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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSIONOFFICE OF THE SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Thomas S. Moore, Presiding Officer
Thomas D. Murphy, Special Assistant
Dr. Robin Brett, Special AssistantIn the Matter of
Hydro Resources, Inc.
PO Box 15910

Rio Rancho, New Mexico 87174

) Docket No.: 40-8968-ML
)
)
) ASLBP No. 95-706-01-ML
)
) Date: November 21, 2001
)
)**HYDRO RESOURCES, INC.'S**
SUBMITTAL OF A RESTORATION ACTION PLAN
FOR CROWNPOINT

By Memorandum and Order dated May 25, 2001 (the "Order"), the Presiding Officer requested that licensee, Hydro Resources, Inc. ("HRI"), submit to the NRC Staff, by November 21, 2001, a restoration action plan ("RAP") for the Crownpoint Uranium Project ("CUP") Crownpoint site. The Order further requested that HRI serve the RAP on all parties in the above-captioned matter. In keeping with this request, attached hereto is the RAP for the CUP Crownpoint site, and Certificate of Service.

As the Presiding Officer is aware, the CUP will consist of an *in situ* leach uranium extraction and processing operation. The extraction process will consist of injecting lixiviant into the uranium ore body to solubilize the uranium present and pumping the

uranium-bearing groundwater to a nearby processing facility, where the uranium will be separated from the groundwater by ion exchange. Ion exchange resin will be further processed for uranium at the Crownpoint Central Plant.

In situ leach uranium recovery will be conducted from the Crownpoint site, and resin will be processed and yellowcake packaged at the Crownpoint Central Plant. Thus, the attached decontamination, decommissioning, and reclamation plan focuses on groundwater restoration of the Crownpoint ore body aquifer and Crownpoint well plugging.¹ Included are detailed calculations for restoring the Crownpoint site to its pre-mining condition. These calculations are based upon LC 9.5 requirements that nine pore volumes will be required to restore the Crownpoint ore body aquifer and incorporate the institutional experience gained by HRI's sister company, URI, in its successful reclamation of *in situ* leach mined ore body aquifers in Texas. HRI proposes to obtain surety and performance bonds, in the forms attached to the Section 8 RAP, in amounts based upon the estimates presented with the attached plan.

HRI submits that the attached plan and cost estimates are consistent with the NRC's "Technical Position on Financial Assurances for Reclamation, Decommissioning, and Long-Term Surveillance and Control of Uranium Recovery Facilities"² and Criterion 9 of Appendix A, Part 40.³ Moreover, HRI's license, at LC 9.5, which provides for the annual reassessment of the adequacy of HRI's surety, ensures that HRI, under

¹ There will be no processing facilities at the Crownpoint site; therefore, cost estimates for decommissioning such facilities are not included in the RAP for Crownpoint.

² Division of Low-Level Waste Management and Decommissioning, U.S. Nuclear Regulatory Commission (October 1988).

³ 10 C.F.R. Part 40, Appendix A, Criterion 9.

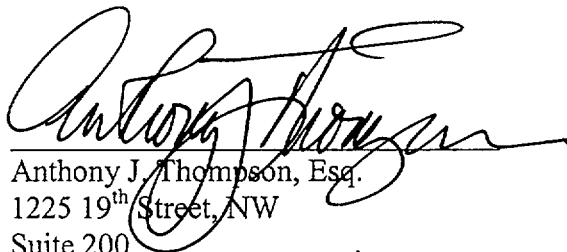
supervision of NRC Staff, will at least annually review HRI's financial assurance instruments and adjust them as conditions and experience warrant.

CONCLUSION

In keeping with the Presiding Officer's May 25, 2001 Order, attached is HRI's RAP for the CUP Crownpoint site. This submittal and accompanying cover letter and RAP have been served on the parties to this matter in accordance with the May 25, 2001 Order and as indicated in the attached Certificate of Service.

Dated: November 21, 2001

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Anthony J. Thompson", is written over a horizontal line.

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

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CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing Hydro Resources, Inc.'s Submittal of a Restoration Action Plan for the Crownpoint site in the above-captioned proceeding has been served on the following by hand delivery (as indicated), and by first-class mail, postage pre-paid (as indicated), on this 21st day of November.

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November 19, 2001

Hydro Resources, Inc.

**CROWNPOINT
RESTORATION ACTION PLAN**

License No: SUA-1580

November 19, 2001

November 19, 2001

CUP PROJECT AND CROWNPOINT SITE COST SUMMARY

November 19, 2001

CROWNPOINT URANIUM PROJECT
Financial Assurance Plan

Project Cost Summary

Category	Project Total	Contingency/ Profit	Totals
Churchrock Section 8	\$8,180,872	\$1,277,021	\$9,457,893
Churchrock Section 17	\$4,456,265	\$674,381	\$5,130,646
Unit 1	\$10,482,586	\$1,619,633	\$12,102,219
Crownpoint	\$14,188,373	\$2,205,568	\$16,393,941
Totals	\$37,308,096	\$5,720,472	\$43,084,699

November 19, 2001

CROWNPOINT URANIUM PROJECT
Restoration Action Plan for the Crownpoint Site

Cost Summary

Category	Project Total	Contingency/ Profit 15%	Contingency/ Profit 25%
Groundwater Restoration	\$10,890,592	\$1,633,589	
Stability Analysis	\$427,160	\$64,074	
Well Plugging	\$2,037,902	\$305,685	
Equipment Removal	\$59,600	\$8,940	
Wellfield D & D	\$402,795		\$100,699
Building D & D	\$98,775		\$24,694
Surface Reclamation	\$271,549		\$67,887
Totals	\$14,188,373	\$2,012,288	\$193,280
Contingency/Profit			\$2,205,568
Total Surety			\$16,393,941

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CROWNPOINT - RESTORATION ACTION PLAN

A. INTRODUCTION

The following summarizes the Restoration Action Plan for Crownpoint site location (RAP-CP). Shown in Attachment A-1, the estimate puts the costs of restoration by an independent contractor at \$16,393,941 over a approximately eight year period which is based on the conservative assumption that all reclamation activities are postponed until the end of the mine life with the resulting liabilities accumulated until the end. In practice, within the wellfield, individual wells will be shut down when they cease to be economically productive and when an entire segment of a wellfield has been depleted of uranium, restoration will be initiated simultaneous with production in new segments of the mine. As a result, at the end of the mine life at the Crownpoint location, a substantial proportion of the groundwater restoration cost that had been contemplated in this plan will also have been complete. This progressive restoration is the reason that annual surety reviews are completed pursuant to LC 9.5.

The RAP encompasses the full cycle activities necessary to:

- ◆ Restore the groundwater at the Crownpoint site to levels consistent with those described in License¹ Condition 9.3 and the COP².
- ◆ Complete a six-month stabilization period during which the chemistry of the groundwater remains constant.
- ◆ Complete the plugging and abandonment ("P&A) of all wells.
- ◆ Radiological decontamination buildings, process vessels, and other structures, or affected areas.
- ◆ Surface reclamation, decommission and obtain release for unrestricted use of the surface and revegetation of restored well fields.

The RAP-CP has been compiled with the absence of actual development in the field that would normally be used as justification for the basic assumptions. The greatest potential for inaccuracy that may result from the absence of real information is in the mine area, where actual drilling will reveal details in the nature of the ore and mine zone. Additionally, there may be other differences in the reclamation costs that will result once "as built" conditions are realized.

The sequence of mining activity and the resulting schedule for production and restoration may also differ from what the RAP-CP budget reflects. Based on HRI's ability to obtain economic uranium sales contracts, production rates may be more or less than what is expected. A change in the development rate would be reflected in the overall groundwater restoration schedule and possibly the sizing of the desired equipment.

¹ The "License" that is referenced throughout this RAP means the U.S. Nuclear Regulatory Commission Materials License SUA-1580.

² The "COP" referenced throughout this RAP means the Crownpoint Uranium Project Consolidated Operations Plan, Revision 2.0, August 15, 1997.

The results of the requisite restoration demonstration described in LC 10.28 and COP 10.4.4 may have a significant effect on groundwater restoration costs. An increase or decrease in demonstrated pore volume requirements will have a proportional effect on groundwater restoration costs.

HRI's submittal presented herein employs assumptions that are based on best professional judgment given the data that is currently available. It is a fact that the detail of the RAP budget model exceeds our ability to predict precise field conditions accurately. Necessarily, the accuracy of the budget assumptions will improve as operations proceed. The annual review required by LC 9.5 would provide the iterative format by which NRC can continually update the surety amount that results from the newly available information.

B. SURETY BOND FORMAT

See the Churchrock Section 8/Crownpoint Process Plant Restoration Action Plan, Nov. 17, 2000, Section B for the Surety Bond format

C. STANDBY TRUST AGREEMENT

See the Churchrock Section 8/Crownpoint Process Plant Restoration Action Plan, Nov. 17, 2000, Section C for the Standby Trust format.

D. CONSOLIDATION OF STATE, EPA AND NRC SURETY INSTRUMENTS

In addition to being crafted to comply with the NRC criteria, HRI's proposed Performance Guarantee Bond is designed to address the New Mexico Environmental Department's (NMED's) restoration and reclamation requirements, and U.S. Environmental Protection Agency (USEPA) Underground Injection Control Criteria. These multi-compliant sureties will require multi-agency concurrence. The Bond examples shown in Appendix A are designed to be consistent with 10 CFR Part 40, Appendix A, Criterion 9 (Financial Criteria) which clearly allows for consolidation of State and Federal financial or surety arrangements established to meet restoration, reclamation, and decommissioning costs provided that "the portion of the surety which covers the decommissioning and reclamation of the mill, mill tailings site and associated areas is clearly identified and committed for use in accomplishing these activities." Absent a mill or tailings, essentially all of the process facility, wellfield, and ancillary components of the operations would be subject to the decommissioning requirements of the State of New Mexico and/or U.S. Environmental Protection Agency and the NRC.

E. COST DETAILS FOR RESTORATION AND RECLAMATION ACTIVITIES

1. Introduction

RAP-CP contains details concerning cost basis figures and assumptions, calculations and/or methodologies used in deriving cost estimates, references, for the full cycle groundwater restoration, well plugging and abandonment, surface decommissioning and reclamation, closure and ultimate license termination. This information is designed to be descriptive enough for the NRC staff to determine the acceptability of HRI's proposed cost figures, and is based on an independent contractor performing the decommissioning and reclamation work³ in accordance with 10 CFR Part 40, Appendix A, Criterion 9. HRI reviewed Appendix E of the NRC's draft "Standard Review Plan for In Situ Leach Uranium Extraction License Applications" (NUREG-1569, dated October 1997), and Section 4 of the NRC's "Technical Position on Financial Assurances for Reclamation, Decommissioning, and Long-Term Surveillance and Control of Uranium Recovery Facilities" (dated October 1988) for examples of acceptable "levels of detail" for cost estimates pertaining to this surety plan.

HRI used two different budget formats to present the closure costs estimates in RAP-CP. Costs for groundwater restoration (2) were estimated over time as an operational budget. Final decommissioning costs including analytical stability, plugging and abandonment, equipment removal, wellfield decommissioning, building decommissioning, and surface reclamation (3-8) were budgeted on a lump sum basis. In both formats HRI developed the cost estimate from the bottom – up using the best available cost estimate or quote for the individual component (s) that were considered. HRI also called on the operation management resources of URI, Inc., the sister company who is the oldest⁴ uranium in situ leaching company in the United States.

³ Costs have been estimated using standard budgetary techniques as would be done by a independent contractor. In addition, HRI has included a subtotal category entitled "contractor profit" that included 15% of the total cost for groundwater restoration, groundwater stability analysis, well plugging and equipment removal and 25% of the total cost for wellfield D & D, building D & D, and surface reclamation.

⁴ URI, Inc. is a wholly owned subsidiary of Uranium Resources, Inc. the parent to HRI, Inc. The firm has been in the business of in situ leach uranium recovery since 1977.

2. Groundwater Restoration

2.1. Introduction

In addition to the regulatory guidance provided by NRC, HRI used historic and ongoing company experience with similar groundwater restoration operations in developing its budget model. Groundwater restoration costs are presented as a monthly restoration budget with cumulative total costs. This is an appropriate budget interval because ongoing operational cost such as labor, electricity, reagents, replacement equipment etc. are paid out of cash on a monthly basis. The duration of the restoration cost expenditure was based on the processing and circulation of 9 pore volumes of groundwater as required by license condition 9.5 surety requirement. Surety will be maintained at this level until the number of pore volumes required to restore the ground water quality of a production scale wellfield has been demonstrated as stated in COP Section 10.4.4.

The COP that was submitted in support of the HRI's License contemplated a number of methods for liquid waste treatment and disposal during ground water restoration. The costs that are presented in this budget assume the most conservative liquid waste treatment and disposal option; reverse osmosis treatment ("RO") and brine concentration ("BC"). It is conservative because it is authorized by the current license (other options would require additional licensing steps) and it is the most costly option. If HRI is to pursue one of the other treatment/disposal options described in the COP Revision 2.0 and it is approved in a future licensing action, then HRI will adjust the surety budget accordingly during the annual update review.

RO and BC will be used to treat water during production operations and be used for groundwater restoration conducted in the pilot demonstration and during concurrent restoration that will be ongoing with production activities. Because the cost of restoration equipment such as wellfield pumps, ponds, the RO unit, the BC unit, laboratory equipment, trucks, and field equipment must be incurred for production process operations, they are assumed to be operational capital and are not included as capital requirements in any of the RAP budget lines. NRC will be able to verify the availability of the restoration equipment during routine inspections.

The budget model described in this RAP used 2,102,609,094 gallons of water to size duration of the restoration program against the projected nominal equipment capacity. Rows 21-42 of the restoration budget is a monthly calculation of water treatment capacity that has been cumulated over the term of restoration and compared with the required nine pore volumes of treated water. It is nominal equipment design capacity that is needed to process the requisite gallonage that justifies the length (and cost) of groundwater restoration operations.

2.2. Reverse Osmosis Equipment Description

Reverse osmosis is a water treatment process whereby the majority of dissolved "ions" are filtered from the wastewater, and concentrated into a smaller concentrated brine volume. The resulting product water typically meets, or exceeds drinking water standards, and during restoration activities, is reinjected back into the wellfield further diluting the underground mining

solutions toward baseline quality. For the purpose of this budget model, the concentrated brine stream, representing 20% of the feed volume will be disposed by brine concentration (a form of distillation).

Osmosis is a natural process that occurs in all living cells. With an appropriate semi-permeable membrane as a barrier to solutions of differing concentrations, naturally occurring osmotic pressure forces pure water from the dilute solution to pass through the membrane, and dilute the more concentrated solution. This process will continue until equilibrium exists between the two solutions.

Reverse osmosis (R.O.) is a reversal of the natural osmotic process. By confining a concentrated solution against a semi permeable membrane, and applying a reverse pressure on the concentrate greater than the naturally occurring osmotic pressure, water will move across the membrane ("product water"), and out of the original concentrate, resulting in an even more concentrated solution ("brine"). The membrane rejects the passage of the majority of the dissolved solids while permitting the passage of water.

Post-mining solutions from a depleted mine area will be treated with an anti-scalent which is the only chemical pretreatment budgeted. The solution may next be bulk-filtered across sand filters to remove all solids greater than 30 microns. Cartridge filters will then filter out the remaining solids greater than 1 micron. The solution at this point is ready for the reverse osmosis process. To achieve reverse osmotic purification, the pretreated and filtered solution is pressurized and directed to the first step of a two-stage reverse osmosis process. Approximately 60 percent of the total feed volume will be converted to product or purified water in the first stage. The brine water of the first stage will then act as the feed for the second stage, which yields an overall product or purified to brine ratio of 4:1. The brine generated will be further treated and reduced by brine concentration.

The RO unit was sized to operate at a nominal⁵ capacity of 580 gallons per minute. This design rate has been utilized by URI at similar ISL facilities with excellent results. Additionally, the sizing is optimal because it will allow concurrent restoration to proceed at approximately the same rate production wellfields are depleted. (I.e. with mining and restoration going on concurrently restoration and mining will proceed at similar rates).

RO treatment operating and maintenance costs are included within the O & M budget in Attachment E-2-1.

2.3. Brine Concentrator Equipment Description

A brine concentrator will be used for final reduction of liquid waste. The RO reject stream will be treated with a vertical tube, falling film vapor compressor evaporator followed by a

⁵ RAP-U1's nominal capacity is an estimate. HRI will deal with capacity variances that result from equipment efficiency or downtime by increasing or decreasing the equipment size and possibly adjusting surge capacity. For example, if actual operating results indicate that R.O. equipment downtime is 5% then increasing the equipment design capacity from 580 gpm to 610 gpm would allow the average throughput to remain the same. At this stage it is impossible for HRI to anticipate and adjust for every operational variable that may arise in the future.

steam driven rotary drum dryer to achieve zero liquid discharge (dry solids). The solids will be bulk stored and shipped to an I.I.E.2-byproduct facility for disposal.

Brine concentration is a process that can process a waste stream into deionized water and solid slurry. Electrical utilities in the Four Corners area, and paper, and pulp companies have employed this technology for decades to handle their waste streams. The principle behind the process is based on the ideal Carnot cycle where an initial fixed volume of concentrated brine is heated to boiling temperature. The steam vapor created is mechanically compressed; resulting in a secondary steam vapor whose temperature is elevated (15-20 degrees) by the work energy used during compression. Distilled water is condensed from the secondary steam vapor onto internal heat exchangers. The heat loss during condensation is transferred to the circulating brine on the opposite side of the heat exchanger. The brine's temperature is raised, maintaining the internal boiling environment. This source of heat sustains the creation of primary steam used to feed the compressor. The cycle is continuous so long as energy is added at the compressor stage. The electrical power used in compressing, and elevating the temperature of the primary steam vapor produces distilled product water. The resultant hyper-concentrated brine allows solid precipitate in the form of common salts as determined by the solution's limits for solubility. Typically, for each 100 gallons of waste brine treated, 98 gallons of distilled water and 2 gallon of slurry solids are formed.

The BC was sized to accommodate the anticipated brine that the RO will produce.

BC costs are included within the O & M budget in Attachment E-2-1.

2.4. Pore Volumes and Flair

Restoration equipment capacity design coupled with timing of the restoration operations budgeted herein is a function of the quantity of water that will be processed during restoration that is calculated in this RAP by using the pore volume unit of measure. The term "pore volume" (PV) is a term of convenience that has been conceived by the ISL industry to describe the quantity of free water in the pores of a given volume of rock. The units are provided in gallons. PV's provides a unit of reference that a miner can use to describe the amount of circulation that is needed to leach an ore body, or describe the times water must be flowed through a quantity of depleted ore to achieve restoration. PV's provide a way that a miner can take small-scale studies, such as studies in the laboratory, and scale these studies up to field level or to compare pilot scale studies⁶ to commercial scale. Hence they provide a miner with an important technique for calculating ISL project economics and restoration costs.

PV's are calculated by determining the three dimensional volume of the rock (that is also the ore zone) and multiplying this number by the percent porosity. HRI used the "ore area" method to determine pore volumes⁷, where the extent of ore of given grade within a mine unit is

⁶ I.e. such as the Section 9 Pilot. See FEIS p. 4-37.

⁷ Different operators have used different methods to determine the volume of the ore zone. For example, some use the "pattern method" where pattern dimensions are used to determine the area of the ore and then the area is multiplied by screen thickness to determine the volume of rock in the five spot. The pore volume of the five spot is

outlined and digitized to provide the ore area⁸. This area is then multiplied by the average ore thickness to provide the three dimensional volume of the ore that is to be leached. This volume is converted to a PV by multiplying the ore volume by the percent porosity and then converting to the units of measurement (i.e. gallons). Table 1 below shows the PV calculation for the Crownpoint location that was used as the assumption in the budget model.

Table 1 – Crownpoint Pore Volume Calculation

ZONE	Area (ft ²)	Tk (ft)	Vol (ft ³)	Por	gal/ft ³	PV (gal)	H-PIF	V-PIF	CPV (gal)	9 X CPV
SE/4										
UA	168,000	12	2,016,000	0.25	7.48	3,769,920	1.5	1.3	7,351,344	66,162,096
ULA	630,000	9.6	6,048,000	0.25	7.48	11,309,760	1.5	1.3	22,054,032	198,486,288
MLA	260,000	8.6	2,236,000	0.25	7.48	4,181,320	1.5	1.3	8,153,574	73,382,166
ULB	350,000	11.9	4,165,000	0.25	7.48	7,788,550	1.5	1.3	15,187,673	136,689,053
LB	182,000	9.8	1,783,600	0.25	7.48	3,335,332	1.5	1.3	6,503,897	58,535,077
UUC	675,000	7.6	5,130,000	0.25	7.48	9,593,100	1.5	1.3	18,706,545	168,358,905
MC	840,000	12.2	10,248,000	0.25	7.48	19,163,760	1.5	1.3	37,369,332	336,323,988
ULC	992,000	11.8	11,705,600	0.25	7.48	21,889,472	1.5	1.3	42,684,470	384,160,234
LLC	754,000	7.3	5,504,200	0.25	7.48	10,292,854	1.5	1.3	20,071,065	180,639,588
TOTALS	4,851,000		48,836,400			91,324,068			178,081,933	1,602,737,393
SW/4										
LA	308,000	8.8	2,710,400	0.25	7.48	5,068,448	1.5	1.3	9,883,474	88,951,262
ULB	270,000	6.2	1,674,000	0.25	7.48	3,130,380	1.5	1.3	6,104,241	54,938,169
LB	437,000	7.5	3,277,500	0.25	7.48	6,128,925	1.5	1.3	11,951,404	107,562,634
UUC	256,000	6.5	1,664,000	0.25	7.48	3,111,680	1.5	1.3	6,067,776	54,609,984
MC	465,000	12.7	5,905,500	0.25	7.48	11,043,285	1.5	1.3	21,534,406	193,809,652
TOTALS	1,736,000		15,231,400			28,482,718			55,541,300	499,871,701
G. Totals	6,587,000		64,067,800			119,806,786			233,623,233	2,102,609,094

Explanation of Headings:

Area - Area of cut off grade mineralization.

Tk - Thickness of cut off grade mineralization.

Por - Estimated porosity of the rock.

PV - Straight pore volume without any correction.

H-PIF - Horizontal pore volume increase factor.

V-PIF - Vertical pore volume increase factor.

CPV - Corrected pore Volume.

“Flare” factors or pore volume increase factors are multipliers that are commonly used by the ISL industry to account for leach solution outside of the specific boundaries of the calculated ore PV and are generally accepted increases⁹ that should be recognized in cost estimates. HRI

calculated by multiplying the volume of rock by the percent porosity and then converting to the units of measurement (i.e. gallons). The total PV of a mine unit is calculated by adding all the five spot patterns in the mine unit. This method works well for existing ISL operations where the ore had been fully delineated and wellfield installed such as the existing projects in Wyoming.

⁸ Future wellfield patterns will be constructed within the ore that is economic at the time. Patterns will be a subset of the overall “ore area”.

⁹ Flare outside of the ore zone is the norm. In the subsurface water moves in a radial pattern from injector to extractor in its path across the target ore. By choosing patterns carefully flair is minimized. However, as an expected component of ISL mining the flair factors are included in the bonding calculation as a deliberate cost contingency. There is a limit on acceptable flair; the horizontal monitor wells. If fluid is detected in the horizontal monitor wells it is no longer simply flair but then becomes an excursion. An excursion requires immediate corrective action to draw it back to the mine zone or the bonding must be increased above the amount contemplated

uses pore volume increase factors of 1.5 for horizontal and 1.3 for vertical¹⁰. Horizontal increase is calculated by multiplying the measured or mapped area of the ore, in plan, and multiplying the actual area by 1.5. This yields the affected horizontal area. Likewise, vertical increase is calculated by multiplying the measures average thickness of the ore by 1.3. This yields the affected vertical area. Multiplying the affected horizontal times the affected vertical by porosity provides the affected pore volume for the surety cost estimation. This number is in turn multiplied by 9 to determine water treatment and disposal volumes that are entered into the model to calculate costs. The 1.5 for horizontal and 1.3 for vertical pore volume increase factors have been calculated by URI engineers based on operating experience at other restoration demonstrations and commercial operations and have been adequate for monitoring and reporting restoration progress at other operations. During the Churchrock restoration demonstration that is described in LC 10.28, HRI will use these factors to measure the number of pore volumes that are processed during the restoration demonstration.

The methods utilized in this RAP and all three previous RAP's to calculate pore volume and adjusted pore volumes are consistent with the methods used for the Mobil Section 9 Pilot that was conducted approximately three miles northwest of the Crownpoint site, which in turn were the basis for the NRC evaluation in the FEIS, and are consistent with the methods used by HRI throughout the CUP licensing process, and for HRI's submittals during the Subpart L hearing. HRI methods to calculate pore volume and adjusted pore volumes, and the factors that were used were not generic or arbitrary, but rather were consistently proposed, evaluated, litigated and applied throughout the NRC licensing process and this Subpart L proceeding.

HRI presented the NRC with the Summary Report for the Mobil Section 9 In Situ Leach Pilot¹¹ as a part of the License Application support materials because the Pilot was a substantial field demonstration, and provided empirical results¹², for the ISL development that is proposed for the CUP. This Report was a compilation of the information from Mobil Oil Company's files and records that were developed when the Pilot was conducted. HRI utilized actual pattern dimensions and the actual number of gallons processed during the restoration to compile the summary report.

The cumulative restoration analyses in Attachment C of the Summary Report show that 59,173,469 gallons were circulated during restoration of the Section 9 Pilot, which equated to 16.7 adjusted pore volumes. It is from this data that NRC determined that after 8 – 10 pore

in this RAP to compensate for the increase in restoration cost. (See L.C. 10.13 which requires a bond increase if corrective action is not completed in 60 days)

¹⁰ Combined pore volume increase factor is 1.95.

¹¹ See Pelizza Affidavit January 19, 2001, Attachment 1.

¹² The Section 9 Pilot data provide actual ore zone dimensions and gallons processed so that actual pore volume can be processed. ENDAUM witness Lafferty Testimony May, 23 2001 ¶ 14 specifically recognizes the importance of knowing the quantity of water removed from the formation in calculating pore volumes "... if the flair factor were increased, the number of pore volumes required should be decreased. This scenario may be true only if the total gallons of impacted groundwater were known." The value of the Section 9 Pilot, or any demonstration, is that it provides *known* variables to the equation that allows pore volume increase factors to be assigned. Given similar mining technology and geology, the pore volume increase factors from a demonstration, such as the Section 9 Pilot, can be applied to an analogous site such as the Crownpoint location.

volumes that TDS concentrations and specific conductance had reached a point where little improvement was realized with additional effort¹³ and that the initial surety should be based on 9 pore volumes. Table 2 shows how the adjusted pore volume was calculated using the pattern area, screen thickness, porosity, a horizontal pore volume increase factor of 1.5, and a vertical pore volume increase factor of 1.3. The methods of pore volume analysis utilized in the Summary Report form the foundation of the NRC impact evaluation in Section 4.3.1 of the FEIS which ultimately resulted in the staff determination that 9 pore volumes would be required for surety calculations¹⁴. It is important that HRI continue to use the previously evaluated pore volume increase factors in the RAP, and in future restoration analyses for the NRC, so that can projected and actual performance and costs can be measured consistently.

Table 2 – Section 9 Pore Volume Calculation

ZONE	Pattern Area (ft ²)	Tk (ft)	Vol (ft ³)	Por	gal/ft ³	PV (gal)	H-PIF	V-PIF	CPV (gal)	Gallons Processed	CPV Processed
Single	40,488	24	971,712	0.25	7.48	1,817,101	1.5	1.3	3,543,347	59,173,469	16.69

Explanation of Headings:

Area - Area of cut off grade mineralization.
 Tk - Thickness of cut off grade mineralization.
 Por - Estimated porosity of the rock.
 PV - Straight pore volume without any correction.
 H-PIF - Horizontal pore volume increase factor.
 V-PIF - Vertical pore volume increase factor.
 CPV - Corrected pore Volume.

HRI has presented similar pore volume estimates during the license application review process. Specifically, in response to NRC Request for Further Information, Question 59, August 15, 1996, pertaining to Ground water Consumption, HRI supplied NRC with a pore volume calculation for the Crownpoint site that was similar to the one presented in the RAP Section 2.a¹⁵¹⁶. Consistent with the methodology used throughout the Crownpoint Project Licensing process, HRI utilized the ore body outline, not pattern dimensions, to determine the affected surface area and used a horizontal increase factor of 1.5. These were the same values utilized by NRC to conduct the evaluation of water consumption in the FEIS¹⁷. HRI's proposed pore volume increase factors are consistent with those, which had been systematically evaluated in the FEIS¹⁸. The FEIS has been found to be adequate for the purpose of licensing the Crownpoint Uranium Project.¹⁹

In summary, HRI correctly used the same methods to calculate adjusted pore volumes in the RAP cost estimate because they were the same as those that NRC reviewed in HRI submittals,

¹³ See FEIS p. 4-40

¹⁴ See FEIS p. 4-40

¹⁵ Based on professional judgment, HRI increased the estimated porosity from .21 in Q/59 to .25 in the RAP. This resulted in a more conservative estimate in the RAP. All other factors are the same.

¹⁶ See RAI Q1/59.

¹⁷ See FEIS pp. 4-57 through 4-60.

¹⁸ FEIS p. 4-122 used a combined horizontal and vertical pore volume increase factor of 1.95. I.e 1.3 (HDF) x 1.5 (VDF) = 1.95.

¹⁹ See COMMISSION CLI-01-04.

that NRC used in the FEIS impact evaluation, and that was placed into evidence by the HRI in the course of the Subpart L hearing process.

As an additional test for reasonableness of HRI's cost estimate, Table 3 below compares important project variables for PRI's Highland Uranium Project in Wyoming²⁰ against similar project variables for HRI's Crownpoint project²¹. Table 3 brings into context the comparative size, and corresponding scope of reclamation, of the two projects. In this table the actual surety amount for PRI are shown against the proposed surety amount from this RAP-CP. Reviewing the data in Table 3 in the context of number of wells, throughput, and number of satellite locations, the PRI Highland project exceeds the size of the HRI Crownpoint project. The PRI Highland and HRI Crownpoint wellfield pattern size and duration of operation are comparable. The PRI Highland adjusted pore volume is 20% greater than that estimated by HRI for the Crownpoint site²². In the comparative measures of \$/acre wellfield, or \$/pound produced, PRI proposed surety amount exceeds that of HRI. In the comparative measures of water process cost in \$/ m gal., HRI's and PRI's²³ proposed surety amount are essentially the same. The Table 3 information provides strong evidence that the costs estimates for the HRI Crownpoint location are consistent the PRI Highland costs that the Intervenor's experts argue should serve as a reasonable example.

Table 3 – Comparison of Key Project Variables and Reclamation Costs

Project Variables	PRI²⁴	HRI Crownpoint
Number of wells (all)	~4141	~1014
Acres of wellfield patterns	~189	~181 ²⁵
Years of operation	13	15
Cumulative production (mm lbs. U ₃ O ₈)	~13	~15
Nominal throughput (gallon per minute)	9000	4000
Number of satellites	3 ²⁶	1
Number of pore volume's used in surety estimate	6	9
Size of adjusted restoration volume (billion gallons)	~2.71	~2.10
Comparative PV size (mm gal.) /acre wellfield	14.3	11.6
Restoration estimate (~mm \$)	\$21.12	\$16.39
Comparative \$/acre wellfield	\$111,751	\$93,370
Comparative \$/pound produced	\$1.63	\$1.09
Comparative process cost \$/ m gal.	\$7.79	\$7.81

²⁰ See Testimony of April Lafferty, May 23, 2001 ¶ 11.

²¹ Mr. Ingle Testimony of December 19, 2000, p. 31 states "there is considerable relevant and analogous uranium ISL restoration experience in Wyoming to draw from to develop credible cost estimates".

²² As stated in 5 above, it is anticipated that if HRI was to use wellfield patterns rather than ore boundary areas then the pore volume and adjusted pore volumes would be smaller and more proportional to PRI when compared to well field pattern acreage.

²³ Dr. Abitz Testimony dated May 23, 2001 continues to describe reasons to use unit groundwater costs from the Fernald site. It is more appropriate to use a similar NRC licensed ISL facility.

²⁴ Actual from information provided by PRI staff.

²⁵ Estimated from COP 2.0, Figure 1.4-3.

²⁶ PRI costs include the D & D of the also include the mother plant. HRI mother plant D & D costs are included in the Churchrock Section 8 RAP.

2.6. Ground Water Quality

Once the economic recovery limit of a mine area is reached, lixiviant injection is stopped, and the affected ground water is treated (restored) to return the quality of water to regulatory standards. Water quality will be reclaimed to the criteria of L.C. 10.21. The limited water quality data from the Crownpoint site suggests that the water good and meets drinking water quality standards for all parameters except uranium related radionuclides.²⁷ The Unit 1 site monitor well data²⁸ from the same ore zone aquifer 2 to 3 miles to the west of the Crownpoint location is more extensive, and provides a good picture of radionuclide concentrations in water that is interstitial to roll front uranium mineralization. A thorough characterization of the premine groundwater will be conducted at the Crownpoint location as required by L.C.'s 10.21 & 10.22 and it will be this characterization that provides the baseline against which restoration will be measured.

LC 9.14 States: "Prior to injection of lixiviant, the licensee shall obtain all necessary permits and licenses from the appropriate regulatory authorities". At the Crownpoint location this provision requires that HRI acquire an Underground Injection Control Permit and an Aquifer Exemption²⁹ through the USEPA. Aquifer Exemption is a regulatory device of the USEPA that is used to designate aquifers or portions of aquifers as "exempt" because they are mineralized and producible of minerals in commercial quantities and are not currently or likely to be in the future sources of drinking water. HRI has not acquired either of these authorizations for the Crownpoint location at this time but will be required to do so by NRC before operations begin.

2.7. Groundwater Restoration Budget Line Item Assumptions

HRI used historic and ongoing company experience with similar ISL uranium recovery and groundwater restoration operations in developing its budget model. For example because URI, HRI's sister company is currently reclaiming two other commercial ISL mines, HRI drew on this experience to aid in sizing labor requirements, maintenance needs and other cost categories that may not be apparent to someone without similar "hands on" experience. Unit labor costs are

²⁷ FEIS p. 3-31.

²⁸ RAP-U1 § 2.6

²⁹ 40 CFR 146.4 states: "An aquifer or a portion thereof which meets the criteria for an "underground source of drinking water" in § 146.3 may be determined under 40 CFR 144.8 to be an "exempted aquifer" if it meets the following criteria:

- (a) It does not currently serve as a source of drinking water; and
- (b) It cannot now and will not in the future serve as a source of drinking water because:
 - (1) It is mineral, hydrocarbon or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or III operation to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible.
 - (2) It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical;
 - (3) It is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption; or
 - (4) It is located over a Class III well mining area subject to subsidence or catastrophic collapse;..."

the same as what was provided to NRC as part of the license review of the overall project.³⁰ In addition HRI used actual costs estimates from the region for utilities, and other materials that will be used in reclamation.

The assumptions that were used in the groundwater restoration budget (See Attachment E-2-1) are as follows:

Salaries

For the purpose of the Financial Assurance Plan, HRI assumed employment of technical professionals whose expertise is needed on a limited basis during the restoration mode. Anticipated positions are listed in the Restoration Budget rows 1-15. However, to justify their full time status and utilize their time on the job, it is assumed that they are required to provide a multitude of services, i.e., every employee will be wearing multiple hats. As such, individual job descriptions are difficult. For example, in the restoration mode, a qualified geologist will be required to verify the configuration of restoration patterns to assure efficient results. While this task requires unique geological expertise, the time commitment by the geologist to this task may only be several hours per week. Therefore, to maximize the use of the geologist time, he or she will be assigned to many other tasks for which he or she will be qualified such as lab analyst, well sampler, and plant operator. HRI also plans to maintain several other technical disciplines on staff such as radiation safety specialist, and engineers. In the restoration mode they will also perform their primary function and a number of secondary roles.

Reflecting the very broad nature of each full time employee's job at the CUP during the restoration mode, the following is a summary of each position that is budgeted in the Financial Assurance Plan. Anticipated salaries that were used in the budget are within Attachment E-2-4.

Operations Manager. In Charge of all aspects of day-to-day activities and planning for Crownpoint Uranium Project D & D. Responsible for interface with accounting services including coding and approval of all invoices, monthly cost analysis, restoration report generation, and employee relation responsibilities.

Environmental Manager. Responsible for the radiation health and safety, environmental compliance and quality assurance program at the Crownpoint Uranium Project. Supervise the Radiation Safety Officers to ensure that all radiation safety; environmental compliance and permitting/licensing programs will be conducted in a responsible manner and in compliance with all applicable regulations and permit/license conditions. Serve as Company liaison with regulatory agencies over the term of the restoration activity.

Radiation Safety Officer. Responsible for compliance with all USNRC, and MSHA rules and regulations at the CUP. Also responsible for assistance with laboratory analysis, vehicle safety, reporting and public information.

³⁰ See RAI Q1/8 - Feb. 19, 1996.

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Chemist. Responsible for maintaining day to day analytical services including operational and environmental. In this capacity the chemist will assure that proper chemical parameters are reported to operations for the water treatment processes. He will be responsible for performing analysis of all routine environmental samples such as monitor wells.

Senior Geologist. Responsible for evaluation of logs and other well data and its interpretation as it pertains to restoration activities. Performs all monitor well sampling duties and when possible, helps with wellfield construction as well as Smeal pump hoist operation. Duties include drafting and ACAD operator for mapping needs. Provides weekend call-out and rotating operator duties as needed.

Wellfield Foreman. Responsible for Wellfield operation and construction as it pertains to restoration. Helps with monitor well sampling and backup pump hoist operator.

Wages-Direct

Electrician. Responsible for performing day to day electrical maintenance and repair services. Performs restoration operator duties on a rotating basis.

Plant Operator. Performs restoration operator duties on a regular basis. This would include the operations of all water treatment equipment including the reverse osmosis unit and brine concentrator.

Truck driver. Provides CDL driver duties. Will serve as backhoe operator and have operator duties on a rotating basis.

Wellfield Operator. Perform wellfield restoration operator duties on a regular basis and rotations with the Plant Operator.

Pump Hoist Operator. Responsible for the running of pumps in and out of the hole as required by restoration activities. Other duties include the operation of the backhoe and labor necessary for field construction.

Insurance-Workman's Compensation

Estimate based on projected compensation expenses and prevailing rates.

Payroll Taxes

Estimate based on projected compensation expenses and prevailing rates.

Medical Insurance

Estimate based on headcount and historic premium rates.

401K Contributions

The 401(k) Contribution cost codes represent HRI-funded contributions under the 401(k) – the retirement savings plan for HRI employees. The 401 (k) Contribution portion is made concurrent with each bi-weekly payroll period as a component of each eligible employee's total compensation.

Telephone/Telegraph

Estimated average costs of regular telephone service, cellular telephone service, and fax line service and internet line service at all CUP locations.

Postage/Freight

Estimated average cost of all types of mail service.

Copy Equipment

Estimate average cost for operation of all types of copy and fax equipment at all CUP locations.

Other Equipment & Rental

This covers the rental of equipment and miscellaneous equipment average costs. As applied in these estimates, it would include office machine rental, water machines for potable water, etc.

Office Supplies

Estimated average costs of office supplies such as paper, pens, etc.

Office Equipment Maintenance

Estimate average cost for maintenance for all types of office equipment at all CUP locations.

Data Processing

Estimated average cost for outside data processing.

Maps

Estimated average cost of plotting and reproducing maps for routine operations and reports.

Drafting & Printing

Estimated average for outside computer automated drawing services for report preparation.

Transportation - Air & Car

Estimated average for airplane tickets and auto rental.

Meals

Estimated average for travel related meals.

Misc. Travel Expense

Estimated average for travel related expenses such as hotels.

Env-Depreciable Equipment

Replacement equipment and calibration costs. This would include survey and sample equipment and routine calibration and service.

Env-Operational Analyses

This cost code is reserved for outside analysis

Environmental – Miscellaneous

As the name suggests, any environmental related item not specifically addressed in the other codes 090 through 098. Miscellaneous items may include sample bottles, filters, reagents, calibration, etc.

Safety

This is for costs associated with safety supplies for the employees. Items charged to this cost code would include safety boots, safety glasses, potable water, protective gloves, safety goggles etc.

Backhoe

All backhoe rental and maintenance such as oil changes, and repairs would be charged to this account

Misc. Chemicals

The major charge to this cost code during restoration is anti-scalent for the RO.

Utilities - Electric, Wellfield

Calculated electrical cost for operating the pumps and other equipment in the wellfield. The basis for these costs is shown in Attachment E-2-2.

Utilities - Electric, Brine Concentrator

Calculated electrical cost for operating the brine concentrator. The basis for these costs is shown in Attachment E-2-2.

Utilities - Electric, Plant and RO

Calculated electrical cost for operating the plant, reverse osmosis unit, and other office lighting and electrical needs. The basis for these costs is shown in Attachment E-2-2.

Submersible Pumps

Estimated average maintenance and replacement costs for submersible pumps that are used in extraction wells.

Submersible Motors

Estimated average maintenance and replacement costs for submersible pump electric motors that are used in extraction wells.

Field Piping & Valves

Estimated average maintenance and replacement costs for the various fittings, valves, glues etc. that is used in wellfield operations.

Meters

Estimated average maintenance and replacement costs for wellfield meters.

Misc. Field

The major charge to this cost code during restoration is PPE, rags, solvents and other miscellaneous field needs.

Handtools

Estimated average handtool replacement costs

Plant Piping & Valves

Estimated average maintenance and replacement costs for the various fittings, valves, glues etc. that is used in plant operations.

Plant Brine Concentrator Inst.

A cost code to charge anticipated brine concentrator instrument replacement.

Pumps

Estimated average maintenance and replacement costs for pumps that are used in the water treatment plant.

Plant Electrical

Estimated average electrical maintenance and replacement costs for water treatment plant operations.

Filters

Estimated average filter and filter media replacement costs and maintenance costs for filtration equipment for water treatment plant operations.

Evaporation Ponds

A cost code to charge anticipated maintenance costs for pond liner repairs and maintenance.

Roads

A cost code to charge anticipated maintenance costs for road maintenance.

Gas, Oil, and Grease

Equipment fuel costs and lubrication.

Disposal - BC Solids

Ongoing operational cost of disposing salt residue from brine concentrator. The basis for these costs is shown in Attachment E-2-2.

RO Unit

A cost code to charge anticipated reverse osmosis unit repair, maintenance and instrument replacement.

Lab Supplies

Estimated average costs of analytical laboratory supplies such as reagents, filters, glassware, etc.

RO Membrane

Average replacement costs of reverse osmosis unit membranes.

Field Equip. Repairs & Maint.

A cost code to charge anticipated maintenance costs for large field equipment such as the pump host equipment, generators, and trucks.

Vehicle Repairs & Maint.

A cost code to charge anticipated maintenance costs for road vehicles such as pick up trucks and company autos.

Vehicles – Pickups

The estimated average cost for the major repair of a company pickup truck.

Vehicles - Tractors & Trucks

The estimated average cost for the major repair of a large trucks or trailers.

Vehicles - Automobiles

The estimated average cost for the major repair of a company car.

Minus contingency/profit, the total cost for groundwater restoration and post restoration management is projected to be \$10,890,592.

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**ATTACHMENT E-2-1
GROUNDWATER RESTORATION BUDGET**

**CROWNPOINT SEC, 24 GROUNDWATER RESTORATION AND DECOMMISSIONING COSTS
COSTS ASSOCIATED WITH RO AND BRINE CONCENTRATION OPERATION AND MAINTENANCE**

November 19, 2001

Period	1/1	2/1	3/1	4/1	5/1	6/1	7/1	8/1	9/1	10/1	11/1	12/1
1 Management and Accounting												
2 Operations Manager	1	1	1	1	1	1	1	1	1	1	1	1
3 Environmental Manager	1	1	1	1	1	1	1	1	1	1	1	1
4 Plant Personnel												
5 Radiation Officer	1	1	1	1	1	1	1	1	1	1	1	1
6 Chemist	1	1	1	1	1	1	1	1	1	1	1	1
7 Electrician	1	1	1	1	1	1	1	1	1	1	1	1
8 Plant Operator	1	1	1	1	1	1	1	1	1	1	1	1
9 Wellfield Personnel												
10 Foreman	1	1	1	1	1	1	1	1	1	1	1	1
11 Truck Driver	1	1	1	1	1	1	1	1	1	1	1	1
12 Wellfield Operators	1	1	1	1	1	1	1	1	1	1	1	1
13 Pump Hoist Operators	1	1	1	1	1	1	1	1	1	1	1	1
14 Engineering & Geologic Personnel												
15 Senior Geologist	1	1	1	1	1	1	1	1	1	1	1	1
16 Total Employees	11	11	11	11	11	11	11	11	11	11	11	11
18 Operations Statistics												
20 Reverse Osmosis Treatment												
21 GPM RO Capacity	580	580	580	580	580	580	580	580	580	580	580	580
22 GPM RO Product	464	464	464	464	464	464	464	464	464	464	464	464
23 GPM RO Reject	116	116	116	116	116	116	116	116	116	116	116	116
24 MM Gals, RO Processed - Month	25,891,200	24,220,800	25,891,200	25,056,000	25,891,200	25,056,000	25,891,200	25,891,200	25,056,000	25,891,200	25,056,000	25,891,200
25 MM Gals, RO Permiate - Month	20,712,960	19,376,840	20,712,960	20,044,800	20,712,960	20,044,800	20,712,960	20,712,960	20,044,800	20,712,960	20,044,800	20,712,960
26 MM Gals, RO Reject - Month	5,178,240	4,844,160	5,178,240	5,011,200	5,178,240	5,011,200	5,178,240	5,178,240	5,011,200	5,178,240	5,011,200	5,178,240
27 Brine Concentration												
28 GPM BC Capacity	125	125	125	125	125	125	125	125	125	125	125	125
29 GPM Distillate	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5
30 GPM Brine	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
31 MM Gals, BC Capacity - Month	5,580,000	5,220,000	5,580,000	5,400,000	5,580,000	5,400,000	5,580,000	5,580,000	5,400,000	5,580,000	5,400,000	5,580,000
32 MM Gals, Distillate - Month	5,068,640	4,739,760	5,068,640	4,903,200	5,068,640	4,903,200	5,068,640	5,068,640	4,903,200	5,068,640	4,903,200	5,068,640
33 MM Gals, Brine - Month	111,600	104,400	111,600	108,000	111,600	108,000	111,600	111,600	108,000	111,600	108,000	111,600
34 Process Results												
35 Beginning Gallons (9 PV Eq.)	2,102,609,094	2,076,829,494	2,052,713,094	2,026,933,494	2,001,985,494	1,976,205,894	1,951,257,894	1,925,478,294	1,899,898,694	1,874,750,694	1,848,971,094	1,824,023,094
36 Beginning PV	9	8.89	8.79	8.68	8.57	8.48	8.35	8.24	8.13	8.02	7.91	7.81
37 Gallons Processed Month	25,779,600	24,116,400	25,779,600	24,948,000	25,779,600	24,948,000	25,779,600	25,779,600	24,948,000	25,779,600	24,948,000	25,779,600
38 PV Processed Month	0.11	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
39 Cumulative Gallons Processed	25,779,600	49,896,000	75,675,600	100,623,600	126,403,200	151,351,200	177,130,800	202,910,400	227,858,400	253,638,000	278,586,000	304,365,600
40 Cumulative PV Processed	0.11	0.21	0.32	0.43	0.54	0.65	0.76	0.87	0.98	1.09	1.19	1.30
41 Remaining Gallons to Process	2,076,829,494	2,052,713,094	2,026,933,494	2,001,985,494	1,976,205,894	1,951,257,894	1,925,478,294	1,899,898,694	1,874,750,694	1,848,971,094	1,824,023,094	1,798,243,494
42 Remaining PV to Process	8.89	8.79	8.68	8.57	8.48	8.35	8.24	8.13	8.02	7.91	7.81	7.70
43 ESTIMATED COST DETAIL												
44 Description	GW Restoration Operations						GW Restoration Operations					
45 Salaries-Direct	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250
46 Wages-Direct	\$10,487	\$10,487	\$10,487	\$10,487	\$10,487	\$10,487	\$10,487	\$10,487	\$10,487	\$10,487	\$10,487	\$10,487
47 Insurance-Workmans Compensation	\$1,368	\$1,368	\$1,368	\$1,368	\$1,368	\$1,368	\$1,368	\$1,368	\$1,368	\$1,368	\$1,368	\$1,368
48 Payroll Taxes	\$2,992	\$2,992	\$2,992	\$2,992	\$2,992	\$2,992	\$2,992	\$2,992	\$2,992	\$2,992	\$2,992	\$2,992
49 Medical Insurance	\$4,274	\$4,274	\$4,274	\$4,274	\$4,274	\$4,274	\$4,274	\$4,274	\$4,274	\$4,274	\$4,274	\$4,274
50 401K Contributions	\$1,068	\$1,068	\$1,068	\$1,068	\$1,068	\$1,068	\$1,068	\$1,068	\$1,068	\$1,068	\$1,068	\$1,068
51 Telephone/Telegraph	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250
52 Postage/Freight	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150
53 Copy Equipment	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
54 Other Equipment & Rental	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
55 Office Supplies	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250
56 Office Equipment Maintenance	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
57 Data Processing	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150
58 Maps	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
59 Drafting & Printing	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
60 Transportation - Air & Car	\$850	\$850	\$850	\$850	\$850	\$850	\$850	\$850	\$850	\$850	\$850	\$850
61 Meals & Entertainment	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
62 Misc. Travel Expense	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
63 Env-Depreciable Equipment	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
64 Env-Operational Analyses	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
65 Environmental - Miscellaneous	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
66 Safety	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250
67 Backhoe Maintenance	\$700	\$700	\$700	\$700	\$700	\$700	\$700	\$700	\$700	\$700	\$700	\$700
68 Misc. Chemicals	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450
69 Utilities - Electric, Wellfield	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362
70 Utilities - Electric, Brine Concentrator	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850
71 Utilities - Electric, Plant and RO	\$5,898	\$5,898	\$5,898	\$5,898	\$5,898	\$5,898	\$5,898	\$5,898	\$5,898	\$5,898	\$5,898	\$5,898
72 Submersible Pumps	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
73 Submersible Motors	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
74 Field Piping & Valves	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400
75 Meters	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
76 Misc. Field	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
77 Handtools	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
78 Plant Piping & Valves	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
79 Plant Brine Conc Inst.	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
80 Pumps	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
81 Plant Electrical	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
82 Filters	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100
83 Evaporation Ponds	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
84 Roads	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
85 Gas, Oil, Grease	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150
86 Disposal - B.C. Solids	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291
87 RO Unit	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250
88 Lab Supplies	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
89 RO Membrane	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000
90 Field Equip. Repairs & Maint.	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150
91 Vehicle Repairs & Maint.	\$550	\$550	\$550	\$550	\$550	\$550	\$550	\$550	\$550	\$550	\$550	\$550
92 Vehicles - Pickups	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
93 Vehicles - Tractors & Trucks	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
94 Vehicles - Automobiles	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
95 Monthly Total	\$136,287	\$136,287	\$136,287	\$136,287	\$136,287	\$136,287	\$136,287	\$136,287	\$136,287	\$136,287	\$136,287	\$136,287
96 Cumulative Total	\$136,287	\$272,574	\$408,861	\$545,148	\$681,435	\$817,722	\$954,008	\$1,090,295	\$1,226,582	\$1,362,869	\$1,499,156	\$1,635,443
97 Period Days	31	29	31	30	31	30	31	31	30	31	30	31

[illegible]

44 :

[illegible]

	Period											
	1/3	2/3	3/3	4/3	5/3	6/3	7/3	8/3	9/3	10/3	11/3	12/3
1 Management and Accounting												
2 Operations Manager	1	1	1	1	1	1	1	1	1	1	1	1
3 Environmental Manager	1	1	1	1	1	1	1	1	1	1	1	1
4 Plant Personnel												
5 Radiation Officer	1	1	1	1	1	1	1	1	1	1	1	1
6 Chemist	1	1	1	1	1	1	1	1	1	1	1	1
7 Electrician	1	1	1	1	1	1	1	1	1	1	1	1
8 Plant Operator	1	1	1	1	1	1	1	1	1	1	1	1
9 Wellfield Personnel												
10 Foreman	1	1	1	1	1	1	1	1	1	1	1	1
11 Truck Driver	1	1	1	1	1	1	1	1	1	1	1	1
12 Wellfield Operators	1	1	1	1	1	1	1	1	1	1	1	1
13 Pump Host Operators	1	1	1	1	1	1	1	1	1	1	1	1
14 Engineering & Geologic Personnel												
15 Senior Geologist	1	1	1	1	1	1	1	1	1	1	1	1
16												
17 Total Employees	11	11	11	11	11	11	11	11	11	11	11	11
18												
19 Operations Statistics												
20 Revenue Omsepa Treatment	580	580	580	580	580	580	580	580	580	580	580	580
21 GPM RO Capacity	464	464	464	464	464	464	464	464	464	464	464	464
22 GPM RO Product	116	116	116	116	116	116	116	116	116	116	116	116
23 GPM RO Reject	25,891,200	25,891,200	25,891,200	25,891,200	25,891,200	25,891,200	25,891,200	25,891,200	25,891,200	25,891,200	25,891,200	25,891,200
24 MM Gals. RO Processed - Month	20,712,960	20,712,960	20,712,960	20,712,960	20,712,960	20,712,960	20,712,960	20,712,960	20,712,960	20,712,960	20,712,960	20,712,960
25 MM Gals. RO Permit - Month	5,178,240	5,178,240	5,178,240	5,178,240	5,178,240	5,178,240	5,178,240	5,178,240	5,178,240	5,178,240	5,178,240	5,178,240
26 MM Gals. RO Reject - Month	4,844,160	4,844,160	4,844,160	4,844,160	4,844,160	4,844,160	4,844,160	4,844,160	4,844,160	4,844,160	4,844,160	4,844,160
27 Brine Concentration	125	125	125	125	125	125	125	125	125	125	125	125
28 MM BC Capacity	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5
29 GPM Brine	5,800,000	5,800,000	5,800,000	5,800,000	5,800,000	5,800,000	5,800,000	5,800,000	5,800,000	5,800,000	5,800,000	5,800,000
30 GPM Brine	5,068,840	5,068,840	5,068,840	5,068,840	5,068,840	5,068,840	5,068,840	5,068,840	5,068,840	5,068,840	5,068,840	5,068,840
31 MM Gals. BC Capacity - Month	111,600	111,600	111,600	111,600	111,600	111,600	111,600	111,600	111,600	111,600	111,600	111,600
32 MM Gals. Distillate - Month	1,443,881,894	1,443,881,894	1,443,881,894	1,443,881,894	1,443,881,894	1,443,881,894	1,443,881,894	1,443,881,894	1,443,881,894	1,443,881,894	1,443,881,894	1,443,881,894
33 MM Gals. Brine - Month	1,468,068,284	1,468,068,284	1,468,068,284	1,468,068,284	1,468,068,284	1,468,068,284	1,468,068,284	1,468,068,284	1,468,068,284	1,468,068,284	1,468,068,284	1,468,068,284
34 Process Results	1,493,877,894	1,493,877,894	1,493,877,894	1,493,877,894	1,493,877,894	1,493,877,894	1,493,877,894	1,493,877,894	1,493,877,894	1,493,877,894	1,493,877,894	1,493,877,894
35 Beginning Gallons (9 PV Eq.)	6,39	6,39	6,39	6,39	6,39	6,39	6,39	6,39	6,39	6,39	6,39	6,39
36 Beginning PV	25,779,600	25,779,600	25,779,600	25,779,600	25,779,600	25,779,600	25,779,600	25,779,600	25,779,600	25,779,600	25,779,600	25,779,600
37 Gallons Processes Month	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
38 PV Processed Month	634,510,000	634,510,000	634,510,000	634,510,000	634,510,000	634,510,000	634,510,000	634,510,000	634,510,000	634,510,000	634,510,000	634,510,000
39 Cumulative Gallons Processed	2,72	2,72	2,72	2,72	2,72	2,72	2,72	2,72	2,72	2,72	2,72	2,72
40 Cumulative PV Processed	1,443,981,894	1,443,981,894	1,443,981,894	1,443,981,894	1,443,981,894	1,443,981,894	1,443,981,894	1,443,981,894	1,443,981,894	1,443,981,894	1,443,981,894	1,443,981,894
41 Cumulative PV to Process	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
42 Remaining PV to Process	5.31	5.31	5.31	5.31	5.31	5.31	5.31	5.31	5.31	5.31	5.31	5.31
43 ESTIMATED COST DETAIL												

—GW Restoration Operations.

[illegible]

25	26	27	28	29	30	31	32	33	34	35	36
1/3	2/3	3/3	4/3	5/3	6/3	7/3	8/3	9/3	40/3	44/3	48/3

**CROWNPOINT SEC, 24 GROUNDWATER RESTORATION AND DECOMMISSIONING COSTS
COSTS ASSOCIATED WITH RO AND BRINE CONCENTRATION OPERATION AND MAINTENANCE**

November 19, 2001

Period	1/4	2/4	3/4	4/4	5/4	6/4	7/4	8/4	9/4	10/4	11/4	12/4
1 Management and Accounting												
2 Operations Manager	1	1	1	1	1	1	1	1	1	1	1	1
3 Environmental Manager	1	1	1	1	1	1	1	1	1	1	1	1
4 Plant Personnel												
5 Radiation Officer	1	1	1	1	1	1	1	1	1	1	1	1
6 Chemist	1	1	1	1	1	1	1	1	1	1	1	1
7 Electrician	1	1	1	1	1	1	1	1	1	1	1	1
8 Plant Operator	1	1	1	1	1	1	1	1	1	1	1	1
9 Wellfield Personnel												
10 Foreman	1	1	1	1	1	1	1	1	1	1	1	1
11 Truck Driver	1	1	1	1	1	1	1	1	1	1	1	1
12 Wellfield Operators	1	1	1	1	1	1	1	1	1	1	1	1
13 Pump Hoist Operators	1	1	1	1	1	1	1	1	1	1	1	1
14 Engineering & Geologic Personnel												
15 Senior Geologist	1	1	1	1	1	1	1	1	1	1	1	1
17 Total Employees	11	11	11	11	11	11	11	11	11	11	11	11
19 Operations Statistics												
20 Reverse Osmosis Treatment												
21 GPM RO Capacity	580	580	580	580	580	580	580	580	580	580	580	580
22 GPM RO Product	464	464	464	464	464	464	464	464	464	464	464	464
23 GPM RO Reject	116	116	116	116	116	116	116	116	116	116	116	116
24 MM Gals, RO Processed - Month	25,891,200	24,220,800	25,891,200	25,058,000	25,891,200	25,058,000	25,891,200	25,891,200	25,058,000	25,891,200	25,058,000	25,891,200
25 MM Gals, RO Permate - Month	20,712,960	19,376,840	20,712,960	20,044,800	20,712,960	20,044,800	20,712,960	20,712,960	20,044,800	20,712,960	20,044,800	20,712,960
26 MM Gals, RO Reject - Month	5,178,240	4,844,160	5,178,240	5,011,200	5,178,240	5,011,200	5,178,240	5,178,240	5,011,200	5,178,240	5,011,200	5,178,240
27 Brine Concentration												
28 GPM BC Capacity	125	125	125	125	125	125	125	125	125	125	125	125
29 GPM Distillate	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5
30 GPM Brine	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
31 MM Gals, BC Capacity - Month	5,580,000	5,220,000	5,580,000	5,400,000	5,580,000	5,400,000	5,580,000	5,580,000	5,400,000	5,580,000	5,400,000	5,580,000
32 MM Gals, Distillate - Month	5,068,640	4,738,760	5,068,640	4,903,200	5,068,640	4,903,200	5,068,640	5,068,640	4,903,200	5,068,640	4,903,200	5,068,640
33 MM Gals, Brine - Month	111,600	104,400	111,600	108,000	111,600	108,000	111,600	111,600	108,000	111,600	108,000	111,600
34 Process Results												
35 Beginning Gallons (8 PV Eq.)	1,189,512,294	1,183,732,694	1,138,016,294	1,113,836,694	1,088,888,694	1,063,109,094	1,038,161,094	1,012,381,494	986,601,894	961,653,894	935,874,294	910,926,294
36 Beginning PV	5.09	4.98	4.88	4.77	4.66	4.55	4.44	4.33	4.22	4.12	4.01	3.90
37 Gallons Processed Month	25,779,600	24,116,400	25,779,600	24,948,000	25,779,600	24,948,000	25,779,600	25,779,600	24,948,000	25,779,600	24,948,000	25,779,600
38 PV Processed Month	0.11	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
39 Cumulative Gallons Processed	938,876,400	962,992,800	988,772,400	1,013,720,400	1,038,500,000	1,064,448,000	1,090,227,600	1,116,007,200	1,140,955,200	1,166,734,800	1,191,682,800	1,217,462,400
40 Cumulative PV Processed	4.02	4.12	4.23	4.34	4.45	4.56	4.67	4.78	4.88	4.99	5.10	5.21
41 Remaining Gallons to Process	1,163,732,694	1,138,016,294	1,113,836,694	1,088,888,694	1,063,109,094	1,038,161,094	1,012,381,494	986,601,894	961,653,894	935,874,294	910,926,294	885,146,694
42 Remaining PV to Process	4.88	4.88	4.77	4.66	4.55	4.44	4.33	4.22	4.12	4.01	3.90	3.79
ESTIMATED COST DETAIL												
Description	GW Restoration Operations						GW Restoration Operations					
43 Salaries-Direct	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250
44 Wages-Direct	\$10,487	\$10,487	\$10,487	\$10,487	\$10,487	\$10,487	\$10,487	\$10,487	\$10,487	\$10,487	\$10,487	\$10,487
45 Insurance-Workmans Compensation	\$1,368	\$1,368	\$1,368	\$1,368	\$1,368	\$1,368	\$1,368	\$1,368	\$1,368	\$1,368	\$1,368	\$1,368
46 Payroll Taxes	\$2,992	\$2,992	\$2,992	\$2,992	\$2,992	\$2,992	\$2,992	\$2,992	\$2,992	\$2,992	\$2,992	\$2,992
47 Medical Insurance	\$4,274	\$4,274	\$4,274	\$4,274	\$4,274	\$4,274	\$4,274	\$4,274	\$4,274	\$4,274	\$4,274	\$4,274
48 401K Contributions	\$1,068	\$1,068	\$1,068	\$1,068	\$1,068	\$1,068	\$1,068	\$1,068	\$1,068	\$1,068	\$1,068	\$1,068
49 Telephone/Telegraph	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250
50 Postage/Freight	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150
51 Copy Equipment	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
52 Other Equipment & Rental	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
53 Office Supplies	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250
54 Office Equipment Maintenance	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
55 Data Processing	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150
56 Maps	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
57 Drafting & Printing	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
58 Transportation - Air & Car	\$850	\$850	\$850	\$850	\$850	\$850	\$850	\$850	\$850	\$850	\$850	\$850
59 Media & Entertainment	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
60 Misc. Travel Expense	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
61 Env-Depreciable Equipment	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
62 Env-Operational Analyses	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
63 Environmental - Miscellaneous	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
64 Safety	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250
65 Backhoe Maintenance	\$700	\$700	\$700	\$700	\$700	\$700	\$700	\$700	\$700	\$700	\$700	\$700
66 Misc. Chemicals	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450
67 Utilities - Electric, Wellfield	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362
68 Utilities - Electric, Brine Concentrator	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850
69 Utilities - Electric, Plant and RO	\$5,896	\$5,896	\$5,896	\$5,896	\$5,896	\$5,896	\$5,896	\$5,896	\$5,896	\$5,896	\$5,896	\$5,896
70 Submersible Pumps	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
71 Submersible Motors	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
72 Field Piping & Valves	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400
73 Meters	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
74 Misc. Field	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
75 Handtools	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
76 Plant Piping & Valves	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
77 Plant Brine Conc Inst.	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
78 Pumps	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
79 Plant Electrical	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
80 Filters	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100
81 Evaporation Ponds	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
82 Roads	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
83 Gas, Oil, Grease	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150
84 Disposal - B.C. Solids	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291
85 RO Unit	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250
86 Lab Supplies	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
87 RO Membrane	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000
88 Field Equip. Repairs & Maint.	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150
89 Vehicle Repairs & Maint.	\$550	\$550	\$550	\$550	\$550	\$550	\$550	\$550	\$550	\$550	\$550	\$550
90 Vehicles - Pickups	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
91 Vehicles - Tractors & Trucks	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
92 Vehicles - Automobiles	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
93 Monthly Total	\$136,287	\$136,287	\$136,287	\$136,287	\$136,287	\$136,287	\$136,287	\$136,287	\$136,287	\$136,287	\$136,287	\$136,287
94 Cumulative Total	\$5,042,818	\$5,178,903	\$5,315,190	\$5,451,477	\$5,587,764	\$5,724,051	\$5,860,338	\$5,996,625	\$6,132,912	\$6,269,198	\$6,405,485	\$6,541,772
95 Period Days	31	29	31	30	31	30	31	31	30	31	30	31

CROWNPOINT SEC. 24 GROUNDWATER RESTORATION AND DECOMMISSIONING COSTS

November 19, 2001

COSTS ASSOCIATED WITH RO AND BRINE CONCENTRATION OPERATION AND MAINTENANCE

Period	1/5	2/5	3/5	4/5	5/5	6/5	7/5	8/5	9/5	10/5	11/5	12/5
1 Management and Accounting												
2 Operations Manager	1	1	1	1	1	1	1	1	1	1	1	1
3 Environmental Manager	1	1	1	1	1	1	1	1	1	1	1	1
4 Plant Personnel												
5 Radiation Officer	1	1	1	1	1	1	1	1	1	1	1	1
6 Chemist	1	1	1	1	1	1	1	1	1	1	1	1
7 Radiologist	1	1	1	1	1	1	1	1	1	1	1	1
8 Plant Operator	1	1	1	1	1	1	1	1	1	1	1	1
9 Wellfield Personnel												
10 Electrician	1	1	1	1	1	1	1	1	1	1	1	1
11 Truck Driver	1	1	1	1	1	1	1	1	1	1	1	1
12 Wellfield Operators	1	1	1	1	1	1	1	1	1	1	1	1
13 Pump House Operators	1	1	1	1	1	1	1	1	1	1	1	1
14 Engineering & Geologic Personnel												
15 Senior Geologist	1	1	1	1	1	1	1	1	1	1	1	1
16												
17 Total Employees	11	11	11	11	11	11	11	11	11	11	11	11
18 Operations Statistics												
19 Reverse Osmosis Treatment												
20 GPM RO Capacity	580	580	580	580	580	580	580	580	580	580	580	580
21 GPM RO Product	464	464	464	464	464	464	464	464	464	464	464	464
22 GPM RO Reject	116	116	116	116	116	116	116	116	116	116	116	116
23 MM Gals. RO Processed - Month	25,891,200	24,220,800	25,891,200	25,056,000	25,056,000	25,056,000	25,056,000	25,056,000	25,056,000	25,056,000	25,056,000	25,056,000
24 MM Gals. RO Permeate - Month	20,712,800	19,378,800	20,712,800	20,044,800	20,044,800	20,044,800	20,044,800	20,044,800	20,044,800	20,044,800	20,044,800	20,044,800
25 MM Gals. RO Reject - Month	5,178,240	4,844,160	5,178,240	5,011,200	5,011,200	5,011,200	5,011,200	5,011,200	5,011,200	5,011,200	5,011,200	5,011,200
26 Brine Concentration												
27 GPM BC Capacity	125	125	125	125	125	125	125	125	125	125	125	125
28 GPM Distillate	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5
29 GPM Brine	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
30 MM Gals. BC Capacity - Month	5,580,000	5,220,000	5,580,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000
31 MM Gals. Brine - Month	5,096,800	4,759,200	5,096,800	4,903,200	4,903,200	4,903,200	4,903,200	4,903,200	4,903,200	4,903,200	4,903,200	4,903,200
32 MM Gals. Brine - Month	111,800	104,400	111,800	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000
33 Process Results												
34 Beginning Gallons (9 PV Eq.)	885,146,684	859,307,094	885,146,684	808,471,094	784,523,094	759,575,094	734,627,094	709,679,094	684,731,094	659,783,094	634,835,094	609,887,094
35 Gallons Processed Month	3.78	3.68	3.78	3.46	3.36	3.25	3.14	3.04	2.93	2.82	2.72	2.61
36 PV Processed Month	25,778,800	24,116,400	25,778,800	24,948,000	24,948,000	24,948,000	24,948,000	24,948,000	24,948,000	24,948,000	24,948,000	24,948,000
37 Cumulative Gallons Processed	1,243,242,000	1,287,358,400	1,293,138,000	1,318,068,000	1,343,034,000	1,367,982,000	1,392,930,000	1,417,878,000	1,442,826,000	1,467,774,000	1,492,722,000	1,517,670,000
38 Remaining Gallons to Process	889,387,094	835,250,684	808,471,094	784,523,094	759,575,094	734,627,094	709,679,094	684,731,094	659,783,094	634,835,094	609,887,094	584,939,094
39	3.68	3.58	3.46	3.36	3.25	3.14	3.04	2.93	2.82	2.72	2.61	2.50
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42 ESTIMATED COST DETAIL												
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GW Restoration Operations

46	Salaries-Direct	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32,250	\$32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November 19, 2001

[illegible]

November 19, 2001

	Period	1/7	2/7	3/7	4/7	5/7	6/7	7/7	8/7	9/7	10/7	11/7	12/7
1	Management and Accounting												
2	Operations Manager												
3	Environmental Manager												
	Plant Personnel												
	Radiation Officer												
	Chemist												
	Electrician												
	Plant Operator												
9	Wellfield Personnel												
10	Foreman												
11	Truck Driver												
12	Wellfield Operators												
13	Pump Hoist Operators												
14	Engineering & Geologic Personnel												
15	Senior Geologist												
16													
17	Total Employees												
18													
19	Operations Statistics												
20	Reverse Osmosis Treatment												
21	GPM RO Capacity	580	580	580	580	580	580	580	580	580	580	580	580
22	GPM RO Product	484	484	484	484	484	484	484	484	484	484	484	484
23	GPM RO Reject	116	116	116	116	116	116	116	116	116	116	116	116
24	MM Gals, RO Processed - Month	25,058,000	25,058,000	25,058,000	25,058,000	25,058,000	25,058,000	25,058,000	25,058,000	25,058,000	25,058,000	25,058,000	25,058,000
25	MM Gals, RO Permiate - Month	20,044,800	20,044,800	20,044,800	20,044,800	20,044,800	20,044,800	20,044,800	20,044,800	20,044,800	20,044,800	20,044,800	20,044,800
26	MM Gals, RO Reject - Month	5,011,200	5,011,200	5,011,200	5,011,200	5,011,200	5,011,200	5,011,200	5,011,200	5,011,200	5,011,200	5,011,200	5,011,200
27	Brine Concentration												
28	GPM BC Capacity	125	125	125	125	125	125	125	125	125	125	125	125
29	GPM Distillate	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5
30	GPM Brine	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
31	MM Gals, BC Capacity - Month	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000
32	MM Gals, Distillate - Month	4,903,200	4,903,200	4,903,200	4,903,200	4,903,200	4,903,200	4,903,200	4,903,200	4,903,200	4,903,200	4,903,200	4,903,200
33	MM Gals, Brine - Month	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000
34	Process Results												
35	Beginning Gallons (9 PV Eq.)	285,563,094	260,615,094	235,667,094	210,719,094	185,771,094	160,823,094	135,875,094	110,927,094	85,979,094	61,031,094	36,083,094	11,135,094
36	Beginning PV	1.22	1.12	1.01	0.90	0.80	0.69	0.58	0.47	0.37	0.26	0.15	0.05
37	Gallons Processes Month	24,948,000	24,948,000	24,948,000	24,948,000	24,948,000	24,948,000	24,948,000	24,948,000	24,948,000	24,948,000	24,948,000	24,948,000
38	PV Processed Month	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
39	Cumulative Gallons Processed	1,841,894,000	1,866,942,000	1,881,890,000	1,918,838,000	1,941,786,000	1,966,734,000	1,991,682,000	2,018,630,000	2,041,578,000	2,066,526,000	2,091,474,000	2,116,422,000
40	Cumulative PV Processed	7.88	7.99	8.10	8.20	8.31	8.42	8.53	8.63	8.74	8.85	8.95	9.06
41	Remaining Gallons to Process	260,615,094	235,667,094	210,719,094	185,771,094	160,823,094	135,875,094	110,927,094	85,979,094	61,031,094	36,083,094	11,135,094	-13,812,906
42	Remaining PV to Process	1.12	1.01	0.90	0.80	0.69	0.58	0.47	0.37	0.26	0.15	0.05	-0.06
43	ESTIMATED COST DETAIL												
44													
45	Description	tons								GW Restoration Operations			
46													
47	Salaries-Direct	\$8,750	\$8,750	\$8,750	\$8,750	\$8,750	\$8,750	\$8,750	\$8,750	\$8,750	\$8,750	\$8,750	\$8,750
48	Wages-Direct	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
49	Insurance-Workmans Compensation	\$280	\$280	\$280	\$280	\$280	\$280	\$280	\$280	\$280	\$280	\$280	\$280
50	Payroll Taxes	\$613	\$613	\$613	\$613	\$613	\$613	\$613	\$613	\$613	\$613	\$613	\$613
51	Medical Insurance	\$875	\$875	\$875	\$875	\$875	\$875	\$875	\$875	\$875	\$875	\$875	\$875
52	401K Contributions	\$219	\$219	\$219	\$219	\$219	\$219	\$219	\$219	\$219	\$219	\$219	\$219
53	Telephone/Telegraph	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250	\$1,250
54	Postage/Freight	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150
55	Copy Equipment	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
56	Other Equipment & Rental	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
57	Office Supplies	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250
58	Office Equipment Maintenance	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
59	Data Processing	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150
60	Maps	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
61	Drafting & Printing	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
62	Transportation - Air & Car	\$850	\$850	\$850	\$850	\$850	\$850	\$850	\$850	\$850	\$850	\$850	\$850
63	Meals & Entertainment	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
64	Misc. Travel Expense	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
65	Env-Depreciable Equipment	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
66	Env-Operational Analyses	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
67	Environmental - Miscellaneous	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
68	Safety	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250
69	Backhoe Maintenance	\$700	\$700	\$700	\$700	\$700	\$700	\$700	\$700	\$700	\$700	\$700	\$700
70	Misc. Chemicals	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450	\$2,450
71	Utilities - Electric, Wellfield	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362	\$16,362
72	Utilities - Electric, Brine Concentrator	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850	\$32,850
73	Utilities - Electric, Plant and RO	\$5,896	\$5,896	\$5,896	\$5,896	\$5,896	\$5,896	\$5,896	\$5,896	\$5,896	\$5,896	\$5,896	\$5,896
74	Submersible Pumps	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
75	Submersible Motors	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
76	Field Piping & Valves	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400
77	Meters	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
78	Misc. Field	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
79	Handtools	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
80	Plant Piping & Valves	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
81	Plant Brine Conc Inst.	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
82	Pumps	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
83	Plant Electrical	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
84	Filters	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100
85	Evaporation Ponds	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
86	Roads	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
87	Gas, Oil, Grease	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150	\$1,150
88	Disposal - B.C. Solids	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291	\$8,291
89	RO Unit	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250
90	Lab Supplies	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
91	RO Membrane	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000
92	Field Equip. Repairs & Maint.	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150
93	Vehicle Repairs & Maint.	\$550	\$550	\$550	\$550	\$550	\$550	\$550	\$550	\$550	\$550	\$550	\$550
94	Vehicles - Pickups	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
95	Vehicles - Tractors & Trucks	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
96	Vehicles - Automobiles	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
97													
98	Monthly Total	\$94,585	\$94,585	\$94,585	\$94,585	\$94,585	\$94,585	\$94,585	\$94,585	\$94,585	\$94,585	\$94,585	\$94,585
99	Cumulative Total	\$9,400,223	\$9,584,808	\$9,679,393	\$9,773,977	\$9,868,562	\$9,963,147	\$10,057,732	\$10,152,317	\$10,246,902	\$10,341,487	\$10,436,072	\$10,530,656
100	Period Days	30	30	30	30	30	30	30	30	30	30	30	30

**CROWNPOINT SEC, 24 GROUNDWATER RESTORATION AND DECOMMISSIONING COSTS
COSTS ASSOCIATED WITH RO AND BRINE CONCENTRATION OPERATION AND MAINTENANCE**

November 19, 2001

Period	1/8	2/8	3/8	4/8	5/8	6/8	7/8	8/8
1 Management and Accounting								
2 Operations Manager	1	1	1	1	1	1	1	1
3 Environmental Manager	1	1	1	1	1	1	1	1
Plant Personnel								
7 Radiation Officer	1	1	1	1	1	1	1	1
8 Chemist	1	1	1	1	1	1	1	1
9 Electrician								
10 Plant Operator								
Wellfield Personnel								
11 Foreman	1	1	1	1	1	1	1	1
12 Truck Driver								
13 Wellfield Operators								
14 Pump House Operators								
Engineering & Geologic Personnel								
15 Senior Geologist								
16 Total Employees	5	5	5	5	5	5	5	5
Operations Statistics								
20 Reverse Osmosis Treatment								
21 GPM RO Capacity								
22 GPM RO Product								
23 GPM RO Reject								
24 MM Gals. RO Processed - Month								
25 MM Gals. RO Permeate - Month								
26 MM Gals. RO Reject - Month								
27 Brine Concentration								
28 GPM BC Capacity								
29 GPM Distillate								
30 GPM Brine								
31 MM Gals. BC Capacity - Month								
32 MM Gals. Distillate - Month								
33 MM Gals. Brine - Month								
34 Process Results								
35 Beginning Gallons (9 PV Eq.)								
36 Beginning PV								
37 Gallons Processed Month								
38 PV Processed Month								
39 Cumulative Gallons Processed								
40 Cumulative PV Processed								
41 Remaining Gallons to Process								
42 Remaining PV to Process								
ESTIMATED COST DETAIL								
Description	Final Decontamination, Decommissioning and Reclamation							
47 Salaries-Direct	\$27,417	\$27,417	\$27,417	\$27,417	\$27,417	\$27,417	\$27,417	\$27,417
48 Wages-Direct	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
49 Insurance-Workmans Compensation	900	900	900	900	900	900	900	900
50 Payroll Taxes	4200	4200	4200	4200	4200	4200	4200	4200
51 Medical Insurance	4000	4000	4000	4000	4000	4000	4000	4000
52 401K Contributions	4000	4000	4000	4000	4000	4000	4000	4000
53 Telephone/Telegaph	\$950	\$950	\$950	\$950	\$950	\$950	\$950	\$950
54 Postage/Freight	\$175	\$175	\$175	\$175	\$175	\$175	\$175	\$175
55 Copy Equipment	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
56 Other Equipment & Rental	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
57 Office Supplies	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150
Office Equipment Maintenance	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
Data Processing								
Maps					\$1,000	\$1,000	\$1,000	\$1,000
61 Drafting & Printing					\$2,500	\$2,500	\$2,500	\$2,500
62 Transportation - Air & Car	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
63 Meals & Entertainment	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
64 Misc. Travel Expense	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
65 Env-Depreciable Equipment								
66 Env-Operational Analyses								
67 Environmental - Miscellaneous								
68 Safety								
69 Backhoe Maintenance								
70 Misc. Chemicals								
71 Utilities - Electric, Wellfield								
72 Utilities - Electric, Brine Concentrator								
73 Utilities - Electric, Plant and RO								
74 Submersible Pumps								
75 Submersible Motors								
76 Field Piping & Valves								
77 Meters								
78 Misc. Field								
79 Handtools								
80 Plant Piping & Valves								
81 Plant Brine Conc Inst.								
82 Pumps								
83 Plant Electrical								
84 Filters								
85 Evaporation Ponds								
86 Roads								
87 Gas, Oil, Grease								
88 Disposal - B.C. Solids								
89 RO Unit								
90 Lab Supplies								
91 RO Membrane								
92 Field Equip. Repairs & Maint.								
93 Vehicle Repairs & Maint.								
94 Vehicles - Pickups								
95 Vehicles - Tractors & Trucks								
96 Vehicles - Automobiles								
97 Monthly Total	\$43,242	\$43,242	\$43,242	\$43,242	\$48,742	\$48,742	\$48,742	\$48,742
98 Cumulative Total	\$10,573,898	\$10,617,140	\$10,660,382	\$10,703,624	\$10,750,366	\$10,797,108	\$10,843,850	\$10,890,592
100 Period Days	31	30	31	31	30	31	30	31

D & D COSTS ARE ITEMIZED ON A TASK BASIS

November 19, 2001

**ATTACHMENT E-2-2
BUDGET CALCUALTION AND BACKUP**

**Labor Rates
Electrical Usage
Solid Production**

LABOR SUMMARIES

November 19, 2001

			Number	Hourly Rate	Yearly Salary	Annual	Monthly
7		Management and Accounting					
9	Salaried	Operations Manager	1	-	\$120,000	\$120,000	\$10,000
10	Salaried	Environmental Manager	1	-	\$105,000	\$105,000	\$8,750
11	Salaried	Accounting Manager			\$105,000	\$105,000	\$8,750
12	Salaried	Accountant		-	\$65,000	\$65,000	\$5,417
13		Plant Personnel					
14	Salaried	Plant Superintendent		-	\$85,000	\$85,000	\$7,083
15	Salaried	Plant Engineer		-	\$45,000	\$45,000	\$3,750
16	Salaried	Radiation Officer	1	-	\$30,000	\$30,000	\$2,500
17	Salaried	Chemist	1	-	\$46,000	\$46,000	\$3,833
18	Salaried	Plant Foreman		-	\$28,000	\$28,000	\$2,333
19	Salaried	Maintenance Foreman		-	\$28,000	\$28,000	\$2,333
20	Wage	Lab Technicians		\$9.62	-	\$20,010	\$1,667
21	Wage	Secretary		\$9.62	-	\$20,010	\$1,667
22	Wage	Electrician	1	\$14.43	-	\$30,014	\$2,501
23	Wage	Apprentice Electrician		\$12.01	-	\$24,981	\$2,082
24	Wage	Plant Operator	1	\$11.54	-	\$24,003	\$2,000
25	Wage	Assistance Plant Operator		\$11.54	-	\$24,003	\$2,000
26	Wage	Dryer Operator		\$11.54	-	\$24,003	\$2,000
27	Wage	Maintenance		\$11.54	-	\$24,003	\$2,000
28		Wellfield Personnel					
29	Salaried	Wellfield Superintendent		-	\$41,200	\$41,200	\$3,433
30	Salaried	Drilling Engineer		-	\$40,500	\$40,500	\$3,375
31	Salaried	Foreman	1	-	\$28,000	\$28,000	\$2,333
32	Wage	Truck Driver	1	\$11.54	-	\$24,003	\$2,000
33	Wage	Electrician		\$14.43	-	\$30,014	\$2,501
34	Salaried	Data Entry Clerk		-	\$20,000	\$20,000	\$1,667
35	Wage	Secretary			\$20,000	\$20,000	\$1,667
36	Wage	Logger		\$12.01	-	\$24,981	\$2,082
37	Wage	Wellfield Operators	1	\$11.50	-	\$23,920	\$1,993
38	Wage	Assistant Wellfield Operator		\$11.50	-	\$23,920	\$1,993
39	Wage	Balancer		\$11.50	-	\$23,920	\$1,993
40	Wage	Environmental Sampler		\$11.50	-	\$23,920	\$1,993
41	Wage	Pump Hoist Operators	1	\$11.50	-	\$23,920	\$1,993
42	Wage	Backhoe Operator		\$10.49	-	\$21,819	\$1,818
43	Wage	Maintenance		\$11.50	-	\$23,920	\$1,993
44	Wage	Casing Crew		\$11.50	-	\$23,920	\$1,993
45		Engineering & Geologic Personnel					
46	Salaried	Chief Engineer		-	\$66,000	\$66,000	\$5,500
47	Salaried	RESERVOIR ENGINEER		-	\$60,000	\$60,000	\$5,000
48	Salaried	Senior Geologist	1	-	\$58,000	\$58,000	\$4,833
49	Salaried	Geologist		-	\$48,800	\$48,800	\$4,067
50	Salaried	Logging Supervisor		-	\$35,000	\$35,000	\$2,917
51	Wage	Secretary			\$20,000	\$20,000	\$1,667
52	Wage	Surveyor		\$12.02	-	\$25,002	\$2,083
53	Wage	Assistant Surveyor		\$12.02	-	\$25,002	\$2,083
54	Wage	Logger		\$10.49	-	\$21,819	\$1,818
56		Total #	11				

COST SUMMARY TABLE					
	KW	Hrs/month	\$/KW	Cost/month	Cost/year
WELL FIELD					
Submersible pumps	10.1				
30 extractors	303	720	0.075	\$ 16,362	\$ 196,344.00
PLANT					
Sand Filter Pump	17	720	0.075	\$ 918	
RO Feed Pump	51	720	0.075	\$ 2,754	
Injection Pump	33	720	0.075	\$ 1,782	
RO Heater Pump	3.5	72	0.075	\$ 19	
RO Wash pump	10	24	0.075	\$ 18	
RO Heater	75	72	0.075	\$ 405	
				\$ 5,896	\$ 70,750.80
		TOTAL		\$ 22,258	\$ 267,094.80

CHURCHROCK
WF/RO ELECTRIC
REQUIREMENTS/COST

ASSUMPTIONS

1 Well depth	660 ft
2 Pump depth	500 ft
3 Static water level	400 ft.
4 Pipe line length	3600 ft.
5 Number of extraction wells	20
6 number of injection wells	30
7 Flow rate per extraction well	30 gpm
8 Flow rate per injection well.	30 gpm
9 Electrical cost.	\$.075/KWH
10 Tank elevation	20 ft.

WELL FIELD

A. Total head requirements

Friction loss

- 1 Pipe line friction loss.
600 gpm in 6" SDR 17 polyethylene pipe.
- 2 Elevation change between plant and WF
- 3 Tank elevation
- 4 Well lift to surface
- 5 Well tubing loss

psi	feet
40	92.4
0	0
8.7	20
173	400
5	11.6
<u>226.7</u>	<u>524</u>

Total submersible head requirements.

B. Submersible pump requirements

Grundfos model 25S100-52DS

10 hp

(see attachment)

Run amps for this pump @ 30 gpm @ 820 ft. of head is:

Full load current:

Amperage used for electrical useage:

Total Wellfield amperage is 30 @ 11 amps.

Amps

8.58

14.8

15

330

KW =

$1.73 * I * E * PF$

1000

KW =

$(1.73 * 15 * 460 * .85) / 1000$

KW =

10.1

Cost per well per year =

10.1 kw * 8640 hrs * \$.075/kw

Cost per well per year =

\$6,544.80

Total cost(30 ext) per year

\$ 196,344.00

PLANT

A.

Injection Pump

1 Injection rate 435 gpm

2 Injection pressure 100 psi

$$\text{WHP} = \frac{Q * \text{TDH} * \text{SG}}{3960}$$

$$\text{WHP} = \frac{435 * 100 * 2.31 * 1}{3960}$$

$$\text{WHP} = 25$$

$$\text{BHP} = \text{WHP} / \text{Eff}$$

$$\text{BHP} = 25 / .75$$

$$\text{BHP} = 33$$

$$\text{Amps} = \frac{\text{BHP} * 746}{1.73 * \text{E} * \text{Eff} * \text{PF}}$$

$$\text{Amps} = \frac{33 * 746}{1.73 * .460 * .75 * .85}$$

$$\text{Amps} = 48$$

$$\text{KW} = \frac{\text{Amps} * \text{E}}{1000}$$

$$\text{KW} = \frac{48 * .460}{1000}$$

$$\text{KW} = 22$$

B.

Sandfilter Feed Pump

$$\text{BHP} = 25$$

$$\text{Amps} = \frac{\text{BHP} * 746}{1.73 * \text{E} * \text{Eff} * \text{PF}}$$

$$\text{Amps} = \frac{25 * 746}{1.73 * .460 * .75 * .85}$$

$$\text{Amps} = 36$$

$$\text{KW} = \frac{\text{Amps} * \text{E}}{1000}$$

$$\text{KW} = \frac{36 * .460}{1000}$$

$$\text{KW} = 17$$

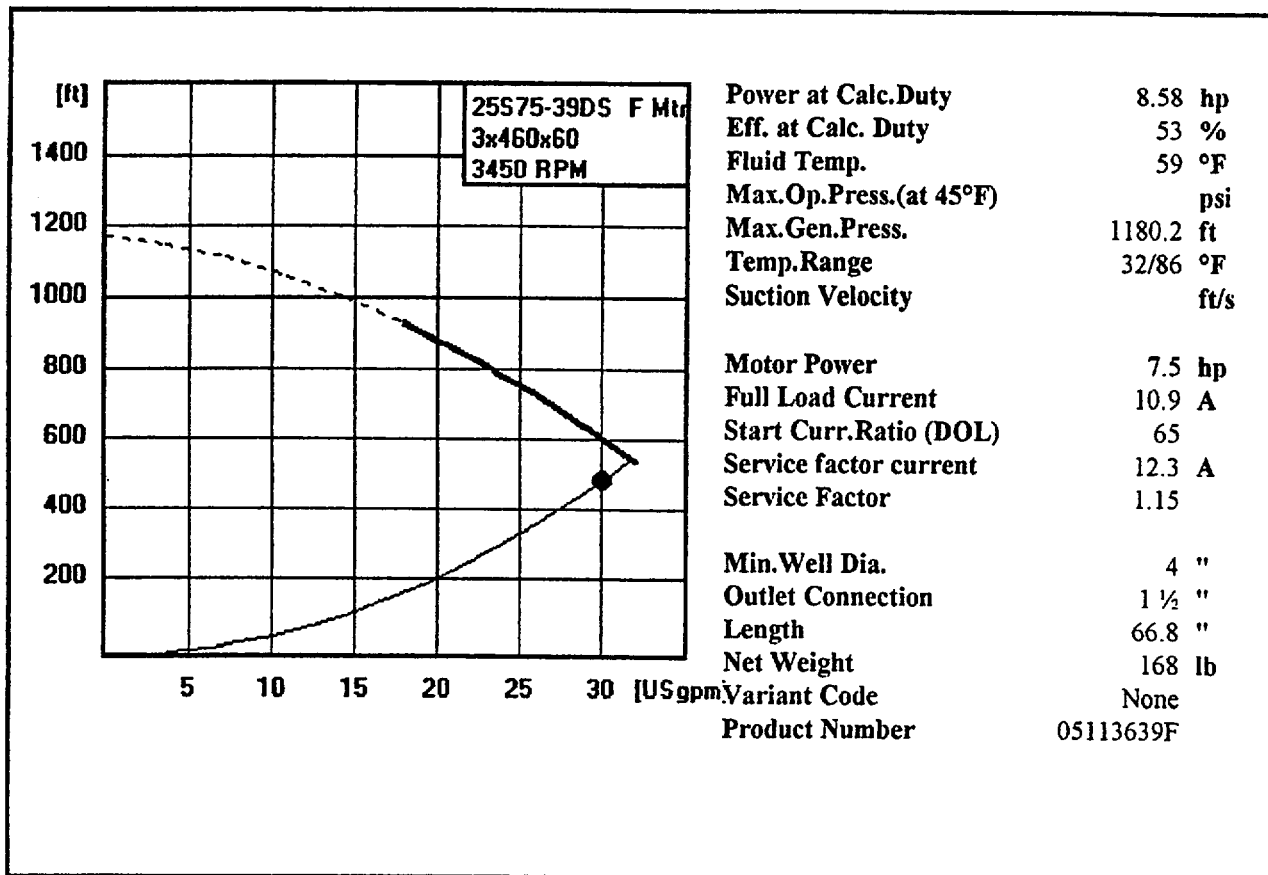
C.	RO Feed Pump	75
	BHP	
	Amps =	$\frac{BHP \times 746}{1.73 \times E \times PF}$
	Amps =	$\frac{75 \times 746}{1.73 \times .85 \times .85}$
	Amps =	110
	KW =	$\frac{Amps \times Volts}{1000}$
	KW =	$\frac{110 \times 460}{1000}$
	KW =	51

D. RO Heater Feed pump

BHP	5
Amps =	$\frac{BHP \times 746}{1.73 \times E \times \text{Eff} \times \text{PF}}$
Amps =	$\frac{5 \times 746}{1.73 \times 480 \times .75 \times .85}$
Amps =	7.5
KW =	$\frac{I \times E}{1000}$
KW =	$\frac{7.5 \times 460}{1000}$
KW =	3.5

E. RO Wash Pump

BHP	15
Amps =	$\frac{BHP \times 746}{1.73 \times E \times \text{Eff} \times \text{PF}}$
Amps =	$\frac{15 \times 746}{1.73 \times 460 \times .75 \times .85}$
Amps =	22
KW =	$\frac{I \times E}{1000}$
KW =	$\frac{22 \times 460}{1000}$
KW =	10



Required Duty 30.0 USgpm at 500.0 ft
Calc. Duty 31.8 USgpm at 562.1 ft

Pos.1.1 - 25S75-39DS F Mtr

\$ 3106.00 x 1

Total \$ 3106.00

25S75-39DS F Mtr/7.5hp/31.8gpm@562.1 ft. of head/8.58 amps/ 53% eff.
 25S75-39DS G Mtr/7.5hp/31.8 gpm@562.1 ft. of head/8.58 amps/53% eff
 40S75-21 F Mtr/7.5hp/30.8 gpm@508.7 ft. of head/? amps/? eff

Calculation of BC Solids Produced

Flow (g/min)	580
Flow (l/min)	2,195
Flow (l/d)	3,161,232
Solids (g/l)	4
Solids (g/d)	12,644,928
Solids (g/mo)	384,616,560
Solids (kg/mo)	384,617
Solids (lb/mo)	174,429
Solids (yd3/mo)*	87
Solids (ft3/mo)	2,355
Unit disposal cost (\$/ft3)	\$3.52
Monthly disposal cost (\$)	\$8,291

*1 yd3 ~ 1 ton

**ATTACHMENT E-2-4
QUOTES AND PRICES**

**BC vendor specs
Electrical rates**



3006 Northrup Way
Bellevue, WA 98004-1407

Phone: 425 828-2400 x 1306
Fax: 425 828-0526

September 13, 2000
RCC No. 00-3218

Mark S. Pelizza
HRI, Inc.
12750 Merit Drive
Suite 720, LB 12
Dallas TX 75251
VIA FAX 972-387-7779

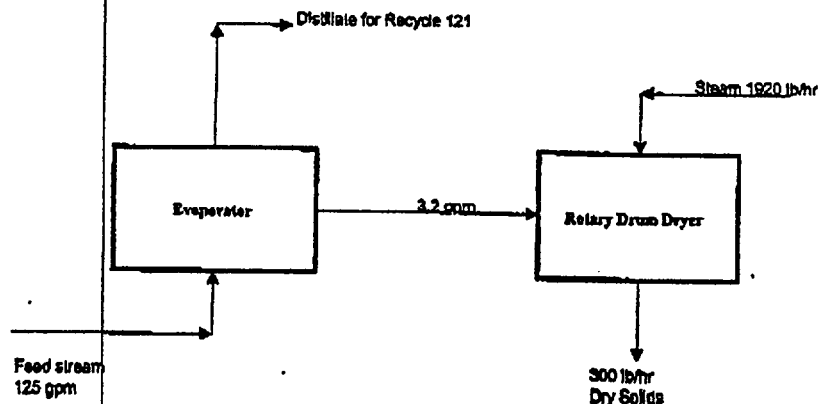
Subject: Brine Concentrator for Uranium Recovery Project, McKinley County, NM

Dear Mr. Pelizza,

RCC has reviewed your request for a Brine Concentrator System for the above project and as discussed with RCC's Process Director, Bob Solomon. RCC would recommend a vertical tube, falling film vapor compression (MVR) evaporator (BC) followed by a steam driven rotary drum dryer to achieve zero liquid discharge (dry solids).

A chemistry of approximately 4800 mg/l TDS was provided as feed to the evaporator/drum dryer system. RCC has assumed a concentration factor of 40 can be achieved in the evaporator thereby reducing the feed stream of 125 gpm to 3.2 gpm. The 3.2 gpm concentrated evaporator blowdown will be sent to a rotary drum dryer for solids generation and zero liquid discharge.

Ionics RCC Zero Liquid Discharge System



Mark Pelizza

HRI, Inc.

Page 2

The offer includes all necessary vessels, pumps, ducts, valves, controls, instrumentation and motors. It is designed to process 100 gpm of the specified wastewater and recovers about 97 percent of that volume as high purity distillate for recycle/reuse. The recovered distillate would contain less than 10 mg/l of total solids, excluding volatile species. The remaining 3.2 gpm concentrate will be sent to the drum dryer.

The proposed evaporator is a vertical tube, falling film, vapor compression unit similar in design to about 80 other RCC systems operating in this country and around the world. The first installations were put on-line in 1974 and continue today to perform as originally required and designed. Many of those units are treating wastewater, which are essentially identical to your requirement.

The composition of the wastewater to be processed is such that sparingly soluble species (e.g., calcium sulfate and silica) will precipitate as it is concentrated. This situation is typical in almost all cases where RCC units are employed and necessitates employing RCC's proprietary seed slurry process to avoid scaling and fouling of heat transfer surfaces. This design feature is incorporated into the proposed system.

The feed is pumped to the agitated feed tank where the pH is adjusted to 5-6 using sulfuric acid. The feed tank provides sufficient residence time for complete mixing before the feed is pumped through the heat exchanger. The feed is heated in the heat exchanger to near boiling by recovering the distillate's sensible heat. The hot feed then passes through the deaerator where carbon dioxide (CO₂) and other non-condensibles are stripped before the feed enters the evaporator sump.

The brine from the sump is continuously recirculated to the top of the vertical heat-transfer tubes where it flows through an RCC patented distributor inserted into the top of each heat transfer tube and falls as a thin film inside the tubes. A portion of the thin film is vaporized. In a vapor compression thermodynamic cycle the vapor is compressed and introduced into the shell side of the vertical tube bundle. The temperature difference between the vapor and the brine film causes the vapor to release its heat of condensation to the falling brine and to condense on the outside of the tubes as distilled water. This distillate is collected at the bottom of the condenser and flows to the distillate tank through a pipe handling both liquid and steam. The steam phase is vented to the deaerator and to the atmosphere to remove non-condensibles and maintain proper system operating pressure. The hot distillate is pumped through the heat exchanger where it gives up its sensible heat to the feed. From this point, the distillate is available for use.

A portion of the concentrated brine is continuously withdrawn from the sump for discharge to the dryer feed tank. The rate of discharge is controlled to maintain proper solids composition in the sump brine.

The concentrated waste blowdown is collected in the dryer feed tank (by others) and is transferred to the rotary drum dryer. A Bufflovak atmospheric double drum dryer is used to crystallize the slurry being discharged from the Brine Concentrator. This drum dryer crystallizer is most versatile and widely applied to dry many food, chemical and pharmaceutical materials of widely varying densities and viscosity's: dilute solutions, heavy liquids, or paste

Mark Pelizza
HRI, Inc.
Page 4

Seed/Waste Tank Mixer	1	6% Mo SS
Seed/Waste Tank Pump & Motor	1	Cd4MCu
Distillate Pump & Motor	1	316 SS
Distillate Tank	1	316L SS
Acid Pump & Motor	2	Alloy 20
AND		
Rotary Drum Dryer	1	Cr. Plated CI
Feed Pump & Motor	1	Cd4MCu
Condensate Tank	1	316 SS
Condensate Pump & Motor	1	316 SS
Control System (PLC type)	1	AB
Field Instruments	1 lot	Various
Control Valves	1 lot	Various

- Provide Operations & Maintenance Manuals.

Scope of Work by Others:

- Design and provide foundations, process and utility interfaces, waste disposal system, electrical equipment (including MCC and medium voltage switchgear), and insulation,
- Erect the system and provide interconnecting piping, manual valves and pipe supports,
- Perform checkout, startup and operation,

A price for equipment design and supply of the proposed system is as follows, FOB site. Delivery can be made in 48 weeks following notification to proceed.

125 gpm Brine Concentrator System with a 3.2 gpm rotary drum dryer to achieve zero liquid discharge: \$1,700,000

Installation is estimated to be \$800,000 including foundations and building. Installation based on components installed on site although some components can be skid mounted at additional costs.

The operation of the proposed system will require approximately four (4) hours per shift. General duties will involve routine monitoring with plant walk-through and simple bench chemical (e.g., pH) tests.

RCC estimates approximately one man-month of supervision, construction support, training, startup and acceptance is required to support this project. RCC offers this on a time and material basis for \$85.00 per hour plus travel and per diem expenses.

Mark Pelizza
HRI, Inc.
Page 5

RCC appreciates your inquiry and would be pleased to provide additional information and answer any questions you may have. Please feel free to contact me at (425) 828-2400, x1306 or by fax at (425) 828-0526 or by email at joeb@ionicsrcc.com.

Very truly yours,
RESOURCES CONSERVATION COMPANY

Joe Bostjancic
Sales Manager

**PUBLIC SERVICE COMPANY OF NEW MEXICO
ELECTRIC SERVICES**

**EFFECTIVE ON ALL BILLS
RENDERED ON OR AFTER
DECEMBER 30, 1999**

**SCHEDULE 5B: INDUSTRIAL POWER SERVICE--TIME-OF-USE
LARGE SERVICE FOR MINING CUSTOMERS
≥ 10,000 KW MINIMUM AT 115 KV AND 69KV**

APPLICABILITY: The rates on this schedule are available to a retail mining customer who contracts for a definite capacity commensurate with the customer's normal requirements but in no case less than 10,000 kW of capacity and who takes service directly from PNM's transmission system at 115 kV and the Company's primary distribution voltage of 69kV.

Service shall be furnished at the Company's available transmission voltage of 115 kV and at the Company's distribution voltage of 69kV. Service will be furnished subject to the Company's Rules and Regulations and any subsequent revisions. These Rules and Regulations are available at the Company's office and are on file with the New Mexico Public Regulation Commission. These Rules and Regulations are a part of this Schedule as if fully written herein.

TERRITORY: All territory served by the Company in New Mexico.

TYPE OF SERVICE: The service available under this schedule shall be three-phase service delivered at the Company's available transmission voltage of 115 kV and distribution voltage of 69kV.

SERVICE WITH A CONTRACT DEMAND OF 10,000 KW OR MORE:

1. The Company will provide service under this rate schedule to retail customers who contract for a demand of 10,000 kW or more and who take service from PNM's transmission system at 115 kV and distribution system at 69kV only if the customer agrees to a specified period of service under this rate schedule of not less than one year but in no event to extend past the initiation of customer choice for generation service as provided for in the Electric Utility Industry Restructuring Act of 1999. The customer must sign a facilities contract or appropriate line extension agreement for any transmission or distribution cost incurred by the Company for the customer not covered through rates on this tariff. Liquidated damages provisions will be included in the contract or line extension agreement unless otherwise agreed to by the Company.
2. All contract modifications must be in writing and executed as a supplement to the Contract.

SUBSTATION EQUIPMENT: All substation and distribution transformers, the necessary structures, voltage regulating devices, lightning arrestors, and accessory equipment required by the customer in order to utilize the Company's service at 115 kV and 69kV shall be installed, paid for, owned, operated, and maintained by the customer.

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LARGE SERVICE FOR MINING CUSTOMERS
≥ 10,000 KW MINIMUM AT 115 KV AND 69KV**

ENIK

The customer shall also provide at customer's expense suitable protective equipment and devices so as to protect Company's system and service, and other electric users, from disturbances or faults that may occur on the customer's system or equipment.

The customer shall at all times keep each of the three phases balanced as far as practicable so as not to affect service and voltage to other customers served by the Company. The customer shall not operate any equipment in a manner which will cause voltage disturbances elsewhere on the Company's system.

NET RATE PER MONTH OR PART THEREOF FOR EACH SERVICE LOCATION: The rate for electric service provided shall be the sum of A, B, C, D, and E below. On-Peak period is from 8:00am to 8:00pm Monday through Friday (60 hours per week). Off Peak period is all times other than On-Peak period (108 hours per week).

(A) CUSTOMER CHARGE:

\$75,100.00/Bill

(Par Metered Account)
(Includes 1st 10,000 kW of
Billed Demand)

(B) ON-PEAK DEMAND

\$7.51/kW

CHARGE:

(For Billing Demand
Above 10,000 kW
During On-Peak Period)

(C) ENERGY CHARGE:

For Energy Consumed
During On-Peak Period:

4.4905¢/kWh

For Energy Consumed
During Off-Peak
Periods:

3.1000¢/kWh

**PUBLIC SERVICE COMPANY OF NEW MEXICO
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≥ 10,000 KW MINIMUM AT 115 KV AND 69KV**

- (D) **POWER FACTOR ADJUSTMENT:** The above rates are based on a power factor of 90 percent or higher and the Company will supply, without additional charge, a maximum of 0.48 kvar (Reactive Kilovolt Amperes) per kW of billable demand. The monthly bill will be increased \$.25 for each kvar in excess of the allowed 0.48 kVAR per kW of billable demand.
- (E) **SPECIAL TAX AND ASSESSMENT ADJUSTMENT:** Billings under this Schedule may be increased by an amount equal to the sum of the taxes payable under the Gross Receipts and Compensating Tax Act and of all other taxes, fees, or charges (exclusive of ad valorem, state and federal income taxes) payable by the Company and levied or assessed by any governmental authority on the public utility service rendered, or on the right or privilege of rendering the service, or on any object or event incidental to the rendition of the service.

MONTHLY MINIMUM CHARGE: The monthly minimum charge under this Schedule is the On-Peak period demand charge applied to the 10,000 kW minimum demand.

DETERMINATION OF ON-PEAK PERIOD DEMAND CHARGE: The On-Peak period demand charge for any month shall be as determined by appropriate measurement as defined by the Company, but in no event shall it be less than the highest of the following: (a) the actual metered kW demand minus minimum demand; or (b) 50 percent of the highest kW demand during the preceding 11 months minus minimum demand, or (c) zero.

Metering shall normally be at customer's substation secondary voltage. The Company reserves the right to meter at the substation primary voltage level, in which event the metered kWh, kW demand, and kVAR shall be multiplied by .98 to allow for losses.

Where highly fluctuating or intermittent loads which are impractical to determine properly (such as welding machine, electric furnaces, hoists, elevators, X-rays, and the like) are in operation by the customer, the Company reserves the right to determine the billing demand by increasing the 15-minute measured maximum demand and kvar by an amount equal to 65 percent of the nameplate rated kVA capacity of the fluctuating equipment in operation by the customer.

INTERRUPTION OF SERVICE: The Company will use reasonable diligence to furnish a regular and uninterrupted supply of energy. However, interruptions or partial interruptions may occur or service may be curtailed, become irregular, or fail as a result of circumstances beyond the control of the Company, or are the results of acts of public enemies, accidents, strikes, legal processes, governmental restrictions, fuel shortages, breakdown or damages to generation,

**PUBLIC SERVICE COMPANY OF NEW MEXICO
ELECTRIC SERVICES****EFFECTIVE ON ALL BILLS
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LARGE SERVICE FOR MINING CUSTOMERS
≥ 10,000 KW MINIMUM AT 115 KV AND 69KV**

transmission, or distribution facilities of the Company, repairs or changes in the Company's generation, transmission, or distribution facilities, and in any such case the Company will not be liable for damages. Customers whose reliability requirements exceed these normally provided should advise the Company and contract for additional facilities and increased reliability as may be required. The Company will not, under any circumstances, contract to provide 100 percent reliability.

ACCESSIBILITY: Equipment used to provide electric service must be physically accessible. The metering must be installed on each service location at a point accessible to Company personnel at any time.

TERMS OF PAYMENT: All bills are net and payable within twenty (20) days, and are delinquent thirty (30) days, from the date the bill is rendered. If payment for any or all electric service rendered is not made within thirty (30) days from the date the bill is rendered, the Company shall apply an additional charge of 1.5 percent per month to the total balance in arrears, excluding gross receipts tax. Partial payment of amount due by Customer is applied first to oldest bill, including any other fees or charges assessed, if any, before any amount is applied to current bill.

LIMITATION OF RATE: Electric service under this Schedule is not available for standby service, is not available to customers served in the downtown area of Albuquerque when served by the underground network system, and shall not be resold or shared with others.

AN-274
PC Document #25409

Analytical Stability

3.1. Introduction and Description

Restoration rates will be monitored through analysis of waters produced from the formation. A sample will be taken weekly from the composite production line and analyzed for conductivity, and uranium. These ongoing sample and analysis costs are covered within the groundwater restoration budget.

When sample data indicates that restoration is at, or near completion, each original baseline well will be sampled for the parameters listed in Table 10.4-1 of the COP and analyzed by HRI on location. If the wellfield average value for each chemical parameter is consistent with baseline quality, restoration is considered to be complete and stability sampling will begin.

Stability will be determined by three sample sets taken at two-month intervals from the original baseline wells, and analyzed for the parameters in COP Table 8.6-1. Stability analysis will be performed off location by an independent commercial laboratory.

3.2. Budget Assumptions

The stability analysis budget was developed with the assumption that sample labor is provided from the on site staff and that staff will be available six months after restoration is complete as shown in the Groundwater Restoration Budget. As stated in LC 10.21 there will be one baseline well per acre of wellfield. It is estimated that at Crownpoint there will be 181 acres when fully developed.

It is estimated that a sample analysis by a commercial laboratory for the parameters shown in Table 10.4-1 of the COP will cost \$120 and a sample analysis by a commercial laboratory for the parameters shown in Table 8.6-1 of the COP will cost \$380.

One sample will be taken from each baseline well and analyzed for all the constituents in Table 8.6-1 of the COP before restoration begins at a cost of \$68,780.

Baseline wells will be sampled once per year and analyzed for all the constituents in Table 10.4-1 of the COP during restoration at a cost of \$152,040.

Following restoration, stability samples will be taken every 2 months for six months and analyzed for all the constituents in Table 8.6-1 of the COP at a cost of \$206,340.

As shown in Attachment E-3-1, the total cost for restoration analytical sampling is projected to be \$427,160.

November 19, 2001

**ATTACHMENT E-3-1
ANALYTICAL STABILITY BUDGET**

GROUND WATER RESTORATION Sampling**Assumptions:**

Labor from staff
 Routine monitoring is covered in the restoration budget
 One baseline well sampled per acre of wellfield
 One sample taken before restoration starts
 Baseline wells sampled once per year during restoration
 Stability samples taken every 2 months for six months

	Units	Sub Total	Total
I Monitoring and sampling costs			
A. Restoration well sampling			
Estimated restoration period (years)	7		
1 Well Sampling prior to restoration start			
# of wells	181		
\$/sample	\$380	\$68,780	
2 Restoration progress sampling			
# of wells	181		
\$/sample	\$120		
Samples/year	1	\$152,040	
B. Stability			
Estimated stabilization period (months)	6		
# of wells	181		
Sample freq. mos.	2		
\$/sample	\$380		
Total		\$206,340	
Total monitoring and sampling costs			\$427,160

November 19, 2001

**ATTACHMENT E-3-2
COMMERCIAL LABORATORY RATES**

JORDAN LABORATORIES, INCORPORATED
ANALYTICAL AND ENVIRONMENTAL CHEMISTS
CORPUS CHRISTI, TEXAS

2000
SCHEDULE OF SERVICES

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HAZARDOUS WASTE CHARACTERIZATION	7
TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP)	7
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ATTACHMENT E-3-2
COMMERCIAL LABORATORY RATES

URANIUM AND RADIOMETRICS

Parameter/Method	Water	Soil/ Filters	Vegetation	Raw Wastes, Sludges, Etc.
Uranium - Fluorometric (ASTM D2907-83)	\$12.00	\$27.00	\$32.00	\$57.00
Radium - Total Alpha Emitting Isotopes (Std. Met. No. 7500-Ra B.)	70.00	85.00	90.00	115.00
Radium 226 (Std. Met. No. 7500-Ra C.)	53.00	68.00	73.00	98.00
Radium 228 (SW846 9320)	80.00	95.00	100.00	125.00
Gross Alpha and Beta - Combined (SW846 9310)	30.00	45.00	50.00	75.00
Lead 210 (HSL Si 76a)	73.00	88.00	93.00	118.00
Thorium 230 (Anal. Chem. 46, 12 (1974))	63.00	78.00	83.00	108.00
Other:				
Uranium in Urine - Fluorometric (ASTM D2907-83)				\$14.00
Uranium in Slurries and Concentrates for Settlement				80.00
Radon in Water, Gas or Air (100 cc Sample Size)				25.00
Cesium 134, 137 & Iodine 131 in Grain or Nuts (by Gamma Spec)				32.00
Naturally Occuring Radioactive Material (NORM)				
Includes Ra 226 & Ra 228				
In Water (StM 7500 RaC, SW846 9320)				133.00
In Soil or Solids (by Gamma Spectroscopy)				70.00
Alpha Spectroscopy				Ask for Quote
Gamma Spectroscopy				\$60 plus \$10 per Isotope

SPECIAL GROUPINGS

Mineral Analysis of Fresh Water - Includes Sodium, Potassium, Calcium, Magnesium, Chloride, Carbonate, Bicarbonate, Sulfate, Silica, Iron, Alkalinity, Hardness, Dissolved Solids, and pH	<u>\$90.00</u>
Oil Field Brine - Same as above but including Barium, Resistivity, CaCO ₃ Stability Calculations and Stiff Diagrams	<u>\$100.00</u>
TDWR Report - Texas Dept. of Water Resources Uranium In-Situ Mining Report with Accuracy Checks and Ion Diagram - TDWR 0177 (Includes Radium 226)	<u>\$380.00</u>
TDWR Report 0678 - Same as above with abbreviated Metals list	<u>\$306.00</u>
TDWR Common Ion Report - Same as above excluding Metals, Radium 226 and Ammonium	<u>\$120.00</u>
Naturally Occurring Radioactive Material (NORM) Includes Radium 226 and Radium 228 In Water (StM 7500 RaC, SW846 9320) In Soil or Solids (by Gamma Spectroscopy)	<u>\$133.00</u> <u>\$70.00</u>
Used Fuel Oil Specification - Includes Arsenic, Cadmium, Chromium, Lead, TOX, and Flash Point	<u>\$164.00</u>

GLYCOL ANALYSES

Benzene, Toluene, Ethyl Benzene & Xylenes (EPA 5030 & 8021)	\$45.00
Chloride (StM 4500 - Cl-B)	10.00
pH (EPA 150.1)	5.00
Water by Karl Fischer (ASTM D1744)	18.00

AMINE ANALYSES

Amine Concentration, Wt. % (by titration)	\$15.00
Total Acid Gas Loading	15.00

4. Plugging and Abandonment

4.1. Introduction and Description

All production, and injection wells will be permanently plugged, and abandoned upon completion of ground water restoration and, stabilized in a manner that prevents interformational transfer of fluids. The casing will be cut off three feet from the surface and, the site disked and seeded as outlined below.

4.2. Budget Assumptions

The plugging budget was developed with the assumption that all labor is contracted. HRI will use a direct placement method of well plugging as described in the procedure shown in Attachment E-4-2. This benefit of this method is its simplicity. It has been used at ISL locations in Texas without any reported problems. HRI will verify that the wells are plugged completely by calculated the volume of the cement used against the volume of the casing receiving the plug.

Cement shrinkage is estimated at 120% of the initial volume. Shown in E-4-1 cement cost per yard is \$100.00. For the purposes of determining labor and equipment requirements, it is estimated that 10 holes will be filled per day. Engineer/geologist supervision will be budgeted at \$50,000 per year and the cement contractor will receive \$100 per well. Finally a backhoe and operator rate of \$37.75 per hour as described in Attachment E-6-2 was assumed.

As shown within Attachment E-4-1, the total cost for plugging is projected to be \$2,037,902.

November 19, 2001

**ATTACHMENT E-4-1
PLUGGING AND ABANDONMENT BUDGET**

WELL PLUGGING AND ABANDONMENT

Assumptions

- | | |
|--------------------------------------|-------------|
| 1. Cement shrinkage | 120% |
| 2. Cement cost per yard | \$100.00 |
| 3. Holes filled per day | 10 |
| 4. Engineer/geologist - per year | \$50,000.00 |
| 5. Backhoe & operator - per hour | \$37.75 |
| 6. Contractor - per well | \$100.00 |
| 7. Wellfield acreage fully developed | 40 ac. |

[illegible]

November 19, 2001

**ATTACHMENT E-4-2
BACKUP INFORMATION**

**PLUGGING PROCEEDURE
CEMENT PRICE QUOTE
CEMENT VOLUME CALCULATION
N.M. STATE ENGINEER RULES AND REGULATIONS**

URANIUM RESOURCES, INC

South Texas Operations

STANDARD OPERATING PROCEDURES & JOB DESCRIPTIONS

SUBJECT PLUGGING & ABANDONMENT OF CASED WELLS	SECTION SOP 87	
	DATE 7/10/2000	PAGE 1 of 4
	STATUS Revision 0.0	

A. Introduction

Following the restoration of groundwater to restoration table values and the demonstration of stabilization, the production wells in a wellfield need to be plugged and abandoned ("P&A'd"). The method detailed here utilizes a simple but effective approach that does not require the services of a drilling rig to completely plug cased production wells from top to bottom with cement. Other benefits include efficiency and minimum commitment of technical and mechanical resources,

It is assumed that URI has received all necessary groundwater releases from the governing state agencies prior to the initiation of these procedures. The wells are plugged with a 13-lb/gallon neat cement slurry which is delivered to the well in a commercial redi-mix truck. The cement is metered down the well using a simple funnel device constructed out of a 55-gallon plastic drum and the well is filled to about 2/3 full with the cement slurry. The cement is allowed to cure for several days and is then tagged with a simple weight on a chain to ensure a competent plug. When the plug has been verified, the well casing is broken off at least three feet below surface and the balance of the hole is filled with cement slurry. The pit is then back filled and the plugging is complete.

B. Resources

The labor and material resources necessary to complete the work include the following:

1. **Engineer.** The term "Engineer" is used herein to describe any competent URI employee or contractor whose task it is to plan, oversee and execute in the field the plugging and abandonment of cased wells.
2. **Backhoe Operator.** To operate the backhoe and provide general labor support.
3. **Backhoe.** Necessary to break off the casing of the well 4 feet below surface and the back filing of the resulting trench.

URANIUM RESOURCES, INC

South Texas Operations

STANDARD OPERATING PROCEDURES & JOB DESCRIPTIONS

SUBJECT PLUGGING & ABANDONMENT OF CASED WELLS	SECTION SOP 87	
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4. **Measuring funnel.** Constructed by cutting off a 55 gallon plastic drum so as to allow at least 35 gallons of capacity (approximately 1/6 of a cubic yard) plus some freeboard. The bottom of the funnel is fitted with a 3 inch pipe which is long enough to keep the funnel in the casing during the filling process. (See Figure No. 1).
5. **Plug for the funnel.** The funnel plug consists of a cement or rubber plug sufficient to restrict flow through the 3 inch pipe at the bottom of the funnel which is attached to a handle long enough to allow its removal when the funnel is full of cement slurry. (See figure No. 2).
6. **Down-hole surveying equipment.** Such equipment as necessary to allow the verification of the location and competency of the plug down hole. In its simplest form, this could be a weight attached to a surveyors tape that would allow direct reading of the distance from top of casing to top of the cement plug
7. **Cement Slurry.** Adequate quantities of 13 lb/gal neat cement slurry delivered in a commercial redi mix truck with driver to fill the holes scheduled for the day. This is provided under a separate contract with a local cement company such as Alamo Cement

C. Office Preparation:

1. Identify the holes that are scheduled to be plugged.
2. Determine casing volumes from logs or other data.
3. Determine the number of 1/6-yd³ loads, or "metered drops", necessary to fill at least 2/3 of each hole's individual casing volume. This shall be calculated by taking the casing volume, multiplying it by 0.667 and rounding up to the nearest 1/2 cubic yard. The number of cubic yards are then multiplied by 6 to get the number of metered drops.
4. Order the required quantity of concrete for the next day's work.

D. Bottom Plugging in the Field:

1. Locate hole in the field.

URANIUM RESOURCES, INC

South Texas Operations

STANDARD OPERATING PROCEDURES & JOB DESCRIPTIONS

SUBJECT PLUGGING & ABANDONMENT OF CASED WELLS	SECTION SOP 87	
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2. Engineer places the metering funnel on the hole and inserts the plug into the funnel
3. The redi-mix driver backs his cement truck up to the hole. (Figure 3).
4. Cement truck driver and the Engineer fill the funnel to the 35 gallon (1/6 yd³) marks with 13 lb. neat slurry. (Figure 4)
5. Engineer lifts the plug, releasing the cement slurry down the hole. (Figure 5)
6. The preceding two steps are repeated until the desired quantity of cement slurry has been discharged to the hole.
7. Funnel and truck are washed down as needed with water from the truck. (Figure No. 6).
8. The engineer and cement truck move to the next hole to be plugged and repeat the process. (Figure 7).

E. Verification of Bottom Plug

1. Hole is allowed to cure for at least three days to allow cement to set up.
2. Engineer tags the top of the cement plug to verify its existence and location. Engineer records the level of the plug found in the hole.
3. Where a solid plug is found, the hole is determined to be properly bottom plugged and scheduled for final surface plugging.

F. Surface Plugging in the Field:

1. Holes that have successfully undergone the tagging exercise above have their casings broken off at least 4 feet below the surface of the ground with a backhoe. The resulting trench is about one bucket wide and about ten feet long with the hole exposed in the bottom. Figures 8 & 9).
2. The cement truck backs up to the trench and discharges the cement slurry down the exposed bore hole until the hole is filled to the bottom of the trench. When full, the truck moves to the next hole to be plugged.

URANIUM RESOURCES, INC

South Texas Operations

STANDARD OPERATING PROCEDURES & JOB DESCRIPTIONS

SUBJECT PLUGGING & ABANDONMENT OF CASED WELLS	SECTION SOP 87	
	DATE 7/10/2000	PAGE 4 of 4
	STATUS Revision 0.0	

3. The engineer records that the hole has been successfully surface plugged and marks it for back-filling.
4. The backhoe returns to the hole and back fills the trench, returning the ground to its original contours.
5. The hole is now completely P&A'd.

FIGURE No. 1

METERING FUNNEL

MADE FROM CUT OFF
55-GALLON PLASTIC
DRUM

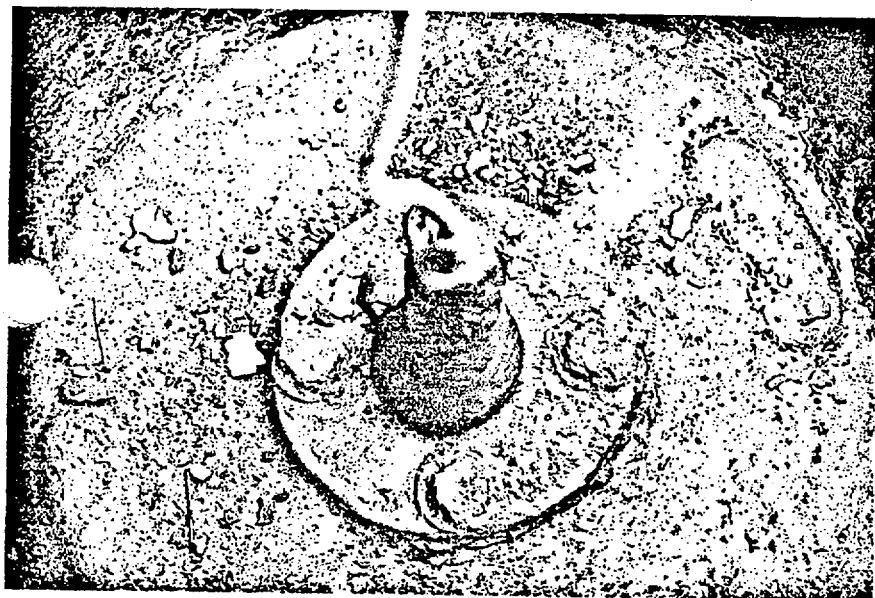


FIGURE No. 2

MANUAL PLUG
FOR METERING FUNNEL

FIGURE No. 3

CEMENT TRUCK
READY TO
FILL FUNNEL

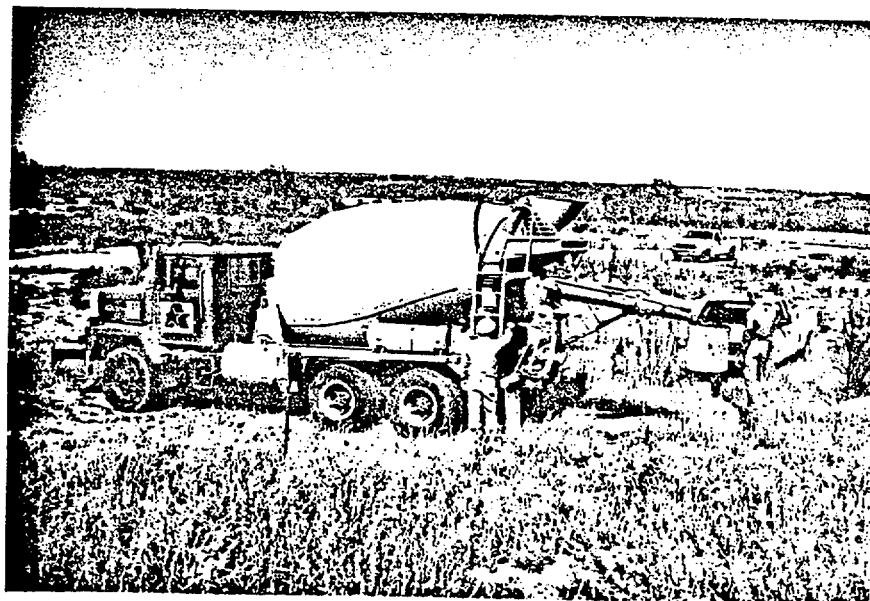


FIGURE NO. 4
FILLING FUNNEL

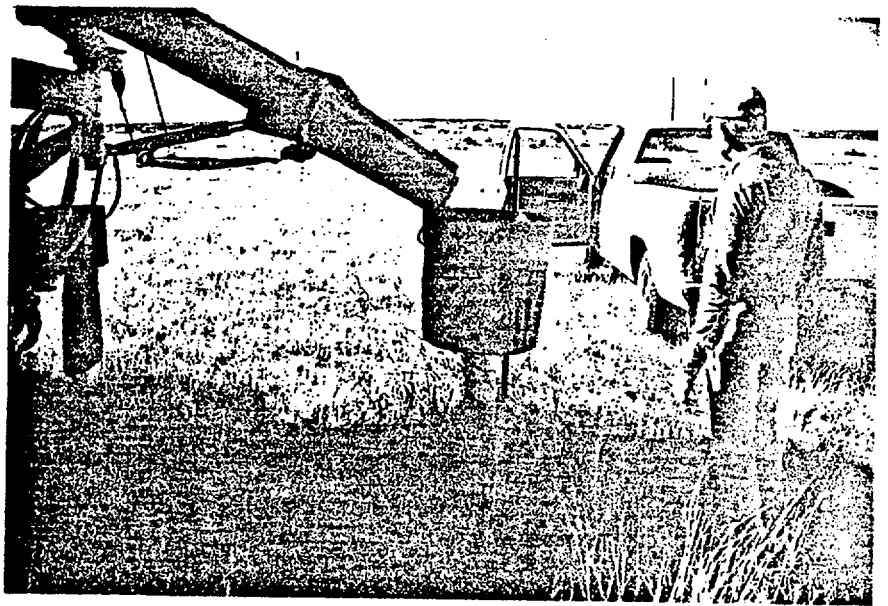


FIGURE NO. 5
FILLING STEP FINISHED
PLUG BEING PULLED
TO RELEASE CEMENT
INTO BORE HOLE

FIGURE NO. 6
WASHING FUNNEL
AFTER DONE FILLING

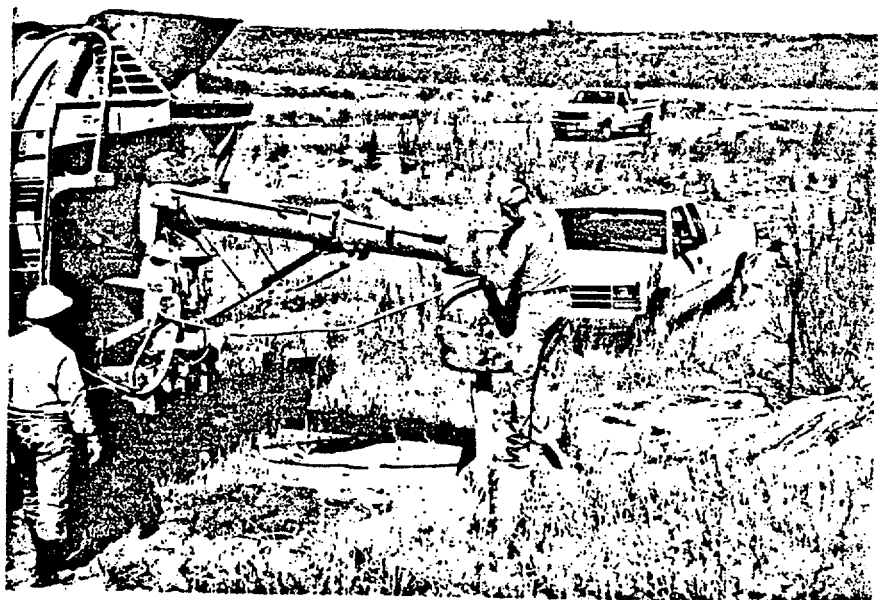


FIGURE NO. 7

CARRYING FUNNEL
BACK TO TRUCK
FOR MOVE TO NEXT HOLE



FIGURE NO. 8
PIT RESULTING
FROM BACKHOE
BREAKING CASING
OFF 4 FEET BELOW
GROUND LEVEL



FIGURE NO. 9
BOOTOM OF PIT
SHOWING BROKEN
CASING AND
DRILL HOLE

**AMERICAN****CEMENT CORPORATION**

P.O. BOX 38
 ESPAÑOLA, NEW MEXICO 87532
 (505) 763-8260 FAX (505) 763-8402

Via FAX

505 386-6555

October 6, 2000

HRI, Inc.
 P.O. Box 777
 Crownpoint, New Mexico 87313

RE: Quotation for Type I/II Portland Cement

Dear Salvador,

We are delighted to quote your cement needs as follows:

Type I/II Cement	f.o.b. Albuquerque	\$83.00 less \$1.00 Pd by 10 th .
Truck freight	to Churchrock, NM	16.70
Total delivered price		\$99.70 less \$1.00 Pd by 10 th
Per short ton (2000 lbs)		

Price should be good for all of 2001, however American Cement reserves the right to amend price on July 1, 2001 should it become necessary due to price increases. These generally do not exceed \$2 or \$3 per ton.

Thank you for the opportunity to quote this job. Please let me know if I can be of any further assistance.

Very truly,

Peter H. Cantrup
 Peter H. Cantrup
 American Cement Corp.

MARK

$$\frac{2000}{95} = 21 \quad \frac{99.70}{21} = 4.75/\text{SACK}$$

Salvador 10/6/00

REQUIRE SILO FOR UNLOADING.

Cement Cost Worksheet

Cement Volumes (per bag)

Specific Gravity	3.15
Absolute Volume Factor (lb/ft ³)	62.4
Absolute volume (lb/ft ³)	196.56
Lbs per bag	94
Lbs per ton	2000
Cement volume per bag (ft ³)	0.478

Water Volumes (per bag)

Specific Gravity	1.00
Pounds per gallon (lbs/gal)	8.33
Water per bag cement (gal)	6
Water weight w/ 1 bag cement (lb)	49.98
Absolute Volume Factor (lb/ft ³)	62.4
Water volume (ft ³)	0.80

Total volume per bag (ft³)	1.279
--	--------------

Cement costs

Cement cost per ton (delivered) (\$)	\$98.70
Cement cost per 94 lbs	\$4.64
Cement/water yield per bag (ft ³)	1.279
Mixed cement cost per ft ³ (\$)	\$3.63
Mixed cement cost per yd ³ (\$)	\$97.91

**HRI Crownpoint
Wellfield Equipment Tabulation**

# H. Houses	# Injectors	# Extractors	# Feet 2"	# Feet 10"	# Feet 14"	Gravel Road
1	2	6	4125			
2	27	33	13490			
3	6	10	7200			
4	19	25	14715			
5	4	4	1325			
6	21	21	14315			
7	24	44	39095			
8	9	15	7660			
9	19	24	13620			
10	26	45	19105			
11	7	9	6110			
12	29	29	13755			
13	25	35	20145			
14	9	7	4850			
15	22	21	9700			
16	14	16	5325			
17	7	18	4205			
18	9	9	2750			
19	26	32	10660			
20	21	24	9245			
21	16	9	5070			
22	17	30	9225			
23	0	5	2200			
24	12	19	7925			
25	9	8	3225			
26	5	6	2250			
27	2	1	600			
28	14	24	7350			
Totals	401	529	259240	51000	11000	5000

Total wellfield acreage = 181

Dokota wells = 45

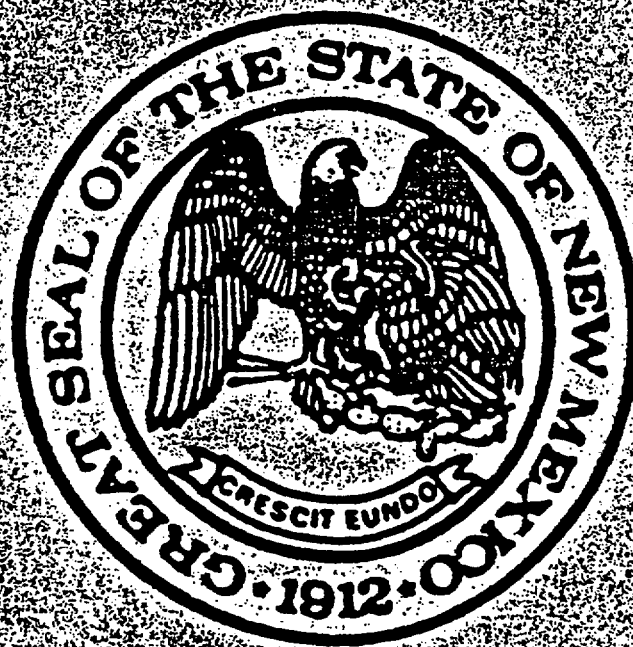
Monitor Wells = 39

RULES AND REGULATIONS

GOVERNING DRILLING OF WELLS
AND APPROPRIATION AND USE OF

GROUND WATER

IN NEW MEXICO



STATE ENGINEER
SANTA FE, NEW MEXICO

1995 EDITION

ARTICLE 4

WELL DRILLERS' LICENSING--CONSTRUCTION, REPAIR, AND PLUGGING OF WELLS

4-1. **LICENSE REQUIREMENTS.** Only those persons with a valid water well driller's license issued by the State Engineer may drill for underground water within a declared underground water basin. Such licenses shall not be required for the construction of a driven well; provided that the casing for such well shall not exceed two and three-eighths ($2\frac{3}{8}$) inches outside diameter. A driller's license may be acquired by application to the State Engineer. The State Engineer will issue a Water Well Driller's License to any applicant who, in the opinion of the State Engineer, having due regard for the interest of the state of New Mexico in the protection of its public waters, is qualified to conduct such drilling.

4-2. **APPLICATIONS--FORMS AND FEES, PERFORMANCE BOND.** Application for water well drillers license must be submitted to the State Engineer in quadruplicate on forms furnished by the State Engineer. An application must be accompanied by a filing fee of fifty dollars (\$50) and a performance bond in the penal sum of five thousand dollars (\$5,000) in a form and with surety approved by the State Engineer. The bond will be conditioned that the applicant will comply with the laws of the state of New Mexico and the rules and regulations of the State Engineer in the drilling of water wells. The license shall be valid only so long as the bond remains in effect.

4-3. **DRILLING DEFINED.** Drilling, deepening, repairing, cleaning, or plugging of a well requiring the use of a well rig is "drilling" within the meaning of these rules and regulations and can only be performed by a licensed driller.

4-4. **LICENSE--ACTIVITIES PERMITTED--AMENDMENT.** The Water Well Driller's License will show what activities the driller named therein is authorized to perform. Provided, however, any holder of a current license may file an application to have his license amended to include other activities. Forms for this application are available in the State Engineer Office. A filing fee of five dollars (\$5) must be submitted with this application.

4-5. **DRILLERS' IDENTIFICATION CARD--LICENSE NUMBER AND EXPIRATION DATE ATTACHED TO WELL RIG.** Each licensee when drilling in a declared underground water basin must have available for inspection upon request his pocket identification card which will be issued with the license by the State Engineer. A licensee must attach, in plain sight, to any well rig he is operating within a declared underground water basin a card showing his license number and the expiration date of the license. Such cards are issued by the State Engineer to current license holders. The licensee's name and address, in legible letters not less than one and one half ($1\frac{1}{2}$) inches in height, shall be conspicuously displayed on any drill rig under the licensee's control which is being operated within a declared underground water basin.

4-6. **LICENSES--DURATION--RENEWALS.** Licenses are granted for periods of two (2) years. A licensee may renew his license by making application to the State Engineer before the expiration of his current license. Application forms for renewals are available at the State Engineer Office and must be submitted in quadruplicate with a filing fee of twenty dollars (\$20). Renewals are also granted for periods of two (2) years.

4-7. **LICENSES--PERFORMANCE BOND--SURETY--CANCELLATION.** If the performance bond supporting the license becomes inoperative, the licensee must immediately cease operations. Sureties must give thirty (30) days written notice to the State Engineer of an intention to cancel a bond. This notice must be by registered mail.

4-8. **DRILLING--WHEN PERMISSIBLE--EMERGENCY WELL DRILLING.** A licensee may drill, deepen, repair, or clean a well within a declared underground water basin only when:

- a. owner of such well has a valid permit from the State Engineer for the work to be performed; or
- b. the requirements of Article 2-1.1 are met. The licensee must assure himself that the statutory requirements have been met.

4-9. **LICENSED DRILLERS--FILING OF OWNERSHIP OF WELL RIGS--TRANSFER OF OWNERSHIP--DESCRIPTIONS.** Each licensed water well driller shall file with the State Engineer a current description of each well rig owned or controlled by him. Whenever a licensee severs his ownership or control of a well rig, he shall notify the State Engineer in writing of such severance within ten (10) days. Whenever a licensee acquires ownership or control of a rig, he shall submit to the State Engineer in quadruplicate a full description of said equipment. The licensee shall submit a photograph (side view) of the rig.

4-10. **SUSPENSION OR REVOCATION OF DRILLER'S LICENSE--GROUNDS.** The State Engineer may, after notice and hearing, suspend or revoke a driller's license if he finds that said driller:

- a. has made a material misstatement of facts in his application for a license;
- b. has made a material misstatement of facts in a well record report;
- c. has violated the conditions of his license;
- d. has violated any of the rules and regulations of the State Engineer;
- e. has failed to submit a well record report (Article 4-11).

4-11. **DRILLING RECORD--FORMS--TIME FOR FILING.** The well driller shall keep a log of each well drilled, repaired, deepened, cleaned, or plugged, making a current record as the work progresses. A complete and properly executed well record, on the form provided by the State Engineer, shall be filed not later than ten (10) days after completion of the well.

4-12. **SOIL FORMATION SAMPLES.** The well driller shall, when so requested by the State Engineer, furnish (in sample bags supplied by the State Engineer) samples of the

formations encountered during drilling operations. The method and interval of sampling and the quantities required will be specified by the State Engineer.

4-13. **WELL CONSTRUCTION.** Every well shall be constructed with an opening of at least three fourths ($\frac{3}{4}$) inch in diameter in the casing above ground level to allow a measuring line to be inserted between the outside casing and the pump column, in order that the water level in the well may be measured. A removable cap shall be provided for such openings.

4-13.1. **CAPACITY MEASUREMENTS -- DISCHARGE PIPE -- TURNOUT -- APPROVED CAPACITY.** In order that capacity measurements may be made, all pumps other than those connected directly into an underground system shall have a discharge pipe unrestricted for at least five (5) diameters in length from the flange of the pump, elbow, or other obstruction. Those connected to an underground system shall have a turnout at the well into which the entire flow can be diverted with an unrestricted pipe as above. This turnout may be equipped with a valve or removable cap. Flowing wells must be equipped with a discharge pipe as described above and a cap or valve approved by the State Engineer.

4-14. **SHALLOW WELLS--CONSTRUCTION--REPAIR--PLUGGING.** The State Engineer has not adopted any general specifications for the construction, repair, or plugging of non-artesian or shallow wells. Any specific requirements and provisions made by the State Engineer shall be set forth in the permit. Application for Permit to Repair is required for all repair work, cleaning, scaling, deepening, modification of casing, or other work requiring the use of a well rig. Any specific requirements or conditions governing the repair will be set out in the approval of the permit. If plugging is required (Article 2-13), shallow wells shall be plugged by filling to the ground surface or, if the casing is not to be removed, by welding a steel plate or cap to the casing.

4-15. **ARTESIAN WELLS--CONSTRUCTION.** The casing for artesian wells shall be inspected by the State Engineer or his representative and shall meet or exceed the specifications as set forth in 4-15.1. All casing and collars must be in good condition. A standard casing shoe shall be used in all instances. The casing shall not be perforated in a manner that would allow the commingling of water from the artesian formation with water in overlying formations.

4-15.1. **CASING AND COUPLING--API TABLE OF SPECIFICATIONS.** Only threaded casing shall be used. Casings and couplings shall meet minimum American Petroleum Institute (API) specifications for the following sizes:

Outside Diameter Inches	Weight With Couplings (lbs/ft)	Wall Thickness Inches	O.D. Inches	Coupling Length Inches	Threads Per Inch	Grade Of Casing
4½	9.50	0.205	5.000	5	8	F-25
5½	13.00	0.228	6.050	6¾	8	F-25

Outside Diameter Inches	Weight With Couplings (lbs/ft)	Wall Thickness Inches	O.D. Inches	Coupling Length Inches	Threads Per Inch	Grade Of Casing
6	15.00	0.238	6.625	7	8	F-25
6 $\frac{1}{8}$	17.00	0.245	7.390	7 $\frac{1}{4}$	8	F-25
7	17.00	0.231	7.656	7 $\frac{1}{4}$	8	F-25
7 $\frac{1}{8}$	20.00	0.250	8.500	7 $\frac{1}{2}$	8	F-25
8 $\frac{1}{8}$	24.00	0.264	9.625	7 $\frac{1}{4}$	8	F-25
9 $\frac{1}{8}$	29.30	0.281	10.625	7 $\frac{1}{4}$	8	F-25
10 $\frac{3}{4}$	32.75	0.279	11.750	8	8	F-25
11 $\frac{1}{4}$	38.00	0.300	12.750	8	8	F-25
13 $\frac{3}{8}$	48.00	0.330	14.375	8	8	F-25

If casing length exceeds one thousand (1,000) feet, H-grade or better shall be used for thirteen and three-eighths (13 $\frac{3}{8}$) inch casing.

4-15.2. HOLE DIAMETER. In all cases the diameter of the drilled hole shall be at least two (2) inches greater than the outside diameter of the casing.

4-16. CASING--CEMENTING--TESTING. The following specifications shall govern casing, cementing, and testing: the casing shoe shall be welded to the casing to assure proper position. The casing shall be landed on a suitable casing seat in the confining formation overlying the artesian aquifer formation and sufficient oil well cement shall be used to obtain circulation to the surface. When circulation to the surface is not obtained, cement shall be placed to the surface behind the casing. Additives of pozzolanic nature may be used above the casing shoe but shall not exceed fifty per cent (50%) by volume. The addition of calcium chloride and/or gel is permissible but shall not in any case exceed two per cent (2%) each by weight. A sufficient amount of cement without additives shall be used to allow neat cement to seal the casing shoe and rise a minimum of fifty (50) feet above the shoe between the casing and the hole. Cement shall be allowed to set a minimum of forty eight (48) hours before drilling is resumed. Sealing off of the formations shall be checked by a method approved by the State Engineer or his authorized representative.

4-16.1. CEMENTING. Cementing shall be done by the pump and plug method as follows: after the casing has been run and landed, the pump shall be started and mud circulation shall be maintained for at least thirty (30) minutes with the casing raised slightly in order to equalize the mud pressure inside and outside of the casing. A heavy slurry of oil well cement and water shall be mixed and poured into the top of the casing. If additives are used in the slurry, sufficient neat cement (density fifteen (15) pounds per gallon) shall then be added to seal the casing shoe and rise a minimum of fifty (50) feet above the shoe. A casing plug of standard make shall be placed in the casing above the cement and a swedge nipple screwed onto the top of the casing and connected to the mud pump. Then a mud slurry or water shall be pumped into the casing, forcing the cement and casing plug down the casing. A measuring line shall be run behind the plug so that the driller may know its location at all times. When the plug reaches the

point desired above the bottom of the casing, the pump shall be stopped and the casing lowered to the casing seat.

4-17. CASING, CEMENTING--TESTING--APPROVAL. The casing, cementing, and testing programs shall be witnessed and approved by an authorized representative of the State Engineer.

4-18. EXCEPTION TO CASING AND CEMENTING REQUIREMENTS. In those areas of declared artesian basins where the well is drilled into the artesian aquifer, but no confining formation overlying the artesian formation is present, the foregoing requirements for casing and cementing are not applicable and may be altered by receiving written approval of the State Engineer or his representative.

4-19. ARTESIAN WELLS--REPAIR. Before repairs are commenced the well shall first be inspected by a representative of the State Engineer to determine if the condition of the well is such that it may be repaired. When leaks in the casing are found and the casing and well are otherwise in good condition, the well may be repaired by a method approved by the State Engineer. A packer or bridge plug approved by the State Engineer shall be used in all well repairs. An inspection shall be made at the completion of the work to determine if the repair was satisfactory. During each inspection, the hole shall be open to allow the entrance of equipment for well logging and leakage measurement.

4-19.1. PLUGGING. If an artesian well is to be replaced by a new well, it shall be plugged immediately following the completion of the new well. All the work shall be done under the supervision of the State Engineer or his representative, or a representative of the appropriate Artesian Conservancy District who shall designate the amount of cement to be used and the depths at which cement plugs shall be set.

4-20. TEST OR EXPLORATORY WELLS. All test or exploratory wells shall be so constructed, maintained, and operated that each water shall be confined to the aquifer in which it is encountered. All test or exploratory wells penetrating artesian aquifers shall be cased, cemented, and tested as required for the construction of artesian wells (Article 4-15 through 4-18) and the casing shall be landed in the formation underlying the deepest artesian aquifer and cemented through all known artesian aquifers. The casing, as referred to in the artesian well specifications, is designated as the water protection string by the oil industry. If conductor pipe is used, it shall not be removed until after cementing of the casing has been completed. All casing, cementing, and testing programs shall be witnessed and approved by a representative of the State Engineer.

4-20.1. SHOTHOLES--PENETRATION. Shotholes for geophysical exploration shall not penetrate closer than twenty-five (25) feet above any known artesian aquifer under confinement.

4-20.2. ABANDONMENT--PLUGGING. In the event that the test or exploratory well is to be abandoned, the State Engineer shall be notified. Such well shall be plugged in accordance with Article 4-19.1 so that the fluids will be permanently confined to the specific strata in which they were originally encountered.

4-21. MINE LODGE DISCOVERY AND DRILL HOLES. Any person drilling a mine lode discovery or mine drill hole to a depth of ten (10) feet or more, who shall encounter or whose drill shall cut into a water body or water bearing strata, shall plug or otherwise construct, maintain, and operate such holes so that any water encountered is permanently confined to the aquifer in which it is found.

4-21.1. DISCOVERY REPORT--FORMS--TIME FOR FILING. Such person, within ninety (90) days from the date of the discovery, shall report to the State Engineer, on forms provided by the State Engineer, the location and depth of the hole, and the method and material used in plugging the hole. If the hole is not plugged, the report shall describe the manner in which it was constructed and is being maintained and operated. The report shall include a log of the hole which is adequate to permit a determination of whether the plugging or construction and operation and maintenance of the drill hole are satisfactory.

4-21.2. ARTESIAN WATER. If artesian water is encountered, the construction, operation, maintenance, or plugging shall be done in accordance with Articles 4-15 through Articles 4-19-1.

4-22. DEVIATIONS FROM SPECIFICATIONS--APPROVAL. Any deviations from the above described casing, cementing, and testing programs must be approved by the State Engineer.

5. Equipment Removal

5.1. Introduction and Description

This budget includes the cost estimates for removing all of the production and restoration process equipment. All process vessels and other equipment are assumed to be contaminated for the purpose of developing the RAP budget and would be disposed in an U.S. NRC licensed waste disposal facility.

The surety would cover removing all process and restoration equipment at the Crownpoint site. The budget contemplates costs for disassembly, or demolition, loading, transportation and disposal at a NRC licensed facility³¹. There is no decommissioning considered, or disposal at an unrestricted site.

5.2 Budget Assumptions

The Process Equipment Removal and Disposal Budget is formatted with the underlying assumptions integrated into the tabulation. The budget figures distinguish individually costs associated with the Crownpoint site, and further break down removal and loading costs and transportation and disposal costs. Costs for tanks, pipe, pumps, reverse osmosis and brine concentration equipment are estimated.

The Process Equipment Removal and Disposal Budget was developed with the assumption that all labor is contracted at a rate of \$120 per day or \$15 per hour. These are reasonable contract labor rates. Estimate labor time requirements are based on best professional judgment. Management of this activity will be provided by site staff who will be available six months after restoration.

All tankage and piping will be reduced in volume as indicated in the budget. Tanks will be reduced by hydraulic shear and pipe will be crushed. There is no provision for reduction in the size of pumps, the dryer, the reverse osmosis equipment or the brine concentrator. No credit is given for salvage value.

For demolished tankage and pipe, a 50% void factor was included in all volume calculations for the purpose of determining transportation and disposal costs. All disposal was priced at the bulk rate as shown in Attachment E-5-2.

A contingency was included for health and safety supplies such as disposable uniforms and respirators.

As shown in Attachment E-5-1, the total cost for equipment removal is projected to be \$59,600.

³¹ For the purpose of this budget, HRI assumed that the NRC licensed site would be the IUC White Mesa Mill near Blanding Utah. Projected unit disposal costs are described in Attachment E-5-2.

November 19, 2001

**ATTACHMENT E-5-1
EQUIPMENT REMOVAL BUDGET**

PROCESS EQUIPMENT REMOVAL AND DISPOSAL

		<u>Satellite</u>	<u>Totals</u>
I.	Removal and Loading Costs		
A.	Tankage		
	Number of tanks	29	
	Volume of tank construction material (ft ³)	1300	
1	Labor		
	Number of persons	3	
	Ft ³ /day	50	
	Number of days	26	
	\$/day/person	\$120	
	Subtotal labor costs	\$9,360	
2	Equipment (hydraulic shear)		
	Number of days	26	
	\$/Day - \$300	\$300	
	Subtotal equipment costs	\$7,800	
	Subtotal tankage removal and loading costs	\$17,160	
B.	PVC pipe		
	PVC pipe footage	3000	
	Average PVC pipe diameter (inches)	3	
	PVC pipe material volume (ft ³ /ft)	0.018	
	Volume of compacted PVC pipe w/100 % void (ft ³)	108	
1	Labor		
	Number of persons	2	
	Ft/day	200	
	Number of days	15	
	\$/day/person	\$120	
	Subtotal labor costs	\$3,600	
2	Pipe crushing		
	Number of persons	2	
	\$/hr./person	\$15	
	Feet pipe per hour	300	
	Subtotal pipe crushing	\$300	
	Subtotal PVC pipe removal and loading costs	\$3,900	
C.	Pumps		
	Number of pumps	29	
	Average volume (ft ³ /pump)	5	
	Volume of pumps (ft ³)	145	
1	Labor		
	Number of persons	1	
	Pumps/day	2	
	Number of days	14.5	
	\$/day/person	\$120	
	Subtotal pump removal and loading costs	\$1,740	
D	Reverse osmosis equipment		
	RO (ft ³)	1000	

1 Labor			
	Number of persons	3	
	Ft ³ /day	200	
	Number of days	5	
	\$/day/person	\$120	
	Total RO dismantling and loading cost	\$1,800	
E	Brine concentration equipment		
	BC (ft ³)	4000	
1 Labor			
	Number of persons	3	
	Ft ³ /day	200	
	Number of days	20	
	\$/day/person	\$120	
	Total BC dismantling and loading cost	\$7,200	\$31,800
	Total process equipment removal and loading costs		
II. Transportation and Disposal Costs (NRC-Licensed Facility)			
A.	Tankage (plastic and fiberglass)		
	Volume of tank construction material (ft ³)	1300	
	Volume of disposal assuming 50% void space (ft ³)	1950	
	Transportation and disposal unit cost (\$/ft ³)	\$3.52	
	Subtotal tankage transportation and disposal costs	\$6,864	
B.	PVC pipe		
	Volume of crushed PVC pipe (ft ³)	108	
	Volume of disposal assuming 50% void space (ft ³)	162	
	Transportation and disposal unit cost (\$/ft ³)	\$3.52	
	Subtotal PVC pipe transportation and disposal costs	\$570	
C.	Pumps		
	Volume of pumps (ft ³)	145	
	Volume of disposal assuming 50% void space (ft ³)	217.5	
	Transportation and disposal unit cost (\$/ft ³)	\$3.52	
	Total dryer transportation and disposal costs per facility	\$766	
D	Reverse osmosis unit		
	RO volume (ft ³)	1000	
	Volume for disposal assuming RO remains intact (ft ³)	1000	
	Transportation and disposal unit cost (\$/ft ³)	\$3.52	
	Total dryer transportation and disposal costs	\$3,520	
E	Brine concentrator		
	BC volume (ft ³)	4000	
	Volume for disposal assuming BC remains intact (ft ³)	4000	
	Transportation and disposal unit cost (\$/ft ³)	\$3.52	
		\$14,080	
	Total equipment transportation and disposal costs		\$25,800
III. Health and Safety Costs			
	Radiation safety equipment	1000	
	Total health and safety costs		\$2,000
TOTAL EQUIPMENT REMOVAL AND DISPOSAL COSTS			\$59,600

November 19, 2001

**ATTACHMENT E-5-2
BUDGET CALCULATIONS
DISPOSAL COSTS**

**PIPE VOLUME
TRANSPORTATION AND DISPOSAL**

Pipe Wall Volume Data

<u>Outside Diameter (in)</u>	<u>Area Inside OD (ft2)</u>	<u>Wall Volume SDR17 (ft3/ft)</u>
2	0.022	0.012
2.5	0.034	
3	0.049	0.018
3.5	0.067	
4	0.087	
4.5	0.110	
5	0.136	
5.5	0.165	
6	0.196	
6.5	0.230	
7	0.267	
7.5	0.307	
8	0.349	
8.5	0.394	
9	0.442	
9.486	0.491	
9.5	0.492	
10	0.545	0.140
10.5	0.601	
10.75	0.630	
11	0.660	
11.5	0.721	
12	0.785	
12.353	0.832	
12.5	0.852	
13	0.922	
13.5	0.994	
14	1.069	0.237
14.5	1.147	
15	1.227	
15.5	1.310	
Wall Tk		
14 " SDR 17		0.824
10 " SDR 17		0.632

TRANSPORTATION AND DISPOSAL

By-Product Material Transportation Disposal Costs per Ft³

Assumptions:

1. Based on URI contract costs for transportation to and disposal at the IUC White Mesa Mill near Blanding Utah
2. Transportation assumed a 200 mile trip at \$2.00 per mile. Bulk truck capacity 20 yds³. Drum truck capacity 48
3. 1 cubic yard = 1 ton.

Type of waste:	Soil, sand, demolished concrete and other bulk wastes		
	<u>Unit Cost</u>	<u>Ft³/Truck</u>	<u>Total \$/ft³</u>
Disposal fee	\$2.78		\$2.78
Shipping	\$400.00	540	\$0.74
Total shipping and disposal			\$3.52

Unrestricted Material Transportation Disposal Costs per ton

Assumptions:

1. Based on public costs disposal at the Waste Management Red Rocks Landfill. 24 \$/ton
2. 1 ton is equal to 1 yd³
2. Transportation assumed a 30 mile trip at \$2.00 per mile. Bulk truck capacity 20 yds³.

	<u>Unit Cost</u>	<u>Total \$/yds³</u>
Disposal fee (ton)	\$24.00	\$24.00
Shipping (truck trip)	\$60.00	\$3.00
Total shipping and disposal (yd ³)		\$27.00

November 19, 2001

**ATTACHMENT E-5-3
QUOTES AND PRICES**

**LANDFILL FEES
LANDFILL DISTANCE
WHITE MESA FEES**

HRI, INC.

Crownpoint Office

P. O. Box 777

Physical Address: ½ mile W of Crownpoint

Crownpoint, New Mexico 87313

Voice: 505-786-5845 Fax: 505-786-5555

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MARK: WASTE MANAGEMENT  
RED ROCKS LANDFILL  
505-862-8402

24<sup>00</sup>/TON REG WASTE

46<sup>00</sup>/TON SPECIAL WASTE  
(CONTAMINATED WITH OIL/GAS/GRASS)

25 MILES FROM CP site

Salvador  
9-12-00

HRI, INC.

Crownpoint Office

P.O. Box 777

Physical Address: 1/2 mile W of Crownpoint

Crownpoint, New Mexico 87313

Voice: 505-786-5845 Fax: 505-786-5555

Mark:

Miles to Landfill

to CP SITE 25 miles

to SEC 8-CR - 35 miles (via I-40)

to SE 8-CR - 35 miles (via Smith Lake

Runoff)

Schedule 9-13-a

Crownpoint/Gallup HAVE TRANSFER  
Stations only. Landfill close to  
THOREAU N.M.

## BYPRODUCT DISPOSAL AGREEMENT

This BYPRODUCT DISPOSAL AGREEMENT ("Agreement") is made on July 26 2001, by and between Uranium Resources, Inc. ("Shipper") with its principal offices at 650 S. Edmonds Lane, Suite 108, Lewisville, Texas 75067 and INTERNATIONAL URANIUM (USA) CORPORATION ("IUSA"), with its principal corporate offices at 1050 Seventeenth Street, Independence Plaza, Suite 950, Denver, Colorado 80265.

### RECITALS:

A. Shipper is the operator and owner of an in-situ uranium recovery project located in the State of Texas and commonly known as the Kingsville Dome Mine (the "Mine"), and such operations are conducted in accordance with a permit issued by the State of Texas ("Shipper's State License").

B. Shipper desires an agreement with the operator and/or owner of a duly licensed facility authorized to permanently dispose of all of the Byproduct Material as defined under Section 11(e)(2) of the Atomic Energy Act of 1954, as amended, 42 U.S.C. § 2014(e)(2) and 10 C.F.R. § 40.4(a-1) (the "Byproduct Material"), associated with the Mine or arising from activities at the Mine.

C. IUSA is the operator of the White Mesa Mill located near Blanding, Utah (the "White Mesa Mill"). The White Mesa Mill is owned by IUC White Mesa, LLC, an affiliate of IUSA. The NRC has duly licensed (the "IUSA NRC License") the White Mesa Mill and its component facilities to permit the disposal of Byproduct Material generated as a result of uranium mining and processing by placement of the Byproduct Material in the White Mesa Mill's tailings impoundment (the "Tailings Facility").

D. IUSA and IUC White Mesa, LLC have the necessary expertise, equipment, facilities, permits and licenses to safely and lawfully dispose of the Byproduct Material and to perform all work required in accordance with the terms and conditions set forth in this Agreement.

E. IUSA is willing to accept Byproduct Material from Shipper for permanent disposal in the Tailings Facility at the White Mesa Mill upon the terms and conditions set forth in this Agreement.

NOW, THEREFORE, in consideration of the mutual promises, covenants and agreements set forth in this Agreement, Shipper and IUSA agree as follows:

### 1. AGREEMENT TO ACCEPT BYPRODUCT MATERIAL.

A. During the period commencing on the date hereof and ending on December 31, 2002 (the "Term"), unless this Agreement is terminated earlier under Article 14 hereof, Shipper shall ship all but not less than all of the Byproduct Material of Shipper associated with or now located at the Mine or arising from activities at the Mine site to IUSA for final disposal at the White Mesa Mill pursuant to the terms and conditions of this Agreement. All such Byproduct Material shall be

delivered to IUSA at the White Mesa Mill.

B. IUSA agrees to accept for final disposal the Byproduct Material of Shipper, as described herein, which is delivered to the White Mesa Mill pursuant to the terms and conditions of this Agreement during the Term of this Agreement, unless this Agreement is terminated sooner under Article 14 hereof.

2. ANALYSIS, TRANSPORTATION, SCHEDULING, AND DELIVERY OF BYPRODUCT MATERIAL.

A. Shipper shall provide and arrange for the transportation of Shipper's Byproduct Material through a transportation contractor. Any and all Byproduct Material shipped for disposal shall be transported in trucks or in 55 gallon drums. All trucks shall be self dumping/end dump trucks, and all such drums shall be full of Byproduct Material and shall be so labeled. Shipper shall comply with, and Shipper shall require that the transportation contractor comply with all applicable federal and state transportation regulations. Shipper shall make a copy of its contract with the transportation contractor available to IUSA upon request. By releasing a shipment from the Mine, Shipper shall be deemed to have represented and warranted that all information set forth in the forms, reports and logs completed by Shipper is in accordance with this Agreement, and all applicable laws, rules and regulations. All deliveries of Byproduct Material to the White Mesa Mill shall be between the hours of 8:00 a.m. and 4:00 p.m., Monday through Friday. Shipper shall schedule loading at the Mine accordingly. Shipper shall be responsible for any demurrage charges resulting from failure to load trucks to ensure that this delivery requirement can be met. As used herein, "shipment" is defined as any number of drums loaded on one truck or a partial or one full truckload of Byproduct Material, transported at one time. Scheduling of the shipments shall be coordinated with IUSA. Shipper shall segregate types of Byproduct Material based on the categories set forth in Section 10(B) hereof to facilitate determination of quantities being shipped for disposal and all shipments shall be in compliance with the requirements of Section 5(D) hereof.

B. Shipper shall notify IUSA, in writing, thirty days prior to an intended shipment of the Byproduct Material. Such notice shall include (1) a detailed description of the content of the proposed shipment, setting forth with specificity a list of categories or types of Byproduct Material that it intends to ship to the White Mesa Mill and; (2) a date when sampling (as described in Paragraph (C)) of the material proposed for shipment will occur.

C. At its sole expense, Shipper shall provide sample analyses (RCRA characterization, radionuclides, and other characterizations requested by IUSA) in sufficient detail to enable IUSA to confirm the content of the intended delivery of Byproduct Material. Shipper shall collect and analyze representative samples for each category or type of Byproduct Material that will be delivered to IUSA for disposal. IUSA reserves the right to have its representative present when Shipper collects the samples. The samples shall be sent to a commercial analytical laboratory, which is acceptable to both IUSA and Shipper. An original report of the results of the commercial analytical laboratory analyses will be provided to IUSA thirty (30) days prior to scheduling the actual delivery of the Byproduct Material.

D. Shipper shall provide IUSA with advance notice of the actual date of delivery of the Byproduct Material two (2) business days prior to such delivery.

E. Unloading at the White Mesa Mill shall occur only in areas designated for unloading by IUSA, and in strict accordance with the procedures established by IUSA.

3. **REJECTION OF MATERIAL.** IUSA shall be entitled to reject delivery of any Byproduct Material or other material of Shipper which, (1) IUSA is not authorized to permanently dispose of at the White Mesa Mill by any term or condition of the IUSA NRC License, or by the terms or conditions of any other applicable permit or license, as by any applicable laws or regulations, or (2) IUSA, in good faith, determines it is not the material from which a sample analysis has been provided to IUSA. Upon receipt of notice from IUSA of any such rejection, Shipper will promptly remove any such nonconforming material from the White Mesa Mill. IUSA may also direct the transportation contractor to return the entire load to the Mine. The removal cost, including any demurrage or delay costs incurred by the trucker, and all of IUSA's costs associated with identifying and handling any rejected material shall be paid for by Shipper. To the extent that IUSA has the legal obligation to identify, and to notify governmental agencies of any shipment of material (or portion thereof), which IUSA believes not to be in compliance with applicable regulations, shall not be liable to Shipper for any loss or damage incurred by Shipper because of such identification and notification. IUSA shall make every effort to notify Shipper of such identification and notification in a timely manner. IUSA's right to reject material of Shipper shall continue up to the time that IUSA has accepted the material for permanent disposal at the Tailings Facility. "Permanent disposal" means the actual placement of the material in a tailings impoundment at the White Mesa Mill. After permanent disposal, Shipper's Byproduct Material will not be segregated from any other material received from any other third party or from any of IUSA's material. Title to the material shall pass to IUSA upon acceptance of the material by IUSA for permanent disposal at the Tailings Facility.

4. **REPRESENTATIONS AND WARRANTIES OF IUSA.** As material inducements to Shipper to enter into this Agreement, IUSA represents and warrants to Shipper as follows:

A. IUSA is a corporation duly organized, validly existing, in good standing under the laws of the State of Delaware, and is duly qualified and authorized to do business in the State of Utah.

B. IUSA has full corporate power and authority to own its property, carry on its business as being conducted on the date of this Agreement, and has full authority to enter into and perform its obligations under this Agreement.

C. The obligations of IUSA, which are set forth in this Agreement, are enforceable in accordance with their terms except as such terms may be limited by bankruptcy, insolvency, or similar laws affecting the enforcement of creditors' rights generally.

D. The White Mesa Mill facility (i) is not or has not been the subject of response costs as

defined by the Comprehensive Environmental Response, Compensatory, and Liability Act, as amended, 42 U.S.C. § 9601-9657 ("CERCLA"), or (ii) is not listed, or is not proposed to be listed, on the National Priority List as defined in CERCLA.

5. **REPRESENTATIONS AND WARRANTIES OF SHIPPER.** As material inducements to IUSA to enter into this Agreement, Shipper represents and warrants to IUSA as follows:

A. Shipper is a corporation duly organized, validly existing, in good standing under the laws of the state of its incorporation. Shipper has been duly licensed under the Shipper's State License to operate the Mine and to generate the Byproduct Material.

B. Shipper has full corporate power and authority to own its property; to carry on its business as being conducted on the date of this Agreement, and has full authority to enter into and perform its obligations under this Agreement.

C. The obligations of Shipper, which are set forth in this Agreement, are enforceable in accordance with their terms except as such terms may be limited by bankruptcy, insolvency, or similar laws affecting the enforcement of creditors' rights generally.

D. Each shipment of Byproduct Material to be delivered to the White Mesa Mill for final disposal in the Tailings Facility will comply with all applicable provisions of Titles 10 and 49 of the U.S. Code of Federal Regulations, Shipper's State License, the IUSA NRC License, and all other applicable regulations, permits and licenses.

E. The Byproduct Material is not hazardous waste as defined in the Resource Conservation and Recovery Act, as amended, 42 U.S.C. § 6901-6991, or comparable state laws or regulations. The Byproduct Material has not been transported from any site or facility which (i) is or has been the subject of response costs or demands for the payment of response costs as defined in CERCLA, or (ii) is listed, or is proposed to be listed, on the National Priority List as defined in CERCLA.

6. **COVENANTS OF IUSA.** IUSA covenants are as follows:

A. IUSA shall remain in compliance with its representations and warranties as set forth in this Agreement during the term of this Agreement.

B. IUSA shall maintain, at its expense, during the continuance of the effectiveness of this Agreement, policies of insurance which provide at least the following types of coverage in at least the following amounts:

| <u>COVERAGE</u>                                           | <u>LIMITS</u>                     |
|-----------------------------------------------------------|-----------------------------------|
| Worker's Compensation                                     | Statutory                         |
| Employer's Liability                                      | \$1,000,000 each occurrence       |
| General Liability                                         | \$2,000,000 combined single limit |
| Automotive Liability<br>(bodily injury & property damage) | \$1,000,000 each accident         |

C. Worker's Compensation insurance shall contain a waiver of subrogation clause.

D. IUSA shall, throughout the continuance of the effectiveness of this Agreement, remain in compliance with the requirements of any federal or state agency for the deposit of surety bonds, cash funds, or other surety arrangements as required by any such agency, to assure it of performance and completion of requirements for reclamation of the White Mesa Mill in accordance with applicable law and regulations.

7. COVENANTS OF SHIPPER. Shipper covenants as follows:

A. Shipper shall remain in compliance with its representations and warranties as set forth in Article 5 of this Agreement during the continuance of the effectiveness of this Agreement.

B. Shipper shall maintain or cause the transportation contractor to maintain, at its expense, during the continuance of the effectiveness of this Agreement, policies of insurance which name each of IUSA and IUC White Mesa LLC as an additional insured, and which provide at least the following types of coverage in at least the following amounts. Prior to delivering any Byproduct Material to the White Mesa Mill and, as a condition to doing so, then, and from time to time during the continuance of this Agreement, Shipper shall furnish to IUSA duly executed certificates of insurance establishing that the required insurance coverage has been obtained and is being maintained in full force and effect.

| <u>COVERAGE</u>                                                            | <u>LIMITS</u>                     |
|----------------------------------------------------------------------------|-----------------------------------|
| Worker's Compensation                                                      | Statutory                         |
| Employer's Liability                                                       | \$1,000,000 each occurrence       |
| General Liability                                                          | \$2,000,000 combined single limit |
| Automotive Liability<br>(bodily injury & property damage)                  | \$1,000,000 each accident         |
| Automotive Liability<br>(LSA - Highway Route Controlled Quantity Coverage) | \$5,000,000                       |



C. Worker's Compensation insurance shall contain a waiver of subrogation clause.

D. The Byproduct Material to be delivered to the White Mesa Mill for disposal in the Tailings Facility will consist of contaminated soil, sand, rocks, demolition masonry, concrete rubble, filter material, pond liners, pond sediments, processing equipment, piping, and other miscellaneous material and equipment. No separate pieces of any material shall exceed 30 cubic feet in volume, with no single dimension greater than six feet. Any and all material containing void space of one cubic foot or greater, except open-ended steel piping, shall be opened by Shipper such that the void space can be filled during disposal, or the material shall be crushed by Shipper such that the remaining void space is less than one cubic foot. No partially filled drums shall be shipped, and Shipper shall crush any empty drums that are shipped for disposal. Materials of a friable nature, such as PVC or fiberglass, shall be crushed or chipped by Shipper to reduce void space. Byproduct Materials saturated with liquid will not be shipped. No rebar or other sharp objects shall be protruding from concrete or cement type of rubble. Any deviation from these requirements must be approved in writing by IUSA prior to transporting such materials. The Byproduct Material is expected to include the radionuclides Radium-226, Thorium-230, and natural uranium. The Radium-226 levels will not exceed 6,000 pci/gram, and total radioactivity will not exceed 6,000 pci gross alpha activity per gram, and sample reports showing radioactivity levels shall be included with the Bill of Lading delivered to IUSA.

E. With each shipment of the Byproduct Material to the White Mesa Mill, Shipper shall execute and deliver to IUSA (or the transporter, as appropriate) the Bill of Lading and Material Release Authorization in the Forms attached hereto as Exhibits A and B, respectively, and the information provided on such shall be true and accurate in all respects. A copy of Shipper's State License shall also be attached to the Bill of Lading.

8. **INDEMNIFICATION BY IUSA.** IUSA shall indemnify, defend, and save harmless Shipper and their representative officers, employees, and agents against all liability whatsoever, including all costs and expenses each of Shipper and their representative officers, agents, and employees may incur, including without limitation by reason of enumeration, claims asserted against either Shipper by any employee of IUSA, environmental response costs, clean up costs, governmental fines, costs of settlement, and reasonable attorney's fees which in any way results from a breach by IUSA of its representations, warranties or covenants made in this Agreement or failure of IUSA to comply with the terms and provisions of the IUC NRC license and/or any state issued permits, or other applicable federal and state statutes or regulations.

9. **INDEMNIFICATION BY SHIPPER.** Shipper shall indemnify, defend, and save harmless IUSA, IUC White Mesa, LLC and their representative officers, employees, and agents against all liability whatsoever, including all costs and expenses that IUSA, IUC White Mesa, LLC and their representative officers, agents, and employees may incur, including without limitation, loss of profits or revenues, claims asserted against IUSA or IUC White Mesa, LLC by any employee of Shipper, environmental response costs, clean up costs, governmental fines, costs of settlement, and reasonable attorney's fees which in any way relate to or arise out of or are incurred in connection with the disposal of any Byproduct Material delivered to IUSA, the White Mesa Mill, from Shipper, if such

loss or liability, in any way whatsoever, results from the failure of the Byproduct Material to conform to the terms of this Agreement or the data supplied on any of the reports, logs or forms provided by Shipper, or said shipment fails to meet applicable standards prescribed by the Department of Transportation, or any other federal or state governmental agency, having jurisdiction over such matters, or which are related to breaches by Shipper of its representations, warranties or covenants made in this Agreement, or the failure of Shipper to comply with the terms and provisions of the Shipper's State License, and/or any other permits or other applicable federal and state statutes or regulations, regardless of whether title to the Byproduct Material has passed to IUSA under the terms of this Agreement.

10. PAYMENTS AND FEES. For all the Byproduct Material delivered to and disposed of by IUSA, Shipper shall pay IUSA as follows:

A. Shipper shall pay IUSA within 10 days of receipt of an invoice therefor, the following disposal fees for quantities of Byproduct Material delivered for disposal, as indicated below:

- (i) For Byproduct Material consisting of soils, sand, gravel, rock, concrete rubble within size specification, masonry-type demolition material, unpackaged pond sediments, PVC, fiberglass, and process equipment: \$75.00/ton. As used herein, "ton" shall mean 2,000 pounds.
- (ii) For Byproduct Material consisting of ion exchange resin, and packaged or drummed demolition and process waste, including PVC, fiberglass, process equipment, and other miscellaneous items not included as bulk material in A(i): \$10.00/cu. ft.
- (iii) A charge of \$35.00 per hour shall be made for unloading time at the White Mesa Mill.
- (iv) A decontamination charge of \$30.00 per hour, or any part thereof, will be made in the event IUSA determines that any truck or container has been contaminated to the extent that additional decontamination efforts are required due to surface contamination not caused by IUSA actions.
- (v) Any truckload consisting of any combination of materials specified in A(i), and A(ii) will be charged at the rates provided in A(ii). The determination of "cubic yard" or "cubic feet" shall be based on the shipping container or package volume.

IUSA will provide Shipper with a copy of IUSA's scale ticket to support IUSA's weight measurement and subsequent invoice.

B. The Utah State Radioactive Waste Tax applicable to the Byproduct Material disposed of at the White Mesa Mill shall be paid by Shipper.

C. All sales and use taxes, that are applicable to the services covered herein, shall be paid by Shipper.

11. FEE REVIEW. Any increase of IUSA's costs of operation, due to regulatory requirements, shall be charged to the Shipper, in a fair and reasonable proportion, from the date a particular requirement becomes effective.

12. INSPECTIONS. Shipper's representatives, as designated to IUSA in writing, shall have the right to inspect IUSA's White Mesa Mill facilities which are related to receipt, handling, and disposal of the Byproduct Material, at reasonable times and frequency designated by IUSA, and upon at least seven days written notice from Shipper. Shipper shall also have the right to inspect, upon reasonable notice, IUSA's licenses and permits to receive, handle and dispose of Byproduct Material at the White Mesa Mill facility. Such inspections shall be at the sole cost and risk of Shipper's participating representatives, and shall not interfere with IUSA's operations at the White Mesa Mill.

13. SAFETY. Shipper, its employees, all its contractors and subcontractors ("Shipper's Personnel"), shall abide by all health, safety, and security rules and regulations in force at the White Mesa Mill, or on any property controlled by IUSA or IUC White Mesa, LLC, while they are present on the premises. Shipper shall indemnify and hold harmless IUSA and IUC White Mesa LLC, for any loss or damages, including reasonable attorney's fees, suffered by IUSA or IUC White Mesa LLC resulting from the failure of Shipper's employees, contractors or subcontractors to comply with the terms of this Article 13.

14. TERMINATION.

A. This Agreement may be terminated by notice from either party in the event of substantial failure by the other party to fulfill its obligations through no fault of the terminating party, provided that no such termination may be effected unless the other party is given not less than 15 business days written notice (delivered in person or by certified mail, return receipt requested) of intent to terminate, during which time the default may be cured and the Agreement reinstated.

B. If termination is caused by default of Shipper, Shipper shall pay IUSA all sums due hereunder, through the date of termination.

C. In the event termination is caused by default of IUSA, IUSA will reimburse Shipper for all sampling and characterization costs incurred for any pending shipments; any transportation costs incurred for pending shipments.

D. In the event any one party shall have declared force majeure, as cited in Article 24 herein, for any event or events cumulating over 60 days, the other party may terminate this Agreement by five days written notice.

15. **CONFIDENTIALITY.** IUSA and Shipper shall endeavor to keep this Agreement and the terms and conditions contained herein confidential and shall not disclose same to third parties without the other party's prior written consent, which will not be unreasonable withheld, unless such disclosure is required pursuant to applicable law or regulation, including tax and securities laws and regulations, or for the purposes of the financing of IUSA or any of its affiliates. Either party may make such disclosures as it deems appropriate to affiliates, employees, agents, contractors or prospective purchasers, lessees or assigns, provided that any such persons are advised of this confidentiality clause and agree to be bound by it.

16. **NOTICES.** Except as specifically provided to the contrary in this Agreement, any notices or communications permitted or required hereunder shall be deemed properly transmitted when delivered in person or sent by mail, telecopy, or any other form of written communication, addressed to the respective party at the addresses listed below or at such other address as either party may notify that other in writing in accordance with the provisions of this paragraph. Notices shall be deemed to have been given on the date of receipt.

IF TO IUSA: International Uranium (USA) Corporation  
Suite 950, 1050 Seventeenth Street  
Denver, Colorado 80265  
Phone: (303) 628-7798  
Fax: (303) 389-4125

IF TO SHIPPER: Uranium Resources, Inc.  
641 East FM 1118  
Kingsville, Texas 78363  
Phone: (361) 595-5731  
Fax: (361) 595-0403

17. **SURVIVAL OF OBLIGATIONS.** As provided in this Agreement, the obligations, representations and warranties of each party to the other, which are to be performed after termination, shall survive the termination of this Agreement regardless of the cause of termination.

18. **GOVERNING LAW AND VENUE.** This Agreement shall be governed by and construed in accordance with the laws of the State of Colorado.

19. **INUREMENT.** The terms and provisions of this Agreement shall be binding upon and inure to the benefit of the parties hereto, their successors, and assigns. Provided, however, Shipper shall not assign or transfer any of its rights or obligations under this Agreement except with the prior written consent of IUSA, and the written assumption by the transferee of all of the obligations of Shipper in a form satisfactory to IUSA. IUSA's consent to one transfer shall not operate as a waiver of IUSA's rights as to any subsequent transfer by Shipper or any subsequent transferee.

20. **COMPLETE AGREEMENT AND AMENDMENT.** This Agreement constitutes the full and complete understanding of the parties with respect to the subject matter hereof and supersedes

any prior agreement, oral or written, relating thereto. This Agreement shall not be amended except in writing, signed by both parties, unless otherwise provided for within this Agreement. The parties hereto agree that any amendments that may be necessary to achieve or maintain compliance with any regulatory program that may apply to the subject of this Agreement shall be made as soon as practicable, provided, however, either party may elect to terminate this Agreement rather than agree to any amendment unless such amendment applies to Byproduct Material already disposed of at the White Mesa Mill, in which case the necessary amendment shall be made.

21. **HEADINGS.** The paragraph headings used in this Agreement are for convenience only, and shall not be deemed part of this Agreement nor used in its interpretation or construction.

22. **ARBITRATION.** Any controversy or claim arising out of or relating to this Agreement or the breach thereof shall be resolved in accordance with the Commercial Arbitration Rules of the American Arbitration Association by one arbitrator. The selection of the Arbitrator shall be in accordance with such rules. The Arbitrator's decision shall be final and binding upon the parties hereto; and judgment upon the award may be entered in any court having jurisdiction. The parties shall each pay one-half of the fees and expenses of the Arbitrator except for all fees and expenses of its own witnesses and counsel. Disputes shall not interrupt operations or other actions contemplated herein.

23. **COSTS AND ATTORNEY FEES.** Except to the extent that such will be considered liquidated damages payable to Shipper under Article 24 and/or to the extent a matter is submitted to arbitration under Article 22, if it is necessary for either party to obtain legal representation to enforce any provision of this Agreement, the non-prevailing party agrees to bear the court costs and reasonable attorney fees of the prevailing party.

24. **LIMITATIONS OF REMEDY.** The parties agree that IUSA shall not be liable for any incidental and/or consequential damages of any nature claimed by Shipper. If IUSA is unable for any reason, except a breach of this Agreement by the Shipper, and other than a breach of any of the provisions of this Agreement by IUSA, to accept delivery and dispose of Byproduct Material of Shipper, Shipper's sole remedy in such an instance shall be a refund of any advance payments or costs incurred by Shipper for pending shipments. Refund of such amount shall be considered as constituting liquidated damages, including any and all incidental and/or consequential damages that might be claimed by Shipper. The parties agree that such a refund is reasonable compensation, and not a penalty, for the reason that actual damages, if any, that might be sustained by the Shipper are uncertain and would be difficult to ascertain.

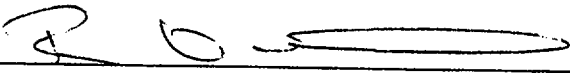
25. **FORCE MAJEURE.** Except for both parties' indemnification, the obligations of confidentiality and the Shipper's obligations to make payments, the obligations of either party shall be suspended to the extent, and for the period that performance is prevented by any cause, whether foreseeable or unforeseeable, beyond its reasonable control, including, without limitation, labor disputes (however arising and whether or not employee demands are reasonable or within the power of the party to grant), acts of God; laws, regulations, orders, proclamations, instructions or requests of any government or governmental entity whether federal, state or local; acts of war or conditions

arising out of or attributable to war, whether declared or undeclared, riot, civil strife, disobedience, insurrection or rebellion, fire, explosion, earthquake, storm, flood, sink holes, drought or other adverse weather condition, or any other cause whether similar or dissimilar to the foregoing, but specifically excluding increasing in the costs of transportation or handling of Byproduct Materials. The affected party shall promptly give notice to the other party, as appropriate of the suspension of performance, stating therein the nature of the suspension, the reasons therefor, and the expected duration thereof. The affected party shall resume performance as soon as reasonably possible.


26. **BOOKS AND RECORDS.** Shipper shall keep complete and accurate books and records respecting all matters covered by this Agreement, including without limitation, records of the quantities and disposition of all Byproduct Materials, which shall be open for inspection by IUSA during business hours.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed by their duly authorized representatives as of the day and year first set forth above.

INTERNATIONAL URANIUM (USA) CORPORATION

By:  \_\_\_\_\_

URANIUM RESOURCES, INC.

By:  \_\_\_\_\_

## **6. Wellfield Decommissioning**

### **6.1. Introduction and Description**

The Wellfield Decommissioning Budget includes the cost estimates for removing wellfield equipment from the Crownpoint site. All equipment used to circulate leach solution such as pumps and piping is assumed to be contaminated for the purpose of developing the budget and would be disposed in an U.S. NRC licensed waste disposal facility. All structures are considered non-contaminated and would be disposed of in a landfill.

After ground water restoration is complete, all well houses, header houses, laterals, and pipelines will be removed. The budget contemplates costs for disassembly, or demolition, loading, transportation and disposal at a NRC licensed facility<sup>32</sup> or to the Red Rock landfill. Any vegetation, which has been disrupted, will be disked and re-seeded.

### **6.2. Budget Assumptions**

The Wellfield Decommissioning Budget is formatted with the underlying assumptions integrated into the tabulation. The budget figures distinguish individually costs associated with break down, excavation, removal, loading, transportation and disposal costs.

Lateral and piping lengths were estimated from the COP schematic Figure 1.4-3. Unit cost calculations are shown in Attachment E-6-2. Well tubing decommissioning costs assumed nominal tubing lengths of 600 feet and 40 existing wells. This quantity of wells is what is needed to supply adequate water to the restoration operations. Other wellfield O & M costs are covered in the groundwater restoration budget.

The Wellfield Decommissioning Budget was developed with the assumption that all labor is contracted at a rate of \$120 per day or \$15 per hour. These are reasonable contract labor rates. Estimate labor time requirements are based on best professional judgment. Management will be provided from the site staff who will be available seven months after groundwater restoration is complete.

After all of the wellfield equipment is removed the entire wellfield area will be surveyed to assure that no residual contamination remains on the soil. Surveys will be conducted according to the according to the Procedure shown in Attachment E-6-2, and the hot spots are picked up and disposed of at a NRC licensed facility. The on site management described above would conduct these surveys.

Piping will be reduced in volume as indicated in the budget. Pipe volume calculations are shown in attachment E-6-2. The smaller diameter wellfield pipe and well tubing will be crushed.

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<sup>32</sup> For the purpose of this RAP, HRI assumed that the NRC licensed site would be the IUC White Mesa Mill near Blanding Utah. Projected unit disposal costs at the White Mesa Mill and the Red Rocks landfill are described in Attachment E-5-2.

November 19, 2001

Larger diameter pipe will be cut into quarter strips for volume reduction. No credit is given for reduction in the size of pumps. No credit is given for salvage value.

For pipe transportation and disposal costs, a 50% void factor was included in all volume calculations. All disposal was priced at the bulk rate as shown in Attachment E-6-4. A contingency was included for health and safety supplies such as disposable uniforms and respirators.

The total cost wellfield decommissioning is projected to be \$402,795.



**November 19, 2001**

**ATTACHMENT E-6-1  
WELLFIELD DECOMMISSIONING BUDGET**

### Crownpoint Wellfield Buildings and Equipment Removal and Disposal

|     | <u>Description</u>                                                                        | <u>Unit</u> | <u>Total</u> |
|-----|-------------------------------------------------------------------------------------------|-------------|--------------|
| I.  | <b>Wellfield Piping</b>                                                                   |             |              |
|     | Assumptions:                                                                              |             |              |
|     | Total length of piping (ft)                                                               | 259240      |              |
|     | Labor included in per foot costs                                                          |             |              |
| A.  | Removal and loading                                                                       |             |              |
|     | Wellfield piping removal unit cost (\$/ft of pipe)                                        | 0.36        |              |
|     | Subtotal wellfield piping removal and loading costs                                       | \$93,326    |              |
| B.  | Pipe crushing                                                                             |             |              |
|     | Number of operators                                                                       | 2           |              |
|     | Operator hourly rate                                                                      | \$15        |              |
|     | Feet pipe per hour                                                                        | 300         |              |
|     | Subtotal crushing cost                                                                    | \$25,924    |              |
| C.  | Transport and disposal costs (NRC-licensed facility)                                      |             |              |
|     | Average diameter of piping (inches)                                                       | 2           |              |
|     | Crushed volume (ft <sup>3</sup> /ft)                                                      | 0.012       |              |
|     | Crushed volume total (ft <sup>3</sup> )                                                   | 3181        |              |
|     | Volume for disposal assuming 100% void space (ft <sup>3</sup> )                           | 6363        |              |
|     | Transportation and disposal unit cost (\$/ft <sup>3</sup> )                               | \$3.52      |              |
|     | Subtotal wellfield piping transport and disposal costs                                    | \$22,397    |              |
|     | Wellfield piping costs per wellfield                                                      |             |              |
|     | Total wellfield piping costs                                                              |             | \$141,647    |
| II. | <b>Well Pumps and Tubing</b>                                                              |             |              |
|     | Assumptions:                                                                              |             |              |
|     | Ongoing pump and tubing removal costs included under ground water restoration labor costs |             |              |
|     | 40 production wells contain pumps and tubing                                              |             |              |
| A.  | Pump and tubing transportation and disposal                                               |             |              |
|     | Number of production wells                                                                | 295         |              |
|     | Number of injection wells                                                                 | 285         |              |
| 1   | Pump volume                                                                               |             |              |
|     | Number of production wells with pumps                                                     | 40          |              |
|     | Average pump volume (ft <sup>3</sup> )                                                    | 1           |              |
|     | Pump volume per wellfield (ft <sup>3</sup> )                                              | 40          |              |
| 2   | Tubing volume                                                                             |             |              |
|     | Assumptions:                                                                              |             |              |
|     | Average tubing length/wellfield based on average well depth minus 600 feet                |             |              |
|     | Number of production wells with tubing                                                    | 40          |              |
|     | Average tubing length per well (ft)                                                       | 600         |              |
|     | Tubing length per wellfield (ft)                                                          | 24000       |              |
|     | Diameter of production well fiberglass tubing (inches)                                    | 2           |              |
|     | Crushed volume reduction (ft <sup>3</sup> /ft)                                            | 0.012       |              |
|     | Wellfield pipe volume w 100% void                                                         | 589         |              |
|     | Volume of pump and tubing (ft <sup>3</sup> )                                              | 629         |              |
|     | Volume for disposal assuming 50% void space (ft <sup>3</sup> )                            | 944         |              |
|     | Transportation and disposal unit cost (\$/ft <sup>3</sup> )                               | \$3.52      |              |
|     | Subtotal pump and tubing transport and disposal costs                                     | \$3,321.38  |              |
|     | Pump and tubing costs per wellfield                                                       |             | \$3,321.38   |

|                              |                                                                      |           |           |
|------------------------------|----------------------------------------------------------------------|-----------|-----------|
| <b>III. Buried Trunkline</b> |                                                                      |           |           |
|                              | Length of trunkline trench (ft)                                      | 62000     |           |
| A.                           | Removal and Loading                                                  |           |           |
|                              | Main pipeline removal unit cost (\$/ft)                              | \$0.45    |           |
|                              | Subtotal trunkline removal and loading costs                         | \$27,900  |           |
| B.                           | Pipe cutting                                                         |           |           |
|                              | Number of operators                                                  | 2         |           |
|                              | Operator hourly rate                                                 | \$15      |           |
|                              | Feet pipe per hour                                                   | 100       |           |
|                              | Subtotal cutting cost                                                | \$18,600  |           |
| C.                           | Transport and disposal costs (NRC-licensed facility)                 |           |           |
|                              | 1    10" HDPE trunkline                                              |           |           |
|                              | Piping length (ft)                                                   | 51000     |           |
|                              | Inj and ext length                                                   | 102000    |           |
|                              | Cut volume (ft <sup>3</sup> /ft)                                     | 0.14      |           |
|                              | Cut volume (ft <sup>3</sup> )                                        | 14280     |           |
|                              | 2    14" HDPE trunkline                                              |           |           |
|                              | Piping length (ft)                                                   | 11000     |           |
|                              | Inj and ext length                                                   | 22000     |           |
|                              | Cut volume (ft <sup>3</sup> /ft)                                     | 0.24      |           |
|                              | Cut volume (ft <sup>3</sup> )                                        | 5214      |           |
|                              | Total trunkline chipped volume (ft <sup>3</sup> )                    | 19494     |           |
|                              | Volume for disposal assuming 50% void space (ft <sup>3</sup> )       | 29241     |           |
|                              | Transportation and disposal unit cost (\$/ft <sup>3</sup> )          | \$3.52    |           |
|                              | Subtotal trunkline transport and disposal costs                      | \$102,928 |           |
|                              | Trunkline decommissioning costs                                      |           | \$149,428 |
| <b>IV. Well Houses</b>       |                                                                      |           |           |
|                              | Total quantity                                                       | 40        |           |
|                              | Average well house volume (ft <sup>3</sup> )                         | 12.5      |           |
| A.                           | Removal                                                              |           |           |
|                              | Total volume (ft <sup>3</sup> )                                      | 500       |           |
|                              | Demolition unit cost per WDEQ Guideline No. 12 (\$/ft <sup>3</sup> ) | \$0.15    |           |
|                              | Subtotal well house demolition costs                                 | \$76      |           |
| B.                           | Survey and decontamination                                           |           |           |
|                              | Assumptions:                                                         |           |           |
|                              | Cost per well house                                                  | \$5       |           |
|                              | Subtotal Survey and decontamination costs                            | \$200     |           |
| C.                           | Disposal                                                             |           |           |
|                              | Total volume (yd <sup>3</sup> )                                      | 19        |           |
|                              | Volume for disposal assuming 10% void space (cy)                     | 20        |           |
|                              | Unrestricted disposal cost of 26.7 \$/yd <sup>3</sup>                | \$27.00   |           |
|                              | Subtotal unrestricted disposal costs                                 | \$530     |           |
|                              | Well house removal and disposal per wellfield                        |           | \$806     |

**VI. Header Houses**

|                                                                      |         |          |
|----------------------------------------------------------------------|---------|----------|
| Total quantity                                                       | 28      |          |
| Average header house volume (ft <sup>3</sup> )                       | 1600    |          |
| <b>A. Removal</b>                                                    |         |          |
| Total volume (ft <sup>3</sup> )                                      | 44800   |          |
| Demolition unit cost per WDEQ Guideline No. 12 (\$/ft <sup>3</sup> ) | \$0.15  |          |
| Subtotal building demolition costs                                   | \$6,810 |          |
| <b>B. Survey and decontamination</b>                                 |         |          |
| Assumptions:                                                         |         |          |
| Cost per header house                                                | \$200   |          |
| Subtotal survey and decontamination costs                            | \$5,600 |          |
| <b>C. Disposal</b>                                                   |         |          |
| Total volume (cy) assume 10% building volume                         | 166     |          |
| Volume for disposal assuming 10% void space (cy)                     | 183     |          |
| Unrestricted disposal cost of 26.7 \$/yd <sup>3</sup>                | \$27.00 |          |
| Subtotal on-site disposal costs                                      | \$4,928 |          |
| Header house removal and disposal costs per wellfield                |         | \$17,338 |

**V. Soil**

|                                               |          |          |
|-----------------------------------------------|----------|----------|
| Assumptions:                                  |          |          |
| Acres of wellfield.                           | 181      |          |
| Surveys by staff.                             |          |          |
| Depth of contaminated soil (in)               | 2        |          |
| Percent of wellfield contaminated             | 1        |          |
| Soil analysis each                            | \$100    |          |
| <b>A. Survey costs</b>                        |          |          |
| 400 soil sample analysis                      | \$40,000 |          |
| Flags, and supplies                           | \$4,000  |          |
| Subtotal survey costs                         | \$44,000 |          |
| <b>B. Disposal costs</b>                      |          |          |
| Backhoe three week                            | \$4,530  |          |
| Volume to disposal                            | 13141    |          |
| NRC disposal unit cost (ft <sup>3</sup> )     | \$3.52   |          |
| Subtotal NRC-licensed facility disposal costs | \$46,255 |          |
| Wellfield soil D & D costs                    |          | \$90,255 |

**TOTAL WELLFIELD BUILDINGS AND EQUIPMENT  
REMOVAL AND DISPOSAL COSTS**

**\$402,795**

November 19, 2001

**ATTACHMENT E-6-2  
BUDGET BACKUP**

---

**WELLFIELD PIPING REMOVAL  
MAIN PIPELINE REMOVAL  
PIPE VOLUMES  
REGULATORY GUIDANCE  
HRI CLOSEOUT PROCEDURE**

**WELLFIELD PIPING REMOVAL****Assumptions:**

1. Trenching with backhoe at 1500 ft/day
2. Pipeline extraction and backfilling with backhoe at 1500 ft/day
3. Backhoe rental: \$750/week
4. Fuel cost: \$9/operating hour
5. Backhoe operation requires 1 worker at \$15/hour
6. Pipeline extraction requires 2 workers at \$15/hour (in addition to trackhoe operator)
7. Operating schedule: 8 hrs/day, 5 days/week

**Wellfield Pipeline Removal Costs per ft of Pipe****Equipment & Fuel**

|         | <u>Weekly</u> | <u>Daily</u> | <u>Hourly</u> | <u>Per Foot</u> |
|---------|---------------|--------------|---------------|-----------------|
| Backhoe | \$550.00      | \$110.00     | \$13.75       | \$0.07          |
| Fuel    |               | \$72.00      | \$9.00        | \$0.05          |

**Labor**

|                         |          |         |        |
|-------------------------|----------|---------|--------|
| Backhoe operator        | \$120.00 | \$15.00 | \$0.08 |
| Pipeline extractors (2) | \$240.00 | \$30.00 | \$0.16 |

|        |  |         |  |
|--------|--|---------|--|
| Totals |  | \$67.75 |  |
|--------|--|---------|--|

|                            |  |  |               |
|----------------------------|--|--|---------------|
| <b>Total Per Foot Cost</b> |  |  | <b>\$0.36</b> |
|----------------------------|--|--|---------------|

**MAIN PIPELINE REMOVAL****Assumptions:**

1. Trenching with trackhoe at 1,500 ft/day
2. Pipeline extraction and backfilling with trackhoe at 1500 ft/day
3. Trackhoe rental: \$1600/week
4. Fuel cost: \$9/operating hour
5. Trackhoe operation requires one worker at \$15/hour
6. Pipeline extraction requires 2 workers at \$15/hour (in addition to trackhoe operator)
7. Pipelines removed simultaneously
8. Includes removal of manholes
9. Operating schedule: 8 hours/day, 5 days/week

**Main Pipeline Removal Costs per ft of Pipe****Equipment & Fuel**

|          | <u>Weekly</u> | <u>Daily</u> | <u>Hourly</u> | <u>Per Foot</u> |
|----------|---------------|--------------|---------------|-----------------|
| Trackhoe | \$1,200.00    | \$240.00     | \$30.00       | \$0.16          |
| Fuel     |               | \$72.00      | \$9.00        | \$0.05          |

**Labor**

|                         |          |         |        |
|-------------------------|----------|---------|--------|
| Trackhoe operator       | \$120.00 | \$15.00 | \$0.08 |
| Pipeline extractors (2) | \$240.00 | \$30.00 | \$0.16 |

|                            |  |  |               |
|----------------------------|--|--|---------------|
| <b>Total Per Foot Cost</b> |  |  | <b>\$0.45</b> |
|----------------------------|--|--|---------------|

# **Hydro Resources, Inc.**

## **PLANT SIGHT AND WELLFIELD CLOSEOUT AND REQUEST FOR LICENSE TERMINATION**

### **Purpose**

This document is HRI's Standard Procedure for sampling, surveys, and documentation methods for the final decontamination of the Churchrock/Crownpoint sites and is intended to be an integral part of the Churchrock/Crownpoint sites Churchrock Section 8/Crownpoint Plant Restoration Action Plan.

### **Standards**

The standard by which HRI will measure final decommissioning is the NRC adopted soil limits for radium-226 or radium-228 as described below.

The concentration of radium-226 or radium-228 in soil averaged over any 100 square meters ( $m^2$ ) shall not exceed the background level by more than:

- A. 5 picocuries per gram (pCi/g) averaged over the first 15 centimeter (cm) of soil below the surface; and
- B. 15 pCi/g averaged over 15-cm thick layers of soil more than 15 cm below the surface.

### **Instrumentation**

When performing close out surveys, HRI will use a general-purpose survey meter such as a 1-inch by 1-inch sodium iodide probes in conjunction with an appropriate rate meter or other appropriate instrumentation, such as microroentgen meters. The chosen instrument will be appropriately calibrated and a daily efficiency check will be performed to assure the instrument is working properly. Shielding of the instrument may be used to eliminate background interference of measurements. All measurements will be taken at ground surface.

### **Survey and Sampling Procedures**

#### **A. Preliminary Survey Design**

A grid spacing of 10 meters will be used on all affected areas. The survey technician along the entire length of the line will survey each grid line with readings recorded at 10-meter intervals.



Background radiation levels will be established by surveying areas adjacent to the survey area, which are not affected by facility operations. The survey locations, result, date, check source ID, and name of surveyor will be recorded in the field notes. Anomalously high survey readings will trigger sampling of the soil at the "hot spot"<sup>1</sup> location.

Random samples will be collected from the survey area, with a minimum of three samples per acre. Any hot spots found during the first survey iteration will be decontaminated and then resurveyed. The final survey iteration will document the decontamination of those areas found to be contaminated in preceding survey iterations. The purpose of the survey program is to verify that soil limits for radium-226 or radim-228 is not exceeded.

## B. Sampling Procedures

HRI's survey and sampling program will cover all areas within the license area including plant sites, previous wellfield locations and those locations adjacent to previous wellfields. During the first iteration of the close-out survey HRI will obtain a number of meter readings in the field, accompanied by soil samples at the same location to be analyzed in the laboratory for radium 226. Meter readings and soil samples taken at regular increments over the range found at the sight will be obtained.

Soil sample locations will be staked and marked for subsequent reference as necessary. The samples will be cored using a 4-inch barrel auger to a depth, as measured in place, of 0-15 cm. Where appropriate, a second lift will be taken to a depth, as measured in place, of 15-30 cm. Any vegetation and stones will be removed and the soil will be placed in a ziploc bag with the project site, project area, date, time, sampler, sample type, and sample ID clearly marked.

Cross contamination of the soil samples will be prevented by cleaning the auger after bagging each soil core.

Chain of Custody, recording the information on the label and any field measurements, or other data will be completed and then the samples will be delivered to a commercial laboratory.

Following laboratory analysis, the meter readings and the laboratory results will be compared as shown in the hypothetical example below. With the laboratory and survey site correlation available, HRI will develop a calibration curve for the purpose of determining what levels of activity measured by survey meter correspond to actual concentration in soil. Hypothetical data and the resulting calibration curve are shown

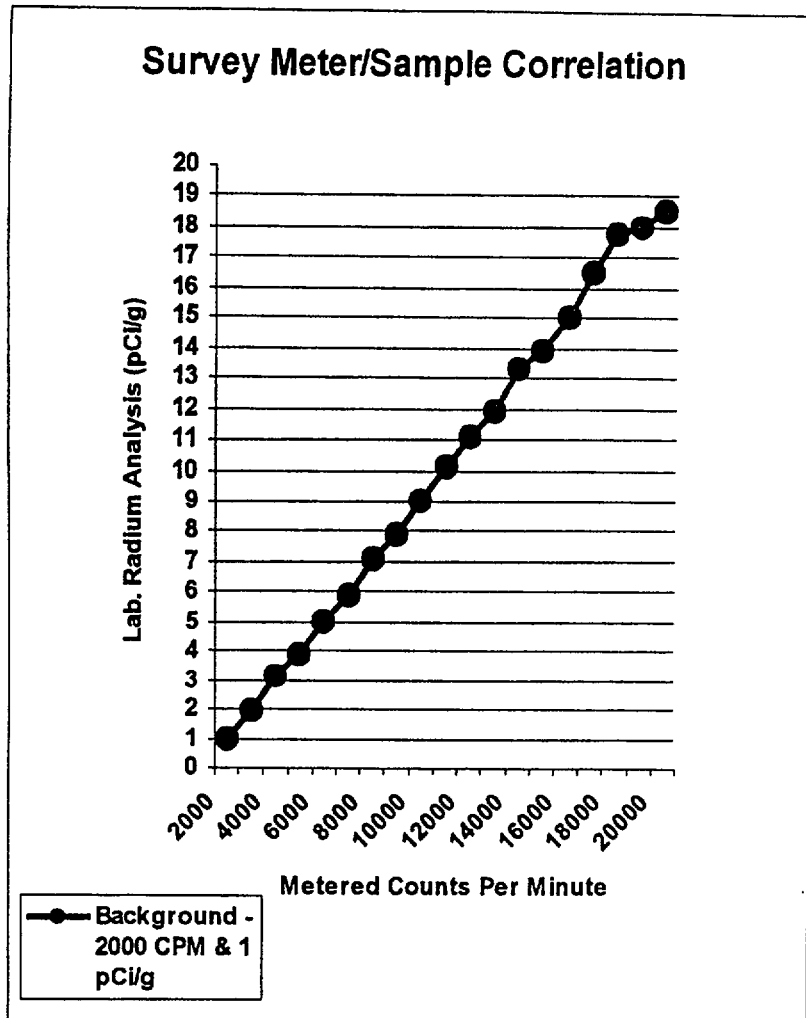
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<sup>1</sup> A hot spot is considered to be an area with a reading equal to or greater than the background multiple based on correlation of the laboratory instrument readings or an area with a radionuclide concentration sufficiently high such that the average for the 100-m2 area will exceed the soil contamination limits.

below. Site data will define the actual remediation targets, however based on past experienced it is anticipated that survey meter gamma radiation levels that are 2 – 3 times background will indicate Ra-226<sup>2</sup> levels above levels 5-pCi/g and trigger further remediation effort.

| CPM   | Ra-226<br>pCi/g | X-Bkg. |
|-------|-----------------|--------|
| 2000  | 1               | 1      |
| 3000  | 1.9             | 1.5    |
| 4000  | 3.1             | 2      |
| 5000  | 3.9             | 2.5    |
| 6000  | 5               | 3      |
| 7000  | 5.9             | 3.5    |
| 8000  | 7.1             | 4      |
| 9000  | 7.9             | 4.5    |
| 10000 | 9               | 5      |
| 11000 | 10.1            | 5.5    |
| 12000 | 11.1            | 6      |
| 13000 | 11.9            | 6.5    |
| 14000 | 13.3            | 7      |
| 15000 | 13.9            | 7.5    |
| 16000 | 15              | 8      |
| 17000 | 16.5            | 8.5    |
| 18000 | 17.8            | 9      |
| 19000 | 18              | 9.5    |
| 20000 | 18.5            | 10     |

HRI will average the concentrations of radium-266 over the first 15 cm of soil below the surface in a 100-m<sup>2</sup> area. In soil more than 15 cm below the surface, the concentrations may be averaged in 15-cm layers in a 100-m<sup>2</sup> area. HRI will, at a minimum, sample the initial 15-cm layer (0-15 cm) and the second 15-cm layer (15-30 cm) if concentrations in the initial 15-cm layer indicate deeper sampling is necessary. A minimum of five samples from each layer will be collected within the 100- m<sup>2</sup> area and composited for analysis.



When sampling a contaminated area, which is less than 100 m<sup>2</sup>, the hot spot will be sampled as part of a single 100-m<sup>2</sup> area. If contamination occurs in long narrow strips, 1 meter wide or less, HRI may divide the contaminated area into more than one sampling area of 100 m<sup>2</sup> each. The dimensions of the sampling area will not be narrower than 5 meters on any boundary.

All areas, which are surveyed and sampled, will be accurately identified on a scaled map of both the Churchrock and Crownpoint sites. The site plan will include, but not be limited to, accurate property boundaries, fences, all state, county, and private roads, location of all existing facilities, delineation of all wellfields, a north arrow, the related graphic scale, and all pertinent information found in typical site plans. A qualified laboratory will analyze all samples.

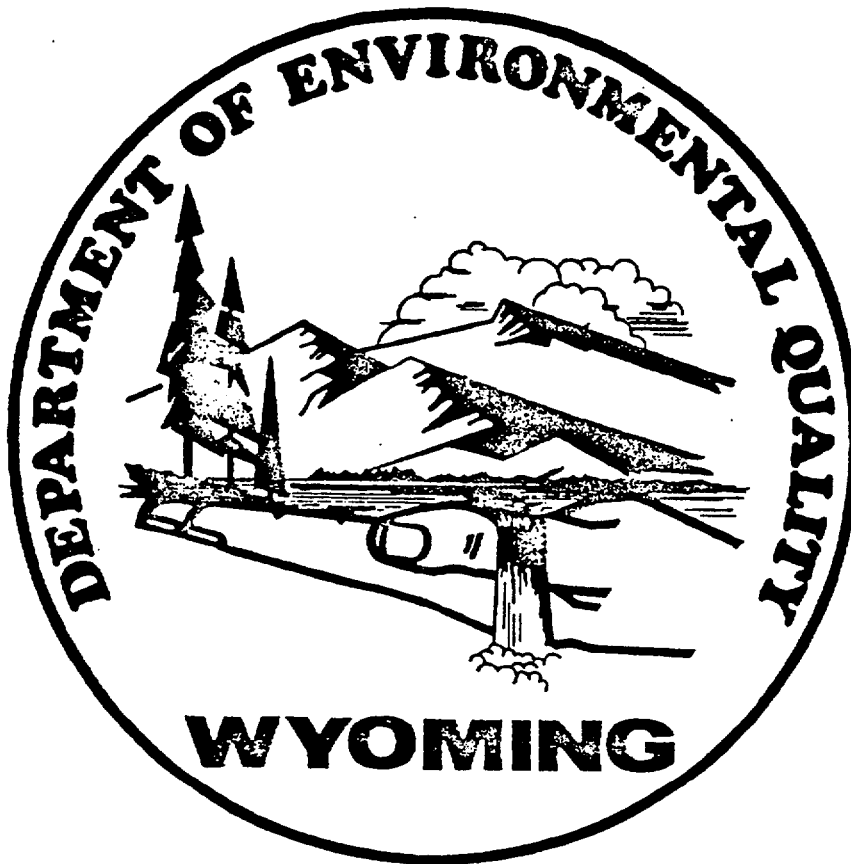
### Request For NRC Confirmation Survey and Sampling

When the HRI is confident that the Churchrock and Crownpoint sites are acceptable for release for unrestricted use, a written request asking for release for unrestricted use will be submitted to the NRC. The information discussed above will be submitted in a comprehensive report accompanied by survey and sample results that show that contamination is less than the limits specified above

The report with the request asking for release for unrestricted use will contain the following information.

- A. A scaled survey map as described above, which provides coordinates of the area surveyed.
- B. A narrative describing the conditions before decommissioning.
- C. A narrative describing each phase of the cleanup as follows:
  - 1. Churchrock wellfield - surveyed areas, recorded results, decontaminated hot spots, disposed of contaminated soil, final conditions.
  - 2. Churchrock Satellite –equipment decontaminated, removed and disposed, break-up pad discussion, decontamination of pad discussion, dispose of clean concrete, disposed contaminated material resulting from pad cleanup (including equipment), survey of plant area, decontaminated soil in plant area and soil which was beneath the pad, disposal of contaminated soil.
  - d. Crownpoint Process Plant –equipment decontaminated, removed and disposed, break-up pad discussion, decontamination of pad discussion, dispose of clean concrete, disposed contaminated material resulting from pad cleanup (including equipment), survey of plant area, decontaminated soil in plant area and soil which was beneath the pad, disposal of contaminated soil.
  - e. Zamzow Wellfield - surveyed areas, recorded results, decontaminated hot spots, stockpiled and/or disposed of contaminated soil, final conditions.
- 4. Any unusual or other discussion topics.

**DEPARTMENT OF ENVIRONMENTAL QUALITY  
LAND QUALITY DIVISION**



**GUIDELINE NO. 12**

**STANDARDIZED RECLAMATION  
PERFORMANCE BOND FORMAT AND COST  
CALCULATION METHODS**

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## INTRODUCTION

This document is a Guideline only. Its contents are not to be interpreted by the applicant/permittee or Wyoming Department of Environmental Quality (WDEQ) staff as mandatory. This Guideline intends to assist applicants/permittees in understanding and attaining the requirements of the Wyoming Environmental Quality Act (WEQA) and Land Quality Division (LQD) Rules and Regulations addressing bonding topics.

This Guideline was developed as a joint project of the Wyoming Mining Association (WMA) Reclamation Subcommittee and the LQD. The LQD has and intends to selectively and periodically publish updated versions of the Cost Calculation Methods as contained in the various Appendices.

## APPLICABLE WEQA STATUTES AND LQD RULES AND REGULATIONS

This is a general summary of items from the WEQA.

W.S. §35-11-417:

Outlines some general provisions applying to initial bond and renewal bond values. This statute outlines the concept of Partial Bond Release.

W.S. §35-11-418:

Outlines acceptable bond vehicles.

W.S. §35-11-423:

Outlines procedures for bond release for coal and other mineral permittees.

W.S. §35-11-411(d):

Authorizes the WDEQ Director to establish the bond amount based upon information submitted in the annual report, an inspection and other materials.

These items in LQD Rules and Regulations have some applicability to bonding.

Coal Rules and Regulations, Chapter 1, Section 2.(k) and Noncoal Rules and Regulations, Chapter 1, Section 2.(i) defines bond.

Coal Rules and Regulations, Chapter 2, Section 3.(b)(xxi) requires that shared structures be cross-referenced in the bonds of applicable coal permittees.

Coal Rules and Regulations, Chapter 4, Section 2.(d)(ix) establishes a minimum ten (10) year bond period for coal permittees.

Coal Rules and Regulations, Chapter 11 and Noncoal Rules and Regulations, Chapter 6 outlines definitions and procedures for the self-bond program.



Coal Rules and Regulations, Chapter 12 applies exclusively to coal permittees. Section 2.(a) defines the Area and Incremental Bonds. Section 2.(b) elaborates further bond data requirements. Section 2.(d) explains the liability areas and periods for the Area and Incremental Bonds. Section 2.(e) distinguishes among and establishes procedures for bond adjustments versus bond reductions versus partial bond releases. Sections 2.(f) through (h) address requirements for specific bond vehicles.

Coal Rules and Regulations, Chapter 14, Section 4. and Noncoal Rules and Regulations, Chapter 8, Section 3. require a bond for exploration by drilling.

Coal Rules and Regulations, Chapter 15 outlines procedures for partial or complete release of coal permittee bonds.

Noncoal Rules and Regulations, Chapter 9, Section 2. discusses bond requirements for conversion of a non-coal Small Mine Permit to a Regular Mine Permit.

Coal Rules and Regulations, Chapter 20 and Noncoal Rules and Regulations, Chapter 12 details information on Letters of Credit used as a bond vehicle.

## **I. COST EXPLANATION FOR ITEMS USED IN STANDARDIZED RECLAMATION BOND COSTS**

Equipment sizes (loaders, trucks, scrapers, motor graders, etc.) were selected and agreed upon by the WMA Committee and WDEQ/LQD based on the usual types of equipment contractors normally have available for use. Costs for other equipment may be calculated by using methodologies as shown in this package.

Owning and operating costs were determined, except where noted, by using the Dataquest Cost Reference Guide (DQCRG). The total owning and operating costs have been adjusted in this package to reflect wholesale prices rather than retail. To do this, a ten percent reduction has been made to DQCRG costs.

Costs for the electric shovel and the trucks associated with the shovel were determined from Western Mine Engineering, Inc. Surface Mine Estimator's Guide (Oct. 1997 Version). There was no adjustment factor used for these costs since they are based on actual costs at mining operations in the United States.

A standard efficiency factor of 0.83 is incorporated into all production calculations. The factor accounts for a fifty-minute work hour as recommended by many cost references.

Labor costs were obtained from the Wyoming Department of Transportation, Wage Determination Decision (1997) with an additional 25 percent for benefits, unemployment insurance, social security, etc.

Supervision costs were determined by adding \$5.00 per hour to labor costs and also include the 25 percent add-on for benefits, etc. In most cases, only a portion of a supervisor's costs is applied to each task. Theoretically, this allows one supervisor the flexibility to oversee many jobs or pieces of equipment at the same time.

The supervisor's transportation is also divided among tasks. For example, where one-half of a supervisor's time is allotted, the same amount of time is used in calculating his transportation costs.

Where only a portion of support equipment are used in a calculation (i.e., one-half water truck), it is assumed that the equipment in question services more than one area.

Table D-1. Operating Costs and Adjusted Costs (\$/Hour w/o Operator) For Equipment in This Standardized Bond Format

| Equipment Type     | Equipment Name         | DQCRG Book Cost (\$) | Multiplier (%) | Adj. Cost (\$) | Date |
|--------------------|------------------------|----------------------|----------------|----------------|------|
| Dozer              | Caterpillar D9R (SU)   | 113.60               | 90             | 102.24         | 3/98 |
| Blade              | Caterpillar 16H        | 72.79                | 90             | 65.51          | 3/98 |
| Scraper            | Caterpillar 657E P-P   | 221.51               | 90             | 199.36         | 3/98 |
| Truck (95 ton)     | Caterpillar 777D       | 170.45               | 90             | 153.41         | 3/98 |
| Loader (13½ yd³)   | Caterpillar 992D       | 192.26               | 90             | 173.03         | 3/98 |
| Loader (5¼ yd³)    | Caterpillar 980F       | 64.38                | 90             | 57.94          | 3/98 |
| Dozer              | Caterpillar D10R (SU)  | 148.97               | 90             | 134.07         | 3/98 |
| Dozer              | Caterpillar D11R (U)   | 223.85               | 90             | 201.47         | 3/98 |
| Dozer              | Caterpillar D9N (U)    | 105.11               | 90             | 94.60          | 3/98 |
| Backhoe Loader     | Caterpillar 428B (2WD) | 16.74                | 90             | 15.07          | 3/98 |
| Water Truck        | 14,000 Gallon          | 135.22               | 90             | 121.70         | 3/98 |
| Dump Truck         | 10-12 yd³              | 29.47                | 90             | 26.52          | 3/98 |
| Pickup Truck       | Crew 4x4 3/4T (Gas)    | 9.74                 | 90             | 8.77           | 3/98 |
| Pickup Truck       | Crew 4x4 3/4T (Diesel) | 7.85                 | 90             | 7.07           | 3/98 |
| Tractor            | MF 50EX 4WD 74 H.P.    | 9.11                 | 90             | 8.20           | 3/98 |
| Towed Mower        | Flail 7 ft             | 1.28                 | 90             | 1.15           | 3/98 |
| Rubber Tired Dozer | Caterpillar 834B       | 96.00                | 90             | 86.40          | 3/98 |
| Scraper            | Caterpillar 637E P-P   | 169.05               | 90             | 152.15         | 3/98 |

Table D-1a. Purchase Price, Lease Cost, and Operating Costs for 56 CY Electric Shovel and 793C Trucks

Operators that use the truck/shovel appendix must show a regrading plan that is suitable for a large shovel/truck operation. Many backfill operations are not suited for this type operation because the cuts are not thick enough to allow the shovel optimum digging depths, highwall reduction with dozers takes up a large percentage of the required backfill, and there is insufficient backfill to justify this large shovel/truck fleet.

Operators using the shovel/truck appendix should submit suitable cut and fill isopachs that support the choice of this backfill method.

This method is not to be used for topsoil movement from native areas or from stockpiles.

The \$7,988,916.00 purchase price of the 56 CY shovel must be added to the bond costs. There is no profit or other contingency items added to this cost so it can be added to the bond cost after all the line items and add-ons have been totaled. No salvage value is allowed at the end of the project.

#### 56 CY Electric Shovel

Purchase Price \$7,988,916.00 (WME)  
 Productivity - 56 CY x 1 pass/35 sec. x 3,600 sec./hr. x 0.968 bucket fill factor = 5,576 CY/hr.  
 5,576 CY/hr. x 0.8696 BCY/LCY (15% swell of BCY) = 4,849 BCY/hr.  
 4,849 BCY/hr. x 0.8333 (operating efficiency) = 4,040 BCY/hr.

#### Hourly Costs (WME)

| <u>Parts</u> | <u>Maint. Labor</u> | <u>Elect.</u> | <u>Lube</u> | <u>Total</u> |
|--------------|---------------------|---------------|-------------|--------------|
| \$55.94      | \$46.23             | \$123.64      | \$22.83     | \$248.64     |

#### Caterpillar 793C Trucks (240 Ton)

Purchase Price \$2,539,800.00 (WME)  
 Monthly Lease (@600 hr./month) \$45,000.00  
 Hourly Lease Cost \$75.00

#### Hourly Costs (WME)

| <u>Parts</u> | <u>Maint. Labor</u> | <u>Fuel</u> | <u>Lube</u> | <u>Tires</u> | <u>Total</u> |
|--------------|---------------------|-------------|-------------|--------------|--------------|
| \$23.04      | \$16.32             | \$26.05     | \$16.80     | \$35.94      | \$118.15     |

Table D-2. Abbreviations Used in This Standardized Bond Format

|             |                                                                                   |
|-------------|-----------------------------------------------------------------------------------|
| CPH -       | Caterpillar Performance Handbook (Edition No. specified where appropriate)        |
| DQCRG -     | Dataquest Cost Reference Guide (date of data indicated)                           |
| WYDOT-WDD - | Wyoming Department of Transportation - Wage Determination Decision (1997 Version) |
| WME -       | Western Mine Engineering, Inc. (Oct. 1997 Estimating Guide)                       |
| BCY -       | Bank Cubic Yard                                                                   |
| LCY -       | Loose Cubic Yard                                                                  |
| MPH -       | Miles Per Hour                                                                    |
| BHB -       | Black Hills Bentonite Corporation                                                 |
| AML -       | DEQ Abandoned Mine Land Reclamation Program                                       |

## II. STANDARDIZED RECLAMATION BOND FORMAT

Individual items may be expanded as necessary or noted as not applicable based upon the specific reclamation practices approved in each permit.

### A. Area Bond

The Area Bond covers the costs of backfilling and rough grading (and special reconstruction techniques when specifically approved) according to procedures and postmining topography approved in the current term permit.

#### 1. Introduction

Present a general discussion of assumptions, calculations, procedures, methods, etc. for summarizing or documenting calculations.

#### 2. Backfill

Describe equipment, procedures, volumes, and costs for bringing all pits to an interim/bond topography with reference to a quality, current map of the project site. The interim/bond topography must come as close as possible to the approved final topography, acknowledging that the current mine site differs from the final configuration.

Appendices A through F detail equipment fleets and costs for this reclamation activity.

Operators should clearly show cut and fill areas and the associated haul distances and grades on a map.

This section should clearly list overburden Drilling and Blasting cost at \$0.10/BCY when applicable.

### 3. Rough Grade Backfill

Describe procedures and costs for shaping interim/bond topography with reference to a quality map. NOTE: Depending upon permit approved backfill practices, rough grading may not be a necessary line item bond cost.

Appendices G and M detail equipment and costs for this reclamation activity.

### 4. Final Grade Backfill

Describe equipment, procedures, and costs for specific site tasks (e.g., drainage reconstruction or permit-specific postmining features).

Appendix G details equipment and costs for this reclamation activity.

## B. Incremental Bond

### 1. Introduction

The Incremental Bond covers all other costs beyond those detailed in the Area Bond.

Present a general discussion of assumptions, calculation procedures, methods for summarizing or documenting calculations, etc.

### 2. Native Topsoil Removal From Borrow and/or Backslope Areas

If applicable, describe equipment, volumes, haul routes, and costs with reference to a quality, current map of the project site.

Appendices A, B, C, E, F and G detail potential equipment and costs for this reclamation activity.

### 3. Native Overburden Removal From Borrow and/or Backslope Areas

If applicable, describe equipment, haul routes, volumes, and costs with reference to a quality, current map of the project site.

Appendices A through G detail potential equipment and costs for this reclamation activity.

### 4. Miscellaneous Overburden Redistribution

Describe equipment, haul routes, volumes, and costs (with reference to a quality map) for backfilling structures, such as:

- scoria or shale pit(s)
- diversion ditches
- access/haul road cut or fill
- railroad cuts/embankments
- sediment ponds
- sewage lagoons
- culverts
- other

Appendices A through G (excluding D) detail potential equipment and costs for this reclamation activity.

## 5. Demolition

Equipment, procedures, and costs for demolition and disposal of each individual structure should be described in terms of size, type of construction, etc. so that appropriate demolition costs can be estimated, such as:

- fences
- power lines, transformers
- hard-surfaced roads
- bridges
- abandoned equipment (i.e., draglines, shovels, drills and pieces of same)
- culverts
- railroads (rails, ties, ballast, scales, etc.)
- facility buildings (shops, warehouse, offices, etc.)
- mineral handling facilities (truck dumps, conveyors, silos, scales, etc.)
- support facilities (ready line, fuel tanks, water tanks, equipment yards, explosive storage sites, electrical substations)

Appendices H through K contain costs for these reclamation and demolition practices.

## 6. Removal of Monitoring Structures and Other Miscellaneous Items

Describe the procedures, equipment, and costs required to properly abandon or remove and disposal of items, such as:

- groundwater monitor wells
- all other operator-owned wells within the permit area
- surface water monitoring stations
- all other experimental study sites within the permit area
- meteorological/air quality monitoring sites

Appendices L through O detail equipment and costs for these reclamation practices.

## 7. Scarification or Ripping of All Compacted Surfaces

Describe equipment, procedures, and costs (preferably on a per acre basis) with reference to a quality, current map of the project site.

Appendices II and P detail costs for this reclamation practice.

8. Topsoil Redistribution on All Disturbed Areas

Describe equipment, procedures, and costs with reference to a quality, current map of the project site. The map should show haul distances and grades.

Appendices B and C detail equipment and costs for this reclamation activity.

9. Revegetation of All Disturbed Areas

Describe equipment, practices, and costs (preferably on a per acre basis), including:

- seedbed preparation
- mulch (purchase and application)
- seed (purchase and application)
- fertilizer (if required, purchase and application)
- post-seeding maintenance over the minimum bonding period (e.g., weed control, mowing, interseeding). Operators suggest that a ten percent line item should cover this issue for the entire bonding period.

Appendix Q outlines a cost calculation process for this reclamation activity. The costs must be calculated using the specific seed mixes and practices from the approved term permit.

10. Reclamation Status and Bond Liability Status of All Lands Within the Permit Area

a. Land Status Categories

The bond calculation should describe the status of all lands within the permit area. Each land status category should be clearly identified on a quality map and cross-referenced to specific reclamation cost for each category. The LQD also prefers a tabular summary of the acreage for each category.

**LANDS THAT HAVE BEEN TOPSOILED AND SEEDED BUT HAVE NO BOND RELEASE MUST BE BONDED FOR RETOPSOILING, SCARIFICATION, AND REVEGETATION.** [see Section 10.b.(2)(b)i)e) on page 10]

The following is a summary of generic land status categories. Section 10.(2) below details the information and calculations necessary for each of these categories.

- (1) Native lands undisturbed at the time of this specific bond calculation and which will remain undisturbed under this bond calculation (e.g., no borrow areas necessary).



(2) Lands disturbed and requiring backfilling, regrading and revegetation at the time of this specific bond calculation.

(a) Lands requiring assessment of Area Bond costs

(b) Lands requiring assessment of full or Incremental Bond costs

(c) Lands requiring assessment of partial Incremental Bond costs

i) Lands permanently reclaimed prior to December 31, 1982

ii) Lands permanently reclaimed after December 31, 1982

a) Lands with no approved Partial or Full Bond Release

b) Lands with approved 60 percent Partial Release of the Incremental Bond

c) Lands with approved larger percent Partial Release of the Incremental Bond

d) Lands with approved Full Release of Area and Incremental Bonds

b. Line Item Bond Costs

(1) The bond covers lands currently disturbed by mining and associated activities and those lands to be disturbed in the next 12-month period.

(2) The bond should include costs for the Area Bond (through backfill, rough and final grading) for all open pits, impoundments, sediment ponds, diversions, etc.

(a) Section E.1 of this Guideline and its associated appendices detail procedures and costs for the Area Bond. The bond calculation should detail costs for the operations listed in Sections E.1.B.), C) and D).

(b) Section E.2 of this Guideline and its associated appendices detail general categories and procedures for the Incremental Bond. Overall, the bond calculation should detail costs for the operations listed in Sections E.2.B) through I).

i) The bond calculation should assess the full suite of Incremental Bond tasks and costs for all disturbed lands which have no formally approved partial or full release of the Incremental Bond.

Historic LQD Administrator policy, LQD Coal Rules and Regulations Chapter 15 and W.S. §35-11-417(e) establish three (3) distinct categories of Partial Bond Release for permanently reclaimed lands.

a) Lands Permanently Reclaimed Prior to December 31, 1982

Prior to this date and prior to approval of the Wyoming State Coal Program, the LQD Administrator granted de facto Partial Bond Release for permanently reclaimed lands.

The LQD did not specifically approve or otherwise record this Partial Bond Release category, so there is generally no written approval letter.

The bond should specifically identify this Partial Bond Release category if it exists.

The bond should include a carry-over cost assessment for interseeding an appropriate, permit-approved seed mixture on these lands. These carry-over costs should include seed purchase and seed implantation.

b) 60 Percent Partial Bond Release

LQD Coal Rules and Regulations Chapter 15, Section 5.(a)(i) allows for release of 60 percent of the Incremental Bond when the permittee has completed backfilling, regrading, topsoil replacement, and drainage control according to the approved term permit procedures.

This category of Partial Bond Release requires formal, written approval by the DEQ Director. If this release category exists for your specific permit, the bond calculation should include the date of the Director's approval letter.

The bond calculation should specifically identify this category and show the appropriate units on a quality map.

The bond calculation should specifically tabulate the residual 40 percent Incremental Bond costs (preferably on a per acre basis) as the appropriate carry-over cost assessment. As noted above, the Incremental Bond includes all term permit approved Reclamation Plan practices beyond rough grading of the backfill. The tabulation of the 40 percent Incremental Bond carry-over costs should detail all approved reclamation practices.

c) Larger Percentage of Partial Bond Release

LQD Coal Rules and Regulations Chapter 15, Section 5.(a)(ii)(A) allows more than 60 percent release of the Incremental Bond as determined by the LQD Administrator and DEQ Director.

W.S. §35-11-423(d) mandates development of specific rules and regulations for release of coal bonds. These rules are controlling notwithstanding other provisions of W.S. §35-11-417 and §35-11-423 to the contrary.

LQD Coal Rules and Regulations, Chapter 15 is that formulation.

Coal Chapter 15 governs partial and 100 percent release of the Incremental Bond. For partial release, the amount remaining cannot be less than the cost of reseeding.

This category of Partial Bond Release requires formal, written approval by the DEQ Director. If this release category exists for your specific permit, the bond calculation should identify the date of the Director's approval letter.

The bond calculation should specifically tabulate the residual percentage Incremental Bond costs (preferably on a per acre basis) as the appropriate carry-over cost assessment. As previously noted, the Incremental Bond includes all term permit approved Reclamation Plan practices beyond rough grading of the backfill. The tabulation of the percentage Incremental Bond carry-over costs should detail all approved reclamation practices.

NOTE: The percentages of partial release of the Incremental Bond vary for Noncoal Permittees. A Noncoal Permittee seeking partial release should consult with the LQD.

d) Full Bond Release of the Area and Incremental Bonds

This category includes all land permanently reclaimed and formally released under provisions of the 1973 Environmental Quality Act and LQD Coal Rules and Regulations Chapter 15.

Full Bond Release requires formal, written approval by the DEQ Director. If this category exists for your specific permit, the bond calculation should list the date of the DEQ Director's Full Bond Release decision.

e) Lands Permanently Reclaimed After December 31, 1982

This category includes all land permanently reclaimed that has no bond release.

These reclaimed lands must be bonded to scarify, retopsoil, and reseed. There are no provisions made for where the topsoil would come from. It is assumed that topsoil would be spread at the same average depth on these lands as it is on the rest of the areas requiring topsoil. Topsoil haul distance and grade used would be the weighted average used for the rest of the reclamation. Scarification and reseeding costs would be the same per acre as those used on other lands requiring reclamation.

NOTE: The DEQ/LQD continues development of a DRAFT Guideline on Full and Partial Bond Release Procedures. Please consult with the LQD concerning the status of that Guideline, should you consider bond release for permanently reclaimed lands.

## 11. Coal Drilling

Describe the approximate number, depth, diameter, and location (show on inclusive map, if possible) of all holes drilled into or through coal during the current and next annual report period. A tabular format with reference to map locations may be an efficient presentation. This description should distinguish between coal drill holes which will be or have been removed by the pit advance within the annual report period versus those coal drill holes which will not be mined out in a report cycle. The operator may distinguish between abandonment/plugging procedures for the coal drill holes mined out in the report cycle versus the longer term abandoned holes. Each category should have a total line item cost entry in the bond. The LQD prefers that all coal drill hole reclamation costs be estimated according to Appendices L and M.

## 12. Miscellaneous Items

Each individual operator should identify these items as a line item or include each in some specific bond category. Otherwise, the LQD will enter the item as an addition to total dollar value of the Area and Incremental Bonds.

- a. COSTS FOR AN INDEPENDENT FIRM TO DESIGN THE FINAL RECLAMATION PROJECT: All design and engineering work (including field and office time) through production of construction documents should be included under this heading. At the least, some surveying and redesign of the operator's reclamation plan to fit the current situation would be required. Reference sources place this category at 2 to 6½ percent of the total bond cost. LQD typically uses 3 percent.
- b. CONTRACTOR PROFIT, OVERHEAD, MOBILIZATION AND DEMOBILIZATION COSTS: The Dataquest Cost Reference Guides used to construct the appendices do not include these costs. If an operator uses these appendices in bond calculations, there is still a need for this distinct line item cost in the bond. Assorted references place these items from 8 to 15 percent of the total bond cost. Presently LQD is using 10 percent.
- c. PRECONSTRUCTION INVESTIGATION AND STABILIZATION: This item addresses all field work necessary to document and mitigate dangerous and/or quickly deteriorating conditions, such as slumping highwalls or drainage problems. Any assessment under this item will be based upon the LQD's knowledge of specific site conditions and the length of time between cessation/forfeiture and initiation of the final reclamation project. When necessary, reference sources place this cost at 1 to 2 percent. LQD is using 1 percent.

- d. **COSTS FOR AN INDEPENDENT FIRM TO MANAGE THE FINAL RECLAMATION PROJECT:** This category includes complete oversight of all demolition, construction, and reclamation activities. Probable tasks would include supervision of earthmoving and reclamation, construction surveying, and soil sampling. References place this cost at 3 to 4 percent. LQD uses 3 percent.
- e. **COSTS FOR ON SITE MONITORING PROGRAMS FOR TEN YEARS AFTER COMPLETION OF THE FINAL RECLAMATION PROJECT (INCLUDES SUCH ITEMS AS UTILITIES AND GROUNDWATER SAMPLING):** Costs of this item will vary depending upon specific permit commitments. The LQD uses a range of 1/2 to 2 percent. Usually LQD uses 0.5 percent.
- f. **COSTS FOR SITE SECURITY DURING THE FINAL RECLAMATION PROJECT AND LIABILITY INSURANCE COST DURING THE FINAL RECLAMATION PROJECT AND OVER THE FULL BONDING PERIOD:** References place this cost at about 1 percent of the total bond amount.
- g. **LONG-TERM ADMINISTRATION AND ACCOUNTING COSTS:** After completion of a major reclamation project, a minimum of five years (non-coal permits) or a minimum of ten years (coal permits) will expire before the LQD can move for final bond release. The LQD will incur additional administrative costs during this extended period. The scale of some coal reclamation projects may necessitate employment of an outside contractor.

The LQD uses a range of 1 to 2 percent for this category depending upon the scale and complexity of the reclamation and post-reclamation monitoring projects. Currently LQD uses 2 percent.

- h. **ANY OTHER SITE-SPECIFIC PERMIT COMMITMENTS SHOULD ALSO BE INCLUDED HERE:** Costs will vary according to specific permit commitments.

The LQD has historically used the following sources to establish the range of percentages list in the Miscellaneous Items.

- \* Means Heavy Construction Cost Data (current edition), published by R. S. Means Company, Inc., Kingston, MA
- \* Means Site Work Cost Data (current edition), published by R. S. Means Company, Inc., Kingston, MA
- \* Building Construction Cost Data (current edition), published by R. S. Means Company, Inc., Kingston, MA
- \* Handbook for Calculation of Reclamation Bond Costs, 1987, Department of Interior, Office of Surface Mining Reclamation and Enforcement, Washington, D.C.

Wyoming DEQ Abandoned Mine Land Program contracting and reclamation practices and cumulative experience

### 13. Unknown Costs

The items under L) represent the usual contingency items applied to bonds. If these items are included as line items in the bond, the only remaining category could be unknown as per W.S. §35-11-417(c)(ii). References place this cost at 2 to 5 percent of the total bond cost. Under normal circumstances LQD is using 4 percent.

### 14. References

List sources of information, procedures, costs, etc. which were used in the bond calculations.

### 15. Maps

This Guideline requests that the various tasks, operations, disturbed areas, reclamation areas, etc., be illustrated on or referenced to a QUALITY, CURRENT MAP. Several of the tasks may be illustrated on the same map. All maps presented in support of the bond calculations must be clear and legible contour maps or recent (with date) aerial photographs. The preferred scale is 1"=500', unless it is necessary to directly compare (e.g., overlay) a bond map to an existing permit map. In this case the scales should be identical. Each map should be of a reasonable size, generally no larger than 48" on a side.

Each map must have a complete title block, including:

- Map title
- Name and address of permittee
- Permit number and term designation
- Annual report period
- Scale, north arrow, contour interval, date of photography or date of preparation

All maps must show and clearly label:

- Legal subdivisions with section, township, and range lines
- Permit area boundary and term boundary

## III. APPENDICES

The following appendices are intended for use in this standardized bond calculation package. Any references to specific equipment should not be interpreted as a recommendation of any kind by any person, company or agency for the use of specific brand-name equipment.

Appendix A  
Calculations for Moving Materials With a Caterpillar 992D Loader and Caterpillar 777D Truck Fleet

**NOTE: THESE COSTS ARE FOR EXCAVATION ONLY. MATERIAL REQUIRING BLASTING SHOULD HAVE AN ADDITIONAL \$0.10/BCY ADDED FOR DRILLING AND BLASTING COSTS.**

Material Movement By Loader-Truck Combination

|                                                     |                   |                                       |
|-----------------------------------------------------|-------------------|---------------------------------------|
| 1) Caterpillar 992D Loader                          | 12.1 BCY          | CPH 25                                |
| 2) Caterpillar 777D Trucks (85 ton)                 | 58.8 BCY          | CPH 25                                |
| 3) Material Density                                 | 2,850.0 LB/BCY    | CPH 25                                |
| 4) Operating Efficiency Factor (50 Min/Hr)          | 0.83 %            | CPH 25                                |
| 5) Rolling Resistance Factor                        | 4.00 %            | CPH 25                                |
| 6) 777D Truck Operating Costs                       | \$153.41 Per Hour | 90% of DataQuest Cost Reference Guide |
| 7) 992D Loader Operating Costs                      | \$173.03 Per Hour | 90% DQCRG                             |
| 8) Labor Costs                                      | \$18.75 Per Hour  | WYDOT-WDD                             |
| 9) 1/2 of 1 - 14,000 Gal. Water Trucks + 1 Operator | \$70.23 Per Hour  | 1/2 of 90% DQCRG                      |
| 10) 1 - 16H Blade for Road Work + 1 Operator        | \$84.26 Per Hour  | 90% DQCRG + Operator                  |
| 11) 1 - D9R for Misc. Work + 1 Operator             | \$120.99 Per Hour | 90% DQCRG + Operator                  |
| 12) Supervision Labor Costs                         | \$12.50 Per Hour  | 1/2 of WYDOT-WDD                      |
| 13) Supervisor Transportation                       | \$4.39 Per Hour   | 1/2 of 90% DQCRG                      |
| 14) Total Fleet Hourly Costs (Except Trucks)        | \$464.53          |                                       |

**TO USE TABLE:** Locate your approximate grade by reference to case number. Determine cost per BCY by using distance column that approximates your distance. No calculations are necessary.

| Case #1: Level Ground |                  |                      | Loaded (0% grade + 4% rolling = 4% total resistance) |                  |                          |                         |                | Empty (0% grade + 4% total resistance) |                                      |                                       |                           |                    |
|-----------------------|------------------|----------------------|------------------------------------------------------|------------------|--------------------------|-------------------------|----------------|----------------------------------------|--------------------------------------|---------------------------------------|---------------------------|--------------------|
| One-way Distance (FL) | Load Time (Min.) | Maneuver Time (Min.) | Travel Time Loaded (Min.)                            | Dump Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour | Payload (BCY)                          | Adjusted Truck Productivity (BCY/Hr) | Adjusted Loader Productivity (BCY/Hr) | Number of Trucks Required | Oper Cos. (\$/BCY) |
| 500                   | 3.50             | 0.70                 | 0.47                                                 | 1.10             | 0.36                     | 6.13                    | 9.8            | 58.8                                   | 479.6                                | 840.0                                 | 1.75                      | \$0.91             |
| 1000                  | 3.50             | 0.70                 | 0.78                                                 | 1.10             | 0.56                     | 6.64                    | 9.0            | 58.8                                   | 442.8                                | 840.0                                 | 1.90                      | \$0.94             |
| 1500                  | 3.50             | 0.70                 | 1.06                                                 | 1.10             | 0.74                     | 7.10                    | 8.5            | 58.8                                   | 414.1                                | 840.0                                 | 2.03                      | \$0.97             |
| 2000                  | 3.50             | 0.70                 | 1.34                                                 | 1.10             | 0.90                     | 7.54                    | 8.0            | 58.8                                   | 389.9                                | 840.0                                 | 2.15                      | \$0.99             |
| 2500                  | 3.50             | 0.70                 | 1.60                                                 | 1.10             | 1.06                     | 7.96                    | 7.5            | 58.8                                   | 369.3                                | 840.0                                 | 2.27                      | \$1.02             |
| 3000                  | 3.50             | 0.70                 | 1.86                                                 | 1.10             | 1.22                     | 8.38                    | 7.2            | 58.8                                   | 350.8                                | 840.0                                 | 2.39                      | \$1.04             |
| 3500                  | 3.50             | 0.70                 | 2.11                                                 | 1.10             | 1.39                     | 8.80                    | 6.8            | 58.8                                   | 334.1                                | 840.0                                 | 2.51                      | \$1.07             |
| 4000                  | 3.50             | 0.70                 | 2.37                                                 | 1.10             | 1.55                     | 9.22                    | 6.5            | 58.8                                   | 318.9                                | 840.0                                 | 2.63                      | \$1.09             |
| 4500                  | 3.50             | 0.70                 | 2.63                                                 | 1.10             | 1.71                     | 9.64                    | 6.2            | 58.8                                   | 305.0                                | 840.0                                 | 2.75                      | \$1.12             |
| 5000                  | 3.50             | 0.70                 | 2.89                                                 | 1.10             | 1.88                     | 10.07                   | 6.0            | 58.8                                   | 292.0                                | 840.0                                 | 2.88                      | \$1.14             |
| 5500                  | 3.50             | 0.70                 | 3.15                                                 | 1.10             | 2.04                     | 10.49                   | 5.7            | 58.8                                   | 280.3                                | 840.0                                 | 3.00                      | \$1.17             |
| 6000                  | 3.50             | 0.70                 | 3.41                                                 | 1.10             | 2.21                     | 10.92                   | 5.5            | 58.8                                   | 269.2                                | 840.0                                 | 3.12                      | \$1.19             |
| 6500                  | 3.50             | 0.70                 | 3.66                                                 | 1.10             | 2.37                     | 11.33                   | 5.3            | 58.8                                   | 259.5                                | 840.0                                 | 3.24                      | \$1.22             |
| 7000                  | 3.50             | 0.70                 | 3.92                                                 | 1.10             | 2.53                     | 11.75                   | 5.1            | 58.8                                   | 250.2                                | 840.0                                 | 3.36                      | \$1.24             |

Operating Costs = (((# Trucks x (Truck costs + Labor costs)) + Total Fleet costs)/Loader Productivity)

Appendix A (Continued)  
Calculations for Moving Materials With a Caterpillar 992D Loader and Caterpillar 777D Truck Fleet

Material Movement By Loader-Truck Combination

| Case #2: 5% Assisting Grade                 |                  |                      |                           |                  |                          |                         |                |                                          |                                      |                                       |                           |                          |
|---------------------------------------------|------------------|----------------------|---------------------------|------------------|--------------------------|-------------------------|----------------|------------------------------------------|--------------------------------------|---------------------------------------|---------------------------|--------------------------|
| Loaded (-5% grade + 4% rolling = -1% total) |                  |                      |                           |                  |                          |                         |                | Empty (5% grade + 4% rolling = 9% total) |                                      |                                       |                           |                          |
| One-Way Distance (Fl.)                      | Load Time (Min.) | Maneuver Time (Min.) | Travel Time Loaded (Min.) | Dump Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour | Payload (BCY)                            | Adjusted Truck Productivity (BCY/Hr) | Adjusted Loader Productivity (BCY/Hr) | Number of Trucks Required | Operating Costs (\$/BCY) |
| 500                                         | 3.50             | 0.70                 | 0.38                      | 1.10             | 0.41                     | 6.09                    | 9.9            | 58.8                                     | 482.8                                | 840.0                                 | 1.74                      | \$0.91                   |
| 1000                                        | 3.50             | 0.70                 | 0.58                      | 1.10             | 0.68                     | 6.56                    | 9.1            | 58.8                                     | 448.2                                | 840.0                                 | 1.87                      | \$0.94                   |
| 1500                                        | 3.50             | 0.70                 | 0.74                      | 1.10             | 0.94                     | 6.98                    | 8.6            | 58.8                                     | 421.2                                | 840.0                                 | 1.99                      | \$0.96                   |
| 2000                                        | 3.50             | 0.70                 | 0.89                      | 1.10             | 1.18                     | 7.37                    | 8.1            | 58.8                                     | 398.9                                | 840.0                                 | 2.11                      | \$0.99                   |
| 2500                                        | 3.50             | 0.70                 | 1.05                      | 1.10             | 1.43                     | 7.78                    | 7.7            | 58.8                                     | 377.9                                | 840.0                                 | 2.22                      | \$1.01                   |
| 3000                                        | 3.50             | 0.70                 | 1.20                      | 1.10             | 1.68                     | 8.18                    | 7.3            | 58.8                                     | 359.4                                | 840.0                                 | 2.34                      | \$1.03                   |
| 3500                                        | 3.50             | 0.70                 | 1.35                      | 1.10             | 1.92                     | 8.57                    | 7.0            | 58.8                                     | 343.1                                | 840.0                                 | 2.45                      | \$1.06                   |
| 4000                                        | 3.50             | 0.70                 | 1.50                      | 1.10             | 2.17                     | 8.97                    | 6.7            | 58.8                                     | 327.8                                | 840.0                                 | 2.56                      | \$1.08                   |
| 4500                                        | 3.50             | 0.70                 | 1.66                      | 1.10             | 2.42                     | 9.38                    | 6.4            | 58.8                                     | 313.4                                | 840.0                                 | 2.68                      | \$1.10                   |
| 5000                                        | 3.50             | 0.70                 | 1.81                      | 1.10             | 2.66                     | 9.77                    | 6.1            | 58.8                                     | 300.9                                | 840.0                                 | 2.79                      | \$1.12                   |
| 5500                                        | 3.50             | 0.70                 | 1.96                      | 1.10             | 2.91                     | 10.17                   | 5.9            | 58.8                                     | 289.1                                | 840.0                                 | 2.91                      | \$1.15                   |
| 6000                                        | 3.50             | 0.70                 | 2.11                      | 1.10             | 3.16                     | 10.57                   | 5.7            | 58.8                                     | 278.1                                | 840.0                                 | 3.02                      | \$1.17                   |
| 6500                                        | 3.50             | 0.70                 | 2.27                      | 1.10             | 3.40                     | 10.97                   | 5.5            | 58.8                                     | 268.0                                | 840.0                                 | 3.13                      | \$1.19                   |
| 7000                                        | 3.50             | 0.70                 | 2.42                      | 1.10             | 3.65                     | 11.37                   | 5.3            | 58.8                                     | 258.6                                | 840.0                                 | 3.25                      | \$1.22                   |

| Case #3: 10% Assisting Grade                 |                  |                      |                           |                  |                          |                         |                |                                            |                                      |                                       |                           |                          |
|----------------------------------------------|------------------|----------------------|---------------------------|------------------|--------------------------|-------------------------|----------------|--------------------------------------------|--------------------------------------|---------------------------------------|---------------------------|--------------------------|
| Loaded (-10% grade + 4% rolling = -6% total) |                  |                      |                           |                  |                          |                         |                | Empty (10% grade + 4% rolling = 14% total) |                                      |                                       |                           |                          |
| One-Way Distance (Fl.)                       | Load Time (Min.) | Maneuver Time (Min.) | Travel Time Loaded (Min.) | Dump Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour | Payload (BCY)                              | Adjusted Truck Productivity (BCY/Hr) | Adjusted Loader Productivity (BCY/Hr) | Number of Trucks Required | Operating Costs (\$/BCY) |
| 500                                          | 3.50             | 0.70                 | 0.35                      | 1.10             | 0.49                     | 6.14                    | 9.8            | 58.8                                       | 478.8                                | 840.0                                 | 1.75                      | \$0.91                   |
| 1000                                         | 3.50             | 0.70                 | 0.52                      | 1.10             | 0.90                     | 6.72                    | 8.9            | 58.8                                       | 437.5                                | 840.0                                 | 1.92                      | \$0.95                   |
| 1500                                         | 3.50             | 0.70                 | 0.67                      | 1.10             | 1.31                     | 7.28                    | 8.2            | 58.8                                       | 403.8                                | 840.0                                 | 2.08                      | \$0.98                   |
| 2000                                         | 3.50             | 0.70                 | 0.82                      | 1.10             | 1.72                     | 7.84                    | 7.7            | 58.8                                       | 375.0                                | 840.0                                 | 2.24                      | \$1.01                   |
| 2500                                         | 3.50             | 0.70                 | 0.97                      | 1.10             | 2.13                     | 8.40                    | 7.1            | 58.8                                       | 350.0                                | 840.0                                 | 2.40                      | \$1.04                   |
| 3000                                         | 3.50             | 0.70                 | 1.13                      | 1.10             | 2.54                     | 8.97                    | 6.7            | 58.8                                       | 327.8                                | 840.0                                 | 2.56                      | \$1.08                   |
| 3500                                         | 3.50             | 0.70                 | 1.28                      | 1.10             | 2.94                     | 9.52                    | 6.3            | 58.8                                       | 308.8                                | 840.0                                 | 2.72                      | \$1.11                   |
| 4000                                         | 3.50             | 0.70                 | 1.43                      | 1.10             | 3.35                     | 10.08                   | 6.0            | 58.8                                       | 291.7                                | 840.0                                 | 2.88                      | \$1.14                   |
| 4500                                         | 3.50             | 0.70                 | 1.59                      | 1.10             | 3.76                     | 10.65                   | 5.6            | 58.8                                       | 276.1                                | 840.0                                 | 3.04                      | \$1.18                   |
| 5000                                         | 3.50             | 0.70                 | 1.74                      | 1.10             | 4.17                     | 11.21                   | 5.4            | 58.8                                       | 262.3                                | 840.0                                 | 3.20                      | \$1.21                   |
| 5500                                         | 3.50             | 0.70                 | 1.89                      | 1.10             | 4.58                     | 11.77                   | 5.1            | 58.8                                       | 249.8                                | 840.0                                 | 3.36                      | \$1.24                   |
| 6000                                         | 3.50             | 0.70                 | 2.04                      | 1.10             | 4.99                     | 12.33                   | 4.9            | 58.8                                       | 238.4                                | 840.0                                 | 3.52                      | \$1.27                   |
| 6500                                         | 3.50             | 0.70                 | 2.20                      | 1.10             | 5.40                     | 12.90                   | 4.7            | 58.8                                       | 227.9                                | 840.0                                 | 3.69                      | \$1.31                   |
| 7000                                         | 3.50             | 0.70                 | 2.35                      | 1.10             | 5.80                     | 13.45                   | 4.5            | 58.8                                       | 218.6                                | 840.0                                 | 3.84                      | \$1.34                   |



Appendix A (Continued)  
Calculations for Moving Materials With a Caterpillar 992D Loader and Caterpillar 777D Truck Fleet

Material Movement by Loader-Truck Combination

| Case #4: 5% Resisting Grade               |                  |                      |                           |                  |                          |                         |                |                                            |                                      |                                       |                           |                          |
|-------------------------------------------|------------------|----------------------|---------------------------|------------------|--------------------------|-------------------------|----------------|--------------------------------------------|--------------------------------------|---------------------------------------|---------------------------|--------------------------|
| Loaded (5% grade + 4% rolling = 9% total) |                  |                      |                           |                  |                          |                         |                | Empty (-5% grade + 4% rolling = -1% total) |                                      |                                       |                           |                          |
| One-Way Distance (Fl.)                    | Load Time (Min.) | Maneuver Time (Min.) | Travel Time Loaded (Min.) | Dump Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour | Payload (BCY)                              | Adjusted Truck Productivity (BCY/Hr) | Adjusted Loader Productivity (BCY/Hr) | Number of Trucks Required | Operating Costs (\$/BCY) |
| 500                                       | 3.50             | 0.70                 | 0.66                      | 1.10             | 0.33                     | 6.29                    | 9.5            | 58.8                                       | 467.4                                | 840.0                                 | 1.80                      | \$0.92                   |
| 1000                                      | 3.50             | 0.70                 | 1.23                      | 1.10             | 0.50                     | 7.03                    | 8.5            | 58.8                                       | 418.2                                | 840.0                                 | 2.01                      | \$0.97                   |
| 1500                                      | 3.50             | 0.70                 | 1.81                      | 1.10             | 0.65                     | 7.76                    | 7.7            | 58.8                                       | 377.3                                | 840.0                                 | 2.23                      | \$1.01                   |
| 2000                                      | 3.50             | 0.70                 | 2.38                      | 1.10             | 0.81                     | 8.49                    | 7.1            | 58.8                                       | 347.9                                | 840.0                                 | 2.41                      | \$1.05                   |
| 2500                                      | 3.50             | 0.70                 | 2.95                      | 1.10             | 0.96                     | 9.21                    | 6.5            | 58.8                                       | 318.5                                | 840.0                                 | 2.64                      | \$1.09                   |
| 3000                                      | 3.50             | 0.70                 | 3.53                      | 1.10             | 1.11                     | 9.94                    | 6.0            | 58.8                                       | 294.0                                | 840.0                                 | 2.86                      | \$1.14                   |
| 3500                                      | 3.50             | 0.70                 | 4.10                      | 1.10             | 1.26                     | 10.66                   | 5.6            | 58.8                                       | 274.4                                | 840.0                                 | 3.06                      | \$1.18                   |
| 4000                                      | 3.50             | 0.70                 | 4.68                      | 1.10             | 1.42                     | 11.40                   | 5.3            | 58.8                                       | 259.7                                | 840.0                                 | 3.23                      | \$1.22                   |
| 4500                                      | 3.50             | 0.70                 | 5.25                      | 1.10             | 1.57                     | 12.12                   | 5.0            | 58.8                                       | 245.0                                | 840.0                                 | 3.43                      | \$1.26                   |
| 5000                                      | 3.50             | 0.70                 | 5.82                      | 1.10             | 1.72                     | 12.84                   | 4.7            | 58.8                                       | 230.3                                | 840.0                                 | 3.65                      | \$1.30                   |
| 5500                                      | 3.50             | 0.70                 | 6.40                      | 1.10             | 1.87                     | 13.57                   | 4.4            | 58.8                                       | 215.6                                | 840.0                                 | 3.90                      | \$1.35                   |
| 6000                                      | 3.50             | 0.70                 | 6.97                      | 1.10             | 2.03                     | 14.30                   | 4.2            | 58.8                                       | 205.8                                | 840.0                                 | 4.08                      | \$1.39                   |
|                                           | 3.50             | 0.70                 | 7.54                      | 1.10             | 2.18                     | 15.02                   | 4.0            | 58.8                                       | 196.0                                | 840.0                                 | 4.29                      | \$1.43                   |
|                                           | 3.50             | 0.70                 | 8.12                      | 1.10             | 2.33                     | 15.75                   | 3.8            | 58.8                                       | 186.2                                | 840.0                                 | 4.51                      | \$1.48                   |

| Case #5: 10% Resisting Grade                |                  |                      |                           |                  |                          |                         |                |                                             |                                      |                                       |                           |                          |
|---------------------------------------------|------------------|----------------------|---------------------------|------------------|--------------------------|-------------------------|----------------|---------------------------------------------|--------------------------------------|---------------------------------------|---------------------------|--------------------------|
| Loaded (10% grade + 4% rolling = 14% total) |                  |                      |                           |                  |                          |                         |                | Empty (-10% grade + 4% rolling = -6% total) |                                      |                                       |                           |                          |
| One-Way Distance (Fl.)                      | Load Time (Min.) | Maneuver Time (Min.) | Travel Time Loaded (Min.) | Dump Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour | Payload (BCY)                               | Adjusted Truck Productivity (BCY/Hr) | Adjusted Loader Productivity (BCY/Hr) | Number of Trucks Required | Operating Costs (\$/BCY) |
| 500                                         | 3.50             | 0.70                 | 0.94                      | 1.10             | 0.33                     | 6.57                    | 9.1            | 58.8                                        | 445.9                                | 840.0                                 | 1.88                      | \$0.94                   |
| 1000                                        | 3.50             | 0.70                 | 1.83                      | 1.10             | 0.49                     | 7.62                    | 7.9            | 58.8                                        | 387.1                                | 840.0                                 | 2.18                      | \$1.00                   |
| 1500                                        | 3.50             | 0.70                 | 2.72                      | 1.10             | 0.64                     | 8.66                    | 6.9            | 58.8                                        | 338.1                                | 840.0                                 | 2.47                      | \$1.06                   |
| 2000                                        | 3.50             | 0.70                 | 3.60                      | 1.10             | 0.79                     | 9.69                    | 6.2            | 58.8                                        | 303.8                                | 840.0                                 | 2.77                      | \$1.12                   |
| 2500                                        | 3.50             | 0.70                 | 4.49                      | 1.10             | 0.94                     | 10.73                   | 5.6            | 58.8                                        | 274.4                                | 840.0                                 | 3.07                      | \$1.18                   |
| 3000                                        | 3.50             | 0.70                 | 5.38                      | 1.10             | 1.10                     | 11.78                   | 5.1            | 58.8                                        | 249.9                                | 840.0                                 | 3.37                      | \$1.24                   |
| 3500                                        | 3.50             | 0.70                 | 6.26                      | 1.10             | 1.25                     | 12.81                   | 4.7            | 58.8                                        | 230.3                                | 840.0                                 | 3.66                      | \$1.30                   |
| 4000                                        | 3.50             | 0.70                 | 7.15                      | 1.10             | 1.40                     | 13.85                   | 4.3            | 58.8                                        | 210.7                                | 840.0                                 | 3.96                      | \$1.36                   |
| 4500                                        | 3.50             | 0.70                 | 8.04                      | 1.10             | 1.55                     | 14.89                   | 4.0            | 58.8                                        | 196.0                                | 840.0                                 | 4.25                      | \$1.42                   |
| 5000                                        | 3.50             | 0.70                 | 8.94                      | 1.10             | 1.71                     | 15.94                   | 3.8            | 58.8                                        | 186.2                                | 840.0                                 | 4.55                      | \$1.49                   |
| 5500                                        | 3.50*            | 0.70                 | 9.81                      | 1.10             | 1.86                     | 16.97                   | 3.5            | 58.8                                        | 171.5                                | 840.0                                 | 4.85                      | \$1.55                   |
| 6000                                        | 3.50             | 0.70                 | 10.70                     | 1.10             | 2.01                     | 18.01                   | 3.3            | 58.8                                        | 161.7                                | 840.0                                 | 5.15                      | \$1.61                   |
|                                             | 3.50             | 0.70                 | 11.59                     | 1.10             | 2.16                     | 19.05                   | 3.1            | 58.8                                        | 151.9                                | 840.0                                 | 5.44                      | \$1.67                   |
|                                             | 3.50             | 0.70                 | 12.48                     | 1.10             | 2.32                     | 20.10                   | 3.0            | 58.8                                        | 147.0                                | 840.0                                 | 5.74                      | \$1.73                   |

Appendix B  
Calculations for Moving Materials With a Caterpillar 657E Push-Pull Scraper Fleet

**NOTE: DRILLING AND BLASTING COSTS ARE NOT INCLUDED IN THESE CALCULATIONS. THE LQD DOES NOT CONSIDER DRILLING AND BLASTING COSTS NECESSARY WHEN USING APPENDIX C.**

Material Movement By Scrapers

|                                                            |                         |                  |
|------------------------------------------------------------|-------------------------|------------------|
| 1) Caterpillar 657E Push-Pull Scraper                      |                         |                  |
| 2) Material Density                                        | 2,850. LB/BCY           | CPH 25           |
| 3) Payload                                                 | 104,000. LB             | CPH 25           |
|                                                            | 35.0 BCY                |                  |
| 4) Maximum Vehicle Speed Loaded                            | 34.9 MPH                | CPH 25           |
| 5) Operating Efficiency Factor (50 Min./Hr.)               | 0.83 %                  | CPH 25           |
| 6) 657E PP Operating Costs                                 | \$199.36 Per Hour       | 90% DQCRG        |
| 7) Labor Costs                                             | \$18.75 Per Hour        | WYDOT-WDD        |
| 8) Supervision Labor Costs                                 | \$3.13 Per Hour         | 1/8 of WYDOT-WDD |
| 9) Supervisor Transportation                               | \$1.10 Per Hour         | 1/8 of 90% DQCRG |
| 10) 1/8 of 1 - 14,000 Gal. Water Trucks + 1 Operator       | \$17.56 Per Hour        | 1/8 of 90% DQCRG |
| 11) 1/8 of 1 - 16H Blade for Road Work + 1 Operator        | \$10.53 Per Hour        | 1/8 of 90% DQCRG |
| 12) 1/4 - D9R for Ripping Ovb. and Misc. Work + 1 Operator | <u>\$60.50 Per Hour</u> | 1/2 of 90% DQCRG |
| 3) Total Hourly Costs                                      | \$310.93                |                  |

**TO USE TABLE:** Locate your approximate grade by reference to case number. Determine cost per BCY by using distance column that approximates your distance. No calculations are necessary.

| Level Ground           |                  | Loaded (0% grade + 4% rolling = 4% total) |                               |                          |                         | Empty (0% grade + 4% rolling = 4% total) |               |                               |                                |                          |
|------------------------|------------------|-------------------------------------------|-------------------------------|--------------------------|-------------------------|------------------------------------------|---------------|-------------------------------|--------------------------------|--------------------------|
| One-Way Distance (Ft.) | Load Time (Min.) | Travel Time Loaded (Min.)                 | Maneuver & Spread Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour                           | Payload (BCY) | Efficiency Factor (50 min/hr) | Adjusted Productivity (BCY/Hr) | Operating Costs (\$/BCY) |
| 500                    | 1.10             | 0.42                                      | 0.60                          | 0.36                     | 2.48                    | 24.2                                     | 35.0          | 0.83                          | 706                            | \$0.44                   |
| 1000                   | 1.10             | 0.68                                      | 0.60                          | 0.57                     | 2.95                    | 20.3                                     | 35.0          | 0.83                          | 593                            | \$0.52                   |
| 1500                   | 1.10             | 0.92                                      | 0.60                          | 0.75                     | 3.37                    | 17.8                                     | 35.0          | 0.83                          | 519                            | \$0.60                   |
| 2000                   | 1.10             | 1.15                                      | 0.60                          | 0.92                     | 3.77                    | 15.9                                     | 35.0          | 0.83                          | 464                            | \$0.67                   |
| 2500                   | 1.10             | 1.37                                      | 0.60                          | 1.09                     | 4.16                    | 14.4                                     | 35.0          | 0.83                          | 421                            | \$0.74                   |
| 3000                   | 1.10             | 1.59                                      | 0.60                          | 1.26                     | 4.55                    | 13.2                                     | 35.0          | 0.83                          | 385                            | \$0.81                   |
| 3500                   | 1.10             | 1.81                                      | 0.60                          | 1.44                     | 4.95                    | 12.1                                     | 35.0          | 0.83                          | 354                            | \$0.88                   |
| 4000                   | 1.10             | 2.02                                      | 0.60                          | 1.61                     | 5.33                    | 11.3                                     | 35.0          | 0.83                          | 328                            | \$0.95                   |
| 4500                   | 1.10             | 2.22                                      | 0.60                          | 1.78                     | 5.70                    | 10.5                                     | 35.0          | 0.83                          | 307                            | \$1.01                   |
| 5000                   | 1.10             | 2.43                                      | 0.60                          | 1.95                     | 6.08                    | 9.9                                      | 35.0          | 0.83                          | 288                            | \$1.08                   |
| 5500                   | 1.10             | 2.64                                      | 0.60                          | 2.13                     | 6.47                    | 9.3                                      | 35.0          | 0.83                          | 270                            | \$1.15                   |
| 6000                   | 1.10             | 2.85                                      | 0.60                          | 2.30                     | 6.85                    | 8.8                                      | 35.0          | 0.83                          | 255                            | \$1.22                   |
| 6500                   | 1.10             | 3.05                                      | 0.60                          | 2.47                     | 7.22                    | 8.3                                      | 35.0          | 0.83                          | 242                            | \$1.28                   |
| 7000                   | 1.10             | 3.26                                      | 0.60                          | 2.64                     | 7.60                    | 7.9                                      | 35.0          | 0.83                          | 230                            | \$1.35                   |

Appendix B (Continued)  
Calculations for Moving Materials With a Caterpillar 657E Push-Pull Scraper Fleet

Material Movement By Scrapers

| Case #2: 5% Assisting Grade                 |                  |                           |                               |                          |                         |                                          |               |                               |                                |                          |
|---------------------------------------------|------------------|---------------------------|-------------------------------|--------------------------|-------------------------|------------------------------------------|---------------|-------------------------------|--------------------------------|--------------------------|
| Loaded (-5% grade + 4% rolling = -1% total) |                  |                           |                               |                          |                         | Empty (5% grade + 4% rolling = 9% total) |               |                               |                                |                          |
| One-Way Distance (Fl.)                      | Load Time (Min.) | Travel Time Loaded (Min.) | Maneuver & Spread Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour                           | Payload (BCY) | Efficiency Factor (50 min/hr) | Adjusted Productivity (BCY/Hr) | Operating Costs (\$/BCY) |
| 500                                         | 1.10             | 0.36                      | 0.60                          | 0.42                     | 2.48                    | 24.2                                     | 35.0          | 0.83                          | 706                            | \$0.44                   |
| 1000                                        | 1.10             | 0.54                      | 0.60                          | 0.71                     | 2.95                    | 20.3                                     | 35.0          | 0.83                          | 593                            | \$0.52                   |
| 1500                                        | 1.10             | 0.71                      | 0.60                          | 0.98                     | 3.39                    | 17.7                                     | 35.0          | 0.83                          | 516                            | \$0.60                   |
| 2000                                        | 1.10             | 0.87                      | 0.60                          | 1.25                     | 3.82                    | 15.7                                     | 35.0          | 0.83                          | 458                            | \$0.68                   |
| 2500                                        | 1.10             | 1.03                      | 0.60                          | 1.51                     | 4.24                    | 14.2                                     | 35.0          | 0.83                          | 413                            | \$0.75                   |
| 3000                                        | 1.10             | 1.19                      | 0.60                          | 1.78                     | 4.67                    | 12.8                                     | 35.0          | 0.83                          | 375                            | \$0.83                   |
| 3500                                        | 1.10             | 1.36                      | 0.60                          | 2.05                     | 5.11                    | 11.7                                     | 35.0          | 0.83                          | 342                            | \$0.91                   |
| 4000                                        | 1.10             | 1.52                      | 0.60                          | 2.32                     | 5.54                    | 10.8                                     | 35.0          | 0.83                          | 316                            | \$0.98                   |
| 4500                                        | 1.10             | 1.68                      | 0.60                          | 2.59                     | 5.97                    | 10.1                                     | 35.0          | 0.83                          | 293                            | \$1.06                   |
| 5000                                        | 1.10             | 1.85                      | 0.60                          | 2.86                     | 6.41                    | 9.4                                      | 35.0          | 0.83                          | 273                            | \$1.14                   |
| 5500                                        | 1.10             | 2.01                      | 0.60                          | 3.12                     | 6.83                    | 8.8                                      | 35.0          | 0.83                          | 256                            | \$1.21                   |
| 6000                                        | 1.10             | 2.17                      | 0.60                          | 3.39                     | 7.26                    | 8.3                                      | 35.0          | 0.83                          | 241                            | \$1.29                   |
| 6500                                        | 1.10             | 2.33                      | 0.60                          | 3.66                     | 7.69                    | 7.8                                      | 35.0          | 0.83                          | 228                            | \$1.36                   |
| 7000                                        | 1.10             | 2.50                      | 0.60                          | 3.93                     | 8.13                    | 7.4                                      | 35.0          | 0.83                          | 215                            | \$1.45                   |

| Case #3: 10% Assisting Grade                 |                  |                           |                               |                          |                         |                                            |               |                               |                                |                          |
|----------------------------------------------|------------------|---------------------------|-------------------------------|--------------------------|-------------------------|--------------------------------------------|---------------|-------------------------------|--------------------------------|--------------------------|
| Loaded (-10% grade + 4% rolling = -6% total) |                  |                           |                               |                          |                         | Empty (10% grade + 4% rolling = 14% total) |               |                               |                                |                          |
| One-Way Distance (Fl.)                       | Load Time (Min.) | Travel Time Loaded (Min.) | Maneuver & Spread Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour                             | Payload (BCY) | Efficiency Factor (50 min/hr) | Adjusted Productivity (BCY/Hr) | Operating Costs (\$/BCY) |
| 500                                          | 1.10             | 0.34                      | 0.60                          | 0.51                     | 2.55                    | 23.5                                       | 35.0          | 0.83                          | 686                            | \$0.45                   |
| 1000                                         | 1.10             | 0.51                      | 0.60                          | 0.96                     | 3.17                    | 18.9                                       | 35.0          | 0.83                          | 552                            | \$0.56                   |
| 1500                                         | 1.10             | 0.67                      | 0.60                          | 1.41                     | 3.78                    | 15.9                                       | 35.0          | 0.83                          | 463                            | \$0.67                   |
| 2000                                         | 1.10             | 0.83                      | 0.60                          | 1.85                     | 4.38                    | 13.7                                       | 35.0          | 0.83                          | 400                            | \$0.78                   |
| 2500                                         | 1.10             | 0.99                      | 0.60                          | 2.30                     | 4.99                    | 12.0                                       | 35.0          | 0.83                          | 351                            | \$0.89                   |
| 3000                                         | 1.10             | 1.16                      | 0.60                          | 2.74                     | 5.60                    | 10.7                                       | 35.0          | 0.83                          | 313                            | \$0.99                   |
| 3500                                         | 1.10             | 1.32                      | 0.60                          | 3.19                     | 6.21                    | 9.7                                        | 35.0          | 0.83                          | 282                            | \$1.10                   |
| 4000                                         | 1.10             | 1.48                      | 0.60                          | 3.63                     | 6.81                    | 8.8                                        | 35.0          | 0.83                          | 257                            | \$1.21                   |
| 4500                                         | 1.10             | 1.64                      | 0.60                          | 4.08                     | 7.42                    | 8.1                                        | 35.0          | 0.83                          | 236                            | \$1.32                   |
| 5000                                         | 1.10             | 1.81                      | 0.60                          | 4.52                     | 8.03                    | 7.5                                        | 35.0          | 0.83                          | 218                            | \$1.43                   |
| 5500                                         | 1.10             | 1.97                      | 0.60                          | 4.97                     | 8.64                    | 6.9                                        | 35.0          | 0.83                          | 203                            | \$1.53                   |
| 6000                                         | 1.10             | 2.13                      | 0.60                          | 5.41                     | 9.24                    | 6.5                                        | 35.0          | 0.83                          | 189                            | \$1.65                   |
| 6500                                         | 1.10             | 2.30                      | 0.60                          | 5.86                     | 9.86                    | 6.1                                        | 35.0          | 0.83                          | 177                            | \$1.76                   |
| 7000                                         | 1.10             | 2.46                      | 0.60                          | 6.30                     | 10.46                   | 5.7                                        | 35.0          | 0.83                          | 167                            | \$1.86                   |

Appendix B (Continued)  
Calculations for Moving Materials With a Caterpillar 657E Push-Pull Scraper Fleet

Material Movement By Scrapers

| Case #4: 5% Resisting Grade                |                  |                           |                               |                          |                         |                |               |                               |                                |                          |
|--------------------------------------------|------------------|---------------------------|-------------------------------|--------------------------|-------------------------|----------------|---------------|-------------------------------|--------------------------------|--------------------------|
| Loaded (5% grade + 4% rolling = 9% total)  |                  |                           |                               |                          |                         |                |               |                               |                                |                          |
| Empty (-5% grade + 4% rolling = -1% total) |                  |                           |                               |                          |                         |                |               |                               |                                |                          |
| One-Way Distance (Ft.)                     | Load Time (Min.) | Travel Time Loaded (Min.) | Maneuver & Spread Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour | Payload (BCY) | Efficiency Factor (50 min/hr) | Adjusted Productivity (BCY/Hr) | Operating Costs (\$/BCY) |
| 500                                        | 1.10             | 0.55                      | 0.60                          | 0.33                     | 2.58                    | 23.3           | 35.0          | 0.83                          | 678                            | \$0.46                   |
| 1000                                       | 1.10             | 1.01                      | 0.60                          | 0.50                     | 3.21                    | 18.7           | 35.0          | 0.83                          | 545                            | \$0.57                   |
| 1500                                       | 1.10             | 1.46                      | 0.60                          | 0.66                     | 3.82                    | 15.7           | 35.0          | 0.83                          | 458                            | \$0.68                   |
| 2000                                       | 1.10             | 1.92                      | 0.60                          | 0.83                     | 4.45                    | 13.5           | 35.0          | 0.83                          | 393                            | \$0.79                   |
| 2500                                       | 1.10             | 2.38                      | 0.60                          | 0.99                     | 5.07                    | 11.8           | 35.0          | 0.83                          | 345                            | \$0.90                   |
| 3000                                       | 1.10             | 2.83                      | 0.60                          | 1.15                     | 5.68                    | 10.6           | 35.0          | 0.83                          | 308                            | \$1.01                   |
| 3500                                       | 1.10             | 3.29                      | 0.60                          | 1.31                     | 6.30                    | 9.5            | 35.0          | 0.83                          | 278                            | \$1.12                   |
| 4000                                       | 1.10             | 3.75                      | 0.60                          | 1.48                     | 6.93                    | 8.7            | 35.0          | 0.83                          | 253                            | \$1.23                   |
| 4500                                       | 1.10             | 4.21                      | 0.60                          | 1.64                     | 7.55                    | 7.9            | 35.0          | 0.83                          | 232                            | \$1.34                   |
| 5000                                       | 1.10             | 4.66                      | 0.60                          | 1.80                     | 8.16                    | 7.4            | 35.0          | 0.83                          | 214                            | \$1.45                   |
| 5500                                       | 1.10             | 5.12                      | 0.60                          | 1.96                     | 8.78                    | 6.8            | 35.0          | 0.83                          | 199                            | \$1.56                   |
| 6000                                       | 1.10             | 5.58                      | 0.60                          | 2.13                     | 9.41                    | 6.4            | 35.0          | 0.83                          | 186                            | \$1.67                   |
| 6500                                       | 1.10             | 6.04                      | 0.60                          | 2.29                     | 10.03                   | 6.0            | 35.0          | 0.83                          | 174                            | \$1.79                   |
|                                            | 1.10             | 6.49                      | 0.60                          | 2.45                     | 10.64                   | 5.6            | 35.0          | 0.83                          | 164                            | \$1.90                   |

| Case #5: 10% Resisting Grade                |                  |                           |                               |                          |                         |                |               |                               |                                |                          |
|---------------------------------------------|------------------|---------------------------|-------------------------------|--------------------------|-------------------------|----------------|---------------|-------------------------------|--------------------------------|--------------------------|
| Loaded (10% grade + 4% rolling = 14% total) |                  |                           |                               |                          |                         |                |               |                               |                                |                          |
| Empty (-10% grade + 4% rolling = -6% total) |                  |                           |                               |                          |                         |                |               |                               |                                |                          |
| One-Way Distance (Ft.)                      | Load Time (Min.) | Travel Time Loaded (Min.) | Maneuver & Spread Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour | Payload (BCY) | Efficiency Factor (50 min/hr) | Adjusted Productivity (BCY/Hr) | Operating Costs (\$/BCY) |
| 500                                         | 1.10             | 0.75                      | 0.60                          | 0.32                     | 2.77                    | 21.7           | 35.0          | 0.83                          | 632                            | \$0.49                   |
| 1000                                        | 1.10             | 1.43                      | 0.60                          | 0.49                     | 3.62                    | 16.6           | 35.0          | 0.83                          | 483                            | \$0.64                   |
| 1500                                        | 1.10             | 2.12                      | 0.60                          | 0.65                     | 4.47                    | 13.4           | 35.0          | 0.83                          | 391                            | \$0.80                   |
| 2000                                        | 1.10             | 2.81                      | 0.60                          | 0.81                     | 5.32                    | 11.3           | 35.0          | 0.83                          | 329                            | \$0.95                   |
| 2500                                        | 1.10             | 3.49                      | 0.60                          | 0.98                     | 6.17                    | 9.7            | 35.0          | 0.83                          | 284                            | \$1.09                   |
| 3000                                        | 1.10             | 4.18                      | 0.60                          | 1.14                     | 7.02                    | 8.5            | 35.0          | 0.83                          | 249                            | \$1.25                   |
| 3500                                        | 1.10             | 4.87                      | 0.60                          | 1.30                     | 7.87                    | 7.6            | 35.0          | 0.83                          | 222                            | \$1.40                   |
| 4000                                        | 1.10             | 5.56                      | 0.60                          | 1.46                     | 8.72                    | 6.9            | 35.0          | 0.83                          | 201                            | \$1.55                   |
| 4500                                        | 1.10             | 6.24                      | 0.60                          | 1.63                     | 9.57                    | 6.3            | 35.0          | 0.83                          | 183                            | \$1.70                   |
| 5000                                        | 1.10             | 6.93                      | 0.60                          | 1.79                     | 10.42                   | 5.8            | 35.0          | 0.83                          | 168                            | \$1.85                   |
| 5500                                        | 1.10             | 7.62                      | 0.60                          | 1.95                     | 11.27                   | 5.3            | 35.0          | 0.83                          | 155                            | \$2.00                   |
| 6000                                        | 1.10             | 8.31                      | 0.60                          | 2.12                     | 12.13                   | 4.9            | 35.0          | 0.83                          | 144                            | \$2.16                   |
| 6500                                        | 1.10             | 8.99                      | 0.60                          | 2.28                     | 12.97                   | 4.6            | 35.0          | 0.83                          | 135                            | \$2.30                   |
|                                             | 1.10             | 9.68                      | 0.60                          | 2.44                     | 13.82                   | 4.3            | 35.0          | 0.83                          | 127                            | \$2.45                   |

Appendix C  
Calculations for Moving Materials With a Caterpillar 637E Push-Pull Scraper Fleet

**NOTE: DRILLING AND BLASTING COSTS ARE NOT INCLUDED IN THESE CALCULATIONS. THE LQD DOES NOT CONSIDER DRILLING AND BLASTING COSTS NECESSARY WHEN USING APPENDIX C.**

Material Movement By Scrapers

|                                                            |                   |                  |
|------------------------------------------------------------|-------------------|------------------|
| 1) Caterpillar 637E Push-Pull Scraper                      |                   |                  |
| 2) Material Density                                        | 2,850. LB/BCY     | CPH 25           |
| 3) Payload                                                 | 75,000. LB        | CPH 25           |
|                                                            | 25.0 BCY          |                  |
| 4) Maximum Vehicle Speed Loaded                            | 33.0 MPH          | CPH 25           |
| 5) Operating Efficiency Factor (50 Min./Hr.)               | 0.83 %            | CPH 25           |
| 6) 637E PP Operating Costs                                 | \$152.15 Per Hour | 90% DQCRG        |
| 7) Labor Costs                                             | \$18.75 Per Hour  | WYDOT-WDD        |
| 8) Supervision Labor Costs                                 | \$3.13 Per Hour   | 1/8 of WYDOT-WDD |
| 9) Supervisor Transportation                               | \$1.10 Per Hour   | 1/8 of 90% DQCRG |
| 10) 1/8 of 1 - 14,000 Gal. Water Trucks + 1 Operator       | \$17.56 Per Hour  | 1/8 of 90% DQCRG |
| 11) 1/8 of 1 - 16H Blade for Road Work + 1 Operator        | \$10.53 Per Hour  | 1/8 of 90% DQCRG |
| 12) 1/4 - D9R for Ripping Ovb. and Misc. Work + 1 Operator | \$60.50 Per Hour  | 1/4 of 90% DQCRG |
| 13) Total Hourly Costs                                     | \$263.72          |                  |

**TO USE TABLE:** Locate your approximate grade by reference to case number. Determine cost per BCY by using distance column that approximates your distance. No calculations are necessary.

| Case #1: Level Ground  |                  | Loaded (0% grade + 4% rolling = 4% total) |                               |                          |                         | Empty (0% grade + 4% rolling = 4% total) |               |                               |                                |                          |
|------------------------|------------------|-------------------------------------------|-------------------------------|--------------------------|-------------------------|------------------------------------------|---------------|-------------------------------|--------------------------------|--------------------------|
| One-Way Distance (Fl.) | Load Time (Min.) | Travel Time Loaded (Min.)                 | Maneuver & Spread Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour                           | Payload (BCY) | Efficiency Factor (50 min/hr) | Adjusted Productivity (BCY/Hr) | Operating Costs (\$/BCY) |
| 500                    | 1.0              | 0.42                                      | 0.60                          | 0.36                     | 2.38                    | 25.2                                     | 25.0          | 0.83                          | 523                            | \$0.50                   |
| 1000                   | 1.0              | 0.68                                      | 0.60                          | 0.57                     | 2.85                    | 21.1                                     | 25.0          | 0.83                          | 438                            | \$0.60                   |
| 1500                   | 1.0              | 0.92                                      | 0.60                          | 0.75                     | 3.27                    | 18.4                                     | 25.0          | 0.83                          | 382                            | \$0.69                   |
| 2000                   | 1.0              | 1.15                                      | 0.60                          | 0.92                     | 3.67                    | 16.3                                     | 25.0          | 0.83                          | 338                            | \$0.78                   |
| 2500                   | 1.0              | 1.37                                      | 0.60                          | 1.09                     | 4.06                    | 14.8                                     | 25.0          | 0.83                          | 307                            | \$0.86                   |
| 3000                   | 1.0              | 1.59                                      | 0.60                          | 1.26                     | 4.45                    | 13.5                                     | 25.0          | 0.83                          | 280                            | \$0.94                   |
| 3500                   | 1.0              | 1.81                                      | 0.60                          | 1.44                     | 4.85                    | 12.4                                     | 25.0          | 0.83                          | 257                            | \$1.03                   |
| 4000                   | 1.0              | 2.02                                      | 0.60                          | 1.61                     | 5.23                    | 11.5                                     | 25.0          | 0.83                          | 239                            | \$1.11                   |
| 4500                   | 1.0              | 2.22                                      | 0.60                          | 1.78                     | 5.60                    | 10.7                                     | 25.0          | 0.83                          | 222                            | \$1.19                   |
| 5000                   | 1.0              | 2.43                                      | 0.60                          | 1.95                     | 5.98                    | 10.0                                     | 25.0          | 0.83                          | 208                            | \$1.27                   |
| 5500                   | 1.0              | 2.64                                      | 0.60                          | 2.13                     | 6.37                    | 9.4                                      | 25.0          | 0.83                          | 195                            | \$1.35                   |
| 6000                   | 1.0              | 2.85                                      | 0.60                          | 2.30                     | 6.75                    | 8.9                                      | 25.0          | 0.83                          | 185                            | \$1.43                   |
| 6500                   | 1.0              | 3.05                                      | 0.60                          | 2.47                     | 7.12                    | 8.4                                      | 25.0          | 0.83                          | 174                            | \$1.51                   |
| 7000                   | 1.0              | 3.26                                      | 0.60                          | 2.64                     | 7.50                    | 8.0                                      | 25.0          | 0.83                          | 166                            | \$1.59                   |

Appendix C (Continued)  
Calculations for Moving Materials With a Caterpillar 637E Push-Pull Scraper Fleet

Material Movement By Scrapers

| Case #2: 5% Assisting Grade                 |                  |                           |                               |                          |                         |                                          |               |                               |                                |                          |
|---------------------------------------------|------------------|---------------------------|-------------------------------|--------------------------|-------------------------|------------------------------------------|---------------|-------------------------------|--------------------------------|--------------------------|
| Loaded (-5% grade + 4% rolling = -1% total) |                  |                           |                               |                          |                         | Empty (5% grade + 4% rolling = 9% total) |               |                               |                                |                          |
| One-Way Distance (Ft.)                      | Load Time (Min.) | Travel Time Loaded (Min.) | Maneuver & Spread Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour                           | Payload (BCY) | Efficiency Factor (50 min/hr) | Adjusted Productivity (BCY/Hr) | Operating Costs (\$/BCY) |
| 500                                         | 1.0              | 0.36                      | 0.60                          | 0.42                     | 2.38                    | 25.2                                     | 25.0          | 0.83                          | 523                            | \$0.50                   |
| 1000                                        | 1.0              | 0.54                      | 0.60                          | 0.71                     | 2.85                    | 21.0                                     | 25.0          | 0.83                          | 436                            | \$0.61                   |
| 1500                                        | 1.0              | 0.71                      | 0.60                          | 0.98                     | 3.29                    | 18.2                                     | 25.0          | 0.83                          | 378                            | \$0.70                   |
| 2000                                        | 1.0              | 0.87                      | 0.60                          | 1.25                     | 3.72                    | 16.1                                     | 25.0          | 0.83                          | 334                            | \$0.79                   |
| 2500                                        | 1.0              | 1.03                      | 0.60                          | 1.51                     | 4.14                    | 14.5                                     | 25.0          | 0.83                          | 301                            | \$0.88                   |
| 3000                                        | 1.0              | 1.19                      | 0.60                          | 1.78                     | 4.57                    | 13.1                                     | 25.0          | 0.83                          | 272                            | \$0.97                   |
| 3500                                        | 1.0              | 1.36                      | 0.60                          | 2.05                     | 5.01                    | 12.0                                     | 25.0          | 0.83                          | 249                            | \$1.06                   |
| 4000                                        | 1.0              | 1.52                      | 0.60                          | 2.32                     | 5.44                    | 11.0                                     | 25.0          | 0.83                          | 228                            | \$1.16                   |
| 4500                                        | 1.0              | 1.68                      | 0.60                          | 2.59                     | 5.87                    | 10.2                                     | 25.0          | 0.83                          | 212                            | \$1.25                   |
| 5000                                        | 1.0              | 1.85                      | 0.60                          | 2.86                     | 6.31                    | 9.5                                      | 25.0          | 0.83                          | 197                            | \$1.34                   |
| 5500                                        | 1.0              | 2.01                      | 0.60                          | 3.12                     | 6.73                    | 8.9                                      | 25.0          | 0.83                          | 185                            | \$1.43                   |
| 6000                                        | 1.0              | 2.17                      | 0.60                          | 3.39                     | 7.16                    | 8.4                                      | 25.0          | 0.83                          | 174                            | \$1.51                   |
| 7000                                        | 1.0              | 2.33                      | 0.60                          | 3.66                     | 7.59                    | 7.9                                      | 25.0          | 0.83                          | 164                            | \$1.61                   |
| 8000                                        | 1.0              | 2.50                      | 0.60                          | 3.93                     | 8.03                    | 7.5                                      | 25.0          | 0.83                          | 156                            | \$1.69                   |

| Case #3: 10% Assisting Grade                 |                  |                           |                               |                          |                         |                                            |               |                               |                                |                          |
|----------------------------------------------|------------------|---------------------------|-------------------------------|--------------------------|-------------------------|--------------------------------------------|---------------|-------------------------------|--------------------------------|--------------------------|
| Loaded (-10% grade + 4% rolling = -6% total) |                  |                           |                               |                          |                         | Empty (10% grade + 4% rolling = 14% total) |               |                               |                                |                          |
| One-Way Distance (Ft.)                       | Load Time (Min.) | Travel Time Loaded (Min.) | Maneuver & Spread Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour                             | Payload (BCY) | Efficiency Factor (50 min/hr) | Adjusted Productivity (BCY/Hr) | Operating Costs (\$/BCY) |
| 500                                          | 1.0              | 0.34                      | 0.60                          | 0.51                     | 2.45                    | 24.5                                       | 25.0          | 0.83                          | 508                            | \$0.52                   |
| 1000                                         | 1.0              | 0.51                      | 0.60                          | 0.96                     | 3.07                    | 19.5                                       | 25.0          | 0.83                          | 405                            | \$0.65                   |
| 1500                                         | 1.0              | 0.67                      | 0.60                          | 1.41                     | 3.68                    | 16.3                                       | 25.0          | 0.83                          | 338                            | \$0.78                   |
| 2000                                         | 1.0              | 0.83                      | 0.60                          | 1.85                     | 4.28                    | 14.0                                       | 25.0          | 0.83                          | 291                            | \$0.91                   |
| 2500                                         | 1.0              | 0.99                      | 0.60                          | 2.30                     | 4.89                    | 12.3                                       | 25.0          | 0.83                          | 255                            | \$1.03                   |
| 3000                                         | 1.0              | 1.16                      | 0.60                          | 2.74                     | 5.50                    | 10.9                                       | 25.0          | 0.83                          | 226                            | \$1.17                   |
| 3500                                         | 1.0              | 1.32                      | 0.60                          | 3.19                     | 6.11                    | 9.8                                        | 25.0          | 0.83                          | 203                            | \$1.30                   |
| 4000                                         | 1.0              | 1.48                      | 0.60                          | 3.63                     | 6.71                    | 8.9                                        | 25.0          | 0.83                          | 185                            | \$1.43                   |
| 4500                                         | 1.0              | 1.64                      | 0.60                          | 4.08                     | 7.32                    | 8.2                                        | 25.0          | 0.83                          | 170                            | \$1.55                   |
| 5000                                         | 1.0              | 1.81                      | 0.60                          | 4.52                     | 7.93                    | 7.6                                        | 25.0          | 0.83                          | 158                            | \$1.67                   |
| 5500                                         | 1.0              | 1.97                      | 0.60                          | 4.97                     | 8.54                    | 7.0                                        | 25.0          | 0.83                          | 145                            | \$1.82                   |
| 6000                                         | 1.0              | 2.13                      | 0.60                          | 5.41                     | 9.14                    | 6.5                                        | 25.0          | 0.83                          | 135                            | \$1.96                   |
| 7000                                         | 1.0              | 2.30                      | 0.60                          | 5.86                     | 9.76                    | 6.2                                        | 25.0          | 0.83                          | 129                            | \$2.05                   |
| 8000                                         | 1.0              | 2.46                      | 0.60                          | 6.30                     | 10.36                   | 5.8                                        | 25.0          | 0.83                          | 120                            | \$2.19                   |

Appendix C (Continued)  
Calculations for Moving Materials With a Caterpillar 637E Push-Pull Scraper Fleet

Material Movement By Scrapers

| Case #4: 5% Resisting Grade               |                  |                           |                               |                          |                         |                                            |               |                               |                                |                          |
|-------------------------------------------|------------------|---------------------------|-------------------------------|--------------------------|-------------------------|--------------------------------------------|---------------|-------------------------------|--------------------------------|--------------------------|
| Loaded (5% grade + 4% rolling = 9% total) |                  |                           |                               |                          |                         | Empty (-5% grade + 4% rolling = -1% total) |               |                               |                                |                          |
| One-Way Distance (FL)                     | Load Time (Min.) | Travel Time Loaded (Min.) | Maneuver & Spread Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour                             | Payload (BCY) | Efficiency Factor (50 min/hr) | Adjusted Productivity (BCY/Hr) | Operating Costs (\$/BCY) |
| 500                                       | 1.0              | 0.55                      | 0.60                          | 0.33                     | 2.48                    | 24.2                                       | 25.0          | 0.83                          | 502                            | \$0.53                   |
| 1000                                      | 1.0              | 1.01                      | 0.60                          | 0.50                     | 3.11                    | 19.3                                       | 25.0          | 0.83                          | 400                            | \$0.66                   |
| 1500                                      | 1.0              | 1.46                      | 0.60                          | 0.66                     | 3.72                    | 16.1                                       | 25.0          | 0.83                          | 334                            | \$0.79                   |
| 2000                                      | 1.0              | 1.92                      | 0.60                          | 0.83                     | 4.35                    | 13.8                                       | 25.0          | 0.83                          | 286                            | \$0.92                   |
| 2500                                      | 1.0              | 2.38                      | 0.60                          | 0.99                     | 4.97                    | 12.1                                       | 25.0          | 0.83                          | 251                            | \$1.05                   |
| 3000                                      | 1.0              | 2.83                      | 0.60                          | 1.15                     | 5.58                    | 10.8                                       | 25.0          | 0.83                          | 224                            | \$1.18                   |
| 3500                                      | 1.0              | 3.29                      | 0.60                          | 1.31                     | 6.20                    | 9.7                                        | 25.0          | 0.83                          | 201                            | \$1.31                   |
| 4000                                      | 1.0              | 3.75                      | 0.60                          | 1.48                     | 6.83                    | 8.8                                        | 25.0          | 0.83                          | 183                            | \$1.44                   |
| 4500                                      | 1.0              | 4.21                      | 0.60                          | 1.64                     | 7.45                    | 8.1                                        | 25.0          | 0.83                          | 168                            | \$1.57                   |
| 5000                                      | 1.0              | 4.66                      | 0.60                          | 1.80                     | 8.06                    | 7.4                                        | 25.0          | 0.83                          | 154                            | \$1.72                   |
| 5500                                      | 1.0              | 5.12                      | 0.60                          | 1.96                     | 8.68                    | 6.9                                        | 25.0          | 0.83                          | 143                            | \$1.84                   |
| 6000                                      | 1.0              | 5.58                      | 0.60                          | 2.13                     | 9.31                    | 6.4                                        | 25.0          | 0.83                          | 133                            | \$1.99                   |
|                                           | 1.0              | 6.04                      | 0.60                          | 2.29                     | 9.93                    | 6.0                                        | 25.0          | 0.83                          | 125                            | \$2.12                   |
| 7000                                      | 1.0              | 6.49                      | 0.60                          | 2.45                     | 10.54                   | 5.7                                        | 25.0          | 0.83                          | 118                            | \$2.23                   |

| Case #5: 10% Resisting Grade                |                  |                           |                               |                          |                         |                                             |               |                               |                                |                          |
|---------------------------------------------|------------------|---------------------------|-------------------------------|--------------------------|-------------------------|---------------------------------------------|---------------|-------------------------------|--------------------------------|--------------------------|
| Loaded (10% grade + 4% rolling = 14% total) |                  |                           |                               |                          |                         | Empty (-10% grade + 4% rolling = -6% total) |               |                               |                                |                          |
| One-Way Distance (FL)                       | Load Time (Min.) | Travel Time Loaded (Min.) | Maneuver & Spread Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour                              | Payload (BCY) | Efficiency Factor (50 min/hr) | Adjusted Productivity (BCY/Hr) | Operating Costs (\$/BCY) |
| 500                                         | 1.0              | 0.75                      | 0.60                          | 0.32                     | 2.67                    | 22.5                                        | 25.0          | 0.83                          | 467                            | \$0.56                   |
| 1000                                        | 1.0              | 1.43                      | 0.60                          | 0.49                     | 3.52                    | 17.0                                        | 25.0          | 0.83                          | 353                            | \$0.75                   |
| 1500                                        | 1.0              | 2.12                      | 0.60                          | 0.65                     | 4.37                    | 13.7                                        | 25.0          | 0.83                          | 284                            | \$0.93                   |
| 2000                                        | 1.0              | 2.81                      | 0.60                          | 0.81                     | 5.22                    | 11.5                                        | 25.0          | 0.83                          | 238                            | \$1.11                   |
| 2500                                        | 1.0              | 3.49                      | 0.60                          | 0.98                     | 6.07                    | 9.9                                         | 25.0          | 0.83                          | 205                            | \$1.28                   |
| 3000                                        | 1.0              | 4.18                      | 0.60                          | 1.14                     | 6.92                    | 8.7                                         | 25.0          | 0.83                          | 181                            | \$1.46                   |
| 3500                                        | 1.0              | 4.87                      | 0.60                          | 1.30                     | 7.77                    | 7.7                                         | 25.0          | 0.83                          | 160                            | \$1.65                   |
| 4000                                        | 1.0              | 5.56                      | 0.60                          | 1.46                     | 8.62                    | 7.0                                         | 25.0          | 0.83                          | 145                            | \$1.82                   |
| 4500                                        | 1.0              | 6.24                      | 0.60                          | 1.63                     | 9.47                    | 6.3                                         | 25.0          | 0.83                          | 131                            | \$2.02                   |
| 5000                                        | 1.0              | 6.93                      | 0.60                          | 1.79                     | 10.32                   | 5.8                                         | 25.0          | 0.83                          | 120                            | \$2.19                   |
| 5500                                        | 1.0              | 7.62                      | 0.60                          | 1.95                     | 11.17                   | 5.4                                         | 25.0          | 0.83                          | 112                            | \$2.35                   |
| 6000                                        | 1.0              | 8.31                      | 0.60                          | 2.12                     | 12.03                   | 4.9                                         | 25.0          | 0.83                          | 102                            | \$2.59                   |
|                                             | 1.0              | 8.99                      | 0.60                          | 2.28                     | 12.87                   | 4.7                                         | 25.0          | 0.83                          | 98                             | \$2.70                   |
| 7000                                        | 1.0              | 9.68                      | 0.60                          | 2.44                     | 13.72                   | 4.4                                         | 25.0          | 0.83                          | 91                             | \$2.89                   |

Appendix D  
Calculations for Moving Materials With a Caterpillar 56 CY Cable Shovel and Caterpillar 240T (793C) Trucks

THESE COSTS ARE FOR EXCAVATION ONLY. MATERIAL REQUIRING BLASTING SHOULD HAVE AN ADDITIONAL \$0.10/BCY ADDED FOR DRILLING AND BLASTING COSTS.

Material Movement By Shovel-Truck Combination

|                                                     |                     |                             |
|-----------------------------------------------------|---------------------|-----------------------------|
| 1) 56 CY Shovel                                     | 56.0 LCY Heaped     |                             |
| 2) Caterpillar 793B - 240-Ton End Dumps             | 193.0 LCY/156.8 BCY |                             |
| 3) Material Density                                 | 2,850.0 LB/BCY      |                             |
| 4) Operating Efficiency Factor                      | 0.83 %              | CPH 25                      |
| 5) Rolling Resistance Factor                        | 4.00 %              | CPH 25                      |
| 6) 56 CY Shovel Operating Costs (No Ownership Cost) | \$248.64            | WME                         |
| 7) 793C Lease + Operating Costs                     | \$193.15            | WME                         |
| 8) Labor Costs                                      | \$18.75 Per Hour    | WYDOT-WDD                   |
| 9) 1/2 of 1 - 14,000 Gal. Water Truck + 1 Operator  | \$70.23 Per Hour    | 1/2 of 90% DQCRG + Operator |
| 0) 1 - 16H Blade + 1 Operator                       | \$84.26 Per Hour    | 90% DQCRG + Operator        |
| 1) 1 - D9R + 1 Operator                             | \$120.99 Per Hour   | 90% DQCRG + Operator        |
| 2) 1 834B Rubber Tired Dozer + 1 Operator           | \$105.15 Per Hour   | 90% DQCRG + Operator        |
| 3) Supervision Labor Costs                          | \$12.50 Per Hour    | 1/2 of WYDOT-WDD            |
| 4) Supervisor Transportation                        | \$4.39 Per Hour     | 1/2 of 90% DQCRG            |
| 5) Total Fleet Hourly Costs (Except Trucks)         | \$664.91 Per Hour   |                             |

TO USE TABLE: Locate your approximate grade by reference to case number. Determine cost per BCY by using distance column that approximates your distance. No calculations are necessary.

Case #1: Level Ground

Loaded (0% grade + 4% rolling = 4% total resistance)

Empty (0% grade + 4% = 4% total)

| One-Way Distance (ft.) | Load Time (Min.) | Maneuver Time (Min.) | Travel Time Loaded (Min.) | Dump Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour | Payload (BCY) | Adjusted Truck Productivity (BCY/Hr) | Adjusted Shovel Productivity (BCY/Hr) | Number of Trucks Required | Operating Costs (\$/BCY) |
|------------------------|------------------|----------------------|---------------------------|------------------|--------------------------|-------------------------|----------------|---------------|--------------------------------------|---------------------------------------|---------------------------|--------------------------|
| 500                    | 1.70             | 0.60                 | 0.4                       | 1.20             | 0.2                      | 4.1                     | 14.6           | 156.8         | 1912                                 | 4040                                  | 2.11                      | \$0.275                  |
| 1000                   | 1.70             | 0.60                 | 0.7                       | 1.20             | 0.4                      | 4.6                     | 13.0           | 156.8         | 1704                                 | 4040                                  | 2.37                      | \$0.289                  |
| 1500                   | 1.70             | 0.60                 | 1.0                       | 1.20             | 0.6                      | 5.1                     | 11.8           | 156.8         | 1537                                 | 4040                                  | 2.63                      | \$0.303                  |
| 2000                   | 1.70             | 0.60                 | 1.3                       | 1.20             | 0.7                      | 5.5                     | 10.9           | 156.8         | 1425                                 | 4040                                  | 2.83                      | \$0.313                  |
| 2500                   | 1.70             | 0.60                 | 1.6                       | 1.20             | 0.9                      | 6.0                     | 10.0           | 156.8         | 1307                                 | 4040                                  | 3.09                      | \$0.327                  |
| 3000                   | 1.70             | 0.60                 | 1.9                       | 1.20             | 1.1                      | 6.5                     | 9.2            | 156.8         | 1206                                 | 4040                                  | 3.35                      | \$0.340                  |
| 3500                   | 1.70             | 0.60                 | 2.2                       | 1.20             | 1.3                      | 7.0                     | 8.6            | 156.8         | 1120                                 | 4040                                  | 3.61                      | \$0.354                  |
| 4000                   | 1.70             | 0.60                 | 2.4                       | 1.20             | 1.5                      | 7.4                     | 8.1            | 156.8         | 1059                                 | 4040                                  | 3.81                      | \$0.364                  |
| 4500                   | 1.70             | 0.60                 | 2.7                       | 1.20             | 1.7                      | 7.9                     | 7.6            | 156.8         | 992                                  | 4040                                  | 4.07                      | \$0.378                  |
| 5000                   | 1.70             | 0.60                 | 3.0                       | 1.20             | 1.9                      | 8.4                     | 7.1            | 156.8         | 933                                  | 4040                                  | 4.33                      | \$0.392                  |
| 5500                   | 1.70             | 0.60                 | 3.2                       | 1.20             | 2.1                      | 8.8                     | 6.8            | 156.8         | 891                                  | 4040                                  | 4.53                      | \$0.402                  |
| 6000                   | 1.70             | 0.60                 | 3.5                       | 1.20             | 2.3                      | 9.3                     | 6.5            | 156.8         | 843                                  | 4040                                  | 4.79                      | \$0.416                  |
| 6500                   | 1.70             | 0.60                 | 3.8                       | 1.20             | 2.5                      | 9.8                     | 6.1            | 156.8         | 800                                  | 4040                                  | 5.05                      | \$0.430                  |
| 7000                   | 1.70             | 0.60                 | 4.1                       | 1.20             | 2.7                      | 10.3                    | 5.8            | 156.8         | 761                                  | 4040                                  | 5.31                      | \$0.443                  |

Operating Costs = (((# Trucks x (Truck costs + Labor costs)) + Total Fleet costs)/Shovel Productivity)



Appendix D (Continued)  
Calculations for Moving Materials With a Caterpillar 56 CY Cable Shovel and Caterpillar 240T (793C) Trucks

Material Movement By Shovel-Truck Combination

| Case #2: 5% Resisting Grade                          |                  |                      |                           |                  |                          |                         |                |                                            |                                      |                                       |                           |                          |
|------------------------------------------------------|------------------|----------------------|---------------------------|------------------|--------------------------|-------------------------|----------------|--------------------------------------------|--------------------------------------|---------------------------------------|---------------------------|--------------------------|
| Loaded (5% grade + 4% rolling = 9% total resistance) |                  |                      |                           |                  |                          |                         |                | Empty (-5% grade + 4% rolling = -1% total) |                                      |                                       |                           |                          |
| One-Way Distance (FL)                                | Load Time (Min.) | Maneuver Time (Min.) | Travel Time Loaded (Min.) | Dump Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour | Payload (BCY)                              | Adjusted Truck Productivity (BCY/Hr) | Adjusted Shovel Productivity (BCY/Hr) | Number of Trucks Required | Operating Costs (\$/BCY) |
| 500                                                  | 1.70             | 0.60                 | 0.8                       | 1.20             | 0.4                      | 4.7                     | 12.8           | 156.8                                      | 1668                                 | 4040                                  | 2.42                      | \$0.292                  |
| 1000                                                 | 1.70             | 0.60                 | 1.4                       | 1.20             | 0.7                      | 5.6                     | 10.7           | 156.8                                      | 1398                                 | 4040                                  | 2.89                      | \$0.316                  |
| 1500                                                 | 1.70             | 0.60                 | 2.2                       | 1.20             | 1.0                      | 6.7                     | 9.0            | 156.8                                      | 1170                                 | 4040                                  | 3.45                      | \$0.346                  |
| 2000                                                 | 1.70             | 0.60                 | 2.9                       | 1.20             | 1.3                      | 7.7                     | 7.8            | 156.8                                      | 1019                                 | 4040                                  | 3.96                      | \$0.372                  |
| 2500                                                 | 1.70             | 0.60                 | 3.6                       | 1.20             | 1.6                      | 8.7                     | 6.9            | 156.8                                      | 902                                  | 4040                                  | 4.48                      | \$0.400                  |
| 3000                                                 | 1.70             | 0.60                 | 4.3                       | 1.20             | 1.9                      | 9.7                     | 6.2            | 156.8                                      | 810                                  | 4040                                  | 4.99                      | \$0.426                  |
| 3500                                                 | 1.70             | 0.60                 | 5.0                       | 1.20             | 2.2                      | 10.7                    | 5.6            | 156.8                                      | 731                                  | 4040                                  | 5.52                      | \$0.454                  |
| 4000                                                 | 1.70             | 0.60                 | 5.7                       | 1.20             | 2.5                      | 11.7                    | 5.1            | 156.8                                      | 669                                  | 4040                                  | 6.04                      | \$0.481                  |
| 4500                                                 | 1.70             | 0.60                 | 6.4                       | 1.20             | 2.8                      | 12.7                    | 4.7            | 156.8                                      | 615                                  | 4040                                  | 6.57                      | \$0.509                  |
| 5000                                                 | 1.70             | 0.60                 | 7.1                       | 1.20             | 3.2                      | 13.8                    | 4.4            | 156.8                                      | 570                                  | 4040                                  | 7.09                      | \$0.537                  |
| 5500                                                 | 1.70             | 0.60                 | 7.8                       | 1.20             | 3.5                      | 14.8                    | 4.1            | 156.8                                      | 531                                  | 4040                                  | 7.61                      | \$0.564                  |
| 6000                                                 | 1.70             | 0.60                 | 8.5                       | 1.20             | 3.8                      | 15.8                    | 3.8            | 156.8                                      | 497                                  | 4040                                  | 8.14                      | \$0.592                  |
| 6500                                                 | 1.70             | 0.60                 | 9.2                       | 1.20             | 4.1                      | 16.8                    | 3.6            | 156.8                                      | 467                                  | 4040                                  | 8.66                      | \$0.619                  |
| =                                                    | 1.70             | 0.60                 | 9.9                       | 1.20             | 4.4                      | 17.8                    | 3.4            | 156.8                                      | 440                                  | 4040                                  | 9.17                      | \$0.646                  |

| Case #3: 5% Assisting Grade                            |                  |                      |                           |                  |                          |                         |                |                                  |                                      |                                       |                           |                          |
|--------------------------------------------------------|------------------|----------------------|---------------------------|------------------|--------------------------|-------------------------|----------------|----------------------------------|--------------------------------------|---------------------------------------|---------------------------|--------------------------|
| Loaded (-5% grade + 4% rolling = -1% total resistance) |                  |                      |                           |                  |                          |                         |                | Empty (5% grade + 4% = 9% total) |                                      |                                       |                           |                          |
| One-Way Distance (FL)                                  | Load Time (Min.) | Maneuver Time (Min.) | Travel Time Loaded (Min.) | Dump Time (Min.) | Travel Time Empty (Min.) | Total Cycle Time (Min.) | Trips Per Hour | Payload (BCY)                    | Adjusted Truck Productivity (BCY/Hr) | Adjusted Shovel Productivity (BCY/Hr) | Number of Trucks Required | Operating Costs (\$/BCY) |
| 500                                                    | 1.70             | 0.60                 | 0.4                       | 1.20             | 0.3                      | 4.2                     | 14.3           | 156.8                            | 1867                                 | 4040                                  | 2.16                      | \$0.278                  |
| 1000                                                   | 1.70             | 0.60                 | 0.7                       | 1.20             | 0.5                      | 4.7                     | 12.7           | 156.8                            | 1662                                 | 4040                                  | 2.43                      | \$0.292                  |
| 1500                                                   | 1.70             | 0.60                 | 1.0                       | 1.20             | 0.8                      | 5.3                     | 11.3           | 156.8                            | 1479                                 | 4040                                  | 2.73                      | \$0.308                  |
| 2000                                                   | 1.70             | 0.60                 | 1.3                       | 1.20             | 1.0                      | 5.8                     | 10.3           | 156.8                            | 1344                                 | 4040                                  | 3.00                      | \$0.322                  |
| 2500                                                   | 1.70             | 0.60                 | 1.6                       | 1.20             | 1.3                      | 6.4                     | 9.4            | 156.8                            | 1227                                 | 4040                                  | 3.29                      | \$0.337                  |
| 3000                                                   | 1.70             | 0.60                 | 1.9                       | 1.20             | 1.6                      | 7.0                     | 8.6            | 156.8                            | 1128                                 | 4040                                  | 3.58                      | \$0.352                  |
| 3500                                                   | 1.70             | 0.60                 | 2.2                       | 1.20             | 1.8                      | 7.5                     | 8.0            | 156.8                            | 1044                                 | 4040                                  | 3.87                      | \$0.368                  |
| 4000                                                   | 1.70             | 0.60                 | 2.5                       | 1.20             | 2.1                      | 8.1                     | 7.4            | 156.8                            | 972                                  | 4040                                  | 4.16                      | \$0.383                  |
| 4500                                                   | 1.70             | 0.60                 | 2.8                       | 1.20             | 2.3                      | 8.6                     | 7.0            | 156.8                            | 909                                  | 4040                                  | 4.44                      | \$0.398                  |
| 5000                                                   | 1.70             | 0.60                 | 3.2                       | 1.20             | 2.6                      | 9.3                     | 6.5            | 156.8                            | 845                                  | 4040                                  | 4.78                      | \$0.415                  |
| 5500                                                   | 1.70             | 0.60                 | 3.5                       | 1.20             | 2.8                      | 9.8                     | 6.1            | 156.8                            | 797                                  | 4040                                  | 5.07                      | \$0.431                  |
| 6000                                                   | 1.70             | 0.60                 | 3.8                       | 1.20             | 3.1                      | 10.4                    | 5.8            | 156.8                            | 754                                  | 4040                                  | 5.36                      | \$0.446                  |
| 6500                                                   | 1.70             | 0.60                 | 4.1                       | 1.20             | 3.4                      | 11.0                    | 5.5            | 156.8                            | 715                                  | 4040                                  | 5.65                      | \$0.461                  |
| =                                                      | 1.70             | 0.60                 | 4.4                       | 1.20             | 3.6                      | 11.5                    | 5.2            | 156.8                            | 681                                  | 4040                                  | 5.93                      | \$0.476                  |

**Appendix E**  
**Calculations for Moving Material With a Caterpillar D9N Dozer**

**Material Movement By Dozing**

|                                       |                          |                     |
|---------------------------------------|--------------------------|---------------------|
| 1) Caterpillar D9N Dozer With U Blade |                          |                     |
| 2) Operating Costs                    | \$94.60 Per Hour         | 90% of DQCRG        |
| 3) Labor Costs                        | \$18.75 Per Hour         | WYDOT-WDD           |
| 4) Supervisor Labor Costs             | \$3.13 Per Hour          | 1/8 of 90% of DQCRG |
| 5) Supervisor Transportation          | <u>\$1.10 Per Hour</u>   | 1/8 of 90% of DQCRG |
| 6) Total Hourly Costs                 | <b>\$117.58 Per Hour</b> |                     |

**TO USE TABLE:** Locate your approximate grade by referencing "Grade" column. Determine cost per LCY by using the distance that best approximates your distance.

| Distance<br>(Ft.) | Productivity<br>(LCY/Hr.) | Job Correction Factors <sup>1</sup> |          |            |            | Grade<br>(0%) | Adjusted<br>Productivity<br>(LCY/Hr.) | Costs<br>(\$/LCY) |
|-------------------|---------------------------|-------------------------------------|----------|------------|------------|---------------|---------------------------------------|-------------------|
|                   |                           | Operator                            | Material | Visibility | Efficiency |               |                                       |                   |
| 50                | 2100                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 1575                                  | \$0.075           |
| 100               | 1200                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 900                                   | \$0.131           |
| 150               | 900                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 675                                   | \$0.174           |
| 200               | 700                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 525                                   | \$0.224           |
| 250               | 570                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 428                                   | \$0.275           |
| 300               | 480                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 360                                   | \$0.327           |
| 350               | 410                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 308                                   | \$0.382           |
| 400               | 370                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 278                                   | \$0.423           |
| 450               | 350                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 263                                   | \$0.447           |
| 500               | 340                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 255                                   | \$0.461           |

| Distance<br>(Ft.) | Productivity<br>(LCY/Hr.) | Job Correction Factors <sup>1</sup> |          |            |            | Grade<br>(-10%) | Adjusted<br>Productivity<br>(LCY/Hr.) | Costs<br>(\$/LCY) |
|-------------------|---------------------------|-------------------------------------|----------|------------|------------|-----------------|---------------------------------------|-------------------|
|                   |                           | Operator                            | Material | Visibility | Efficiency |                 |                                       |                   |
| 50                | 2100                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 1890                                  | \$0.062           |
| 100               | 1200                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 1080                                  | \$0.109           |
| 150               | 900                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 810                                   | \$0.145           |
| 200               | 700                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 630                                   | \$0.187           |
| 250               | 570                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 513                                   | \$0.229           |
| 300               | 480                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 432                                   | \$0.272           |
| 350               | 410                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 369                                   | \$0.317           |
| 400               | 370                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 333                                   | \$0.353           |
| 450               | 350                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 315                                   | \$0.373           |
| 500               | 340                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 306                                   | \$0.384           |

**Job Correction Factors<sup>2</sup>**

|            |           |        |
|------------|-----------|--------|
| Operator   | Excellent | = 1.00 |
| Material   | Good      | = 1.00 |
| Visibility | Fair      | = 0.90 |
| Efficiency | 50 min/hr | = 0.83 |

Appendix E (Continued)  
Calculations for Moving Material With a Caterpillar D9N Dozer

Material Movement By Dozing

| Distance<br>(Ft.) | Productivity<br>(LCY/Hr.) | Job Correction Factors <sup>1</sup> |          |            |            | Grade<br>(-20%) | Adjusted<br>Productivity<br>(LCY/Hr.) | Costs<br>(\$/LCY) |
|-------------------|---------------------------|-------------------------------------|----------|------------|------------|-----------------|---------------------------------------|-------------------|
|                   |                           | Operator                            | Material | Visibility | Efficiency |                 |                                       |                   |
| 50                | 2100                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 2205                                  | \$0.053           |
| 100               | 1200                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 1260                                  | \$0.093           |
| 150               | 900                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 945                                   | \$0.124           |
| 200               | 700                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 735                                   | \$0.160           |
| 250               | 570                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 599                                   | \$0.196           |
| 300               | 480                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 504                                   | \$0.233           |
| 350               | 410                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 431                                   | \$0.273           |
| 400               | 370                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 389                                   | \$0.302           |
| 450               | 350                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 368                                   | \$0.320           |
| 500               | 340                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 357                                   | \$0.329           |

| Distance<br>(Ft.) | Productivity<br>(LCY/Hr.) | Job Correction Factors <sup>1</sup> |          |            |            | Grade<br>(10%) | Adjusted<br>Productivity<br>(LCY/Hr.) | Cost<br>(\$/LCY) |
|-------------------|---------------------------|-------------------------------------|----------|------------|------------|----------------|---------------------------------------|------------------|
|                   |                           | Operator                            | Material | Visibility | Efficiency |                |                                       |                  |
| 50                | 2100                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 1181                                  | \$0.100          |
| 100               | 1200                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 675                                   | \$0.174          |
| 150               | 900                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 506                                   | \$0.232          |
| 200               | 700                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 394                                   | \$0.298          |
| 250               | 570                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 321                                   | \$0.366          |
| 300               | 480                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 270                                   | \$0.436          |
| 350               | 410                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 231                                   | \$0.509          |
| 400               | 370                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 208                                   | \$0.565          |
| 450               | 350                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 197                                   | \$0.600          |
| 500               | 340                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 191                                   | \$0.616          |

<sup>1</sup> Job Correction Factors:

|            |           |        |
|------------|-----------|--------|
| Operator   | Excellent | = 1.00 |
| Material   | Good      | = 1.00 |
| Visibility | Fair      | = 0.90 |
| Efficiency | 50 min/hr | = 0.83 |

Appendix F  
Calculations For Moving Material With a Caterpillar D11R Dozer

Material Movement By Dozing With D11R

|                                                                                 |                   |                     |
|---------------------------------------------------------------------------------|-------------------|---------------------|
| 1) Caterpillar D11R Dozer With U Blade (Operating Costs) \$223.85 per DataQuest |                   |                     |
| 2) Operating Costs                                                              | \$201.47 Per Hour | 90% of DQCRG        |
| 3) Labor Costs                                                                  | \$18.75 Per Hour  | WYDOT-WDD           |
| 4) Supervisor Labor Costs                                                       | \$3.13 Per Hour   | 1/8 of 90% of DQCRG |
| 5) Supervisor Transportation                                                    | \$1.10 Per Hour   | 1/8 of 90% of DQCRG |
| 6) Total Hourly Costs                                                           | \$224.45 Per Hour |                     |

TO USE TABLE: Locate your approximate grade by referencing "Grade" column. Determine cost per LCY by using the distance that best approximates your distance.

| Distance<br>(FL) | Productivity<br>(LCY/Hr.) | Job Correction Factors <sup>1</sup> |          |            |            | Grade<br>(0%) | Adjusted<br>Productivity<br>(LCY/Hr.) | Costs<br>(\$/LCY) |
|------------------|---------------------------|-------------------------------------|----------|------------|------------|---------------|---------------------------------------|-------------------|
|                  |                           | Operator                            | Material | Visibility | Efficiency |               |                                       |                   |
| 50               | 3200                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 2400                                  | \$0.094           |
| 100              | 2700                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 2025                                  | \$0.111           |
| 150              | 1800                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 1350                                  | \$0.166           |
| 200              | 1400                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 1050                                  | \$0.214           |
| 250              | 1150                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 863                                   | \$0.260           |
| 300              | 1000                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 750                                   | \$0.300           |
| 350              | 850                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 638                                   | \$0.352           |
| 400              | 750                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 563                                   | \$0.400           |
| 450              | 670                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 503                                   | \$0.446           |
| 500              | 600                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.00          | 450                                   | \$0.500           |

| Distance<br>(FL) | Productivity<br>(LCY/Hr.) | Job Correction Factors <sup>1</sup> |          |            |            | Grade<br>(-10%) | Adjusted<br>Productivity<br>(LCY/Hr.) | Costs<br>(\$/LCY) |
|------------------|---------------------------|-------------------------------------|----------|------------|------------|-----------------|---------------------------------------|-------------------|
|                  |                           | Operator                            | Material | Visibility | Efficiency |                 |                                       |                   |
| 50               | 3200                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 2880                                  | \$0.078           |
| 100              | 2700                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 2430                                  | \$0.092           |
| 150              | 1800                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 1620                                  | \$0.139           |
| 200              | 1400                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 1260                                  | \$0.178           |
| 250              | 1150                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 1035                                  | \$0.217           |
| 300              | 1000                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 900                                   | \$0.249           |
| 350              | 850                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 765                                   | \$0.293           |
| 400              | 750                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 675                                   | \$0.333           |
| 450              | 670                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 603                                   | \$0.372           |
| 500              | 600                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.20            | 540                                   | \$0.416           |

Job Correction Factors:

|            |           |        |
|------------|-----------|--------|
| Operator   | Excellent | = 1.00 |
| Material   | Good      | = 1.00 |
| Visibility | Fair      | = 0.90 |
| Efficiency | 50 min/hr | = 0.83 |

Appendix F (Continued)  
Calculations For Moving Material With a Caterpillar D11R Dozer

Material Movement By Dozing With D11R

| Distance<br>(Ft.) | Productivity<br>(LCY/Hr.) | Job Correction Factors <sup>1</sup> |          |            |            | Grade<br>(-20%) | Adjusted<br>Productivity<br>(LCY/Hr.) | Costs<br>(\$/LCY) |
|-------------------|---------------------------|-------------------------------------|----------|------------|------------|-----------------|---------------------------------------|-------------------|
|                   |                           | Operator                            | Material | Visibility | Efficiency |                 |                                       |                   |
| 50                | 3200                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 3360                                  | \$0.067           |
| 100               | 2700                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 2835                                  | \$0.079           |
| 150               | 1800                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 1890                                  | \$0.119           |
| 200               | 1400                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 1470                                  | \$0.153           |
| 250               | 1150                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 1208                                  | \$0.186           |
| 300               | 1000                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 1050                                  | \$0.214           |
| 350               | 850                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 893                                   | \$0.251           |
| 400               | 750                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 788                                   | \$0.285           |
| 450               | 670                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 704                                   | \$0.319           |
| 500               | 600                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 1.40            | 630                                   | \$0.356           |

| Distance<br>(Ft.) | Productivity<br>(LCY/Hr.) | Job Correction Factors <sup>1</sup> |          |            |            | Grade<br>(10%) | Adjusted<br>Productivity<br>(LCY/Hr.) | Costs<br>(\$/LCY) |
|-------------------|---------------------------|-------------------------------------|----------|------------|------------|----------------|---------------------------------------|-------------------|
|                   |                           | Operator                            | Material | Visibility | Efficiency |                |                                       |                   |
| 50                | 3200                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 1800                                  | \$0.125           |
| 100               | 2700                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 1519                                  | \$0.148           |
| 150               | 1800                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 1013                                  | \$0.222           |
| 200               | 1400                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 788                                   | \$0.285           |
| 250               | 1150                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 647                                   | \$0.347           |
| 300               | 1000                      | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 563                                   | \$0.399           |
| 350               | 850                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 478                                   | \$0.470           |
| 400               | 750                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 422                                   | \$0.532           |
| 450               | 670                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 377                                   | \$0.595           |
| 500               | 600                       | 1.0                                 | 1.0      | 0.90       | 0.83       | 0.75           | 338                                   | \$0.664           |

Job Correction Factors:

|            |           |        |
|------------|-----------|--------|
| Operator   | Excellent | = 1.00 |
| Material   | Good      | = 1.00 |
| Visibility | Fair      | = 0.90 |
| Efficiency | 50 min/hr | = 0.83 |

Appendix G  
Calculations for Final Grading With a Caterpillar 16H Motor Grader

Final Grading

|                                                                                        |  | INPUT, UNIT AS INDICATED      | COMMENT/<br>SOURCE  |
|----------------------------------------------------------------------------------------|--|-------------------------------|---------------------|
| Caterpillar 16H Motor Grader                                                           |  |                               |                     |
| Speed in Miles Per Hour (Second Gear)                                                  |  | 3.3 Miles/Hour                | CPH 25              |
| Width of Grading Per Pass                                                              |  | 8 Feet                        | CPH 25              |
| Feet Per Mile                                                                          |  | 5,280 Feet                    |                     |
| Square Feet Per Acre                                                                   |  | 43,560 Sq. Ft.                |                     |
| Operating Efficiency Factor 50 Min./Hr.                                                |  | 0.83 %                        | CPH 25              |
| Operating Costs                                                                        |  | \$65.51 Per Hour              | 90% of DQCRG        |
| Labor Costs                                                                            |  | \$18.75 Per Hour              | WYDOT-WDD           |
| Supervision Labor Costs                                                                |  | \$3.13 Per Hour               | 1/8 of 90% of DQCRG |
| Supervisor Transportation                                                              |  | \$1.10 Per Hour               | 1/8 of 90% of DQCRG |
| Total Hourly Costs                                                                     |  | \$88.49                       |                     |
| Grading Rate                                                                           |  |                               |                     |
| $(3.3 \text{ Miles/Hour}) \times (5,280 \text{ Ft./Mile}) \times (8 \text{ Ft./Pass})$ |  | 139,392 Ft <sup>2</sup> /Hour |                     |
| $(139,392 \text{ Ft}^2/\text{Hour}) / (43,560 \text{ Ft}^2/\text{Acre})$               |  | 3.2 Acres/Hour                |                     |
| $(3.2 \text{ Acres/Hour}) \times (0.83 \text{ Efficiency Factor})$                     |  | 2.66 Acres/Hour               |                     |
| Operating Costs                                                                        |  |                               |                     |
| $(\$88.49/\text{Hour}) / (2.66 \text{ Acres/Hour})$                                    |  | \$33.27 Per Acre              |                     |

Appendix H  
Cost Estimates for Handling Wire Fencing and Electrical Power Lines

| FENCING                      |                                | SOURCES                                                         |
|------------------------------|--------------------------------|-----------------------------------------------------------------|
| Construction 4-Strand Barbed | Overall Average -<br>\$1.15/LF | Wyoming Highway Department<br>Weighted Average Bid Prices, 1997 |
| Removal                      | Overall Average -<br>\$0.68/LF | Wyoming Highway Department,<br>Average Bid Prices, 1997         |
|                              | Power Line Removal             |                                                                 |
| Distribution Lines:          | No Charge                      | From: Tri-County Electric                                       |
| Transmission Lines:          | No Charge                      | From: Tri-County Electric                                       |

Note: Cost estimates for power line removal are based on phone contact with Tri-County Electric. Distribution lines are owned by Tri-County Electric and would be removed upon request at no charge by Tri-County Electric. Transmission lines (lines which go from the main metering point to various electrical substations and are not owned by Tri-County Electric) would be removed by Tri-County Electric at no cost for their salvage value.

Appendix I  
Cost Estimate for Ripping Asphalt Using a Caterpillar D9R Dozer

Asphalt Ripping (3"-4" Mat)

| INPUT, UNIT AS INDICATED                                                              |                              | COMMENT/<br>SOURCE  |
|---------------------------------------------------------------------------------------|------------------------------|---------------------|
| Caterpillar D9R Dozer With 3 Shank Ripper                                             |                              |                     |
| Speed in Miles Per Hour                                                               | 1 Mile/Hour                  | CPH 25              |
| Width of Ripping Pass                                                                 | 3 Feet                       | CPH 25              |
| Feet Per Mile                                                                         | 5,280 Feet                   |                     |
| Square Feet Per Acre                                                                  | 43,560 Sq. Ft.               |                     |
| Operating Efficiency Factor 50 Min./Hr.                                               | 0.83 %                       | CPH 25              |
| Operating Costs                                                                       | \$102.24 Per Hour            | 90% of DQCRG        |
| Labor Costs                                                                           | \$18.75 Per Hour             | WYDOT-WDD           |
| Supervision Labor Costs                                                               | \$3.13 Per Hour              | 1/8 of 90% of DQCRG |
| Supervisor Transportation                                                             | \$1.10 Per Hour              | 1/8 of 90% of DQCRG |
| Total Hourly Costs                                                                    | \$125.22                     |                     |
| Ripper Productivity                                                                   |                              |                     |
| $(1.0 \text{ Mile/Hour}) \times (5,280 \text{ Ft./Mile}) \times (3 \text{ Ft./Pass})$ | 15,840 Ft <sup>2</sup> /Hour |                     |
| $(15,840 \text{ Ft}^2/\text{Hour}) / (43,560 \text{ Ft}^2/\text{Acre})$               | 0.36 Acres/Hour              |                     |
| $(0.36 \text{ Acres/Hour}) \times (0.83 \text{ Efficiency Factor})$                   | 0.299 Acres/Hour             |                     |
| Operating Costs                                                                       |                              |                     |
| $(\$125.22/\text{Hour}) / (0.299 \text{ Acres/Hour})$                                 | \$418.80 Per Acre            |                     |



Appendix II  
Cost Estimate for Ripping Overburden Using a Caterpillar D10R Dozer

Overburden Ripping

| INPUT, UNIT AS INDICATED                                                              |                              | COMMENT/<br>SOURCE  |
|---------------------------------------------------------------------------------------|------------------------------|---------------------|
| Caterpillar D10R Dozer With Single Shank Ripper                                       |                              |                     |
| Speed in Miles Per Hour                                                               | 1 Mile/Hour                  | CPH 25              |
| Width of Ripping Pass                                                                 | 3 Feet                       | CPH 25              |
| Feet Per Mile                                                                         | 5,280 Feet                   |                     |
| Square Feet Per Acre                                                                  | 43,560 Sq. Ft.               |                     |
| Operating Efficiency Factor 50 Min./Hr.                                               | 0.75 %                       | CPH 25              |
| Depth                                                                                 | 2 Feet                       | CPH 25              |
| Operating Costs                                                                       | \$134.07 Per Hour            | 90% of DQCRG        |
| Labor Costs                                                                           | \$18.75 Per Hour             | WYDOT-WDD           |
| Supervision Labor Costs                                                               | \$3.13 Per Hour              | 1/8 of 90% of DQCRG |
| Supervisor Transportation                                                             | \$1.10 Per Hour              | 1/8 of 90% of DQCRG |
| Total Hourly Costs                                                                    | \$157.05                     |                     |
| Ripper Productivity                                                                   |                              |                     |
| $(1.0 \text{ Mile/Hour}) \times (5,280 \text{ Ft./Mile}) \times (3 \text{ Ft./Pass})$ | 15,840 Ft <sup>2</sup> /Hour |                     |
| $(15,840 \text{ Ft}^2/\text{Hour}) / (43,560 \text{ Ft}^2/\text{Acre})$               | 0.36 Acre/Hour               |                     |
| $(0.36 \text{ Acre/Hour}) \times (0.75 \text{ Efficiency Factor})$                    | 0.27 Acre/Hour               |                     |
| Operating Costs                                                                       |                              |                     |
| $(\$157.05/\text{Hour}) / (0.27 \text{ Acre/Hour})$                                   | \$581.67 Per Acre            |                     |

A 75 percent Efficiency Factor was used to account for slowing, raising ripper, maneuvering and turn time.

Appendix J  
Cost Estimate for Culvert Removal

Culvert Removal

|                                                                       | INPUT, UNIT AS<br>INDICATED | COMMENT/<br>SOURCE |
|-----------------------------------------------------------------------|-----------------------------|--------------------|
| Average Length of CMP Section                                         | 20 Feet                     |                    |
| Assumed Culvert Diameter                                              | 48 Inches                   |                    |
| Time to Cut One Band                                                  | 10 Minutes                  |                    |
| Time to Load One 20' Section (2 People)                               | 20 Minutes                  |                    |
| Average Haul, Dump and Return Time                                    | 30 Minutes                  |                    |
| Number of Sections of CMP Per Load                                    | 2                           |                    |
| Operating Efficiency Factor 50 Min./Hr.                               | 0.83 %                      |                    |
|                                                                       | \$18.75 Per Hour            | WYDOT-WDD          |
| Dump Truck (10-12 yd <sup>3</sup> )                                   | \$26.52 Per Hour            | 90 % of DQCRG      |
| Caterpillar 980F Front-End Loader                                     | \$57.94 Per Hour            | 90 % of DQCRG      |
| Cost to Remove One 20' Section of CMP                                 |                             |                    |
| Labor Cost x Time to Cut One Band                                     | \$3.13                      |                    |
| + ((Labor Cost x 2) + FEL Cost) x Time to Load 1 Section              | \$31.78                     |                    |
| + (Labor Cost + Truck Cost) x Haul Time                               | \$22.64                     |                    |
| Cost to Remove One 20' Section of CMP<br>(not including dirt removal) | \$57.55                     |                    |

Note: Culverts may be smashed and buried in place when feasible.

Appendix K  
Cost Estimates for Demolition and Removal of Railroad Spurs and Facilities Buildings

| TASK                                                | COST PER UNIT (\$)   | REGIONAL COST ADJUSTMENT <sup>1</sup> | ADJUSTED COST PER UNIT (\$) |
|-----------------------------------------------------|----------------------|---------------------------------------|-----------------------------|
| Track Removal                                       | 6.19/lin. ft.        | 84.2 %                                | 5.21/lin. ft.               |
| Ballast Removal                                     | 2.54/cy              | 84.2 %                                | 2.14/cy                     |
| Building Demolition and Disposal <sup>1, 2, 3</sup> |                      |                                       |                             |
| Mixture of Types                                    | 0.18/ft <sup>3</sup> | 84.2 %                                | 0.152/ft <sup>3</sup>       |
| Explosive Demolition, Concrete or Steel             | 0.18/ft <sup>3</sup> | 84.2 %                                | 0.152/ft <sup>3</sup>       |
| Disposal                                            | 6.47/cy              | 84.2 %                                | 5.45/cy                     |
| City Landfill Dump Charges                          | \$50.00/ton          | 84.2 %                                | \$42.10/ton                 |
| rete Footings and Foundations                       |                      |                                       |                             |
| 6" Thick With Rebar                                 | 9.65/sq. ft.         | 84.2 %                                | 8.13/sq. ft.                |
| Footings - 2' Thick, 3' Wide                        | 13.15/lin. ft.       | 84.2 %                                | 11.07/lin. ft.              |
| Concrete Disposal On-Site                           | 5.25/cy              | 84.2 %                                | 4.42/cy                     |

Note: Operators may also provide a verifiable cost estimate from a qualified contractor for these demolition tasks. This estimate may be used for one to three consecutive years, assuming few substantial changes in mine facilities.

Costs From: 1998 Means Heavy Construction Cost Data

Based on Total Volume of Building, does not include disposal cost

Based on Concrete Structures Volume Only, does not include disposal cost

Appendix L  
Abandonment and Sealing of Cased Drill Holes and Monitor Wells

| TASKS                                                                                    | UNIT COST                          | UNITS | TOTAL COST |
|------------------------------------------------------------------------------------------|------------------------------------|-------|------------|
| <b>DRILL HOLE RECLAMATION COSTS</b>                                                      |                                    |       |            |
| Site Locating                                                                            | \$10.00/site                       |       |            |
| Sealing Using High-Solids Bentonite Grout <sup>1,2</sup><br>≤ 500' deep<br>≤ 1,000' deep | \$4.00/lin. ft.<br>\$6.28/lin. ft. |       |            |
| Capping Using a Pre-cast Concrete Cap (if needed)                                        | \$7.50/hole                        |       |            |
| Site Grading                                                                             | \$30.00/site                       |       |            |
| Seeding - Small Site (15' x 25')                                                         | \$1.00/site                        |       |            |
| Cultivating & Seeding - Large Sites (100' x 100')                                        | \$250.00/site                      |       |            |
| <b>MONITORING WELL RECLAMATION COSTS</b>                                                 |                                    |       |            |
| Site Locating                                                                            | \$10.00/site                       |       |            |
| Removal of Top Few Feet of Casing (Backhoe & Welder)                                     | \$15.00/well                       |       |            |
| Sealing Using High-Solids Bentonite Grout <sup>1,2</sup><br>≤ 500' deep<br>≤ 1,000' deep | \$4.00/lin. ft.<br>\$6.28/lin. ft. |       |            |
| Site Smoothing (Hand Work) & Seeding                                                     | \$5.00/site                        |       |            |

Costs based on industry sources.

Assumes a hole/well size of 5" diameter.

Gassy or artesian wells would require class G neat cement plugging @ \$6.46/ft. for wells up to 500' deep and \$7.64/ft. for holes over 500' deep.

Appendix M  
Cost Estimate for Rough Grading Backfill Using  
Caterpillar D9R Dozer or Caterpillar 834B

| ITEMS                                                                                                                                                                                  | CATERPILLAR D9R<br>DOZER      | CATERPILLAR 834B<br>RUBBER TIRED<br>DOZER | COMMENT/SOURCE      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------------------|---------------------|
| Speed in Miles Per Hour (First Gear)                                                                                                                                                   | 2.0 Miles/Hour                | 4.0 Miles/Hour                            | CPH 25              |
| Width of Dozer Pass                                                                                                                                                                    | 14 Feet                       | 14 Feet                                   | CPH 25              |
| Feet Per Mile                                                                                                                                                                          | 5,280 Feet                    | 5,280 Feet                                |                     |
| Square Feet Per Acre                                                                                                                                                                   | 43,560 Sq. Ft.                | 43,560 Sq. Ft.                            |                     |
| Operating Efficiency Factor 50 Min./Hr.                                                                                                                                                | 0.83%                         | 0.83%                                     | CPH 25              |
| Operating Costs                                                                                                                                                                        | \$102.24 Per Hour             | \$86.40 Per Hour                          | 90% of DQCRG        |
| Labor Costs                                                                                                                                                                            | \$18.75 Per Hour              | \$18.75 Per Hour                          | WYDOT-WDD           |
| Supervision Labor Costs                                                                                                                                                                | \$3.13 Per Hour               | \$3.13 Per Hour                           | 1/8 of 90% of DQCRG |
| Motor Transportation                                                                                                                                                                   | \$1.10 Per Hour               | \$1.10 Per Hour                           | 1/8 of 90% of DQCRG |
| Total Hourly Costs                                                                                                                                                                     | \$125.20                      | \$109.38                                  |                     |
| SCARIFICATION RATE                                                                                                                                                                     |                               |                                           |                     |
| $(2.0 \text{ Miles/Hour}) \times (5,280 \text{ Ft./Mile}) \times (14 \text{ Ft./Pass})^1$<br>$(4.0 \text{ Miles/Hour}) \times (5,280 \text{ Ft./Mile}) \times (14 \text{ Ft./Pass})^2$ | 147,840 Ft <sup>2</sup> /Hour | 295,680 Ft <sup>2</sup> /Hour             |                     |
| $(147,890 \text{ Ft}^2/\text{Hour}) / (43,560 \text{ Ft}^2/\text{Acre})^1$<br>$(295,680 \text{ Ft}^2/\text{Hour}) / (43,560 \text{ Ft}^2/\text{Acre})^2$                               | 3.39 Acres/Hour               | 6.79 Acres/Hour                           |                     |
| $(3.39 \text{ Acres/Hour}) \times (0.83 \text{ Efficiency Factor})^1$<br>$(6.79 \text{ Acres/Hour}) \times (0.83 \text{ Efficiency Factor})^2$                                         | 2.82 Acres/Hour               | 5.66 Acres/Hour                           |                     |
| OPERATING COSTS                                                                                                                                                                        |                               |                                           |                     |
| $(\$125.20/\text{Hour}) / (2.82 \text{ Acres/Hour})^1$<br>$(\$109.38/\text{Hour}) / (5.66 \text{ Acres/Hour})^2$                                                                       | \$44.40 Per Acre              | \$19.33 Per Acre                          |                     |

<sup>1</sup> Caterpillar D9R Dozer

<sup>2</sup> Caterpillar 834B Rubber Tired Dozer

### Appendix N

#### Cost Estimates for Demolition and Removal of One "Standard" Surface Water Monitoring Station

|                                                                                     | INPUT, UNIT AS INDICATED | COMMENT/SOURCE |
|-------------------------------------------------------------------------------------|--------------------------|----------------|
| Assumed Time to Remove One Station                                                  | 8 Hours                  |                |
| Labor                                                                               | \$18.75 Per Hour         | WYDOT-WDD      |
| Dump Truck (10-12 yd <sup>3</sup> )                                                 | \$26.52 Per Hour         | 90% of DQCRG   |
| Caterpillar 980F Front-End Loader                                                   | \$57.94 Per Hour         | 90% of DQCRG   |
| Cost to Remove One Surface Water Station =<br>(Labor Cost x Time to Remove Station) | \$150.00                 |                |
| + (Labor Cost + Truck Cost) x Time to Remove Station                                | \$362.16                 |                |
| + (Labor Cost + Loader Cost) x Time to Remove Station                               | \$613.52                 |                |
| Cost to Remove One Surface Water Station =                                          | \$1125.68                |                |

### Appendix O

#### Cost Estimates for Demolition and Removal of One "Standard" Meteorological or Air Quality Monitoring Site

|                                                                                                     | INPUT, UNIT AS INDICATED | COMMENT/SOURCE |
|-----------------------------------------------------------------------------------------------------|--------------------------|----------------|
| Assumed Time to Remove One Station                                                                  | 4 Hours                  |                |
| Labor                                                                                               | \$18.75 Per Hour         | WYDOT-WDD      |
| Dump Truck (10-12 yd <sup>3</sup> )                                                                 | \$26.52 Per Hour         | 90% of DQCRG   |
| Caterpillar 428B (2WD) Front-End Loader                                                             | \$15.07 Per Hour         | 90% of DQCRG   |
| Cost to Remove One Meteorological or Air Quality Station =<br>(Labor Cost x Time to Remove Station) | \$75.00                  |                |
| + (Labor Cost + Truck Cost) x Time to Remove Station                                                | \$181.08                 |                |
| + (Labor Cost + Loader Cost) x Time to Remove Station                                               | \$135.28                 |                |
| Cost to Remove One Meteorological or Air Quality Station =                                          | \$391.36                 |                |

Appendix P  
Cost Estimate for Scarification of Compacted Surfaces

| INPUT, UNIT AS INDICATED                                       |                               | COMMENT/<br>SOURCE  |
|----------------------------------------------------------------|-------------------------------|---------------------|
| <b>CATERPILLAR 16H MOTOR GRADER</b>                            |                               |                     |
| Speed in Miles Per Hour (First Gear)                           | 2.4 Miles/Hour                | CPH 25              |
| Width of Scarifying Pass                                       | 12 Feet                       | CPH 25              |
| Feet Per Mile                                                  | 5,280 Feet                    |                     |
| Square Feet Per Acre                                           | 43,560 Sq. Ft.                |                     |
| Operating Efficiency Factor 50 Min./Hr.                        | 0.83%                         | CPH 25              |
| Operating Costs                                                | \$65.51 Per Hour              | 90% of DQCRG        |
| Labor Costs                                                    | \$18.75 Per Hour              | WYDOT-WDD           |
| Supervision Labor Costs                                        | \$3.13 Per Hour               | 1/8 of 90% of DQCRG |
| Supervisor Transportation                                      | \$1.10 Per Hour               | 1/8 of 90% of DQCRG |
| Total Hourly Costs                                             | \$88.49                       |                     |
| <b>SCARIFICATION RATE</b>                                      |                               |                     |
| (2.4 Miles/Hour)x(5,280 Ft./Mile)x(12 Ft./Pass)                | 152,064 Ft <sup>2</sup> /Hour |                     |
| (152,064 Ft <sup>2</sup> /Hour)/(43,560 Ft <sup>2</sup> /Acre) | 3.49 Acres/Hour               |                     |
| (3.49 Acres/Hour)x(0.83 Efficiency Factor)                     | 2.90 Acres/Hour               |                     |
| <b>OPERATING COSTS</b>                                         |                               |                     |
| (\$88.49/Hour)/(2.90 Acres/Hour)                               | \$30.51 Per Acre              |                     |

# APPENDIX 1 GENERAL REVEGETATION COSTS

| General Revegetation Activity                                                                                                                                                                                                                                                                                                     | Calculate According To Specific Permit Commitments |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| 1) Seedbed Preparation                                                                                                                                                                                                                                                                                                            |                                                    |
| Ripping                                                                                                                                                                                                                                                                                                                           | \$                                                 |
| Chisel Plowing                                                                                                                                                                                                                                                                                                                    | \$                                                 |
| Disking                                                                                                                                                                                                                                                                                                                           | \$                                                 |
| Harrowing or Cultipacking                                                                                                                                                                                                                                                                                                         | \$                                                 |
| 2) Drill Seed Stubble Mulch Mix                                                                                                                                                                                                                                                                                                   |                                                    |
| Seed Costs                                                                                                                                                                                                                                                                                                                        | \$                                                 |
| Drill Seeding                                                                                                                                                                                                                                                                                                                     | \$                                                 |
| Mowing Prior to Planting Permanent Seed Mix                                                                                                                                                                                                                                                                                       | \$                                                 |
| 3) Seeding Permanent Mixes: Detail for each seed mix, if different seed mixes will be applied. The costs/acre for each individual mix should then be proportioned on the basis of acreage per parcels to derive a single weighted average cost/acre.                                                                              |                                                    |
| Drill Seeding                                                                                                                                                                                                                                                                                                                     | \$                                                 |
| Broadcast Seeding                                                                                                                                                                                                                                                                                                                 | \$                                                 |
| Seed Costs                                                                                                                                                                                                                                                                                                                        | \$                                                 |
| 4) Mulching                                                                                                                                                                                                                                                                                                                       |                                                    |
| Mulch Purchase                                                                                                                                                                                                                                                                                                                    | \$                                                 |
| Hydromulch Application                                                                                                                                                                                                                                                                                                            | \$                                                 |
| Straw Mulch Placement and Crimping                                                                                                                                                                                                                                                                                                | \$                                                 |
| 5) Fertilizer                                                                                                                                                                                                                                                                                                                     |                                                    |
| Fertilizer Purchase by Defined Composition                                                                                                                                                                                                                                                                                        | \$                                                 |
| Application                                                                                                                                                                                                                                                                                                                       | \$                                                 |
| 6) Fencing                                                                                                                                                                                                                                                                                                                        |                                                    |
| Construction                                                                                                                                                                                                                                                                                                                      | \$                                                 |
| Removal                                                                                                                                                                                                                                                                                                                           | \$                                                 |
| Subtotal                                                                                                                                                                                                                                                                                                                          | \$                                                 |
| 7) Maintenance Operations at 10% of Total Revegetation Costs: This cost addresses standard husbandry practices applied over the minimum 10-year bonding period, such as remedial seeding, mowing, selective weed treatment, etc. The 10 percent figure is derived from historical operator experience for the Powder River Basin. |                                                    |
| Subtotal                                                                                                                                                                                                                                                                                                                          | \$                                                 |
| Total Revegetation Cost Per Acre                                                                                                                                                                                                                                                                                                  | \$                                                 |



November 19, 2001

**ATTACHMENT E-6-3**  
**QUOTES AND PRICES**  
---  
**EQUIPMENT RATES**

## Crownpoint Office

P. O. Box 777

Physical Address: 1/2 mile W of Crownpoint

Crownpoint, New Mexico 87313

Voice: 505-786-5845 Fax: 505-786-5555

MARK:

|                        |                        |                          |                           |                                           |
|------------------------|------------------------|--------------------------|---------------------------|-------------------------------------------|
| BACKHOE                | 140 <sup>00</sup> /day | 550 <sup>00</sup> /week  | 1650 <sup>00</sup> /MONTH | (RUST TRACKER<br>PENZANCE<br>ALBUQ/FARM.) |
|                        | 200 <sup>00</sup> /day | 600 <sup>00</sup> /week  | 1800 <sup>00</sup> /MONTH | ROAD MACHINERY<br>ALBUQ/FARM.             |
| ESCAVATORS (TRACK HOE) |                        |                          |                           |                                           |
| 54HP                   | 400 <sup>00</sup> /day | 1200 <sup>00</sup> /week | 3600 <sup>00</sup> /MONTH | ROAD MACHINERY                            |
|                        | 330 <sup>00</sup> /day | 1330 <sup>00</sup> /week | 3990 <sup>00</sup> /MONTH | RUST RENTAL<br>ALBUQ/FARM.                |

+ 35% FOR FUEL / OPERATOR / DELIVERY

I HAVE CALL IN TO AMERICAN CEMENT CORP ALBUQ  
FOR QUOTE ON BLUE CEMENT DEL TO CATHOLIC  
505-753-6269 (PETER CANTOR)

3300 cu yards X 21 SACKS per yard = 69,300 SACKS.  
Sack / cu yd.  $\frac{1}{21}$  S.N. 0.

## **7. Building Decommissioning**

### **7.1. Introduction and Description**

All radiologically contaminated buildings, and other structures will be decontaminated prior to final reclamation to unrestricted release standards in accordance with NRC requirements, or removed to the appropriate disposal facilities. Decontamination will include acid, and water washdown of structures, and concrete. The resulting waste water will be disposed by brine concentration, and evaporation. Equipment which is not decontaminated will be dismantled, and disposed in an U.S. NRC licensed waste disposal facility, or utilized at another NRC licensed uranium facility. All uncontaminated foundations will be removed, or broken, and buried in place.

### **7.2 Budget Assumptions**

The Building Decommissioning Budget is formatted with the underlying assumptions integrated into the tabulation. The budget figures distinguish individually costs associated with decontamination, demolition, transportation and disposal costs.

Buildings sizes were estimated using the schematic diagram COP Figure 2.1-2. At the Crownpoint location wall heights were estimated. HRI used Wyoming Department of Environmental Quality guideline costs to estimate demolition costs for non-contaminated structures. Concrete demolition cost was estimated by local contractor (See Attachment E-7-3).

HRI assumed that 100 % of the buildings would be released for unrestricted disposal after decommissioning. For concrete floors it was assumed that 100% of the CR Satellite would meet release standards. These assumptions were used to determine disposal costs.

Management will be provided from the site staff who will be available six months after restoration. No credit is given for salvage value of any buildings.

All restricted and unrestricted disposal was priced at the bulk rate as shown in Attachment E-5-2.

A contingency was included for health and safety supplies such as disposable uniforms and respirators.

As shown in Attachment E-7-1, the total cost for building demolition and removal is projected to be \$98,775.

**November 19, 2001**

**ATTACHMENT E-7-1  
BUILDING DECOMMISSIONING BUDGET**

## Building and Demolition and Disposal

### Assumptions:

Crownpoint offices will be left intact after the project ends

|                                                     | <u>Description</u>                                                                                      | <u>Satellite</u> | <u>Cost</u>     |
|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------|------------------|-----------------|
| <b>I.</b>                                           | <b>Decontamination Costs</b>                                                                            |                  |                 |
| A.                                                  | Wall decontamination                                                                                    |                  |                 |
|                                                     | Area to be decontaminated (ft <sup>2</sup> )                                                            | 12167            |                 |
|                                                     | Application rate (gallons/ft)                                                                           | 1                |                 |
|                                                     | HCl acid wash, including labor (\$/gallon)                                                              | \$0.50           |                 |
|                                                     | Subtotal wall decontamination costs                                                                     | \$6,083          | \$6,083         |
| B.                                                  | Concrete floor decontamination                                                                          |                  |                 |
|                                                     | Area to be decontaminated (ft <sup>2</sup> )                                                            | 10491            |                 |
|                                                     | Application rate (gallons/ft)                                                                           | 4                |                 |
|                                                     | HCl acid wash, including labor (\$/gallon)                                                              | \$0.50           |                 |
|                                                     | Subtotal concrete floor decontamination costs                                                           | \$20,982         | \$20,982        |
| <b>II.</b>                                          | <b>Demolition Costs</b>                                                                                 |                  |                 |
| A.                                                  | Building                                                                                                |                  |                 |
|                                                     | Dryer bldg. demolition unit cost of \$0.75/ft <sup>3</sup> for additional radiation safety precautions. |                  |                 |
|                                                     | Volume of building (ft <sup>3</sup> )                                                                   | 209820           |                 |
|                                                     | Demolition unit cost per WDEQ Guideline No. 12 (\$/ft <sup>3</sup> )                                    | \$0.15           |                 |
|                                                     | Dryer building demolition unit cost (\$/ft <sup>3</sup> )                                               |                  |                 |
|                                                     | Subtotal building demolition costs                                                                      | \$31,893         | \$31,893        |
| B.                                                  | Concrete floor                                                                                          |                  |                 |
|                                                     | Area of concrete floor (ft <sup>2</sup> )                                                               | 10491            |                 |
|                                                     | Demolition unit cost (ft <sup>3</sup> ) per local estimate                                              | \$1.20           |                 |
|                                                     | Subtotal concrete floor demolition costs                                                                | \$12,589         | \$12,589        |
| <b>III.</b>                                         | <b>Disposal Costs</b>                                                                                   |                  |                 |
| A.                                                  | Building                                                                                                |                  |                 |
|                                                     | Volume of building (cy)                                                                                 | 7771             |                 |
| 1                                                   | Unrestricted                                                                                            |                  |                 |
|                                                     | Unrestricted disposal cost of 26.7 \$/yd <sup>3</sup>                                                   | \$27.00          |                 |
|                                                     | Building will collapse to 10% of standing volume                                                        | 777              |                 |
|                                                     | Percentage (%) on site                                                                                  | 100              |                 |
|                                                     | Subtotal unrestricted disposal costs                                                                    | \$20,982         | \$20,982        |
| B.                                                  | Concrete floor                                                                                          |                  |                 |
|                                                     | Area of concrete floor (ft <sup>2</sup> )                                                               | 10491            |                 |
|                                                     | Average Thickness of concrete floor (ft)                                                                | 0.5              |                 |
|                                                     | Volume of concrete floor (ft <sup>3</sup> )                                                             | 5246             |                 |
|                                                     | Volume of concrete floor (cy)                                                                           | 194              |                 |
| 1                                                   | Unrestricted                                                                                            |                  |                 |
|                                                     | Percentage (%)                                                                                          | 100              |                 |
|                                                     | Volume for disposal (ft <sup>3</sup> )                                                                  | 194              |                 |
|                                                     | Disposal unit cost \$/cy                                                                                | \$27.00          |                 |
|                                                     | Subtotal on-site disposal costs                                                                         | \$5,246          | \$5,246         |
| <b>III.</b>                                         | <b>Health and Safety Costs</b>                                                                          |                  |                 |
|                                                     | Total health and safety costs                                                                           |                  | \$1,000         |
| <b>TOTAL BUILDING DEMOLITION AND DISPOSAL COSTS</b> |                                                                                                         |                  | <b>\$98,775</b> |

November 19, 2001

**ATTACHMENT E-7-2**  
**BUDGET BACKUP**  
---  
**RELEASE STANDARDS**

## Limits for Release to Uncontrolled Areas

| <u>Nuclide</u> | <u>Average</u> <sup>a</sup>   | <u>Maximum</u> <sup>b</sup>    | <u>Removable</u> <sup>c</sup> |
|----------------|-------------------------------|--------------------------------|-------------------------------|
| U-nat          | 5,000 dpm/100 cm <sup>2</sup> | 15,000 dpm/100 cm <sup>2</sup> | 1,000 dpm/100 cm <sup>2</sup> |
| 226-Ra         | 100 dpm/100 cm <sup>2</sup>   | 300 dpm/100 cm <sup>2</sup>    | 20 dpm/100 cm <sup>2</sup>    |

- a. Averaged over no more than 1 m<sup>2</sup>.
- b. Applies to an area of not more than 100 cm<sup>2</sup>.
- c. Determined by smearing with dry filter, or soft absorbent paper, applying moderate pressure and assessing the amount of radioactive material on the smear.

Source: Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors," and "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use, or Termination of License for Byproduct, Source, or Special Nuclear Material."

November 19, 2001

**ATTACHMENT E-7-3**  
**QUOTES AND PRICES**  
---  
**CONCRETE DEMOLITION**



# HRI, INC.

## Crownpoint Office

P. O. Box 777

Physical Address: ½ mile W of Crownpoint  
Crownpoint, New Mexico 87313

Voice: 505-786-5845 Fax: 505-786-5555

MARK:

PRICES FROM DENNIS Fuh's construction  
505-722-6909  
Gallup

BREAK & Haul Concrete (\$Dispose)

CHUCKROCK (2500 sq FT) 6" thick CROWNPOINT (3000 sq FT)

120 BREAK

110 Haul off

230 sq. FT

120 C BREAK

180 Haul off

300 sq FT

NOT CONTAMINATED Hauled to crusher &  
@ Gallup or Thoreau & REprocessed.

Schedule 9-14-00

## **8. Surface Reclamation**

### **8.1. Introduction and Description**

The purpose of the surface reclamation program will be to reestablish the sites to their premining topographic conditions, stabilize the site with self-sustaining vegetative cover, and to restore all land disturbed by mining, and related activities to a productive condition for livestock grazing, wildlife habitat consistent with the present, and/or historical use of the area. It is anticipated that future land use will be similar to current uses.

### **8.2. Budget Assumptions**

The Surface Reclamation Budget is formatted with the underlying assumptions integrated into the tabulation. The budget figures distinguish individually costs associated with wellfield area reclamation, wellfield road.

Wellfield sizes and road lengths were estimated using the schematic diagram COP Figure 1.4-3. Unit costs for road, wellfield, pond were calculated by HRI (See Attachment E-8-2).

After all of the equipment is removed the entire wellfield area will be scanned to assure that no residual contamination remains on the soil. Scans will be conducted according to the according to Procedure shown in Attachment E-6-2, and the hot spots characterized, picked up and disposed of at a NRC licensed facility. The on site management would conduct these surveys.

All disposal was priced at the bulk rate as shown in Attachment E-6-4.

As shown in Attachment E-8-1, the total cost for final surface reclamation is \$271,549.

**November 19, 2001**

**ATTACHMENT E-8-1  
SURFACE RECLAMATION BUDGET**

## Wellfield and Satellite Surface Reclamation

|      | <u>Description</u>                                             | <u>Unit</u> | <u>Total</u>     |
|------|----------------------------------------------------------------|-------------|------------------|
| I.   | <b>Wellfield Area Reclamation</b>                              |             |                  |
|      | Wellfields rea (acres)                                         | 181         |                  |
|      | Disking/seeding unit cost (\$/acre)                            | \$200       |                  |
|      | Subtotal reclamation costs for wellfield                       |             | \$36,200         |
| II.  | <b>Wellfield Road Reclamation</b>                              |             |                  |
|      | Length of wellfield roads (1000 ft)                            | 5           |                  |
|      | Wellfield road reclamation unit cost (\$/1000 ft)              | \$690       |                  |
|      | Subtotal wellfield road reclamation costs                      |             | \$3,450          |
| III. | <b>Pond Decommissioning (2 X 350')</b>                         |             |                  |
|      | Assumptions:                                                   |             |                  |
|      | Sediment disposal of 6 inches (ft <sup>3</sup> )               | 26797       |                  |
|      | Pond dimension are 350 ft x 350 ft. x 20 ft. or 3 acres        | 3           |                  |
|      | Disposal of inner and outer liners                             |             |                  |
|      | Soil below the liners is not contaminated                      |             |                  |
|      | Folded liner volume each (ft <sup>3</sup> ).                   | 2700        |                  |
|      | Backhoe hourly rate (w/operator)                               | \$37.75     |                  |
|      | Bulldozer hourly rate (w/operator)                             | \$37.75     |                  |
| A.   | Removal and loading                                            |             |                  |
| 1    | Equipment                                                      |             |                  |
|      | Number of backhoes                                             | 1           |                  |
|      | Number of hours                                                | 40          |                  |
|      | Number of bulldozers                                           | 1           |                  |
|      | Number of hours                                                | 40          |                  |
| 2    | Labor                                                          |             |                  |
|      | Number of persons                                              | 3           |                  |
|      | Number of hours                                                | 40          |                  |
|      | \$/hr/person                                                   | \$15.00     |                  |
|      | Total removal and loading costs                                | \$4,820.00  |                  |
| B.   | Transportation and disposal                                    |             |                  |
|      | Transportation and disposal unit costs (\$/ft <sup>3</sup> )   | \$3.52      |                  |
|      | Total transportation and disposal costs (sediment and 1 liner) | \$103,829   |                  |
|      | Subtotal pond reclamation costs (1 ponds)                      | \$108,649   |                  |
|      | Subtotal pond reclamation costs (1 ponds)                      |             | \$217,299        |
| IV.  | <b>Soil</b>                                                    |             |                  |
|      | Assumptions:                                                   |             |                  |
|      | Acres of plant area                                            | 6           |                  |
|      | Surveys by staff                                               |             |                  |
|      | Depth of contaminated soil (in)                                | 2           |                  |
|      | Percent of wellfield contaminated                              | 1           |                  |
|      | Soil analysis each                                             | \$100       |                  |
| A.   | Survey costs                                                   |             |                  |
|      | 50 soil sample analysis                                        | \$5,000     |                  |
|      | Flags, and supplies                                            | \$250       |                  |
|      | Subtotal survey costs                                          | \$5,250     |                  |
| B.   | Disposal costs                                                 |             |                  |
|      | Backhoe one week                                               | \$1,510     |                  |
|      | Volume to disposal                                             | 436         |                  |
|      | NRC disposal unit cost (ft <sup>3</sup> )                      | \$3.52      |                  |
|      | Subtotal NRC-licensed facility disposal costs                  | \$1,533     |                  |
|      | Plant area soil D & D costs                                    |             | \$6,783          |
| V    | <b>Final Satellite Area Reclamation</b>                        |             |                  |
|      | Assumptions:                                                   |             |                  |
|      | Area of disturbance (acres)                                    | 10          |                  |
| A.   | Ripping overburden with dozer                                  |             |                  |
|      | Ripping unit cost per WDEQ Guideline No. 12, App.11 (\$/acre)  | \$581.67    |                  |
|      | Subtotal ripping costs                                         | \$5,817     |                  |
| B.   | Disking and seeding                                            |             |                  |
|      | Disking/seeding unit cost (\$/acre)                            | \$200.00    |                  |
|      | Subtotal disking/seeding costs                                 | \$2,000     |                  |
|      | Subtotal surface reclamation costs                             |             | \$7,817          |
|      | <b>TOTAL WELLFIELD AND SATELLITE SURFACE RECLAMATION COSTS</b> |             | <b>\$271,549</b> |

**November 19, 2001**

**ATTACHMENT E-8-2  
BUDGET CALCULATIONS**

**---**

**POND VOLUMES  
ROAD REMOVAL**

November 19, 2001

**PROGRAM TO CALCULATE THE VOLUME CONTAINED WITHIN  
A RECTANGULAR POND WITH KNOWN SLOPE AND DEPTH**

ALL DIMENSIONS ARE IN FEET

THE TOP OF THE POND MEASUREMENTS ARE:

|        |     |
|--------|-----|
| LENGTH | 350 |
| WIDTH  | 350 |
| DEPTH  | 20  |
| SLOPE  | 3   |

|                  |     |
|------------------|-----|
| W= BOTTOM WIDTH  | 230 |
| L= BOTTOM LENGTH | 230 |

| DEPTH | GALLONS   | CUBIC FEET | CUBIC YARDS |
|-------|-----------|------------|-------------|
| 0.50  | 200,438   | 26,797     | 992         |
| 1.00  | 406,104   | 54,292     | 2,011       |
| 1.50  | 617,066   | 82,496     | 3,055       |
| 2.00  | 833,392   | 111,416    | 4,127       |
| 2.50  | 1,055,148 | 141,063    | 5,225       |
| 3.00  | 1,282,401 | 171,444    | 6,350       |
| 3.50  | 1,515,220 | 202,570    | 7,503       |
| 4.00  | 1,753,671 | 234,448    | 8,683       |
| 4.50  | 1,997,822 | 267,089    | 9,892       |
| 5.00  | 2,247,740 | 300,500    | 11,130      |
| 5.50  | 2,503,492 | 334,692    | 12,396      |
| 6.00  | 2,765,147 | 369,672    | 13,692      |
| 6.50  | 3,032,770 | 405,451    | 15,017      |
| 7.00  | 3,306,429 | 442,036    | 16,372      |
| 7.50  | 3,586,193 | 479,438    | 17,757      |
| 8.00  | 3,872,127 | 517,664    | 19,173      |
| 8.50  | 4,164,299 | 556,725    | 20,619      |
| 9.00  | 4,462,777 | 596,628    | 22,097      |
| 9.50  | 4,767,629 | 637,384    | 23,607      |
| 10.00 | 5,078,920 | 679,000    | 25,148      |

Liner Size            375X375

**WELLFIELD ROAD RECLAMATION****Assumptions:**

1. Gravel road base removed at cost of \$0.60/cy/1000 ft (WDEQ Guideline No. 12, Appendix C)
2. Gravel road base: average depth = 0.5 ft, average width = 15 ft
3. Roads scarified prior to topsoil application at cost of \$30.51/acre (WDEQ Guideline No. 12, Appendix P)
4. Grading of scarified roads prior to topsoil application at cost of \$33.27/acre (WDEQ Guideline No. 12, Appendix G)
5. Topsoil applied at cost of \$0.60/cy/1000 ft (WDEQ Guideline No. 12, Appendix C, surface grade: level ground)
6. Stripped topsoil: average depth = 0.67 ft, average width = 25 ft
7. Discing/seeding cost of \$200/acre

**Costs per 1000 ft of road**

|                     | <u>Width (ft)</u> | <u>Thick (ft.)</u> | <u>Yd3</u> | <u>\$/Yd3</u> | <u>Total</u> |
|---------------------|-------------------|--------------------|------------|---------------|--------------|
| Road base removal   | 15                | 0.5                | 278        | \$0.60        | \$166.67     |
| Topsoil application | 25                | 0.67               | 620        | \$0.60        | \$372.22     |

|                 | <u>Width (ft)</u> | <u>Acres</u> | <u>\$/Acres</u> | <u>Total</u> |
|-----------------|-------------------|--------------|-----------------|--------------|
| Scarification   | 25                | 0.6          | \$30.51         | \$17.51      |
| Grading         | 25                | 0.6          | \$33.27         | \$19.09      |
| Disking/seeding | 25                | 0.6          | \$200.00        | \$114.78     |

|                                         |                        |
|-----------------------------------------|------------------------|
| <b>TOTAL WELLFIELD ROAD RECLAMATION</b> | <u><b>\$690.28</b></u> |
|-----------------------------------------|------------------------|

November 19, 2001

**ATTACHMENT E-8-3  
QUOTES AND PRICES**



November 19, 2001

## **DISKING/SEEDING**

Assumption:

1. Based on actual contractor costs

**TOTAL DISKING/SEEDING COSTS PER ACRE = \$200.00**

November 19, 2001

**9. Contingency/Profit**

Contractor profit has been included at 15% of the total cost for groundwater restoration, groundwater stability analysis, well plugging and equipment removal and 25% of the total cost for wellfield D & D, building D & D, and surface reclamation.

Shown in Section 10 Contingency/Profit is \$2,205,568.

November 19, 2001

**HRI CROWNPOINT URANIUM PROJECT**  
**Financial Assurance Plan for the Crownpoint Site**  
**Summary**

| <b>Category</b>                | <b>Project Total</b> | <b>Contingency/<br/>Profit 15%</b> | <b>Contingency/<br/>Profit 25%</b> |
|--------------------------------|----------------------|------------------------------------|------------------------------------|
| Groundwater Restoration        | \$10,890,592         | \$1,633,589                        |                                    |
| Groundwater Stability Analysis | \$427,160            | \$64,074                           |                                    |
| Well Plugging                  | \$2,037,902          | \$305,685                          |                                    |
| Equipment Removal              | \$59,600             | \$8,940                            |                                    |
| Wellfield D & D                | \$402,795            |                                    | \$100,699                          |
| Building D & D                 | \$98,775             |                                    | \$24,694                           |
| Surface Reclamation            | \$271,549            |                                    | \$67,887                           |
| <b>Totals</b>                  | <b>\$14,188,373</b>  | <b>\$2,012,288</b>                 | <b>\$193,280</b>                   |
| <b>Contingency/Profit</b>      |                      |                                    | <b>\$2,205,568</b>                 |
| <b>Total Surety</b>            |                      |                                    | <b>\$16,393,941</b>                |

November 19, 2001

**HRI CROWNPOINT URANIUM PROJECT**  
**Financial Assurance Plan**  
**Project Summary**

| Category              | Project Total | Contingency/<br>Profit | Totals       |
|-----------------------|---------------|------------------------|--------------|
| Churchrock Section 8  | \$8,180,872   | \$1,277,021            | \$9,457,893  |
| Churchrock Section 17 | \$4,456,265   | \$674,381              | \$5,130,646  |
| Unit 1                | \$10,482,586  | \$1,619,633            | \$12,102,219 |
| Crownpoint            | \$14,188,373  | \$2,205,568            | \$16,393,941 |
| Totals                | \$37,308,096  | \$5,720,472            | \$43,084,699 |

## ABBREVIATIONS/ACRONYMS

|                                |                                             |
|--------------------------------|---------------------------------------------|
| \$                             | Dollars                                     |
| \$/Kgal                        | Dollars per 1000 gallons                    |
| avg                            | average                                     |
| ft                             | feet                                        |
| ft <sup>2</sup>                | square feet                                 |
| ft <sup>3</sup>                | cubic feet                                  |
| gal                            | gallons                                     |
| gpm                            | gallons per minute                          |
| H&S                            | Health and Safety                           |
| H <sub>2</sub> S               | Hydrogen Sulfide                            |
| H <sub>2</sub> SO <sub>4</sub> | Sulfuric Acid                               |
| HCl                            | Hydrochloric Acid                           |
| Hp                             | Horsepower                                  |
| Kgal                           | 1000 gallons                                |
| Kwh                            | Kilowatt-hours                              |
| HaOH                           | Caustic Soda                                |
| OD                             | Outside Diameter                            |
| PPE                            | personal protective equipment               |
| PV                             | Pore Volume                                 |
| reqm't                         | requirement                                 |
| RO                             | Reverse Osmosis                             |
| WDEQ                           | Wyoming Department of Environmental Quality |
| WDW                            | Waste Disposal Well                         |
| yd <sup>3</sup>                | cubic yards                                 |
| yr                             | year                                        |