



PATHFINDER

January 20, 2005

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: Revised surety estimate for the Shirley Basin mill tailings site
Docket No. 40-6622, Source Material License No. SUA-442

Dear Mr. Janosko:

The enclosed revision of the Shirley Basin mill tailings site surety estimate is submitted in response to the NRC staff comments we received via e-mail in December, 2004. The estimate has been modified to reflect 1) additional detail concerning various unit costs, 2) an update of quantities of various materials to be moved or placed, 3) modifications to the well abandonment procedures and updated cost estimates for that activity, and 4) additional project management and miscellaneous costs as described in Appendix C of NUREG-1620. Additional comments regarding some of these revisions are provided below.

The volumes of materials and corresponding unit costs have been broken down in this revision by different work areas, reflecting the structure of the existing contract under which most of the tailings reclamation work is being done. The quantities have been updated through the end of December, 2004, to present the most accurate, up to date information. This includes the production and delivery of granite rock material from a quarry site. The delivery of rock products to the tailings site began during the fourth quarter of 2004, and has continued into 2005. Enclosed with this submittal are relevant portions of the rock production/delivery contract and photographic documentation of the existing rock stockpiles at the Shirley Basin site. Unit costs for rock products have been presented in this revision based on weight as opposed to volume. The payments for both production and delivery of rock, and rock placement are based on weight, so it was logical to present the surety estimate on that same basis.

The well abandonment procedures have been updated to reflect filling the entire casing with bentonite chips. The September, 2004 surety estimate for well abandonment was based on bentonite chips through the perforated interval of each well with earthen fill on top of the chips. The extent of the well abandonment work to be done has been re-

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evaluated to more accurately reflect what exists on site. Unit costs for the abandonment have also been updated. The cost also reflects the fact that 71 wells have already been abandoned as part of the ongoing tailings reclamation work.

The number of acres requiring re-vegetation has been increased in this estimate to account for adjacent, off-tailings disturbed areas that will require stabilization. Those areas were missed in the previous estimate.

Pathfinder requests an amendment to the referenced license to incorporate the revised surety amount 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	7,252,491	4,166,643
3. Long Term Surveillance	681,684	705,318
SUBTOTAL	\$7,934,175	\$4,871,961
4. Contingency (15% of 1 & 2)	1,087,874	624,996
TOTAL	\$9,022,049	\$5,496,957

Increase/(Decrease) (\$3,525,092)

The decrease to \$5,496,957 in the proposed surety amount reflects a recalculation of the cost estimate based upon the approved revised reclamation plan, revised estimates of the various volumes, credit for work done through the end of 2004, and updated unit costs based upon the actual contracts in place to do the work.

The long term surveillance fee has been increased, consistent with the latest available CPI adjustment (November, 2004). 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

Enclosures

Cc: J. Whitten, USNRC Region IV
D. L. Wichers

Pathfinder Mines Corporation
Shirley Basin Mine
Tailings and Mill Site Reclamation Cost Estimate
January 20, 2005

ACTIVITY	QUANTITY	UNIT COST (\$)	COST (\$)
Regrading and Channels Excavation:			
Localized Cut/Fill-			
Pond #4	0 CY	1.13	0
Pond #5	60,933 CY	1.13	68,854
Pond #5 Dam	41,600 CY	1.17	48,672
West Pond #4	0 CY	1.11	0
Evap. Ponds	94,946 CY	1.15	109,188
Mill Site & Ore Pad	52,146 CY	1.13	58,925
Pond #3 & Adjacent Area*	122,086 CY	1.11	135,515
Imported Fill-			
Pond #4	0	1.48	0
Pond #5	19,680 CY	1.48	29,126
Pond #5 Dam	226,581 CY	0.55	124,609
West Pond #4	1,878 CY	1.48	2,779
Evap. Ponds	0 CY	0	0
Mill Site & Ore Pad	64,254 CY	1.15	73,892
Pond #3 & Adjacent Area*	226,732 CY	1.48	335,563
Clay Radon Barrier Placement:			
Pond #4	73,402 CY	0.72	52,849
Pond #5	90,601 CY	0.73	66,139
West Pond #4	30,365 CY	0.73	22,166
Evap. Ponds	21,554 CY	0.32	6,897
Mill Site & Ore Pad	20,218 CY	0.74	14,961
Pond #3 & Adjacent Area*	21,968 CY	1.60	35,149
Sand Layer:			
Pond #4	67,813 CY	1.48	100,363
Pond #5	90,601 CY	1.44	130,465
West Pond #4	30,480 CY	1.46	44,501
Evap. Ponds	21,554 CY	0.66	14,226
Mill Site & Ore Pad	20,218 CY	1.44	29,114
Pond #3 & Adjacent Area*	21,968 CY	1.46	32,073
Rip Rap, Rock Mulch, and Filter Bed:			
Rip Rap (1.2') Purchase	13,512 tons	16.02	216,462
Rip Rap (0.8') Purchase	4,525 tons	15.52	70,228
Rip Rap (0.4') Purchase	3,435 tons	14.52	49,876
Rock Mulch (1.5" & 2.5") Purchase	12,026 tons	13.52	162,592
Filter Bed (<1.0") Purchase	26,321 tons	11.02	290,057
Large Rip Rap (1.2') Placement	4,187 tons	0.31	1,298
Large Rip Rap Placement*	9,325 tons	4.50	41,963
Small Rip Rap (0.4' & 0.8') Placement	5,119 tons	1.23	6,296
Small Rip Rap Placement*	9,893 tons	4.50	44,519
Rock Mulch Placement	42,066 tons	1.44	60,575
Rock Mulch Placement*	93 tons	2.55	237
Filter Bed Placement	48,609 tons	0.80	38,887
Filter Bed Placement*	14,688 tons	2.50	36,720
Topsoil Placement:			
Pond #4	120,380 CY	1.56	187,793
Pond #5	120,013 CY	1.54	184,820
West Pond #4	39,414 CY	1.87	73,704
Evap. Ponds	28,448 CY	0.51	14,508
Mill Site & Ore Pad	28,900 CY	0.64	17,216
Pond #3 & Adjacent Area*	93,639 CY	1.87	175,105
Revegetation:	381 AC	105.50	40,196
SUBTOTAL			3,249,081
Construction Management	—	Lump Sum	320,000
Engineering Design/Plan Changes	—	Lump Sum	15,880
Mobilization/Demobilization	—	Lump Sum	46,757
Legal Expenses	—	Lump Sum	10,000
Power	—	Lump Sum	4,800
Completion Report Preparation	—	Lump Sum	11,380
License Termination Activities	—	Lump Sum	28,700
Materials Testing	—	Lump Sum	130,890
Groundwater Restoration	—	Lump Sum	100,720
Solution Evaporation	—	Lump Sum	0
Fencing	—	Lump Sum	31,625
Radiological Surveys	—	Lump Sum	40,000
Environmental Monitoring	—	Lump Sum	177,010
		TOTAL	4,166,643
		Contingency (15%)	624,996
		Site Surveillance	705,318
		GRAND TOTAL	\$5,496,957

*Second phase work - not covered by the current contract.

Shirley Basin Mill Tailings Site
Materials Unit Rates and
Equipment Hourly Costs

Most materials unit rates and equipment hourly rates utilized in this bond calculation are from the signed contract between Pathfinder and Construction Remediation Engineering, Inc. (CRE) to accomplish the Shirley Basin tailings reclamation. See Exhibit "B" for the various materials unit rates, and "Table 2" for the equipment hourly rates. **Pathfinder considers Exhibit "B" and "Table 2" to be confidential information.** Hourly equipment rates in Table 2 are without an operator. Work designated as "Pond #3 & Adjacent Area" on page 1 of this surety estimate represents the second phase of the reclamation project, encompassing the ISL waste disposal site and adjacent ground that cannot be reclaimed until the ISL disposal is finished. The unit costs for this area are based upon the highest comparable costs from the existing contract, or in the case of rock placement, the bid prices from the second place bidder for the Shirley Basin tailings reclamation. Those rock placement costs are more representative since CRE intentionally bid portions of the rock work artificially low in order to increase their odds of winning the original contract.

Labor Costs

The labor rates for earth moving contractor help utilized in this calculation are also based upon the quoted rates as presented in "Table 2". 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 Pathfinder's 2004 experience, it appears that \$24.38 per hour is still appropriate for the non-earth moving activities.

The quantities of materials presented in Table 1 are the latest revised figures for the remaining tailings reclamation work at Shirley Basin. They have been updated through the end of 2004. They represent the actual quantities of material yet to be placed in order to complete the project. The revised radon barrier clay and sand quantities are adjusted to recognize only the compacted, finished material on Pond 4. Rough-placed clay on the balance of Pond 4 is not counted since it still has to be finish graded, compacted, and subjected to materials testing.

More detail on quantities is provided in Table 1 than in the previous (September, 2004) submittal. The project is broken down

into different areas, consistent with CRE's unit cost bid summary (Exhibit "B"), facilitating review of the estimate.

Localized Cut/Fill and Imported Fill

Sculpting the tailings area to create acceptable slopes and appropriate drainage basins and drainage ways (consistent with the reclamation plan) will be accomplished by grading the area and filling in low areas with above grade material or fill imported from an adjacent mine dump. The CRE contract unit rates for local cut/fill vary from \$1.11/CY to \$1.17/CY, depending upon area. Imported fill generally is truck-hauled material from the Area 3 North Mine Waste Dump, and the contractual unit cost varies from \$0.55/CY to \$1.48/CY, depending upon area.

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. The clay will be compacted to 95% Proctor. Based on the CRE contract, the unit cost varies from \$0.32/CY to \$0.74/CY.

Based on the CRE contract, the unit cost for sandy layer placement varies from \$0.66/CY to \$1.48/CY.

Rip Rap, Rock Mulch, and Filter Bed Purchase

The granite is being mined from a quarry area located approximately 15 miles northeast of the project. This quarry is owned by a local rancher. A contractor has been hired to do the blasting and crushing to produce the desired products. The mobilization charge from the quarry contractor has already been paid. Based on the contract, the costs of the various rock products delivered to the Shirley Basin tailings site are as follows: **filter bed material at \$10.50/ton, rock mulch at \$13.00/ton, D50 0.4' rip rap at \$14.00/ton, D50 0.8' rip rap at \$15.00/ton, and D50 1.2' rip rap at \$15.50/ton.** There has been a significant amount of rock products already delivered on site by the quarry contractor. Specifically, the contractor has delivered to Shirley Basin as of the end of 2004: 7,052 tons of D50 0.4' rock, 935 tons of D50 2.5" rock, 29,754 tons of D50 1.5" rock, and 36,976 tons of filter bed (see the enclosed photograph documenting stockpiled rock products at the Shirley Basin site). Table 1 has been adjusted to reflect the remaining quantities of rock products to be delivered. Rock quantities are presented in Table 1 in tons since that is the basis

of payment for delivered products as well as for eventual placement. All rock products are weighed over the Shirley Basin scale upon delivery, and they will be weighed prior to placement.

In addition to the rock production/hauling cost, a royalty of \$0.52/ton is paid to the quarry site landowner. That cost has been added to each of the rock production/haul costs to arrive at the overall rock unit costs as given in Table 1. Enclosed with this submittal are sections of the rock supply contract that are relevant to this surety estimate. **Pathfinder considers the rock contract information to be confidential.**

Contract prices as reflected by Exhibit "B" for rock placement are as follows: **filter bed at \$0.80/ton, rock mulch at \$1.44/ton, 0.4' and 0.8' rip rap at \$1.23/ton, and 1.2' rip rap at \$0.31/ton.** All rock quantities in tons were derived by converting estimated volume needs to weight, utilizing a density of 1.37 tons/CY.

Topsoil Placement

Based on the CRE contract, the unit cost for **topsoil placement** varies from \$0.51/CY to \$1.87/CY.

Re-vegetation

Unit costs for the purchase of seed and the planting of the seed are based on recent vendor/contractor quotes for similar work.

Discing and Seeding:

Labor and equipment* - \$65.50/AC

Seed - 40.00/AC

Total **\$105.50/AC**

Construction Management and Miscellaneous Expenses

There are two years of construction activity left for the project. Construction management would entail an onsite engineer and a survey support team. An onsite engineer on a consulting basis would cost \$60/hr at prevailing rates in the area. The construction season each year would consist of six months or 120 work days. The engineer would have a dedicated vehicle.

\$60/hr x 10 hrs./day x 120 days/yr. x 2 yrs. = \$144,000.

Vehicle @ \$50/day x 120 days/yr. x 2 yrs. = \$12,000.

A survey crew will consists of two technicians, a GPS unit, and a vehicle (which also will be used to commute to work). Current contractual rates that Pathfinder is paying for survey services are used:

2 technicians x \$25/hr/tech. x 10hr/day x 120 days/yr.
x 2 yrs. = \$120,000.

GPS unit @ \$125/day x 120 days/yr. x 2 yrs. = \$30,000.

Vehicle @ \$50/day x 120 days/yr. x 2 yrs. = \$12,000.

Survey supplies, consisting of stakes, paint, markers, etc. will cost \$1,000/yr. or \$2,000 for the duration of the project.

Total construction management cost is summarized as follows:

\$144,000 + \$12,000 + \$120,000 + \$30,000 + \$12,000 + \$2,000 =
\$320,000.

Other miscellaneous expenses consist of the following:

- 1) Engineering design/plan changes - An estimated 80 hours of consulting engineering time would be devoted each year to minimal plan modifications. Using prevailing rates for this area:

Engineer @ \$76/hr x 80 hrs./yr. x 2 yrs. = \$12,160.

Clerical/drafting aide @ \$44/hr. x 40 hrs./yr. x 2 yrs. =
\$3,520.

Total Design Cost = \$12,160 + \$3,520 = **\$15,680.**

- 2) Mobilization - CRE, the current project contractor, will receive a demobilization fee of \$6,757. The mobilization and demobilization for a contractor to do the last phase of the project is estimated to cost \$40,000. Total mobilization charges are **\$46,757.**
- 3) Legal expenses - An estimated \$10,000 is applied to this activity, exclusive of license termination activities discussed below.
- 4) Power - Power needs will consist of electricity to service the office. Historically, that has been about \$400/month. Total power cost would be:

\$400/mo. x 6 mos./yr. x 2 yrs. = **\$4,800.**

- 5) Completion report preparation - It is estimated that approximately 160 hours of consultant time would be required to assemble the completion report. At typical engineering consultant rates, the following cost is derived:

120 hrs. engineering work @ \$76/hr. =	\$9,120
40 hrs. clerical/drafting work @ \$44/hr. =	1,760
Materials -	<u>500</u>
Total	\$11,380

- 6) License termination activities - The cost to terminate the NRC license and transfer the site to DOE is estimated as follows:

Site final survey, survey caps, sign & monument -	\$6,500
Legal expenses -	5,000
Labor - 200 hrs. @ \$76/hr. -	15,200
Miscellaneous -	<u>2,000</u>
Total	\$28,700

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 located east of the tailings. The tailings dewatering program has been terminated due to the ongoing tailings reclamation work. 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>30,000</u>
Total	\$45,000

Labor for All Systems -
1 operator for 20 hours/wk at \$24.38/hr for 1 year -
\$24.38/hr x 20 hr/wk x 52 wk/yr x 1 yr = \$25,350

Total Operating Expense for the Groundwater Restoration:

\$45,000 + \$25,350 = \$70,350.

Well Plugging:

To date 71 wells have been abandoned because of the ongoing tailings reclamation work (all of these wells were either completed on tailings or immediately adjacent to tailings). There are 140 remaining wells associated with the tailings/mill site or the groundwater restoration effort. Average well depth varies for the different casing diameters. Two inch diameter wells average 24 feet below the land surface. Similarly, four inch wells average 76 feet, five inch wells average 61 feet, and six inch wells average 64 feet. Plugging will involve the filling of each well to five feet below the land surface with bentonite pellets. A two feet deep poured concrete plug will be installed on top of the bentonite; after excavating around the casing, the casing will be cut off three feet below the land surface. The hole will then be backfilled with soil to the land surface. A cost summary for this activity follows:

Equipment:

A Cat 416CIT tractor/backhoe/loader will be utilized to dig out the top three feet of casing below the land surface and to backfill the hole after well plugging. A pickup truck will also be required to haul materials. The cost for this equipment is \$30.00/hr.

Materials:

Using average well depths and filling with bentonite to a point five feet below the land surface, the quantities of bentonite required for each well diameter size are as follows:

<u>Well Size</u>	<u>Avg. Depth-5'</u>	<u>CF of bentonite</u>
2"	19'	0.5
4"	71'	6.2
5"	56'	7.6
6"	59'	11.6

A 50 lb. bag of pellets cost \$3.25 FOB the tailings site (based on bagged bentonite chips purchased in January, 2005). One CF of pellets equals 70 lbs.

$70 \text{ lbs/CF} / 50 \text{ lbs/bag} \times \$3.25/\text{bag} = \$4.55/\text{CF bentonite}.$

$\$4.55/\text{CF} \times .5 \text{ CF} = \$2.28 \text{ bentonite for } 2" \text{ well}.$

$\$4.55/\text{CF} \times 6.2 \text{ CF} = \$28.21 \text{ bentonite for } 4" \text{ well}.$

$\$4.55/\text{CF} \times 7.6 \text{ CF} = \$34.58 \text{ bentonite for } 5" \text{ well}.$

$\$4.55/\text{CF} \times 11.6 \text{ CF} = \$52.78 \text{ bentonite for } 6" \text{ well}.$

1 bag of sacked concrete will be required for each well at \$4.00/bag FOB the tailings site.

	<u>2" Well</u>	<u>4" Well</u>	<u>5" Well</u>	<u>6" Well</u>
Bentonite Pellets	\$ 2.28	\$28.21	\$34.58	\$52.78
Sacked Concrete	4.00	4.00	4.00	4.00
Total Materials	\$ 6.28	\$32.21	\$ 38.58	\$ 56.78

Labor:

An operator at \$35 per hour and an additional driver/laborer at \$30 per hour will be required.

It is assumed that each well requires two hours to plug. Therefore, labor = 2 hr./well x \$65.00/hr = \$130.00/well.

Total Costs for Each Size Well:

	<u>2" Well</u>	<u>4" Well</u>	<u>5" Well</u>	<u>6" Well</u>
Equipment	\$ 60.00	\$ 60.00	\$ 60.00	\$ 60.00
Materials	6.28	32.21	38.58	56.78
Labor	<u>130.00</u>	<u>130.00</u>	<u>130.00</u>	<u>130.00</u>
Total	\$196.28	\$222.21	\$228.58	\$246.78

52 - 2" wells x \$196.28/well =	\$10,207
21 - 4" wells x \$222.21/well =	\$ 4,666
57 - 5" wells x \$228.58/well =	\$13,029
10 - 6" wells x \$246.78/well =	\$ 2,468
Total	\$30,370

Total Expense for Groundwater Restoration =
\$70,350 + \$30,370 = \$100,720.

Solution Evaporation

The operation of the enhanced evaporation system has been terminated since the remaining volume of contaminated water is small. The last of this water will evaporate on its own by next year.

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 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 3,000

Total analytical work \$83,000

Total Environmental Monitoring -

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

Long Term Surveillance Fee

Inflation adjustment:

Consumer Price Index, all urban consumers -
November, 2004 = 191.0
December, 1978 = 67.7

191.0/67.7 x \$250,000 = \$705,318.