

# A PATHFINDER

October 14, 2003

Mr. Gary Janosko, Chief  
 Fuel Cycle Facilities Branch  
 Division of Fuel Cycle Safety and Safeguards  
 Office of Nuclear Material Safety and Safeguards  
 U. S. Nuclear Regulatory Commission  
 11545 Rockville Pike  
 Rockville, Maryland 20852

Ref: Docket No. 40-6622, Source Material License No. SUA-442

Dear Mr. Janosko:

Pathfinder hereby requests an amendment to the referenced license to incorporate into the Shirley Basin license a revised surety amount for tailings and mill site reclamation as required by condition 27. A summary of the adjusted surety amount is shown below.

### SHIRLEY BASIN SITE

<u>ACTIVITY</u>	<u>CURRENT SURETY</u>	<u>PROPOSED SURETY</u>
1. Mill Decommissioning	\$0	\$0
2. Tailings Reclamation	11,293,578	7,252,491
3. Long Term Surveillance	667,282	681,684
<b>SUBTOTAL</b>	<b>\$11,960,860</b>	<b>\$7,934,175</b>
4. Contingency (15% of 1 & 2)	1,694,037	1,087,874
<b>TOTAL</b>	<b>\$13,654,897</b>	<b>\$9,022,049</b>
Increase/(Decrease)		(\$4,632,848)

The decrease to \$9,022,049 in the proposed surety amount reflects a recalculation of the cost estimate based upon the recently approved revised reclamation plan and updated costs where appropriate.

*NmSS01*

A

The long term surveillance fee has been increased, consistent with the latest available CPI adjustment (August, 2003). Supporting information for the recalculated surety estimate is enclosed (two copies). Upon your written approval, we will proceed to obtain a rider for the existing Letter-of-Credit to reflect the revised surety amount.

Sincerely,



T. W. Hardgrove  
Manager, Reclamation Operations

Enclosure

Cc: D. L. Wichers

Pathfinder Mines Corporation  
 Shirley Basin Mine  
 Tailings and Mill Site Reclamation Cost Estimate  
 October 14, 2003

ACTIVITY	QUANTITY	UNIT COST (\$)	COST (\$)
Regrading and Channels Excavation:	1,720,420 CY	1.48	2,546,222
Radon Barrier Placement:			
Clay	284,090 CY	1.74	494,317
Sand	284,090 CY	1.16	329,544
Rock Mulch and Filter Bed:			
Large Rip Rap Purchase	9,390 CY	24.50	230,055
Small Rip Rap Purchase	7,240 CY	23.70	171,588
Rock Mulch Purchase	27,510 CY	20.00	550,200
Filter Bed Purchase	37,420 CY	16.40	613,688
Rip Rap Placement	16,630 CY	7.55	125,557
Rock Mulch/Filter Bed Placement	64,930 CY	3.25	211,023
Topsoil Placement:	436,410 CY	1.17	510,600
Revegetation:	328 AC	97.50	31,980
<b>SUBTOTAL</b>			<b>5,814,772</b>
Contractor Profit, mobilization/demobilization (10%)			581,477
<b>TOTAL RECLAMATION CONTRACTOR COST</b>			<b>6,396,250</b>
Construction Management (5% of contractor cost)	—	Lump Sum	319,812
Materials Testing	—	Lump Sum	130,890
Groundwater Restoration	—	Lump Sum	144,528
Solution Evaporation	—	Lump Sum	12,376
Fencing	—	Lump Sum	31,625
Radiological Surveys	—	Lump Sum	40,000
Environmental Monitoring	—	Lump Sum	177,010
<b>TOTAL</b>			<b>7,252,491</b>
Contingency (15%)			1,087,874
Site Surveillance			681,684
<b>GRAND TOTAL</b>			<b><u>\$9,022,049</u></b>

## Equipment Hourly Costs

All equipment utilized in this bond calculation is identified and priced based on recently quoted equipment rates including an operator from the contractor who has done tailings reclamation work at Pathfinder's Lucky Mc and Shirley Basin sites. Exhibit "A" at the end of this estimate presents the 2003 rates from the contractor. **Pathfinder considers Exhibit "A" confidential information.**

## Labor Costs

The labor rates for earth moving contractor help (beyond operators which are included with the hourly equipment rates) utilized in this calculation are also based upon the quoted rates as presented on Exhibit "A". The other labor rate utilized in this bonding calculation is \$24.38 per hour, based on the Wyoming Department of Transportation, Wage Determination Decision (2000) with an additional twenty-five percent for burden (benefits, unemployment insurance, social security, etc.). Based on the quoted labor rates from the contractor, it appears that \$24.38 per hour is still appropriate for the non-earth moving activities.

The following estimates of volumes are provided to allow assessment of the cost of reclamation.

	<u>Estimated Volume (Cubic Yards)</u>
Regrading and Channel Cuts	Total 1,720,420
Radon Barrier	
Clay	284,090
Sand	284,090
	Total <u>568,180</u>
Rock	
Large Riprap	9,390
Small Riprap	7,240
Rock Mulch	27,510
Filter	<u>37,420</u>
	Total 81,560
Topsoil	Total 436,410

Regrading - Cut and Fill (balanced throughout the Tailings Area)

Sculpting the tailings area to create acceptable slopes and appropriate drainage basins and drainage ways will be accomplished by regrading the area and filling in low areas with above grade material. Utilizing Cat 627E push-pull scrapers, productivity is estimated at 120 CY/hr per scraper. The D8N tractor and 16G motor grader support the regrading effort. Utilizing the following equipment fleet, the estimated unit volume cost is derived (note that all equipment costs include operators and supervision):

- 1 ea. Cat D8N dozer - Distributing fill material
- 6 ea. Cat 627E scrapers - material haulage
- 1 ea. Cat 16G motor grader - finish grading and road maintenance

1 ea. Cat D8N dozer	1 x \$122.00/hr	= \$ 122.00/hr
6 ea. Cat 627E scrapers	6 x \$140.00/hr	= 840.00/hr
1 ea. Cat 16G motor grader	1 x \$102.00/hr	= 102.00/hr
	Total hourly equipment cost	<u>\$1,064.00/hr</u>

Equipment Productivity

6 ea. 627E scrapers @ 120 BCY/hr = 720 BCY/hr

Unit Cost = \$1,064.00/hr / 720 BCY/hr = \$ 1.48/BCY

**Radon Barrier Placement**

Application of the radon barrier involves placement of one foot of material over the tailings. This cover system will consist of a 0.5 foot thick clay cover and a 0.5 foot thick sandy capillary barrier.

The clay material is located in the Area 3 south dump, resulting in an average haul distance of approximately 5,200 feet. The clay will be compacted to 95% Proctor. Placement of the clay barrier is scheduled for two construction seasons and consists of:

- a: Excavating and hauling the clay
- b: Wetting the clay on the placement area
- c: Mixing and compacting the clay to 95% Proctor

a. Excavation and hauling

Estimated productivity for each 627E scrapers is 150 CY/hr. The fleet for this excavation consists of the following:

- 1 - Cat D8N dozer - ripping and dozing

- 6 - Cat 627E scrapers - material haulage
- 1 - Cat 16G motor grader - haul road maintenance
- 1 - 4,000 gal. water truck, dust suppression

1 ea. Cat D8N dozer	1 x \$122.00/hr	= \$	122.00/hr
6 ea. Cat 627E scraper	6 x \$140.00/hr	=	840.00/hr
1 ea. Cat 16G motor grader	1 x \$102.00/hr	=	102.00/hr
1 ea. 4,000 gal. water truck	1 x \$57.00/hr	=	<u>57.00/hr</u>

Total hourly equipment cost      \$1,121.00/hr

Equipment Productivity

6 ea. scrapers @ 150 CY/hr                      = 900 CY/hr

Unit Cost      =      \$1,121.00/hr / 900 CY/hr                      =      **\$ 1.25/CY**

c. Mixing and compacting

Prior to compaction the material will be mixed with directly applied water by pulling a disc with a John Deere 7520 tractor. Compaction will be performed with Cat 815 and 825 compactors. A motor grader will also be required to maintain the area. The machine fleet for this operation consists of the following:

- 1 - 8,000 gal. Cat 621E water wagon - wetting
- 1 - John Deere 7520 tractor with disc - mixing
- 1 - Cat 825 compactor - compacting fill
- 1 - Cat 815 compactor - compacting fill
- 1 - Cat 14G motor grader - maintaining fill area

1 ea. Cat 621E water wagon	1 x \$102.00/hr	=	\$ 102.00/hr.
1 ea. John Deere 7520 tractor	1 x \$57.00/hr.	=	\$ 57.00/hr.
1 ea. Cat 825 compactor	1 x \$100.00/hr	=	\$ 100.00/hr.
1 ea. Cat 815 compactor	1 x \$87.00/hr.	=	\$ 87.00/hr.
1 ea. Cat 14G motor grader	1 x \$84.00/hr	=	\$ 84.00/hr.
1 ea. Construction disc, \$1150/mo or \$7.00/hr		=	<u>\$ 7.00/hr.</u>

Total hourly equipment cost                      =      \$ 437.00/hr.

Equipment Productivity:

Fill is delivered to the site at the rate of 900 cubic yards per hour. Compactor capacity averages approximately 500 cubic yards per hour per machine; therefore, the scraper capacity is the governing factor.

Unit Cost = \$437.00/hr / 900 CY/hr = **\$0.49/CY**

Total barrier clay unit cost = \$1.25/CY + \$0.49/CY = **\$1.74/CY.**

Sand capillary layer haul and placement will involve an average 4,100 foot haul at 180 CY/hour for each scraper from the Area 3 north dump utilizing the following equipment:

- 1 - Cat D8N dozer - ripping and dozing
- 6 - Cat 627E scrapers - material haulage
- 1 - Cat 16G motor grader - haul road maintenance
- 1 - 8,000 gal. Cat 621E water wagon, material wetting and haul road dust suppression
- 1 - Cat 14G motor grader - final grading of sand layer

1 ea. Cat D8N dozer	1 x \$122.00/hr	= \$	122.00/hr
6 ea. Cat 627E scraper	6 x \$140.00/hr	=	840.00/hr
1 ea. Cat 16G motor grader	1 x \$102.00/hr	=	102.00/hr
1 ea. Cat 621E water wagon	1 x \$102.00/hr	=	102.00/hr
1 ea. Cat 14G motor grader	1 x \$84.00/hr.	=	<u>84.00/hr</u>

Total hourly equipment cost \$1,250.00/hr

Equipment Productivity

6 ea. scrapers @ 180 CY/hr = 1,080 CY/hr

Unit Cost = \$1,250.00/hr / 1,080 CY/hr = **\$ 1.16/CY**

### **Rock Mulch and Filter Bed**

The granite will be mined from a quarry area located approximately 15 miles northeast of the project. This quarry is owned by a local rancher. A contractor will be hired to do the blasting and crushing to produce the desired product. Based on the cost of rock purchased in 2003 from the same source to do mine reclamation, Pathfinder anticipates the following prices for delivered rock products for the tailings reclamation: large rip rap at **\$24.50/CY**, small rip rap at **\$23.70/CY**, rock mulch at **\$20.00/CY**, and filter bed material at **\$16.40/CY**.

Contract prices as reflected by Exhibit "A" for comparable rock placement this year in the mine at Lucky Mc have been utilized in this bond estimate. Filter bed and rock mulch were both placed at the same cost. "Rock" on Exhibit "A" means rip rap.

## Topsoiling

Topsoil placement estimates are based on an average haul distance of 6,000 feet. Single scraper productivity is estimated at 140 CY/hr. The machine fleet for this operation consists of the following:

6 ea. Cat 627E scrapers - hauling topsoil		
1 ea. Cat 14G motor grader - road maintenance and distributing topsoil		
1 ea. 4,000 gal. water truck - dust suppression		
6 ea. Cat 627E scrapers	6 x \$140.00/hr =	\$840.00/hr
1 ea. Cat 14G motor grader	1 x \$ 84.00/hr =	84.00/hr
1 ea. 4,000 gal. water truck	1 x \$ 57.00/hr =	<u>57.00/hr</u>
Total hourly equipment cost =		\$981.00/hr

### Equipment Productivity:

6 ea. 627E scrapers @ 140 CY/hr	=	840 CY/hr
Unit Cost = \$981.00/hr / 840 CY/hr	=	<b>\$1.17/CY</b>

## Revegetation

Unit costs for the various operations involved in the revegetation of areas that are not covered with rock are based upon recent contractor rates experienced by Pathfinder for similar work in mine reclamation. There are about 328 acres that will require revegetation. The unit costs are as follows:

Discing and Seeding:	
Labor and equipment* -	\$57.50/AC
Seed -	40.00/AC
	-----
Total	<b>\$97.50/AC</b>

\*Includes mobilization/demobilization charges prorated on a per acre basis.

## Construction Management and Materials Testing

An estimated **five percent** of construction costs is applied to construction management.

### Materials Testing Costs:

Based on the materials testing proposals in the plan, and utilizing quotes from a local geotechnical testing firm, the following costs

are applicable:

Radon Barrier Testing	
gradation - 144 tests @ \$45/test =	\$ 6,480
Atterberg limits - 360 tests @ \$35/test =	12,600
single pt. Proctor - 114 tests @ \$40/test =	4,560
complete Proctor - 38 tests @ \$75/test =	2,850
in place density & moisture -	
626 tests or 140 days @ \$350/day =	49,000
additional moisture and layers depth testing	
2594 tests or 140 days @ \$300/day =	<u>42,000</u>

Total \$117,490

Topsoil Testing	
Atterberg limits - 44 tests @ \$35/test	\$1,540
gradation - 44 tests @ \$45/test	<u>1,980</u>

Total \$3,520

Rock Testing	
specific gravity - 13 tests @ \$40/test	\$ 520
sodium sulfate soundness -	
13 tests @ \$350/test	4,550
absorption - 13 tests @ \$40/test	520
L.A. abrasion - 13 tests @ \$80/test	1,040
gradation - 13 tests @ \$250/test	<u>3,250</u>

Total \$9,880

Total Materials Testing Costs:

\$117,490 + \$3,520 + \$9,880 = **\$130,890**

### Groundwater restoration

Groundwater restoration is currently underway. Groundwater restoration consists of a series of injection wells and recovery wells. In addition there is a tailings dewatering program consisting of pumped wells installed in the tailings. Pathfinder has applied to the NRC for Alternate Concentration Limits (ACLs). Anticipating NRC approval of the ACL application, it is assumed for bonding purposes that the groundwater corrective action program (CAP) will continue for one more year.

Dewatering System and Injection System -	<u>Annual Cost</u>
Supplies -	\$15,000
Electricity -	<u>69,000</u>
Total	\$84,000

Labor for All Systems -

1 operator for 20 hours/wk at \$24.38/hr for 1 year -  
 $\$24.38/\text{hr} \times 20 \text{ hr/wk} \times 52 \text{ wk/yr} \times 1 \text{ yr} = \$25,350$

Total Operating Expense for the Groundwater Restoration:

$\$84,000 + \$25,350 = \$109,350.$

Well Plugging:

There are some 211 wells associated with the tailings/millsite or the groundwater restoration effort. An average depth for these wells is about 50 feet while the average water column height is about 30 feet. Plugging will involve the filling of each well to an elevation above the water level with bentonite pellets. Most of the balance of the well will be backfilled with soil. The casing will be cut off two feet below the land surface, and a concrete plug will be installed. The hole will then be backfilled with soil to the land surface. A cost summary for this activity follows:

Equipment:

A Case 580 tractor/backhoe/loader will be utilized to dig out the top two feet of casing below the land surface and provide adjacent fill dirt for the backfilling of the dry portion of each well. The cost for the 580 with operator is \$47.00/hr.

Materials:

Five inch diameter wells with an average 30 ft. of water in them will require 4 CF of bentonite pellets to seal through the aquifer. Two inch diameter wells with an average of 30 feet of water in them will require .75 CF of bentonite pellets. Four inch diameter wells with an average of 30 ft. of water in them will require 3 CF of bentonite pellets. Six inch diameter wells will each require 6 CF of bentonite pellets. A 50 lb. bag of pellets cost \$7.00/bag. One CF of pellets equals 70 lbs.

$70 \text{ lbs/CF} / 50 \text{ lbs/bag} \times \$7.00/\text{bag} = \$9.80/\text{CF bentonite}.$

$\$9.80/\text{CF} \times 4 \text{ CF} = \$39.20 \text{ bentonite for 5" well}.$

$\$9.80/\text{CF} \times .75 \text{ CF} = \$7.35 \text{ bentonite for 2" well}.$

$\$9.80/\text{CF} \times 3 \text{ CF} = \$29.40 \text{ bentonite for 4"well}.$

$\$9.80/\text{CF} \times 6 \text{ CF} = \$58.80 \text{ bentonite for 6"well}.$

1 bag of sacked concrete will be required for each well at \$3.00/bag.

	<u>5" Well</u>	<u>2" Well</u>	<u>4" Well</u>	<u>6" Well</u>
Bentonite Pellets	\$39.20	\$ 7.35	\$29.40	\$58.80
Sacked Concrete	<u>3.00</u>	<u>3.00</u>	<u>3.00</u>	<u>3.00</u>
Total Materials	\$42.20	\$10.35	\$ 32.40	\$ 61.80

Labor:

1 additional laborer will be required to assist the backhoe operator at a cost of \$20.50/hr.

It is assumed that each well requires two hours to plug. Therefore, labor = 2 hr./well x \$20.50/hr = \$41.00/well.

Total Costs for Each Size Well:

	<u>5" Well</u>	<u>2" Well</u>	<u>4" Well</u>	<u>6" Well</u>
Equipment	\$94.00	\$ 94.00	\$94.00	\$ 94.00
Materials	42.20	10.35	\$32.40	61.80
Labor	<u>41.00</u>	<u>41.00</u>	<u>41.00</u>	<u>41.00</u>
Total	\$177.20	\$145.35	\$167.40	\$196.80

106 - 5" wells x \$177.20/well = \$18,783
64 - 2" wells x \$144.35/well = \$ 9,238
31 - 4" wells x \$167.40/well = \$ 5,189
10 - 6" wells x \$196.80/well = \$ 1,968
Total
\$35,178

Total Expense for Groundwater Restoration =  
\$109,350 + \$35,178 = **\$144,528.**

**Solution Evaporation**

The enhanced evaporation system will operate for one more year in order to eliminate excess contaminated water that is stored in two remaining holding ponds. The main cost is electrical power to run the pumps. Historical electrical cost is \$1,300/mo. for five months of operation per year.

1 yr x 5 mos./yr x \$1,300/mo. = \$6,500.

Maintenance and labor for the evaporation system is projected as follows:

Supplies cost \$200/mo.

1 yr X 5mos./yr x \$200/mo. = \$1,000.

Labor requirements for maintenance of the system are projected at 40 hrs/mo.

1 yr x 5 mos./yr x 40 hrs./mo. X \$24.38/hr. = \$4,876.

Total cost for the evaporation system =  
\$6,500 + \$1,000 + \$4,876 = **\$12,376.**

### **Fencing**

New fencing will be necessary to establish the control boundary for the property prior to transfer to the DOE. Consistent with the proposed boundary in the ACL application, some 27,500 feet of fence will be constructed. Based on recent contract fencing work done for Pathfinder, a unit cost of \$1.15/linear foot of fence is appropriate, including materials and labor.

27,500 ft x \$1.15/ft = **\$31,625.**

### **Radiological Surveys**

The majority of the required radiological surveys included in the final reclamation plan have been completed. Remaining post reclamation gamma/Ra226 survey work will focus on the area to the immediate west and south of the restricted area. Based upon recent experience using a contractor indicates that such an effort, including soil sample analyses, will cost about **\$40,000.**

### **Environmental Monitoring**

It is assumed that an environmental monitoring program will be maintained during reclamation and continue for another four years. Estimated costs are as follows:

#### Labor

1 technician for 40 hours per month for 4 years.  
40 hrs/mo. x 12 mo./yr x 4 yrs. x \$24.38/hr = \$46,810

Administration, general overhead, and general engineering/  
consultant oversight -

Administration/overhead = \$500/mo x 12 mo/yr x 4 yrs =  
\$24,000.

Engineering/consultants = \$400/mo x 12 mo/yr x 4 yrs =  
\$19,200.

Materials and supplies @ \$1,000/yr = \$4,000.

Analytical work

Water samples	\$20,000/yr x 4 yrs	\$80,000
Radon flux tests - 100 tests at \$30/test		<u>3,000</u>
Total analytical work		\$83,000

Total Environmental Monitoring -

\$46,810 + \$24,000 + \$19,200 + \$4,000 + \$83,000 = **\$177,010.**