



## UEBLACKER ASSOCIATES

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NATURAL ENERGY RESOURCES COMPANY

2009-04-17

P. O. Box 567

Palmer Lake, CO 80133

Attention: Dave Miller, President

**RE: Interim Report on Evaluation of CCP Phase I (see our Agreement,  
Dated 2009-04-0800)**

Dear Dave:

Preliminary engineering analyses and estimates of probable construction costs and revenues were completed for the proposed Taylor Park/ Union Park pumped hydro energy storage (PHES) operation and associated trans-mountain diversion. These analyses and estimates are based on further evaluation of USBR Trans-mountain Diversion Alternatives # 6 and # 13. The cost summary sheets are attached for your review and consideration. You will note the total investment for this option can be broken down as follows:

- Blue Mesa/ Taylor Park Reservoir Pipeline and Pumping Plants \$1,221,255,414.49
  - Union Park Dam and Reservoir, Taylor Park Reservoir Enlargement, Union Park/Taylor Park 1,500 MW PHES Facility, and Trans-mountain Diversion from Union Park Reservoir to Antero Reservoir
- \$6,051,688,289.72

Please call if I can answer any questions or provide additional information. Thanks.

Sincerely,

UEBLACKER ASSOCIATES

Hofst Ueblacker, P.E.

Attachments

REVISED ESTIMATE OF PROBABLE CONSTRUCTION COSTS prepared by Horst Ueblacker, P. E., April 16, 2009  
 Proposed U.S. Bureau of Reclamation (USBR) Transmountain Diversion Alternative # 6  
 Description: Pump Lift from Blue Mesa Reservoir to Taylor Park Reservoir (eliminate Jan 09 Cost Items 4 through 12)  
 Project Water Supply (Municipal and Industrial): 210,000 acre-feet/12 months (1987), 300,000 acre-feet/10 months (2009)  
 Project Power and Energy Requirements: 1987: 52.6 MW (Power); 414,512 MWH (Energy)  
 2009: 126.0 MW (Power); 919,800 MWH (Energy)

CEF = Cost Escalation Factor

Item	Features/Capacity/Size	Jan 87 Costs	CEF	Jan 09 Costs
1	Blue Mesa Pumping Plant Intake Structure: Q=240 cfs (1987), Q=500 cfs (2009)	\$ 3,281,000.00	2.25	\$ 7,382,250.00
2	Blue Mesa Pumping Plants: 5 EA. @ Q=240 cfs, TDH=440' (1987) 3 EA. @ Q=500 cfs, TDH=733.33' (2009)	\$ 40,105,000.00	4.86	\$ 195,034,625.50
3	Blue Mesa Pipeline: Q=240 cfs, L=187,400', d=8' (1987) Q=500 cfs, L=187,400', d=9' (2009)	\$ 91,826,000.00	4.65	\$ 426,990,900.00
4	Taylor Park Tunnel Intake Structure, Q=330-410 cfs	\$ 2,475,000.00	0.00	\$ -
5	Taylor Park Tunnel, Q=330-410 cfs, d=9', L=97,500'	\$ 258,995,000.00	0.00	\$ -
6	Cottonwood Creek Pipeline, Q=330-410 cfs, d=9', L=9,900'	\$ 6,336,000.00	0.00	\$ -
7	Arkansas Valley Siphon, Q=330-410 cfs, d=9', L=36,100'	\$ 135,205,000.00	0.00	\$ -
8	Midland Hill Pipeline, Q=330-410 cfs, d=9', L=4,700'	\$ 3,196,000.00	0.00	\$ -
9	Hop Gulch Siphon, Q=330-410 cfs, d=9', L=2,400'	\$ 6,196,000.00	0.00	\$ -
10	Piles Pasture Pipeline, Q=330-410 cfs, d=9', L=7,800'	\$ 4,992,000.00	0.00	\$ -
11	Trout Creek Pass Tunnel, Q=330-410 cfs, d=9', L=52,600'	\$ 119,629,000.00	0.00	\$ -
12	Salt Creek Drop Structure, Q=330-410 cfs, L=500'	\$ 53,000.00	0.00	\$ -
13	Transmission Line, 69 KV, L=166,000'	\$ 3,773,000.00	1.85	\$ 6,980,050.00
<b>Subtotal</b>		\$ 676,062,000.00		\$ 636,387,825.50
Unlisted Items (20%)		\$ 135,212,400.00		\$ 159,096,956.38
<b>Subtotal</b>		\$ 811,274,400.00		\$ 795,484,781.88
Engineering, Const. Admin., and Legal (25%)		\$ 202,818,600.00		\$ 198,871,195.47
<b>Total Construction Cost</b>		\$ 1,014,093,000.00		\$ 994,355,977.34
Interest during Construction @ 4.196%, n = 3 years (1987), 5 years (2009)		\$ 133,100,170.78		\$ 226,899,437.14
<b>Total Investment</b>		\$ 1,147,193,170.78		\$ 1,221,255,414.49
<b>Annual Equivalent Cost</b>				
Amortized Investment 50 yrs. @ 8 7/8% (1987) and 5% (2009)		\$ 103,284,440.75		\$ 66,896,384.80
OM (Excluding power and energy costs/revenues) @ 4.98%		\$ 5,143,565.15		\$ 3,331,439.96
Replacement Storage @ Blue Mesa (\$50/acre-ft.)		\$ 10,500,000.00		\$ 15,000,000.00
Power/Energy: 1987 (\$126,720/MW, \$25.22/MWH); 2009 (\$154,789/MW, \$26.50/MWH)		\$ 17,119,464.64		\$ 43,878,114.00
<b>Total Annual Cost</b>		\$ 136,047,470.54		\$ 129,105,938.76
<b>Annual Cost per acre-ft. (\$/acre-ft.)</b>		\$ 647.85		\$ 614.79



Item	Features/Capacity/Size	Jan 87 Costs	CEF	Jan 09 Costs
1	Union Park Dam and Reservoir: 900,000 AF (1987); 1.2 million AF (2009) plus 1,500 MW Pumped Hydro Energy Storage (PHES) Facility between enlarged Taylor Park Reservoir and Union Park Reservoir	\$ 32,428,000.00		\$ 2,046,981,547.00
2	Union Park Inlet/Outlet Structure, Q=1,000-1,400 cfs	\$ 4,000,000.00	0.00	\$ -
3	Union Park Intake Channel, Q=1,000-1,400 cfs	\$ 1,038,000.00	0.00	\$ -
4	Taylor Park Intake/Outlet Structure, Q=1,000-1400 cfs	\$ 3,000,000.00	0.00	\$ -
5	Conveyance Syst. Taylor-Union Pk., Q=1,000-1,400 cfs, d=8.6-11', L=11,400'	\$ 26,452,000.00	0.00	\$ -
6	Power/Pump Plant Structures and Improvement 1 EA.	\$ 5,000,000.00	0.00	\$ -
7	Pump/Turbine and Motor/Generator, 1 EA. 60MW, Q=1,000-1,400 cfs	\$ 9,900,000.00	0.00	\$ -
8	Accessory Electrical and Misc. Equipment, LS.	\$ 2,840,000.00	0.00	\$ -
9	Access Tunnels and Cableway, d=11', L=5,700'	\$ 7,073,000.00	0.00	\$ -
10	Union Park Tunnel, Q=500 cfs, d=11', L=75,400'	\$ 212,880,000.00	2.04	\$ 434,275,200.00
11	South Cottonwood Creek Pipeline, Q=500 cfs, d=8', L=15,500'	\$ 8,525,000.00	2.19	\$ 18,669,750.00
12	Arkansas Valley Siphon, Q=500 cfs, d=8', L=64,300'	\$ 227,612,000.00	2.19	\$ 498,470,280.00
13	Sevenmile Creek Pipeline, Q=500 cfs, d=8', L=4,300'	\$ 2,150,000.00	2.19	\$ 4,708,500.00
14	Trout Creek Pass Tunnel, Q=500 cfs, d=11', L=29,900'	\$ 66,894,000.00	2.04	\$ 136,463,760.00
15	Salt Creek Drop Structure/Creek Stabilization, Q=500 cfs, L=23,000'	\$ 3,680,000.00	2.07	\$ 7,617,600.00
16	Transmission Line, 69KV, L=150,000'	\$ 3,409,000.00	1.85	\$ 6,306,650.00
	<b>Subtotal</b>	<b>\$ 616,881,000.00</b>		<b>\$ 3,153,493,287.00</b>
	Unlisted Items (20%)	\$ 123,376,200.00		\$ 788,373,321.75
	<b>Subtotal</b>	<b>\$ 740,257,200.00</b>		<b>\$ 3,941,866,608.75</b>
	Engineering, Const. Admin., and Legal (25%)	\$ 185,064,300.00		\$ 985,466,652.19
	<b>Total Construction Cost</b>	<b>\$ 925,321,500.00</b>		<b>\$ 4,927,333,260.94</b>
	Interest during Construction @ 4.196%, n = 3 years (1978), 5 years (2009)	\$ 121,448,870.74		\$ 1,124,355,028.79
	<b>Total Investment</b>	<b>\$ 1,046,770,370.74</b>		<b>\$ 6,051,688,289.72</b>
	<b>Annual Equivalent Cost</b>			
	Amortized Investment 50 yrs. @ 8 7/8% (1987) and 5% (2009)	\$ 94,243,145.00		\$ 331,491,728.69
	OM (Excluding power and energy costs/revenues) @ 4.98%	\$ 4,693,308.62		\$ 16,508,288.09
	Replacement Storage @ Blue Mesa (\$50/acre-ft.)	\$ 3,000,000.00		\$ 15,000,000.00
	Annual Power and Energy Costs: 1987 (\$126,720/MW, \$25.22/MW/h); 2009 (\$1,300/MW, \$45.77/MW/h)	\$ 11,667,655.20		\$ 249,363,998.67
	Annual Power and Energy Revenues: 1987 (\$108,015/MW, \$25.22/MW/h) 2009: (\$1,300/MW, \$99.54/MW/h)	\$ (8,614,512.00)		\$ (450,294,965.00)
	<b>Total Annual Cost</b>	<b>\$ 104,989,596.82</b>		<b>\$ 162,069,050.45</b>
	<b>Annual Cost per acre-ft (\$/acre-ft.)</b>	<b>\$ 874.91</b>		<b>\$ 540.23</b>

**REVISED ESTIMATE OF PROBABLE CONSTRUCTION COSTS prepared by Horst Ueblacker, P.E., April 15, 2009 cont'd. PAGE 2 OF 2**  
**Proposed U.S. Bureau of Reclamation (USBR) Transmountain Diversion Alternative # 13, Union Park Water Supply Project**

Project Water Supply (Municipal and Industrial): 60,000 acre-feet/12 months (1987), 300,000 acre-feet/10 months (2009).

Project Power and Energy Requirements 1987: 60.0 MW (Power); 161,160 MWh (Energy); 2009: 1,546.55 MW (Power); 5,404,271 MWh (Energy).

Project Power and Energy Production 1987: 60.0 MW (Power); 84,600 MWh (Energy); 2009: 1,546.55 MW (Power); 4,503,560.88 MWh (Energy).

CE = Cost Escalation Factor

**Note: Jan 09 Costs of Items 2 through 9 are included in Item 1 (see attached summary sheet Page 1 of 2 of "Revised Estimate of Probable Construction Costs and Revenues for Union Park/Taylor Park Pumped Storage Operation", dated 4/10/2009. Item 1 includes \$36,462,592 for the proposed enlargement of Taylor Park Reservoir to 167,500 acre-feet (Elev. HWL 9,360 feet).**



REVISED ESTIMATE OF PROBABLE CONSTRUCTION COSTS AND REVENUES FOR UNION PARK/TAYLOR PARK PUMPED STORAGE OPERATION, prepared by Horst Uebliacker, P.E, 4/10/2009

Power and Capacity	240.58 Meters		
Head	20,969,500.00 M <sup>3</sup>		
Limiting Forebay Volume	20,000.00 acre feet		
Res. Surface Area @ El. 10,120 ft.	5,020.00 Acres		
Flow Rate Min	582.49 M <sup>3</sup> /S		
Flow Rate Max	728.11 M <sup>3</sup> /S		
Storage Time Min	8.00 hours		
Storage Time Max	10.00 hours		
Power Min	1,237.24 MW		
Power Max	1,546.55 MW		
Energy	12,372.42 MWh/day		** Assumes 15% of forebay volume is unused
Revenue			
Cycle Value	\$552,065		
Annual Revenue	\$200,951,597		
Avoided NG Cost	\$126,662,694		
Avoided CO <sub>2</sub> Emissions	4,856,510.27 tons[metric] of CO <sub>2</sub> avoided/year		
CO <sub>2</sub> value	\$24,282,551.36 value per annual CO <sub>2</sub> reduction		
Avoided SO <sub>2</sub> Emissions	1,082.67 tons[metric] of SO <sub>2</sub> avoided/year		
SO <sub>2</sub> value	\$649,604.72 Annual Traded Value		
Total	\$352,546,447.34 Total Annual Value		
Total	\$225,234,148.46 Counted Annual Value		
Cost Breakdown by %			
Environmental Impact Statements and Federal Permits		%	\$41,199,159
Power Station Structures and Improvements		2%	\$175,529,017
Reservoirs, Dams, Waterways, and Access Roads		9%	\$445,259,910
Reversible Pump Turbines and Valve Governors		22%	\$185,396,215
Generator Motors and Static Starting Equipment		9%	\$128,747,372
Accessory Electrical Power and Plant Substation Equipment		6%	\$204,485,159
Engineering, Administrative, and Legal Services		10%	\$284,699,921
Subsurface Exploration, Design, and Construction		14%	\$545,202,203
OTHER: Enlargement of Taylor Park Reservoir to 167,500 acre-feet (Elev. HWL 9,360 feet)		27%	\$36,462,592
Cost Estimate Based on Needed Facilities and other Costs			\$2,046,981,547
		TOTAL	

Payback Period and Life Cycle overnight cost	\$2,046,981,547	Cost based on Max Cost of shortest storage duration & itemized cost entries.
Does CO2 Have Market Value?	yes yes or no	CO2 valued at \$24,282,551.36 at \$5/ton
Annual Rev	\$327,614,291	Revenue based on Min storage time and buying vs. selling data
Payback Time	13 years	
Life Time Net Present Value	\$46,045,523,097	100 year plant lifetime
Interest Rate	6.50%	
O & M	\$10,234,908	per year
Construction Time	5 years	
Annual % increase in Cost	1.00%	