

**PANDORA MINE MODIFICATIONS  
RECLAMATION COST ESTIMATE  
DENISON MINES (USA) CORP.  
LA SAL MINES COMPLEX  
SAN JUAN COUNTY, UTAH**

**Prepared for:  
DENISON MINES (USA) CORP.**



**Prepared by:  
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**May 2010**

## **PURPOSE AND INTENDED USES**

The surety reclamation bond estimate was developed in an effort to provide Denison Mines with a cost estimate for determining the surety reclamation bond for the expanded development rock area at the Pandora Mine in accordance with the Plan of Operations Amendment for the La Sal Mines Complex, San Juan County and UDOM Rule R647-4-113: Surety.

## **METHODOLOGY**

The bond estimate is divided into three areas of work: earthwork, demolition, and revegetation. Calculations and cost estimate spreadsheets are organized according to these three work areas. The cost estimate templates supplied by Denison Mines were used to estimate the costs for each of the three categories. The costs are totalled in a cost summary sheet supplied by Denison Mines that applies indirect costs and escalation to the sum of the three areas of work to develop the overall surety reclamation bond estimate.

The estimate was developed using RS Means CostWorks 2010 unit costs; these costs were tailored for Utah through application of a state-specific adjustment factor. Unit costs derived from RS Means were not specifically adjusted for other site-specific considerations such as current fuel prices or prevailing labor wages.

## **SCOPE**

The bond estimate includes the following work scope activities, consistent with the draft Plan of Operations:

- Removal and disposal of two 36-inch corrugated metal pipe (CMP) culverts from the Pandora Mine Access Road
- Removal and disposal of one 36-inch reinforced concrete pipe (RCP) culvert from the Pandora Mine Site
- Construction of a riprap reinforced drainage channel from the Pandora Mine Site
- Grading approximately 38,000 cubic yards of development rock from a 1.5:1 slope to an approximate 3:1 slope
- Placement of stockpiled topsoil over the graded development rock area
- Ripping and broadcast seeding with BLM-approved seed mixes of the impacted areas to establish vegetation

## **ASSUMPTIONS**

Several cost considerations have been identified that represent significant cost drivers. The following summarizes the general assumptions during development of the surety reclamation bond estimate:

- The work that the bond estimate is based on will not vary considerably from that shown in the Plan of Operations Amendment.
- No overtime was assumed; working day was defined as an 8-hour day Monday through Friday excluding major holidays.
- The bond estimate is based on current (2010) dollars.
- The bond estimate assumes that all the necessary equipment, labor, and material will be locally available for the project.
- Crew assemblies will not vary from those selected.

- The indirect costs and the escalation factor of 3.2 percent for 3 years were obtained from the surety estimate attached to the letter "Notice for addition of two vent holes (Vent 3-09 and Vent 4-09) at the Pandora Mine" dated August 2009. Depending on timing of award of construction contract, field mobilization and construction duration, costs due to escalation could vary.

The following site specific assumptions were made during development of the bond estimate:

- The existing 36-inch CMP culverts from the Pandora Mine Access Road will be removed and can be disposed of onsite. However, the ditch will remain and soil will be bermed on either side of drainage channel to prevent anyone from driving over the access road.
- The existing 36-inch RCP culvert from the Pandora Mine Site will be removed and can be disposed of onsite.
- The riprap reinforced drainage channel from the Pandora Mine Site will be constructed along the alignment of the existing 36-inch RCP culvert.
- Existing soil stockpile is of sufficient volume to place a vegetative cover over the graded waste rock pile.
- The graded surface of the development rock area will be covered with topsoil from onsite sources, ripped and seeded by broadcasting.
- No compaction or compaction testing will be required.
- No watering or fertilizing of seeded areas will be required.

#### **ACCURACY**

The costs presented in the bond estimate are considered Class 3 (Budget Authorization or Control) estimates with an accuracy range of +30%/-15% of estimated costs, according to the American Society for Testing and Materials (ASTM) Standard Classification for Cost Estimate Classification System (Designation E 2516-06). Class 3 estimates are generally supported by a discussion of the scope of the estimate and the uncertainties associated with each major cost item in the estimate. Special attention should be given to large cost items and items that are sensitive to change like equipment operating costs, materials costs or quantity estimates.

## **COST ESTIMATE TABLES AND CALCULATIONS**

## Bonding Calculations

## Direct Costs

Subtotal Demolition and Removal	\$6,467.98
Subtotal Drainage Improvements	\$32,367.57
Subtotal Backfilling and Grading	\$37,749.39
Subtotal Revegetation	\$63,685.91
<b>Subtotal Direct Costs</b>	<b>\$140,270.85</b>

## Indirect Costs

Contingency	\$14,027.00	10.0%
<b>Subtotal</b>	<b>\$154,297.85</b>	

Management	\$15,430.00	10.0%
<b>Subtotal</b>	<b>\$169,727.85</b>	

Total Cost 2010	\$169,727.85
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Escalation (3.2% every year for 3 years)	\$16,821.00
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Reclamation Cost Escalated	\$186,548.85
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Bond Amount (rounded to nearest \$1,000)	\$187,000.00
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Posted Bond	\$0.00
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Difference Between Cost Estimate and Bond	-\$187,000.00
Percent Difference	

Ref.	Description	Materials	Means Costworks 2010 Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
<b>Demo 36" CMP Culverts from the Pandora Mine Access Road</b>																				
	Excavating, bulk bank measure, 3.5 CY, hydraulic excavator, crawler mounted		31 23 16 42 0305	\$1.47	BCY						112					BCY	1	112	BCY	\$164.64
	Hauling, excavated, 22 CY truck, 5 MPH		31 23 23 20 5000	\$3.41	LCY						88					BCY	1.2	106	LCY	\$361.46
	Dozing material, 100' haul, 410 HP		31 23 16 32 3400	\$1.79	LCY						54					BCY	1.2	65	LCY	\$116.35
	<b>Subtotal</b>																			<b>\$642.45</b>
<b>Demo 36" CMP Culverts from the Pandora Mine Site</b>																				
	Excavating, bulk bank measure, 3.5 CY, hydraulic excavator, crawler mounted		31 23 16 42 0305	\$1.47	BCY						1559					BCY	1	1559	BCY	\$2,291.73
	Hauling, excavated, 22 CY truck, 5 MPH		31 23 23 20 5000	\$3.41	LCY						147					BCY	1.2	177	LCY	\$603.57
	Dozing material, 100' haul, 410 HP		31 23 16 32 3400	\$1.79	LCY						1364					BCY	1.2	1637	LCY	\$2,930.23
	<b>Subtotal</b>																			<b>\$5,825.53</b>
	<b>Total</b>																			<b>\$6,467.98</b>

BCY - bank cubic yard  
 CY - cubic yard  
 HP - horsepower  
 LCY - loose cubic yard  
 MPH - miles per hour

Description	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Labor Hourly Wage Rate	Hourly Cost	Total Eq. & Lab. Costs	Units	Material Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost**	Means Costworks 2009 Reference Number
<b>Grade Rock Pile</b>																			
Dozing material, 300' haul	N/A	\$99.18	N/A	N/A	\$57.77	N/A	\$0.00	\$156.95	\$/HR	\$0.00	N/A	45,458	LCY	189	LCY/HR	N/A	N/A	\$37,749.39	31231 632 3450
<b>Total</b>																		<b>\$37,749.39</b>	

\* Hourly rates include overhead and profit

\*\* Cost is rounded up to nearest \$0.01

N/A - information not available

LCY - loose cubic yard

HR - hour

Ref.	Description	Materials	Means Costworks 2010 Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
<b>Remove Stockpiled Topsoil and Spread</b>																				
	Excavating, bulk bank measure, 3.5 CY, hydraulic excavator, crawler mounted		31231 642 0305	\$1.44	BCY						6292					BCY	1	6292	BCY	\$9,060.48
	Hauling, excavated, 22 CY truck, 5 MPH		31232 320 5000	\$3.35	LCY						6292					BCY	1.1	6922	LCY	\$23,188.70
	Dozing material, 100' haul, 410 HP		31231 632 3400	\$1.75	BCY						6292					BCY	1.1	6922	LCY	\$12,113.50
	<b>Subtotal</b>																			<b>\$44,362.68</b>
<b>Ripping</b>																				
	Soil preparation, ripping, 0.5' deep, dozer with single shank ripper		31231 632 2400	\$2.09	BCY						5647					BCY	1	5647	BCY	\$11,802.23
	<b>Subtotal</b>																			<b>\$11,802.23</b>
<b>Seed</b>																				
	Seeding, 0.45 pounds per MSF, tractor spre	Seed	32921 914 0500	\$23.00	MSF					327						MSF	1	327	MSF	\$7,521.00
	<b>Subtotal</b>																			<b>\$7,521.00</b>
	<b>Total</b>																			<b>\$63,685.91</b>

BCY - bank cubic yard  
 CY - cubic yard  
 HP - horsepower  
 LCY - loose cubic yard  
 MPH - miles per hour  
 MSF - 1,000 square feet  
 SY -square yard

Description	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Labor Hourly Wage Rate	Hourly Cost	Total Eq. & Lab. Costs	Units	Material Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost**	Means Costworks 2010 Reference Number
<b>Drainage Channel through the Pandora Mine Site</b>																			
Excavating, trench or continuous footing, common earth, 1 C.Y. excavator, 4' deep	N/A	\$110.22	N/A	N/A	\$66.45	N/A	\$51.05	\$227.72	\$/HR	\$0.00	N/A	93	BCY	50	BCY/HR	N/A	N/A	\$423.56	31231 613 0120
Geotextile soil stabilization, geotextile fabric, woven, 200 lb. tensile strength	N/A	\$0.00	N/A	N/A	\$0.00	N/A	\$102.10	\$102.10	\$/HR	\$1.99	\$/SY	1,425	SY	312.5	SY/HR	N/A	N/A	\$3,301.33	31321 916 1500
Rip-rap and rock lining, random, broken stone, machine placed for slope protection	N/A	\$110.22	N/A	N/A	\$66.45	N/A	\$51.05	\$227.72	\$/HR	\$27.00	\$/LCY	508	LCY	7.75	LCY/HR	N/A	N/A	\$28,642.68	31371 310 0100
<b>Total</b>																		<b>\$32,367.57</b>	

\* Hourly rates include overhead and profit

\*\* Cost is rounded up to nearest \$0.01

N/A - information not available

LCY - loose cubic yard

HR - hour

PROJECT: Pandora Mine Rec Bond Est.  
 JOB NO.: \_\_\_\_\_  
 CLIENT: \_\_\_\_\_

COMPUTED BY: EB  
 DATE: 4/22/2010

CHECKED BY: \_\_\_\_\_  
 DATE CHECKED: \_\_\_\_\_  
 WRKSHT NO.: DEMO-01

**Description:** Calculations for demolition in support of the reclamation bond for the Pandora Mine.

**Assumed Material Properties**

Soil Bulking factor:	<b>1.2</b>	<i>Conversion from BCY to LCY</i>
Soil Compaction Factor:	<b>1.1</b>	<i>Conversion from BCY to ECY</i>
Soil Compaction Factor:	<b>0.9</b>	<i>Conversion from LCY to ECY</i>

**Demo 36-inch Culvert from the Pandora Mine Access Road**

**Assumptions**

- Assume culvert will be removed and not replaced
- Assume access road is no longer needed but existing drainage ditch will remain.
- Assume demolished material can be placed on development rock area
- Assume a trapezoidal volume for the base excavated portion and a triangular volume for the side portion
- Assume no other culverts will be removed
- Assume majority of excavated material surrounding culvert will be used to create berms on either side of drainage channel to prevent anyone from driving over the access road.
- Assume culvert will be corrugated metal pipe (CMP)

**Calculations**

Estimated top length of base excavation	<b>40 FT</b>	<i>Estimated from pdf drawing</i>
Estimated bottom length of base excavation	<b>10 FT</b>	<i>Estimated from pdf drawing</i>
Estimated depth of base excavation	<b>6 FT</b>	<i>Estimated from pdf drawing</i>
Estimated width of base excavation	<b>12 FT</b>	<i>Estimated from pdf drawing</i>
	<b>1800 CF</b>	
Estimated top length of side excavation	<b>40</b>	
Estimated bottom width of side excavation	<b>12</b>	
Estimated depth of side excavation	<b>5</b>	
Number of sides	<b>2</b>	
	<b>1200 CF</b>	
Estimated volume of cut	<b>112 BCY</b>	<i>Rounded up to nearest whole number</i>
Estimated buried length of culvert	<b>70 LF</b>	
Inside diameter of culvert	<b>36 IN</b>	
Outside diameter of culvert	<b>45.5 IN</b>	
Number of culverts	<b>2 EA</b>	
Estimated volume of culvert pipe	<b>1582 CF</b>	<i>Rounded up to nearest whole number</i>
	<b>59 BCY</b>	<i>Rounded up to nearest whole number</i>
Assumed crushed volume decrease	<b>50%</b>	
Estimated volume for haul	<b>30 LCY</b>	<i>Rounded up to nearest whole number</i>
Number of berms	<b>2 EA</b>	
Estimated width of berms on either side of ditch	<b>12 FT</b>	
Estimated height of berm	<b>4 FT</b>	
Estimated top length of berm	<b>3 FT</b>	
Slope of berm	<b>3 H:1V</b>	
Estimated bottom length of berm	<b>27 FT</b>	<i>Rounded up to nearest whole number</i>
Volume of berm	<b>720 CF</b>	<i>Rounded up to nearest whole number</i>
	<b>27 BCY</b>	<i>Rounded up to nearest whole number</i>
Total volume of berms	<b>54 BCY</b>	
Estimated volume remaining to be hauled off	<b>88 BCY</b>	
Estimated haul volume	<b>106 LCY</b>	<i>Rounded up to nearest whole number</i>
Estimated compaction volume	<b>96 ECY</b>	<i>Rounded up to nearest whole number</i>

PROJECT: Pandora Mine Rec Bond Est.  
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COMPUTED BY: EB  
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CHECKED BY: \_\_\_\_\_  
 DATE CHECKED: \_\_\_\_\_  
 WRKSHT NO.: DEMO-01

**Description:** Calculations for demolition in support of the reclamation bond for the Pandora Mine.

**Demo 36-inch Culvert from the Pandora Mine Site**

**Assumptions**

- Assume culvert will be removed and not replaced
- Assume demolished material can be placed on development rock area
- Assume a trapezoidal volume for the excavation of the culvert
- Assume drainage channel will be placed in same alignment as culvert

**Calculations**

Estimated length of culvert	465 FT	<i>Estimated from pdf drawing</i>
Number of culverts	1 EA	
Inside diameter of culvert	36 IN	
Outside diameter of culvert	45.5 IN	
Excavation side slopes:	2 :1	
Estimated cover on culvert	2 FT	
Estimated depth of culvert	5.8 FT	
Estimated bottom width of excavation	4 FT	
Estimated top width excavation	27.2 FT	<i>Estimated from pdf drawing</i>
	42073.2 CF	
Estimated volume of excavation	<b>1559 BCY</b>	<i>Rounded up to nearest whole number</i>
Estimated buried length of culvert	465 LF	
Inside diameter of culvert	36 IN	
Outside diameter of culvert	45.5 IN	
Number of culverts	1 EA	
Estimated volume of culvert pipe	5251 CF	<i>Rounded up to nearest whole number</i>
	195 BCY	<i>Rounded up to nearest whole number</i>
Assumed crushed volume decrease	75%	
Estimated volume for haul	147 LCY	<i>Rounded up to nearest whole number</i>
	123 BCY	
Estimated haul volume	<b>147 LCY</b>	<i>Rounded up to nearest whole number</i>
Estimated compaction volume	133 ECY	<i>Rounded up to nearest whole number</i>
Estimated volume for spreading excavated material	<b>1364 BCY</b>	

PROJECT: Pandora Mine Rec Bond Est.  
 JOB NO.: \_\_\_\_\_  
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COMPUTED BY: EB  
 DATE: 4/22/2010

CHECKED BY: \_\_\_\_\_  
 DATE CHECKED: \_\_\_\_\_  
 WRKSH T NO. : EARTH-01

**Description:** Earthwork calculations in support of the reclamation bond for the Pandora Mine.

**Assumed Material Properties for Development Rock Material**

Soil Bulking factor: **1.2** *Conversion from BCY to LCY*  
 Soil Compaction Factor: **1.1** *Conversion from BCY to ECY*  
 Soil Compaction Factor: **0.9** *Conversion from LCY to ECY*

BCY - bank cubic yard - in place volume prior to excavation

LCY - loose cubic yards - volume after excavation

ECY - embankment cubic yards (aka compacted cubic yards) - volume after compaction

**Grade Development Rock Pile**

**Assumptions**

- Material will be pushed with a dozer to rough grade
- No fine grading of surface will be conducted

**Calculations**

Estimated volume of cut **37881 BCY** *Based on CADD volume determination*  
 Estimated haul volume **45458 LCY** *Rounded up to nearest whole number*

**Dozer Productivity Determination - 300' Push Distance**

**Hours per Shift, HR: 8**

**Work Efficiency, %: 0.83** *Assumes 50 minutes/hour*

**Slot Dozing Correction Factor: 1.20**

**Visibility Correction Factor: 1.0**

**Weight Correction Factor: 0.87**

**Average Dozing Distance, FT: 300**

Work Efficiency % **83%**

Operator Type **Average**

Operator Ability Correction Factor Factor **0.75**

Grade **3 H:1V**

% Slope **33%**

Grade Factor **1.6** *Chart pg 1-45 CAT Handbook, Edition 31*

Material Type **Rock**

Material Correction Factor Factor **0.6**

Slot Dozing Correction Factor Factor **1.20**

Visibility Correction Factor Factor **1.0**

Weight Correction Factor Factor **0.87**

Combined Prod. Correction Factor Factor **0.63**

Ideal Dozer Productivity LCY/HR **300.0** *Chart on pg 1-42 CAT Handbook, Edition 31*

Adjusted Dozer Productivity LCY/HR **189.0**

PROJECT: Pandora Mine Rec Bond Est.  
 JOB NO.:  
 CLIENT:

COMPUTED BY: EB  
 DATE: 4/22/2010

CHECKED BY: 0  
 DATE CHECKED: 1/0/1900  
 WRKSHT NO.: EARTH-01

**Description:** Earthwork calculations in support of the reclamation bond for the Pandora Mine.

**Drainage Channel through the Pandora Mine Site**

**Assumptions**

- Assume drainage channel will be placed in same alignment as existing 36" RCP culvert
- Assume majority of excavation will be conducted during removal of existing 36" RCP culvert

Shape: Triangular

Side slopes: 2 :1

Finished Channel Height: 4 FT

Top width: 16 FT

Additional width on either side of channel 2 FT

Riprap channel length: 513 FT

General riprap depth: 12 IN

Specific riprap depth: 24 IN

Length of specific riprap depth: 3 FT

Riprap size. D50 8"

**Calculations**

Excavation depth for 1' deep riprap: 5 FT

Area of channel excavation for 1' deep riprap: 54 SF *Includes sides*

Additional excavation for 1' deep riprap: 45 LF

Excavation depth for 2' deep riprap: 6 FT

Area of channel excavation for 2' deep riprap: 80 SF *Includes sides*

Additional excavation for 2' deep riprap: 3 LF

Volume of excavation: 2508 CF

**93 BCY** *Rounded up to nearest whole number*

112 LCY *Rounded up to nearest whole number*

Perimeter of channel: 25 LF

Total area of geotextile required: 12825 SF *Rounded up to nearest whole number*

**1425 SY** *Rounded up to nearest whole number*

Volume of riprap for 1' deep riprap: 12750 CF

Volume of riprap for 2' deep riprap: 150 CF

Total volume of rip rap: 12900 CF

478 ECY *Rounded up to nearest whole number*

Total volume of rip rap: **507 LCY** *Rounded up to nearest whole number*

Density of rip rap, TN/CY: 1.5 TN/CY

Weight of rip rap: 760.5 TN

PROJECT: Pandora Mine Rec Bond Est.  
 JOB NO.: \_\_\_\_\_  
 CLIENT: \_\_\_\_\_

COMPUTED BY: EB  
 DATE: 4/22/2010

CHECKED BY: \_\_\_\_\_  
 DATE CHECKED: \_\_\_\_\_  
 WRKSHT NO.: REVEG-01

**Description:** Calculations in support of the reclamation bond for the Pandora Mine.

**Assumed Material Properties**

Soil Bulking factor:	<b>1.1</b>	<i>Conversion from BCY to LCY</i>
Soil Compaction Factor:	<b>1.1</b>	<i>Conversion from BCY to ECY</i>
Soil Compaction Factor:	<b>1</b>	<i>Conversion from LCY to ECY</i>

**Remove Stockpiled Topsoil and Spread**

**Assumptions**

- Material will be moved with a hydraulic excavator
- Material will be spread with a dozer to rough grade. Dozer will provide some compaction to maintain slope.
- Assume existing soil stockpile will be removed and hauled to a nearby location for later use
- Assume soil stockpile has an area of 1.3 acres with an average thickness of 3 feet

**Calculations**

Area of soil stockpile	<b>1.3 AC</b>	<i>Based on CADD volume determination</i>
Assumed average depth of soil stockpile	<b>3 FT</b>	
Estimated soil stockpile volume	6292 BCY	<i>Rounded up to nearest whole number</i>
Estimated haul and spreading volume	6922 LCY	<i>Rounded up to nearest whole number</i>

**Rip, and Seed**

**Assumptions**

- Assumes surface of topsoil layer will be ripped
- Assumes broadcast with native seed will be applied over topsoil

**Calculations**

Estimated area of development rock area for grading	<b>7 AC</b>	<i>Based on CADD</i>
	33880 SY	<i>Rounded up to nearest whole number</i>
	<b>305 MSF</b>	<i>Rounded up to nearest whole number</i>
Estimated depth for ripping	<b>0.5 FT</b>	
Volume for ripping	5647 BCY	<i>Rounded up to nearest whole number</i>