SEAL DESIGN AND COST ESTIMATE……. APPENDIX L

SEAL DESIGN AND COST ESTIMATE

Whirlwind Hydrogeologic Setting

Based on exploration drilling completed in 2007 and inspection of the Whirlwind decline, two schematic cross sections of the local lithology were developed. Figure L1 shows the location of the two cross sections. Figure L2 presents a northwest to southeast cross section (A-A') from four exploration drill holes to the lower level of the Whirlwind decline while Figure L3 shows a northeast to southwest cross section through the center of the decline. Known contacts are shown with a solid line while inferred contacts are shown with a dashed line.

As shown on Figure L3, the decline for the Whirlwind Mine descends for 3,200 feet at a 6 percent grade through the Brushy Basin formation to the Salt Wash formation. The Brushy Basin formation consists of about 400 feet of low-permeable mudstones containing only a few sandstone lenses that are from 10 to 40 feet in thickness (see Figure L2). Limited volumes of unconfined, perched water are found in the lower portions of some of these sandstone lenses. The sandstone lenses were formed by fluvial processes, are lenticular in shape, and may not be continuous across the mesa. The recharge areas for these sandstone lenses are limited to short, steep outcrops on the southwest (i.e., updip) side of the mesa. The thick mudstone sequences prevent recharge from entering the sandstone lenses from above.

Near the bottom of the Whirlwind decline, a sand lens within the Lower Brushy Basin is weeping ground water, which then flows down the decline into the mine workings. This lens historically made about 5 gpm, according to the records kept by the former operator. It currently makes about 1.5 gpm. As shown on the lower right-hand side of Figure L2, the lower sandstone lens of the Brushy Basin is very thin with numerous shale/mudstone partings where it intersects the Whirlwind decline. It does not appear that this lens, which is making water, continues much further to the southeast.

Whirlwind Bulkhead

At the time of closure, a bulkhead will be installed below the seepage in the decline to prevent this water from entering the mine. The water seeping into the decline is from an unconfined perched aquifer and will backup behind the bulkhead only to the point where the water is entering the decline. Water quality within this pool is expected to remain relatively stable because it will not be in contact with the mineralized zone of the Salt Wash. Although it is probably impossible to completely eliminate ground water inflow into the mine, it does appear that the inflows can be reduced to levels more consistent with what may have existed prior to historic mining operations in the area.

The Whirlwind Decline was carefully evaluated to find a competent sandstone that is located below the entrance point of the water in the decline but before the start of the mineralized zone of the Salt Wash Formation, where the uranium ore is found. This evaluation was performed by Dick White, certified geologist for Energy Fuels. A

competent sandstone zone was found in a non-mineralized area at the very top of the Salt Wash Formation. This proposed seal location is shown on Figure L3. The sandstone is fine-grained, non-mineralized, and there are no observed bedding planes or fractures in this sandstone that could serve as conduits. As is seen in Figure L3, the estimated vertical distance from the seal location to the water entrance point is 23 feet. Figure L4 shows a conceptual layout of the 1.6-foot thick bulkhead, including forms, timber, piping, and the surrounding rock.

The sandstone was sampled and laboratory tests were conducted for compressive strength and hydraulic conductivity. These test results are presented in Attachment A. The compressive strength was found to be 8,490 pounds per square inch (psi). This is about twice the compressive strength of cured, high-quality concrete and more than adequate for the seal installation. The tested hydraulic conductivity of a 3-inch diameter coring of the sandstone was 2.5×10^{-2} m/d (equivalent to 2.9×10^{-5} cm/s). A long-term test of a larger 8-inch core resulted in a calculated hydraulic conductivity of 1.5×10^{-3} m/d (equivalent to 1.7×10^{-6} cm/s). Although not completely impermeable, it is within the range of an aquiclude. The plan for the seal is to employ low-pressure grouting of the surrounding sandstone to ensure that water does not bypass the seal.

Mr. White also inspected the updip extent of the sandstone lens from which the ground water is seeping to determine the maximum elevation of the water pool that would be created by the seal. He concluded that if the sandstone lens were completely saturated, the expected water level above the seal would be no more than 15 vertical feet above the current high-water entrance point. Because the seal will be located about 23 vertical feet below the current entrance point, the total estimated head on the seal will be no more than 38 feet. Using the Einarson and Abel (1990) template, this would result in a theoretical seal concrete thickness of 0.40 feet. Because a seal of this thickness would be difficult to adequately anchor in the surrounding sandstone, Energy Fuels commits to using a seal thickness of 1.6 feet. This seal would be capable of handling 147 feet of head, which is very conservative for this site-specific application.

The seal will be approximately 380 feet downdip (at a 6% grade) of the current ground water inflow into the decline. As discussed above, after sealing the water levels could potentially increase by a maximum of approximately 15 vertical feet above the current high-water inflow point. This is equivalent to an additional 250 feet of flooded drift or about 630 feet of total drift that is partially or totally under water. Given that the drift has nominal dimensions of 9 feet by 12 feet and assuming the current inflow rate of 1.5 gpm will continue over time, the expected time for the pool to form and equilibrate is about six to nine months. The pool is not expected to migrate because it will be contained within low-permeable Brushy Basin mudstones and shales. A schedule for taking water level measurements and water quality samples will be proposed to DRMS and the BLM prior to sealing based on the inflow rates measured at that time. Once the pool reaches equilibrium, the portal will be backfilled and reclamation of the site can be completed.

Packrat Contingency Seal

The mine and reclamation plan calls for plugging the flows from the 10-Straight Shaft (3 gpm when last measured in 1994) and any historic drill holes with measurable flows. The 60-inch vent shaft that previously produced 0.4 gpm was backfilled by Umetco at the time of closure. The only other known significant source of ground water inflow is the water flowing into the Whirlwind Decline, which will be sealed off from the mine workings as discussed above.

Energy Fuels believes that the evidence shows that there will be no water discharge from the Packrat Mine after mine closure. There has not been a discharge for many years from the Packrat Mine and Energy Fuels will be plugging the pre-existing shaft and drill holes that likely contribute most of the water currently present within the mine. Furthermore, any new vent shafts and exploration holes will be sealed/plugged to prevent migration of ground water from the upper water-bearing zones.

Energy Fuels has agreed, however, to bond for a contingency seal in the Packrat Mine in the event that an area of the mine is opened where ground water inflow from above cannot be controlled with packers, grouting, or other less-costly measures. This seal would be placed as close as possible to the source of ground water to reduce the head requirement for the seal and to minimize the volume of water sealed within the Salt Wash sandstone.

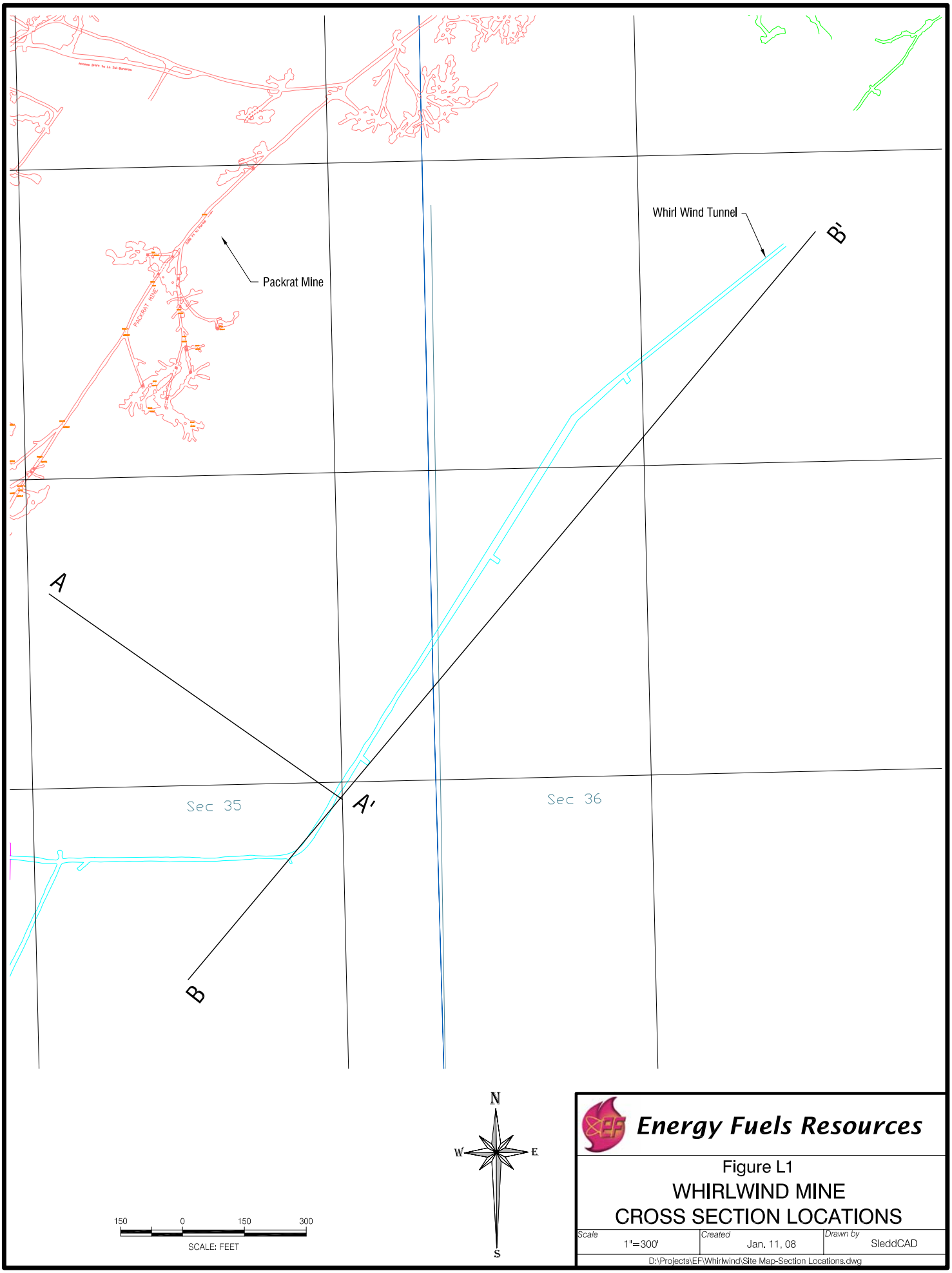
According to the evaluation performed by the DRMS using the Einarson and Abel (1990) template for bulk seal design, a concrete bulkhead seal of 1.6 feet can withstand a minimum head of 147 feet. This seal would be placed using low-pressure grout within the sandstone of the Salt Wash Formation. The Salt Wash sandstone is a competent rock with low hydraulic conductivity and high compressive strength (see Attachment A). Since the seal will be placed close to the source, Energy Fuels believes that the maximum head on the seal would be no greater than 147 feet; therefore, the contingency seal cost estimate has been based on a seal thickness of 1.6 feet.

Bulkhead Costs

The cost estimates for constructing the Whirlwind seal and the Packrat contingency seal are presented in Attachments B and C, respectively. The costs are very similar, as both seals would be 1.6 feet thick and constructed in the same manner. An additional cost for a coffer dam and extra piping is included for the contingency seal since it will be assumed that water may be flowing toward the seal from the updip mine workings.

Cost estimation for the Whirlwind seal and Packrat contingency seal are based on the As-built Report for the Terry Tunnel Bulkhead. The Terry Tunnel Bulkhead was installed at the Sunnyside Mine in Silverton, CO and the DRMS considers this design to be satisfactory. This seal cost estimates provided in both Attachments B and C take into account the following differences between the Terry Tunnel Bulkhead and the proposed bulkheads for the Whirlwind Mine.

- Labor costs have increased over time. A list of the current labor costs for Energy Fuels is presented in Attachment C.
- The dimensions of the bulkheads (perimeter area, perimeter length, cross sectional area, volume).
- The distance to the bulkheads from the portal affects the productivity during construction and therefore affecting the cost of construction.
- The costs of materials have gone up since the Terry Tunnel was constructed in 1996 although fewer materials are needed.
- The Terry Tunnel had a significant amount of flowing water that had to be dealt with during the seal installation. The Whirlwind seal does not have that problem. This reduces the amount of pumping that will be needed and removes the need for a bypass pipe during construction.
- The Terry Tunnel was designed for 347 feet of head and the Whirlwind bulkhead is designed for 38 feet (although the actual design would handle 147 feet).
- A smaller bulkhead needs fewer materials and less labor to build. It also requires less engineering, auxiliary equipment, bracing, timber, etc.
- Energy Fuels believes the seal can be formed and poured in 2 weeks, which is about half the time required for the Terry Tunnel.
- A number of other minor items described in the cost estimates.



Energy Fuels Resources

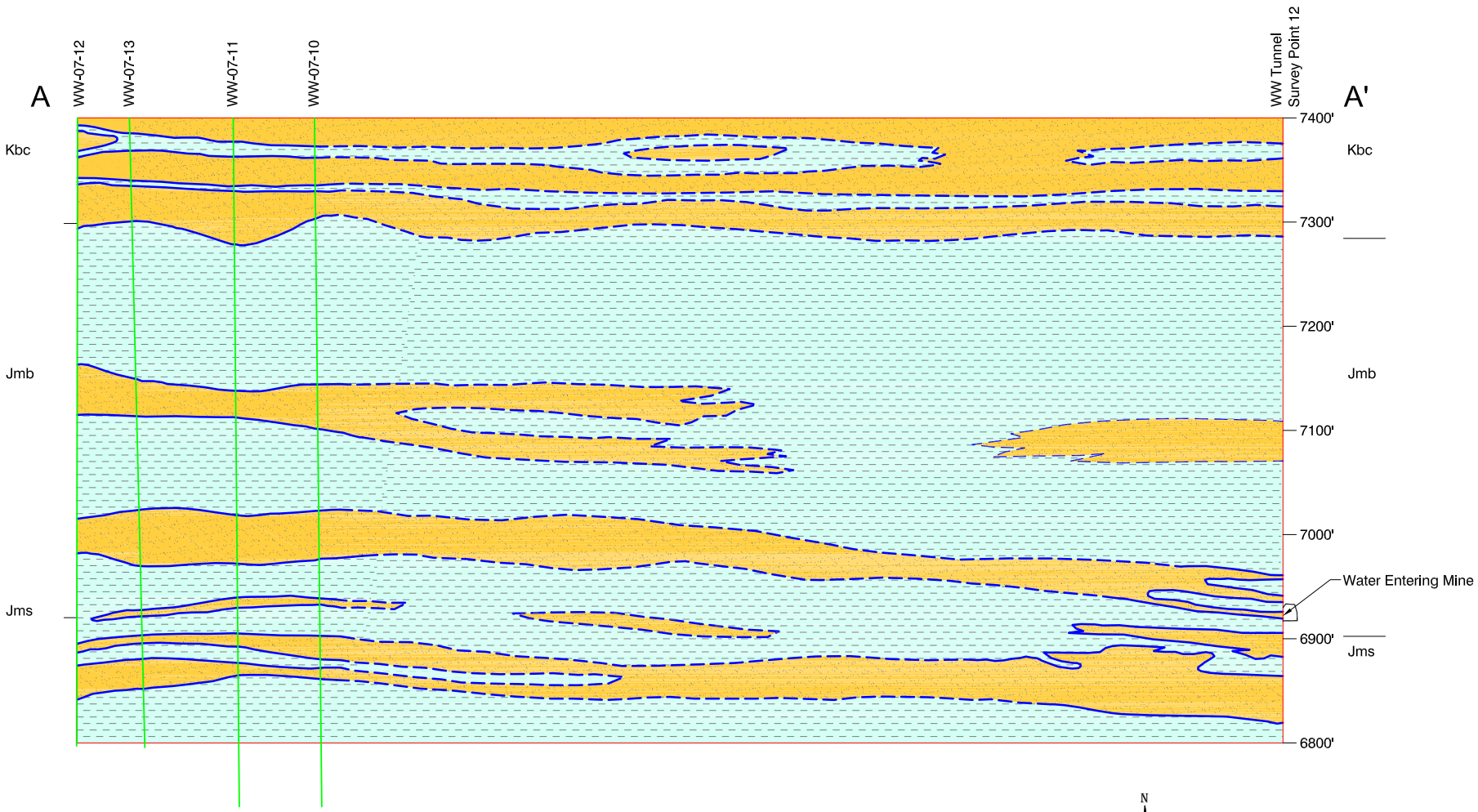
Figure L1

WHIRLWIND MINE

CROSS SECTION LOCATIONS

Scale	Created	Drawn by
1"=300'	Jan. 11, 08	SleddCAD

D:\Projects\EF\Whirlwind\Site Map-Section Locations.dwg



LEGEND

Inferred Contact		Kbc	Burro Canyon
Known Contact		Jmb	Brushy Basin
Sandstone		Jms	Salt Wash
Mudstone/Shale			

N
W
E
S

50 25 0 50 100
SCALE IN FEET

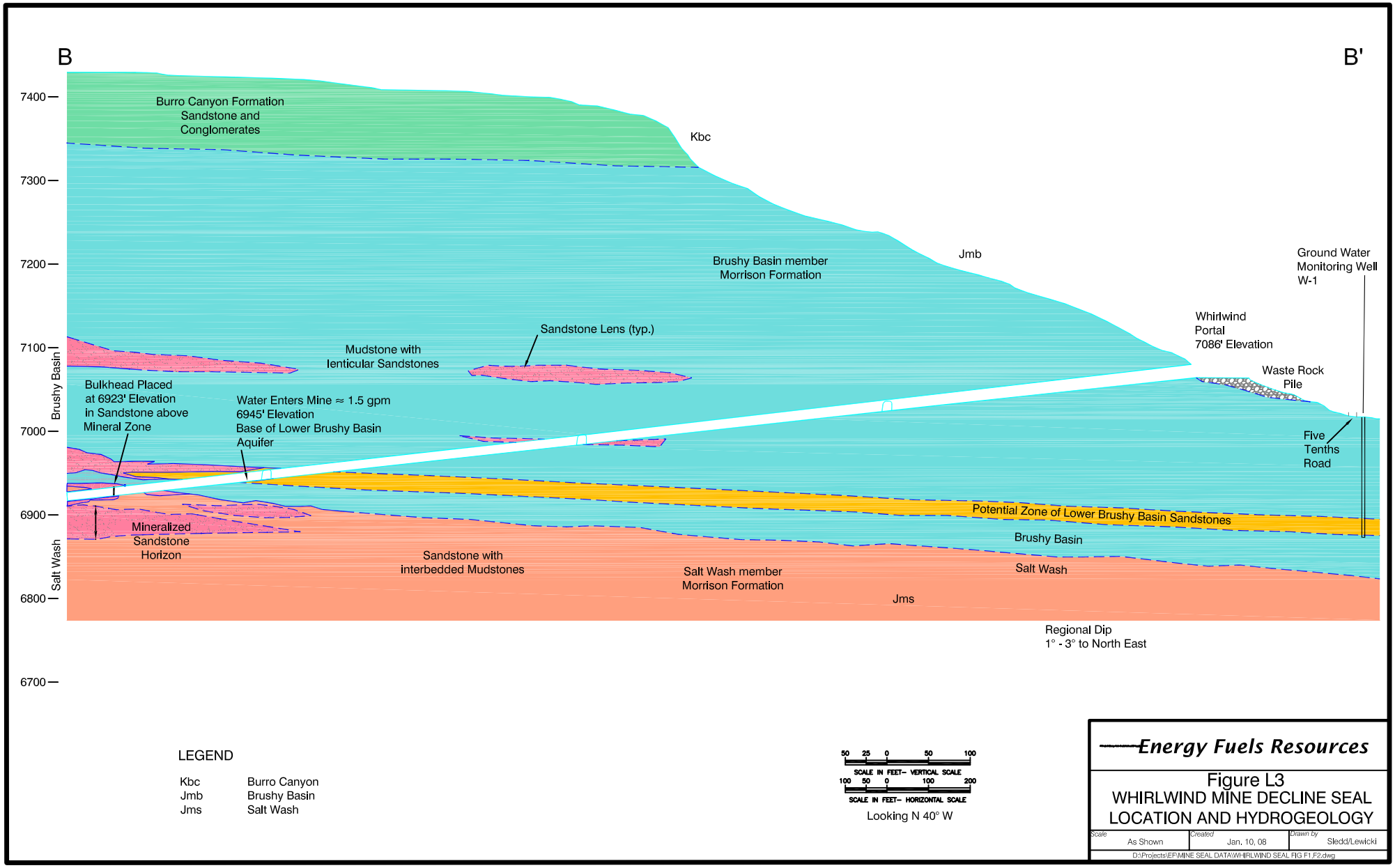
Looking N 35° E

Energy Fuels Resources

Figure L2
WHIRLWIND CROSS SECTION A-A'
NW-SE

Scale	Created	Drawn by
As Shown	Jan. 10, 08	Sledd

D:\Projects\EF\Whirlwind\ww sect aa_sect bb.dwg



LEGEND

Kbc	Burro Canyon
Jmb	Brushy Basin
Jms	Salt Wash

50 25 0 50 100
SCALE IN FEET– VERTICAL SCALE
100 50 0 100 200
SCALE IN FEET– HORIZONTAL SCALE

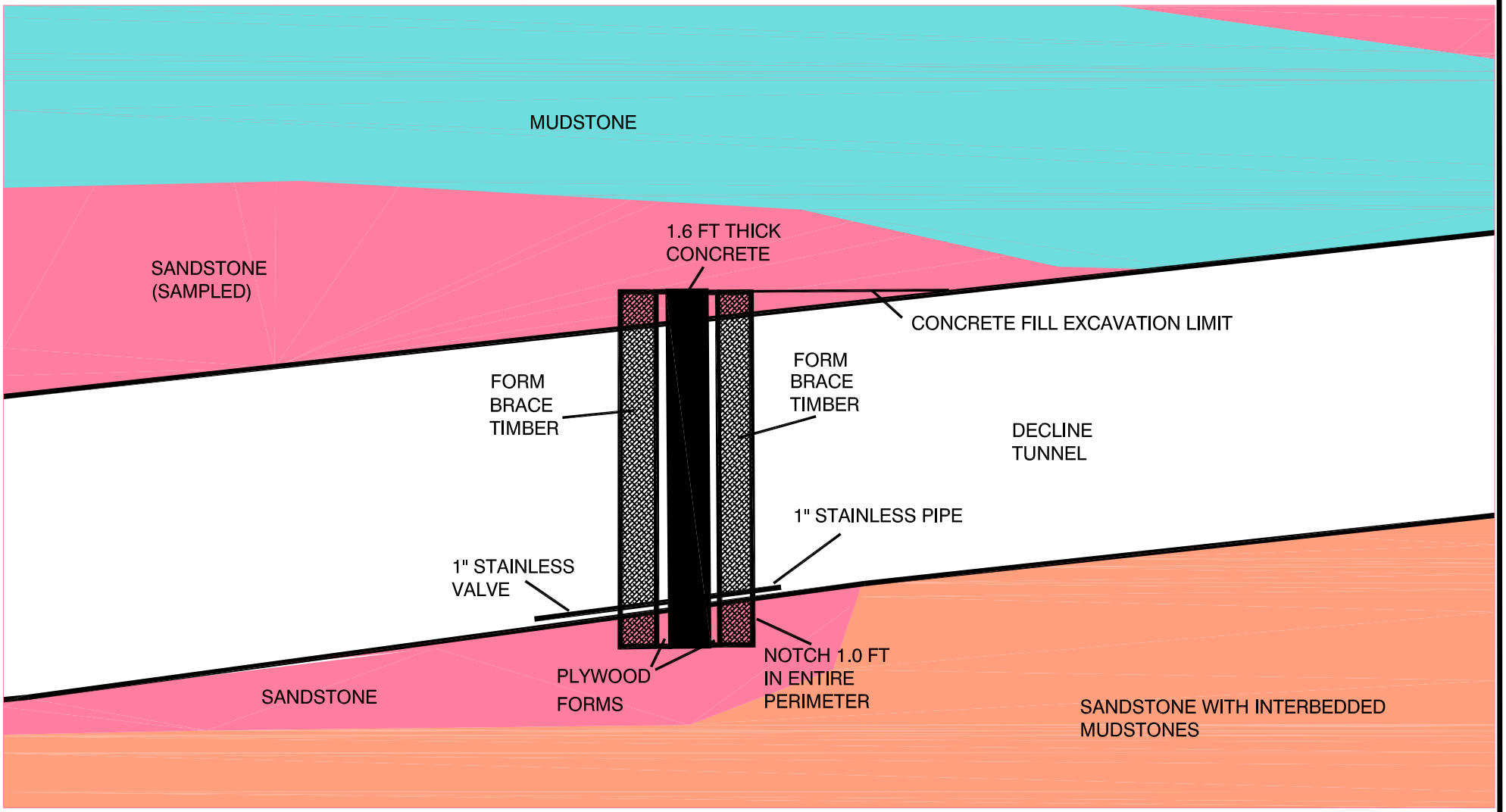
Looking N 40° W

Energy Fuels Resources

Figure L3
WHIRLWIND MINE DECLINE SEAL
LOCATION AND HYDROGEOLOGY

Scale	Created	Drawn by
As Shown	Jan. 10, 08	Sledd/Lewicki

D:\Projects\EF\MINE SEAL DATA\WHIRLWIND SEAL FIG F1,F2.dwg



NOT TO SCALE

Looking N 40° W

Energy Fuels Resources

Figure L4
WHIRLWIND BULKHEAD SEAL
CONCEPTUAL DETAIL

Scale	Created	Drawn by
As Shown	Jan. 13, 08	Lewlckl

D:\Projects\EF\MINE SEAL DATA WHIRLWIND SEAL FIG 1.2.dwg

ATTACHMENT A
HYDRAULIC CONDUCTIVITY AND COMPRESSIVE STRENGTH OF SALT WASH SANDSTONE

Knight Piésold CONSULTING

Constant Head Permeability

USBR 5605, Amended

Project	*Whirlwind Mine*	*Project No.*	*DV108-49.3*
Lab No.		*Date of Test*	*1/10 - 3/14/08*
Sample No.	*Large Core*	*Tested By*	*jdb*
Location	*Sandstone*	*Checked By*	*SPB*

Specimen Data

Target Dry Density, pcf	NA	Wet Sample Wt. + Tare, lbs.	18.082
Target Density, t/m^3	NA	Tare, lbs.	0.000
Moisture Content, %	4.6	Wet Sample Wt., lbs.	18.082
Specimen Diameter, in.	7.68	Sample Length, in.	4.697
Specimen Area, in.^{2}	46.34	Sample Volume, in.^{3}	217.6
Specimen Area, ft^2	0.3218	Sample Volume, ft^3	0.1260
Depth to Mold Bottom, in.	8.600	Wet Density, pcf	143.6
		Initial Depth to Plate, in.	3.903
Normal Stress Range, psf	0		

Permeability Trial Data

Normal Stress, psf	0			Head, cm	25.1
Avg. Depth to Plate, in.	3.903	Consolidated Length, in.	4.697	Wet Density, pcf	143.6

Trial No.	Q cc	Time sec	Flow cc/sec	Permeability k, cm/sec
1	54.4	78780.0	0.0	1.1E-06
2	31.7	19100.0	0.0	2.6E-06
3	68.0	70860.0	0.0	1.5E-06
4	18.1	17460.0	0.0	1.6E-06
5	54.4	60000.0	0.0	1.4E-06
Averages			0.001	1.7E-06

General Notes:

1) Tap water was used as permeant.

2) A bentonite seal was placed at the anulus to minimize transmissivity.

FLEXIBLE WALL PERMEABILITY TEST

ASTM D 5084-03

Falling Head/Increasing Tailwater Pressure

CLIENT:	CTL/Thompson		
PROJECT:		PROJECT NO. :	DV108-49.3
BORING NO.		LAB NO. :	L28001
DEPTH		SAMPLE ID:	
SAMPLE NO.	Sandstone	TEST STARTED :	01/07/08
SAMPLE TYPE	Drilled core	TEST FINISHED :	01/12/08
CONF. PRESSURE. (psi)	10	SATURATED TEST:	YES

MOISTURE/DENSITY DATA	BEFORE TEST	AFTER TEST
Wt. Soil + Moisture (g)	683.30	695.26
Wt. Wet Soil & Pan (g)	683.30	807.10
Wt. Dry Soil & Pan (g)	647.36	759.20
Wt. Moisture Lost (g)	35.94	47.90
Wt. of Pan Only (g)	0.00	111.84
Wt. of Dry Soil (g)	647.36	647.36
Moisture Content %	5.6	7.4
Wet Density (pcf)	143.5	146.0
Dry Density (pcf)	136.0	136.0

Init. Diameter (in)	2.770	(cm)	7.036
Init. Area (sq in)	6.026	(sq cm)	38.879
Init. Height (in)	3.010	(cm)	7.645
Height Change (in)	0.000	(cm)	0.000
Consol. Height (in)	3.010	(cm)	7.645
Area After Consol. (sq in)	6.026	(sq cm)	38.879

Vol. Before Consol. (cu ft)	0.01050	Specific Gravity	2.6
Vol. Before Consol. (cc)	297.2	Assumed?	Yes
Change in Vol. (cc)	0.0		
Cell Exp. (cc)	0.0	Init. Saturation	74.5
Vol. After Consol. (cc)	297.2	Init. Void Ratio	0.194
Vol. After Consol. (cu ft)	0.01050	Final Saturation	99.3
Effective Porosity %	16.24	Final Void Ratio	0.194
Pressure Difference (psi):	0.00		
C =	0.20823	Buret Constant, a	0.920
k, cm/s = (C/t)*log(h1/h2)		Buret Stand	3

Permeability Test Trials

Time min.	Cap Elevation cc	Pedestal Elevation cc	Elevation Head cm	Total Head cm	Permeability k cm/sec
0.0	42.0	8.7	36.0	36.0	
11.0	37.6	13.2	26.4	26.4	4.3E-05
8.0	35.2	15.7	21.1	21.1	4.2E-05
0.0	47.8	2.9	48.5	48.5	
5.0	45.4	4.6	44.1	44.1	2.9E-05
7.0	42.9	7.2	38.6	38.6	2.9E-05
5.0	41.2	8.7	35.1	35.1	2.8E-05
7.0	39.1	10.9	30.5	30.5	3.1E-05
7.0	37.5	12.5	27.0	27.0	2.6E-05
7.0	35.7	13.1	24.4	24.4	2.2E-05
7.0	34.5	15.5	20.5	20.5	3.7E-05
7.0	33.3	16.8	17.8	17.8	3.0E-05
			Avg. of Last 7 Rdgs.		2.9E-05

General Test Notes:
1) Tap water was used as the permeant.
2) Back pressure saturation continued until 'B' parameter a minimum of 0.95.

ATTACHMENT B
WHIRLWIND BULKHEAD SEAL COST ESTIMATE

Labor Rates and Various Adjustment Factors

Employees Including Overhead and Profit- RS Means (2007) Building Construction Costs Data

Job Type	Base Pay	Benefits	Profit and Overhead	final pay
Laborer	17	1.4	1.1307	**$ 26.91**
Equipment Operator (light)	24	1.4	1.1307	**$ 37.99**
Carpenter	30	1.4	1.1307	**$ 47.49**
Cement Finisher	30	1.4	1.1307	**$ 47.49**
Welder	30	1.4	1.1307	**$ 47.49**

Adjustment Factors: Terry Tunnel Bulkhead Costs to 2007 Costs

Note: one foot added to Whirlwind Mine workings dimensions to account for notching of bulkheads

Whirlwind bulkhead perimeter area (10'+10'+13'+13')1.6'=	73.6	sq. ft.
Terry Tunnel bulkhead perimeter area (11'+11'+11'+11')8'=	352	sq. ft.
Whirlwind bulkhead reduction factor: 73.6/352=	**0.21**	
Whirlwind bulkhead perimeter length 10'+10'+13'+13'=	46	ft
Terry Tunnel bulkheads perimeter length 11'+11'+11'+11'=	44	ft
Whirlwind bulkhead increase factor: 46/44=	**1.05**	
Whirlwind bulkhead cross sectional area 10'x13'=	130	sq. ft. each
Terry Tunnel bulkhead cross sectional area 11'x11'=	121	sq. ft. each
Whirlwind bulkhead increase factor: 130/121=	**1.07**	
Whirlwind bulkhead volume: (10'x13'x1.6'/)27=	7.7	cu. yd. each
Terry Tunnel bulkhead volume: (11'x11'x8')/27=	35.9	cu. yd. each
Whirlwind increase factor: 7.7/35.9=	**0.21**	
1996 laborer $16.39/hr. + 35% benefits =	$22.13	per hr
2007 laborer $26.91/hr	$26.91	per hr
Labor increase factor = $26.91/$22.13=	**1.18**	

Ventilation:

Whirlwind portal elevation 7084' Whirlwind bulkhead elevation 6936' Whirlwind driven at 6% grade

2467 linear feet from portal to Whirlwind bulkhead location

Terry Tunnel bulkhead 3800 linear feet (actual) inby the portal

Whirlwind bulkhead ventilation reduction factor: 2467/3800 = **0.65**

Adjustment from 1996 cost to 2007 costs from Means (2007)

Index for 2007=	166.3
Index for 1996=	110.2
166.3/110.2=	**1.5**

A) Bulkhead Installation Labor Estimate, includes Overhead and Profit

Task and Cost Item				Quantity				Extended Cost
1) Initial site cleaning								
Terry Tunnel				50	hrs.			
				Terry Tunnel Hours		Factor		
Whirlwind Bulkhead				50		0.21	hr/hr	
Whirlwind Bulkhead								
1 laborer inside @	$	26.91	per hr.	10.5	hrs.			$ 282.56
1 laborer outside @	$	26.91	per hr.	10.5	hrs.			$ 282.56
1 equip.op. (light) @	$	37.99	per hr.	10.5	hrs.			$ 398.91
							Subtotal	**$ 964.03**
2) Set rebar anchors and fine site cleaning								
Terry Tunnel				50	hrs.			
				Terry Tunnel Hours		Factor		
Whirlwind Bulkhead				50		0.21	hr/hr	
Whirlwind Bulkhead								
1 laborer inside @	$	26.91	per hr.	10.5	hrs.			$ 282.56
1 laborer outside @	$	26.91	per hr.	10.5	hrs.			$ 282.56
1 equip.op. (light) @	$	37.99	per hr.	10.5	hrs.			$ 398.91
							Subtotal	**$ 964.03**
3) Build Forms, Set Pipes, Valves, and Rebar, Divert Water								
Terry Tunnel				80	hrs.			
				Terry Tunnel Hours		Factor		
Whirlwind Bulkhead				80		1.07	hr/hr	
Note: Due to the less head ant Whirlwind Bulkhead, less thickness, and no valves a reduction factor of 0.6 will be used as well as only 3 laborers inside.						Factor		
						0.6	hr/hr	
Whirlwind Bulkhead								
3 laborer inside @	$	26.91	per hr.	85.6	hrs.			$ 4,146.39
1 laborer outside @	$	26.91	per hr.	85.6	hrs.			$ 1,382.13
1 equip.op. (light) @	$	37.99	per hr.	85.6	hrs.			$ 1,951.24
							Subtotal	**$ 7,479.77**

4) Brace Form in Preparation for Concrete Pour

Terry Tunnel, General labor				40	hrs.				
Terry Tunnel, Welder				20	hrs.				
				Terry Tunnel Hours		Factor			
Whirlwind Bulkhead, General labor				40		1.07	hr/hr		
Whirlwind Bulkhead, Welder				20		1.07	hr/hr		
Whirlwind Bulkhead									
3 laborer inside @	$	26.91	per hr.	42.8	hrs.			$	4,607.10
1 laborer outside @	$	26.91	per hr.	42.8	hrs.			$	1,151.78
1 welder @	$	47.49	per hr.	21.4	hrs.			$	1,016.27
							Subtotal	**$**	**6,775.15**

5) Set up and pour Bulkhead

Terry Tunnel, General labor				890	hrs.				
Terry Tunnel, Overtime during pour				$ 2,157.30					
Terry Tunnel, salary (management) during pour				$ 2,987.05					
Terry Tunnel, contract labor for pour				$ 864.00					
Terry Tunnel, outside man				100	hrs.				
				Terry Tunnel Hours		Factor			
Whirlwind Bulkhead, General labor @	$	26.91	per hr.	890		0.21	hr/hr	$	5,029.60
Whirlwind Bulkhead, Overtime during pour				$ 2,157.30		0.21	hr/hr	$	453.03
Whirlwind Bulkhead, salary (management) during pour				$ 2,987.05		0.21	hr/hr	$	627.28
Whirlwind Bulkhead, contract labor for pour				$ 864.00		0.21	hr/hr	$	181.44
Whirlwind Bulkhead, outside man @	$	26.91	per hr.	100		0.21	hr/hr	$	565.12
							Subtotal	**$**	**6,856.48**

6) Strip Forms, move equipment, Grout Bulkhead

Terry Tunnel, general labor				120	hrs.				
Note: Reduction factor for using less bulky forms 0.8				Terry Tunnel Hours		Factor			
Whirlwind Bulkhead, General labor @	$	26.91	per hr.	120		1.07*0.8	hr/hr	$	2,764.26
							Subtotal	**$**	**2,764.26**

7) Install Ventilation

Terry Tunnel, general labor			40	hrs.		
		Terry Tunnel Hours		Factor		
Whirlwind Bulkhead, General labor @ $ 26.91 per hr.		40		0.65 hr/hr		$ 699.68
					Subtotal	**$ 699.68**
Subtotal Labor, includes overhead and profit						$ 26,503.41
Add 5% DRMS administration required by statute						$ 1,325.17
Labor Component of Bulkhead Bond					**Subtotal**	**$ 27,828.59**

B) Supplies, Parts, Equipment Rental, and Engineering Costs, including Overhead and Profit

Task and Cost Item			Quantity				Extended Cost
1) Set Rebar Anchors and Fine Site Cleaning							
Terry Tunnel							
* Sand Blaster	$ 20.00	per day	3	days			
* Non-shrink grout, 1-bag	$ 10.16	per bag	1	bag			
* Sand blaster sand, 30# grit, 100 lb. bag	$ 7.36	per bag	3	bag			
	Terry Tunnel price		Terry Tunnel Quantity		Price Factor	Size Factor	
Whirlwind Bulkhead							
* Sand Blaster	$ 20.00	per day	3	days	1.5	0.21	$ 18.90
* Non-shrink grout, 1-bag	$ 10.16	per bag	1	bag	1.5		$ 15.24
* Sand blaster sand, 30# grit, 100 lb. bag	$ 7.36	per bag	1	bag	1.5		$ 11.04
						Subtotal	**$ 45.18**
2) Build Forms, Set Pipes, Valves, and Rebar, Divert Water							
Terry Tunnel							
* 8"x8"x16' timbers	$ 2,196.00	each					
* 2"x6"x14' timbers	$ 381.00	each					
* 2"x12"x14' timbers	$ 150.00	each					
* 8" DRISCO pipe w/ flanges	$ 420.00	each					
* #9 rebar	$ 928.00	each					
* #6 rebar	$ 128.00	each					
* Concrete Block (pipe support)	$ 252.00	each					
* 6" stainless bypass pipe	$ 2,250.00	each					
* 1" stainless monitoring pipe	$ 618.00	each					
* 6" stainless gate valve	$ 3,986.00	each					
* Miscellaneous bolt packages and gaskets	$ 155.00	each					
* Freight	$ 200.00	each					

Note: Reduction factor of 0.7 will be used because of less head, less materials, less complex

Whirlwind Bulkhead	Terry Tunnel price		Reduction Factor	Price Factor	Size Factor		
* 8"x8"x16' timbers	$ 2,196.00	each	0.7	1.5	1.07	$	2,467.21
* 2"x6"x14' timbers	$ 381.00	each	0.7	1.5	1.07	$	428.05
* 2"x12"x14' timbers	$ 150.00	each	0.7	1.5	1.07	$	168.53
* 8" DRISCO pipe w/ flanges	Not used at Whirlwind						
* #9 rebar	$ 928.00	each	0.7	1.5	1.07	$	1,042.61
* #6 rebar	$ 128.00	each	0.7	1.5	1.07	$	143.81
* Concrete Block (pipe support)	$ 252.00	each	0.7	1.5		$	264.60
* 6" stainless bypass pipe	Not used at Whirlwind						
* 1" stainless monitoring pipe	$ 618.00	each	0.7	1.5	1.6"/8"	$	129.78
* 6" stainless gate valve	Not used at Whirlwind						
* Miscellaneous bolt packages and gaskets	$ 155.00	each	0.7	1.5		$	162.75
* Freight	$ 200.00	each	0.7	1.5		$	210.00
					Subtotal	**$**	**5,017.33**

3) Brace Forms

Terry Tunnel		
* Equipment: Welder and torch	$ 200.00	each
* Angle Iron	$ 296.00	each
* #8 thread bar	$ 163.00	each
* #8 bevel and flat washers	$ 71.00	each
* 2" schedule 20 pipe	$ 148.00	each
* Celtite	$ 81.00	each

Note: Reduction factor of 0.7 will be used because of less head, less materials, less complex

Whirlwind Bulkhead	Terry Tunnel price		Reduction Factor	Price Factor	Size Factor		
* Equipment: Welder and torch	$ 200.00	each	0.7	1.5	1.07	$	210.00
* Angle Iron	$ 296.00	each	0.7	1.5	1.07	$	310.80
* #8 thread bar	$ 163.00	each	0.7	1.5	1.07	$	171.15
* #8 bevel and flat washers	$ 71.00	each	0.7	1.5	1.07	$	74.55
* 2" schedule 20 pipe	$ 148.00	each	0.7	1.5	1.07	$	155.40
* Celtite	$ 81.00	each	0.7	1.5	1.07	$	85.05
					Subtotal	**$**	**1,006.95**

4) Set up and Pour Bulkhead

Terry Tunnel

* Rent two 9 cu.ft. mixers	$	500.00	per month
* Rent auger feed	$	250.00	per month
* Rent concrete pump	$	2,000.00	per month
* Rent concrete pipe and hose	$	350.00	per month
* Concrete vibrator	$	60.00	per month
* Rent roller conveyors	$	250.00	per month
* Concrete	$	6,679.00	material cost
* Delay set	$	248.00	each
* Plasticizer	$	136.00	each
* Type V cement	$	280.00	each
* Meals during pour	$	345.00	each

Note: Increase factor of 20%will be used because a shoter rental will be a higher cost per time

Whirlwind Bulkhead	Terry Tunnel price				Price Factor	Size Factor		
* Rent 9 cu.ft. mixers	$	62.50	per week	2 week	1.5	1.2	$	225.00
* Rent auger feed	$	62.50	per week	2 week	1.5	1.2	$	225.00
* Rent concrete pump	$	500.00	per week	2 week	1.5	1.2	$	1,800.00
* Rent concrete pipe and hose	$	87.50	per week	2 week	1.5	1.2	$	315.00
* Concrete vibrator	$	15.00	per week	2 week	1.5	1.2	$	54.00
* Rent roller conveyors	$	62.50	per week	2 week	1.5	1.2	$	225.00
* Concrete	$	6,679.00	material cost		1.5	0.21	$	2,103.89
* Delay set	$	248.00	each		1.5	0.21	$	78.12
* Plasticizer	$	136.00	each		1.5	0.21	$	42.84
* Type V cement	$	280.00	each		1.5	0.21	$	88.20
* Meals during pour	$	345.00	each		1.5	0.21	$	108.68
						Subtotal	**$**	**5,265.72**

5) Strip Forms, Move Equipment, and Grout Bulkhead

Terry Tunnel

* Grout mixer and pump	$	250.00	per week	2	weeks
* Packers	$	480.00	each		
* Type V cement	$	112.00	each		

Whirlwind Bulkhead	Terry Tunnel Price				Price Factor	Size Factor		
* Grout mixer and pump	$	250.00	per week	2 weeks	1.5		$	750.00
* Packers	$	480.00	each		1.5	1.05	$	756.00
* Type V cement	$	112.00	each		1.5	1.05	$	176.40
						Subtotal	**$**	**1,682.40**

6) Miscellaneous Costs

Terry Tunnel

* Engineering design	$	4,538.00	each
* Engineering Inspections	$	2,077.00	each
* Material Testing	$	168.00	each
* Miscellaneous small hand tool usage	$	3,000.00	each
* Miscellaneous materials (nails, bits, wire, etc.)	$	3,000.00	each
* Diesel	$	1,500.00	each
* Electricity	$	5,000.00	per month
* Safety supplies	$	1,000.00	each
* Intake screen, bypass pipe	$	200.00	each

Note: Reduction factor of 0.7 will be used for items that apply because of less head, less materials, less complex; a reduction factor of 0.5 will be used for half as long.

Whirlwind Bulkhead	Terry Tunnel Price			Price Factor	Size Factor	
* Engineering design	$ 4,538.00	each		1.5		$ 6,807.00
* Engineering Inspections	$ 2,077.00	each		1.5		$ 3,115.50
* Material Testing	$ 168.00	each		1.5		$ 252.00
* Miscellaneous small hand tool usage	$ 3,000.00	each		1.5	1.07*0.7	$ 3,370.50
* Miscellaneous materials (nails, bits, wire, etc.)	$ 3,000.00	each		1.5	1.07*0.7	$ 3,370.50
* Diesel	$ 1,500.00	each		3	0.7	$ 3,150.00
* Electricity	$ 1,250.00	per week	2 weeks	1.5		$ 3,750.00
* Safety supplies	$ 1,000.00	each		1.5	0.5	$ 750.00
* Intake screen, bypass pipe	$ 200.00	each		1.5		$ 300.00
					Subtotal	**$ 24,865.50**

7) Install Ventilation

Terry Tunnel

* Generator	$	800.00	each
* Fan	$	3,000.00	each
* Flatbed truck and loader	$	700.00	each
* Contractor install	$	6,400.00	each
* Vent bag	$	4,755.00	each

Whirlwind Bulkhead	Terry Tunnel Price		Price Factor	Size Factor	
* Generator	$ 800.00	each	1.5		$ 1,200.00
* Fan	$ 3,000.00	each	1.5		$ 4,500.00
* Flatbed truck and loader	$ 700.00	each	1.5		$ 1,050.00
* Contractor install	$ 6,400.00	each	1.5	0.65	$ 6,240.00
* Vent bag	$ 4,755.00	each	1.5	0.65	$ 4,636.13
				Subtotal	**$ 17,626.13**

Subtotal Supplies, Equipment, and Engineering, includes overhead and profit	$	55,509.21
Add 5% DRMS administration required by statute	$	2,775.46
Supplies, Equipment, and Engineering Component of Bulkhead Bond	**$**	**58,284.67**

C) Other Equipment Costs, not including Overhead and Profit

Task and Cost Item			Quantity				Extended Cost
1) Initial Site Cleaning							
Terry Tunnel							
* Two yard Load Haul Dump	$ 45.00	per hr	10.5	hrs.			
Whirlwind Bulkhead	Terry Tunnel Price				Price Factor	Size Factor	
* 1.25 yard Load Haul Dump	$ 35.00	per hr	10.5	hrs.	1.5		$ 551.25
Note: 1.25 yard LHD will bee on site for Bulkhead building.							
2) Set Rebar Anchors and Fine Site Cleaning							
Terry Tunnel							
* 1.25 yard Load Haul Dump	$ 35.00	per hr	10.5	hrs.			
Whirlwind Bulkhead	Terry Tunnel Price				Price Factor	Size Factor	
* 1.25 yard Load Haul Dump	$ 35.00	per hr	10.5	hrs.	1.5		$ 551.25
3) Build Forms, Set Valves, and Rebar, Divert Water							
Terry Tunnel							
* 1.25 yard Load Haul Dump	$ 35.00	per hr	85.6	hrs.			
Note: Due to the less head ant Whirlwind Bulkhead, less thickness, and no valves a reduction factor of 0.6 will be used as well as only 3 laborers inside.							
Whirlwind Bulkhead	Terry Tunnel Price				Price Factor	Size Factor	
* 1.25 yard Load Haul Dump	$ 35.00	per hr	85.6	hrs.	1.5	0.6	$ 2,696.40
4) Set up and Pour Bulkheads							
Terry Tunnel							
* 1.25 yard Load Haul Dump	$ 35.00	per hr	21	hrs.			
* Forklift	$ 20.00	per hr	21	hrs.			
Whirlwind Bulkhead	Terry Tunnel Price				Price Factor	Size Factor	
* 1.25 yard Load Haul Dump	$ 35.00	per hr	21	hrs.	1.5		$ 1,102.50
* Forklift	$ 20.00	per hr	21	hrs.	1.5		$ 630.00

5) Strip Forms, Move Equipment, and Grout Bulkhead

Terry Tunnel

* 1.25 yard Load Haul Dump	$	35.00	per hr	120	hrs.				

Note: Reduction factor for leaving the forms in place 0.8

Whirlwind Bulkhead	Terry Tunnel Price					Price Factor	Size Factor		
* 1.25 yard Load Haul Dump	$	35.00	per hr	100	hrs.	1.5	1.07	$	5,617.50

6) Miscellaneous Costs

Terry Tunnel

* Compressor usage	$	3,000.00	each
* Air Bean 25 pump usage	$	1,200.00	each
* Flight 123 HP pump usage	$	1,620.00	each
* GD 83 jackleg	$	1,125.00	each
* Outside loader	$	6,000.00	each

Note: A reduction factor of 0.5 will be used because less material will be moved and less work will be done and a short rental period factor of 20% will be used

Whirlwind Bulkhead	Terry Tunnel Price	Price Factor	Size Factor

* Compressor usage	$ 3,000.00 each	1.5	0.5*1.2	$	2,700.00
* Air Bean 25 pump usage	$ 1,200.00 each	1.5	0.5*1.2	$	1,080.00
* Flight 123 HP pump usage	Not used at Whirlwind				
* GD 83 jackleg	$ 1,125.00 each	1.5	0.5*1.2	$	1,012.50
* Outside loader	$ 6,000.00 each	1.5	0.5*1.2	$	5,400.00

Subtotal Other Equipment, not including overhead and profit	$	21,341.40
Overhead and profit@13.07%	$	2,789.32
Subtotal	$	24,130.72
Add 5% DRMS administration required by statute	$	1,206.54
Other Equipment Component of Bulkhead Bond	**$**	**25,337.26**

Bond Amount for Whirlwind Bulkhead

Supplies, Equipment, and Engineering	$	86,113.25
Other Equipment	$	25,337.26
Total	**$**	**111,450.51**

ATTACHMENT C
PACK RAT CONTINGENCY BULKHEAD SEAL COST ESTIMATE

ENERGY FUELS RESOURCES

January 11, 2008

To Whom It May Concern:

Listed below you will find the job types as identified by the Division of Reclamation, Mining and Safety and Energy Fuels Resources' corresponding categories along with the designated pay rates.

Job Type	EFR Job Type	Pay Rate $
Laborer	Laborer (2 employees)	16.00
Laborer	Laborer (1 employees)	18.00
Equipment Operator	Miner III (2 employees)	24.00
Welder	Mechanic (1 employees)	21.00
Welder	Mechanic (2 employees)	24.00
Welder	Mechanic (1 employees)	30.00
	Electrician	30.00

Thank you,

DeeAnn Nazarenus
Office Manager/HR

Energy Fuels Resources
www.energyfuels.com

44 Union Blvd., Suite 600
Lakewood, Colorado 80228
Phone: 303-974-2140
Fax: 303-974-2141

Labor Rates and Various Adjustment Factors

Employees Including Overhead and Profit- RS Means (2007) Building Construction Costs Data

Job Type	Base Pay	Benefits	Profit and Overhead	final pay
Laborer	17	1.4	1.1307	**$ 26.91**
Equipment Operator (light)	24	1.4	1.1307	**$ 37.99**
Carpenter	30	1.4	1.1307	**$ 47.49**
Cement Finisher	30	1.4	1.1307	**$ 47.49**
Welder	30	1.4	1.1307	**$ 47.49**

Adjustment Factors: Terry Tunnel Bulkhead Costs to 2007 Costs

Note: one foot added to Whirlwind Mine workings dimensions to account for notching of bulkheads

Pack Rat Contingency bulkhead perimeter area (10'+10'+13'+13')1.6'=	73.6	sq. ft.
Terry Tunnel bulkhead perimeter area (11'+11'+11'+11')8'=	352	sq. ft.
Pack Rat Contingency bulkhead reduction factor: 73.6/352=	**0.21**	
Pack Rat Contingency bulkhead perimeter length 10'+10'+13'+13'=	46	ft
Terry Tunnel bulkheads perimeter length 11'+11'+11'+11'=	44	ft
Pack Rat Contingency bulkhead increase factor: 46/44=	**1.05**	
Pack Rat Contingency bulkhead cross sectional area 10'x13'=	130	sq. ft. each
Terry Tunnel bulkhead cross sectional area 11'x11'=	121	sq. ft. each
Pack Rat Contingency bulkhead increase factor: 130/121=	**1.07**	
Pack Rat Contingency bulkhead volume: (10'x13'x1.6'/)27=	7.7	cu. yd. each
Terry Tunnel bulkhead volume: (11'x11'x8')/27=	35.9	cu. yd. each
Pack Rat Contingency increase factor: 7.7/35.9=	**0.21**	
1996 laborer $16.39/hr. + 35% benefits =	$22.13	per hr
2007 laborer $26.91/hr	$26.91	per hr
Labor increase factor = $26.91/$22.13=	**1.18**	

Ventilation:

Pack Rat Contingency Bulkhead estimated distance from the portal 4750'
Terry Tunnel bulkhead 3800 linear feet (actual) inby the portal
Pack Rat Contingency bulkhead ventilation factor: 4750/3800 = **1.25**

Adjustment from 1996 cost to 2007 costs from Means (2007)

Index for 2007=	166.3
Index for 1996=	110.2
166.3/110.2=	**1.5**

A) Bulkhead Installation Labor Estimate, includes Overhead and Profit

Task and Cost Item				Quantity				Extended Cost
1) Initial site cleaning								
Terry Tunnel				50	hrs.			
				Terry Tunnel Hours		Factor		
Pack Rat Contingency Bulkhead				50		0.21	hr/hr	
Pack Rat Contingency Bulkhead								
1 laborer inside @	$	26.91	per hr.	10.5	hrs.			$ 282.56
1 laborer outside @	$	26.91	per hr.	10.5	hrs.			$ 282.56
1 equip.op. (light) @	$	37.99	per hr.	10.5	hrs.			$ 398.91
							Subtotal	**$ 964.03**
2) Set rebar anchors and fine site cleaning								
Terry Tunnel				50	hrs.			
				Terry Tunnel Hours		Factor		
Pack Rat Contingency Bulkhead				50		0.21	hr/hr	
Pack Rat Contingency Bulkhead								
1 laborer inside @	$	26.91	per hr.	10.5	hrs.			$ 282.56
1 laborer outside @	$	26.91	per hr.	10.5	hrs.			$ 282.56
1 equip.op. (light) @	$	37.99	per hr.	10.5	hrs.			$ 398.91
							Subtotal	**$ 964.03**
3) Build Forms, Set Pipes, Valves, and Rebar, Divert Water								
Terry Tunnel				80	hrs.			
				Terry Tunnel Hours		Factor		
Pack Rat Contingency Bulkhead				80		1.07	hr/hr	
Note: Due to the less head ant Pack Rat Contingency Bulkhead, less thickness, and no valves a reduction factor of 0.6 will be used as well as only 3 laborers inside.						Factor		
						0.6	hr/hr	
Pack Rat Contingency Bulkhead								
3 laborer inside @	$	26.91	per hr.	85.6	hrs.			$ 4,146.39
1 laborer outside @	$	26.91	per hr.	85.6	hrs.			$ 1,382.13
1 equip.op. (light) @	$	37.99	per hr.	85.6	hrs.			$ 1,951.24
Pack Rat Contingency Coffer Dam	$	37.99	per hr.	40	hrs.			$ 1,519.66
							Subtotal	**$ 8,999.43**

4) Brace Form in Preparation for Concrete Pour

Terry Tunnel, General labor					40	hrs.			
Terry Tunnel, Welder					20	hrs.			
				Terry Tunnel Hours		Factor			
Pack Rat Contingency Bulkhead, General labor				40		1.07	hr/hr		
Pack Rat Contingency Bulkhead, Welder				20		1.07	hr/hr		
Pack Rat Contingency Bulkhead									
3 laborer inside @	$	26.91	per hr.	42.8	hrs.			$	4,607.10
1 laborer outside @	$	26.91	per hr.	42.8	hrs.			$	1,151.78
1 welder @	$	47.49	per hr.	21.4	hrs.			$	1,016.27
							Subtotal	**$**	**6,775.15**

5) Set up and pour Bulkhead

Terry Tunnel, General labor					890	hrs.			
Terry Tunnel, Overtime during pour					$ 2,157.30				
Terry Tunnel, salary (management) during pour					$ 2,987.05				
Terry Tunnel, contract labor for pour					$ 864.00				
Terry Tunnel, outside man					100	hrs.			
Pack Rat Contingency Bulkhead				Terry Tunnel Hours		Factor			
General labor @	$	26.91	per hr.	890		0.21	hr/hr	$	5,029.60
Overtime during pour				$ 2,157.30		0.21	hr/hr	$	453.03
Salary (management) during pour				$ 2,987.05		0.21	hr/hr	$	627.28
Contract labor for pour				$ 864.00		0.21	hr/hr	$	181.44
Outside man @	$	26.91	per hr.	100		0.21	hr/hr	$	565.12
							Subtotal	**$**	**6,856.48**

6) Strip Forms, move equipment, Grout Bulkhead

Terry Tunnel, general labor					120	hrs.			
Note: Reduction factor for using less bulky forms 0.8									
Pack Rat Contingency Bulkhead				Terry Tunnel Hours		Factor			
General labor @	$	26.91	per hr.	120		1.07*0.8	hr/hr	$	2,764.26
							Subtotal	**$**	**2,764.26**

7) Install Ventilation

Terry Tunnel, general labor 40 hrs.

Pack Rat Contingency Bulkhead			Terry Tunnel Hours	Factor			
General labor @	$ 26.91	per hr.	40	1.25	hr/hr		$ 1,345.53
					Subtotal		**$ 1,345.53**
Subtotal Labor, includes overhead and profit							$ 28,668.93
Add 5% DRMS administration required by statute							$ 1,433.45
Labor Component of Bulkhead Bond					**Subtotal**		**$ 30,102.38**

B) Supplies, Parts, Equipment Rental, and Engineering Costs, including Overhead and Profit

Task and Cost Item			Quantity				Extended Cost
1) Set Rebar Anchors and Fine Site Cleaning							
Terry Tunnel							
* Sand Blaster	$ 20.00	per day	3	days			
* Non-shrink grout, 1-bag	$ 10.16	per bag	1	bag			
* Sand blaster sand, 30# grit, 100 lb. bag	$ 7.36	per bag	3	bag			
	Terry Tunnel price		Terry Tunnel Quantity		Price Factor	Size Factor	
Pack Rat Contingency Bulkhead							
* Sand Blaster	$ 20.00	per day	3	days	1.5	0.21	$ 18.90
* Non-shrink grout, 1-bag	$ 10.16	per bag	1	bag	1.5		$ 15.24
* Sand blaster sand, 30# grit, 100 lb. bag	$ 7.36	per bag	1	bag	1.5		$ 11.04
						Subtotal	**$ 45.18**
2) Build Forms, Set Pipes, Valves, and Rebar, Divert Water							
Terry Tunnel							
* 8"x8"x16' timbers	$ 2,196.00	each					
* 2"x6"x14' timbers	$ 381.00	each					
* 2"x12"x14' timbers	$ 150.00	each					
* 8" DRISCO pipe w/ flanges	$ 420.00	each					
* #9 rebar	$ 928.00	each					
* #6 rebar	$ 128.00	each					
* Concrete Block (pipe support)	$ 252.00	each					
* 6" stainless bypass pipe	$ 2,250.00	each					
* 1" stainless monitoring pipe	$ 618.00	each					
* 6" stainless gate valve	$ 3,986.00	each					
* Miscellaneous bolt packages and gaskets	$ 155.00	each					
* Freight	$ 200.00	each					

Note: Reduction factor of 0.7 will be used because of less head, less materials, less complex

Pack Rat Contingency Bulkhead	Terry Tunnel price		Reduction Factor	Price Factor	Size Factor		
* 8"x8"x16' timbers	$ 2,196.00	each	0.7	1.5	1.07	$	2,467.21
* 2"x6"x14' timbers	$ 381.00	each	0.7	1.5	1.07	$	428.05
* 2"x12"x14' timbers	$ 150.00	each	0.7	1.5	1.07	$	168.53
* 8" DRISCO pipe w/ flanges	Not used at Pack Rat Cor						
* #9 rebar	$ 928.00	each	0.7	1.5	1.07	$	1,042.61
* #6 rebar	$ 128.00	each	0.7	1.5	1.07	$	143.81
* Concrete Block (pipe support)	$ 252.00	each	0.7	1.5		$	264.60
* 6" stainless bypass pipe	Not used at Pack Rat Cor						
* 1" stainless monitoring pipe	$ 618.00	each	0.7	1.5	1.6"/8"	$	129.78
* 6" stainless gate valve	Not used at Pack Rat Cor						
* Miscellaneous bolt packages and gaskets	$ 155.00	each	0.7	1.5		$	162.75
* Freight	$ 200.00	each	0.7	1.5		$	210.00
					Subtotal	**$**	**5,017.33**

3) Brace Forms

Terry Tunnel		
* Equipment: Welder and torch	$ 200.00	each
* Angle Iron	$ 296.00	each
* #8 thread bar	$ 163.00	each
* #8 bevel and flat washers	$ 71.00	each
* 2" schedule 20 pipe	$ 148.00	each
* Celtite	$ 81.00	each

Note: Reduction factor of 0.7 will be used because of less head, less materials, less complex

Pack Rat Contingency Bulkhead	Terry Tunnel price		Reduction Factor	Price Factor	Size Factor		
* Equipment: Welder and torch	$ 200.00	each	0.7	1.5	1.07	$	210.00
* Angle Iron	$ 296.00	each	0.7	1.5	1.07	$	310.80
* #8 thread bar	$ 163.00	each	0.7	1.5	1.07	$	171.15
* #8 bevel and flat washers	$ 71.00	each	0.7	1.5	1.07	$	74.55
* 2" schedule 20 pipe	$ 148.00	each	0.7	1.5	1.07	$	155.40
* Celtite	$ 81.00	each	0.7	1.5	1.07	$	85.05
					Subtotal	**$**	**1,006.95**

4) Set up and Pour Bulkhead

Terry Tunnel

* Rent two 9 cu.ft. mixers	$	500.00	per month
* Rent auger feed	$	250.00	per month
* Rent concrete pump	$	2,000.00	per month
* Rent concrete pipe and hose	$	350.00	per month
* Concrete vibrator	$	60.00	per month
* Rent roller conveyors	$	250.00	per month
* Concrete	$	6,679.00	material cost
* Delay set	$	248.00	each
* Plasticizer	$	136.00	each
* Type V cement	$	280.00	each
* Meals during pour	$	345.00	each

Note: Increase factor of 20%will be used because a shoter rental will be a higher cost per time

Pack Rat Contingency Bulkhead	Terry Tunnel price				Price Factor	Size Factor		
* Rent 9 cu.ft. mixers	$	62.50	per week	2 week	1.5	1.2	$	225.00
* Rent auger feed	$	62.50	per week	2 week	1.5	1.2	$	225.00
* Rent concrete pump	$	500.00	per week	2 week	1.5	1.2	$	1,800.00
* Rent concrete pipe and hose	$	87.50	per week	2 week	1.5	1.2	$	315.00
* Concrete vibrator	$	15.00	per week	2 week	1.5	1.2	$	54.00
* Rent roller conveyors	$	62.50	per week	2 week	1.5	1.2	$	225.00
* Concrete	$	6,679.00	material cost		1.5	0.21	$	2,103.89
* Delay set	$	248.00	each		1.5	0.21	$	78.12
* Plasticizer	$	136.00	each		1.5	0.21	$	42.84
* Type V cement	$	280.00	each		1.5	0.21	$	88.20
* Meals during pour	$	345.00	each		1.5	0.21	$	108.68
						Subtotal	**$**	**5,265.72**

5) Strip Forms, Move Equipment, and Grout Bulkhead

Terry Tunnel

* Grout mixer and pump	$	250.00	per week	2	weeks
* Packers	$	480.00	each		
* Type V cement	$	112.00	each		

Pack Rat Contingency Bulkhead	Terry Tunnel Price			Price Factor	Size Factor		
* Grout mixer and pump	$ 250.00	per week	2 weeks	1.5		$	750.00
* Packers	$ 480.00	each		1.5	1.05	$	756.00
* Type V cement	$ 112.00	each		1.5	1.05	$	176.40
					Subtotal	**$**	**1,682.40**

6) Miscellaneous Costs

Terry Tunnel

* Engineering design	$	4,538.00	each
* Engineering Inspections	$	2,077.00	each
* Material Testing	$	168.00	each
* Miscellaneous small hand tool usage	$	3,000.00	each
* Miscellaneous materials (nails, bits, wire, etc.)	$	3,000.00	each
* Diesel	$	1,500.00	each
* Electricity	$	5,000.00	per month
* Safety supplies	$	1,000.00	each
* Intake screen, bypass pipe	$	200.00	each

Note: Reduction factor of 0.7 will be used for items that apply because of less head, less materials, less complex; a reduction factor of 0.5 will be used for Safety supplies because they will be used for half as long, and the enginerring design for the Pack Rat Contingency Bulkhead will be very similar to the Whirlwind Decline Bulkhead so a reduction factor of 0.5 will be used

Pack Rat Contingency Bulkhead	Terry Tunnel Price			Price Factor	Size Factor	
* Engineering design	$ 4,538.00	each		1.5	0.5	$ 3,403.50
* Engineering Inspections	$ 2,077.00	each		1.5		$ 3,115.50
* Material Testing	$ 168.00	each		1.5		$ 252.00
* Miscellaneous small hand tool usage	$ 3,000.00	each		1.5	1.07*0.7	$ 1,011.15
* Miscellaneous materials (nails, bits, wire, etc.)	$ 3,000.00	each		1.5	1.07*0.7	$ 1,011.15
* Diesel	$ 1,500.00	each		3	0.7	$ 3,150.00
* Electricity	$ 1,250.00	per week	2 weeks	1.5		$ 3,750.00
* Safety supplies	$ 1,000.00	each		1.5	0.5	$ 750.00
* Intake screen, bypass pipe	$ 200.00	each		1.5		$ 300.00
					Subtotal	**$ 16,743.30**

7) Install Ventilation

Terry Tunnel		
* Generator	$ 800.00	each
* Fan	$ 3,000.00	each
* Flatbed truck and loader	$ 700.00	each
* Contractor install	$ 6,400.00	each
* Vent bag	$ 4,755.00	each

Pack Rat Contingency Bulkhead	Terry Tunnel Price		Price Factor	Size Factor	
* Generator	$ 800.00	each	1.5		$ 1,200.00
* Fan	$ 3,000.00	each	1.5		$ 4,500.00
* Flatbed truck and loader	$ 700.00	each	1.5		$ 1,050.00
* Contractor install	$ 6,400.00	each	1.5	1.25	$ 12,000.00
* Vent bag	$ 4,755.00	each	1.5	1.25	$ 8,915.63
				Subtotal	**$ 27,665.63**

Subtotal Supplies, Equipment, and Engineering, includes overhead and profit	$ 57,426.51
Add 5% DRMS administration required by statute	$ 2,871.33
Supplies, Equipment, and Engineering Component of Bulkhead Bond	**$ 60,297.83**

C) Other Equipment Costs, not including Overhead and Profit

Task and Cost Item				Quantity				Extended Cost
1) Initial Site Cleaning								
Terry Tunnel								
* Two yard Load Haul Dump	$	45.00	per hr	10.5	hrs.			
Pack Rat Contingency Bulkhead		Terry Tunnel Price				Price Factor	Size Factor	
* 1.25 yard Load Haul Dump	$	35.00	per hr	10.5	hrs.	1.5		$ 551.25
Note: 1.25 yard LHD will bee on site for Bulkhead building.								
2) Set Rebar Anchors and Fine Site Cleaning								
Terry Tunnel								
* 1.25 yard Load Haul Dump	$	35.00	per hr	10.5	hrs.			
Pack Rat Contingency Bulkhead		Terry Tunnel Price				Price Factor	Size Factor	
* 1.25 yard Load Haul Dump	$	35.00	per hr	10.5	hrs.	1.5		$ 551.25
3) Build Forms, Set Valves, and Rebar, Divert Water								
Terry Tunnel								
* 1.25 yard Load Haul Dump	$	35.00	per hr	85.6	hrs.			
Note: Due to the less head at Pack Rat Contingency Bulkhead, less thickness, and no valves a reduction factor of 0.6 will be used as well as only 3 laborers inside.								
Pack Rat Contingency Bulkhead		Terry Tunnel Price				Price Factor	Size Factor	
* 1.25 yard Load Haul Dump	$	35.00	per hr	85.6	hrs.	1.5	0.6	$ 2,696.40
4) Set up and Pour Bulkheads								
Terry Tunnel								
* 1.25 yard Load Haul Dump	$	35.00	per hr	21	hrs.			
* Forklift	$	20.00	per hr	21	hrs.			
Pack Rat Contingency Bulkhead		Terry Tunnel Price				Price Factor	Size Factor	
* 1.25 yard Load Haul Dump	$	35.00	per hr	21	hrs.	1.5		$ 1,102.50
* Forklift	$	20.00	per hr	21	hrs.	1.5		$ 630.00

5) Strip Forms, Move Equipment, and Grout Bulkhead

Terry Tunnel

* 1.25 yard Load Haul Dump	$ 35.00	per hr	120	hrs.	

Note: Reduction factor for leaving the forms in place 0.8

Pack Rat Contingency Bulkhead	Terry Tunnel Price				Price Factor	Size Factor		
* 1.25 yard Load Haul Dump	$ 35.00	per hr	100	hrs.	1.5	1.07	$	5,617.50

6) Miscellaneous Costs

Terry Tunnel

* Compressor usage	$ 3,000.00	each
* Air Bean 25 pump usage	$ 1,200.00	each
* Flight 123 HP pump usage	$ 1,620.00	each
* GD 83 jackleg	$ 1,125.00	each
* Outside loader	$ 6,000.00	each

Note: A reduction factor of 0.5 will be used because less material will be moved and less work will be done and a short rental period factor of 20% will be used

Pack Rat Contingency Bulkhead	Terry Tunnel Price		Price Factor	Size Factor		
* Compressor usage	$ 3,000.00	each	1.5	0.5*1.2	$	2,700.00
* Air Bean 25 pump usage	Not used at Pack Rat Contingency					
* Flight 123 HP pump usage	Not used at Pack Rat Contingency					
* GD 83 jackleg	$ 1,125.00	each	1.5	0.5*1.2	$	1,687.50
* Outside loader	$ 6,000.00	each	1.5	0.5*1.2	$	5,400.00

Subtotal Other Equipment, not including overhead and profit	$	20,936.40
Overhead and profit@13.07%	$	2,736.39
Subtotal	$	23,672.79
Add 5% DRMS administration required by statute	$	1,183.64
Other Equipment Component of Bulkhead Bond	**$**	**24,856.43**

Bond Amount for Pack Rat Contingency Bulkhead

Supplies, Equipment, and Engineering	$	90,400.21
Other Equipment	$	24,856.43
Total	**$**	**115,256.64**