70	--	BPJ	200.0
		Cadmium	mg/L	1997 - 2012	4	0.001	0.001	0.001	0.000	< 0.001	Hard. Dep.[1]	Reg. Std.	0.005

Notes:
S.U. - standard units
mg/L - milligrams per liter
BPJ - Best Professional Judgement
[1]Hardness Dependent - 0.002 mg/L acute and 0.00025 mg/L chronic at hardness of 100 mg/L

Figure 1
Site Location Map

F:\Projects\Den\L... nerals\0076128 Richmond Hill Reclamation\Diagrams\GIS\Post Closure Plan\Figure 1 Site Location Map 05

SOURCE: Google Mapsntain

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SITE LOCATION MAP

RICHMOND HILL MINE
POSTCLOSURE PLAN AND FINANCIAL ASSURANCE
SURFACE MINE PERMIT NOS. 445 AND 460
CENTRAL CITY, SOUTH DAKOTA

ERM
Environmental Resources Management
6455 S. Yosemite St., Suite 900
Greenwood Village, Colorado 80111
(303) 741-5050

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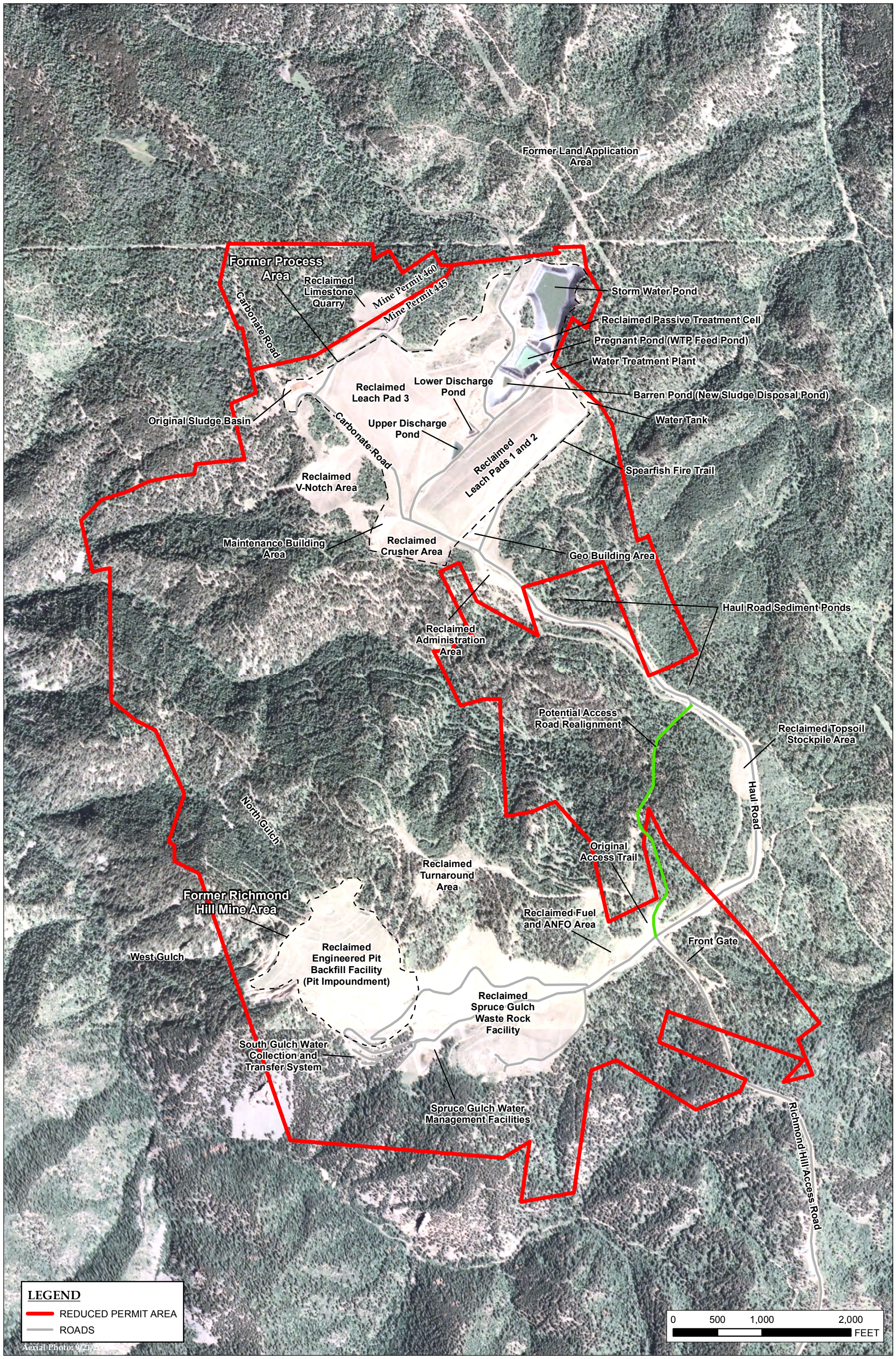
Figure 2
Reduced Permit Area and Surface Facilities

F:\Projects\Den\L\LAC Minerals\0076128 Richmond Hill Reclamation\Diagrams\GIS\Post Closure Plan\Figure 2 Reduced Permit Area and Surface Facilities (11x17) 05-15.mxd



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REDUCED PERMIT AREA AND SURFACE FACILITIES

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Figure 3
Permit Area and Surface Facilities Under 100-Year Postclosure Care

F:\Projects\Den\L\LAC Minerals\0076128 Richmond Hill Reclamation\Diagrams\GIS\Post Closure Plan\Figure 3 Reduced Permit Area and Suface Facilities Under 3-Year Postclosure Care (11x17) 05-15.mxd

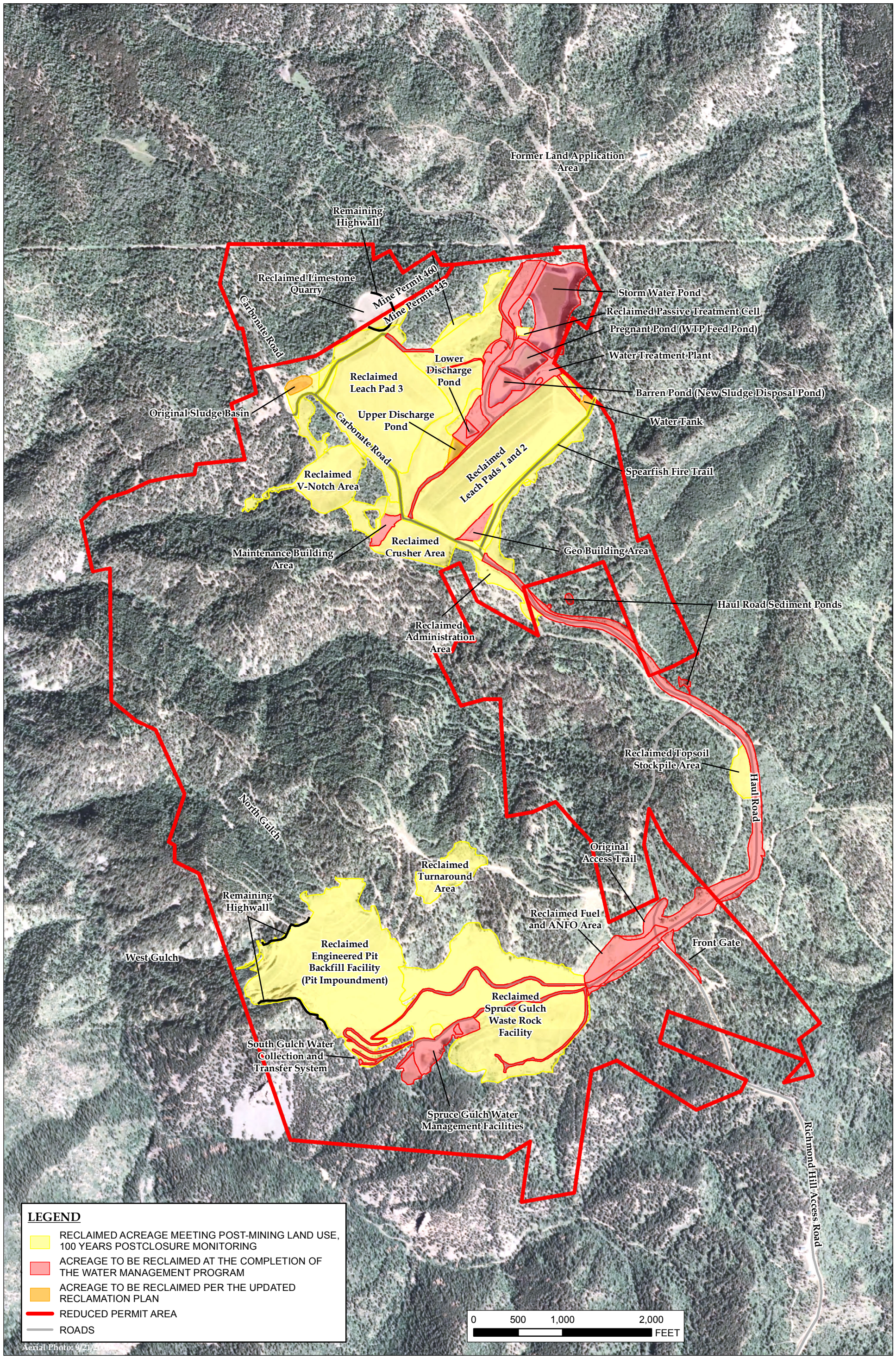

FIGURE	DESIGNED / DRAWN / CHECKED / DATE / TIME	TFC / TFC /	REDUCED PERMIT AREA AND SURFACE FACILITIES UNDER 100 YEAR POSTCLOSURE CARE	Environmental Resources Management	N W E S	REVISION DESCRIPTION	DATE
3		May 15, 2015 12:00 pm	RICHMOND HILL MINE POSTCLOSURE PLAN AND FINANCIAL ASSURANCE SURFACE MINE PERMIT NOS. 445 AND 460 CENTRAL CITY, SOUTH DAKOTA	ERM 6455 S. Yosemite St., Suite 900 Greenwood Village, Colorado 80111 (303) 741-5050			

Figure 4
Surface Drainages and Proposed Surface Water Sample Locations

F:\Projects\Den\L\LAC Minerals\0076128 Richmond Hill Reclamation\Diagrams\GIS\Post Closure Plan\Figure 4 SW Monitoring Locations (11x17Landscape) 05-15.mxd

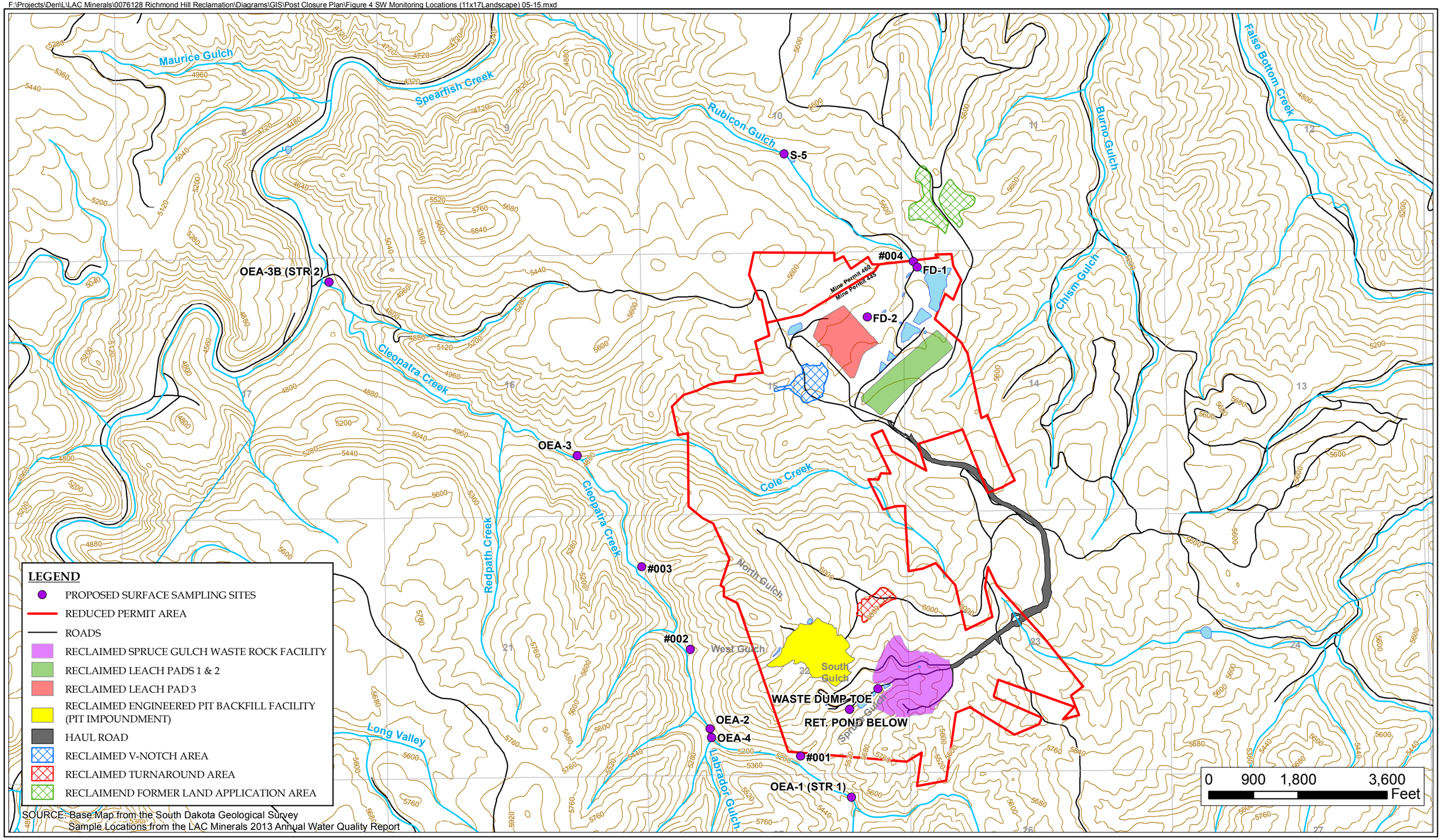

FIGURE	DESIGNED / DRAWN	TFC / TFC	SURFACE DRAINAGES AND PROPOSED SURFACE WATER SAMPLE LOCATIONS	Environmental Resources Management	REVISION	DESCRIPTION	DATE
4	CHECKED		RICHMOND HILL MINE POSTCLOSURE PLAN AND FINANCIAL ASSURANCE SURFACE MINE PERMIT NOS. 445 AND 460 CENTRAL CITY, SOUTH DAKOTA	6455 S. Yosemite St., Suite 900 Greenwood Village, Colorado 80111 (303) 741-5050			
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Figure 5
Proposed Groundwater Sample Locations

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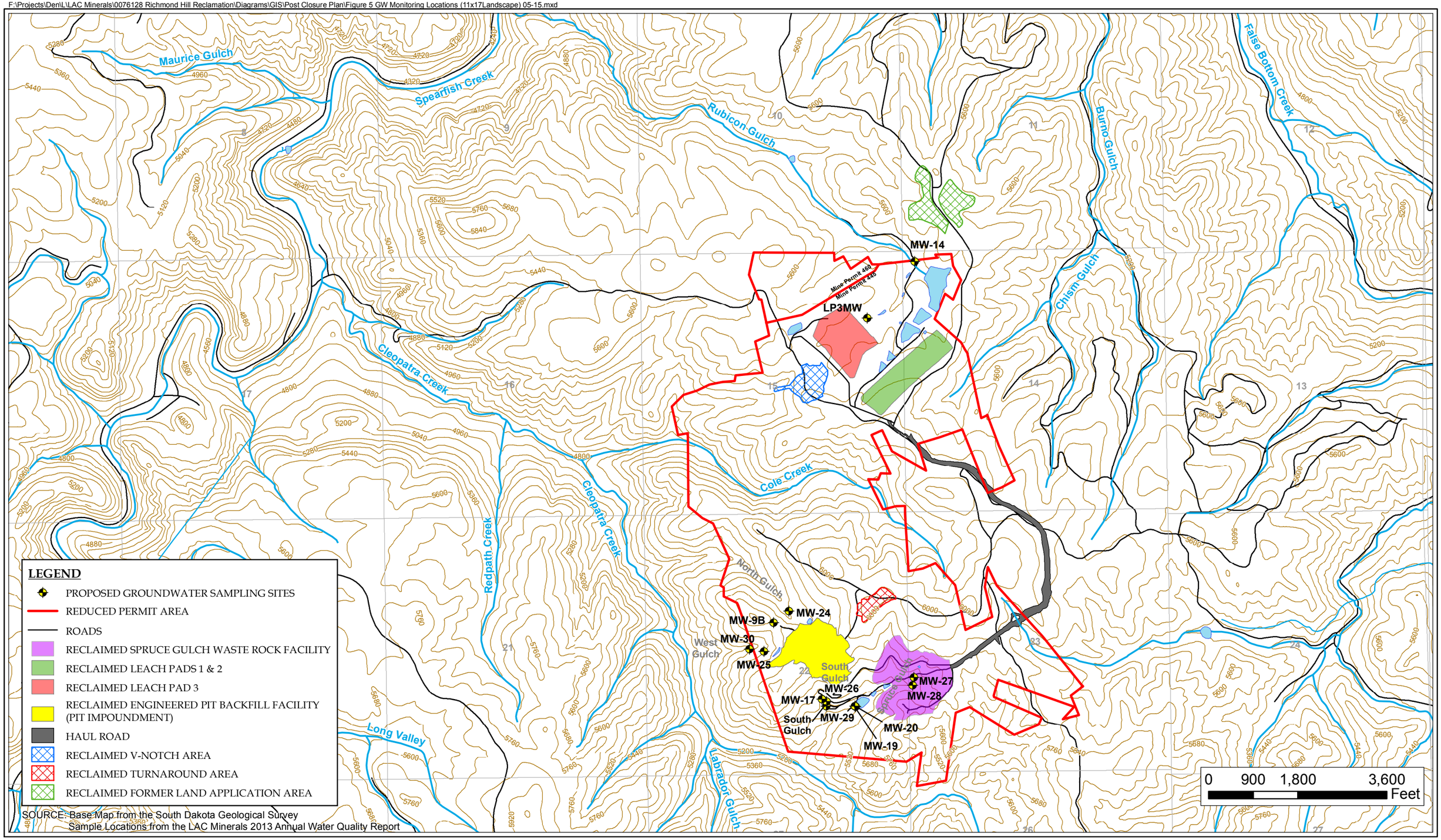

SOURCE: Base Map from the South Dakota Geological Survey
Sample Locations from the LAC Minerals 2013 Annual Water Quality Report

FIGURE	DESIGNED / DRAWN / CHECKED / DATE / TIME	TFC / TFC / / May 15, 2015 / 12:00 pm
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PROPOSED GROUNDWATER SAMPLE LOCATIONS

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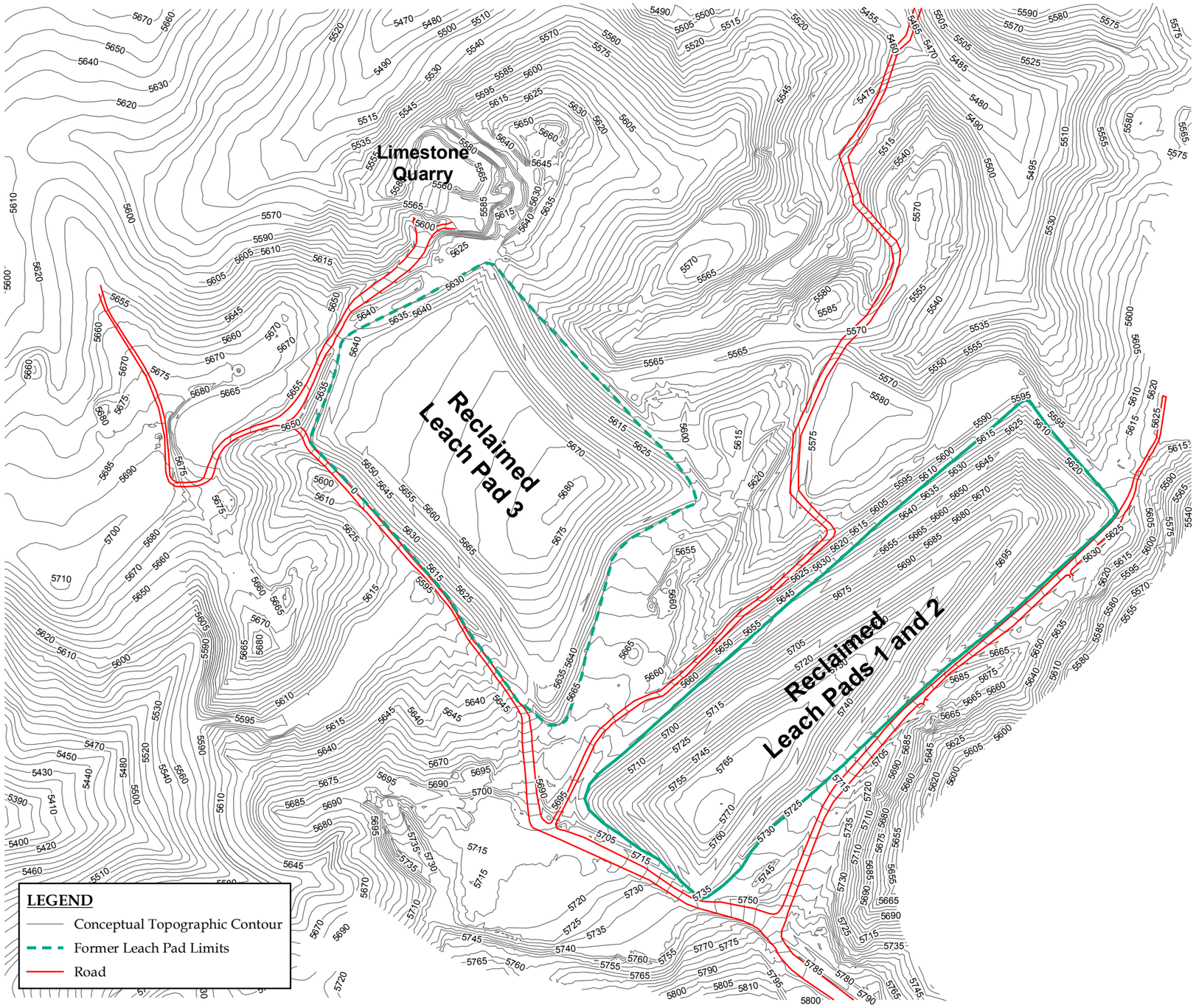
Figure 6
Conceptual Final Reclamation Topography – Process Area

F:\Projects\Den\L\LAC Minerals\0076128 Richmond Hill Reclamation\Diagrams\GIS\Post Closure Plan\Figure 6 Conceptual Postclosure Topography - Process Area (11x17Landscape) 05-15.mxd



0 200 400 800 Feet

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CONCEPTUAL FINAL RECLAMATION TOPOGRAPHY - PROCESS AREA

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Figure 7
Conceptual Final Reclamation Topography
– Pit Impoundment and Spruce Gulch

F:\Projects\Den\L\LAC Minerals\0076128 Richmond Hill Reclamation\Diagrams\GIS\Post Closure Plan\Figure 7 Conceptual Postclosure Topography - Spruce Gulch Area (11x17Landscape) 05-15.mxd

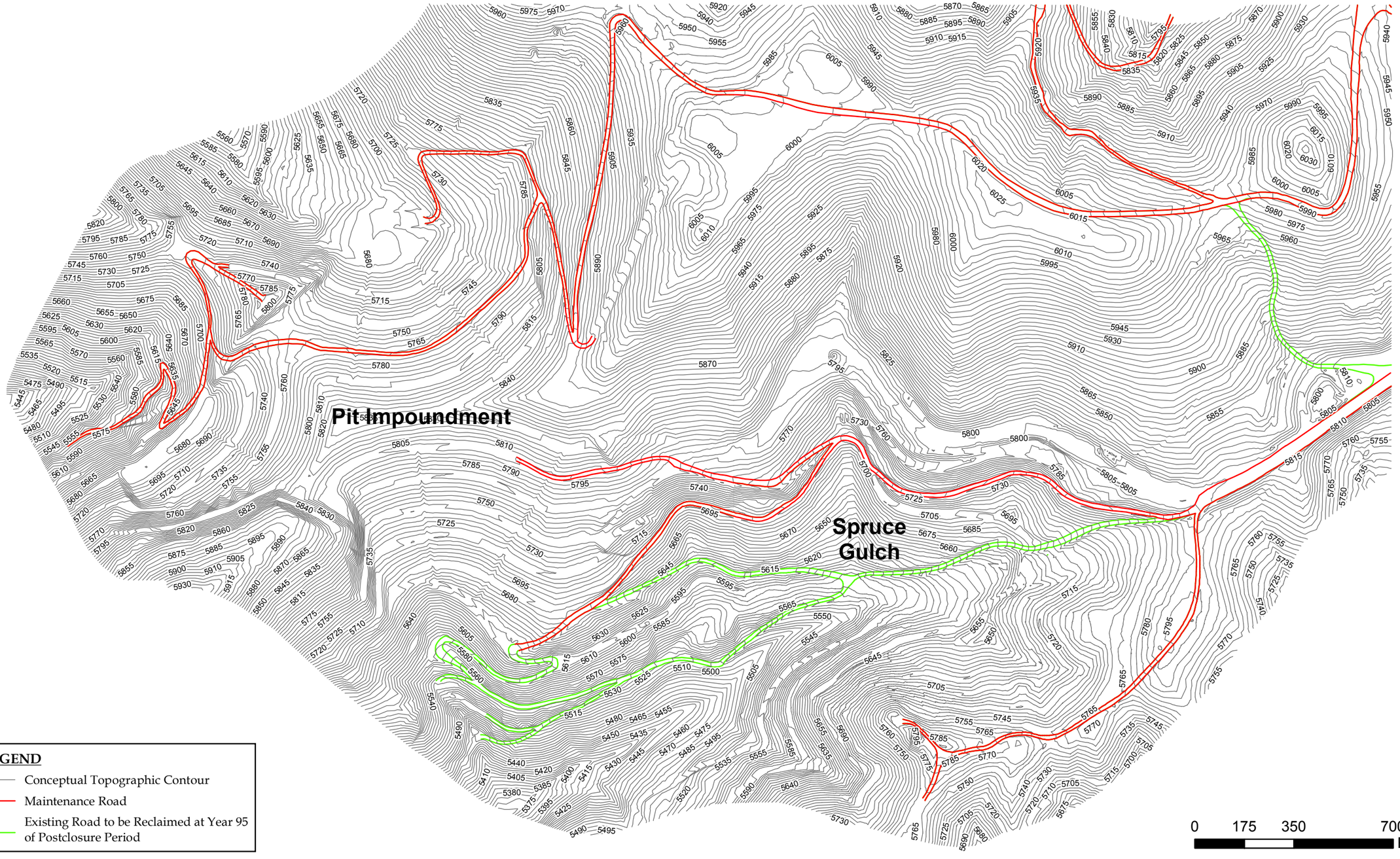
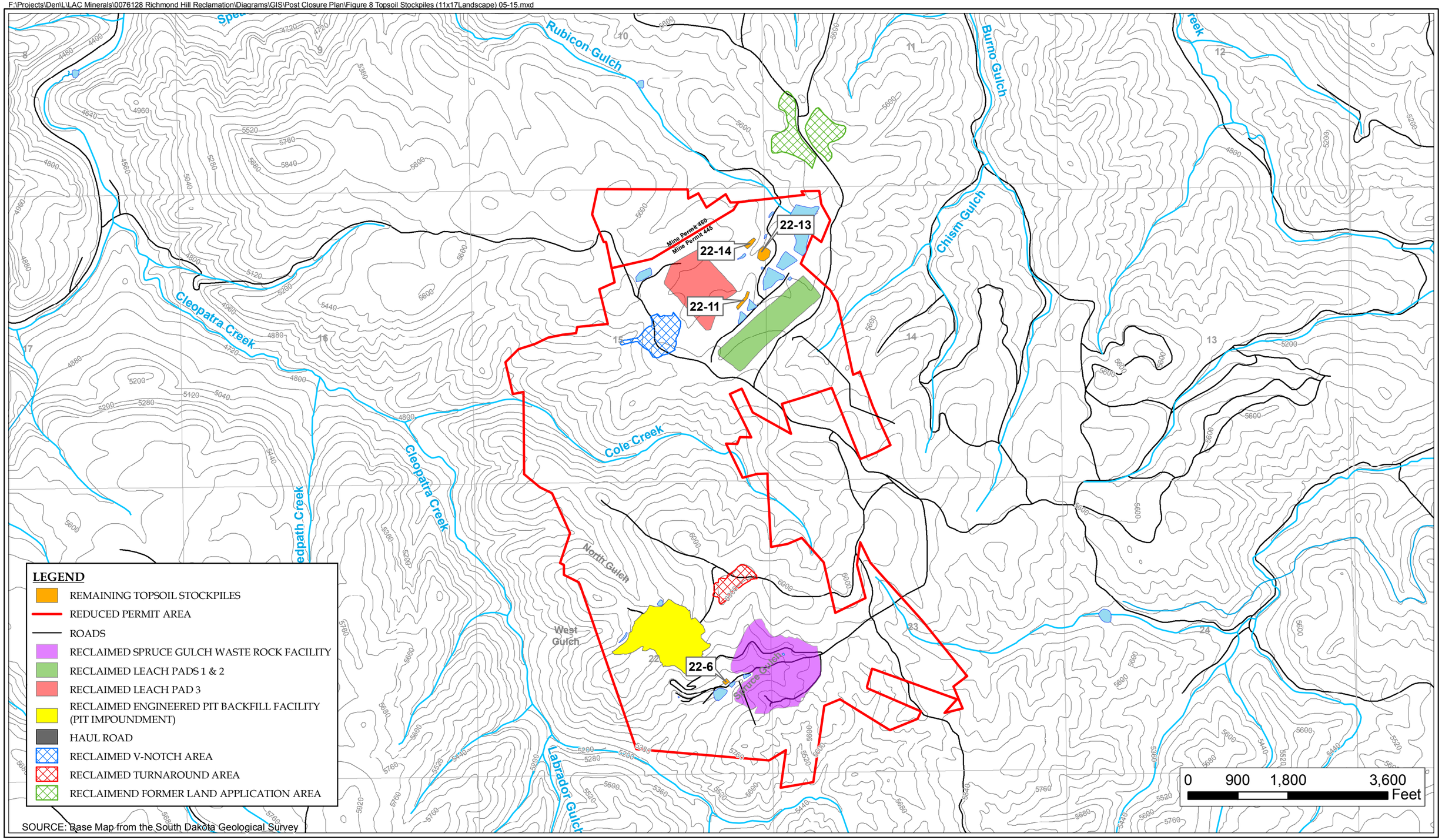


FIGURE	DESIGNED / DRAWN	TFC / TFC	CONCEPTUAL FINAL RECLAMATION TOPOGRAPHY - PIT IMPOUNDMENT AND SPRUCE GULCH	Environmental Resources Management	N W E S	REVISION	DESCRIPTION	DATE
7	CHECKED		RICHMOND HILL MINE POSTCLOSURE PLAN AND FINANCIAL ASSURANCE SURFACE MINE PERMIT NOS. 445 AND 460 CENTRAL CITY, SOUTH DAKOTA	ERM 6455 S. Yosemite St., Suite 900 Greenwood Village, Colorado 80111 (303) 741-5050				
	DATE	May 15, 2015						
	TIME	12:00 pm						

Figure 8
Topsoil Stockpiles

F:\Projects\Den\L\LAC Minerals\0076128 Richmond Hill Reclamation\Diagrams\GIS\Post Closure Plan\Figure 8 Topsoil Stockpiles (11x17Landscape) 05-15.mxd



SOURCE: Base Map from the South Dakota Geological Survey

FIGURE	DESIGNED / DRAWN / CHECKED / DATE / TIME	TFC / TFC /	
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TOPSOIL STOCKPILES

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Appendix A
Postclosure Financial Assurance Cost Estimate

Appendix A

ASSUMPTIONS for the POSTCLOSURE FINANCIAL ASSURANCE COST ESTIMATE Richmond Hill Mine Surface Mine Permit Nos. 445 and 460 Central City, South Dakota

General Assumptions

1. The postclosure bond calculation is based on perpetual water treatment calculations developed by various state and federal agencies. Annual costs are first escalated at an annual inflation rate of 3 percent. The present worth of the escalated cost is then applied at an annual discount rate of 5 percent. These rates were selected based on historic inflation and discount rates and an historic spread of 2 percent between inflation and discount rate according to the South Dakota Investment Council. The first year postclosure bond amount of $19,667,216 was calculated by adding together the present worth values for each year of the 100 year postclosure period used in the calculation.

2. The calculations are based on the actual cost that would accrue to the state if it had to hire a third party contractor to treat water and conduct operation and maintenance activities during the postclosure period and reclamation of the remaining facilities in Year 95 of the postclosure period.

3. In the calculations, different indirect costs are applied separately to the direct operation and maintenance and water treatment costs instead of one indirect cost being applied to the sum of all three direct costs. Each indirect cost is explained further in the sections below. The escalation and present worth factors have been applied to the indirect costs.

Operation and Maintenance Assumptions

1. An annual cost of $10,000 was used for road maintenance and snow removal for the 100 year postclosure period.

2. An annual cost of $5,000 was used for weed control for the 100 year postclosure period.

3. A cost of $25,000 was assumed to purchase a vehicle for the mine site every 10 years, starting in Year 1.

4. A site caretaker, at an annual calculated salary of $43,992 would do general site maintenance, collect surface and ground water samples, and conduct other tasks at the mine site. The caretaker would be at the mine site 8 hours each day and 5 days each week through the 100 year postclosure period (see Attachment A4, Table A4-1).

5. An annual cost of $2,000 was assumed to repair the various pond liners at the mine site during the postclosure period. In addition, a cost of $1,240,000 was used to replace liners in the Stormwater, Pregnant, and Spruce Gulch Ponds every 25 years, beginning in Year 5.

6. The following indirect costs were added to the direct operating and maintenance cost:

Contractor Overhead	8%
State Excise Tax	2%
Contractor Profit	10%
Contingency	5%
Administration	5%
Engineering/Consulting	1%
Total	31%

7. 5% mobilization and 5% scope and bid costs were added to the direct operating and maintenance costs every 10 years beginning in Year 1 to account for new contractors at the site. Also, the 5% mobilization and 5% scope and bid indirect costs were added to the $1,240,000 pond liner replacement costs mentioned in number 5 to account for bidding and mobilization of pond liner contractors.

Water Treatment Assumptions

1. Water treatment in the postclosure period will consist of using biological treatment at the water treatment plant and liquid caustic at the Spruce Gulch treatment facility. The following costs are based on LAC Mineral's actual annual costs to treat an average of 20 million gallons of water annually:

Consumables	
Biotreatment Consumables	$ 9,700
Propane	$ 20,000
Utilities	$ 90,000
Spruce Gulch Water Treatment	$ 2,000
Diesel	$ 1,000
Rental	$ 3,600
Labor and Equipment	
Replacement Costs	$ 15,000
Vehicle Maintenance	$ 3,000
Total Annual Costs	$204,433

The plant operator salary is covered in the Homestake postclosure bond since the water treatment plant at the Richmond Hill Mine is remotely operated from Homestake's Blacktail Water Treatment Plant in Central City.

2. The following indirect costs were added to the direct water treatment cost:

Contractor Overhead	8%
State Excise Tax	2%
Contractor Profit	10%
Contingency	10%
Administration	5%
Engineering/Consulting	3%
Total	38%

3. 5% mobilization and 5% scope and bid costs were added to the direct water treatment costs every 10 years beginning in Year 1 to account for new contractors at the site.

Monitoring Assumptions

1. Water sampling equipment costs were calculated separately from water sample analysis costs. Water sampling equipment costs are summarized in Attachment A3, Table A3-1. Associated water sample analysis costs of $41,330 for aquatic monitoring were calculated every other year for the first 10 years. After WET tests are eliminated in year 11, the cost decreases to $35,670 for sampling every 5 years for the next 20 years. For years without aquatic monitoring, water sampling analysis costs of $40,346 were calculated through year 10. After WET tests are eliminated in year 11, water sampling costs for years without aquatic monitoring decrease to $34,686.

2. An annual cost of $25,000 was included to continue aquatic monitoring every other year for the first 10 years and then every five years for the next 20 years.

3. An annual cost of $1,000 was used to cover monitoring of the Pit Impoundment. The cost increases to $13,000 every 5 years beginning at Year 5 to cover more extensive monitoring of the impoundment.

4. The following indirect costs were added to the direct monitoring cost:

Contractor Overhead	8%
State Excise Tax	2%
Contractor Profit	10%
Contingency	5%
Administration	5%
Total	30%

5. 5% mobilization and 5% scope and bid costs were added to the direct monitoring costs

every 10 years beginning in Year 1 to account for new contractors at the site.

6. Since indirect costs are already included in the water sample analysis costs quoted by the laboratory, and since water sample collection, preparation, and delivery costs by the site contractor are calculated separately, no addition indirect costs were added to the water sample analysis costs.

Final Closure and Reclamation Assumptions (Year 95 through 100)

1. The acreages used in the Year 95 reclamation cost estimate are summarized in the LAC 2014 Release Petition Acreage Table and in Figure 1 – LAC Minerals Postclosure Bond Map.

2. The Earthmoving Summary (Attachement A4, Table A4-4) contains information on volumes of material to be moved and graded, topsoil application, and revegetation acreage. This includes the volume of material need to be moved to remove pond berms and the volume of fill material needed to re-establish the access road.

3. Approximately 65,685 cy of fill material will be required to re-establish the access road grade in the former fuel and anfo storage area. Fill material will consist of removed pond berm material.

4. A dozer will be used to grade 5.53 acres of the new access road which includes portions of the current haul road. A grader will then do finish grading on the road. The new access road will be 26 feet wide.

5. The following equipment and equipment and operator costs were used in the calculation:

Equipment Type	Equipment Cost	Operator Cost
Cat 16M grader	$112.07/hr.	$35/hr.
Cat D9T dozer	$143.18/hr.	$30/hr.
Cat 988 loader	$147.02/hr.	$35/hr.
50 ton truck	$120.07/hr.	$35/hr.

The equipment costs are based on average rates obtained from two Caterpillar dealers in the Black Hills area and do not include fuel. A fuel cost of $3.55/gallon was used in the calculation.

ASSUMPTIONS for the
POSTCLOSURE FINANCIAL ASSURANCE COST ESTIMATE
Richmond Hill Mine Surface Mine Permit Nos. 445 and 460
Central City, South Dakota

6. The following construction support personnel, including annual salaries and benefits, are accounted for in the calculation:

Earthwork Superintendent	$84,000
Demolition Superintendent	$30,000
Mechanic	$60,500
Security/Safety Person	$67,200

The site safety person will develop the site safety plan, conduct safety training and annual safety refresher for site personnel, and provide site security.

7. The average density of material in the haul road and pond berms is 120 lb/ft^3, and the average density of topsoil is 100 lb/ft^3. These densities were obtained from the SME Mining Engineering Handbook.

8. The topsoil haul distances were calculated by measuring the actual haul distances (not straight line distance) from the center of the topsoil or subsoil stockpile to the center of the regraded area. Fertilizer will be added to the topsoil.

9. All equipment will run at 80 percent efficiency. This is obtained from the Cat Handbook and other bond calculation references.

10. As the cash value of salvaged facilities may be claimed by creditors in order to satisfy any outstanding debts, no assumption was made that salvage value can be traded off with demolition cost. Therefore, a building demolition cost of **$161,321** was calculated **which can be found in the Attachment A4, Tables A4-7 and A4-8.**

11. The following shrub seed mix was used for the Process area:

Serviceberry	0.25 lb/acre
Chokecherry	0.25 lb/acre
Snowberry	0.25 lb/acre
Woods Rose	0.25 lb/acre

12. The following fertilizer application rates were used in the calculation:

40-40-10 at 90 lb/acre
25-10-10 at 45 lb/acre
29-5-0 at 25 lb/acre

ASSUMPTIONS for the
POSTCLOSURE FINANCIAL ASSURANCE COST ESTIMATE
Richmond Hill Mine Surface Mine Permit Nos. 445 and 460
Central City, South Dakota

Based on the fertilizer application rates, the following amounts of nitrogen, phosphorus, and potassium per acre were calculated:

$(0.40 \times 90) + (0.25 \times 45) + (0.29 \times 25) = 54.5$ lbs. nitrogen/acre
$(0.40 \times 90) + (0.10 \times 45) + (0.10 \times 25) = 43$ lbs. phosphorus/acre
$(0.10 \times 90) + (0.10 \times 45) + (0 \times 25) = 13.5$ lbs. potassium/acre

The following costs per pound for nitrogen, phosphorus, and potassium were used in the calculation:

Nitrogen	$1.67/lb.
Phosphorus	$0.65/lb.
Potassium	$0.50/lb.

13. $500/acre was used for hydroseeding costs and $400/acre was used for hydromulch. These costs were obtained from other bond calculations.

14. A cost of $20,000 is assumed to hire a contractor to survey the site. The surveyor will be used to develop engineering plans for construction and install survey stakes to mark slope reduction and other earthmoving areas. This cost was developed from the Means Site Work and Cost Data book.

15. A cost of $1.22/ft was assumed to remove 11,421 feet of fence and gates from the mine site as shown in Petition, Figure 6. Fencing and gates will remain around the process area and pit impoundment.

16. Pond liners from the Process, Spruce Gulch, and South Gulch areas will be either perforated and buried in place where possible or removed and shredded and hauled to a licensed disposal facility.

17. Any sludge in the Process, Spruce Gulch, and South Gulch ponds will be dewatered and disposed in the new Sludge Disposal basin at the completion of water treatment activities.

18. An annual cost of $5,000 was assumed for site inspection and monitoring in Years 96-100 after completion of final reclamation.

19. Calculations to plug 30 monitoring wells (6 inactive and 24 active) in Year 100 of the postclosure period are included in Attachment A-5. The calculations include well depths and diameters. The total calculated cost is $19,258.

20. The following indirect costs were added to the reclamation costs in Year 95:

Mobilization	5%
Performance Bond	1%
Contractor Overhead	8%
State Excise Tax	2%
Contractor Profit	10%
Contingency	10%
Administration	5%
Engineering/Consulting	3%
Scope & Bid	5%
Total	49%

21. The following indirect costs were added to the final closure inspection and monitoring costs in Years 96 through 100:

Contractor Overhead	8%
State Excise Tax	2%
Contractor Profit	10%
Contingency	10%
Administration	5%
Total	35%

22. 5% mobilization and 5% scope and bid costs were added to the final closure inspection and monitoring costs in Year 100 to account for hiring a contractor to plug monitoring wells.

Additional

1. The one-time $200,000 Contingency Plan implementation allowance and the one-time $100,000 Pit Impoundment and Leach Pad capping system mitigation allowance were included under Year 1 of the calculation and was included in the net present value analysis. It is assumed this money would be placed in the state treasury upon bond forfeiture and would be subject to same inflation and discount factors as the rest of the postclosure calculation.

Appendix A

ASSUMPTIONS for the
POSTCLOSURE FINANCIAL ASSURANCE COST ESTIMATE
Richmond Hill Mine Surface Mine Permit Nos. 445 and 460
Central City, South Dakota

Pad capping system failure was added to the cost at $100,000 in Year 1 of the postclosure period.

ATTACHMENT A1

100-YEAR POSTCLOSURE COST ESTIMATE

May 2015

Appendix A: Postclosure Financial Assurance Cost Estimate
Attachment A1: 100-Year Postclosure Cost Estimate

Project Years (1-10)

Item	Year 1 Annual Cost	Year 2 Annual Cost	Year 3 Annual Cost	Year 4 Annual Cost	Year 5 Annual Cost	Year 6 Annual Cost	Year 7 Annual Cost	Year 8 Annual Cost	Year 9 Annual Cost	Year 10 Annual Cost	Total Years 1-10 Cost
Operation & Maintenance											
Road Maintenance	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$100,000.00
Weed Spraying	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$50,000.00
Vehicle Purchase	$25,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25,000.00
Site Caretaker/Water Sampler	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$439,920.00
Pond Liner Maintenance/Repair	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$1,240,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$1,258,000.00
Subtotal Operation & Maintenance	**$85,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$1,298,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$1,872,920.00**
Mobilization (5%)	$4,300.00	$0.00	$0.00	$0.00	$62,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$66,300.00
Contractor Overhead (8%)	$6,879.00	$4,879.00	$4,879.00	$4,879.00	$103,919.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$149,830.00
State Excise Tax (2%)	$1,720.00	$1,220.00	$1,220.00	$1,220.00	$25,980.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$37,460.00
Contractor Profit (10%)	$8,599.00	$6,099.00	$6,099.00	$6,099.00	$129,899.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$187,290.00
Contingency (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$64,950.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$93,650.00
Insp., Admin., & Maint. (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$64,950.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$93,650.00
Engineering/Consulting (1%)	$860.00	$610.00	$610.00	$610.00	$12,990.00	$610.00	$610.00	$610.00	$610.00	$610.00	$18,730.00
Scope and Bid (5%)	$4,300.00	$0.00	$0.00	$0.00	$62,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$66,300.00
Total Operation & Maintenance	**$121,250.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$1,825,680.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$2,586,130.00**
Water Treatment											
Consumables											
Bio Treatment Consumables	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$97,000.00
Propane	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$200,000.00
Utilities	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$900,000.00
Spruce Gulch Water Treatment	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$20,000.00
Diesel	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$10,000.00
Rental	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$36,000.00
Labor & Equipment											
Replacement Costs	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$150,000.00
Plant Operator	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Vehicle Costs	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$30,000.00
Subtotal Water Treatment	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$1,263,000.00**
Mobilization (5%)	$7,215.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,215.00
Contractor Overhead (8%)	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$115,440.00
State Excise Tax (2%)	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$28,860.00
Contractor Profit (10%)	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$144,300.00
Contingency (10%)	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$144,300.00
Insp., Admin., & Maint. (5%)	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$72,150.00
Engineering & Consulting (3%)	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$43,290.00
Scope & Bid (5%)	$7,215.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,215.00
Total Water Treatment	**$213,564.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$2,005,770.00**
Monitoring											
Water Quality Sample Collection Equipment	$8,310.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$36,036.00
Aquatic/Biological Monitoring	$0.00	$25,000.00	$0.00	$25,000.00	$0.00	$25,000.00	$0.00	$25,000.00	$0.00	$25,000.00	$125,000.00
Pit Impoundment Monitoring	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$34,000.00
Subtotal Monitoring	**$9,310.00**	**$28,716.00**	**$3,716.00**	**$29,810.00**	**$15,716.00**	**$28,716.00**	**$4,810.00**	**$28,716.00**	**$3,716.00**	**$41,810.00**	**$195,036.00**
Mobilization (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Contractor Overhead (8%)	$745.00	$2,297.00	$297.00	$2,385.00	$1,257.00	$2,297.00	$385.00	$2,297.00	$297.00	$3,345.00	$15,602.00
State Excise Tax (2%)	$186.00	$574.00	$74.00	$596.00	$314.00	$574.00	$96.00	$574.00	$74.00	$836.00	$3,898.00
Contractor Profit (10%)	$931.00	$2,872.00	$372.00	$2,981.00	$1,572.00	$2,872.00	$481.00	$2,872.00	$372.00	$4,181.00	$19,506.00
Contingency (5%)	$466.00	$1,436.00	$186.00	$1,491.00	$786.00	$1,436.00	$241.00	$1,436.00	$186.00	$2,091.00	$9,755.00
Insp., Admin., & Maint. (5%)	$466.00	$1,436.00	$186.00	$1,491.00	$786.00	$1,436.00	$241.00	$1,436.00	$186.00	$2,091.00	$9,755.00
Scope & Bid (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Total Monitoring	**$13,036.00**	**$37,331.00**	**$4,831.00**	**$38,754.00**	**$20,431.00**	**$37,331.00**	**$6,254.00**	**$37,331.00**	**$4,831.00**	**$54,354.00**	**$254,484.00**
Water Quality Sample Analysis Lab Costs	$40,346.00	$41,330.00	$40,346.00	$41,330.00	$40,346.00	$41,330.00	$40,346.00	$41,330.00	$40,346.00	$41,330.00	$408,380.00
Total Monitoring and Analysis	**$53,382.00**	**$78,661.00**	**$45,177.00**	**$80,084.00**	**$60,777.00**	**$78,661.00**	**$46,600.00**	**$78,661.00**	**$45,177.00**	**$95,684.00**	**$662,864.00**
Contingency Plan	$200,000.00										
Capping System Mitigation	$100,000.00										
Grand Total	**$688,196.00**	**$357,695.00**	**$324,211.00**	**$359,118.00**	**$2,085,591.00**	**$357,695.00**	**$325,634.00**	**$357,695.00**	**$324,211.00**	**$374,718.00**	**$5,254,764.00**
Annual Inflation Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	
Project Year	1	2	3	4	5	6	7	8	9	10	
Escalation Factor	1.0300	1.0609	1.0927	1.1255	1.1593	1.1941	1.2299	1.2668	1.3048	1.3439	
Escalated Amount	$708,842	$379,479	$354,274	$404,190	$2,417,772	$427,107	$400,489	$453,117	$423,022	$503,590	**$6,471,882.00**
Annual Discount Rate	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
Present Worth Factor	0.9524	0.9070	0.8638	0.8227	0.7835	0.7462	0.7107	0.6768	0.6446	0.6139	
Present Worth Amount	$675,088	$344,199	$306,035	$332,528	$1,894,388	$318,714	$284,620	$306,687	$272,684	$309,161	**$5,044,104.00**

Project Years (11-20)

Item	Year 11 Annual Cost	Year 12 Annual Cost	Year 13 Annual Cost	Year 14 Annual Cost	Year 15 Annual Cost	Year 16 Annual Cost	Year 17 Annual Cost	Year 18 Annual Cost	Year 19 Annual Cost	Year 20 Annual Cost	Total Years 11-20 Cost
Operation & Maintenance											
Road Maintenance	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$100,000.00
Weed Spraying	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$50,000.00
Vehicle Purchase	$25,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25,000.00
Site Caretaker/Water Sampler	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$439,920.00
Pond Liner Maintenance/Repair	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$20,000.00
Subtotal Operation & Maintenance	**$85,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$634,920.00**
Mobilization (5%)	$4,300.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,300.00
Contractor Overhead (8%)	$6,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$50,790.00
State Excise Tax (2%)	$1,720.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$12,700.00
Contractor Profit (10%)	$8,599.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$63,490.00
Contingency (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$31,750.00
Insp., Admin., & Maint. (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$31,750.00
Engineering/Consulting (1%)	$860.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$6,350.00
Scope and Bid (5%)	$4,300.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,300.00
Total Operation & Maintenance	**$121,250.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$840,350.00**
Water Treatment											
Consumables											
Bio Treatment Consumables	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$97,000.00
Propane	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$200,000.00
Utilities	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$900,000.00
Spruce Gulch Water Treatment	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$20,000.00
Diesel	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$10,000.00
Rental	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$36,000.00
Labor & Equipment											
Replacement Costs	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$150,000.00
Plant Operator	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Vehicle Costs	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$30,000.00
Subtotal Water Treatment	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$1,263,000.00**
Mobilization (5%)	$7,215.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,215.00
Contractor Overhead (8%)	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$115,440.00
State Excise Tax (2%)	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$28,860.00
Contractor Profit (10%)	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$144,300.00
Contingency (10%)	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$144,300.00
Insp., Admin., & Maint. (5%)	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$72,150.00
Engineering & Consulting (3%)	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$43,290.00
Scope & Bid (5%)	$7,215.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,215.00
Total Water Treatment	**$213,564.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$2,005,770.00**
Monitoring											
Water Quality Sample Collection Equipment	$8,310.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$36,036.00
Aquatic/Biological Monitoring	$0.00	$0.00	$0.00	$0.00	$25,000.00	$0.00	$0.00	$0.00	$0.00	$25,000.00	$50,000.00
Pit Impoundment Monitoring	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$34,000.00
Subtotal Monitoring	**$9,310.00**	**$3,716.00**	**$3,716.00**	**$4,810.00**	**$40,716.00**	**$3,716.00**	**$4,810.00**	**$3,716.00**	**$3,716.00**	**$41,810.00**	**$120,036.00**
Mobilization (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Contractor Overhead (8%)	$745.00	$297.00	$297.00	$385.00	$3,257.00	$297.00	$385.00	$297.00	$297.00	$3,345.00	$9,602.00
State Excise Tax (2%)	$186.00	$74.00	$74.00	$96.00	$814.00	$74.00	$96.00	$74.00	$74.00	$836.00	$2,398.00
Contractor Profit (10%)	$931.00	$372.00	$372.00	$481.00	$4,072.00	$372.00	$481.00	$372.00	$372.00	$4,181.00	$12,006.00
Contingency (5%)	$466.00	$186.00	$186.00	$241.00	$2,036.00	$186.00	$241.00	$186.00	$186.00	$2,091.00	$6,005.00
Insp., Admin., & Maint. (5%)	$466.00	$186.00	$186.00	$241.00	$2,036.00	$186.00	$241.00	$186.00	$186.00	$2,091.00	$6,005.00
Scope & Bid (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Total Monitoring	**$13,036.00**	**$4,831.00**	**$4,831.00**	**$6,254.00**	**$52,931.00**	**$4,831.00**	**$6,254.00**	**$4,831.00**	**$4,831.00**	**$54,354.00**	**$156,984.00**
Water Quality Sample Analysis Lab Costs	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$35,670.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$35,670.00	$348,828.00
Total Monitoring and Analysis	**$47,722.00**	**$39,517.00**	**$39,517.00**	**$40,940.00**	**$88,601.00**	**$39,517.00**	**$40,940.00**	**$39,517.00**	**$39,517.00**	**$90,024.00**	**$505,812.00**
Grand Total	**$382,536.00**	**$318,551.00**	**$318,551.00**	**$319,974.00**	**$367,635.00**	**$318,551.00**	**$319,974.00**	**$318,551.00**	**$318,551.00**	**$369,058.00**	**$3,351,932.00**
Annual Inflation Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	
Project Year	11	12	13	14	15	16	17	18	19	20	
Escalation Factor	1.3842	1.4258	1.4685	1.5126	1.5580	1.6047	1.6528	1.7024	1.7535	1.8061	
Escalated Amount	$529,519	$454,178	$467,803	$483,989	$572,763	$511,181	$528,868	$542,312	$558,581	$666,560	**$5,315,754.00**
Annual Discount Rate	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
Present Worth Factor	0.5847	0.5568	0.5303	0.5051	0.4810	0.4581	0.4363	0.4155	0.3957	0.3769	
Present Worth Amount	$309,599	$252,903	$248,086	$244,447	$275,509	$234,178	$230,743	$225,342	$221,049	$251,219	**$2,493,075.00**

Project Years (21-30)

Item	Year 21 Annual Cost	Year 22 Annual Cost	Year 23 Annual Cost	Year 24 Annual Cost	Year 25 Annual Cost	Year 26 Annual Cost	Year 27 Annual Cost	Year 28 Annual Cost	Year 29 Annual Cost	Year 30 Annual Cost	Total Years 21-30 Cost
Operation & Maintenance											
Road Maintenance	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$100,000.00
Weed Spraying	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$50,000.00
Vehicle Purchase	$25,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25,000.00
Site Caretaker/Water Sampler	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$439,920.00
Pond Liner Maintenance/Repair	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$1,240,000.00	$2,000.00	$2,000.00	$2,000.00	$1,258,000.00
Subtotal Operation & Maintenance	**$85,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$1,298,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$1,872,920.00**
Mobilization (5%)	$4,300.00	$0.00	$0.00	$0.00	$0.00	$0.00	$62,000.00	$0.00	$0.00	$0.00	$66,300.00
Contractor Overhead (8%)	$6,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$103,919.00	$4,879.00	$4,879.00	$4,879.00	$149,830.00
State Excise Tax (2%)	$1,720.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$25,980.00	$1,220.00	$1,220.00	$1,220.00	$37,460.00
Contractor Profit (10%)	$8,599.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$129,899.00	$6,099.00	$6,099.00	$6,099.00	$187,290.00
Contingency (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$64,950.00	$3,050.00	$3,050.00	$3,050.00	$93,650.00
Insp., Admin., & Maint. (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$64,950.00	$3,050.00	$3,050.00	$3,050.00	$93,650.00
Engineering/Consulting (1%)	$860.00	$610.00	$610.00	$610.00	$610.00	$610.00	$12,990.00	$610.00	$610.00	$610.00	$18,730.00
Scope and Bid (5%)	$4,300.00	$0.00	$0.00	$0.00	$0.00	$0.00	$62,000.00	$0.00	$0.00	$0.00	$66,300.00
Total Operation & Maintenance	**$121,250.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$1,825,680.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$2,586,130.00**
Water Treatment											
Consumables											
Bio Treatment Consumables	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$97,000.00
Propane	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$200,000.00
Utilities	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$900,000.00
Spruce Gulch Water Treatment	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$20,000.00
Diesel	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$10,000.00
Rental	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$36,000.00
Labor & Equipment											
Replacement Costs	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$150,000.00
Plant Operator	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Vehicle Costs	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$30,000.00
Subtotal Water Treatment	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$1,263,000.00**
Mobilization (5%)	$7,215.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,215.00
Contractor Overhead (8%)	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$115,440.00
State Excise Tax (2%)	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$28,860.00
Contractor Profit (10%)	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$144,300.00
Contingency (10%)	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$144,300.00
Insp., Admin., & Maint. (5%)	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$72,150.00
Engineering & Consulting (3%)	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$43,290.00
Scope & Bid (5%)	$7,215.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,215.00
Total Water Treatment	**$213,564.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$2,005,770.00**
Monitoring											
Water Quality Sample Collection Equipment	$8,310.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$36,036.00
Aquatic/Biological Monitoring	$0.00	$0.00	$0.00	$0.00	$25,000.00	$0.00	$0.00	$0.00	$0.00	$25,000.00	$50,000.00
Pit Impoundment Monitoring	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$34,000.00
Subtotal Monitoring	**$9,310.00**	**$3,716.00**	**$3,716.00**	**$4,810.00**	**$40,716.00**	**$3,716.00**	**$4,810.00**	**$3,716.00**	**$3,716.00**	**$41,810.00**	**$120,036.00**
Mobilization (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Contractor Overhead (8%)	$745.00	$297.00	$297.00	$385.00	$3,257.00	$297.00	$385.00	$297.00	$297.00	$3,345.00	$9,602.00
State Excise Tax (2%)	$186.00	$74.00	$74.00	$96.00	$814.00	$74.00	$96.00	$74.00	$74.00	$836.00	$2,398.00
Contractor Profit (10%)	$931.00	$372.00	$372.00	$481.00	$4,072.00	$372.00	$481.00	$372.00	$372.00	$4,181.00	$12,006.00
Contingency (5%)	$466.00	$186.00	$186.00	$241.00	$2,036.00	$186.00	$241.00	$186.00	$186.00	$2,091.00	$6,005.00
Insp., Admin., & Maint. (5%)	$466.00	$186.00	$186.00	$241.00	$2,036.00	$186.00	$241.00	$186.00	$186.00	$2,091.00	$6,005.00
Scope & Bid (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Total Monitoring	**$13,036.00**	**$4,831.00**	**$4,831.00**	**$6,254.00**	**$52,931.00**	**$4,831.00**	**$6,254.00**	**$4,831.00**	**$4,831.00**	**$54,354.00**	**$156,984.00**
Water Quality Sample Analysis Lab Costs	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$35,670.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$35,670.00	$348,828.00
Total Monitoring and Analysis	**$47,722.00**	**$39,517.00**	**$39,517.00**	**$40,940.00**	**$88,601.00**	**$39,517.00**	**$40,940.00**	**$39,517.00**	**$39,517.00**	**$90,024.00**	**$505,812.00**
Grand Total	**$382,536.00**	**$318,551.00**	**$318,551.00**	**$319,974.00**	**$367,635.00**	**$318,551.00**	**$2,065,754.00**	**$318,551.00**	**$318,551.00**	**$369,058.00**	**$5,097,712.00**
Annual Inflation Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	
Project Year	21	22	23	24	25	26	27	28	29	30	
Escalation Factor	1.8603	1.9161	1.9736	2.0328	2.0938	2.1566	2.2213	2.2879	2.3566	2.4273	
Escalated Amount	$711,630	$610,377	$628,688	$650,441	$769,746	$686,984	$4,588,637	$728,822	$750,686	$895,801	**$11,021,812.00**
Annual Discount Rate	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
Present Worth Factor	0.3589	0.3418	0.3256	0.3101	0.2953	0.2812	0.2678	0.2551	0.2429	0.2314	
Present Worth Amount	$255,434	$208,657	$204,683	$201,681	$227,308	$193,208	$1,229,059	$185,918	$182,376	$207,268	**$3,095,592.00**

Project Years (31-40)

Item	Year 31 Annual Cost	Year 32 Annual Cost	Year 33 Annual Cost	Year 34 Annual Cost	Year 35 Annual Cost	Year 36 Annual Cost	Year 37 Annual Cost	Year 38 Annual Cost	Year 39 Annual Cost	Year 40 Annual Cost	Total Years 31-40 Cost
Operation & Maintenance											
Road Maintenance	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$100,000.00
Weed Spraying	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$50,000.00
Vehicle Purchase	$25,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25,000.00
Site Caretaker/Water Sampler	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$439,920.00
Pond Liner Maintenance/Repair	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$20,000.00
Subtotal Operation & Maintenance	**$85,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$634,920.00**
Mobilization (5%)	$4,300.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,300.00
Contractor Overhead (8%)	$6,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$50,790.00
State Excise Tax (2%)	$1,720.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$12,700.00
Contractor Profit (10%)	$8,599.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$63,490.00
Contingency (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$31,750.00
Insp., Admin., & Maint. (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$31,750.00
Engineering/Consulting (1%)	$860.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$6,350.00
Scope and Bid (5%)	$4,300.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,300.00
Total Operation & Maintenance	**$121,250.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$840,350.00**
Water Treatment											
Consumables											
Bio Treatment Consumables	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$9,700.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$77,500.00
Propane	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$200,000.00
Utilities	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$900,000.00
Spruce Gulch Water Treatment	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$20,000.00
Diesel	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$10,000.00
Rental	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$36,000.00
Labor & Equipment											
Replacement Costs	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$150,000.00
Plant Operator	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Vehicle Costs	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$30,000.00
Subtotal Water Treatment	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$144,300.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$1,243,500.00**
Mobilization (5%)	$7,215.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,215.00
Contractor Overhead (8%)	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,544.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$113,880.00
State Excise Tax (2%)	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,886.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$28,470.00
Contractor Profit (10%)	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$142,350.00
Contingency (10%)	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,430.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$142,350.00
Insp., Admin., & Maint. (5%)	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,215.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$71,175.00
Engineering & Consulting (3%)	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,329.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$42,705.00
Scope & Bid (5%)	$7,215.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,215.00
Total Water Treatment	**$213,564.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$199,134.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$1,978,860.00**
Monitoring											
Water Quality Sample Collection Equipment	$8,310.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$36,036.00
Pit Impoundment Monitoring	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$34,000.00
Subtotal Monitoring	**$9,310.00**	**$3,716.00**	**$3,716.00**	**$4,810.00**	**$15,716.00**	**$3,716.00**	**$4,810.00**	**$3,716.00**	**$3,716.00**	**$16,810.00**	**$70,036.00**
Mobilization (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Contractor Overhead (8%)	$745.00	$297.00	$297.00	$385.00	$1,257.00	$297.00	$385.00	$297.00	$297.00	$1,345.00	$5,602.00
State Excise Tax (2%)	$186.00	$74.00	$74.00	$96.00	$314.00	$74.00	$96.00	$74.00	$74.00	$336.00	$1,398.00
Contractor Profit (10%)	$931.00	$372.00	$372.00	$481.00	$1,572.00	$372.00	$481.00	$372.00	$372.00	$1,681.00	$7,006.00
Contingency (5%)	$466.00	$186.00	$186.00	$241.00	$786.00	$186.00	$241.00	$186.00	$186.00	$841.00	$3,505.00
Insp., Admin., & Maint. (5%)	$466.00	$186.00	$186.00	$241.00	$786.00	$186.00	$241.00	$186.00	$186.00	$841.00	$3,505.00
Scope & Bid (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Total Monitoring	**$13,036.00**	**$4,831.00**	**$4,831.00**	**$6,254.00**	**$20,431.00**	**$4,831.00**	**$6,254.00**	**$4,831.00**	**$4,831.00**	**$21,854.00**	**$91,984.00**
Water Quality Sample Analysis Lab Costs	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$346,860.00
Total Monitoring and Analysis	**$47,722.00**	**$39,517.00**	**$39,517.00**	**$40,940.00**	**$55,117.00**	**$39,517.00**	**$40,940.00**	**$39,517.00**	**$39,517.00**	**$56,540.00**	**$438,844.00**
Grand Total	**$382,536.00**	**$318,551.00**	**$318,551.00**	**$319,974.00**	**$334,151.00**	**$313,169.00**	**$314,592.00**	**$313,169.00**	**$313,169.00**	**$330,192.00**	**$3,258,054.00**
Annual Inflation Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	
Project Year	31	32	33	34	35	36	37	38	39	40	
Escalation Factor	2.5001	2.5751	2.6523	2.7319	2.8139	2.8983	2.9852	3.0748	3.1670	3.2620	
Escalated Amount	$956,371	$820,295	$844,904	$874,139	$940,255	$907,651	$939,128	$962,927	$991,815	$1,077,099	**$9,314,584.00**
Annual Discount Rate	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
Present Worth Factor	0.2204	0.2099	0.1999	0.1904	0.1813	0.1727	0.1644	0.1566	0.1491	0.1420	
Present Worth Amount	$210,745	$172,152	$168,873	$166,397	$170,459	$156,713	$154,426	$150,800	$147,927	$152,997	**$1,651,489.00**

Project Years (41-50)

Item	Year 41 Annual Cost	Year 42 Annual Cost	Year 43 Annual Cost	Year 44 Annual Cost	Year 45 Annual Cost	Year 46 Annual Cost	Year 47 Annual Cost	Year 48 Annual Cost	Year 49 Annual Cost	Year 50 Annual Cost	Total Years 41-50 Cost
Operation & Maintenance											
Road Maintenance	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$100,000.00
Weed Spraying	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$50,000.00
Vehicle Purchase	$25,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25,000.00
Site Caretaker/Water Sampler	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$439,920.00
Pond Liner Maintenance/Repair	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$20,000.00
Subtotal Operation & Maintenance	**$85,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$634,920.00**
Mobilization (5%)	$4,300.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,300.00
Contractor Overhead (8%)	$6,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$50,790.00
State Excise Tax (2%)	$1,720.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$12,700.00
Contractor Profit (10%)	$8,599.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$63,490.00
Contingency (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$31,750.00
Insp., Admin., & Maint. (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$31,750.00
Engineering/Consulting (1%)	$860.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$6,350.00
Scope and Bid (5%)	$4,300.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,300.00
Total Operation & Maintenance	**$121,250.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$840,350.00**
Water Treatment											
Consumables											
Bio Treatment Consumables	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$58,000.00
Propane	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$200,000.00
Utilities	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$900,000.00
Spruce Gulch Water Treatment	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$20,000.00
Diesel	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$10,000.00
Rental	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$36,000.00
Labor & Equipment											
Replacement Costs	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$150,000.00
Plant Operator	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Vehicle Costs	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$30,000.00
Subtotal Water Treatment	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$1,224,000.00**
Mobilization (5%)	$7,020.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,020.00
Contractor Overhead (8%)	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$112,320.00
State Excise Tax (2%)	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$28,080.00
Contractor Profit (10%)	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$140,400.00
Contingency (10%)	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$140,400.00
Insp., Admin., & Maint. (5%)	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$70,200.00
Engineering & Consulting (3%)	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$42,120.00
Scope & Bid (5%)	$7,020.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,020.00
Total Water Treatment	**$207,792.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$1,951,560.00**
Monitoring											
Water Quality Sample Collection Equipment	$8,310.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$36,036.00
Pit Impoundment Monitoring	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$34,000.00
Subtotal Monitoring	**$9,310.00**	**$3,716.00**	**$3,716.00**	**$4,810.00**	**$15,716.00**	**$3,716.00**	**$4,810.00**	**$3,716.00**	**$3,716.00**	**$16,810.00**	**$70,036.00**
Mobilization (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Contractor Overhead (8%)	$745.00	$297.00	$297.00	$385.00	$1,257.00	$297.00	$385.00	$297.00	$297.00	$1,345.00	$5,602.00
State Excise Tax (2%)	$186.00	$74.00	$74.00	$96.00	$314.00	$74.00	$96.00	$74.00	$74.00	$336.00	$1,398.00
Contractor Profit (10%)	$931.00	$372.00	$372.00	$481.00	$1,572.00	$372.00	$481.00	$372.00	$372.00	$1,681.00	$7,006.00
Contingency (5%)	$466.00	$186.00	$186.00	$241.00	$786.00	$186.00	$241.00	$186.00	$186.00	$841.00	$3,505.00
Insp., Admin., & Maint. (5%)	$466.00	$186.00	$186.00	$241.00	$786.00	$186.00	$241.00	$186.00	$186.00	$841.00	$3,505.00
Scope & Bid (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Total Monitoring	**$13,036.00**	**$4,831.00**	**$4,831.00**	**$6,254.00**	**$20,431.00**	**$4,831.00**	**$6,254.00**	**$4,831.00**	**$4,831.00**	**$21,854.00**	**$91,984.00**
Water Quality Sample Analysis Lab Costs	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$346,860.00
Total Monitoring and Analysis	**$47,722.00**	**$39,517.00**	**$39,517.00**	**$40,940.00**	**$55,117.00**	**$39,517.00**	**$40,940.00**	**$39,517.00**	**$39,517.00**	**$56,540.00**	**$438,844.00**
Grand Total	**$376,764.00**	**$313,169.00**	**$313,169.00**	**$314,592.00**	**$328,769.00**	**$313,169.00**	**$314,592.00**	**$313,169.00**	**$313,169.00**	**$330,192.00**	**$3,230,754.00**
Annual Inflation Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	
Project Year	41	42	43	44	45	46	47	48	49	50	
Escalation Factor	3.3599	3.4607	3.5645	3.6715	3.7816	3.8950	4.0119	4.1323	4.2562	4.3839	
Escalated Amount	$1,265,889	$1,083,783	$1,116,296	$1,155,010	$1,243,271	$1,219,807	$1,262,110	$1,294,093	$1,332,916	$1,447,531	**$12,420,706.00**
Annual Discount Rate	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
Present Worth Factor	0.1353	0.1288	0.1227	0.1169	0.1113	0.1060	0.1009	0.0961	0.0916	0.0872	
Present Worth Amount	$171,251	$139,634	$136,974	$134,976	$138,372	$129,295	$127,409	$124,417	$122,047	$126,230	**$1,350,605.00**

Project Years (51-60)

Item	Year 51 Annual Cost	Year 52 Annual Cost	Year 53 Annual Cost	Year 54 Annual Cost	Year 55 Annual Cost	Year 56 Annual Cost	Year 57 Annual Cost	Year 58 Annual Cost	Year 59 Annual Cost	Year 60 Annual Cost	Total Years 51-60 Cost
Operation & Maintenance											
Road Maintenance	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$100,000.00
Weed Spraying	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$50,000.00
Vehicle Purchase	$25,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25,000.00
Site Caretaker/Water Sampler	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$439,920.00
Pond Liner Maintenance/Repair	$2,000.00	$1,240,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$1,258,000.00
Subtotal Operation & Maintenance	**$85,992.00**	**$1,298,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$1,872,920.00**
Mobilization (5%)	$4,300.00	$62,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$66,300.00
Contractor Overhead (8%)	$6,879.00	$103,919.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$149,830.00
State Excise Tax (2%)	$1,720.00	$25,980.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$37,460.00
Contractor Profit (10%)	$8,599.00	$129,899.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$187,290.00
Contingency (5%)	$4,300.00	$64,950.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$93,650.00
Insp., Admin., & Maint. (5%)	$4,300.00	$64,950.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$93,650.00
Engineering/Consulting (1%)	$860.00	$12,990.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$18,730.00
Scope and Bid (5%)	$4,300.00	$62,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$62,000.00
Total Operation & Maintenance	**$121,250.00**	**$1,825,680.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$2,586,130.00**
Water Treatment											
Consumables											
Bio Treatment Consumables	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$58,000.00
Propane	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$200,000.00
Utilities	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$900,000.00
Spruce Gulch Water Treatment	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$20,000.00
Diesel	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$10,000.00
Rental	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$36,000.00
Labor & Equipment											
Replacement Costs	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$150,000.00
Plant Operator	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Vehicle Costs	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$30,000.00
Subtotal Water Treatment	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$1,224,000.00**
Mobilization (5%)	$7,020.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,020.00
Contractor Overhead (8%)	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$112,320.00
State Excise Tax (2%)	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$28,080.00
Contractor Profit (10%)	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$140,400.00
Contingency (10%)	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$140,400.00
Insp., Admin., & Maint. (5%)	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$70,200.00
Engineering & Consulting (3%)	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$42,120.00
Scope & Bid (5%)	$7,020.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,020.00
Total Water Treatment	**$207,792.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$1,951,560.00**
Monitoring											
Water Quality Sample Collection Equipment	$8,310.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$36,036.00
Pit Impoundment Monitoring	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$34,000.00
Subtotal Monitoring	**$9,310.00**	**$3,716.00**	**$3,716.00**	**$4,810.00**	**$15,716.00**	**$3,716.00**	**$4,810.00**	**$3,716.00**	**$3,716.00**	**$16,810.00**	**$70,036.00**
Mobilization (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Contractor Overhead (8%)	$745.00	$297.00	$297.00	$385.00	$1,257.00	$297.00	$385.00	$297.00	$297.00	$1,345.00	$5,602.00
State Excise Tax (2%)	$186.00	$74.00	$74.00	$96.00	$314.00	$74.00	$96.00	$74.00	$74.00	$336.00	$1,398.00
Contractor Profit (10%)	$931.00	$372.00	$372.00	$481.00	$1,572.00	$372.00	$481.00	$372.00	$372.00	$1,681.00	$7,006.00
Contingency (5%)	$466.00	$186.00	$186.00	$241.00	$786.00	$186.00	$241.00	$186.00	$186.00	$841.00	$3,505.00
Insp., Admin., & Maint. (5%)	$466.00	$186.00	$186.00	$241.00	$786.00	$186.00	$241.00	$186.00	$186.00	$841.00	$3,505.00
Scope & Bid (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Total Monitoring	**$13,036.00**	**$4,831.00**	**$4,831.00**	**$6,254.00**	**$20,431.00**	**$4,831.00**	**$6,254.00**	**$4,831.00**	**$4,831.00**	**$21,854.00**	**$91,984.00**
Water Quality Sample Analysis Lab Costs	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$346,860.00
Total Monitoring and Analysis	**$47,722.00**	**$39,517.00**	**$39,517.00**	**$40,940.00**	**$55,117.00**	**$39,517.00**	**$40,940.00**	**$39,517.00**	**$39,517.00**	**$56,540.00**	**$438,844.00**
Grand Total	**$376,764.00**	**$2,058,949.00**	**$313,169.00**	**$314,592.00**	**$328,769.00**	**$313,169.00**	**$314,592.00**	**$313,169.00**	**$313,169.00**	**$330,192.00**	**$4,976,534.00**
Annual Inflation Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	
Project Year	51	52	53	54	55	56	57	58	59	60	
Escalation Factor	4.5154	4.6509	4.7904	4.9341	5.0821	5.2346	5.3917	5.5534	5.7200	5.8916	
Escalated Amount	$1,701,249	$9,575,937	$1,500,209	$1,552,236	$1,670,853	$1,639,319	$1,696,170	$1,739,153	$1,791,328	$1,945,360	**$24,811,814.00**
Annual Discount Rate	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
Present Worth Factor	0.0831	0.0791	0.0753	0.0717	0.0683	0.0651	0.0620	0.0590	0.0562	0.0535	
Present Worth Amount	$141,291	$757,422	$113,011	$111,362	$114,163	$106,675	$105,119	$102,650	$100,695	$104,146	**$1,756,534.00**

Project Years (61-70)

Item	Year 61 Annual Cost	Year 62 Annual Cost	Year 63 Annual Cost	Year 64 Annual Cost	Year 65 Annual Cost	Year 66 Annual Cost	Year 67 Annual Cost	Year 68 Annual Cost	Year 69 Annual Cost	Year 70 Annual Cost	Total Years 61-70 Cost
Operation & Maintenance											
Road Maintenance	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$100,000.00
Weed Spraying	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$50,000.00
Vehicle Purchase	$25,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25,000.00
Site Caretaker/Water Sampler	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$439,920.00
Pond Liner Maintenance/Repair	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$20,000.00
Subtotal Operation & Maintenance	**$85,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$634,920.00**
Mobilization (5%)	$4,300.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,300.00
Contractor Overhead (8%)	$6,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$50,790.00
State Excise Tax (2%)	$1,720.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$12,700.00
Contractor Profit (10%)	$8,599.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$63,490.00
Contingency (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$31,750.00
Insp., Admin., & Maint. (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$31,750.00
Engineering/Consulting (1%)	$860.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$6,350.00
Scope and Bid (5%)	$4,300.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,300.00
Total Operation & Maintenance	**$121,250.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$840,350.00**
Water Treatment											
Consumables											
Bio Treatment Consumables	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$58,000.00
Propane	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$200,000.00
Utilities	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$900,000.00
Spruce Gulch Water Treatment	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$20,000.00
Diesel	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$10,000.00
Rental	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$36,000.00
Labor & Equipment											
Replacement Costs	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$150,000.00
Plant Operator	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Vehicle Costs	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$30,000.00
Subtotal Water Treatment	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$1,224,000.00**
Mobilization (5%)	$7,020.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,020.00
Contractor Overhead (8%)	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$112,320.00
State Excise Tax (2%)	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$28,080.00
Contractor Profit (10%)	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$140,400.00
Contingency (10%)	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$140,400.00
Insp., Admin., & Maint. (5%)	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$70,200.00
Engineering & Consulting (3%)	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$42,120.00
Scope & Bid (5%)	$7,020.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,020.00
Total Water Treatment	**$207,792.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$1,951,560.00**
Monitoring											
Water Quality Sample Collection Equipment	$8,310.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$36,036.00
Pit Impoundment Monitoring	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$34,000.00
Subtotal Monitoring	**$9,310.00**	**$3,716.00**	**$3,716.00**	**$4,810.00**	**$15,716.00**	**$3,716.00**	**$4,810.00**	**$3,716.00**	**$3,716.00**	**$16,810.00**	**$70,036.00**
Mobilization (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Contractor Overhead (8%)	$745.00	$297.00	$297.00	$385.00	$1,257.00	$297.00	$385.00	$297.00	$297.00	$1,345.00	$5,602.00
State Excise Tax (2%)	$186.00	$74.00	$74.00	$96.00	$314.00	$74.00	$96.00	$74.00	$74.00	$336.00	$1,398.00
Contractor Profit (10%)	$931.00	$372.00	$372.00	$481.00	$1,572.00	$372.00	$481.00	$372.00	$372.00	$1,681.00	$7,006.00
Contingency (5%)	$466.00	$186.00	$186.00	$241.00	$786.00	$186.00	$241.00	$186.00	$186.00	$841.00	$3,505.00
Insp., Admin., & Maint. (5%)	$466.00	$186.00	$186.00	$241.00	$786.00	$186.00	$241.00	$186.00	$186.00	$841.00	$3,505.00
Scope & Bid (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Total Monitoring	**$13,036.00**	**$4,831.00**	**$4,831.00**	**$6,254.00**	**$20,431.00**	**$4,831.00**	**$6,254.00**	**$4,831.00**	**$4,831.00**	**$21,854.00**	**$91,984.00**
Water Quality Sample Analysis Lab Costs	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$346,860.00
Total Monitoring and Analysis	**$47,722.00**	**$39,517.00**	**$39,517.00**	**$40,940.00**	**$55,117.00**	**$39,517.00**	**$40,940.00**	**$39,517.00**	**$39,517.00**	**$56,540.00**	**$438,844.00**
Grand Total	**$376,764.00**	**$313,169.00**	**$313,169.00**	**$314,592.00**	**$328,769.00**	**$313,169.00**	**$314,592.00**	**$313,169.00**	**$313,169.00**	**$330,192.00**	**$3,230,754.00**
Annual Inflation Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	
Project Year	61	62	63	64	65	66	67	68	69	70	
Escalation Factor	6.0684	6.2504	6.4379	6.6311	6.8300	7.0349	7.2459	7.4633	7.6872	7.9178	
Escalated Amount	$2,286,336	$1,957,432	$2,016,155	$2,086,076	$2,245,487	$2,203,107	$2,279,511	$2,337,276	$2,407,395	$2,614,401	**$22,433,176.00**
Annual Discount Rate	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
Present Worth Factor	0.0510	0.0486	0.0462	0.0440	0.0419	0.0399	0.0380	0.0362	0.0345	0.0329	
Present Worth Amount	$116,572	$95,050	$93,239	$91,879	$94,190	$88,012	$86,728	$84,691	$83,078	$85,925	**$919,364.00**

Appendix A: Postclosure Financial Assurance Cost Estimate
Attachment A1: 100-Year Postclosure Cost Estimate

Project Years (71-80)

Item	Year 71 Annual Cost	Year 72 Annual Cost	Year 73 Annual Cost	Year 74 Annual Cost	Year 75 Annual Cost	Year 76 Annual Cost	Year 77 Annual Cost	Year 78 Annual Cost	Year 79 Annual Cost	Year 80 Annual Cost	Total Years 71-80 Cost
Operation & Maintenance											
Road Maintenance	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$100,000.00
Weed Spraying	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$50,000.00
Vehicle Purchase	$25,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25,000.00
Site Caretaker/Water Sampler	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$439,920.00
Pond Liner Maintenance/Repair	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$1,240,000.00	$2,000.00	$2,000.00	$2,000.00	$1,258,000.00
Subtotal Operation & Maintenance	**$85,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$1,298,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$1,872,920.00**
Mobilization (5%)	$4,300.00	$0.00	$0.00	$0.00	$0.00	$0.00	$62,000.00	$0.00	$0.00	$0.00	$66,300.00
Contractor Overhead (8%)	$6,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$103,919.00	$4,879.00	$4,879.00	$4,879.00	$149,830.00
State Excise Tax (2%)	$1,720.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$25,980.00	$1,220.00	$1,220.00	$1,220.00	$37,460.00
Contractor Profit (10%)	$8,599.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$129,899.00	$6,099.00	$6,099.00	$6,099.00	$187,290.00
Contingency (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$64,950.00	$3,050.00	$3,050.00	$3,050.00	$93,650.00
Insp., Admin., & Maint. (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$64,950.00	$3,050.00	$3,050.00	$3,050.00	$93,650.00
Engineering/Consulting (1%)	$860.00	$610.00	$610.00	$610.00	$610.00	$610.00	$12,990.00	$610.00	$610.00	$610.00	$18,730.00
Scope and Bid (5%)	$4,300.00	$0.00	$0.00	$0.00	$0.00	$0.00	$62,000.00	$0.00	$0.00	$0.00	$66,300.00
Total Operation & Maintenance	**$121,250.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$1,825,680.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$2,586,130.00**
Water Treatment											
Consumables											
Bio Treatment Consumables	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$58,000.00
Propane	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$200,000.00
Utilities	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$900,000.00
Spruce Gulch Water Treatment	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$20,000.00
Diesel	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$10,000.00
Rental	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$36,000.00
Labor & Equipment											
Replacement Costs	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$150,000.00
Plant Operator	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Vehicle Costs	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$30,000.00
Subtotal Water Treatment	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$1,224,000.00**
Mobilization (5%)	$7,020.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,020.00
Contractor Overhead (8%)	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$112,320.00
State Excise Tax (2%)	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$28,080.00
Contractor Profit (10%)	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$140,400.00
Contingency (10%)	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$140,400.00
Insp., Admin., & Maint. (5%)	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$70,200.00
Engineering & Consulting (3%)	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$42,120.00
Scope & Bid (5%)	$7,020.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,020.00
Total Water Treatment	**$207,792.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$1,951,560.00**
Monitoring											
Water Quality Sample Collection Equipment	$8,310.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$36,036.00
Pit Impoundment Monitoring	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$34,000.00
Subtotal Monitoring	**$9,310.00**	**$3,716.00**	**$3,716.00**	**$4,810.00**	**$15,716.00**	**$3,716.00**	**$4,810.00**	**$3,716.00**	**$3,716.00**	**$16,810.00**	**$70,036.00**
Mobilization (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Contractor Overhead (8%)	$745.00	$297.00	$297.00	$385.00	$1,257.00	$297.00	$385.00	$297.00	$297.00	$1,345.00	$5,602.00
State Excise Tax (2%)	$186.00	$74.00	$74.00	$96.00	$314.00	$74.00	$96.00	$74.00	$74.00	$336.00	$1,398.00
Contractor Profit (10%)	$931.00	$372.00	$372.00	$481.00	$1,572.00	$372.00	$481.00	$372.00	$372.00	$1,681.00	$7,006.00
Contingency (5%)	$466.00	$186.00	$186.00	$241.00	$786.00	$186.00	$241.00	$186.00	$186.00	$841.00	$3,505.00
Insp., Admin., & Maint. (5%)	$466.00	$186.00	$186.00	$241.00	$786.00	$186.00	$241.00	$186.00	$186.00	$841.00	$3,505.00
Scope & Bid (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Total Monitoring	**$13,036.00**	**$4,831.00**	**$4,831.00**	**$6,254.00**	**$20,431.00**	**$4,831.00**	**$6,254.00**	**$4,831.00**	**$4,831.00**	**$21,854.00**	**$91,984.00**
Water Quality Sample Analysis Lab Costs	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$346,860.00
Total Monitoring and Analysis	**$47,722.00**	**$39,517.00**	**$39,517.00**	**$40,940.00**	**$55,117.00**	**$39,517.00**	**$40,940.00**	**$39,517.00**	**$39,517.00**	**$56,540.00**	**$438,844.00**
Grand Total	**$376,764.00**	**$313,169.00**	**$313,169.00**	**$314,592.00**	**$328,769.00**	**$313,169.00**	**$2,060,372.00**	**$313,169.00**	**$313,169.00**	**$330,192.00**	**$4,976,534.00**
Annual Inflation Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	
Project Year	71	72	73	74	75	76	77	78	79	80	
Escalation Factor	8.1554	8.4000	8.6520	8.9116	9.1789	9.4543	9.7379	10.0301	10.3310	10.6409	
Escalated Amount	$3,072,645	$2,630,625	$2,709,544	$2,803,511	$3,017,746	$2,960,792	$20,063,742	$3,141,104	$3,235,337	$3,513,537	**$47,148,583.00**
Annual Discount Rate	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
Present Worth Factor	0.0313	0.0298	0.0284	0.0270	0.0258	0.0245	0.0234	0.0222	0.0212	0.0202	
Present Worth Amount	$96,177	$78,420	$76,927	$75,804	$77,711	$72,614	$468,636	$69,874	$68,543	$70,893	**$1,155,599.00**

Appendix A: Postclosure Financial Assurance Cost Estimate
Attachment A1: 100-Year Postclosure Cost Estimate

Project Years (81-90)

Item	Year 81 Annual Cost	Year 82 Annual Cost	Year 83 Annual Cost	Year 84 Annual Cost	Year 85 Annual Cost	Year 86 Annual Cost	Year 87 Annual Cost	Year 88 Annual Cost	Year 89 Annual Cost	Year 90 Annual Cost	Total Years 81-90 Cost
Operation & Maintenance											
Road Maintenance	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$100,000.00
Weed Spraying	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$50,000.00
Vehicle Purchase	$25,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25,000.00
Site Caretaker/Water Sampler	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$439,920.00
Pond Liner Maintenance/Repair	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$20,000.00
Subtotal Operation & Maintenance	**$85,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$634,920.00**
Mobilization (5%)	$4,300.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,300.00
Contractor Overhead (8%)	$6,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$4,879.00	$50,790.00
State Excise Tax (2%)	$1,720.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$1,220.00	$12,700.00
Contractor Profit (10%)	$8,599.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$6,099.00	$63,490.00
Contingency (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$31,750.00
Insp., Admin., & Maint. (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$3,050.00	$31,750.00
Engineering/Consulting (1%)	$860.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$610.00	$6,350.00
Scope and Bid (5%)	$4,300.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,300.00
Total Operation & Maintenance	**$121,250.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$840,350.00**
Water Treatment											
Consumables											
Bio Treatment Consumables	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$58,000.00
Propane	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$200,000.00
Utilities	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$900,000.00
Spruce Gulch Water Treatment	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$20,000.00
Diesel	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$10,000.00
Rental	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$36,000.00
Labor & Equipment											
Replacement Costs	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$150,000.00
Plant Operator	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Vehicle Costs	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$30,000.00
Subtotal Water Treatment	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$1,224,000.00**
Mobilization (5%)	$7,020.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,020.00
Contractor Overhead (8%)	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$112,320.00
State Excise Tax (2%)	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$28,080.00
Contractor Profit (10%)	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$140,400.00
Contingency (10%)	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$140,400.00
Insp., Admin., & Maint. (5%)	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$70,200.00
Engineering & Consulting (3%)	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$42,120.00
Scope & Bid (5%)	$7,020.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,020.00
Total Water Treatment	**$207,792.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$1,951,560.00**
Monitoring											
Water Quality Sample Collection Equipment	$8,310.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$36,036.00
Pit Impoundment Monitoring	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$34,000.00
Subtotal Monitoring	**$9,310.00**	**$3,716.00**	**$3,716.00**	**$4,810.00**	**$15,716.00**	**$3,716.00**	**$4,810.00**	**$3,716.00**	**$3,716.00**	**$16,810.00**	**$70,036.00**
Mobilization (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Contractor Overhead (8%)	$745.00	$297.00	$297.00	$385.00	$1,257.00	$297.00	$385.00	$297.00	$297.00	$1,345.00	$5,602.00
State Excise Tax (2%)	$186.00	$74.00	$74.00	$96.00	$314.00	$74.00	$96.00	$74.00	$74.00	$336.00	$1,398.00
Contractor Profit (10%)	$931.00	$372.00	$372.00	$481.00	$1,572.00	$372.00	$481.00	$372.00	$372.00	$1,681.00	$7,006.00
Contingency (5%)	$466.00	$186.00	$186.00	$241.00	$786.00	$186.00	$241.00	$186.00	$186.00	$841.00	$3,505.00
Insp., Admin., & Maint. (5%)	$466.00	$186.00	$186.00	$241.00	$786.00	$186.00	$241.00	$186.00	$186.00	$841.00	$3,505.00
Scope & Bid (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Total Monitoring	**$13,036.00**	**$4,831.00**	**$4,831.00**	**$6,254.00**	**$20,431.00**	**$4,831.00**	**$6,254.00**	**$4,831.00**	**$4,831.00**	**$21,854.00**	**$91,984.00**
Water Quality Sample Analysis Lab Costs	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$346,860.00
Total Monitoring and Analysis	**$47,722.00**	**$39,517.00**	**$39,517.00**	**$40,940.00**	**$55,117.00**	**$39,517.00**	**$40,940.00**	**$39,517.00**	**$39,517.00**	**$56,540.00**	**$438,844.00**
Grand Total	**$376,764.00**	**$313,169.00**	**$313,169.00**	**$314,592.00**	**$328,769.00**	**$313,169.00**	**$314,592.00**	**$313,169.00**	**$313,169.00**	**$330,192.00**	**$3,230,754.00**
Annual Inflation Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	
Project Year	81	82	83	84	85	86	87	88	89	90	
Escalation Factor	10.9601	11.2889	11.6276	11.9764	12.3357	12.7058	13.0870	13.4796	13.8839	14.3005	
Escalated Amount	$4,129,378	$3,535,340	$3,641,400	$3,767,685	$4,055,599	$3,979,056	$4,117,051	$4,221,381	$4,348,022	$4,721,900	**$40,516,812.00**
Annual Discount Rate	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
Present Worth Factor	0.0192	0.0183	0.0174	0.0166	0.0158	0.0151	0.0143	0.0137	0.0130	0.0124	
Present Worth Amount	$79,351	$64,701	$63,468	$62,542	$64,116	$59,910	$59,036	$57,650	$56,551	$58,490	**$625,815.00**

Appendix A: Postclosure Financial Assurance Cost Estimate
Attachment A1: 100-Year Postclosure Cost Estimate

Project Years (91-100)

Item	Year 91 Annual Cost	Year 92 Annual Cost	Year 93 Annual Cost	Year 94 Annual Cost	Year 95 Annual Cost	Year 96 Annual Cost	Year 97 Annual Cost	Year 98 Annual Cost	Year 99 Annual Cost	Year 100 Annual Cost	Total Years 91-100 Cost
Operation & Maintenance											
Road Maintenance	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$100,000.00
Weed Spraying	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$50,000.00
Vehicle Purchase	$25,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25,000.00
Site Caretaker/Water Sampler	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$43,992.00	$439,920.00
Pond Liner Maintenance/Repair	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8,000.00
Subtotal Operation & Maintenance	**$85,992.00**	**$60,992.00**	**$60,992.00**	**$60,992.00**	**$58,992.00**	**$58,992.00**	**$58,992.00**	**$58,992.00**	**$58,992.00**	**$58,992.00**	**$622,920.00**
Mobilization (5%)	$4,300.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,300.00
Contractor Overhead (8%)	$6,879.00	$4,879.00	$4,879.00	$4,879.00	$4,719.00	$4,719.00	$4,719.00	$4,719.00	$4,719.00	$4,719.00	$49,830.00
State Excise Tax (2%)	$1,720.00	$1,220.00	$1,220.00	$1,220.00	$1,180.00	$1,180.00	$1,180.00	$1,180.00	$1,180.00	$1,180.00	$12,460.00
Contractor Profit (10%)	$8,599.00	$6,099.00	$6,099.00	$6,099.00	$5,899.00	$5,899.00	$5,899.00	$5,899.00	$5,899.00	$5,899.00	$62,290.00
Contingency (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$2,950.00	$2,950.00	$2,950.00	$2,950.00	$2,950.00	$2,950.00	$31,150.00
Insp., Admin., & Maint. (5%)	$4,300.00	$3,050.00	$3,050.00	$3,050.00	$2,950.00	$2,950.00	$2,950.00	$2,950.00	$2,950.00	$2,950.00	$31,150.00
Engineering/Consulting (1%)	$860.00	$610.00	$610.00	$610.00	$590.00	$590.00	$590.00	$590.00	$590.00	$590.00	$6,230.00
Scope and Bid (5%)	$4,300.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,300.00
Total Operation & Maintenance	**$121,250.00**	**$79,900.00**	**$79,900.00**	**$79,900.00**	**$77,280.00**	**$77,280.00**	**$77,280.00**	**$77,280.00**	**$77,280.00**	**$77,280.00**	**$824,630.00**
Water Treatment											
Consumables											
Bio Treatment Consumables	$5,800.00	$5,800.00	$5,800.00	$5,800.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$23,200.00
Propane	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$80,000.00
Utilities	$90,000.00	$90,000.00	$90,000.00	$90,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$360,000.00
Spruce Gulch Water Treatment	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8,000.00
Diesel	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,000.00
Rental	$3,600.00	$3,600.00	$3,600.00	$3,600.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$14,400.00
Labor & Equipment											
Replacement Costs	$15,000.00	$15,000.00	$15,000.00	$15,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$60,000.00
Plant Operator	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Vehicle Costs	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$12,000.00
Subtotal Water Treatment	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$140,400.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$489,600.00**
Mobilization (5%)	$7,020.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,020.00
Contractor Overhead (8%)	$11,232.00	$11,232.00	$11,232.00	$11,232.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$44,928.00
State Excise Tax (2%)	$2,808.00	$2,808.00	$2,808.00	$2,808.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$11,232.00
Contractor Profit (10%)	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$56,160.00
Contingency (10%)	$14,040.00	$14,040.00	$14,040.00	$14,040.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$56,160.00
Insp., Admin., & Maint. (5%)	$7,020.00	$7,020.00	$7,020.00	$7,020.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$28,080.00
Engineering & Consulting (3%)	$4,212.00	$4,212.00	$4,212.00	$4,212.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$16,848.00
Scope & Bid (5%)	$7,020.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,020.00
Total Water Treatment	**$207,792.00**	**$193,752.00**	**$193,752.00**	**$193,752.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$789,048.00**
Monitoring											
Water Quality Sample Collection Equipment	$8,310.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$36,036.00
Pit Impoundment Monitoring	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$13,000.00	$34,000.00
Subtotal Monitoring	**$9,310.00**	**$3,716.00**	**$3,716.00**	**$4,810.00**	**$15,716.00**	**$3,716.00**	**$4,810.00**	**$3,716.00**	**$3,716.00**	**$16,810.00**	**$70,036.00**
Mobilization (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Contractor Overhead (8%)	$745.00	$297.00	$297.00	$385.00	$1,257.00	$297.00	$385.00	$297.00	$297.00	$1,345.00	$5,602.00
State Excise Tax (2%)	$186.00	$74.00	$74.00	$96.00	$314.00	$74.00	$96.00	$74.00	$74.00	$336.00	$1,398.00
Contractor Profit (10%)	$931.00	$372.00	$372.00	$481.00	$1,572.00	$372.00	$481.00	$372.00	$372.00	$1,681.00	$7,006.00
Contingency (5%)	$466.00	$186.00	$186.00	$241.00	$786.00	$186.00	$241.00	$186.00	$186.00	$841.00	$3,505.00
Insp., Admin., & Maint. (5%)	$466.00	$186.00	$186.00	$241.00	$786.00	$186.00	$241.00	$186.00	$186.00	$841.00	$3,505.00
Scope & Bid (5%)	$466.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$466.00
Total Monitoring	**$13,036.00**	**$4,831.00**	**$4,831.00**	**$6,254.00**	**$20,431.00**	**$4,831.00**	**$6,254.00**	**$4,831.00**	**$4,831.00**	**$21,854.00**	**$91,984.00**
Water Quality Sample Analysis Lab Costs	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$34,686.00	$346,860.00
Total Monitoring and Analysis	**$47,722.00**	**$39,517.00**	**$39,517.00**	**$40,940.00**	**$55,117.00**	**$39,517.00**	**$40,940.00**	**$39,517.00**	**$39,517.00**	**$56,540.00**	**$438,844.00**
Final Closure and Reclamation (Year 95)											
Surveyor	$0.00	$0.00	$0.00	$0.00	$20,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$20,000.00
Plug Monitoring Wells	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$19,258.00	$19,258.00
Spruce Gulch Water Mangement Facilities	$0.00	$0.00	$0.00	$0.00	$126,853.00	$0.00	$0.00	$0.00	$0.00	$0.00	$126,853.00
South Gulch Water Collection and Transfer System	$0.00	$0.00	$0.00	$0.00	$18,247.00	$0.00	$0.00	$0.00	$0.00	$0.00	$18,247.00
Process Area Mangement System	$0.00	$0.00	$0.00	$0.00	$339,299.00	$0.00	$0.00	$0.00	$0.00	$0.00	$339,299.00
Maintenance & Storage Building Area	$0.00	$0.00	$0.00	$0.00	$5,332.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,332.00
Geo Building Area	$0.00	$0.00	$0.00	$0.00	$5,730.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,730.00
Front Gate	$0.00	$0.00	$0.00	$0.00	$1,462.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,462.00
Haul Road & Access Road Reconstruction	$0.00	$0.00	$0.00	$0.00	$303,754.00	$0.00	$0.00	$0.00	$0.00	$0.00	$303,754.00
Building Demolition	$0.00	$0.00	$0.00	$0.00	$163,321.00	$0.00	$0.00	$0.00	$0.00	$0.00	$163,321.00
Other Earthwork Personnel											
Earthwork Superintendent	$0.00	$0.00	$0.00	$0.00	$84,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$84,000.00
Demolition Superintendent	$0.00	$0.00	$0.00	$0.00	$30,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$30,000.00
Mechanic	$0.00	$0.00	$0.00	$0.00	$60,500.00	$0.00	$0.00	$0.00	$0.00	$0.00	$60,500.00
Security/Safety	$0.00	$0.00	$0.00	$0.00	$67,200.00	$0.00	$0.00	$0.00	$0.00	$0.00	$67,200.00
Final Closure Inspection & Monitoring	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$25,000.00
Subtotal Final Closure and Reclamation Costs	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$1,235,698.00**	**$5,000.00**	**$5,000.00**	**$5,000.00**	**$5,000.00**	**$24,258.00**	**$1,269,956.00**
Mobilization (5%)	$0.00	$0.00	$0.00	$0.00	$61,285.00	$0.00	$0.00	$0.00	$0.00	$1,213.00	$62,498.00
Performance Bond (1%)	$0.00	$0.00	$0.00	$0.00	$12,257.00	$0.00	$0.00	$0.00	$0.00	$0.00	$12,257.00
Contractor Overhead (8%)	$0.00	$0.00	$0.00	$0.00	$98,056.00	$400.00	$400.00	$400.00	$400.00	$1,941.00	$101,597.00
State Excise Tax (2%)	$0.00	$0.00	$0.00	$0.00	$24,514.00	$100.00	$100.00	$100.00	$100.00	$485.00	$25,399.00
Contractor Profit (10%)	$0.00	$0.00	$0.00	$0.00	$122,570.00	$500.00	$500.00	$500.00	$500.00	$2,426.00	$126,996.00
Contingency (10%)	$0.00	$0.00	$0.00	$0.00	$122,570.00	$500.00	$500.00	$500.00	$500.00	$2,426.00	$126,996.00
Insp., Admin., & Maint. (5%)	$0.00	$0.00	$0.00	$0.00	$61,285.00	$250.00	$250.00	$250.00	$250.00	$1,213.00	$63,498.00
Engineering/Consulting (3%)	$0.00	$0.00	$0.00	$0.00	$36,771.00	$0.00	$0.00	$0.00	$0.00	$0.00	$36,771.00
Scope & Bid (5%)	$0.00	$0.00	$0.00	$0.00	$61,285.00	$0.00	$0.00	$0.00	$0.00	$1,213.00	$62,498.00
Total Final Closure and Reclamation Costs	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$1,826,291.00**	**$6,750.00**	**$6,750.00**	**$6,750.00**	**$6,750.00**	**$33,962.00**	**$1,825,968.00**
Grand Total	**$376,764.00**	**$313,169.00**	**$313,169.00**	**$314,592.00**	**$1,958,688.00**	**$123,547.00**	**$124,970.00**	**$123,547.00**	**$123,547.00**	**$167,782.00**	**$3,878,490.00**
Annual Inflation Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	
Project Year	91	92	93	94	95	96	97	98	99	100	
Escalation Factor	14.7295	15.1714	15.6265	16.0953	16.5782	17.0755	17.5878	18.1154	18.6589	19.2186	
Escalated Amount	$5,549,538	$4,751,201	$4,893,737	$5,063,453	$32,471,445	$2,109,627	$2,197,944	$2,238,104	$2,305,247	$3,224,541	**$64,804,837.00**
Annual Discount Rate	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
Present Worth Factor	0.0118	0.0112	0.0107	0.0102	0.0097	0.0092	0.0088	0.0084	0.0080	0.0076	
Present Worth Amount	$65,468	$53,381	$52,364	$51,600	$315,151	$19,500	$19,349	$18,764	$18,407	$24,521	**$638,505**

100-Year Postclosure Cost Estimate Summary
Present values calculated at beginning of year

Inflation Rate 3.00%
Discount Rate 5.00%

Year	Project Year No.	Compound Period (t)	Annual Cost (2016 dollars)	Future Value Inflation	2016 Present Value Discount		Present Values in Future Years (face amount on LOC in given year)	
2016	1	1	$ 688,196	$ 708,842	$ 675,088	2016 PV:	$ 19,667,216	2016 dollars
2017	2	2	$ 357,695	$ 379,479	$ 344,199	2017 PV:	$ 19,906,292	2017 dollars
2018	3	3	$ 324,211	$ 354,274	$ 306,035	2018 PV:	$ 20,503,154	2018 dollars
2019	4	4	$ 359,118	$ 404,190	$ 332,528	2019 PV:	$ 21,156,324	2019 dollars
2020	5	5	$ 2,085,591	$ 2,417,772	$ 1,894,388	2020 PV:	$ 21,789,741	2020 dollars
2021	6	6	$ 357,695	$ 427,107	$ 318,714	2021 PV:	$ 20,340,567	2021 dollars
2022	7	7	$ 325,634	$ 400,489	$ 284,620	2022 PV:	$ 20,909,132	2022 dollars
2023	8	8	$ 357,695	$ 453,117	$ 306,687	2023 PV:	$ 21,534,076	2023 dollars
2024	9	9	$ 324,211	$ 423,022	$ 272,684	2024 PV:	$ 22,135,007	2024 dollars
2025	10	10	$ 374,718	$ 503,590	$ 309,161	2025 PV:	$ 22,797,584	2025 dollars
2026	11	11	$ 382,536	$ 529,519	$ 309,599	2026 PV:	$ 23,408,693	2026 dollars
2027	12	12	$ 318,551	$ 454,178	$ 252,903	2027 PV:	$ 24,023,132	2027 dollars
2028	13	13	$ 318,551	$ 467,803	$ 248,086	2028 PV:	$ 24,747,403	2028 dollars
2029	14	14	$ 319,974	$ 483,989	$ 244,447	2029 PV:	$ 25,493,579	2029 dollars
2030	15	15	$ 367,635	$ 572,763	$ 275,509	2030 PV:	$ 26,260,071	2030 dollars
2031	16	16	$ 318,551	$ 511,181	$ 234,178	2031 PV:	$ 26,971,673	2031 dollars
2032	17	17	$ 319,974	$ 528,868	$ 230,743	2032 PV:	$ 27,783,516	2032 dollars
2033	18	18	$ 318,551	$ 542,312	$ 225,342	2033 PV:	$ 28,617,381	2033 dollars
2034	19	19	$ 318,551	$ 558,581	$ 221,049	2034 PV:	$ 29,478,822	2034 dollars
2035	20	20	$ 369,058	$ 666,560	$ 251,219	2035 PV:	$ 30,366,255	2035 dollars
2036	21	21	$ 382,536	$ 711,630	$ 255,434	2036 PV:	$ 31,184,681	2036 dollars
2037	22	22	$ 318,551	$ 610,377	$ 208,657	2037 PV:	$ 31,996,704	2037 dollars
2038	23	23	$ 318,551	$ 628,688	$ 204,683	2038 PV:	$ 32,955,644	2038 dollars
2039	24	24	$ 319,974	$ 650,441	$ 201,681	2039 PV:	$ 33,943,303	2039 dollars
2040	25	25	$ 367,635	$ 769,746	$ 227,308	2040 PV:	$ 34,957,505	2040 dollars
2041	26	26	$ 318,551	$ 686,984	$ 193,208	2041 PV:	$ 35,897,147	2041 dollars
2042	27	27	$ 2,065,754	$ 4,588,637	$ 1,229,059	2042 PV:	$ 36,970,671	2042 dollars
2043	28	28	$ 318,551	$ 728,822	$ 185,918	2043 PV:	$ 34,001,134	2043 dollars
2044	29	29	$ 318,551	$ 750,686	$ 182,376	2044 PV:	$ 34,935,927	2044 dollars
2045	30	30	$ 369,058	$ 895,801	$ 207,268	2045 PV:	$ 35,894,505	2045 dollars
2046	31	31	$ 382,536	$ 956,371	$ 210,745	2046 PV:	$ 36,748,640	2046 dollars
2047	32	32	$ 318,551	$ 820,295	$ 172,152	2047 PV:	$ 37,581,884	2047 dollars
2048	33	33	$ 318,551	$ 844,904	$ 168,873	2048 PV:	$ 38,599,670	2048 dollars
2049	34	34	$ 319,974	$ 874,139	$ 166,397	2049 PV:	$ 39,642,504	2049 dollars
2050	35	35	$ 334,151	$ 940,255	$ 170,459	2050 PV:	$ 40,706,781	2050 dollars
2051	36	36	$ 313,169	$ 907,651	$ 156,713	2051 PV:	$ 41,754,853	2051 dollars
2052	37	37	$ 314,592	$ 939,128	$ 154,426	2052 PV:	$ 42,889,560	2052 dollars
2053	38	38	$ 313,169	$ 962,927	$ 150,800	2053 PV:	$ 44,047,955	2053 dollars
2054	39	39	$ 313,169	$ 991,815	$ 147,927	2054 PV:	$ 45,239,276	2054 dollars
2055	40	40	$ 330,192	$ 1,077,099	$ 152,997	2055 PV:	$ 46,459,835	2055 dollars
2056	41	41	$ 376,764	$ 1,265,889	$ 171,251	2056 PV:	$ 47,651,875	2056 dollars
2057	42	42	$ 313,169	$ 1,083,783	$ 139,634	2057 PV:	$ 48,705,289	2057 dollars
2058	43	43	$ 313,169	$ 1,116,296	$ 136,974	2058 PV:	$ 50,002,583	2058 dollars
2059	44	44	$ 314,592	$ 1,155,010	$ 134,976	2059 PV:	$ 51,330,605	2059 dollars
2060	45	45	$ 328,769	$ 1,243,271	$ 138,372	2060 PV:	$ 52,684,375	2060 dollars
2061	46	46	$ 313,169	$ 1,219,807	$ 129,295	2061 PV:	$ 54,013,156	2061 dollars
2062	47	47	$ 314,592	$ 1,262,110	$ 127,409	2062 PV:	$ 55,433,022	2062 dollars
2063	48	48	$ 313,169	$ 1,294,093	$ 124,417	2063 PV:	$ 56,879,457	2063 dollars
2064	49	49	$ 313,169	$ 1,332,916	$ 122,047	2064 PV:	$ 58,364,631	2064 dollars
2065	50	50	$ 330,192	$ 1,447,531	$ 126,230	2065 PV:	$ 59,883,301	2065 dollars
2066	51	51	$ 376,764	$ 1,701,249	$ 141,291	2066 PV:	$ 61,357,559	2066 dollars
2067	52	52	$ 2,058,949	$ 9,575,937	$ 757,422	2067 PV:	$ 62,639,122	2067 dollars
2068	53	53	$ 313,169	$ 1,500,209	$ 113,011	2068 PV:	$ 55,716,340	2068 dollars
2069	54	54	$ 314,592	$ 1,552,236	$ 111,362	2069 PV:	$ 56,926,931	2069 dollars
2070	55	55	$ 328,769	$ 1,670,853	$ 114,163	2070 PV:	$ 58,143,425	2070 dollars
2071	56	56	$ 313,169	$ 1,639,319	$ 106,675	2071 PV:	$ 59,296,206	2071 dollars
2072	57	57	$ 314,592	$ 1,696,170	$ 105,119	2072 PV:	$ 60,539,732	2072 dollars
2073	58	58	$ 313,169	$ 1,739,153	$ 102,650	2073 PV:	$ 61,785,732	2073 dollars
2074	59	59	$ 313,169	$ 1,791,328	$ 100,695	2074 PV:	$ 63,048,906	2074 dollars
2075	60	60	$ 330,192	$ 1,945,360	$ 104,146	2075 PV:	$ 64,320,450	2075 dollars
2076	61	61	$ 376,764	$ 2,286,336	$ 116,572	2076 PV:	$ 65,493,842	2076 dollars
2077	62	62	$ 313,169	$ 1,957,432	$ 95,050	2077 PV:	$ 66,367,874	2077 dollars
2078	63	63	$ 313,169	$ 2,016,155	$ 93,239	2078 PV:	$ 67,630,954	2078 dollars
2079	64	64	$ 314,592	$ 2,086,076	$ 91,879	2079 PV:	$ 68,895,542	2079 dollars
2080	65	65	$ 328,769	$ 2,245,487	$ 94,190	2080 PV:	$ 70,149,933	2080 dollars
2081	66	66	$ 313,169	$ 2,203,107	$ 88,012	2081 PV:	$ 71,299,675	2081 dollars
2082	67	67	$ 314,592	$ 2,279,511	$ 86,728	2082 PV:	$ 72,551,396	2082 dollars
2083	68	68	$ 313,169	$ 2,337,276	$ 84,691	2083 PV:	$ 73,785,476	2083 dollars
2084	69	69	$ 313,169	$ 2,407,395	$ 83,078	2084 PV:	$ 75,020,612	2084 dollars
2085	70	70	$ 330,192	$ 2,614,401	$ 85,925	2085 PV:	$ 76,243,876	2085 dollars
2086	71	71	$ 376,764	$ 3,072,645	$ 96,177	2086 PV:	$ 77,310,960	2086 dollars
2087	72	72	$ 313,169	$ 2,630,625	$ 78,420	2087 PV:	$ 77,950,237	2087 dollars
2088	73	73	$ 313,169	$ 2,709,544	$ 76,927	2088 PV:	$ 79,085,609	2088 dollars
2089	74	74	$ 314,592	$ 2,803,511	$ 75,804	2089 PV:	$ 80,194,859	2089 dollars
2090	75	75	$ 328,769	$ 3,017,746	$ 77,711	2090 PV:	$ 81,260,929	2090 dollars
2091	76	76	$ 313,169	$ 2,960,792	$ 72,614	2091 PV:	$ 82,155,362	2091 dollars
2092	77	77	$ 2,060,372	$ 20,063,742	$ 468,636	2092 PV:	$ 83,154,305	2092 dollars
2093	78	78	$ 313,169	$ 3,141,104	$ 69,874	2093 PV:	$ 66,245,103	2093 dollars
2094	79	79	$ 313,169	$ 3,235,337	$ 68,543	2094 PV:	$ 66,259,210	2094 dollars
2095	80	80	$ 330,192	$ 3,513,537	$ 70,893	2095 PV:	$ 66,175,080	2095 dollars
2096	81	81	$ 376,764	$ 4,129,378	$ 79,351	2096 PV:	$ 65,794,597	2096 dollars
2097	82	82	$ 313,169	$ 3,535,340	$ 64,701	2097 PV:	$ 64,748,470	2097 dollars
2098	83	83	$ 313,169	$ 3,641,400	$ 63,468	2098 PV:	$ 64,273,767	2098 dollars
2099	84	84	$ 314,592	$ 3,767,685	$ 62,542	2099 PV:	$ 63,664,001	2099 dollars
2100	85	85	$ 328,769	$ 4,055,599	$ 64,116	2100 PV:	$ 62,891,147	2100 dollars
2101	86	86	$ 313,169	$ 3,979,056	$ 59,910	2101 PV:	$ 61,777,307	2101 dollars
2102	87	87	$ 314,592	$ 4,117,051	$ 59,036	2102 PV:	$ 60,688,174	2102 dollars
2103	88	88	$ 313,169	$ 4,221,381	$ 57,650	2103 PV:	$ 59,399,682	2103 dollars
2104	89	89	$ 313,169	$ 4,348,022	$ 56,551	2104 PV:	$ 57,937,184	2104 dollars
2105	90	90	$ 330,192	$ 4,721,900	$ 58,490	2105 PV:	$ 56,268,661	2105 dollars
2106	91	91	$ 376,764	$ 5,549,538	$ 65,468	2106 PV:	$ 54,124,079	2106 dollars
2107	92	92	$ 313,169	$ 4,751,201	$ 53,381	2107 PV:	$ 51,003,289	2107 dollars
2108	93	93	$ 313,169	$ 4,893,737	$ 52,364	2108 PV:	$ 48,564,706	2108 dollars
2109	94	94	$ 314,592	$ 5,063,453	$ 51,600	2109 PV:	$ 45,854,552	2109 dollars
2110	95	95	$ 1,958,688	$ 32,471,445	$ 315,151	2110 PV:	$ 42,830,691	2110 dollars
2111	96	96	$ 123,547	$ 2,109,627	$ 19,500	2111 PV:	$ 10,877,170	2111 dollars
2112	97	97	$ 124,970	$ 2,197,944	$ 19,349	2112 PV:	$ 9,205,912	2112 dollars
2113	98	98	$ 123,547	$ 2,238,104	$ 18,764	2113 PV:	$ 7,358,345	2113 dollars
2114	99	99	$ 123,547	$ 2,305,247	$ 18,407	2114 PV:	$ 5,376,272	2114 dollars
2115	100	100	$ 167,782	$ 3,224,541	$ 24,521	2115 PV:	$ 3,224,542	2115 dollars
Totals			**$ 40,847,567**	**$ 244,259,960**	**$ 18,730,682**			

ATTACHMENT A2

TABLES

May 2015

TABLE A2-1
ACREAGE CLASSIFICATION

Category	Area (acres)	Notes
Permitted Affected Acreage (Includes Mine Permits 445 & 460)	460.20	--
Total Acreage Affected as of December 31, 2013	341.03	--
Total Surface Mining Disturbed Acreage	205.68	--
Reclaimed Acreage Meeting Post-Mining Land Use, No Postclosure Monitoring Required	45.29	Includes: -Richmond Hill Access Road, Spearfish Fire Trail and reclaimed mine roads -Topsoil Stockpiles along Richmond Hill Access Road -Land Application Area; and -Limestone Quarry on SMP 460
Acreage Meeting Post-Mining Land Use and entering a 100-year Postclosure Monitoring Period	220.65	Includes: -Former Spruce Gulch Waste Rock Facility -Pit Impoundment -V-Notch -Process Area (Leach Pads 1, 2 and 3) -Passive Treatment Cell -Crusher -Carbonate Road -Turnaround Area; -Reclaimed Topsoil Stockpiles Areas on mine site -Administrative Area; and -Limestone Quarry on SMP 445 and Access Road
Acreage that will be Reclaimed at the Completion of Water Treatment and during the 30-year Postclosure Period	73.33	Includes: -Front Gate & Guard Shack -Original Water Treatment Plant (Chemical Precipitation and Selenium Treatment Circuit) -Spruce Gulch Water Management Facilities -South Gulch Water Collection and Transfer System -Process Area Water Management System including the operations building, Lower Discharge Pond, Barren (new Sludge Disposal Pond), Pregnant and Storm Water ponds -Areas west of the Process Area Water Management System -Fuel and ANFO Storage areas -Maintenance Building Area -Geo Building Area; and -Water Management Access Roads including portions of the main Haul Road unless the road is transferred to an interested third party.
Acreage that will be Reclaimed in the Short Term under the Updated Reclamation Plan	1.76	Includes: -Original Sludge Basin; -Water Tank; and Upper Discharge Pond

TABLE A2-2
POST-CLOSURE ACREAGE DETAIL

Site	Subcomponents	Sub Acres	Total Site Acres
Front Gate			
	Front Gate	0.29	
	Subtotal =		**0.29**
Original Water Treatment Plant (Chemical Precipitation and Selenium Treatment Circuit)			
	Original Water Treatment Plant	0.1	
	Subtotal =		**0.1**
Spruce Gulch Water Management Facilities			
	Spruce Gulch Ponds	4.1	
	Dam Face North	0.16	
	Dam Face South	1.12	
	Subtotal =		**5.38**
South Gulch Water Collection and Transfer System			
	South Gulch Pond	0.05	
	Subtotal =		**0.05**
Process Area Mangement System			
	Lower Discharge Pond	0.34	
	Barren Pond (New Sludge Pond)	2.19	
	Pregnant Pond	2.71	
	Storm Water Pond	10.05	
	Process Area (Minus Ponds)	6.0	
	Subtotal =		**21.29**
Area West of Process Ponds			
	Process Area (Middle)	1.08	
	Process Area (North)	1.93	
	Process Area (South)	2.47	
	Slope (by Process Area)	0.91	
	SW Pond Slope	2.29	
	Subtotal =		**8.68**
Fuel & ANFO Area			
	Fuel & ANFO Area	3.99	
	Subtotal =		**3.99**
Maintenance & Storage Building Area			
	Maintenance & Storage Building Area	1.24	
	Subtotal =		**1.24**
Geo Building Area			
	Geo Building Area	1.37	
	Subtotal =		**1.37**
Access Roads			
	Spruce Gulch Roads	3.7	
	Pit Impoundment Roads	1.16	
	Haul Road (South of Fuel & Anfo Area)	0.96	
	Haul Road (South Edge After 135 Deg Turn)	0.45	
	Haul Road (North of Front Gate)	0.46	
	Haul Road (North of Carbonate Road)	1.49	
	Haul Road (North of Administration Area)	1.54	
	Haul Road	18.69	
	Access Road (Water Tank to Process Area)	0.41	
	Access Road (Thru SW Pond Slope)	0.51	
	Access Road (By SW Pond Slope Thru Process Area)	0.38	
	Access Road (By Limestone Quarry)	0.49	
	Access Road (Haul Road To Process Area)	0.5	
	Access Road (between Leach Pad 3 & Process Area)	0.2	
	Subtotal =		**30.94**
		TOTAL =	**73.33**

TABLE A2-3
Post-Closure Material Volumes and Earth Moving Summary (Non-Demolition)
LAC Minerals Richmond Hill Mine

Area	Top Soil Required (cy)	Grading Flats Grader (acres)	Ripping Dozer (acres)	Material Moved Dozer (cy)	Grading Slopes Dozer (acres)	Material Moved Scraper (cy)	Material Moved Loader (acres)	Material Moved Truck & Loader (cy)	Acres Revegetated
Spruce Gulch Ponds & Roads	7,693		3.70		9.45			7,623	9.45
Spruce Gulch Pond Berm & Liner Removal				71,649					
South Gulch Water Managnment Facilities & Roads	976		1.16		1.21			976	1.21
South Gulch Pond Berm and Drain Pipe Removal				5,000					
Process Area and Roads	27,257		1.35		33.79			27,257	33.79
Storm Water Pond Berm & Liner Removal				90,139					
Pregnant Pond Berm & Liner Removal				45,626					
New Sludge Pond Cover	6,300			6,300				6,300	
Lower Discharge Pond Berm & Liner Removal				9,722					
Maintenance Building	1,000	1.24	1.24					1,000	1.24
Geo Building	1,105	1.37	1.37					1,105	1.37
Front Gate	234	0.29	0.29					234	0.29
Haul Road Removal	18,085		22.42		22.42			18,085	22.42
Access Road Reconstruction (Includes Portion of Haul Road Reduction)[1]		5.53		32,843	5.53			65,685	
Totals =	**62,650**	**8.43**	**31.53**	**261,279**	**72.4**			**128,265**	**69.77**

Notes:
[1]Toposoil for portion of Haul Road Reduction included in Haul Road Removal.

ATTACHMENT A3

ANNUAL WATER QUALITY SAMPLING & ANALYSIS COST ESTIMATE

May 2015

Table A3-1 Annual Costs for Field Equipment

Water Sampling Equipment Costs	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
10 year annual costs for field equipment										
pH probe[1]	$665.00	$0.00	$0.00	$665.00	$0.00	$0.00	$665.00	$0.00	$0.00	$665.00
pH probe replacement[2]	$352.00	$352.00	$352.00	$352.00	$352.00	$352.00	$352.00	$352.00	$352.00	$352.00
pH Buffers/electrode storage solution[3]	$74.00	$74.00	$74.00	$74.00	$74.00	$74.00	$74.00	$74.00	$74.00	$74.00
Flow meter replacement[4]	$3,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Monitor well probe[5]	$429.00	$0.00	$0.00	$429.00	$0.00	$0.00	$429.00	$0.00	$0.00	$429.00
Field books	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
Ice	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00
Shipping[6]	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00
DI water for cleaning sampling equipment	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00
Filters[7]	$960.00	$960.00	$960.00	$960.00	$960.00	$960.00	$960.00	$960.00	$960.00	$960.00
Portable generator[8]	$1,500.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total	$8,310.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00	$2,716.00	$2,716.00	$3,810.00

(1) Orion A324 Star @ $665, 3 year estimated life, from USA Blue Book
(2) Assumes 2 probes per year, from USA Blue Book
(3) 3 year estiamted life, from USA Blue Book
(4) Marsh McBirney Flo-mate 2000 @ $3000, 10 year estimated life
(5) Solinst Model 102 @ $429 from USA Blue Book
(6) Assumes 2 coolers per week shipped to contract lab by rapid delivery
(7) Assumes single use disposable filter cartridges,192 samples per year
(8) Assumes $1500 cost for 10 year estimated life

Appendix A: Postclosure Financial Assurance Cost Estimate
Attachment A3: Annual Water Quality Sampling and Analysis Cost Estimate

Richmond Hill Surface Water List
Sampling Frequency: Quarterly

Parameter	# smpls./yr.	$/smpl.	$/yr.
TDS	8	$ 13.00	$ 104.00
Nitrate	8	$ 13.00	$ 104.00
Acidity	8	$ 13.00	$ 104.00
Alkalinity	8	$ 13.00	$ 104.00
Calcium	8	$ 13.00	$ 104.00
Magnesium	8	$ 13.00	$ 104.00
Sulfate	8	$ 13.00	$ 104.00
Aluminum (TR)	8	$ 13.00	$ 104.00
Arsenic (TR)	8	$ 18.00	$ 144.00
Cadmium (TR)	8	$ 18.00	$ 144.00
Copper (TR)	8	$ 18.00	$ 144.00
Nickel (TR)	8	$ 18.00	$ 144.00
Selenium (TR)	8	$ 21.00	$ 168.00
Zinc (TR)	8	$ 18.00	$ 144.00
	Total Analysis Cost		$ 1,720.00

Sites	Samples/yr.
Waste Dump Toe	4
Retention Pond Below	4
Total	8

Appendix A: Postclosure Financial Assurance Cost Estimate
Attachment A3: Annual Water Quality Sampling and Analysis Cost Estimate

Richmond Hill Ground Water List
Sampling Frequency: Quarterly

Parameter	# smpls./yr.	$/smpl.	$/yr.
TDS	48	$ 13.00	$ 624.00
Nitrate	48	$ 13.00	$ 624.00
Acidity	48	$ 13.00	$ 624.00
Alkalinity	48	$ 13.00	$ 624.00
Sulfate	48	$ 13.00	$ 624.00
Aluminum (D)	48	$ 13.00	$ 624.00
Arsenic (D)	48	$ 13.00	$ 624.00
Cadmium (D)	48	$ 13.00	$ 624.00
Copper (D)	48	$ 13.00	$ 624.00
Iron (D)	48	$ 13.00	$ 624.00
Lead (D)	48	$ 13.00	$ 624.00
Selenium (D)	48	$ 16.00	$ 768.00
Zinc (D)	48	$ 13.00	$ 624.00
	Total Analysis Cost		$ 8,256.00

Sites	Samples/yr.
South Gulch	4
MW-9B	4
MW-17	4
MW-19	4
MW-20	4
MW-24	4
MW-25	4
MW-26	4
MW-27	4
MW-28	4
MW-29	4
MW-30	4
Total	48

Appendix A: Postclosure Financial Assurance Cost Estimate
Attachment A3: Annual Water Quality Sampling and Analysis Cost Estimate

Surface Water Discharge List #1
Sampling Frequency: Monthly

Parameter	# smpls./yr.	$/smpl.	$/yr.
TDS	24	$ 13.00	$ 312.00
TSS	24	$ 13.00	$ 312.00
Nitrate	24	$ 13.00	$ 312.00
Ammonia	24	$ 13.00	$ 312.00
Hardness	24	$ 6.00	$ 144.00
Calcium	24	$ 13.00	$ 312.00
Magnesium	24	$ 13.00	$ 312.00
Phosphorus	1	$ 13.00	$ 13.00
Aluminum (TR)	24	$ 18.00	$ 432.00
Arsenic (TR)	24	$ 18.00	$ 432.00
Cadmium (TR)	24	$ 18.00	$ 432.00
Chromium (TR)	24	$ 18.00	$ 432.00
Copper (TR)	24	$ 18.00	$ 432.00
Iron (TR)	24	$ 18.00	$ 432.00
Lead (TR)	24	$ 18.00	$ 432.00
Mercury (T)	24	$ 18.00	$ 432.00
Nickel (TR)	24	$ 18.00	$ 432.00
Selenium (TR)	24	$ 21.00	$ 504.00
Silver (TR)	24	$ 18.00	$ 432.00
Zinc (TR)	24	$ 18.00	$ 432.00
	Total Analysis Cost		$ 6,349.00

Sites	Samples/yr.
OEA-1 (STR 1)	12
OEA-3B (STR 2)	12
Total	24

Appendix A: Postclosure Financial Assurance Cost Estimate
Attachment A3: Annual Water Quality Sampling and Analysis Cost Estimate

Surface Water Discharge List #2
Sampling Frequency: Varies

Parameter	# smpls./yr.	$/smpl.	$/yr.
TDS	32	$ 13.00	$ 416.00
TSS	46	$ 13.00	$ 598.00
Nitrate	32	$ 13.00	$ 416.00
Ammonia	32	$ 13.00	$ 416.00
Hardness	46	$ 6.00	$ 276.00
Calcium	46	$ 13.00	$ 598.00
Magnesium	46	$ 13.00	$ 598.00
Sodium	16	$ 13.00	$ 208.00
Sulfate	16	$ 13.00	$ 208.00
BOD (5-day)	24	$ 27.00	$ 648.00
Aluminum (TR)	32	$ 18.00	$ 576.00
Arsenic (TR)	46	$ 18.00	$ 828.00
Cadmium (TR)	46	$ 18.00	$ 828.00
Chromium (TR)	46	$ 18.00	$ 828.00
Copper (TR)	46	$ 18.00	$ 828.00
Iron (TR)	32	$ 18.00	$ 576.00
Lead (TR)	46	$ 18.00	$ 828.00
Mercury (T)	46	$ 20.00	$ 920.00
Nickel (TR)	46	$ 18.00	$ 828.00
Selenium (TR)	46	$ 21.00	$ 966.00
Silver (TR)	46	$ 18.00	$ 828.00
Zinc (TR)	46	$ 18.00	$ 828.00
	Total Analysis Cost		$ 14,044.00

Sites	Samples/yr.
#001	19
#002	4
#003	4
#004	19
Total	46

Appendix A: Postclosure Financial Assurance Cost Estimate
Attachment A3: Annual Water Quality Sampling and Analysis Cost Estimate

Leach Pad Surface Water List
Sampling Frequency: Varies

Parameter	# smpls./yr.	$/smpl.	$/yr.
TDS	6	$ 13.00	$ 78.00
Nitrate	6	$ 13.00	$ 78.00
Acidity	6	$ 13.00	$ 78.00
Alkalinity	6	$ 13.00	$ 78.00
Calcium	6	$ 13.00	$ 78.00
Magnesium	6	$ 13.00	$ 78.00
Sulfate	6	$ 13.00	$ 78.00
Aluminum (TR)	6	$ 18.00	$ 108.00
Arsenic (TR)	6	$ 18.00	$ 108.00
Cadmium (TR)	6	$ 18.00	$ 108.00
Copper (TR)	6	$ 18.00	$ 108.00
Nickel (TR)	6	$ 18.00	$ 108.00
Selenium (TR)	6	$ 21.00	$ 126.00
Zinc (TR)	6	$ 18.00	$ 108.00
	Total Analysis Cost		$ 1,320.00

Sites	Samples/yr.
FD-1	4
FD-2	2
Total	6

Appendix A: Postclosure Financial Assurance Cost Estimate
Attachment A3: Annual Water Quality Sampling and Analysis Cost Estimate

Leach Pad Ground Water List
Sampling Frequency: Varies

Parameter	# smpls./yr.	$/smpl.	$/yr.
TDS	6	$ 13.00	$ 78.00
Nitrate	6	$ 13.00	$ 78.00
Acidity	6	$ 13.00	$ 78.00
Alkalinity	6	$ 13.00	$ 78.00
Sulfate	6	$ 13.00	$ 78.00
Aluminum (D)	6	$ 13.00	$ 78.00
Arsenic (D)	6	$ 13.00	$ 78.00
Cadmium (D)	6	$ 13.00	$ 78.00
Copper (D)	6	$ 13.00	$ 78.00
Iron (D)	6	$ 13.00	$ 78.00
Lead (D)	6	$ 13.00	$ 78.00
Nickel (D)	6	$ 13.00	$ 78.00
Selenium (D)	6	$ 16.00	$ 96.00
Zinc (D)	0	$ 13.00	$ -
	Total Analysis Cost		$ 1,032.00

Sites	Samples/yr.
LP3MW	2
MW-14	4
Total	6

Appendix A: Postclosure Financial Assurance Cost Estimate
Attachment A3: Annual Water Quality Sampling and Analysis Cost Estimate

Aquatic Biological
Sampling Frequency: Annual with Aquatic Biological Monitoring

Parameter	# smpls./yr.	$/smpl.	$/yr.
TDS	4	$ 13.00	$ 52.00
TSS	4	$ 13.00	$ 52.00
Nitrate	4	$ 13.00	$ 52.00
Hardness	4	$ 6.00	$ 24.00
Calcium	4	$ 13.00	$ 52.00
Magnesium	4	$ 13.00	$ 52.00
Phosphorus	4	$ 13.00	$ 52.00
Arsenic (TR)	4	$ 18.00	$ 72.00
Cadmium (TR)	4	$ 18.00	$ 72.00
Chromium (TR)	4	$ 18.00	$ 72.00
Copper (TR)	4	$ 18.00	$ 72.00
Iron (TR)	4	$ 18.00	$ 72.00
Lead (TR)	4	$ 18.00	$ 72.00
Mercury (T)	4	$ 18.00	$ 72.00
Nickel (TR)	4	$ 18.00	$ 72.00
Selenium (TR)	4	$ 21.00	$ 84.00
Silver (TR)	4	$ 18.00	$ 72.00
Zinc (TR)	4	$ 18.00	$ 72.00
	Total Analysis Cost		$ 984.00

Sites	Samples/yr.
OEA-2	1
OEA-3	1
OEA-4	1
S-5	1
Total	4

Appendix A: Postclosure Financial Assurance Cost Estimate
Attachment A3: Annual Water Quality Sampling and Analysis Cost Estimate

Leach Pad Elluent List
Sampling Frequency: Semi-annual

Parameter	# smpls./yr.	$/smpl.	$/yr.
TDS	4	$ 13.00	$ 52.00
Nitrate	2	$ 13.00	$ 26.00
Calcium	2	$ 13.00	$ 26.00
Magnesium	2	$ 13.00	$ 26.00
Arsenic (TR)	4	$ 18.00	$ 72.00
Cadmium (TR)	4	$ 18.00	$ 72.00
Chromium (TR)	4	$ 18.00	$ 72.00
Copper (TR)	4	$ 18.00	$ 72.00
Iron (TR)	4	$ 18.00	$ 72.00
Lead (TR)	4	$ 18.00	$ 72.00
Mercury (T)	4	$ 20.00	$ 80.00
Nickel (TR)	4	$ 18.00	$ 72.00
Selenium (TR)	4	$ 21.00	$ 84.00
Zinc (TR)	4	$ 18.00	$ 72.00
	Total Analysis Cost		$ 870.00

Sites	Samples/yr.
Pad 1	2
Pad 3	2
Total	4

Appendix A: Postclosure Financial Assurance Cost Estimate
Attachment A3: Annual Water Quality Sampling and Analysis Cost Estimate

Process Area LDCRS
Sampling Frequency: Annual

Parameter	# smpls./yr.	$/smpl.	$/yr.
TDS	5	$ 13.00	$ 65.00
Nitrate	5	$ 13.00	$ 65.00
Calcium	5	$ 13.00	$ 65.00
Magnesium	5	$ 13.00	$ 65.00
Arsenic (TR)	5	$ 18.00	$ 90.00
Cadmium (TR)	5	$ 18.00	$ 90.00
Chromium (TR)	0	$ 18.00	$ -
Copper (TR)	5	$ 18.00	$ 90.00
Iron (TR)	5	$ 18.00	$ 90.00
Lead (TR)	0	$ 18.00	$ -
Mercury (T)	5	$ 20.00	$ 100.00
Nickel (TR)	5	$ 18.00	$ 90.00
Selenium (TR)	5	$ 21.00	$ 105.00
Silver (TR)	5	$ 18.00	$ 90.00
Zinc (TR)	5	$ 18.00	$ 90.00
	Total Analysis Cost		$ 1,095.00

Sites	Samples/yr.
LP-1	1
LP-2	1
LP-3	1
Pregnant Pond	1
New Sludge Basin	1
Total	5

Annual Water Sample Analysis and Equipment Costs (Years 1-10)
Years with Aquatic Monitoring

Sample List		
Richmond Hill Surface Water	$	1,720.00
Richmond Hill Ground Water	$	8,256.00
Surface Water Discharge List #1	$	6,349.00
Surface Water Discharge List #2	$	14,044.00
Aquatic Biological	$	984.00
Leach Pad Surface Water	$	1,320.00
Leach Pad Ground Water	$	1,032.00
Leach Pad Effluent	$	870.00
WET Testing (4 @ $840)	$	3,360.00
WET Testing (4 @ $575)	$	2,300.00
Process Area LDCRS	$	1,095.00
Total Annual Analysis Cost	$	41,330.00

Annual Water Sample Analysis and Equipment Costs (Years 1-10)
Years without Aquatic Monitoring

Sample List		
Richmond Hill Surface Water	$	1,720.00
Richmond Hill Ground Water	$	8,256.00
Surface Water Discharge List #1	$	6,349.00
Surface Water Discharge List #2	$	14,044.00
Leach Pad Surface Water	$	1,320.00
Leach Pad Ground Water	$	1,032.00
Leach Pad Effluent	$	870.00
WET Testing (4 @ $840)	$	3,360.00
WET Testing (4 @ $575)	$	2,300.00
Process Area LDCRS	$	1,095.00
Total Annual Analysis Cost	$	40,346.00

Annual Water Sample Analysis and Equipment Costs (Years 11-100)
Years with Aquatic Monitoring

Sample List		
Richmond Hill Surface Water	$	1,720.00
Richmond Hill Ground Water	$	8,256.00
Surface Water Discharge List #1	$	6,349.00
Surface Water Discharge List #2	$	14,044.00
Aquatic Biological	$	984.00
Leach Pad Surface Water	$	1,320.00
Leach Pad Ground Water	$	1,032.00
Leach Pad Effluent	$	870.00
Process Area LDCRS	$	1,095.00
Total Annual Analysis Cost	$	35,670.00

Annual Water Sample Analysis and Equipment Costs (Years 11-100)
Years without Aquatic Monitoring

Sample List		
Richmond Hill Surface Water	$	1,720.00
Richmond Hill Ground Water	$	8,256.00
Surface Water Discharge List #1	$	6,349.00
Surface Water Discharge List #2	$	14,044.00
Leach Pad Surface Water	$	1,320.00
Leach Pad Ground Water	$	1,032.00
Leach Pad Effluent	$	870.00
Process Area LDCRS	$	1,095.00
Total Annual Analysis Cost	$	34,686.00

ATTACHMENT A4

TOPSOIL, EARTHWORK, GRADING, AND REVEGETATION WORKSHEETS

May 2015

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Spruce Gulch Ponds and Roads
INDEX

GRADING	A 21
RIPPING	A 38
MAT. MOVING WITH DOZER	A 54
GRADING WITH DOZER	A 71
TOPSOIL REAPPL. (SCRAPER)	A 85
TOPSOIL REAPPL. (F.E.L.)	A 104
MATERIAL MOVING	A 120
SEED COSTS (MIXTURE #1)	A 146
SEED COSTS (MIXTURE #2)	A 160
SHRUB COSTS	A 174
DISKING AND SEEDING	A 187
MULCH	A 194
FERTILIZER	A 202
POND LINER REMOVAL	A 214
TREE COSTS	A 223
FUEL COSTS	A 234
MISC. COSTS	A 249
SUMMARY	A 263
DOZER PROD. TABLES	AA 71
SCRAPER TIME TABLES	AA 84
F.E.L. TIME TABLES	AA 114
TABLE OF SEED COSTS	AA 146
MACRO (FOR CLEARING WKS)	AA 255
MACRO (FOR PRINTING WKS)	L 1

(Index Continued in Cell F 5)

GRADING FLATS

Grader Type:	Cat 16 M Grader
Blade Width (ft):	10.2
Man. Time (min):	0.35
Avg. Pass (ft):	1000
Avg. Speed (mph):	3
# of passes over area:	2
Acreage (acres):	0.00
Cost for Grader ($/hr):	$112.07
Cost for Oper. ($/hr):	$35.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0.0 hrs
Cost =	$0

RIPPING FLAT AREAS

Dozer Type:	Cat D9T Dozer
Ripper Spacing (ft):	3
Avg. Speed (mph):	1
Avg. Pass (ft):	300
Man. Time (min):	0.25
Acreage (acres):	3.70
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Travel Distance =	53724 ft
Number of Passes =	179 passes
Total Time @ 80% eff =	13.7 hrs
Cost =	$2,373

MATERIAL MOVING WITH DOZER

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	250
Vol. of Mat. (cy):	0.00 (estimation)
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Is mat. being moved to reduce slopes of heap, dump or other stockpile? Enter 1 if yes, 2 if no:	2
Production =	432 cy/hr
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

GRADING TOPSOIL ON SLOPES WITH DOZER

Dozer Type:	Cat D9T Dozer	
Blade Type:	Universal	
Avg. Doze Dist. (ft.):	300	
Acreage (acres):	9.45	
Mat. Thickness (ft.):	0.5	
Cost for Dozer ($/hr):	$143.18	
Cost for Oper. ($/hr):	$30.00	
Production =	480	cy/hr
Total Time @ 80% Eff. =	19.9	hrs
Cost =	$3,446	

TOPSOIL REAPPL. (SCRAPER)

Scraper Type:	Cat 637E	
Scraper Capacity (cy):	31	
Avg. Haul Dist. (ft):	4800	
Total Resistance (%):	10	
Acreage (acres):	0.00	
T'soil Reapp. Depth (ft):	0.33	
Cost for Scraper ($/hr):	$86.00	
Cost for Oper. ($/hr):	$35.00	
Time to Load =	0.80	mins/trip
Time to Man. & Spread =	0.70	mins/trip
Time to Travel Loaded =	5.20	mins/trip
Time to Travel Empty =	3.10	mins/trip
Total Cycle Time =	9.80	mins/trip
No. of Trips =	0	trips
Total Time @ 80% Eff. =	0	hrs
Cost =	$0	

TOPSOIL REAPPL. (FRONT END LOADER)

Loader Type:	Cat 988H Loader	
Bucket Capacity (cy.):	8.25	
Avg. Haul Dist. (ft):	100	
Acreage (acres):	0.00	
T'soil Reapp. Depth (ft):	1.5	
Cost for Loader ($/hr):	$147.02	
Cost for Oper. ($/hr):	$35.00	
Hydraulic Cycle Time =	0.20	mins/trip
Travel Time (one way) =	0.15	mins/trip
Total Cycle Time =	0.50	mins/trip
No. of Trips =	0	trips
Total Time @ 80% Eff. =	0	hrs
Cost =	$0	

MATERIAL MOVING (Truck & Front End Loader)
(Replacing topsoil on ponds and roads)

Unit Wt. Mat. (lb/cu ft):	100	
Vol. of Material (cy):	7623.00	
Loader Type(1:980,2:988)	2	
Bucket Capacity (cy):	8.25	
Load-Dump-Man. Time(min):	0.6	
Cost for Loader ($/hr):	$147.02	
Cost for Oper. ($/hr):	$35.00	
Truck Type (1:35T,2:50T):	2	
Truck Capacity (cy):	37	
Avg. Truck Speed (mph):	10	
Man. & Dump Time (min):	2	
Avg. Haul Dist. (ft):	2700	
Cost for Truck ($/hr):	$120.17	
Cost for Oper. ($/hr):	$35.00	
# Buckets to Fill Truck =	4	buckets
Loader Time/Truckload =	2.4	min/truck
No. of Truckloads =	206	loads
Time per Truckload =	10.5	min
Optimum No. of Trucks =	4	trucks
Time/Truck @ 80% Eff. =	11.3	hrs/truck
F.E.L. Time @ 80% Eff. =	11.3	hrs
Cost =	$9,071	

SEED COSTS

SEED TYPE	APPL.	RATE	COST
Western Wheatgrass		8.00 lbs/acre	$8.50 /lb
Thickspike Wheatgrass		6.00 lbs/acre	$7.38 /lb
Slender Wheatgrass		4.00 lbs/acre	$4.88 /lb
Hard Fescue		2.00 lbs/acre	$3.00 /lb
Kentucky Bluegrass		4.00 lbs/acre	$2.88 /lb
Timothy		4.00 lbs/acre	$1.98 /lb
White Dutch Clover		4.00 lbs/acre	$3.25 /lb
Acreage (acres):		9.45 acres	
Cost =		$1,609	

SEED COSTS (CONTINUED)

SEED TYPE	APPL.	RATE	COST
Regreen (nurse crop)		20.00 lbs/acre	$2.60 /lb
Acreage (acres):		9.45 acres	
Cost =		$491	

FORB COSTS

FORB TYPE	APPL.	RATE	COST
Black-eyed Susan		lbs/acre	/lb
Rocky Mountain Penstemon		lbs/acre	/lb
Blanket Flower		lbs/acre	/lb
Acreage (acres)		acres	
Cost =		$0	

SEEDING COSTS

Acreage (acres):	9.45
Cost ($/acre):	500
Total Cost =	$4,725

HYDOMULCH (WOOD FIBER)

Acreage (acres):	9.45
Cost ($/acres):	400
Total Cost =	$3,780

FERTILIZER

N Appl. Rate (lbs/acre):	54.5
P Appl. Rate (lbs/acre):	43
K Appl. Rate (lbs/acre):	13.5
N Cost ($/lb):	$1.67
P Cost ($/lb):	$0.65
K Cost ($/lb):	$0.50
Acreage (acres):	9.45
Total Cost =	$1,188

POND LINER REMOVAL

No. of Ponds:	
Hours per Pond (assumed):	8
No. of Laborers (assumed):	6
Cost per Laborer:	$10.00
Cost for Supervisior	$20.00
Total Cost =	$0

TREE COST

TREE TYPE	NUMBER	COST
Black Hills Spruce		$2.75 /stem
Paper Birch		$2.75 /stem
Ponderosa Pine		$2.75 /stem
Aspen		$2.75 /stem
Trees/acre		

* Includes planting and herbivore protection

Total Cost = $0

FUEL COSTS

Cost of fuel ($/gal): $3.55 /gal

EQUIPMENT	HOURS	CONSUMP.
Cat D9T Dozer	33.6	14.0 gal/hr
Cat 637E Scraper	0.0	11.5 gal/hr
Cat 16M Grader	0.0	9.0 gal/hr
Cat 980 Loader	0.0	8.4 gal/hr
Cat 988H Loader	11.3	16 gal/hr
Cat 773 Truck	45.2	14.5 gal/hr
Cat 770 Truck	0.0	13.5 gal/hr

Total Cost = $4,638

MISC. COSTS

Erosion Control	$20,000
Remove Spruce Gulch Pond Berms	$60,532
Sludge Removal to Sludge Basin	$15,000

TOTAL COST = $126,853

Press "Alt" and "C" to clear worksheet.
(This will bring all costs to 0.)

Press "Alt" and "P" to print worksheet with a header.
Press "Alt" and "A" to print worksheet without a header.

BONDCALC Program

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BONDCALC (COPYRIGHT 1995. STATE OF SOUTH DAKOTA)
Spruce Gulch Pond Berm & Liner Removal
INDEX

GRADING	A 21
RIPPING	A 38
MAT. MOVING WITH DOZER	A 54
GRADING WITH DOZER	A 71
TOPSOIL REAPPL. (SCRAPER)	A 85
TOPSOIL REAPPL. (F.E.L.)	A 104
MATERIAL MOVING	A 120
SEED COSTS (MIXTURE #1)	A 146
SEED COSTS (MIXTURE #2)	A 160
SHRUB COSTS	A 174
DISKING AND SEEDING	A 187
MULCH	A 194
FERTILIZER	A 202
POND LINER REMOVAL	A 214
TREE COSTS	A 223
FUEL COSTS	A 234
MISC. COSTS	A 249
SUMMARY	A 263
DOZER PROD. TABLES	AA 71
SCRAPER TIME TABLES	AA 84
F.E.L. TIME TABLES	AA 114
TABLE OF SEED COSTS	AA 146
MACRO (FOR CLEARING WKS)	AA 255
MACRO (FOR PRINTING WKS)	L 1

(Index Continued in Cell F 5)

GRADING FLATS

Grader Type:	Cat 16 M Grader
Blade Width (ft):	10.2
Man. Time (min):	0.35
Avg. Pass (ft):	1000
Avg. Speed (mph):	3
# of passes over area:	2
Acreage (acres):	0.00
Cost for Grader ($/hr):	$112.07
Cost for Oper. ($/hr):	$35.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0.0 hrs
Cost =	$0

RIPPING FLAT AREAS

Dozer Type:	Cat D9T Dozer
Ripper Spacing (ft):	3
Avg. Speed (mph):	1
Avg. Pass (ft):	300
Man. Time (min):	0.25
Acreage (acres):	0.00
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0 hrs
Cost =	$0

MATERIAL MOVING WITH DOZER (Removing pond berms)

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	300
Vol. of Mat. (cy):	71649.00 (estimation)
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Is mat. being moved to reduce slopes of heap, dump or other stockpile? Enter 1 if yes, 2 if no:	2
Production =	345.6 cy/hr
Total Time @ 80% Eff. =	259.1 hrs
Cost =	$44,871

GRADING TOPSOIL ON SLOPES WITH DOZER

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	300
Acreage (acres):	0.00
Mat. Thickness (ft.):	0.5
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Production =	480 cy/hr
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (SCRAPER)

Scraper Type:	Cat 637E
Scraper Capacity (cy):	31
Avg. Haul Dist. (ft):	4800
Total Resistance (%):	10
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	0.33
Cost for Scraper ($/hr):	$86.00
Cost for Oper. ($/hr):	$35.00
Time to Load =	0.80 mins/trip
Time to Man. & Spread =	0.70 mins/trip
Time to Travel Loaded =	5.20 mins/trip
Time to Travel Empty =	3.10 mins/trip
Total Cycle Time =	9.80 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (FRONT END LOADER)

Loader Type:	Cat 988H Loader
Bucket Capacity (cy.):	8.25
Avg. Haul Dist. (ft):	100
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	1.5
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Hydraulic Cycle Time =	0.20 mins/trip
Travel Time (one way) =	0.15 mins/trip
Total Cycle Time =	0.50 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

MATERIAL MOVING (Truck & Front End Loader)

Unit Wt. Mat. (lb/cu ft):	100
Vol. of Material (cy):	0.00
Loader Type(1:980,2:988)	2
Bucket Capacity (cy):	8.25
Load-Dump-Man. Time(min):	0.6
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Truck Type (1:35T,2:50T):	2
Truck Capacity (cy):	37
Avg. Truck Speed (mph):	10
Man. & Dump Time (min):	2
Avg. Haul Dist. (ft):	2700
Cost for Truck ($/hr):	$120.17
Cost for Oper. ($/hr):	$35.00
# Buckets to Fill Truck =	4 buckets
Loader Time/Truckload =	2.4 min/truck
No. of Truckloads =	0 loads
Time per Truckload =	10.5 min
Optimum No. of Trucks =	4 trucks
Time/Truck @ 80% Eff. =	0 hrs/truck
F.E.L. Time @ 80% Eff. =	0 hrs
Cost =	$0

SEED COSTS

SEED TYPE	APPL.	RATE	COST
Western Wheatgrass		8.00 lbs/acre	$8.50 /lb
Thickspike Wheatgrass		6.00 lbs/acre	$7.38 /lb
Slender Wheatgrass		4.00 lbs/acre	$4.88 /lb
Hard Fescue		2.00 lbs/acre	$3.00 /lb
Kentucky Bluegrass		4.00 lbs/acre	$2.88 /lb
Timothy		4.00 lbs/acre	$1.98 /lb
White Dutch Clover		4.00 lbs/acre	$3.25 /lb
Acreage (acres):		0.00 acres	
Cost =		$0	

SEED COSTS (CONTINUED)

SEED TYPE	APPL.	RATE	COST
Regreen (nurse crop)		20.00 lbs/acre	$2.60 /lb
Acreage (acres):		0.00 acres	
Cost =		$0	

FORB COSTS

FORB TYPE	APPL.	RATE	COST
Black-eyed Susan		lbs/acre	/lb
Rocky Mountain Penstemon		lbs/acre	/lb
Blanket Flower		lbs/acre	/lb
Acreage (acres)		acres	
Cost =		$0	

SEEDING COSTS

Acreage (acres):	0.00
Cost ($/acre):	500
Total Cost =	$0

HYDOMULCH (WOOD FIBER)

Acreage (acres):	0.00
Cost ($/acres):	400
Total Cost =	$0

FERTILIZER

N Appl. Rate (lbs/acre):	18
P Appl. Rate (lbs/acre):	46
K Appl. Rate (lbs/acre):	0
N Cost ($/lb):	$1.67
P Cost ($/lb):	$0.65
K Cost ($/lb):	$0.50
Acreage (acres):	0.00
Total Cost =	$0

POND LINER REMOVAL

No. of Ponds:	2
Hours per Pond (assumed):	16
No. of Laborers (assumed):	6
Cost per Laborer:	$11.00
Cost for Supervisior	$21.00
Total Cost =	$2,784

TREE COST

TREE TYPE	NUMBER	COST
Black Hills Spruce		$2.75 /stem
Paper Birch		$2.75 /stem
Ponderosa Pine		$2.75 /stem
Aspen		$2.75 /stem
Trees/acre		

* Includes planting and herbivore protection

Total Cost = $0

FUEL COSTS

Cost of fuel ($/gal): $3.55 /gal

EQUIPMENT	HOURS	CONSUMP.
Cat D9T Dozer	259.1	14.0 gal/hr
Cat 637E Scraper	0.0	11.5 gal/hr
Cat 16M Grader	0.0	9.0 gal/hr
Cat 980 Loader	0.0	8.4 gal/hr
Cat 988H Loader	0.0	16 gal/hr
Cat 773 Truck	0.0	14.5 gal/hr
Cat 770 Truck	0.0	13.5 gal/hr

Total Cost = $12,877

MISC. COSTS

TOTAL COST = $60,532

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South Gulch Water Managnment Facilities & Roads
INDEX

GRADING	A 21
RIPPING	A 38
MAT. MOVING WITH DOZER	A 54
GRADING WITH DOZER	A 71
TOPSOIL REAPPL. (SCRAPER)	A 85
TOPSOIL REAPPL. (F.E.L.)	A 104
MATERIAL MOVING	A 120
SEED COSTS (MIXTURE #1)	A 146
SEED COSTS (MIXTURE #2)	A 160
SHRUB COSTS	A 174
DISKING AND SEEDING	A 187
MULCH	A 194
FERTILIZER	A 202
POND LINER REMOVAL	A 214
TREE COSTS	A 223
FUEL COSTS	A 234
MISC. COSTS	A 249
SUMMARY	A 263
DOZER PROD. TABLES	AA 71
SCRAPER TIME TABLES	AA 84
F.E.L. TIME TABLES	AA 114
TABLE OF SEED COSTS	AA 146
MACRO (FOR CLEARING WKS)	AA 255
MACRO (FOR PRINTING WKS)	L 1

(Index Continued in Cell F 5)

GRADING FLATS

Grader Type:	Cat 16 M Grader
Blade Width (ft):	10.2
Man. Time (min):	0.35
Avg. Pass (ft):	1000
Avg. Speed (mph):	3
# of passes over area:	2
Acreage (acres):	0.00
Cost for Grader ($/hr):	$112.07
Cost for Oper. ($/hr):	$35.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0.0 hrs
Cost =	$0

RIPPING FLAT AREAS

Dozer Type:	Cat D9T Dozer
Ripper Spacing (ft):	3
Avg. Speed (mph):	1
Avg. Pass (ft):	300
Man. Time (min):	0.25
Acreage (acres):	1.16
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Travel Distance =	16843 ft
Number of Passes =	56 passes
Total Time @ 80% eff =	4.3 hrs
Cost =	$745

MATERIAL MOVING WITH DOZER

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	250
Vol. of Mat. (cy):	0.00 (estimation)
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Is mat. being moved to reduce slopes of heap, dump or other stockpile? Enter 1 if yes, 2 if no:	2
Production =	432 cy/hr
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

GRADING TOPSOIL ON SLOPES WITH DOZER

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	300
Acreage (acres):	1.21
Mat. Thickness (ft.):	0.5
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Production =	480 cy/hr
Total Time @ 80% Eff. =	2.5 hrs
Cost =	$433

TOPSOIL REAPPL. (SCRAPER)

Scraper Type:	Cat 637E
Scraper Capacity (cy):	31
Avg. Haul Dist. (ft):	4800
Total Resistance (%):	10
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	0.33
Cost for Scraper ($/hr):	$86.00
Cost for Oper. ($/hr):	$35.00
Time to Load =	0.80 mins/trip
Time to Man. & Spread =	0.70 mins/trip
Time to Travel Loaded =	5.20 mins/trip
Time to Travel Empty =	3.10 mins/trip
Total Cycle Time =	9.80 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (FRONT END LOADER)

Loader Type:	Cat 988H Loader
Bucket Capacity (cy.):	8.25
Avg. Haul Dist. (ft):	100
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	1.5
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Hydraulic Cycle Time =	0.20 mins/trip
Travel Time (one way) =	0.15 mins/trip
Total Cycle Time =	0.50 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

MATERIAL MOVING (Truck & Front End Loader)
(Replacing topsoil on water managment area and roads)

Unit Wt. Mat. (lb/cu ft):	100
Vol. of Material (cy):	976.00
Loader Type(1:980,2:988)	2
Bucket Capacity (cy):	8.25
Load-Dump-Man. Time(min):	0.6
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Truck Type (1:35T,2:50T):	2
Truck Capacity (cy):	37
Avg. Truck Speed (mph):	10
Man. & Dump Time (min):	2
Avg. Haul Dist. (ft):	2700
Cost for Truck ($/hr):	$120.17
Cost for Oper. ($/hr):	$35.00
# Buckets to Fill Truck =	4 buckets
Loader Time/Truckload =	2.4 min/truck
No. of Truckloads =	26 loads
Time per Truckload =	10.5 min
Optimum No. of Trucks =	4 trucks
Time/Truck @ 80% Eff. =	1.4 hrs/truck
F.E.L. Time @ 80% Eff. =	1.4 hrs
Cost =	$1,124

SEED COSTS

SEED TYPE	APPL.	RATE	COST
Western Wheatgrass		8.00 lbs/acre	$8.50 /lb
Thickspike Wheatgrass		6.00 lbs/acre	$7.38 /lb
Slender Wheatgrass		4.00 lbs/acre	$4.88 /lb
Hard Fescue		2.00 lbs/acre	$3.00 /lb
Kentucky Bluegrass		4.00 lbs/acre	$2.88 /lb
Timothy		4.00 lbs/acre	$1.98 /lb
White Dutch Clover		4.00 lbs/acre	$3.25 /lb
Acreage (acres):		1.21 acres	
Cost =		$206	

SEED COSTS (CONTINUED)

SEED TYPE	APPL.	RATE	COST
Regreen (nurse crop)		20.00 lbs/acre	$2.60 /lb
Acreage (acres):		1.21 acres	
Cost =		$63	

FORB COSTS

FORB TYPE	APPL.	RATE	COST
Black-eyed Susan		lbs/acre	/lb
Rocky Mountain Penstemon		lbs/acre	/lb
Blanket Flower		lbs/acre	/lb
Acreage (acres)		acres	
Cost =		$0	

SEEDING COSTS

Acreage (acres):	1.21
Cost ($/acre):	500
Total Cost =	$605

HYDOMULCH (WOOD FIBER)

Acreage (acres):	1.21
Cost ($/acres):	400
Total Cost =	$484

FERTILIZER

N Appl. Rate (lbs/acre):	54.5
P Appl. Rate (lbs/acre):	43
K Appl. Rate (lbs/acre):	13.5
N Cost ($/lb):	$1.67
P Cost ($/lb):	$0.65
K Cost ($/lb):	$0.50
Acreage (acres):	1.21
Total Cost =	$152

POND LINER REMOVAL

No. of Ponds:	
Hours per Pond (assumed):	8
No. of Laborers (assumed):	6
Cost per Laborer:	$10.00
Cost for Supervisior	$20.00
Total Cost =	$0

TREE COST

TREE TYPE	NUMBER	COST
Black Hills Spruce		$2.75 /stem
Paper Birch		$2.75 /stem
Ponderosa Pine		$2.75 /stem
Aspen		$2.75 /stem
Trees/acre		

* Includes planting and herbivore protection

Total Cost = $0

FUEL COSTS

Cost of fuel ($/gal): $3.55 /gal

EQUIPMENT	HOURS	CONSUMP.
Cat D9T Dozer	6.8	14.0 gal/hr
Cat 637E Scraper	0.0	11.5 gal/hr
Cat 16M Grader	0.0	9.0 gal/hr
Cat 980 Loader	0.0	8.4 gal/hr
Cat 988H Loader	1.4	16 gal/hr
Cat 773 Truck	5.6	14.5 gal/hr
Cat 770 Truck	0.0	13.5 gal/hr

Total Cost = $706

MISC. COSTS

Erosion Control	$2,500
Remove Spruce Gulch Pond Berms	$8,230
Sludge Removal to Sludge Basin	$3,000

TOTAL COST = $18,247

Press "Alt" and "C" to clear worksheet.
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South Gulch Pond Berm and Drain Pipe Removal
INDEX

GRADING	A 21
RIPPING	A 38
MAT. MOVING WITH DOZER	A 54
GRADING WITH DOZER	A 71
TOPSOIL REAPPL. (SCRAPER)	A 85
TOPSOIL REAPPL. (F.E.L.)	A 104
MATERIAL MOVING	A 120
SEED COSTS (MIXTURE #1)	A 146
SEED COSTS (MIXTURE #2)	A 160
SHRUB COSTS	A 174
DISKING AND SEEDING	A 187
MULCH	A 194
FERTILIZER	A 202
POND LINER REMOVAL	A 214
TREE COSTS	A 223
FUEL COSTS	A 234
MISC. COSTS	A 249
SUMMARY	A 263
DOZER PROD. TABLES	AA 71
SCRAPER TIME TABLES	AA 84
F.E.L. TIME TABLES	AA 114
TABLE OF SEED COSTS	AA 146
MACRO (FOR CLEARING WKS)	AA 255
MACRO (FOR PRINTING WKS)	L 1

(Index Continued in Cell F 5)

GRADING FLATS

Grader Type:	Cat 16 M Grader
Blade Width (ft):	10.2
Man. Time (min):	0.35
Avg. Pass (ft):	1000
Avg. Speed (mph):	3
# of passes over area:	2
Acreage (acres):	0.00
Cost for Grader ($/hr):	$112.07
Cost for Oper. ($/hr):	$35.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0.0 hrs
Cost =	$0

RIPPING FLAT AREAS

Dozer Type:	Cat D9T Dozer
Ripper Spacing (ft):	3
Avg. Speed (mph):	1
Avg. Pass (ft):	300
Man. Time (min):	0.25
Acreage (acres):	0.00
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0 hrs
Cost =	$0

MATERIAL MOVING WITH DOZER (Remove pond berms)

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	300
Vol. of Mat. (cy):	5000.00 (estimation)
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Is mat. being moved to reduce slopes of heap, dump or other stockpile? Enter 1 if yes, 2 if no:	2
Production =	345.6 cy/hr
Total Time @ 80% Eff. =	18.1 hrs
Cost =	$3,135

GRADING TOPSOIL ON SLOPES WITH DOZER

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	300
Acreage (acres):	0.00
Mat. Thickness (ft.):	0.5
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Production =	480 cy/hr
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (SCRAPER)

Scraper Type:	Cat 637E
Scraper Capacity (cy):	31
Avg. Haul Dist. (ft):	4800
Total Resistance (%):	10
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	0.33
Cost for Scraper ($/hr):	$86.00
Cost for Oper. ($/hr):	$35.00
Time to Load =	0.80 mins/trip
Time to Man. & Spread =	0.70 mins/trip
Time to Travel Loaded =	5.20 mins/trip
Time to Travel Empty =	3.10 mins/trip
Total Cycle Time =	9.80 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (FRONT END LOADER)

Loader Type:	Cat 988H Loader
Bucket Capacity (cy.):	8.25
Avg. Haul Dist. (ft):	100
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	1.5
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Hydraulic Cycle Time =	0.20 mins/trip
Travel Time (one way) =	0.15 mins/trip
Total Cycle Time =	0.50 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

MATERIAL MOVING (Truck & Front End Loader)

Unit Wt. Mat. (lb/cu ft):	100
Vol. of Material (cy):	0.00
Loader Type(1:980,2:988)	2
Bucket Capacity (cy):	8.25
Load-Dump-Man. Time(min):	0.6
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Truck Type (1:35T,2:50T):	2
Truck Capacity (cy):	37
Avg. Truck Speed (mph):	10
Man. & Dump Time (min):	2
Avg. Haul Dist. (ft):	2700
Cost for Truck ($/hr):	$120.17
Cost for Oper. ($/hr):	$35.00
# Buckets to Fill Truck =	4 buckets
Loader Time/Truckload =	2.4 min/truck
No. of Truckloads =	0 loads
Time per Truckload =	10.5 min
Optimum No. of Trucks =	4 trucks
Time/Truck @ 80% Eff. =	0 hrs/truck
F.E.L. Time @ 80% Eff. =	0 hrs
Cost =	$0

SEED COSTS

SEED TYPE	APPL.	RATE	COST
Western Wheatgrass		8.00 lbs/acre	$8.50 /lb
Thickspike Wheatgrass		6.00 lbs/acre	$7.38 /lb
Slender Wheatgrass		4.00 lbs/acre	$4.88 /lb
Hard Fescue		2.00 lbs/acre	$3.00 /lb
Kentucky Bluegrass		4.00 lbs/acre	$2.88 /lb
Timothy		4.00 lbs/acre	$1.98 /lb
White Dutch Clover		4.00 lbs/acre	$3.25 /lb
Acreage (acres):		0.00 acres	
Cost =		$0	

SEED COSTS (CONTINUED)

SEED TYPE	APPL.	RATE	COST
Regreen (nurse crop)		20.00 lbs/acre	$2.60 /lb
Acreage (acres):		0.00 acres	
Cost =		$0	

FORB COSTS

FORB TYPE	APPL.	RATE	COST
Black-eyed Susan		lbs/acre	/lb
Rocky Mountain Penstemon		lbs/acre	/lb
Blanket Flower		lbs/acre	/lb
Acreage (acres)		acres	
Cost =		$0	

SEEDING COSTS

Acreage (acres):	0.00
Cost ($/acre):	500
Total Cost =	$0

HYDOMULCH (WOOD FIBER)

Acreage (acres):	0.00
Cost ($/acres):	400
Total Cost =	$0

FERTILIZER

N Appl. Rate (lbs/acre):	18
P Appl. Rate (lbs/acre):	46
K Appl. Rate (lbs/acre):	0
N Cost ($/lb):	$1.67
P Cost ($/lb):	$0.65
K Cost ($/lb):	$0.50
Acreage (acres):	0.00
Total Cost =	$0

POND LINER REMOVAL

No. of Ponds:	1
Hours per Pond (assumed):	8
No. of Laborers (assumed):	6
Cost per Laborer:	$11.00
Cost for Supervisior	$21.00
Total Cost =	$696

TREE COST

TREE TYPE	NUMBER	COST
Black Hills Spruce		$2.75 /stem
Paper Birch		$2.75 /stem
Ponderosa Pine		$2.75 /stem
Aspen		$2.75 /stem
Trees/acre		

* Includes planting and herbivore protection

Total Cost = $0

FUEL COSTS

Cost of fuel ($/gal): $3.55 /gal

EQUIPMENT	HOURS	CONSUMP.
Cat D9T Dozer	18.1	14.0 gal/hr
Cat 637E Scraper	0.0	11.5 gal/hr
Cat 16M Grader	0.0	9.0 gal/hr
Cat 980 Loader	0.0	8.4 gal/hr
Cat 988H Loader	0.0	16 gal/hr
Cat 773 Truck	0.0	14.5 gal/hr
Cat 770 Truck	0.0	13.5 gal/hr

Total Cost = $900

MISC. COSTS

Drain Pipe Removal $3,500

TOTAL COST = $8,230

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Process Area and Roads
INDEX

GRADING	A 21	POND LINER REMOVAL	A 214
RIPPING	A 38	TREE COSTS	A 223
MAT. MOVING WITH DOZER	A 54	FUEL COSTS	A 234
GRADING WITH DOZER	A 71	MISC. COSTS	A 249
TOPSOIL REAPPL. (SCRAPER)	A 85	SUMMARY	A 263
TOPSOIL REAPPL. (F.E.L.)	A 104	DOZER PROD. TABLES	AA 71
MATERIAL MOVING	A 120	SCRAPER TIME TABLES	AA 84
SEED COSTS (MIXTURE #1)	A 146	F.E.L. TIME TABLES	AA 114
SEED COSTS (MIXTURE #2)	A 160	TABLE OF SEED COSTS	AA 146
SHRUB COSTS	A 174	MACRO (FOR CLEARING WKS)	AA 255
DISKING AND SEEDING	A 187	MACRO (FOR PRINTING WKS)	L 1
MULCH	A 194		
FERTILIZER	A 202		

(Index Continued in Cell F 5)

GRADING FLATS

Grader Type:	Cat 16 M Grader
Blade Width (ft):	10.2
Man. Time (min):	0.35
Avg. Pass (ft):	1000
Avg. Speed (mph):	3
# of passes over area:	2
Acreage (acres):	0.00
Cost for Grader ($/hr):	$112.07
Cost for Oper. ($/hr):	$35.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0.0 hrs
Cost =	$0

RIPPING FLAT AREAS

Dozer Type:	Cat D9T Dozer
Ripper Spacing (ft):	3
Avg. Speed (mph):	1
Avg. Pass (ft):	300
Man. Time (min):	0.25
Acreage (acres):	1.35
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Travel Distance =	19602 ft
Number of Passes =	65 passes
Total Time @ 80% eff =	5 hrs
Cost =	$866

MATERIAL MOVING WITH DOZER

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	250
Vol. of Mat. (cy):	0.00 (estimation)
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Is mat. being moved to reduce slopes of heap, dump or other stockpile? Enter 1 if yes, 2 if no:	2
Production =	432 cy/hr
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

GRADING TOPSOIL ON SLOPES WITH DOZER

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	300
Acreage (acres):	33.79
Mat. Thickness (ft.):	0.5
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Production =	480 cy/hr
Total Time @ 80% Eff. =	71 hrs
Cost =	$12,296

TOPSOIL REAPPL. (SCRAPER)

Scraper Type:	Cat 637E
Scraper Capacity (cy):	31
Avg. Haul Dist. (ft):	4800
Total Resistance (%):	10
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	0.33
Cost for Scraper ($/hr):	$86.00
Cost for Oper. ($/hr):	$35.00
Time to Load =	0.80 mins/trip
Time to Man. & Spread =	0.70 mins/trip
Time to Travel Loaded =	5.20 mins/trip
Time to Travel Empty =	3.10 mins/trip
Total Cycle Time =	9.80 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (FRONT END LOADER)

Loader Type:	Cat 988H Loader
Bucket Capacity (cy.):	8.25
Avg. Haul Dist. (ft):	100
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	1.5
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Hydraulic Cycle Time =	0.20 mins/trip
Travel Time (one way) =	0.15 mins/trip
Total Cycle Time =	0.50 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

MATERIAL MOVING (Truck & Front End Loader)

Unit Wt. Mat. (lb/cu ft):	100
Vol. of Material (cy):	27257.00
Loader Type(1:980,2:988)	2
Bucket Capacity (cy):	8.25
Load-Dump-Man. Time(min):	0.6
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Truck Type (1:35T,2:50T):	2
Truck Capacity (cy):	37
Avg. Truck Speed (mph):	10
Man. & Dump Time (min):	2
Avg. Haul Dist. (ft):	2700
Cost for Truck ($/hr):	$120.17
Cost for Oper. ($/hr):	$35.00
# Buckets to Fill Truck =	4 buckets
Loader Time/Truckload =	2.4 min/truck
No. of Truckloads =	737 loads
Time per Truckload =	10.5 min
Optimum No. of Trucks =	4 trucks
Time/Truck @ 80% Eff. =	40.3 hrs/truck
F.E.L. Time @ 80% Eff. =	40.3 hrs
Cost =	$32,349

SEED COSTS

SEED TYPE	APPL.	RATE	COST
Western Wheatgrass		8.00 lbs/acre	$8.50 /lb
Thickspike Wheatgrass		6.00 lbs/acre	$7.38 /lb
Slender Wheatgrass		4.00 lbs/acre	$4.88 /lb
Hard Fescue		2.00 lbs/acre	$3.00 /lb
Kentucky Bluegrass		4.00 lbs/acre	$2.88 /lb
Timothy		4.00 lbs/acre	$1.98 /lb
White Dutch Clover		4.00 lbs/acre	$3.25 /lb
Acreage (acres):		33.79 acres	
Cost =		$5,752	

SEED COSTS (CONTINUED)

SEED TYPE	APPL.	RATE	COST
Regreen (nurse crop)		20.00 lbs/acre	$2.60 /lb
Forbs			
Black-eyed Susan		0.25 lbs/acre	$19.88 /lb
Rocky Mountain Penstemon		0.25 lbs/acre	$42.50 /lb
Blanket Flower		1.00 lbs/acre	$27.25 /lb
Acreage (acres):		33.79 acres	
Cost =		$3,205	

SHRUB SEED COSTS

SHRUB TYPE	APPL.	RATE	COST
Serviceberry		0.25 lbs/acre	$105.00 /lb
Chokecherry		0.25 lbs/acre	$29.25 /lb
Snowberry		0.25 lbs/acre	$97.50 /lb
Woods Rose		0.25 lbs/acre	$51.00 /lb
Acreage (acres)		33.79 acres	
Cost =		$2,389	

SEEDING COSTS

Acreage (acres):	33.79
Cost ($/acre):	500
Total Cost =	$16,895

HYDOMULCH (WOOD FIBER)

Acreage (acres):	33.79
Cost ($/acres):	400
Total Cost =	$13,516

FERTILIZER

N Appl. Rate (lbs/acre):	54.5
P Appl. Rate (lbs/acre):	43
K Appl. Rate (lbs/acre):	13.5
N Cost ($/lb):	$1.67
P Cost ($/lb):	$0.65
K Cost ($/lb):	$0.50
Acreage (acres):	33.79
Total Cost =	$4,248

POND LINER REMOVAL

No. of Ponds:	
Hours per Pond (assumed):	8
No. of Laborers (assumed):	6
Cost per Laborer:	$10.00
Cost for Supervisior	$20.00
Total Cost =	$0

TREE COST

TREE TYPE	NUMBER	COST	
Black Hills Spruce	450	$2.75	/stem
Paper Birch		$2.75	/stem
Ponderosa Pine	450	$2.75	/stem
Aspen	450	$2.75	/stem
Trees/acre	40		
* Includes planting and herbivore protection			
Total Cost =	$3,713		

FUEL COSTS

Cost of fuel ($/gal):		$3.55	/gal
EQUIPMENT	HOURS		CONSUMP.
Cat D9T Dozer	76.0	14.0	gal/hr
Cat 637E Scraper	0.0	11.5	gal/hr
Cat 16M Grader	0.0	9.0	gal/hr
Cat 980 Loader	0.0	8.4	gal/hr
Cat 988H Loader	40.3	16	gal/hr
Cat 773 Truck	161.2	14.5	gal/hr
Cat 770 Truck	0.0	13.5	gal/hr
Total Cost =	$14,364		

MISC. COSTS

Remove Stormwater Pond Berm	$110,409
Remove Pregnant Pond Berm	$76,392
Place Cover Over New Sludge Pond	$11,957
Remove Lower Diversion Pond Berm	$10,950
Erosion Control	$20,000

TOTAL COST = $339,299

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Storm Water Pond Berm & Liner Removal
INDEX

GRADING	A 21	POND LINER REMOVAL	A 214
RIPPING	A 38	TREE COSTS	A 223
MAT. MOVING WITH DOZER	A 54	FUEL COSTS	A 234
GRADING WITH DOZER	A 71	MISC. COSTS	A 249
TOPSOIL REAPPL. (SCRAPER)	A 85	SUMMARY	A 263
TOPSOIL REAPPL. (F.E.L.)	A 104	DOZER PROD. TABLES	AA 71
MATERIAL MOVING	A 120	SCRAPER TIME TABLES	AA 84
SEED COSTS (MIXTURE #1)	A 146	F.E.L. TIME TABLES	AA 114
SEED COSTS (MIXTURE #2)	A 160	TABLE OF SEED COSTS	AA 146
SHRUB COSTS	A 174	MACRO (FOR CLEARING WKS)	AA 255
DISKING AND SEEDING	A 187	MACRO (FOR PRINTING WKS)	L 1
MULCH	A 194		
FERTILIZER	A 202		

(Index Continued in Cell F 5)

GRADING FLATS

Grader Type:	Cat 16 M Grader
Blade Width (ft):	10.2
Man. Time (min):	0.35
Avg. Pass (ft):	1000
Avg. Speed (mph):	3
# of passes over area:	2
Acreage (acres):	0.00
Cost for Grader ($/hr):	$112.07
Cost for Oper. ($/hr):	$35.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0.0 hrs
Cost =	$0

RIPPING FLAT AREAS

Dozer Type:	Cat D9T Dozer
Ripper Spacing (ft):	3
Avg. Speed (mph):	1
Avg. Pass (ft):	300
Man. Time (min):	0.25
Acreage (acres):	0.00
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0 hrs
Cost =	$0

MATERIAL MOVING WITH DOZER (Removing pond berm)

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	300
Vol. of Mat. (cy):	90139.00 (estimation)
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Is mat. being moved to reduce slopes of heap, dump or other stockpile? Enter 1 if yes, 2 if no:	2
Production =	345.6 cy/hr
Total Time @ 80% Eff. =	326 hrs
Cost =	$56,457

GRADING TOPSOIL ON SLOPES WITH DOZER

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	300
Acreage (acres):	0.00
Mat. Thickness (ft.):	0.5
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Production =	480 cy/hr
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (SCRAPER)

Scraper Type:	Cat 637E
Scraper Capacity (cy):	31
Avg. Haul Dist. (ft):	4800
Total Resistance (%):	10
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	0.33
Cost for Scraper ($/hr):	$86.00
Cost for Oper. ($/hr):	$35.00
Time to Load =	0.80 mins/trip
Time to Man. & Spread =	0.70 mins/trip
Time to Travel Loaded =	5.20 mins/trip
Time to Travel Empty =	3.10 mins/trip
Total Cycle Time =	9.80 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (FRONT END LOADER)

Loader Type:	Cat 988H Loader
Bucket Capacity (cy.):	8.25
Avg. Haul Dist. (ft):	100
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	1.5
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Hydraulic Cycle Time =	0.20 mins/trip
Travel Time (one way) =	0.15 mins/trip
Total Cycle Time =	0.50 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

MATERIAL MOVING (Truck & Front End Loader)

Unit Wt. Mat. (lb/cu ft):	100
Vol. of Material (cy):	0.00
Loader Type(1:980,2:988)	2
Bucket Capacity (cy):	8.25
Load-Dump-Man. Time(min):	0.6
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Truck Type (1:35T,2:50T):	2
Truck Capacity (cy):	37
Avg. Truck Speed (mph):	10
Man. & Dump Time (min):	2
Avg. Haul Dist. (ft):	2700
Cost for Truck ($/hr):	$120.17
Cost for Oper. ($/hr):	$35.00
# Buckets to Fill Truck =	4 buckets
Loader Time/Truckload =	2.4 min/truck
No. of Truckloads =	0 loads
Time per Truckload =	10.5 min
Optimum No. of Trucks =	4 trucks
Time/Truck @ 80% Eff. =	0 hrs/truck
F.E.L. Time @ 80% Eff. =	0 hrs
Cost =	$0

SEED COSTS

SEED TYPE	APPL.	RATE	COST
Western Wheatgrass		8.00 lbs/acre	$8.50 /lb
Thickspike Wheatgrass		6.00 lbs/acre	$7.38 /lb
Slender Wheatgrass		4.00 lbs/acre	$4.88 /lb
Hard Fescue		2.00 lbs/acre	$3.00 /lb
Kentucky Bluegrass		4.00 lbs/acre	$2.88 /lb
Timothy		4.00 lbs/acre	$1.98 /lb
White Dutch Clover		4.00 lbs/acre	$3.25 /lb
Acreage (acres):		0.00 acres	
Cost =		$0	

SEED COSTS (CONTINUED)

SEED TYPE	APPL.	RATE	COST
Regreen (nurse crop)		20.00 lbs/acre	$2.60 /lb
Acreage (acres):		0.00 acres	
Cost =		$0	

FORB COSTS

FORB TYPE	APPL.	RATE	COST
Black-eyed Susan		lbs/acre	/lb
Rocky Mountain Penstemon		lbs/acre	/lb
Blanket Flower		lbs/acre	/lb
Acreage (acres)		acres	
Cost =		$0	

SEEDING COSTS

Acreage (acres):	0.00
Cost ($/acre):	500
Total Cost =	$0

HYDOMULCH (WOOD FIBER)

Acreage (acres):	0.00
Cost ($/acres):	400
Total Cost =	$0

FERTILIZER

N Appl. Rate (lbs/acre):	18
P Appl. Rate (lbs/acre):	46
K Appl. Rate (lbs/acre):	0
N Cost ($/lb):	$1.67
P Cost ($/lb):	$0.65
K Cost ($/lb):	$0.50
Acreage (acres):	0.00
Total Cost =	$0

POND LINER REMOVAL

No. of Ponds:	1
Hours per Pond (assumed):	250
No. of Laborers (assumed):	10
Cost per Laborer:	$11.00
Cost for Supervisior	$21.00
Total Cost =	$32,750

TREE COST

TREE TYPE	NUMBER	COST
Black Hills Spruce		$2.75 /stem
Paper Birch		$2.75 /stem
Ponderosa Pine		$2.75 /stem
Aspen		$2.75 /stem
Trees/acre		

* Includes planting and herbivore protection

Total Cost = $0

FUEL COSTS

Cost of fuel ($/gal): $3.55 /gal

EQUIPMENT	HOURS	CONSUMP.
Cat D9T Dozer	326.0	14.0 gal/hr
Cat 637E Scraper	0.0	11.5 gal/hr
Cat 16M Grader	0.0	9.0 gal/hr
Cat 980 Loader	0.0	8.4 gal/hr
Cat 988H Loader	0.0	16 gal/hr
Cat 773 Truck	0.0	14.5 gal/hr
Cat 770 Truck	0.0	13.5 gal/hr

Total Cost = $16,202

MISC. COSTS

Remove Pond Sludge to Sludge Basin $5,000

TOTAL COST = $110,409

Press "Alt" and "C" to clear worksheet.
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Pregnant Pond Berm & Liner Removal
INDEX
=======

GRADING	A 21	POND LINER REMOVAL	A 214
RIPPING	A 38	TREE COSTS	A 223
MAT. MOVING WITH DOZER	A 54	FUEL COSTS	A 234
GRADING WITH DOZER	A 71	MISC. COSTS	A 249
TOPSOIL REAPPL. (SCRAPER)	A 85	SUMMARY	A 263
TOPSOIL REAPPL. (F.E.L.)	A 104	DOZER PROD. TABLES	AA 71
MATERIAL MOVING	A 120	SCRAPER TIME TABLES	AA 84
SEED COSTS (MIXTURE #1)	A 146	F.E.L. TIME TABLES	AA 114
SEED COSTS (MIXTURE #2)	A 160	TABLE OF SEED COSTS	AA 146
SHRUB COSTS	A 174	MACRO (FOR CLEARING WKS)	AA 255
DISKING AND SEEDING	A 187	MACRO (FOR PRINTING WKS)	L 1
MULCH	A 194		
FERTILIZER	A 202		

(Index Continued in Cell F 5)

GRADING FLATS

Grader Type:	Cat 16 M Grader
Blade Width (ft):	10.2
Man. Time (min):	0.35
Avg. Pass (ft):	1000
Avg. Speed (mph):	3
# of passes over area:	2
Acreage (acres):	0.00
Cost for Grader ($/hr):	$112.07
Cost for Oper. ($/hr):	$35.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0.0 hrs
Cost =	$0

RIPPING FLAT AREAS

Dozer Type:	Cat D9T Dozer
Ripper Spacing (ft):	3
Avg. Speed (mph):	1
Avg. Pass (ft):	300
Man. Time (min):	0.25
Acreage (acres):	0.00
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0 hrs
Cost =	$0

MATERIAL MOVING WITH DOZER (Removing pond berm)

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	450
Vol. of Mat. (cy):	45626.00 (estimation)
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Is mat. being moved to reduce slopes of heap, dump or other stockpile? Enter 1 if yes, 2 if no:	2
Production =	187.2 cy/hr
Total Time @ 80% Eff. =	304.7 hrs
Cost =	$52,768

GRADING TOPSOIL ON SLOPES WITH DOZER

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	300
Acreage (acres):	0.00
Mat. Thickness (ft.):	0.5
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Production =	480 cy/hr
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (SCRAPER)

Scraper Type:	Cat 637E
Scraper Capacity (cy):	31
Avg. Haul Dist. (ft):	4800
Total Resistance (%):	10
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	0.33
Cost for Scraper ($/hr):	$86.00
Cost for Oper. ($/hr):	$35.00
Time to Load =	0.80 mins/trip
Time to Man. & Spread =	0.70 mins/trip
Time to Travel Loaded =	5.20 mins/trip
Time to Travel Empty =	3.10 mins/trip
Total Cycle Time =	9.80 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (FRONT END LOADER)

Loader Type:	Cat 988H Loader
Bucket Capacity (cy.):	8.25
Avg. Haul Dist. (ft):	100
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	1.5
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Hydraulic Cycle Time =	0.20 mins/trip
Travel Time (one way) =	0.15 mins/trip
Total Cycle Time =	0.50 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

MATERIAL MOVING (Truck & Front End Loader)

Unit Wt. Mat. (lb/cu ft):	100
Vol. of Material (cy):	0.00
Loader Type(1:980,2:988)	2
Bucket Capacity (cy):	8.25
Load-Dump-Man. Time(min):	0.6
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Truck Type (1:35T,2:50T):	2
Truck Capacity (cy):	37
Avg. Truck Speed (mph):	10
Man. & Dump Time (min):	2
Avg. Haul Dist. (ft):	2700
Cost for Truck ($/hr):	$120.17
Cost for Oper. ($/hr):	$35.00
# Buckets to Fill Truck =	4 buckets
Loader Time/Truckload =	2.4 min/truck
No. of Truckloads =	0 loads
Time per Truckload =	10.5 min
Optimum No. of Trucks =	4 trucks
Time/Truck @ 80% Eff. =	0 hrs/truck
F.E.L. Time @ 80% Eff. =	0 hrs
Cost =	$0

SEED COSTS

SEED TYPE	APPL.	RATE	COST
Western Wheatgrass		8.00 lbs/acre	$8.50 /lb
Thickspike Wheatgrass		6.00 lbs/acre	$7.38 /lb
Slender Wheatgrass		4.00 lbs/acre	$4.88 /lb
Hard Fescue		2.00 lbs/acre	$3.00 /lb
Kentucky Bluegrass		4.00 lbs/acre	$2.88 /lb
Timothy		4.00 lbs/acre	$1.98 /lb
White Dutch Clover		4.00 lbs/acre	$3.25 /lb
Acreage (acres):		0.00 acres	
Cost =		$0	

SEED COSTS (CONTINUED)

SEED TYPE	APPL.	RATE	COST
Regreen (nurse crop)		20.00 lbs/acre	$2.60 /lb
Acreage (acres):		0.00 acres	
Cost =		$0	

FORB COSTS

FORB TYPE	APPL.	RATE	COST
Black-eyed Susan		lbs/acre	/lb
Rocky Mountain Penstemon		lbs/acre	/lb
Blanket Flower		lbs/acre	/lb
Acreage (acres)		acres	
Cost =		$0	

SEEDING COSTS

Acreage (acres):	0.00
Cost ($/acre):	500
Total Cost =	$0

HYDOMULCH (WOOD FIBER)

Acreage (acres):	0.00
Cost ($/acres):	400
Total Cost =	$0

FERTILIZER

N Appl. Rate (lbs/acre):	18
P Appl. Rate (lbs/acre):	46
K Appl. Rate (lbs/acre):	0
N Cost ($/lb):	$1.67
P Cost ($/lb):	$0.65
K Cost ($/lb):	$0.50
Acreage (acres):	0.00
Total Cost =	$0

POND LINER REMOVAL

No. of Ponds:	1
Hours per Pond (assumed):	40
No. of Laborers (assumed):	6
Cost per Laborer:	$11.00
Cost for Supervisior	$21.00
Total Cost =	$3,480

TREE COST

TREE TYPE	NUMBER	COST
Black Hills Spruce		$2.75 /stem
Paper Birch		$2.75 /stem
Ponderosa Pine		$2.75 /stem
Aspen		$2.75 /stem
Trees/acre		

* Includes planting and herbivore protection

Total Cost = $0

FUEL COSTS

Cost of fuel ($/gal): $3.55 /gal

EQUIPMENT	HOURS	CONSUMP.
Cat D9T Dozer	304.7	14.0 gal/hr
Cat 637E Scraper	0.0	11.5 gal/hr
Cat 16M Grader	0.0	9.0 gal/hr
Cat 980 Loader	0.0	8.4 gal/hr
Cat 988H Loader	0.0	16 gal/hr
Cat 773 Truck	0.0	14.5 gal/hr
Cat 770 Truck	0.0	13.5 gal/hr

Total Cost = $15,144

MISC. COSTS

Sludge Removal to Sludge Basin $5,000

TOTAL COST = $76,392

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New Sludge Pond Cover
INDEX

GRADING	A 21
RIPPING	A 38
MAT. MOVING WITH DOZER	A 54
GRADING WITH DOZER	A 71
TOPSOIL REAPPL. (SCRAPER)	A 85
TOPSOIL REAPPL. (F.E.L.)	A 104
MATERIAL MOVING	A 120
SEED COSTS (MIXTURE #1)	A 146
SEED COSTS (MIXTURE #2)	A 160
SHRUB COSTS	A 174
DISKING AND SEEDING	A 187
MULCH	A 194
FERTILIZER	A 202
POND LINER REMOVAL	A 214
TREE COSTS	A 223
FUEL COSTS	A 234
MISC. COSTS	A 249
SUMMARY	A 263
DOZER PROD. TABLES	AA 71
SCRAPER TIME TABLES	AA 84
F.E.L. TIME TABLES	AA 114
TABLE OF SEED COSTS	AA 146
MACRO (FOR CLEARING WKS)	AA 255
MACRO (FOR PRINTING WKS)	L 1

(Index Continued in Cell F 5)

GRADING FLATS

Grader Type:	Cat 16 M Grader
Blade Width (ft):	10.2
Man. Time (min):	0.35
Avg. Pass (ft):	1000
Avg. Speed (mph):	3
# of passes over area:	2
Acreage (acres):	0.00
Cost for Grader ($/hr):	$112.07
Cost for Oper. ($/hr):	$35.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0.0 hrs
Cost =	$0

RIPPING FLAT AREAS

Dozer Type:	Cat D9T Dozer
Ripper Spacing (ft):	3
Avg. Speed (mph):	1
Avg. Pass (ft):	300
Man. Time (min):	0.25
Acreage (acres):	0.00
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0 hrs
Cost =	$0

MATERIAL MOVING WITH DOZER (Spreading pond cover material)

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	250
Vol. of Mat. (cy):	6300.00 (estimation)
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Is mat. being moved to reduce slopes of heap, dump or other stockpile? Enter 1 if yes, 2 if no:	2
Production =	432 cy/hr
Total Time @ 80% Eff. =	18.2 hrs
Cost =	$3,152

GRADING TOPSOIL ON SLOPES WITH DOZER

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	300
Acreage (acres):	0.00
Mat. Thickness (ft.):	0.5
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Production =	480 cy/hr
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (SCRAPER)

Scraper Type:	Cat 637E
Scraper Capacity (cy):	31
Avg. Haul Dist. (ft):	4800
Total Resistance (%):	10
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	0.33
Cost for Scraper ($/hr):	$86.00
Cost for Oper. ($/hr):	$35.00
Time to Load =	0.80 mins/trip
Time to Man. & Spread =	0.70 mins/trip
Time to Travel Loaded =	5.20 mins/trip
Time to Travel Empty =	3.10 mins/trip
Total Cycle Time =	9.80 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (FRONT END LOADER)

Loader Type:	Cat 988H Loader
Bucket Capacity (cy.):	8.25
Avg. Haul Dist. (ft):	100
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	1.5
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Hydraulic Cycle Time =	0.20 mins/trip
Travel Time (one way) =	0.15 mins/trip
Total Cycle Time =	0.50 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

MATERIAL MOVING (Truck & Front End Loader)
(Hauling pond cover material)

Unit Wt. Mat. (lb/cu ft):	100
Vol. of Material (cy):	6300.00
Loader Type(1:980,2:988)	2
Bucket Capacity (cy):	8.25
Load-Dump-Man. Time(min):	0.6
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Truck Type (1:35T,2:50T):	2
Truck Capacity (cy):	37
Avg. Truck Speed (mph):	10
Man. & Dump Time (min):	2
Avg. Haul Dist. (ft):	1500
Cost for Truck ($/hr):	$120.17
Cost for Oper. ($/hr):	$35.00
# Buckets to Fill Truck =	4 buckets
Loader Time/Truckload =	2.4 min/truck
No. of Truckloads =	170 loads
Time per Truckload =	7.8 min
Optimum No. of Trucks =	3 trucks
Time/Truck @ 80% Eff. =	9.2 hrs/truck
F.E.L. Time @ 80% Eff. =	9.2 hrs
Cost =	$5,957

SEED COSTS

SEED TYPE	APPL.	RATE	COST
Western Wheatgrass		8.00 lbs/acre	$8.50 /lb
Thickspike Wheatgrass		6.00 lbs/acre	$7.38 /lb
Slender Wheatgrass		4.00 lbs/acre	$4.88 /lb
Hard Fescue		2.00 lbs/acre	$3.00 /lb
Kentucky Bluegrass		4.00 lbs/acre	$2.88 /lb
Timothy		4.00 lbs/acre	$1.98 /lb
White Dutch Clover		4.00 lbs/acre	$3.25 /lb
Acreage (acres):		0.00 acres	
Cost =		$0	

SEED COSTS (CONTINUED)

SEED TYPE	APPL.	RATE	COST
Regreen (nurse crop)		20.00 lbs/acre	$2.60 /lb
Acreage (acres):		0.00 acres	
Cost =		$0	

FORB COSTS

FORB TYPE	APPL.	RATE	COST
Black-eyed Susan		lbs/acre	/lb
Rocky Mountain Penstemon		lbs/acre	/lb
Blanket Flower		lbs/acre	/lb
Acreage (acres)		acres	
Cost =		$0	

SEEDING COSTS

Acreage (acres):	0.00
Cost ($/acre):	500
Total Cost =	$0

HYDOMULCH (WOOD FIBER)

Acreage (acres):	0.00
Cost ($/acres):	400
Total Cost =	$0

FERTILIZER

N Appl. Rate (lbs/acre):	18
P Appl. Rate (lbs/acre):	46
K Appl. Rate (lbs/acre):	0
N Cost ($/lb):	$1.67
P Cost ($/lb):	$0.65
K Cost ($/lb):	$0.50
Acreage (acres):	0.00
Total Cost =	$0

POND LINER REMOVAL

No. of Ponds:	
Hours per Pond (assumed):	8
No. of Laborers (assumed):	6
Cost per Laborer:	$10.00
Cost for Supervisior	$20.00
Total Cost =	$0

TREE COST

TREE TYPE	NUMBER	COST
Black Hills Spruce		$2.75 /stem
Paper Birch		$2.75 /stem
Ponderosa Pine		$2.75 /stem
Aspen		$2.75 /stem
Trees/acre		

* Includes planting and herbivore protection

Total Cost = $0

FUEL COSTS

Cost of fuel ($/gal): $3.55 /gal

EQUIPMENT	HOURS	CONSUMP.
Cat D9T Dozer	18.2	14.0 gal/hr
Cat 637E Scraper	0.0	11.5 gal/hr
Cat 16M Grader	0.0	9.0 gal/hr
Cat 980 Loader	0.0	8.4 gal/hr
Cat 988H Loader	9.2	16 gal/hr
Cat 773 Truck	27.6	14.5 gal/hr
Cat 770 Truck	0.0	13.5 gal/hr

Total Cost = $2,848

MISC. COSTS

TOTAL COST = $11,957

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Lower Discharge Pond Berm & Liner Removal
INDEX

GRADING	A 21	POND LINER REMOVAL	A 214
RIPPING	A 38	TREE COSTS	A 223
MAT. MOVING WITH DOZER	A 54	FUEL COSTS	A 234
GRADING WITH DOZER	A 71	MISC. COSTS	A 249
TOPSOIL REAPPL. (SCRAPER)	A 85	SUMMARY	A 263
TOPSOIL REAPPL. (F.E.L.)	A 104	DOZER PROD. TABLES	AA 71
MATERIAL MOVING	A 120	SCRAPER TIME TABLES	AA 84
SEED COSTS (MIXTURE #1)	A 146	F.E.L. TIME TABLES	AA 114
SEED COSTS (MIXTURE #2)	A 160	TABLE OF SEED COSTS	AA 146
SHRUB COSTS	A 174	MACRO (FOR CLEARING WKS)	AA 255
DISKING AND SEEDING	A 187	MACRO (FOR PRINTING WKS)	L 1
MULCH	A 194		
FERTILIZER	A 202		

(Index Continued in Cell F 5)

GRADING FLATS

Grader Type:	Cat 16 M Grader
Blade Width (ft):	10.2
Man. Time (min):	0.35
Avg. Pass (ft):	1000
Avg. Speed (mph):	3
# of passes over area:	2
Acreage (acres):	0.00
Cost for Grader ($/hr):	$112.07
Cost for Oper. ($/hr):	$35.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0.0 hrs
Cost =	$0

RIPPING FLAT AREAS

Dozer Type:	Cat D9T Dozer
Ripper Spacing (ft):	3
Avg. Speed (mph):	1
Avg. Pass (ft):	300
Man. Time (min):	0.25
Acreage (acres):	0.00
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0 hrs
Cost =	$0

MATERIAL MOVING WITH DOZER (Removing pond berm)

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	300
Vol. of Mat. (cy):	9722.00 (estimation)
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Is mat. being moved to reduce slopes of heap, dump or other stockpile? Enter 1 if yes, 2 if no:	2
Production =	345.6 cy/hr
Total Time @ 80% Eff. =	35.2 hrs
Cost =	$6,096

GRADING TOPSOIL ON SLOPES WITH DOZER

Dozer Type:	Cat D9T Dozer	
Blade Type:	Universal	
Avg. Doze Dist. (ft.):	300	
Acreage (acres):	0.00	
Mat. Thickness (ft.):	0.5	
Cost for Dozer ($/hr):	$143.18	
Cost for Oper. ($/hr):	$30.00	
Production =	480	cy/hr
Total Time @ 80% Eff. =	0	hrs
Cost =	$0	

TOPSOIL REAPPL. (SCRAPER)

Scraper Type:	Cat 637E	
Scraper Capacity (cy):	31	
Avg. Haul Dist. (ft):	4800	
Total Resistance (%):	10	
Acreage (acres):	0.00	
T'soil Reapp. Depth (ft):	0.33	
Cost for Scraper ($/hr):	$86.00	
Cost for Oper. ($/hr):	$35.00	
Time to Load =	0.80	mins/trip
Time to Man. & Spread =	0.70	mins/trip
Time to Travel Loaded =	5.20	mins/trip
Time to Travel Empty =	3.10	mins/trip
Total Cycle Time =	9.80	mins/trip
No. of Trips =	0	trips
Total Time @ 80% Eff. =	0	hrs
Cost =	$0	

TOPSOIL REAPPL. (FRONT END LOADER)

Loader Type:	Cat 988H Loader	
Bucket Capacity (cy.):	8.25	
Avg. Haul Dist. (ft):	100	
Acreage (acres):	0.00	
T'soil Reapp. Depth (ft):	1.5	
Cost for Loader ($/hr):	$147.02	
Cost for Oper. ($/hr):	$35.00	
Hydraulic Cycle Time =	0.20	mins/trip
Travel Time (one way) =	0.15	mins/trip
Total Cycle Time =	0.50	mins/trip
No. of Trips =	0	trips
Total Time @ 80% Eff. =	0	hrs
Cost =	$0	

MATERIAL MOVING (Truck & Front End Loader)

Unit Wt. Mat. (lb/cu ft):	100	
Vol. of Material (cy):	0.00	
Loader Type(1:980,2:988)	2	
Bucket Capacity (cy):	8.25	
Load-Dump-Man. Time(min):	0.6	
Cost for Loader ($/hr):	$147.02	
Cost for Oper. ($/hr):	$35.00	
Truck Type (1:35T,2:50T):	2	
Truck Capacity (cy):	37	
Avg. Truck Speed (mph):	10	
Man. & Dump Time (min):	2	
Avg. Haul Dist. (ft):	2700	
Cost for Truck ($/hr):	$120.17	
Cost for Oper. ($/hr):	$35.00	
# Buckets to Fill Truck =	4	buckets
Loader Time/Truckload =	2.4	min/truck
No. of Truckloads =	0	loads
Time per Truckload =	10.5	min
Optimum No. of Trucks =	4	trucks
Time/Truck @ 80% Eff. =	0	hrs/truck
F.E.L. Time @ 80% Eff. =	0	hrs
Cost =	$0	

SEED COSTS

SEED TYPE	APPL.	RATE	COST
Western Wheatgrass		8.00 lbs/acre	$8.50 /lb
Thickspike Wheatgrass		6.00 lbs/acre	$7.38 /lb
Slender Wheatgrass		4.00 lbs/acre	$4.88 /lb
Hard Fescue		2.00 lbs/acre	$3.00 /lb
Kentucky Bluegrass		4.00 lbs/acre	$2.88 /lb
Timothy		4.00 lbs/acre	$1.98 /lb
White Dutch Clover		4.00 lbs/acre	$3.25 /lb
Acreage (acres):		0.00 acres	
Cost =		$0	

SEED COSTS (CONTINUED)

SEED TYPE	APPL.	RATE	COST
Regreen (nurse crop)		20.00 lbs/acre	$2.60 /lb
Acreage (acres):		0.00 acres	
Cost =		$0	

FORB COSTS

FORB TYPE	APPL.	RATE	COST
Black-eyed Susan		lbs/acre	/lb
Rocky Mountain Penstemon		lbs/acre	/lb
Blanket Flower		lbs/acre	/lb
Acreage (acres)		acres	
Cost =		$0	

SEEDING COSTS

Acreage (acres):	0.00
Cost ($/acre):	500
Total Cost =	$0

HYDOMULCH (WOOD FIBER)

Acreage (acres):	0.00
Cost ($/acres):	400
Total Cost =	$0

FERTILIZER

N Appl. Rate (lbs/acre):	18
P Appl. Rate (lbs/acre):	46
K Appl. Rate (lbs/acre):	0
N Cost ($/lb):	$1.67
P Cost ($/lb):	$0.65
K Cost ($/lb):	$0.50
Acreage (acres):	0.00
Total Cost =	$0

POND LINER REMOVAL

No. of Ponds:	1
Hours per Pond (assumed):	15
No. of Laborers (assumed):	6
Cost per Laborer:	$11.00
Cost for Supervisior	$21.00
Total Cost =	$1,305

TREE COST

TREE TYPE	NUMBER	COST
Black Hills Spruce		$2.75 /stem
Paper Birch		$2.75 /stem
Ponderosa Pine		$2.75 /stem
Aspen		$2.75 /stem
Trees/acre		

* Includes planting and herbivore protection

Total Cost = $0

FUEL COSTS

Cost of fuel ($/gal): $3.55 /gal

EQUIPMENT	HOURS	CONSUMP.
Cat D9T Dozer	35.2	14.0 gal/hr
Cat 637E Scraper	0.0	11.5 gal/hr
Cat 16M Grader	0.0	9.0 gal/hr
Cat 980 Loader	0.0	8.4 gal/hr
Cat 988H Loader	0.0	16 gal/hr
Cat 773 Truck	0.0	14.5 gal/hr
Cat 770 Truck	0.0	13.5 gal/hr

Total Cost = $1,749

MISC. COSTS

Remove Sludge to Sludge basin $1,800

TOTAL COST = $10,950

Press "Alt" and "C" to clear worksheet.
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BONDCALC (COPYRIGHT 1995. STATE OF SOUTH DAKOTA)
Maintenance Building
INDEX

GRADING	A 21
RIPPING	A 38
MAT. MOVING WITH DOZER	A 54
GRADING WITH DOZER	A 71
TOPSOIL REAPPL. (SCRAPER)	A 85
TOPSOIL REAPPL. (F.E.L.)	A 104
MATERIAL MOVING	A 120
SEED COSTS (MIXTURE #1)	A 146
SEED COSTS (MIXTURE #2)	A 160
SHRUB COSTS	A 174
DISKING AND SEEDING	A 187
MULCH	A 194
FERTILIZER	A 202
POND LINER REMOVAL	A 214
TREE COSTS	A 223
FUEL COSTS	A 234
MISC. COSTS	A 249
SUMMARY	A 263
DOZER PROD. TABLES	AA 71
SCRAPER TIME TABLES	AA 84
F.E.L. TIME TABLES	AA 114
TABLE OF SEED COSTS	AA 146
MACRO (FOR CLEARING WKS)	AA 255
MACRO (FOR PRINTING WKS)	L 1

(Index Continued in Cell F 5)

GRADING FLATS

Grader Type:	Cat 16 M Grader
Blade Width (ft):	10.2
Man. Time (min):	0.35
Avg. Pass (ft):	1000
Avg. Speed (mph):	3
# of passes over area:	2
Acreage (acres):	1.24
Cost for Grader ($/hr):	$112.07
Cost for Oper. ($/hr):	$35.00
Travel Distance =	10591 ft
Number of Passes =	11 passes
Total Time @ 80% eff =	0.9 hrs
Cost =	$132

RIPPING FLAT AREAS

Dozer Type:	Cat D9T Dozer
Ripper Spacing (ft):	3
Avg. Speed (mph):	1
Avg. Pass (ft):	300
Man. Time (min):	0.25
Acreage (acres):	1.24
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Travel Distance =	18005 ft
Number of Passes =	60 passes
Total Time @ 80% eff =	4.6 hrs
Cost =	$797

MATERIAL MOVING WITH DOZER

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	250
Vol. of Mat. (cy):	0.00 (estimation)
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Is mat. being moved to reduce slopes of heap, dump or other stockpile? Enter 1 if yes, 2 if no:	2
Production =	432 cy/hr
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

GRADING TOPSOIL ON SLOPES WITH DOZER

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	300
Acreage (acres):	0.00
Mat. Thickness (ft.):	0.5
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Production =	480 cy/hr
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (SCRAPER)

Scraper Type:	Cat 637E
Scraper Capacity (cy):	31
Avg. Haul Dist. (ft):	4800
Total Resistance (%):	10
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	0.33
Cost for Scraper ($/hr):	$86.00
Cost for Oper. ($/hr):	$35.00
Time to Load =	0.80 mins/trip
Time to Man. & Spread =	0.70 mins/trip
Time to Travel Loaded =	5.20 mins/trip
Time to Travel Empty =	3.10 mins/trip
Total Cycle Time =	9.80 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (FRONT END LOADER)

Loader Type:	Cat 988H Loader
Bucket Capacity (cy.):	8.25
Avg. Haul Dist. (ft):	100
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	1.5
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Hydraulic Cycle Time =	0.20 mins/trip
Travel Time (one way) =	0.15 mins/trip
Total Cycle Time =	0.50 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

MATERIAL MOVING (Truck & Front End Loader)
(Applying topsoil)

Unit Wt. Mat. (lb/cu ft):	100
Vol. of Material (cy):	1000.00
Loader Type(1:980,2:988)	2
Bucket Capacity (cy):	8.25
Load-Dump-Man. Time(min):	0.6
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Truck Type (1:35T,2:50T):	2
Truck Capacity (cy):	37
Avg. Truck Speed (mph):	10
Man. & Dump Time (min):	2
Avg. Haul Dist. (ft):	2700
Cost for Truck ($/hr):	$120.17
Cost for Oper. ($/hr):	$35.00
# Buckets to Fill Truck =	4 buckets
Loader Time/Truckload =	2.4 min/truck
No. of Truckloads =	27 loads
Time per Truckload =	10.5 min
Optimum No. of Trucks =	4 trucks
Time/Truck @ 80% Eff. =	1.5 hrs/truck
F.E.L. Time @ 80% Eff. =	1.5 hrs
Cost =	$1,204

SEED COSTS

SEED TYPE	APPL.	RATE	COST
Western Wheatgrass	8.00	lbs/acre	$8.50 /lb
Thickspike Wheatgrass	6.00	lbs/acre	$7.38 /lb
Slender Wheatgrass	4.00	lbs/acre	$4.88 /lb
Hard Fescue	2.00	lbs/acre	$3.00 /lb
Kentucky Bluegrass	4.00	lbs/acre	$2.88 /lb
Timothy	4.00	lbs/acre	$1.98 /lb
White Dutch Clover	4.00	lbs/acre	$3.25 /lb
Acreage (acres):	1.24	acres	
Cost =	$211		

SEED COSTS (CONTINUED)

SEED TYPE	APPL.	RATE	COST
Regreen (nurse crop)	20.00	lbs/acre	$2.60 /lb
Acreage (acres):	1.24	acres	
Cost =	$64		

FORB COSTS

FORB TYPE	APPL.	RATE	COST
Black-eyed Susan		lbs/acre	/lb
Rocky Mountain Penstemon		lbs/acre	/lb
Blanket Flower		lbs/acre	/lb
Acreage (acres)		acres	
Cost =	$0		

SEEDING COSTS

Acreage (acres):	1.24
Cost ($/acre):	500
Total Cost =	$620

HYDOMULCH (WOOD FIBER)

Acreage (acres):	1.24
Cost ($/acres):	400
Total Cost =	$496

FERTILIZER

N Appl. Rate (lbs/acre):	54.5
P Appl. Rate (lbs/acre):	43
K Appl. Rate (lbs/acre):	13.5
N Cost ($/lb):	$1.67
P Cost ($/lb):	$0.65
K Cost ($/lb):	$0.50
Acreage (acres):	1.24
Total Cost =	$156

POND LINER REMOVAL

No. of Ponds:	
Hours per Pond (assumed):	8
No. of Laborers (assumed):	6
Cost per Laborer:	$10.00
Cost for Supervisior	$20.00
Total Cost =	$0

TREE COST

TREE TYPE	NUMBER	COST
Black Hills Spruce		$2.75 /stem
Paper Birch		$2.75 /stem
Ponderosa Pine		$2.75 /stem
Aspen		$2.75 /stem
Trees/acre		

* Includes planting and herbivore protection

Total Cost = $0

FUEL COSTS

Cost of fuel ($/gal): $3.55 /gal

EQUIPMENT	HOURS	CONSUMP.
Cat D9T Dozer	4.6	14.0 gal/hr
Cat 637E Scraper	0.0	11.5 gal/hr
Cat 16M Grader	0.9	9.0 gal/hr
Cat 980 Loader	0.0	8.4 gal/hr
Cat 988H Loader	1.5	16 gal/hr
Cat 773 Truck	6.0	14.5 gal/hr
Cat 770 Truck	0.0	13.5 gal/hr

Total Cost = $651

MISC. COSTS

Erosion Control $1,000

TOTAL COST = $5,332

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Geo Building
INDEX

GRADING	A 21
RIPPING	A 38
MAT. MOVING WITH DOZER	A 54
GRADING WITH DOZER	A 71
TOPSOIL REAPPL. (SCRAPER)	A 85
TOPSOIL REAPPL. (F.E.L.)	A 104
MATERIAL MOVING	A 120
SEED COSTS (MIXTURE #1)	A 146
SEED COSTS (MIXTURE #2)	A 160
SHRUB COSTS	A 174
DISKING AND SEEDING	A 187
MULCH	A 194
FERTILIZER	A 202

(Index Continued in Cell F 5)

POND LINER REMOVAL	A 214
TREE COSTS	A 223
FUEL COSTS	A 234
MISC. COSTS	A 249
SUMMARY	A 263
DOZER PROD. TABLES	AA 71
SCRAPER TIME TABLES	AA 84
F.E.L. TIME TABLES	AA 114
TABLE OF SEED COSTS	AA 146
MACRO (FOR CLEARING WKS)	AA 255
MACRO (FOR PRINTING WKS)	L 1

GRADING FLATS

Grader Type:	Cat 16 M Grader
Blade Width (ft):	10.2
Man. Time (min):	0.35
Avg. Pass (ft):	1000
Avg. Speed (mph):	3
# of passes over area:	2
Acreage (acres):	1.37
Cost for Grader ($/hr):	$112.07
Cost for Oper. ($/hr):	$35.00
Travel Distance =	11701 ft
Number of Passes =	12 passes
Total Time @ 80% eff =	1.0 hrs
Cost =	$147

RIPPING FLAT AREAS

Dozer Type:	Cat D9T Dozer
Ripper Spacing (ft):	3
Avg. Speed (mph):	1
Avg. Pass (ft):	300
Man. Time (min):	0.25
Acreage (acres):	1.37
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Travel Distance =	19892 ft
Number of Passes =	66 passes
Total Time @ 80% eff =	5.1 hrs
Cost =	$883

MATERIAL MOVING WITH DOZER (Spreading pit backfill)

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	250
Vol. of Mat. (cy):	0.00 (estimation)
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Is mat. being moved to reduce slopes of heap, dump or other stockpile? Enter 1 if yes, 2 if no:	2
Production =	432 cy/hr
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

GRADING TOPSOIL ON SLOPES WITH DOZER

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	300
Acreage (acres):	0.00
Mat. Thickness (ft.):	0.5
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Production =	480 cy/hr
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (SCRAPER)

Scraper Type:	Cat 637E
Scraper Capacity (cy):	31
Avg. Haul Dist. (ft):	4800
Total Resistance (%):	10
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	0.33
Cost for Scraper ($/hr):	$86.00
Cost for Oper. ($/hr):	$35.00
Time to Load =	0.80 mins/trip
Time to Man. & Spread =	0.70 mins/trip
Time to Travel Loaded =	5.20 mins/trip
Time to Travel Empty =	3.10 mins/trip
Total Cycle Time =	9.80 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (FRONT END LOADER)

Loader Type:	Cat 988H Loader
Bucket Capacity (cy.):	8.25
Avg. Haul Dist. (ft):	100
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	1.5
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Hydraulic Cycle Time =	0.20 mins/trip
Travel Time (one way) =	0.15 mins/trip
Total Cycle Time =	0.50 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

MATERIAL MOVING (Truck & Front End Loader)

Unit Wt. Mat. (lb/cu ft):	100
Vol. of Material (cy):	1105.00
Loader Type(1:980,2:988)	2
Bucket Capacity (cy):	8.25
Load-Dump-Man. Time(min):	0.6
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Truck Type (1:35T,2:50T):	2
Truck Capacity (cy):	37
Avg. Truck Speed (mph):	10
Man. & Dump Time (min):	2
Avg. Haul Dist. (ft):	2700
Cost for Truck ($/hr):	$120.17
Cost for Oper. ($/hr):	$35.00
# Buckets to Fill Truck =	4 buckets
Loader Time/Truckload =	2.4 min/truck
No. of Truckloads =	30 loads
Time per Truckload =	10.5 min
Optimum No. of Trucks =	4 trucks
Time/Truck @ 80% Eff. =	1.6 hrs/truck
F.E.L. Time @ 80% Eff. =	1.6 hrs
Cost =	$1,284

SEED COSTS

SEED TYPE	APPL.	RATE	COST
Western Wheatgrass	8.00	lbs/acre	$8.50 /lb
Thickspike Wheatgrass	6.00	lbs/acre	$7.38 /lb
Slender Wheatgrass	4.00	lbs/acre	$4.88 /lb
Hard Fescue	2.00	lbs/acre	$3.00 /lb
Kentucky Bluegrass	4.00	lbs/acre	$2.88 /lb
Timothy	4.00	lbs/acre	$1.98 /lb
White Dutch Clover	4.00	lbs/acre	$3.25 /lb
Acreage (acres):	1.37	acres	

Cost = $233

SEED COSTS (CONTINUED)

SEED TYPE	APPL.	RATE	COST
Regreen (nurse crop)	20.00	lbs/acre	$2.60 /lb

Acreage (acres): 1.37 acres

Cost = $71

FORB COSTS

FORB TYPE	APPL.	RATE	COST
Black-eyed Susan		lbs/acre	/lb
Rocky Mountain Penstemon		lbs/acre	/lb
Blanket Flower		lbs/acre	/lb

Acreage (acres) acres

Cost = $0

SEEDING COSTS

Acreage (acres): 1.37
Cost ($/acre): 500

Total Cost = $685

HYDOMULCH (WOOD FIBER)

Acreage (acres): 1.37
Cost ($/acres): 400

Total Cost = $548

FERTILIZER

N Appl. Rate (lbs/acre): 54.5
P Appl. Rate (lbs/acre): 43
K Appl. Rate (lbs/acre): 13.5
N Cost ($/lb): $1.67
P Cost ($/lb): $0.65
K Cost ($/lb): $0.50
Acreage (acres): 1.37

Total Cost = $172

POND LINER REMOVAL

No. of Ponds:
Hours per Pond (assumed): 8
No. of Laborers (assumed): 6
Cost per Laborer: $10.00
Cost for Supervisior $20.00
Total Cost = $0

TREE COST

TREE TYPE	NUMBER	COST
Black Hills Spruce		$2.75 /stem
Paper Birch		$2.75 /stem
Ponderosa Pine		$2.75 /stem
Aspen		$2.75 /stem
Trees/acre		

* Includes planting and herbivore protection

Total Cost = $0

FUEL COSTS

Cost of fuel ($/gal): $3.55 /gal

EQUIPMENT	HOURS	CONSUMP.
Cat D9T Dozer	5.1	14.0 gal/hr
Cat 637E Scraper	0.0	11.5 gal/hr
Cat 16M Grader	1.0	9.0 gal/hr
Cat 980 Loader	0.0	8.4 gal/hr
Cat 988H Loader	1.6	16 gal/hr
Cat 773 Truck	6.4	14.5 gal/hr
Cat 770 Truck	0.0	13.5 gal/hr

Total Cost = $706

MISC. COSTS

Erosion Control $1,000

TOTAL COST = $5,730

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Front Gate
INDEX

GRADING	A 21
RIPPING	A 38
MAT. MOVING WITH DOZER	A 54
GRADING WITH DOZER	A 71
TOPSOIL REAPPL. (SCRAPER)	A 85
TOPSOIL REAPPL. (F.E.L.)	A 104
MATERIAL MOVING	A 120
SEED COSTS (MIXTURE #1)	A 146
SEED COSTS (MIXTURE #2)	A 160
SHRUB COSTS	A 174
DISKING AND SEEDING	A 187
MULCH	A 194
FERTILIZER	A 202
POND LINER REMOVAL	A 214
TREE COSTS	A 223
FUEL COSTS	A 234
MISC. COSTS	A 249
SUMMARY	A 263
DOZER PROD. TABLES	AA 71
SCRAPER TIME TABLES	AA 84
F.E.L. TIME TABLES	AA 114
TABLE OF SEED COSTS	AA 146
MACRO (FOR CLEARING WKS)	AA 255
MACRO (FOR PRINTING WKS)	L 1

(Index Continued in Cell F 5)

GRADING FLATS

Grader Type:	Cat 16 M Grader
Blade Width (ft):	10.2
Man. Time (min):	0.35
Avg. Pass (ft):	1000
Avg. Speed (mph):	3
# of passes over area:	2
Acreage (acres):	0.29
Cost for Grader ($/hr):	$112.07
Cost for Oper. ($/hr):	$35.00
Travel Distance =	2477 ft
Number of Passes =	2 passes
Total Time @ 80% eff =	0.2 hrs
Cost =	$29

RIPPING FLAT AREAS

Dozer Type:	Cat D9T Dozer
Ripper Spacing (ft):	3
Avg. Speed (mph):	1
Avg. Pass (ft):	300
Man. Time (min):	0.25
Acreage (acres):	0.29
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Travel Distance =	4211 ft
Number of Passes =	14 passes
Total Time @ 80% eff =	1.1 hrs
Cost =	$190

MATERIAL MOVING WITH DOZER

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	250
Vol. of Mat. (cy):	0.00 (estimation)
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Is mat. being moved to reduce slopes of heap, dump or other stockpile? Enter 1 if yes, 2 if no:	2
Production =	432 cy/hr
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

GRADING TOPSOIL ON SLOPES WITH DOZER

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	300
Acreage (acres):	0.00
Mat. Thickness (ft.):	0.5
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Production =	480 cy/hr
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (SCRAPER)

Scraper Type:	Cat 637E
Scraper Capacity (cy):	31
Avg. Haul Dist. (ft):	4800
Total Resistance (%):	10
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	0.33
Cost for Scraper ($/hr):	$86.00
Cost for Oper. ($/hr):	$35.00
Time to Load =	0.80 mins/trip
Time to Man. & Spread =	0.70 mins/trip
Time to Travel Loaded =	5.20 mins/trip
Time to Travel Empty =	3.10 mins/trip
Total Cycle Time =	9.80 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (FRONT END LOADER)

Loader Type:	Cat 988H Loader
Bucket Capacity (cy.):	8.25
Avg. Haul Dist. (ft):	100
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	1.5
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Hydraulic Cycle Time =	0.20 mins/trip
Travel Time (one way) =	0.15 mins/trip
Total Cycle Time =	0.50 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

MATERIAL MOVING (Truck & Front End Loader)

Unit Wt. Mat. (lb/cu ft):	100
Vol. of Material (cy):	234.00
Loader Type(1:980,2:988)	2
Bucket Capacity (cy):	8.25
Load-Dump-Man. Time(min):	0.6
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Truck Type (1:35T,2:50T):	2
Truck Capacity (cy):	37
Avg. Truck Speed (mph):	10
Man. & Dump Time (min):	2
Avg. Haul Dist. (ft):	2700
Cost for Truck ($/hr):	$120.17
Cost for Oper. ($/hr):	$35.00
# Buckets to Fill Truck =	4 buckets
Loader Time/Truckload =	2.4 min/truck
No. of Truckloads =	6 loads
Time per Truckload =	10.5 min
Optimum No. of Trucks =	4 trucks
Time/Truck @ 80% Eff. =	0.3 hrs/truck
F.E.L. Time @ 80% Eff. =	0.3 hrs
Cost =	$241

SEED COSTS

SEED TYPE	APPL.	RATE	COST
Western Wheatgrass		8.00 lbs/acre	$8.50 /lb
Thickspike Wheatgrass		6.00 lbs/acre	$7.38 /lb
Slender Wheatgrass		4.00 lbs/acre	$4.88 /lb
Hard Fescue		2.00 lbs/acre	$3.00 /lb
Kentucky Bluegrass		4.00 lbs/acre	$2.88 /lb
Timothy		4.00 lbs/acre	$1.98 /lb
White Dutch Clover		4.00 lbs/acre	$3.25 /lb
Acreage (acres):		0.29 acres	
Cost =		$49	

SEED COSTS (CONTINUED)

SEED TYPE	APPL.	RATE	COST
Regreen (nurse crop)		20.00 lbs/acre	$2.60 /lb
Acreage (acres):		0.29 acres	
Cost =		$15	

FORB COSTS

FORB TYPE	APPL.	RATE	COST
Black-eyed Susan		lbs/acre	/lb
Rocky Mountain Penstemon		lbs/acre	/lb
Blanket Flower		lbs/acre	/lb
Acreage (acres)		acres	
Cost =		$0	

SEEDING COSTS

Acreage (acres):	0.29
Cost ($/acre):	500
Total Cost =	$145

HYDOMULCH (WOOD FIBER)

Acreage (acres):	0.29
Cost ($/acres):	400
Total Cost =	$116

FERTILIZER

N Appl. Rate (lbs/acre):	54.5
P Appl. Rate (lbs/acre):	43
K Appl. Rate (lbs/acre):	13.5
N Cost ($/lb):	$1.67
P Cost ($/lb):	$0.65
K Cost ($/lb):	$0.50
Acreage (acres):	0.29
Total Cost =	$36

POND LINER REMOVAL

No. of Ponds:	
Hours per Pond (assumed):	8
No. of Laborers (assumed):	6
Cost per Laborer:	$10.00
Cost for Supervisior	$20.00
Total Cost =	$0

TREE COST

TREE TYPE	NUMBER	COST
Black Hills Spruce		$2.75 /stem
Paper Birch		$2.75 /stem
Ponderosa Pine		$2.75 /stem
Aspen		$2.75 /stem
Trees/acre		

* Includes planting and herbivore protection

Total Cost = $0

FUEL COSTS

Cost of fuel ($/gal): $3.55 /gal

EQUIPMENT	HOURS	CONSUMP.
Cat D9T Dozer	1.1	14.0 gal/hr
Cat 637E Scraper	0.0	11.5 gal/hr
Cat 16M Grader	0.2	9.0 gal/hr
Cat 980 Loader	0.0	8.4 gal/hr
Cat 988H Loader	0.3	16 gal/hr
Cat 773 Truck	1.2	14.5 gal/hr
Cat 770 Truck	0.0	13.5 gal/hr

Total Cost = $140

MISC. COSTS

Erosion Control $500

TOTAL COST = $1,462

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Haul Road Removal and Restablish Original Access Road
INDEX
======

GRADING	A 21	POND LINER REMOVAL	A 214
RIPPING	A 38	TREE COSTS	A 223
MAT. MOVING WITH DOZER	A 54	FUEL COSTS	A 234
GRADING WITH DOZER	A 71	MISC. COSTS	A 249
TOPSOIL REAPPL. (SCRAPER)	A 85	SUMMARY	A 263
TOPSOIL REAPPL. (F.E.L.)	A 104	DOZER PROD. TABLES	AA 71
MATERIAL MOVING	A 120	SCRAPER TIME TABLES	AA 84
SEED COSTS (MIXTURE #1)	A 146	F.E.L. TIME TABLES	AA 114
SEED COSTS (MIXTURE #2)	A 160	TABLE OF SEED COSTS	AA 146
SHRUB COSTS	A 174	MACRO (FOR CLEARING WKS)	AA 255
DISKING AND SEEDING	A 187	MACRO (FOR PRINTING WKS)	L 1
MULCH	A 194		
FERTILIZER	A 202		

(Index Continued in Cell F 5)

GRADING FLATS

Grader Type:	Cat 16 M Grader
Blade Width (ft):	10.2
Man. Time (min):	0.35
Avg. Pass (ft):	1000
Avg. Speed (mph):	3
# of passes over area:	2
Acreage (acres):	0.00
Cost for Grader ($/hr):	$112.07
Cost for Oper. ($/hr):	$35.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0.0 hrs
Cost =	$0

RIPPING FLAT AREAS

Dozer Type:	Cat D9T Dozer
Ripper Spacing (ft):	3
Avg. Speed (mph):	1
Avg. Pass (ft):	300
Man. Time (min):	0.25
Acreage (acres):	22.42
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Travel Distance =	325538 ft
Number of Passes =	1085 passes
Total Time @ 80% eff =	82.7 hrs
Cost =	$14,322

MATERIAL MOVING WITH DOZER (Removing road berm)

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	250
Vol. of Mat. (cy):	0.00 (estimation)
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Is mat. being moved to reduce slopes of heap, dump or other stockpile? Enter 1 if yes, 2 if no:	2
Production =	432 cy/hr
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

GRADING TOPSOIL ON SLOPES WITH DOZER

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	300
Acreage (acres):	22.42
Mat. Thickness (ft.):	0.5
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Production =	480 cy/hr
Total Time @ 80% Eff. =	47.1 hrs
Cost =	$8,157

TOPSOIL REAPPL. (SCRAPER)

Scraper Type:	Cat 637E
Scraper Capacity (cy):	31
Avg. Haul Dist. (ft):	4800
Total Resistance (%):	10
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	0.33
Cost for Scraper ($/hr):	$86.00
Cost for Oper. ($/hr):	$35.00
Time to Load =	0.80 mins/trip
Time to Man. & Spread =	0.70 mins/trip
Time to Travel Loaded =	5.20 mins/trip
Time to Travel Empty =	3.10 mins/trip
Total Cycle Time =	9.80 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

TOPSOIL REAPPL. (FRONT END LOADER)

Loader Type:	Cat 988H Loader
Bucket Capacity (cy.):	8.25
Avg. Haul Dist. (ft):	100
Acreage (acres):	0.00
T'soil Reapp. Depth (ft):	1.5
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Hydraulic Cycle Time =	0.20 mins/trip
Travel Time (one way) =	0.15 mins/trip
Total Cycle Time =	0.50 mins/trip
No. of Trips =	0 trips
Total Time @ 80% Eff. =	0 hrs
Cost =	$0

MATERIAL MOVING (Truck & Front End Loader)

Unit Wt. Mat. (lb/cu ft):	100
Vol. of Material (cy):	18085.00
Loader Type(1:980,2:988)	2
Bucket Capacity (cy):	8.25
Load-Dump-Man. Time(min):	0.6
Cost for Loader ($/hr):	$147.02
Cost for Oper. ($/hr):	$35.00
Truck Type (1:35T,2:50T):	2
Truck Capacity (cy):	37
Avg. Truck Speed (mph):	10
Man. & Dump Time (min):	2
Avg. Haul Dist. (ft):	2700
Cost for Truck ($/hr):	$120.17
Cost for Oper. ($/hr):	$35.00
# Buckets to Fill Truck =	4 buckets
Loader Time/Truckload =	2.4 min/truck
No. of Truckloads =	489 loads
Time per Truckload =	10.5 min
Optimum No. of Trucks =	4 trucks
Time/Truck @ 80% Eff. =	26.7 hrs/truck
F.E.L. Time @ 80% Eff. =	26.7 hrs
Cost =	$21,432

SEED COSTS

SEED TYPE	APPL.	RATE	COST
Western Wheatgrass	8.00	lbs/acre	$8.50 /lb
Thickspike Wheatgrass	6.00	lbs/acre	$7.38 /lb
Slender Wheatgrass	4.00	lbs/acre	$4.88 /lb
Hard Fescue	2.00	lbs/acre	$3.00 /lb
Kentucky Bluegrass	4.00	lbs/acre	$2.88 /lb
Timothy	4.00	lbs/acre	$1.98 /lb
White Dutch Clover	4.00	lbs/acre	$3.25 /lb
Acreage (acres):	22.42	acres	
Cost =	$3,817		

SEED COSTS (CONTINUED)

SEED TYPE	APPL.	RATE	COST
Regreen (nurse crop)	20.00	lbs/acre	$2.60 /lb
Acreage (acres):	22.42	acres	
Cost =	$1,166		

FORB COSTS

FORB TYPE	APPL.	RATE	COST
Black-eyed Susan		lbs/acre	/lb
Rocky Mountain Penstemon		lbs/acre	/lb
Blanket Flower		lbs/acre	/lb
Acreage (acres)		acres	
Cost =	$0		

SEEDING COSTS

Acreage (acres):	22.42
Cost ($/acre):	500
Total Cost =	$11,210

HYDOMULCH (WOOD FIBER)

Acreage (acres):	22.42
Cost ($/acres):	400
Total Cost =	$8,968

FERTILIZER

N Appl. Rate (lbs/acre):	54.5
P Appl. Rate (lbs/acre):	43
K Appl. Rate (lbs/acre):	13.5
N Cost ($/lb):	$1.67
P Cost ($/lb):	$0.65
K Cost ($/lb):	$0.50
Acreage (acres):	22.42
Total Cost =	$2,819

POND LINER REMOVAL

No. of Ponds:	
Hours per Pond (assumed):	8
No. of Laborers (assumed):	6
Cost per Laborer:	$10.00
Cost for Supervisior	$20.00
Total Cost =	$0

TREE COST

TREE TYPE	NUMBER	COST
Black Hills Spruce		$2.75 /stem
Paper Birch		$2.75 /stem
Ponderosa Pine		$2.75 /stem
Aspen		$2.75 /stem
Trees/acre		

* Includes planting and herbivore protection

Total Cost = $0

FUEL COSTS

Cost of fuel ($/gal): $3.55 /gal

EQUIPMENT	HOURS	CONSUMP.
Cat D9T Dozer	129.8	14.0 gal/hr
Cat 637E Scraper	0.0	11.5 gal/hr
Cat 16M Grader	0.0	9.0 gal/hr
Cat 980 Loader	0.0	8.4 gal/hr
Cat 988H Loader	26.7	16 gal/hr
Cat 773 Truck	106.8	14.5 gal/hr
Cat 770 Truck	0.0	13.5 gal/hr

Total Cost = $13,465

MISC. COSTS

Erosion Control	$20,000
Remove Pipeline from Haul Road Berm	$50,000
Reconstruct Access Road	$148,399

TOTAL COST = $303,754

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Access Road Reconstruction (Includes Portion of Haul Road Reduction)
INDEX

GRADING	A 21
RIPPING	A 38
MAT. MOVING WITH DOZER	A 54
GRADING WITH DOZER	A 71
TOPSOIL REAPPL. (SCRAPER)	A 85
TOPSOIL REAPPL. (F.E.L.)	A 104
MATERIAL MOVING	A 120
SEED COSTS (MIXTURE #1)	A 146
SEED COSTS (MIXTURE #2)	A 160
SHRUB COSTS	A 174
DISKING AND SEEDING	A 187
MULCH	A 194
FERTILIZER	A 202

(Index Continued in Cell F 5)

POND LINER REMOVAL	A 214
TREE COSTS	A 223
FUEL COSTS	A 234
MISC. COSTS	A 249
SUMMARY	A 263
DOZER PROD. TABLES	AA 71
SCRAPER TIME TABLES	AA 84
F.E.L. TIME TABLES	AA 114
TABLE OF SEED COSTS	AA 146
MACRO (FOR CLEARING WKS)	AA 255
MACRO (FOR PRINTING WKS)	L 1

GRADING FLATS

Grader Type:	Cat 16 M Grader
Blade Width (ft):	10.2
Man. Time (min):	0.35
Avg. Pass (ft):	1000
Avg. Speed (mph):	3
# of passes over area:	2
Acreage (acres):	5.53
Cost for Grader ($/hr):	$112.07
Cost for Oper. ($/hr):	$35.00
Travel Distance =	47233 ft
Number of Passes =	47 passes
Total Time @ 80% eff =	4.1 hrs
Cost =	$603

RIPPING FLAT AREAS

Dozer Type:	Cat D9T Dozer
Ripper Spacing (ft):	3
Avg. Speed (mph):	1
Avg. Pass (ft):	300
Man. Time (min):	0.25
Acreage (acres):	0.00
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Travel Distance =	0 ft
Number of Passes =	0 passes
Total Time @ 80% eff =	0 hrs
Cost =	$0

MATERIAL MOVING WITH DOZER (Spreading access road fill material)

Dozer Type:	Cat D9T Dozer
Blade Type:	Universal
Avg. Doze Dist. (ft.):	250
Vol. of Mat. (cy):	32843.00 (estimation)
Cost for Dozer ($/hr):	$143.18
Cost for Oper. ($/hr):	$30.00
Is mat. being moved to reduce slopes of heap, dump or other stockpile? Enter 1 if yes, 2 if no:	2
Production =	432 cy/hr
Total Time @ 80% Eff. =	95 hrs
Cost =	$16,452

GRADING TOPSOIL ON SLOPES WITH DOZER

Dozer Type:	Cat D9T Dozer	
Blade Type:	Universal	
Avg. Doze Dist. (ft.):	300	
Acreage (acres):	5.53	
Mat. Thickness (ft.):	0.5	
Cost for Dozer ($/hr):	$143.18	
Cost for Oper. ($/hr):	$30.00	
Production =	480	cy/hr
Total Time @ 80% Eff. =	11.6	hrs
Cost =	$2,009	

TOPSOIL REAPPL. (SCRAPER)

Scraper Type:	Cat 637E	
Scraper Capacity (cy):	31	
Avg. Haul Dist. (ft):	4800	
Total Resistance (%):	10	
Acreage (acres):	0.00	
T'soil Reapp. Depth (ft):	0.33	
Cost for Scraper ($/hr):	$86.00	
Cost for Oper. ($/hr):	$35.00	
Time to Load =	0.80	mins/trip
Time to Man. & Spread =	0.70	mins/trip
Time to Travel Loaded =	5.20	mins/trip
Time to Travel Empty =	3.10	mins/trip
Total Cycle Time =	9.80	mins/trip
No. of Trips =	0	trips
Total Time @ 80% Eff. =	0	hrs
Cost =	$0	

TOPSOIL REAPPL. (FRONT END LOADER)

Loader Type:	Cat 988H Loader	
Bucket Capacity (cy.):	8.25	
Avg. Haul Dist. (ft):	100	
Acreage (acres):	0.00	
T'soil Reapp. Depth (ft):	1.5	
Cost for Loader ($/hr):	$147.02	
Cost for Oper. ($/hr):	$35.00	
Hydraulic Cycle Time =	0.20	mins/trip
Travel Time (one way) =	0.15	mins/trip
Total Cycle Time =	0.50	mins/trip
No. of Trips =	0	trips
Total Time @ 80% Eff. =	0	hrs
Cost =	$0	

MATERIAL MOVING (Truck & Front End Loader)
(Hauling fill material to re-establish access road)

Unit Wt. Mat. (lb/cu ft):	120	
Vol. of Material (cy):	65685.00	
Loader Type(1:980,2:988)	2	
Bucket Capacity (cy):	8.25	
Load-Dump-Man. Time(min):	0.6	
Cost for Loader ($/hr):	$147.02	
Cost for Oper. ($/hr):	$35.00	
Truck Type (1:35T,2:50T):	2	
Truck Capacity (cy):	30.9	
Avg. Truck Speed (mph):	10	
Man. & Dump Time (min):	2	
Avg. Haul Dist. (ft):	2700	
Cost for Truck ($/hr):	$120.17	
Cost for Oper. ($/hr):	$35.00	
# Buckets to Fill Truck =	4	buckets
Loader Time/Truckload =	2.4	min/truck
No. of Truckloads =	2126	loads
Time per Truckload =	10.5	min
Optimum No. of Trucks =	4	trucks
Time/Truck @ 80% Eff. =	116.3	hrs/truck
F.E.L. Time @ 80% Eff. =	116.3	hrs
Cost =	$93,354	

SEED COSTS

SEED TYPE	APPL.	RATE	COST
Western Wheatgrass	8.00	lbs/acre	$8.50 /lb
Thickspike Wheatgrass	6.00	lbs/acre	$7.38 /lb
Slender Wheatgrass	4.00	lbs/acre	$4.88 /lb
Hard Fescue	2.00	lbs/acre	$3.00 /lb
Kentucky Bluegrass	4.00	lbs/acre	$2.88 /lb
Timothy	4.00	lbs/acre	$1.98 /lb
White Dutch Clover	4.00	lbs/acre	$3.25 /lb
Acreage (acres):	0.00	acres	
Cost =	$0		

SEED COSTS (CONTINUED)

SEED TYPE	APPL.	RATE	COST
Regreen (nurse crop)	20.00	lbs/acre	$2.60 /lb
Acreage (acres):	0.00	acres	
Cost =	$0		

FORB COSTS

FORB TYPE	APPL.	RATE	COST
Black-eyed Susan		lbs/acre	/lb
Rocky Mountain Penstemon		lbs/acre	/lb
Blanket Flower		lbs/acre	/lb
Acreage (acres)		acres	
Cost =	$0		

SEEDING COSTS

Acreage (acres):	0.00
Cost ($/acre):	500
Total Cost =	$0

HYDOMULCH (WOOD FIBER)

Acreage (acres):	0.00
Cost ($/acres):	400
Total Cost =	$0

FERTILIZER

N Appl. Rate (lbs/acre):	18
P Appl. Rate (lbs/acre):	46
K Appl. Rate (lbs/acre):	0
N Cost ($/lb):	$1.67
P Cost ($/lb):	$0.65
K Cost ($/lb):	$0.50
Acreage (acres):	0.00
Total Cost =	$0

POND LINER REMOVAL

No. of Ponds:	
Hours per Pond (assumed):	8
No. of Laborers (assumed):	6
Cost per Laborer:	$10.00
Cost for Supervisior	$20.00
Total Cost =	$0

TREE COST

TREE TYPE	NUMBER	COST
Black Hills Spruce		$2.75 /stem
Paper Birch		$2.75 /stem
Ponderosa Pine		$2.75 /stem
Aspen		$2.75 /stem
Trees/acre		

* Includes planting and herbivore protection

Total Cost = $0

FUEL COSTS

Cost of fuel ($/gal): $3.55 /gal

EQUIPMENT	HOURS	CONSUMP.
Cat D9T Dozer	106.6	14.0 gal/hr
Cat 637E Scraper	0.0	11.5 gal/hr
Cat 16M Grader	4.1	9.0 gal/hr
Cat 980 Loader	0.0	8.4 gal/hr
Cat 988H Loader	116.3	16 gal/hr
Cat 773 Truck	465.2	14.5 gal/hr
Cat 770 Truck	0.0	13.5 gal/hr

Total Cost = $35,981

MISC. COSTS

TOTAL COST = $148,399

Press "Alt" and "C" to clear worksheet.
(This will bring all costs to 0.)

Press "Alt" and "P" to print worksheet with a header.
Press "Alt" and "A" to print worksheet without a header.

BONDCALC Program

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Table A4-1 - Water Treatment Labor and Other Labor Costs

Bio Plant Operator (40 hour work week)		
1 FTE @ $20.50 and 41% burden	$0.00 per hour	(Based on Homestake WTP Operator Cost)
40 hours/week * 52 weeks	2080 hrs/year	
Total	$0	
Site Caretaker/Water Sampler (40 hour work week)		
1 FTE @ $15.00 and 41% burden	$21.15 per hour	
40 hours/week * 52 weeks	2080 hrs/year	
Total	$43,992	
Construction Personnel in Year 95		
Earthwork Superintendent	$84,000 per year	
Demolition Superintendent	$30,000 per year	
Mechanic	$60,500 per year	
Security/Safety	$67,200 per year	

Table A4-2 - Seed Costs

SEED TYPE	APPL. RATE	COST
Western Wheatgrass	8.00 lbs/acre	$8.50 /lb
Thickspike Wheatgrass	6.00 lbs/acre	$7.38 /lb
Slender Wheatgrass	4.00 lbs/acre	$4.88 /lb
Hard Fescue	2.00 lbs/acre	$3.00 /lb
Kentucky Bluegrass	4.00 lbs/acre	$2.88 /lb
Timothy	4.00 lbs/acre	$1.98 /lb
White Dutch Clover	4.00 lbs/acre	$3.25 /lb
Regreen (nurse crop)	20.00 lbs/acre	$2.60 /lb
Forb Seed		
Black-eyed Susan	0.25 lbs/acre	$19.88 /lb
Rocky Mountain Penstemon	0.25 lbs/acre	$42.50 /lb
Blanket Flower	1.00 lbs/acre	$27.25 /lb
Shrub Seed		
Serviceberry	0.25 lbs/acre	$105.00 /lb
Chokecherry	0.25 lbs/acre	$29.25 /lb
Snowberry	0.25 lbs/acre	$97.50 /lb
Woods Rose	0.25 lbs/acre	$51.00 /lb

Table A4-3 - Equipment, Labor and Fuel Costs

Equipment Type	Cost/hr.
Cat 16 M Grader	$112.07 /hr
Cat D9T Dozer	$143.18 /hr
Cat 988H Loader	$147.02 /hr
Cat 772 (50 ton truck)	$120.17 /hr
Labor	
Dozer Operators	$30.00 /hr
All Other Operators	$35.00 /hr
Fuel	$3.55 /gal

Table A4-4 - Earthmoving Summary

Area	Grading Flats Grader (acres)	Ripping Dozer (acres)	Material Moved Dozer (cy)	Grading Slopes Dozer (acres)	Material Moved Scraper (cy)	Material Moved Loader (acres)	Material Moved Truck & Loader (cy)	Acres Revegetated
Spruce Gulch Ponds & Roads		3.70		9.45			7623	9.45
Spruce Gulch Pond Berm & Liner Removal			71,649					
South Gulch Water Managnment Facilities & Roads		1.16		1.21			976	1.21
South Gulch Pond Berm and Drain Pipe Removal			5,000					
Process Area and Roads		1.35		33.79			27257	33.79
Storm Water Pond Berm & Liner Removal			90,139					
Pregnanat Pond Berm & Liner Removal			45,626					
New Sludge Pond Cover			6,300				6300	
Upper Discharge Berm & Liner Removal			5,278					
Lower Discharge Pond Berm & Liner Removal			9,722					
Maintenance Building	1.24	1.24					1000	1.24
Geo Building	1.37	1.37					1105	1.37
Front Gate	0.29	0.29					234	0.29
Haul Road Removal		22.42		22.42			18085	22.42
Access Road Reconstruction (Includes Portion of Haul Road Reduction)	5.53		32,843	5.53			65,685	
Total	8.43	31.53	266,557	72.4			128,265	69.77

Table A4-5 - Annual Operation & Maintenace and Water Treatment Costs

Item	Annual Cost	
Operation & Maintenance		
Road Maintenance	$10,000.00	
Weed Spraying	$5,000.00	
Pond Liner Repair	$2,000.00	
Consumables		
Bio Treatment Consumables	$9,700.00	(Years 1 - 35)
	$5,800.00	(Years 36 - 94)
Propane	$20,000.00	
Utilities	$90,000.00	
Spruce Gulch Water Treatment	$2,000.00	
Diesel	$1,000.00	
Rental	$3,600.00	
Labor & Equipment		
Replacement Costs	$15,000.00	
Vehicle Costs	$3,000.00	
Monitoring		
Aquatic/Biological Monitoring	$25,000.00	
Pit Impoundment Monitoring	$1,000.00	
Other Costs		
Vehicle Purchase	$25,000.00	(every 10 years beginning in Year 1)
Pond Liner Replacement	$1,245,000.00	(every 25 years beginning in Year 2)
Pit Impoundment Monitoring	$13,000.00	(every 5 years)

Table A4-6 - Building Volumes

Building	Number of Sections	Section No.	Length (ft)	Width (ft)	Height (ft)	Total Volume (cubic feet)
Old Water Treatment Plant	3	1	96	51	40	195,840
		2	14	10	10	1,400
		3	22	10	10	2,200
Old Water Treatment Plant Total						199,440
Biotreatment Plant Addition	1	1	51	36	28	51,408
Chlorine Pond Building	1	1	25	15	15	5,625
Pregnant Pond Pump House	1	1	12	12	8	1,152
FD-1 Pump House	1	1	10	8	8	640
Maintenance Shop	1	1	60	42	25	63,000
Geo Building	1	1	60	40	25	60,000
Guard Shack	1	1	10	10	8	800
Spruce Gulch Caustic Building & Tank	1	1	10	6	10	600
Spruce Gulch Pump Houses	2	1	10	10	8	800
		2	7	7	7	343
Spruce Gulch Pump House Total						1,143
Spruce Gulch Pole Barn	1	1	25	15	15	5,625
South Gulch Building	1	1	1162		10	11,620

Table A4-7 - Building Demolition Summary

Building	Type	Building Size (cubic feet)	Demolition Cost ($/cubic foot)	Total Cost
Old Water Treatment Plant	Metal	199,440	$0.21	$41,882
Biotreatment Addition	Metal	51,408	$0.21	$10,796
Chlorine Pond Building	Metal	5,625	$0.21	$1,181
Pregnant Pond Pump House	Metal	1,152	$0.21	$242
FD-1 Pump House	Metal	640	$0.21	$134
Maintenance Shop	Metal	63,000	$0.21	$13,230
Geo Building	Metal	60,000	$0.21	$12,600
Guard Shack	Wood	800	$0.21	$168
Spruce Gulch Caustic Building & Tank	Wood/Metal	600	$0.21	$126
Spruce Gulch Pump Houses	Wood/Metal	1,143	$0.21	$240
Spruce Gulch Pole Barn	Wood/Metal	5,625	$0.21	$1,181
South Gulch Building	Wood/Metal	11,620	$0.21	$2,440
Total				$84,221

Building	Type	Building Size (square feet)	Demolition Cost ($/square foot)	Total Cost
Gut Biotreatment Addition	Metal	1,836	$4.23	$7,766

Table A4-8 - Other Demolition

Pipeline, Fenceline, Powerline & Other Demolition			
Tank	Number	Cost/lf	Total Cost
Propane (Portable)	1		$0
Wash Bay Water – Shop	1		$2,400
Pipeline Disposal			$5,000
Powerline Removal			$50,000
Fenceline Removal (linear feet)	11,421	$1.22	$13,934
Total			$71,334

ATTACHMENT A5

WELL PLUGGING COST ESTIMATE

May 2015

Appendix A: Postclosure Financial Assurance Cost Estimate
Attachment A5: Monitoring Well Plugging Cost Esimate

$$Volume(ft^3) = D_I(in)^2 \cdot 0.005454 \cdot L(ft)$$

Labor: $200.00 per hour
Cement: $12.00 per sack
1.28 ft^3 per sack
Pumping Rate: 2.67 ft^3 per minute

Well	Status	Inside Diameter (inches)	Total Depth (feet)	Volume (cf)	Set Up (Min)	Full Time (min)	Mobilize (min)	Cement Cost	Labor Cost	Total Cost
MW-1	Plugged									$0.00
MW-2	Active	4.5	149.9	16.56	60	6.20	20	$155.00	$287.00	$442.00
MW-3	Plugged									$0.00
MW-4B	Active	4.5	401	44.29	60	16.59	20	$415.00	$322.00	$737.00
MW-5	Active	4.5	221.7	24.49	60	9.17	20	$230.00	$297.00	$527.00
MW-7	Plugged									$0.00
MW-8	Inactive	4.5	597.2	65.96	60	24.70	20	$618.00	$349.00	$967.00
MW-9B	Active	4.5	371	40.97	60	15.35	20	$384.00	$318.00	$702.00
MW-11	Active	4.5	338	37.33	60	13.98	20	$350.00	$313.00	$663.00
MW-12	Plugged									$0.00
MW-13	Active	4.5	298.8	33.00	60	12.36	20	$309.00	$308.00	$617.00
MW-14	Active	4.5	9	0.99	60	0.37	20	$9.00	$268.00	$277.00
MW-15	Active	4.5	17	1.88	60	0.70	20	$18.00	$269.00	$287.00
MW-16	Plugged									$0.00
MW-17	Active	4.0	44.8	3.91	60	1.46	20	$37.00	$272.00	$309.00
MW-19	Active	4.0	40.5	3.53	60	1.32	20	$33.00	$271.00	$304.00
MW-20	Active	4.0	105.5	9.21	60	3.45	20	$86.00	$278.00	$364.00
MW-21	Plugged									$0.00
MW-22	Active	3.5	30	2.00	60	0.75	20	$19.00	$269.00	$288.00
MW-23	Active	3.5	18.5	1.24	60	0.46	20	$12.00	$268.00	$280.00
MW-24	Active	4.5	260	28.72	60	10.75	20	$269.00	$303.00	$572.00
MW-25	Active	4.5	270	29.82	60	11.17	20	$280.00	$304.00	$584.00
MW-26	Active	5.0	337	45.95	60	17.21	20	$431.00	$324.00	$755.00
MW-27	Active	5.0	24	3.27	60	1.23	20	$31.00	$271.00	$302.00
MW-28	Active	5.0	20	2.73	60	1.02	20	$26.00	$270.00	$296.00
MW-29	Active	5.0	37	5.04	60	1.89	20	$47.00	$273.00	$320.00
MW-30	Active	4.5	158	17.45	60	6.54	20	$164.00	$288.00	$452.00
LP3MW	Active	4.5	20	2.21	60	0.83	20	$21.00	$269.00	$290.00
SW-2	Active	7.5	720	220.89	60	82.73	20	$2,071.00	$542.00	$2,613.00
SW-8	Active	7.5	496	152.17	60	56.99	20	$1,427.00	$457.00	$1,884.00
SW-15	Active	7.5	770	236.23	60	88.47	20	$2,215.00	$562.00	$2,777.00
PW-1	Inactive	4.5	50	5.52	60	2.07	20	$52.00	$274.00	$326.00
PW-2	Inactive	4.5	45.5	5.03	60	1.88	20	$47.00	$273.00	$320.00
PW-3	Inactive	4.5	46.5	5.14	60	1.92	20	$48.00	$273.00	$321.00
OW-1	Inactive	4.5	46.5	5.14	60	1.92	20	$48.00	$273.00	$321.00
OW-2	Inactive	4.5	80	8.84	60	3.31	20	$83.00	$278.00	$361.00
Total				**1059.47**	**1800.00**	**396.81**	**600.00**	**$9,935.00**	**$9,323.00**	**$19,258.00**

B

Appendix B
Photolog of the Richmond Hill Mine

1. Spruce Gulch – view facing southwest, showing former rock depository (center-left) and Pit impoundment (right).

2. August 2010 - Reclaimed surface showing vegetation success and stability in Spruce Gulch drainage.

3. August 2010 – Reclaimed drainage with developing wetlands near headwaters of Spruce Gulch.

4. August 2010 - Reclaimed Sawdust area along east side of Spruce Gulch.

5. August 2010 – Reclaimed Sawdust area showing revegetated surface.

6. August 2010 – West side of Spruce Gulch near headwaters showing stormwater control features.

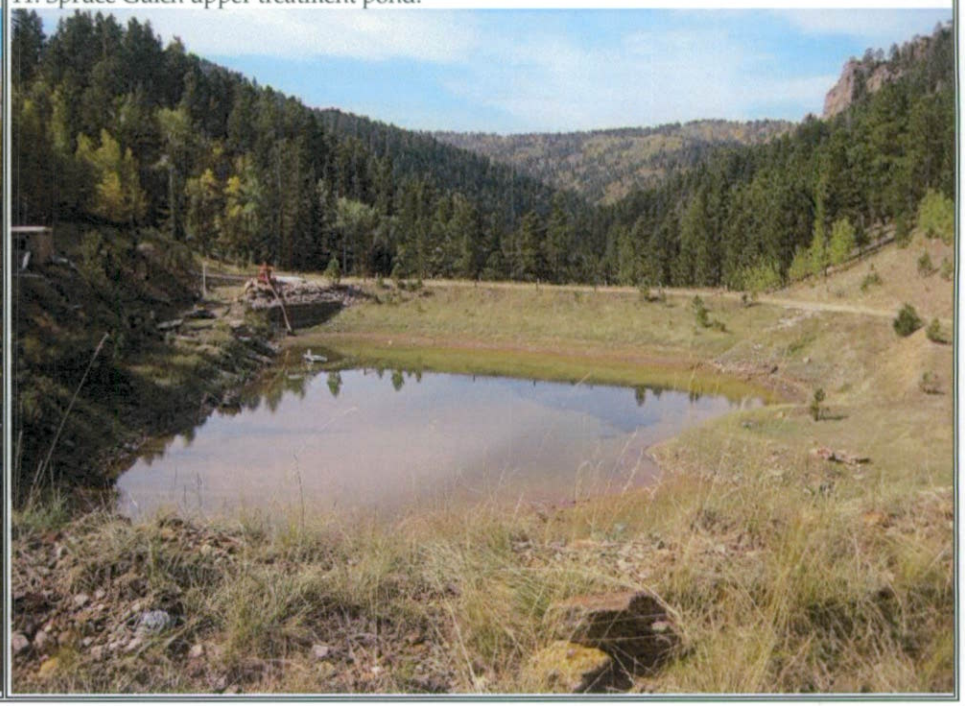
7. August 2010 - Deer tracks along Spruce Gulch access road.

8. Reclaimed Spruce Gulch Waste Rock facility - view facing northeast.

9. August 2010 – Spruce Gulch Treatment Ponds - view facing southeast.

10. Spruce Gulch ponds and treatment system.

11. Spruce Gulch upper treatment pond.



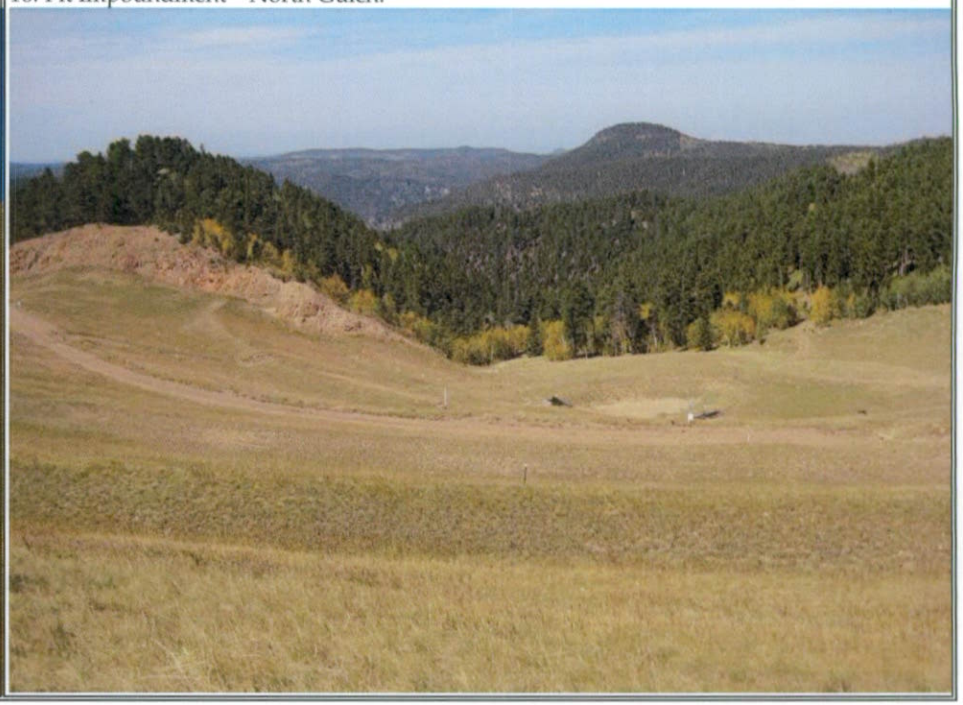
12. South Gulch below Pit Impoundment - view facing south.

13. View facing northwest of Pit Impoundment and West Gulch.

14. Pit Impoundment – view facing north showing North Gulch.

15. Pit Impoundment – view facing northwest.

16. Pit Impoundment – North Gulch.



17. Pit Impoundment – view facing east.

18. Pit Impoundment – Lysimer and Tensiometer.

19. Turnaround Area – view facing west.

20. Turnaround Area – view facing south.

21. Maintenance Building and Storage Area – view facing southwest.

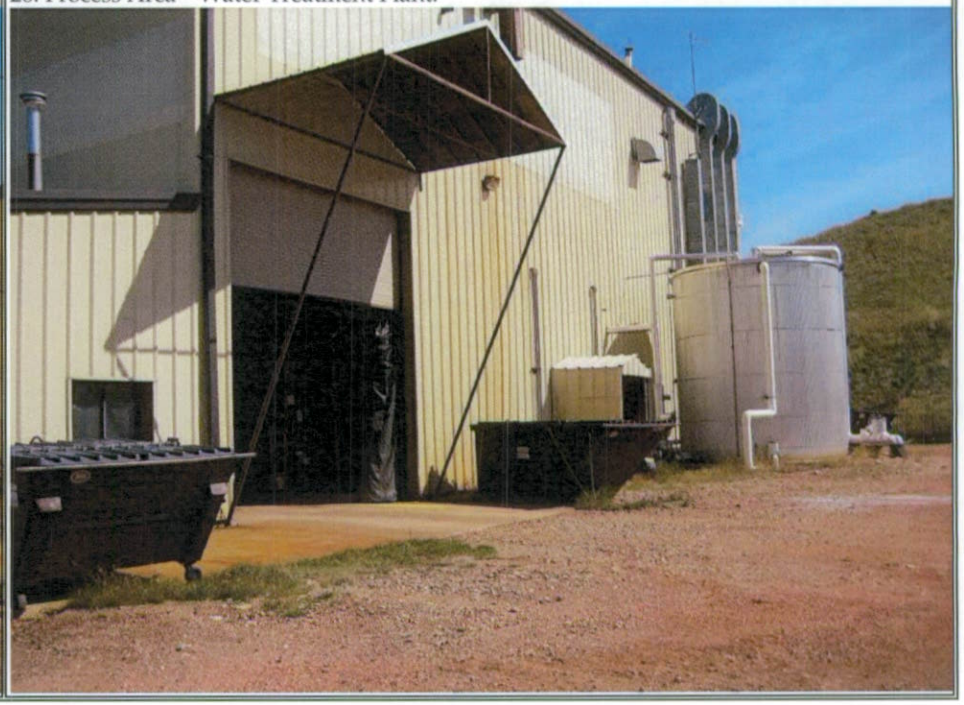
22. Geo-Building with Leach Pad 3 in background – view facing west.

23. Process Area showing Leach Pad 3 (left) – view facing north.

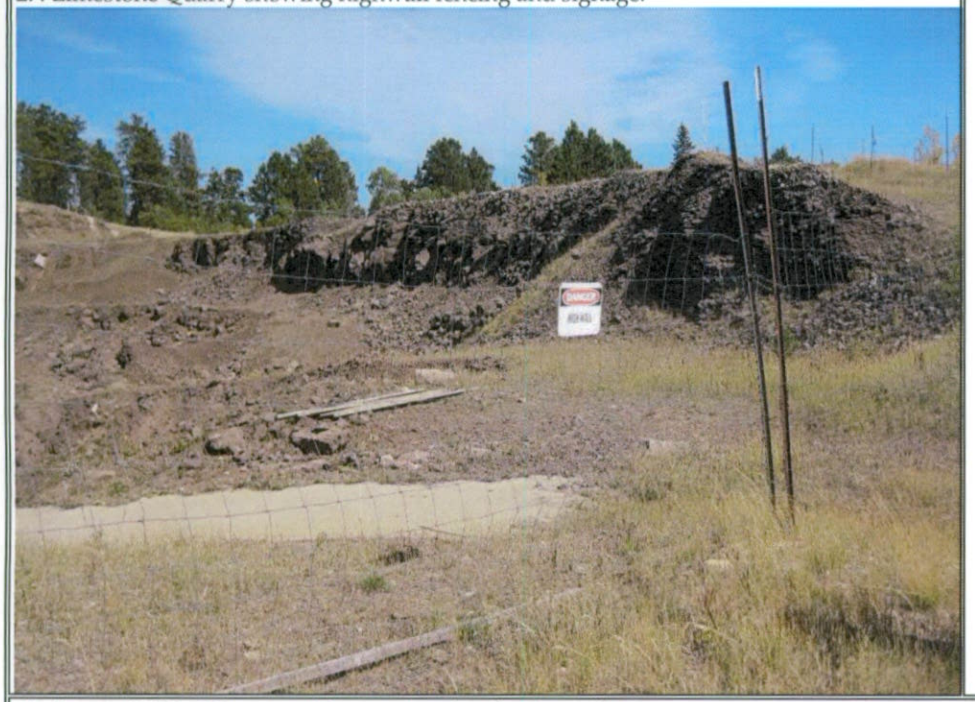
24. August 2010 – Original Sludge Basin and water treatment system piping - view facing east.

25. Original Sludge Basin.

26. Process Area – Water Treatment Plant.



27. Limestone Quarry showing highwall fencing and signage.



28. August 2010 – Limestone Quarry showing fencing and signage.

29. August 2010 - Limestone Quarry highwall.

30. August 2010 - Limestone Quarry highwall.

31. August 2010 – Upper reclaimed benches in the Limestone Quarry - view facing east.

32. August 2010 - Reclaimed upper bench in the Limestone Quarry.

33. August 2010 – Reclaimed upper bench in the western portion of the Limestone Quarry.

34. August 2010 – Limestone Quarry reclaimed lower benches - view facing south. Reclaimed Leach Pad 3 northern slope in the background.

35. August 2010 – Top of the reclaimed Leach Pad 3 area - view facing south showing the Maintenance building in the background.

36. August 2010 – Top of the reclaimed Leach Pad 3 area - view facing northeast showing the upper portion of the Limestone Quarry highwall in the background.

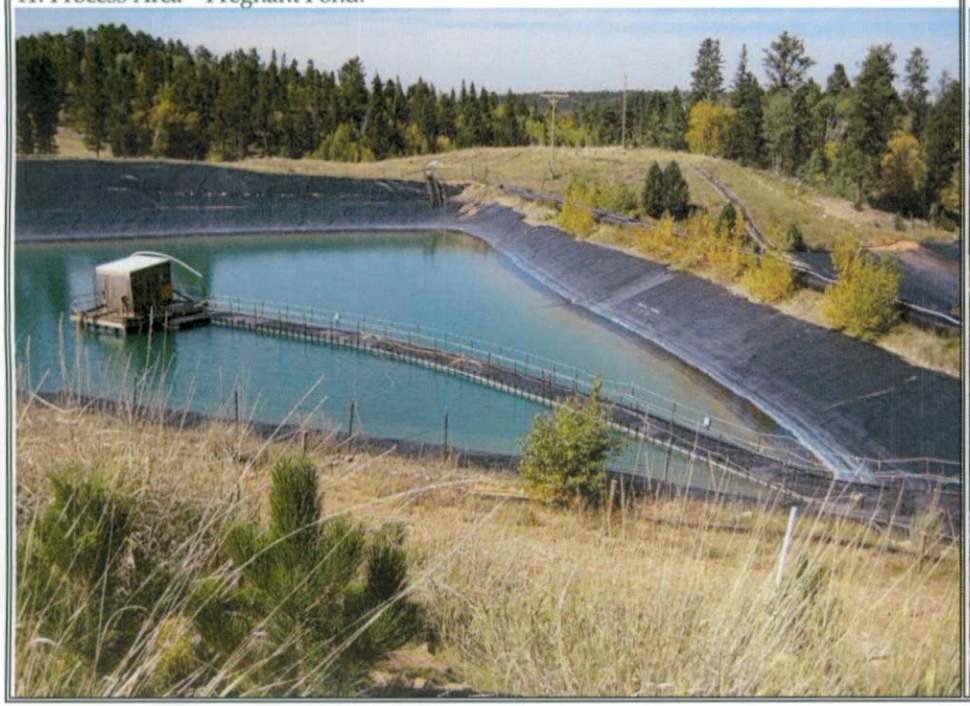
37. August 2010 – Reclaimed Leach Pad 3 showing deer pellets and evidence of wildlife habitat.

38. August 2010 – Reclaimed soil stockpile and drainage west of the Process Area - view facing southeast showing the water treatment building and pregnant pond in the left background and the reclaimed north slope Leach Pads 1 and 2.

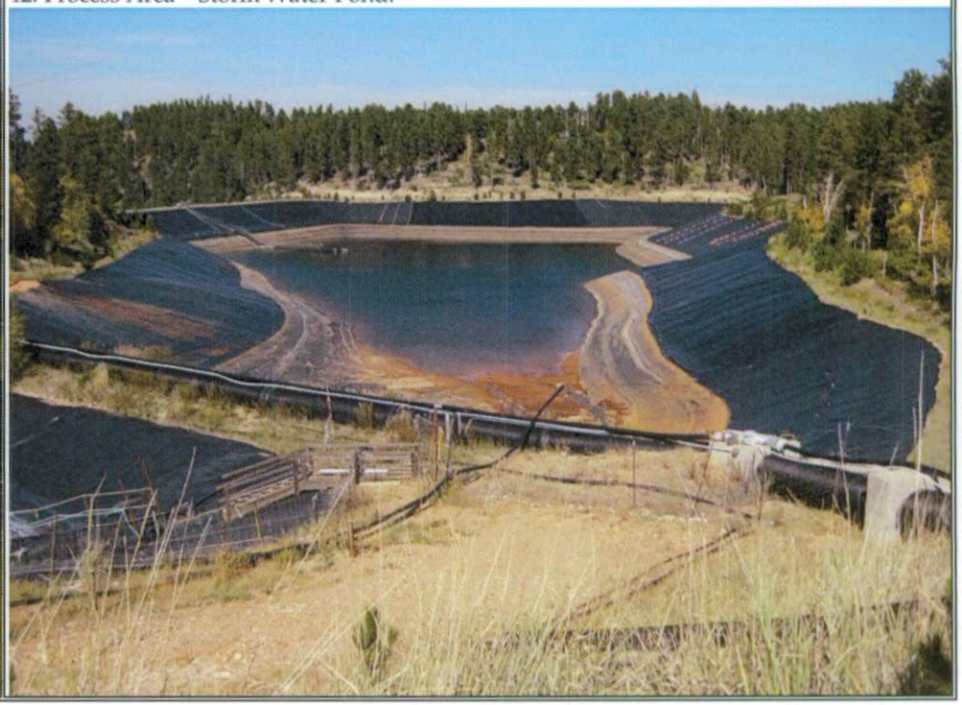
39. August 2010 – Reclaimed Process and soil stockpile area - view facing northeast showing stormwater pond in the left background and pregnant pond and water treatment building in the right background.

40. Process Area – Barren Pond.

41. Process Area – Pregnant Pond.



42. Process Area – Storm Water Pond.



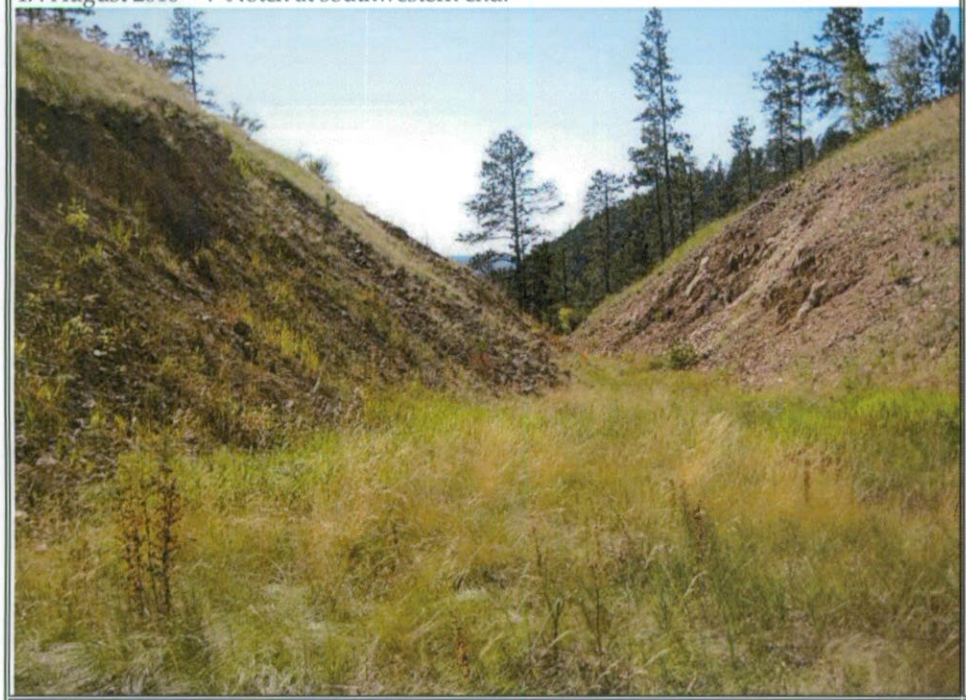
43. August 2010 – Reclaimed V-Notch area - view facing southeast showing the Maintenance building in the background (left).

44. August 2010. Reclaimed V-Notch area - view facing northwest showing redirected drainage away from the leach pads. The reclaimed southwestern slope of Leach Pad 3 is in the background.

45. August 2010 – Reclaimed V-Notch area - view facing southeast showing the Maintenance building in the background (left).

46. August 2010 – Reclaimed southwestern slope of the V-Notch.

47. August 2010 – V-Notch at southwestern end.



48. August 2010. Reclaimed Crusher Area showing Maintenance building in the background.

49. August 2010. Reclaimed Crusher Area facing south.

50. August 2010. Reclaimed Crusher Area facing southeast showing Geo building in the background.

51. August 2010. Reclaimed Crusher area showing animal burrow.

C

APPENDIX C
GROUNDWATER QUALITY CONTINGENCY PLAN

Postclosure Plan and Financial Assurance
Richmond Hill Mine
Surface Mine Permit Nos. 445 and 460
Central City, South Dakota

The following is a conceptual Groundwater Quality Contingency Plan that would be employed in the highly unlikely event that the Pit Impoundment, leach pads or former Spruce Gulch Waste Rock Facility area begin to generate acid rock drainage (ARD) such that the water quality parameters at the defined "sentinel" monitoring locations in the Pit Impoundment area exceed the proposed site-specific performance criteria presented in Table 3 in two successive sampling events. In the Process Area, this conceptual contingency plan would be employed in the highly unlikely event that the leach-pad effluent water quality would exceed the treatment capability of the water treatment system.

- LAC Minerals has agreed to include $200,000 in the surety bond to perform the necessary investigations to determine the cause or causes of an exceedance of the site-specific performance criteria. The $200,000 included in the surety bond would also cover any investigations required to determine the cause or causes of leach-pad effluent water quality issues that have the potential to exceed the treatment capability of the water treatment system.

- An investigation would be conducted to determine the cause of ARD or source of contamination that affects the groundwater quality in the area of the Pit Impoundment leach pads or former Spruce Gulch Waste Rock Facility as described above.

- If the generation of ARD or source of contamination is the result of damage, defect or degradation of a capping system, the cap would be repaired. Cap repairs would include, as appropriate, the following measures listed in subsections a through f of Postclosure Condition No. 4 of the Permit Amendment:

    a. The addition of base material to waste rock;
    b. Capping, or improvements to capping systems;
    c. Recovery and treatment of contaminated groundwater;

d. Mitigation of acid generating rock at ancillary facilities;
e. Removal of additional waste rock to the pit impoundment or other suitable location; and/ or
f. Long term water treatment of effluent from the waste impoundment, or the waste dump.

LAC Minerals has also agreed to include $100,000 in the surety bond for cap failure mitigation.

- The existing water quality monitoring program would be modified as necessary to help determine the sources and extent of the ARD and contamination of groundwater. This could include increasing the monitoring frequency and adding sampling parameters or monitoring sites. The specific changes to the monitoring program would be determined based on the specific scenario.

- The installation of groundwater pump-back wells would be considered in the unlikely event that the degradation of groundwater quality could not otherwise be mitigated and/or the source of contamination could not be identified.

- Water from any groundwater pump-back wells and/or collected acid mine drainage would be pumped through the existing pipeline to the existing treatment system. The use of an existing treatment system or the construction of a new system and its design would depend on the specific scenario and cannot be predicted with any certainty.

- The treatment of water contaminated with ARD would likely entail the addition of caustic for pH adjustment and metals precipitation.

- The addition of base material to waste rock or the removal of waste rock to the pit impoundment would not likely be required under most scenarios as the closures of the existing facilities were completed to properly manage the existing acid generating materials and the facilities are well maintained.

D

Appendix D
Pit Impoundment and Leach Pad Capping System Failure Contingency Plan

APPENDIX D
PIT IMPOUNDMENT AND LEACH PAD CAPPING SYSTEM FAILURE MITIGATION PLAN

Postclosure Plan and Financial Assurance
Richmond Hill Mine
Surface Mine Permit Nos. 445 and 460
Central City, South Dakota

A failure of the pit impoundment or leach pad capping system would likely be in the form of cracking or slumping of the composite cap. In the highly unlikely event of a significant crack developing in one of the capping systems that extended through the topsoil and thermal barrier, down to or into the clay layer, the following mitigation measures would be employed:

- The length and depth of the crack would be measured and marked in the field;
- A trench would be excavated along the length of the crack, down to below the measured depth of the crack using an excavator or mini-excavator using care to ensure that the full-depth of the crack was excavated;
- The condition of the clay layer would be carefully inspected;
- If damage is observed in the clay layer, the damaged section would be excavated and a bentonite grout or geosynthetic clay liner (GCL) would be placed in the removed section of the clay layer at a depth equal to or exceeding the depth of the original clay layer;
- Synthetic liner may be used in addition to bentonite in certain applications;
- The overlying thermal barrier would be replaced;
- The topsoil layer would be replaced and seeded using the approved seed mix;
- The repaired area would be marked and surveyed; and
- Monthly inspections and inspections following significant precipitation events would be conducted for the first year following the repairs or until the vegetative cover was reestablished.

In the highly unlikely event of significant slumping developing in one of the capping systems, the following mitigation measures would be employed:

- The extent of the slumping would be measured and marked in the field;
- The slumped area would be excavated down to the clay layer using an excavator or mini-excavator;
- The condition of the clay layer would be carefully inspected;
- If damage is observed in the clay layer, the damaged section would be excavated and suitable backfill material would be placed under the bentonite layer as necessary;
- A bentonite grout or GCL would be placed in the removed section of the clay layer at a depth equal to or exceeding the depth of the original clay layer;
- Synthetic liner may be used in addition to bentonite in certain applications;
- The overlying thermal barrier would be replaced;
- Care would be taken to ensure the proper grade is maintained for storm-water runoff;
- The topsoil layer would be replaced and seeded using the approved seed mix;
- The repaired area would be marked and surveyed; and
- Monthly inspections and inspections following significant precipitation events would be conducted for the first year following the repairs or until the vegetative cover was reestablished.