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March 16, 2001

Mr. Philip Ting, Chief
Fuel Cycle Licensing Branch
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Materials Safety and Safeguards
United States Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Subject: Request for Additional Information Concerning Restoration Costs for Hydro Resources In-Situ Uranium Mining Project

Dear Mr. Ting:

The following response will address the request for additional information ("RAI") concerning restoration costs for Hydro Resources, Inc.'s ("HRI") Crownpoint Project. I have formatted this response by first restating the individual RAI and then responding in italic font. The attached updated pages to the Churchrock Section 8/Crownpoint Plant Restoration Action Plan ("RAP") November 17, 2000 are an integral part to this response that should be inserted into the RAP binder as indicated in the instructions. One original and seventeen copies of this response and attachments are enclosed for distribution to the Presiding Officer and parties to the hearing.

1. **Groundwater Sweep** - Groundwater sweep is not included in the Restoration Action Plan (RAP). It is the staff's experience that groundwater sweep is included in surety estimates of all other in situ leach operations licensed by the NRC. Groundwater sweep was also part of the Mobil Section 9 pilot test. The staff considers that groundwater sweep aids groundwater quality restoration by removing lixiviant that may have moved between the well field and the horizontal monitor wells.

Explain how HRI's RAP will adequately remove lixiviant between the well field and the horizontal wells or propose an acceptable alternative that will also restore this area and include cost estimates.

Response:

HRI has always considered groundwater sweep ("GWS") one of the groundwater restoration options[1] and continues to do so. For the limited purpose of estimating costs in the RAP, we believe that the assumption of reverse osmosis ("RO") treatment and brine concentration ("BC") operations are most financially conservative. RO and BC also will allow the use of the optimally designed production

[1] § 10.4, Consolidated Operations Plan, Revision 2.0, August 15, 1997.

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wellfield pattern and flow regime during restoration, and because of the basic recycle nature of the process be much more conservative of groundwater than GWS where with the entire volume that is evacuated must be disposed of.

The proposed option of RO treatment and BC is the most fiscally conservative for the RAP cost estimate. GWS has always been an attractive restoration operation option for the ISL industry because it is the less expensive than methods that require purification treatment and recirculation (reinjection). The costs associated with GWS are limited to pumping the water to the surface, radionuclide treatment and surface application. RO treatment and BC operational costs not only include the cost of pumping the water to the surface, but also the cost of operating the RO and BC equipment, the cost of disposal of residue, and the cost of operating the injection filtration equipment and injection pumps to return the water to the wellfield.[2] Therefore, if HRI was to limit itself to groundwater sweep for the first pore volume, projected groundwater restoration costs would go down. HRI operational assumptions of 9 PV of RO treatment and BC actually bolster the cost estimate.

At this stage of project development HRI cannot provide any information on wellfield flow because no wellfield has been installed. Wellfield patterns will be designed for optimal efficiency for uranium recovery, and after the Churchrock production patterns are designed, HRI would demonstrate that balanced injection/extraction flow patterns, when used with RO/BC restoration techniques, would adequately remove lixiviant between the well field and the horizontal wells. The restoration flow regime is no different than the design flow for removing uranium mineral efficiently from the ore sands.

HRI will conduct tests at the Churchrock mine site to document the effectiveness of various restoration operation options[3]. It is anticipated that HRI will utilize GWS, RO and BC in these tests and will incorporate the results of these tests into future surety updates as specified by LC 9.5.

2. **Building and Surface Cleanup** - The cost itemization for buildings in RAP Appendix 7 does not include any costs for radiation surveys or monitoring during decommissioning. For surface reclamation in RAP Appendix 8, radiation survey costs are for 6 acres of soil around the plant. The estimate does not include surveys of the pond areas, the required QA/QC, and preparation of the final survey plan or report. Areas of pipe leaks, spills, well field pipelines, etc. might need to be surveyed, and costs estimated.

The reference to the Texas Regulatory Guide for survey procedures is not appropriate for an NRC licensee. HRI should base its estimate for survey procedures on Section 5 of the draft Standard Review Plan NUREG-1620, January 1999.

Response:

Radiation surveys and monitoring during building decommissioning and surveys of land within the license area would be conducted by on site staff. Please note that the budgeted numbers within Attachment E-2-1 provide for a full time Environmental Manager, Radiation Officer, and Chemist for eight months after groundwater restoration is complete. HRI's assumption was that these trained personnel would continue applicable operational surveys, and monitoring as described in the COP[4]

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[2] In the RAP cost estimate, Attachment E-2-1 line items 70 – Mic. Chemicals, 72 – Electric, Brine Concentrator, 72 - Electric, Plant and RO, 81 – Plant Brine Conc. Inst., 84 – Filters, 88 – Disposal – BC Solids, 88 – RO Unit, 91 –1 RO Membrane would be greatly reduced or eliminated if ground water sweep was used instead of RO & BC. This would result in a lower cost per pore volume.

[3] § 10.4.4, Consolidated Operations Plan, Revision 2.0, August 15, 1997.

[4] § 9, Consolidated Operations Plan, Revision 2.0, August 15, 1997.

during closure. If HRI were absent and a contractor was employed, we believe the contractor would provide staffing for surveys and monitoring similarly. The contractor would receive a profit.[5]

The Churchrock Section 8 wellfield, evaporation pond and satellite would impact approximately 40 acres. The Crownpoint process site would cover approximately 6 acres resulting in approximately 46 acres that would require site characterization and possible decontamination at the end of operations. For the purpose of budget estimates, HRI will assume that Q & A soil samples will be taken for radium and uranium analysis during site characterization to confirm the survey results. This is consistent with the provisions of § 5.2.2(6) NUREG-1620, January 1999. The cost estimate in Attachment E-6-1 provided for 100-soil sample analysis in the Churchrock area. The revised RAP E-8-1 cost estimate provides for 50 additional Q & A soil samples in the plant area.

In addition to the revised budget insert, HRI has also attached the company's procedure that we plan to use for final decommissioning surveys. This HRI procedure replaces the Texas Regulatory Guide.

Finally, HRI agrees that the cost estimate should include money for preparation of the final survey plan and report. HRI has included $4000 under cost code #60 Maps and $10,000 under cost code #61-Drafting and Printing in the revisions to Attachment E-2-1.

3. **Well Plugging** - The RAP assumed State of Texas well plugging requirements.

Confirm that HRI's proposed well plugging methodology is acceptable to the New Mexico State Engineer. If the methodology is not acceptable, provide a description of a methodology acceptable to the New Mexico State Engineer and a revised cost estimate.

Response:

The plugging methodology specified by the New Mexico State Engineer does not specify how the cement will be placed in the well during plugging. The New Mexico State Engineer Rules and Regulations Governing Drilling of Wells and Appropriation and Use of Groundwater in New Mexico are attached for insertion into the RAP. Plugging is addressed in Articles 4-19.1 & 4-20.2. According to Article 4-20.2 the State Engineer's general criteria is that "the fluids will be permanently confined to the specific strata in which they were originally encountered". HRI proposed well plugging methodology is designed to achieve the general Article 4-20.2 criteria.

The New Mexico State Engineer will supervise all well construction and plugging activity associated with HRI's ISL development. In the future, if the New Mexico State Engineer imposes more specific plugging requirement on HRI than is currently described in the rules, that will cost more than is currently estimated in the RAP, HRI will include these changes in the annual cost estimate review that is as specified by LC 9.5.

4. **Back-up Equipment** - Paragraph D.26 of Mr. Pelizza's affidavit dated January 18, 2001 (Reply of Hydro Resources) states that "back up equipment is not proposed or required. In the event of routine or non-routine maintenance or repairs HRI would plan to shut operations down, perform the needed maintenance or repair, and resume operations." However, surety estimates should be based on the assumption that all restoration work will be done by another party and not by HRI personnel.

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[5] RAP § E.9.

Explain how maintenance and repair costs included in the RAP, assume the work will be done by another party, or provide a revised cost estimate based on work performed by another party.

Response:

The is no relationship between "back up equipment" and "maintenance and repair cost" whether performed by HRI or another party. In my Affidavit, it was stated that back up equipment is not proposed or required because there is no health, or safety reason to warrant it. Maintenance is anticipated as a normal part of operations and is budgeted in the O & M Budget in Attachment E-2-1.

Specifically referring to the budget in Attachment E-2-1, many of the listed employees are planned for maintenance assignments. The categories of Electrician, Plant Operator, Foreman, Wellfield Operator, Pump Hoist Operator are all operations and maintenance functions. This would be true whether HRI is operator or a contractor was to operate. The RAP includes a profit factor for contractor.

In the case of non-salary budget line items; 69-86, 89, 91-93 all contemplate estimated maintenance expenditures. These costs would be incurred regardless who operates during restoration.

5. **Mechanical Integrity Testing** - Paragraph D.29 of Mr. Pelizza's January 18, 2001, affidavit states the "Mechanical Integrity Testing will be conducted as part of routine operations during restoration by the site staff. No additional cost is expected or budgeted."

Explain how no additional cost for equipment or contractor staff are expected or provide these costs.

Response:

MIT testing will be a minor effort during the restoration mode. MIT testing will occur once every five years[6]*. The duration of restoration is slated to be approximately 4.5 years. Therefore, MIT tests will need to be conducted one time during the restoration program, and for many wells, where restoration has been completed in the five-year window, not at all.*

MIT testing requires a pump hoist truck and operator, a wellhead assembly, an inflatable packer, water and compressed air that will either available at the site as part of the equipment inventory or are budgeted for within Attachment E-2-1. This would be true whether HRI is operator or a contractor was to take over and operate. The RAP includes a profit factor for contractor.

6. **Brine Reject** - In Paragraph D.9 of Mr. Pelizza's January 18, 2001, affidavit, he stated that the quantity of brine reject from the brine concentrator in the RAP operating tabulation should be raised to 2.5 gpm.

The increase in brine reject should be included in the revised RAP.

Response:

Revised text for RAP Groundwater Restoration § 2 and Attachment E-2-1 are within the attached updated materials.

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[6] § 6.4.1.4, Consolidated Operations Plan, Revision 2.0, August 15, 1997.

7. **Cost Spreadsheet** - In Paragraph E.9 of Mr. Pelizza's January 18, 2001, affidavit, he agrees that HRI will change to a 30-day month in its spreadsheet.

This change should be included in the revised RAP.

Response:

The revised RAP Budget Attachment E-2-1 includes actual days for each month.

8. **Void Factor** - For building and equipment removal, a 30% "void factor" was used in the calculations. The void factor is apparently intended to account for air voids with aggregations of debris. There is no basis reported for the void factor. If voids greater than 30% are generated, surety costs would need to be increased.

Either increase the void factor and provide a basis and cost estimate or provide a rational basis for using the 30% value.

Response:

The void factor is intended to account for spaces between aggregations of debris and is necessarily subjective. To add a greater degree of conservatism to the RAP cost estimate HRI will utilize a void factor of 50% as a reasonable upper limit. The revised text and estimated costs for RAP §§ E.5 & E.6 within the attached updates utilize a void factor of 50%.

9. **Contingency** - The general 15% contingency will be insufficient for certain phases of demolition and earthwork. Since weather, equipment breakdowns, personnel, and other factors enter into the demolition and earthwork operations, a higher contingency is advised for these line items.

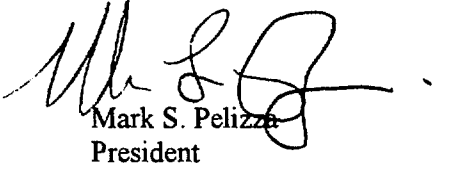
Provide contingency estimates for demolition and earthwork separate from the overall 15%, or justify the use of 15% for these activities.

Response:

Because dirtwork and demolition is subject to certain uncontrollable factors such as weather, HRI has increased the contingency estimates for RAP § E.6 (Wellfield Decommissioning), E.7 (Building Decommissioning), and E.8 (Surface Reclamation) from 15% to a reasonable upper boundary of 25%. Revised text and estimated costs for RAP Attachment A-1 and §§ E.6, E.7, E.8, & E.9 are within the attached updates.

Please contact me with questions pertaining to this response.

Sincerely,



Mark S. Pelizza
President

Churchrock Section 8/Crownpoint Plant Restoration Action Plan
Updated Pages

Instruction

Remove RAP § A. Introduction (November 17, 2000) and replace with the following copy of RAP § A. Introduction (Rev. March 16, 2001)

CHURCH ROCK SECTION 8/CROWNPOINT PROCESS PLANT - RESTORATION ACTION PLAN

A. INTRODUCTION

The following summarizes the Restoration Action Plan ("RAP") for the Churchrock Section 8 and Crownpoint Process site locations. Shown in Attachment A-1, the estimate puts the costs of restoration by an independent contractor at $9,457,893 over a five 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 Churchrock Section 8 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 Churchrock Section 8 site to levels consistent with those described in License[1] Condition 9.3 and the COP[2].
- 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.
- Removal as necessary and reclamation of the Crownpoint Central Plant ("CCP"), satellites, and auxiliary structures.
- Surface reclamation, decommission and obtain release for unrestricted use of the surface and revegetation of restored well fields. When accomplished, the land is returned to its original premining use of sheep, and cattle grazing, and associated wildlife habitat.

It should be emphasized that this RAP 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 buildings may be larger or smaller. HRI may not bury laterals. Because of new deregulation initiatives, electrical costs may be more or less.

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

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.

Instruction

Remove Attachment A-1 in RAP (November 17, 2000) and replace with the following copy of Attachment A-1 (Rev. March 16, 2001)

HRI CROWNPOINT URANIUM PROJECT
Financial Assurance Plan for Churchrock Section 8 and the Crownpoint Central Plant
Summary

Category	Project Total	Contingency/ Profit 15%	Contingency/ Profit 25%	Initial Surety	Contingency/ Profit 15%	Contingency/ Profit 25%
Groundwater Restoration	$7,131,813	$1,069,772		$2,377,271	$356,591	
Groundwater Stability Analysis	$80,000	$12,000		$80,000	$12,000	
Well Plugging	$401,345	$60,202		$133,782	$20,067	
Equipment Removal	$68,808	$10,321		$68,808	$10,321	
Wellfield D & D	$106,372		$26,593	$106,372		$26,593
Building D & D	$249,874		$62,468	$249,874		$62,468
Surface Reclamation	$142,660		$35,665	$142,660		$35,665
Totals	$8,180,872	$1,152,295	$124,726	$3,158,766	$398,979	$124,726
Contingency/Profit			$1,277,021			$523,706
Total Surety			$9,457,893			$3,682,472

Rev. March 16, 2001

E. COST DETAILS FOR RESTORATION AND RECLAMATION ACTIVITIES

1. Introduction

HRI's proposed RAP 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 work[3] 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-1 569, 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 this RAP. 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

[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.

2. Groundwater Restoration Budget

a. Assumptions Used in Sizing Equipment and Estimating the Length of Restoration Operations

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.

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 and brine concentration. 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.

The central assumption in this RAP is that groundwater restoration is conducted using reverse osmosis ("RO") and brine concentration ("BC") water treatment methods. 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.

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 studies 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 pore space. HRI used the "ore area" method to determine pore volumes, where the extent of economic ore within a mine unit is outlined and digitized to provide the area. 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 Churchrock Section 8 location that was used as the assumption in the budget model.

Table 1 – Churchrock Section 8 Pore Volume Calculation

ZONE	Area (ft2)	Tk (ft)	Vol (ft3)	Por	gal/ft3	PV (gal)	H-PIF	V-PIF	CPV (gal)	9 X CPV
UA	318,700	8.6	2,740,820	0.25	7.48	5,125,333	1.5	1.3	9,994,400	89,949,601
LA	404,500	12.2	4,934,900	0.25	7.48	9,228,263	1.5	1.3	17,995,113	161,956,016
UB	329,500	10.5	3,459,750	0.25	7.48	6,469,733	1.5	1.3	12,615,978	113,543,805
LB	555,300	11.6	6,441,480	0.25	7.48	12,045,568	1.5	1.3	23,488,857	211,399,711
UC	658,700	14.9	9,814,630	0.25	7.48	18,353,358	1.5	1.3	35,789,048	322,101,435
ULC	378,200	10.5	3,971,100	0.25	7.48	7,425,957	1.5	1.3	14,480,616	130,325,545
LLC	321,900	12.3	3,959,370	0.25	7.48	7,404,022	1.5	1.3	14,437,843	129,940,584
UD	124,600	10.4	1,295,840	0.25	7.48	2,423,221	1.5	1.3	4,725,281	42,527,525
MD+LD	326,500	12	3,918,000	0.25	7.48	7,326,660	1.5	1.3	14,286,987	128,582,883
TOTALS	3,417,900		40,535,890			75,802,114			147,814,123	1,330,327,106

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.

Attachment E-2-2 contains a map and cross section that will enable the reader to visualize the individual zones from which pore volumes were calculated. Within Attachment E-2-2 Cross Section C-C' is presented. This is the same cross section that has been provided in the Application[4]. Additionally within Attachment E-2-2, HRI has superimposed the C-C' cross section location on a composite GT contour map which provide a plan view of the various zones at the Churchrock Section 8 site. Each zone volume is derived from the average zone thickness shown in cross section and the digitized areas are taken from within a selected GT contour; zone by zone.

[4] See Churchrock Project Environmental Report, April 1988, Figure 2.6-8.

"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 increases[5] that should be recognized in cost estimates. HRI uses pore volume increase factors of 1.5 for horizontal and 1.3 for vertical. 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 times porosity provides the affected pore volume for bonding purposes. This number is in turn multiplied by 9 pore volumes to determine water treatment and disposal volumes and costs. During the Churchrock restoration demonstration that is described in LC 10.28, HRI will use these factors to determine the number of pore volumes that are processed during restoration.

The budget model described in this RAP used 1,330,327,106 gallons of water to size duration of the restoration program against the chosen 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 the equipment design capacity that is needed to process the requisite gallonage that justifies the length (and cost) of groundwater restoration operations.

b. Reverse Osmosis Equipment Description

Reverse osmosis is a water treatment process whereby the majority of dissolved "ions" are filtered from the waste water, 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 an 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

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[5] 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 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)

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 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 water in the first stage. The brine water of the first stage will then act as the feed for the second stage, which yields a overall product 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 nominal 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.

c. 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 steam driven rotary drum dryer to achieve zero liquid discharge (dry solids). The solids will be bulk stored and shipped to an 11.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 a 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.

d. Groundwater Restoration Budget Assumptions

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.

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-scalant 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-2-3.

Utilities - Electric, Brine Concentrator

Calculated electrical cost for operating the brine concentrator. The basis for these costs is shown in Attachment E-2-3.

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-2-3.

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-2-3.

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. The basis for these costs is shown in Attachment E-2-3.

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.

The total cost for groundwater restoration and post restoration management is projected to be $7,131,813.

Instruction

Remove RAP § E. Cost Details for Restoration and Reclamation Activities (November 17, 2000) and replace with the following copy of RAP § E. Restoration and Reclamation Activities (Rev. March 16, 2001)

Instruction

Remove Attachment E-2-1 in RAP (November 17, 2000) and replace with the following copy of Attachment E-2-1 (Rev. March 16, 2001)

CHURCHROCK SECTION 8 GROUNDWATER RESTORATION AND DECOMMISSIONING COSTS
COSTS ASSOCIATED WITH RO AND BRINE CONCENTRATION OPERATION AND MAINTENANCE

Rev. March 16, 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
	nt Personnel												
	Radiation Officer	1	1	1	1	1	1	1	1	1	1	1	1
	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													
17	***Total Employees***	11	11	11	11	11	11	11	11	11	11	11	11
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	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	19,376,640	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	5,066,640	4,739,760	5,066,640	4,903,200	5,066,640	4,903,200	5,066,640	5,066,640	4,903,200	5,066,640	4,903,200	5,066,640
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.)	1,330,327,106	1,304,547,506	1,280,431,106	1,254,651,506	1,229,703,506	1,203,923,906	1,178,975,906	1,153,196,306	1,127,416,706	1,102,468,706	1,076,689,106	1,051,741,106
36	Beginning PV	9	8.83	8.66	8.49	8.32	8.14	7.98	7.80	7.63	7.46	7.28	7.12
37	Gallons Processes 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	0.17	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
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	0.17	0.34	0.51	0.68	0.86	1.02	1.20	1.37	1.54	1.72	1.88	2.06
41	Remaining Gallons to Process	1,304,547,506	1,280,431,106	1,254,651,506	1,229,703,506	1,203,923,906	1,178,975,906	1,153,196,306	1,127,416,706	1,102,468,706	1,076,689,106	1,051,741,106	1,025,961,506
42	Remaining PV to Process	8.83	8.66	8.49	8.32	8.14	7.98	7.80	7.63	7.46	7.28	7.12	6.94
43	***ESTIMATED COST DETAIL***												
44													
45	Description	GW Restoration Operations										GW Restoration Operations	
46													
47	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
48	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
49	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
50	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
51	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
52	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
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
	Drafting & Printing	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50
	Transportation - Air & Car	$850	$850	$850	$850	$850	$850	$850	$850	$850	$850	$850	$850
	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	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053
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	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541
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	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228
99	Cumulative Total	$130,228	$260,457	$390,685	$520,914	$651,142	$781,370	$911,599	$1,041,827	$1,172,056	$1,302,284	$1,432,512	$1,562,741
100	Period Days	31	29	31	30	31	30	31	31	30	31	30	31

CHURCHROCK SECTION 8 GROUNDWATER RESTORATION AND DECOMMISSIONING COSTS
COSTS ASSOCIATED WITH RO AND BRINE CONCENTRATION OPERATION AND MAINTENANCE

Rev. March 16, 2001

	Period	1/2	2/2	3/2	4/2	5/2	6/2	7/2	8/2	9/2	10/2	11/2	12/2
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
	nt Personnel												
	Radiation Officer	1	1	1	1	1	1	1	1	1	1	1	1
	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													
17	***Total Employees***	11	11	11	11	11	11	11	11	11	11	11	11
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	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	19,376,640	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	5,066,640	4,739,760	5,066,640	4,903,200	5,066,640	4,903,200	5,066,640	5,066,640	4,903,200	5,066,640	4,903,200	5,066,640
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.)	1,025,961,506	1,000,181,906	976,065,506	950,285,906	925,337,906	899,558,306	874,610,306	848,830,706	823,051,106	798,103,106	772,323,506	747,375,506
36	Beginning PV	6.94	6.77	6.60	6.43	6.26	6.09	5.92	5.74	5.57	5.40	5.22	5.06
37	Gallons Processes 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	0.17	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
39	Cumulative Gallons Processed	330,145,200	354,261,600	380,041,200	404,989,200	430,768,800	455,716,800	481,496,400	507,276,000	532,224,000	558,003,600	582,951,600	608,731,200
40	Cumulative PV Processed	2.23	2.40	2.57	2.74	2.91	3.08	3.26	3.43	3.60	3.78	3.94	4.12
41	Remaining Gallons to Process	1,000,181,906	976,065,506	950,285,906	925,337,906	899,558,306	874,610,306	848,830,706	823,051,106	798,103,106	772,323,506	747,375,506	721,595,906
42	Remaining PV to Process	6.77	6.60	6.43	6.26	6.09	5.92	5.74	5.57	5.40	5.22	5.06	4.88
43	***ESTIMATED COST DETAIL***												
44													
45	Description	GW Restoration Operations											
46													
47	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
48	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
49	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
50	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
51	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
52	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
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
	Maps	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50
	Drafting & Printing	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50
	Transportation - Air & Car	$850	$850	$850	$850	$850	$850	$850	$850	$850	$850	$850	$850
	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	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053
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	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541
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	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228
99	Cumulative Total	$1,692,969	$1,823,198	$1,953,426	$2,083,654	$2,213,883	$2,344,111	$2,474,340	$2,604,568	$2,734,796	$2,865,025	$2,995,253	$3,125,482
100	Period Days	31	29	31	30	31	30	31	31	30	31	30	31

CHURCHROCK SECTION 8 GROUNDWATER RESTORATION AND DECOMMISSIONING COSTS
COSTS ASSOCIATED WITH RO AND BRINE CONCENTRATION OPERATION AND MAINTENANCE

Rev. March 16, 2001

	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***												
	Radiation Officer	1	1	1	1	1	1	1	1	1	1	1	1
	Chemist	1	1	1	1	1	1	1	1	1	1	1	1
	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													
17	***Total Employees***	11	11	11	11	11	11	11	11	11	11	11	11
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	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	19,376,640	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	5,066,640	4,739,760	5,066,640	4,903,200	5,066,640	4,903,200	5,066,640	5,066,640	4,903,200	5,066,640	4,903,200	5,066,640
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.)	721,595,906	695,816,306	671,699,906	645,920,306	620,972,306	595,192,706	570,244,706	544,465,106	518,685,506	493,737,506	467,957,906	443,009,906
36	Beginning PV	4.88	4.71	4.54	4.37	4.20	4.03	3.86	3.68	3.51	3.34	3.17	3.00
37	Gallons Processes 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	0.17	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
39	Cumulative Gallons Processed	634,510,800	658,627,200	684,406,800	709,354,800	735,134,400	760,082,400	785,862,000	811,641,600	836,589,600	862,369,200	887,317,200	913,096,800
40	Cumulative PV Processed	4.29	4.46	4.63	4.80	4.97	5.14	5.32	5.49	5.66	5.83	6.00	6.18
41	Remaining Gallons to Process	695,816,306	671,699,906	645,920,306	620,972,306	595,192,706	570,244,706	544,465,106	518,685,506	493,737,506	467,957,906	443,009,906	417,230,306
42	Remaining PV to Process	4.71	4.54	4.37	4.20	4.03	3.86	3.68	3.51	3.34	3.17	3.00	2.82
43	***ESTIMATED COST DETAIL***												
44													
45	Description	GW Restoration Operations											
46													
47	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
48	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
49	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
50	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
51	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
52	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
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
	Drafting & Printing	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50
	Transportation - Air & Car	$850	$850	$850	$850	$850	$850	$850	$850	$850	$850	$850	$850
	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	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053
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	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541
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	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228
99	Cumulative Total	$3,255,710	$3,385,938	$3,516,167	$3,646,395	$3,776,624	$3,906,852	$4,037,080	$4,167,309	$4,297,537	$4,427,765	$4,557,994	$4,688,222
100	Period Days	31	29	31	30	31	30	31	31	30	31	30	31

CHURCHROCK SECTION 8 GROUNDWATER RESTORATION AND DECOMMISSIONING COSTS
COSTS ASSOCIATED WITH RO AND BRINE CONCENTRATION OPERATION AND MAINTENANCE

Rev. March 16, 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
	nt Personnel												
	Radiation Officer	1	1	1	1	1	1	1	1	1	1	1	1
	Chemist	1	1	1	1	1	1	1	1	1	1	1	1
	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													
17	***Total Employees***	11	11	11	11	11	11	11	11	11	11	11	11
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	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	19,376,640	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	5,066,640	4,739,760	5,066,640	4,903,200	5,066,640	4,903,200	5,066,640	5,066,640	4,903,200	5,066,640	4,903,200	5,066,640
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.)	417,230,306	391,450,706	367,334,306	341,554,706	316,606,706	290,827,106	265,879,106	240,099,506	214,319,906	189,371,906	163,592,306	138,644,306
36	Beginning PV	2.82	2.65	2.49	2.31	2.14	1.97	1.80	1.62	1.45	1.28	1.11	0.94
37	Gallons Processes 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	0.17	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
39	Cumulative Gallons Processed	938,876,400	962,992,800	988,772,400	1,013,720,400	1,039,500,000	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	6.35	6.51	6.69	6.86	7.03	7.20	7.38	7.55	7.72	7.89	8.06	8.24
41	Remaining Gallons to Process	391,450,706	367,334,306	341,554,706	316,606,706	290,827,106	265,879,106	240,099,506	214,319,906	189,371,906	163,592,306	138,644,306	112,864,706
42	Remaining PV to Process	2.65	2.49	2.31	2.14	1.97	1.80	1.62	1.45	1.28	1.11	0.94	0.76
43	***ESTIMATED COST DETAIL***												
44													
45	Description	GW Restoration Operations								GW Restoration Operations			
46													
47	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
48	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
49	Insurance-Workmens 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
50	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
51	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
52	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
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
	Maps	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50
	Drafting & Printing	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50
	Transportation - Air & Car	$850	$850	$850	$850	$850	$850	$850	$850	$850	$850	$850	$850
	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	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053	$12,053
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	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541	$6,541
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	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228	$130,228
99	Cumulative Total	$4,818,451	$4,948,679	$5,078,907	$5,209,136	$5,339,364	$5,469,593	$5,599,821	$5,730,049	$5,860,278	$5,990,506	$6,120,735	$6,250,963
100	Period Days	31	29	31	30	31	30	31	31	30	31	30	31

CHURCHROCK SECTION 8 GROUNDWATER RESTORATION AND DECOMMISSIONING COSTS
COSTS ASSOCIATED WITH RO AND BRINE CONCENTRATION OPERATION AND MAINTENANCE

Rev. March 16, 2001

	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	***t 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								
8	Plant Operator	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								
12	Wellfield Operators	1	1	1	1								
13	Pump Hoist Operators	1	1	1	1								
14	***Engineering & Geologic Personnel***												
15	Senior Geologist	1	1	1	1								
16													
17	***Total Employees***	11	11	11	11	5	5	5	5	5	5	5	5
18													
19	***Operations Statistics***												
20	Reverse Osmosis Treatment												
21	GPM RO Capacity	580	580	580	580								
22	GPM RO Product	464	464	464	464								
23	GPM RO Reject	116	116	116	116								
24	MM Gals, RO Processed - Month	25,891,200	24,220,800	25,891,200	25,056,000								
25	MM Gals, RO Permiate - Month	20,712,960	19,376,640	20,712,960	20,044,800								
26	MM Gals, RO Reject - Month	5,178,240	4,844,160	5,178,240	5,011,200								
27	Brine Concentration												
28	GPM BC Capacity	125	125	125	125								
29	GPM Distillate	113.5	113.5	113.5	113.5								
30	GPM Brine	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								
32	MM Gals, Distillate - Month	5,068,640	4,739,760	5,068,640	4,903,200								
33	MM Gals, Brine - Month	111,600	104,400	111,600	108,000								
34	Process Results												
35	Beginning Gallons (9 PV Eq.)	112,864,706	87,085,106	62,968,706	37,189,106								
36	Beginning PV	0.76	0.59	0.43	0.25								
37	Gallons Processes Month	25,779,600	24,116,400	25,779,600	24,948,000								
38	PV Processed Month	0.17	0.16	0.17	0.17								
39	Cumulative Gallons Processed	1,243,242,000	1,267,358,400	1,293,138,000	1,318,086,000								
40	Cumulative PV Processed	8.41	8.57	8.75	8.92								
41	Remaining Gallons to Process	87,085,106	62,968,706	37,189,106	12,241,106								
42	Remaining PV to Process	0.59	0.43	0.25	0.08								
43	***ESTIMATED COST DETAIL***												
44													
45	Description						Final Decontamination, Decomissioning and Reclamation						
46													
47	Salaries-Direct	$32,250	$32,250	$32,250	$32,250	$27,417	$27,417	$27,417	$27,417	$27,417	$27,417	$27,417	$27,417
48	Wages-Direct	$10,487	$10,487	$10,487	$10,487	$0	$0	$0	$0	$0	$0	$0	$0
49	Insurance-Workmans Compensation	$1,368	$1,368	$1,368	$1,368	900	900	900	900	900	900	900	900
50	Payroll Taxes	$2,992	$2,992	$2,992	$2,992	4200	4200	4200	4200	4200	4200	4200	4200
51	Medical Insurance	$4,274	$4,274	$4,274	$4,274	4000	4000	4000	4000	4000	4000	4000	4000
52	401K Contributions	$1,068	$1,068	$1,068	$1,068	4000	4000	4000	4000	4000	4000	4000	4000
53	Telephone/Telegraph	$1,250	$1,250	$1,250	$1,250	$950	$950	$950	$950	$950	$950	$950	$950
54	Postage/Freight	$150	$150	$150	$150	$175	$175	$175	$175	$175	$175	$175	$175
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	$150	$150	$150	$150	$150	$150	$150	$150
58	Office Equipment Maintenance	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50
59	Data Processing	$150	$150	$150	$150								
60	Maps	$50	$50	$50	$50					$1,000	$1,000	$1,000	$1,000
	Drafting & Printing	$50	$50	$50	$50					$2,500	$2,500	$2,500	$2,500
	Transportation - Air & Car	$850	$850	$850	$850	$300	$300	$300	$300	$300	$300	$300	$300
63	Meals & Entertainment	$200	$200	$200	$200	$300	$300	$300	$300	$300	$300	$300	$300
64	Misc. Travel Expense	$300	$300	$300	$300	$300	$300	$300	$300	$300	$300	$300	$300
65	Env-Depreciable Equipment	$100	$100	$100	$100								
66	Env-Operational Analyses	$2,000	$2,000	$2,000	$2,000								
67	Environmental - Miscellaneous	$200	$200	$200	$200								
68	Safety	$250	$250	$250	$250								
69	Backhoe Maintenance	$700	$700	$700	$700								
70	Misc. Chemicals	$2,450	$2,450	$2,450	$2,450								
71	Utilities - Electric, Wellfield	$12,053	$12,053	$12,053	$12,053								
72	Utilities - Electric, Brine Concentrator	$32,850	$32,850	$32,850	$32,850								
73	Utilities - Electric, Plant and RO	$5,896	$5,896	$5,896	$5,896								
74	Submersible Pumps	$500	$500	$500	$500								
75	Submersible Motors	$500	$500	$500	$500								
76	Field Piping & Valves	$400	$400	$400	$400								
77	Meters	$50	$50	$50	$50								
78	Misc. Field	$100	$100	$100	$100								
79	Handtools	$100	$100	$100	$100								
80	Plant Piping & Valves	$200	$200	$200	$200								
81	Plant Brine Conc Inst.	$50	$50	$50	$50								
82	Pumps	$500	$500	$500	$500								
83	Plant Electrical	$100	$100	$100	$100								
84	Filters	$1,100	$1,100	$1,100	$1,100								
85	Evaporation Ponds	$50	$50	$50	$50								
86	Roads	$100	$100	$100	$100								
87	Gas, Oil, Grease	$1,150	$1,150	$1,150	$1,150								
88	Disposal - B.C. Solids	$6,541	$6,541	$6,541	$6,541								
89	RO Unit	$250	$250	$250	$250								
90	Lab Supplies	$100	$100	$100	$100								
91	RO Membrane	$3,000	$3,000	$3,000	$3,000								
92	Field Equip. Repairs & Maint.	$150	$150	$150	$150								
93	Vehicle Repairs & Maint.	$550	$550	$550	$550								
94	Vehicles - Pickups	$500	$500	$500	$500								
95	Vehicles - Tractors & Trucks	$1,000	$1,000	$1,000	$1,000								
96	Vehicles - Automobiles	$500	$500	$500	$500								
97													
98	Monthly Total	$130,228	$130,228	$130,228	$130,228	$43,242	$43,242	$43,242	$43,242	$46,742	$46,742	$46,742	$46,742
99	Cumulative Total	$8,381,191	$6,511,420	$6,641,648	$6,771,877	$6,815,119	$6,858,361	$6,901,603	$6,944,845	$6,991,587	$7,038,329	$7,085,071	$7,131,813
100	Period Days	31	29	31	30	31	30	31	31	30	31	30	31

D & D COSTS ARE ITEMIZED ON A TASK BASIS

Instruction

Remove Attachment E-2-3 "Labor Summaries" in RAP (November 17, 2000) and replace with the following blue copy of Attachment E-2-3 "Labor Summaries" (Rev. March 16, 2001)

LABOR SUMMARIES

Rev. March 16, 2001

		Number	Hourly Rate	Yearly Salary	Annual	Monthly
Management and Accounting						
Salaried	Operations Manager	1	-	$120,000	$120,000	$10,000
Salaried	Environmental Manager	1	-	$105,000	$105,000	$8,750
Salaried	Accounting Manager			$105,000	$105,000	$8,750
Salaried	Accountant		-	$65,000	$65,000	$5,417
Plant Personnel						
Salaried	Plant Superintendent		-	$85,000	$85,000	$7,083
Salaried	Plant Engineer		-	$45,000	$45,000	$3,750
Salaried	Radiation Officer	1	-	$30,000	$30,000	$2,500
Salaried	Chemist	1	-	$46,000	$46,000	$3,833
Salaried	Plant Foreman		-	$28,000	$28,000	$2,333
Salaried	Maintenance Foreman		-	$28,000	$28,000	$2,333
Wage	Lab Technicans		$9.62	-	$20,010	$1,667
Wage	Secretary		$9.62	-	$20,010	$1,667
Wage	Electrician	1	$14.43	-	$30,014	$2,501
Wage	Apprentice Electrican		$12.01	-	$24,981	$2,082
Wage	Plant Operator	1	$11.54	-	$24,003	$2,000
Wage	Assistance Plant Operator		$11.54	-	$24,003	$2,000
Wage	Dryer Operator		$11.54	-	$24,003	$2,000
Wage	Maintenance		$11.54	-	$24,003	$2,000
Wellfield Personnel						
Salaried	Wellfield Superintendent		-	$41,200	$41,200	$3,433
Salaried	Drilling Engineer		-	$40,500	$40,500	$3,375
Salaried	Foreman	1	-	$28,000	$28,000	$2,333
Wage	Truck Driver	1	$11.54	-	$24,003	$2,000
Wage	Electrician		$14.43	-	$30,014	$2,501
Salaried	Data Entry Clerk		-	$20,000	$20,000	$1,667
Wage	Secretary			$20,000	$20,000	$1,667
Wage	Logger		$12.01	-	$24,981	$2,082
Wage	Wellfield Operators	1	$11.50	-	$23,920	$1,993
Wage	Assistant Wellfield Operator		$11.50	-	$23,920	$1,993
Wage	Balancer		$11.50	-	$23,920	$1,993
Wage	Environmental Sampler		$11.50	-	$23,920	$1,993
Wage	Pump Hoist Operators	1	$11.50	-	$23,920	$1,993
Wage	Backhoe Operator		$10.49	-	$21,819	$1,818
Wage	Maintenance		$11.50	-	$23,920	$1,993
Wage	Casing Crew		$11.50	-	$23,920	$1,993
Engineering & Geologic Personnel						
Salaried	Chief Engineer		-	$66,000	$66,000	$5,500
Salaried	RESERVOIR ENGINEER		-	$60,000	$60,000	$5,000
Salaried	Senior Geologist	1	-	$58,000	$58,000	$4,833
Salaried	Geologist		-	$48,800	$48,800	$4,067
Salaried	Logging Supervisor		-	$35,000	$35,000	$2,917
Wage	Secretary			$20,000	$20,000	$1,667
Wage	Surveyor		$12.02	-	$25,002	$2,083
Wage	Assistant Surveyor		$12.02	-	$25,002	$2,083
Wage	Logger		$10.49	-	$21,819	$1,818
	Total #	11				

Instruction

Remove RAP Attachment E-4-2 "Backup Information" cover (November 17, 2000) and replace with the following copy of RAP Attachment E-4-2 "Backup Information" cover (Rev. March 16, 2001)

Rev. March 16, 2001

ATTACHMENT E-4-2
BACKUP INFORMATION

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

Instruction

Add the following copy of Article 4 of the N.M. State Engineer's 1995 Edition of the Rules and Regulations Governing Drilling of Wells and Appropriation and Used of Groundwater in New Mexico to RAP Attachment E-4-2 "Backup Information"

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-eights (2⅜) 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 (1½) 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 (¾) 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
6⅝	17.00	0.245	7.390	7¼	8	F-25
7	17.00	0.231	7.656	7¼	8	F-25
7⅝	20.00	0.250	8.500	7½	8	F-25
8⅝	24.00	0.264	9.625	7¾	8	F-25
9⅝	29.30	0.281	10.625	7¾	8	F-25
10¾	32.75	0.279	11.750	8	8	F-25
11¾	38.00	0.300	12.750	8	8	F-25
13⅜	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 (13⅜) 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 LODE 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.

Instruction

Remove RAP § 5 Equipment Removal (November 17, 2000) and replace with the following copy of RAP § 5 Equipment Removal (Rev. March 16, 2001)

5. Equipment Removal

a. 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 contaminate 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 both the Churchrock satellite and at the Crownpoint process facility site. The budget contemplates costs for disassembly, or demolition, loading, transportation and disposal at a NRC licensed facility[1]. There is no decommissioning considered or disposal at an unrestricted site.

b. 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 Churchrock and Crownpoint locations, and further break down removal and loading costs and transportation and disposal costs. Costs for tanks, pipe, pumps, the dryer, 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 reduces 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 $68,808.

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[1] For the purpose of this budget cycle, 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.

Instruction

Remove Attachment E-5-1 in RAP (November 17, 2000) and replace with the following copy of Attachment E-5-1 (Rev. March 16, 2001)

PROCESS EQUIPMENT REMOVAL AND DISPOSAL

			CR Satellite	Central Plant	Combined	Totals
I.	**Removal and Loading Costs**					
	A.	Tankage				
		Number of tanks	29	9		
		Volume of tank construction material (ft^3)	1300	405		
		1 Labor				
		Number of persons	3	3		
		Ft^3/day	50	50		
		Number of days	26	8.1		
		$/day/person	$120	$120		
		Subtotal labor costs	$9,360	$2,916	$12,276	
		2 Equipment (hydraulic shear)				
		Number of days	26	8.1		
		$/Day - $300	$300	$300		
		Subtotal equipment costs	$7,800	$2,430	$10,230	
		Subtotal tankage removal and loading costs	$17,160	$5,346		
	B.	PVC pipe				
		PVC pipe footage	3000	3000		
		Average PVC pipe diameter (inches)	3	3		
		PVC pipe material volume (ft^3/ft)	0.018	0.018		
		Volume of compacted PVC pipe w/100 % void (ft^3)	108	108		
		1 Labor				
		Number of persons	2	2		
		Ft/day	200	200		
		Number of days	15	15		
		$/day/person	$120	$120		
		Subtotal labor costs	$3,600	$3,600	$7,200	
		2 Pipe crushing				
		Number of persons	2	2		
		$/hr./person	$15	$15		
		Feet pipe per hour	300	300		
		Subtotal pipe crushing	$300	$300		
		Subtotal PVC pipe removal and loading costs	$3,900	$3,900	$7,800	
	C.	Pumps				
		Number of pumps	29	9		
		Average volume (ft^3/pump)	5	5		
		Volume of pumps (ft^3)	145	45		
		1 Labor				
		Number of persons	1	1		
		Pumps/day	2	2		
		Number of days	14.5	4.5		
		$/day/person	$120	$120		
		Subtotal pump removal and loading costs	$1,740	$540	$2,280	
	D.	Dryer				
		Dryer volume (ft^3)		2000		
		1 Labor				
		Number of persons		3		
		Ft^3/day		200		
		Number of days		10		
		$/day/person		$120		
		Total dryer dismantling and loading cost		$3,600	$3,600	

	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		$1,800	
F	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		$7,200	$52,386
Total process equipment removal and loading costs						
II.	**Transportation and Disposal Costs (NRC-Licensed Facility)**					
A.	Tankage (plastic and fiberglass)					
	Volume of tank construction material (ft^3)		1300	405		
	Volume of disposal assuming 50% void space (ft^3)		1950	607.5		
	Transportation and disposal unit cost ($/$ft^3$)		$2.78	$2.78		
	Subtotal tankage transportation and disposal costs		$5,417	$1,688	$7,104	
B.	PVC pipe					
	Volume of crushed PVC pipe (ft^3)		108	108		
	Volume of disposal assuming 50% void space (ft^3)		162	162		
	Transportation and disposal unit cost ($/$ft^3$)		$2.78	$2.78		
	Subtotal PVC pipe transportation and disposal costs		$450	$450	$900	
C.	Pumps					
	Volume of pumps (ft^3)		145	45		
	Volume of disposal assuming 50% void space (ft^3)		217.5	93		
	Transportation and disposal unit cost ($/$ft^3$)		$2.78	$2.78		
	Total dryer transportation and disposal costs per facility		$604	$258	$863	
D.	Dryer					
	Dryer volume (ft^3)			2000		
	Volume for disposal assuming dryer remains intact (ft^3)			2000		
	Transportation and disposal unit cost ($/$ft^3$)			$2.78		
	Total tryer transportation and disposal costs per facility			$5,556	$5,556	
E	Reverse osmosis unit					
	RO volume (ft^3)		1000			
	Volume for disposal assuming RO remains intact (ft^3)		1000			
	Transportation and disposal unit cost ($/$ft^3$)		$2.78			
	Total dryer transportation and disposal costs		$2,778		$2,778	
F	Brine concentrator					
	BC volume (ft^3)		4000			
	Volume for disposal assuming BC remains intact (ft^3)		4000			
	Transportation and disposal unit cost ($/$ft^3$)		$2.78			
			$11,111		$11,111	
Total equipment transportation and disposal costs						$14,422
III.	**Health and Safety Costs**					
	Radiation safety equipment		1000	1000	$2,000	
Total health and safety costs						$2,000
TOTAL EQUIPMENT REMOVAL AND DISPOSAL COSTS						**$68,808**

Instruction

Remove RAP § 6 Wellfield Decommissioning (November 17, 2000) and replace with the following copy of RAP § 6 Wellfield Decommissioning (Rev. March 16, 2001)

6. Wellfield Decommissioning

a. Introduction and Description

The Wellfield Decommissioning Budget includes the cost estimates for removing wellfield equipment from the Churchrock Section 8 site. All equipment that was used to circulate leach solution such a pumps and piping is 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. 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[2] or to the Red Rock landfill. Any vegetation, which has been disrupted, will be disked and re-seeded.

b. 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 1.4-8. 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 six months after restoration.

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. Larger diameter pipe will be cut into quarter strips for volume reduction. No credit is given for

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[2] For the purpose of this budget cycle, 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.

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 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-5-2.A contingency was included for health and safety supplies such as disposable uniforms and respirators.

The total cost wellfield decommissioning is projected to be $106,372.

Instruction

Remove Attachment E-6-1 in RAP (November 17, 2000) and replace with the following copy of Attachment E-6-1 (Rev. March 16, 2001)

Section 8 Wellfield Buildings and Equipment Removal and Disposal

	Description	Unit	Total
I.	**Wellfield Piping**		
	Assumptions:		
	Total length of piping (ft)	71120	
	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	$25,603	
B.	Pipe crushing		
	Number of operators	2	
	Operator hourly rate	$15	
	Feet pipe per hour	300	
	Subtotal crushing cost	$7,112	
C.	Transport and disposal costs (NRC-licensed facility)		
	Average diameter of piping (inches)	2	
	Crused volume (ft^3/ft)	0.012	
	Crushed volume total (ft^3)	873	
	Volume for disposal assuming 100% void space (ft^3)	1746	
	Transportation and disposal unit cost ($/$ft^3$)	$2.78	
	Subtotal wellfield piping transport and disposal costs	$4,853	
	Wellfield piping costs per wellfield		
	Total wellfield piping costs		$37,568
II.	**Well Pumps and Tubing**		
	Assumptions:		
	Ongoing pump and tubing removal costs included under ground water restoration labor costs		
	40 production wells contain pumps and tubing		
A.	Pump and tubing transportation and disposal		
	Number of production wells	226	
	Number of injection wells	215	
1	Pump volume		
	Number of production wells with pumps	40	
	Average pump volume (ft^3)	1	
	Pump volume per wellfield (ft^3)	40	
2	Tubing volume		
	Assumptions:		
	Average tubing length/wellfield based on average well depth minus 600 feet		
	Number of production wells with tubing	40	
	Average tubing length per well (ft)	600	
	Tubing length per wellfield (ft)	24000	
	Diameter of production well fiberglass tubing (inches)	2	
	Crushed volume reduction (ft^3/ft)	0.012	
	Wellfield pipe volume w 100% void	589	
	Volume of pump and tubing (ft^3)	629	
	Volume for disposal assuming 50% void space (ft^3)	944	
	Transportation and disposal unit cost ($/$ft^3$)	$2.78	
	Subtotal pump and tubing transport and disposal costs	$2,623.14	
	Pump and tubing costs per wellfield		$2,623.14

III.	**Buried Trunkline**			
	Length of trunkline trench (ft)		25800	
	A. Removal and Loading			
		Main pipeline removal unit cost ($/ft of trench)	$0.42	
		Subtotal trunkline removal and loading costs	$10,870	
	B. Pipe cutting			
		Number of operators	2	
		Operator hourly rate	$15	
		Feet pipe per hour	100	
		Subtotal cutting cost	$7,740	
	C. Transport and disposal costs (NRC-licensed facility)			
	1 10" HDPE trunkline			
		Piping length (ft)	5700	
		Inj and ext length	11400	
		Cut volume (ft^3/ft)	0.14	
		Cut volume (ft^3)	1596	
	2 14" HDPE trunkline			
		Piping length (ft)	7200	
		Inj and ext length	14400	
		Cut volume (ft^3/ft)	0.24	
		Cut volume (ft^3)	3413	
		Total trunkline chipped volume (ft^3)	5009	
		Volume for disposal assuming 50% void space (ft^3)	7513	
		Transportation and disposal unit cost ($/$ft^3$)	$2.78	
		Subtotal trunkline transport and disposal costs	$20,887	
	Trunkline decommissioning costs			$39,497
IV.	**Well Houses**			
	Total quantity		40	
	Average well house volume (ft^3)		12.5	
	A. Removal			
		Total volume (ft^3)	500	
		Demolition unit cost per WDEQ Guideline No. 12 ($/$ft^3$)	$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 (yd3)	19	
		Volume for disposal assuming 10% void space (cy)	20	
		Unrestricted disposal cost of 26.7 $/yd3	$27.00	
		Subtotal unrestricted disposal costs	$530	
	Well house removal and disposal per wellfield			$806

VI.	**Header Houses**			
	Total quantity		11	
	Average header house volume (ft^3)		1600	
	A.	Removal		
		Total volume (ft^3)	17600	
		Demolition unit cost per WDEQ Guideline No. 12 ($/ft^3$)	$0.15	
	Subtotal building demolition costs		$2,675	
	B.	Survey and decontamination		
		Assumptions:		
		Cost per header house	$200	
	Subtotal survey and decontamination costs		$2,200	
	C.	Disposal		
		Total volume (cy) assume 10% building volume	65	
		Volume for disposal assuming 10% void space (cy)	72	
		Unrestricted disposal cost of 26.7 $/yd3	$27.00	
	Subtotal on-site disposal costs		$1,936	
Header house removal and disposal costs per wellfield				$6,811
V.	**Soil**			
Assumptions:				
	Acres of wellfield.		40	
	Surveys by staff.			
	Depth of contaminated soil (in)		2	
	Percent of wellfield contaminated		1	
	Soil analysis each		$100	
	A.	Survey costs		
		100 soil sample analysis	$10,000	
		Flags, and supplies	$1,000	
	Subtotal survey costs		$11,000	
	B.	Disposal costs		
		Backhoe one week	$1,510	
		Volume to disposal	2904	
		NRC disposal unit cost (ft3)	$2.78	
	Subtotal NRC-licensed facility disposal costs		$8,067	
Wellfield soil D & D costs				$19,067
TOTAL WELLFIELD BUILDINGS AND EQUIPMENT REMOVAL AND DISPOSAL COSTS				**$106,372**

Instruction

Remove Attachment E-6-2 Cover in RAP (November 17, 2000) and replace with the following copy of Attachment E-6-2 Cover (Rev. March 16, 2001)

Rev. March 16, 2001

ATTACHMENT E-6-2
BUDGET BACKUP

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

Instruction

Remove Attachment E-6-2 - Texas Department of Health Regulatory Guide in RAP (November 17, 2000) and replace with the following copy of "Hydro Resources, Inc. – Plant Site and Wellfield Closeout and Request for License Termination."

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" [1] 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.

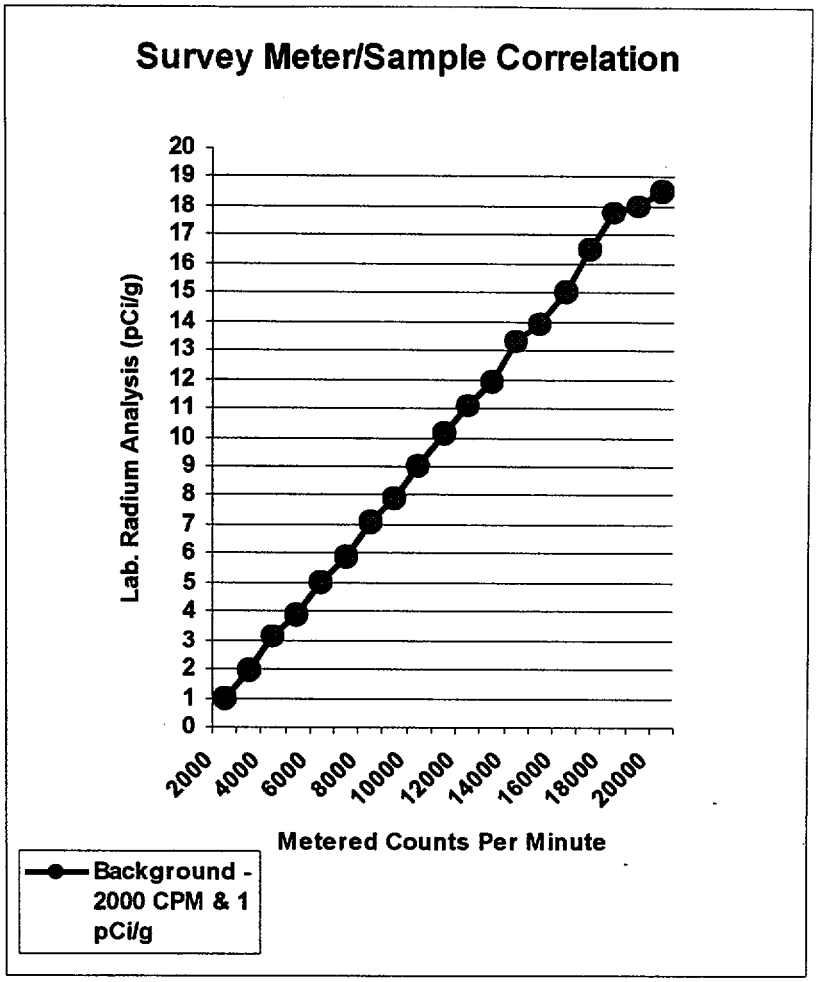
Following laboratory analysis, the meter readings and the laboratory results will be compared as shown in the hypothetical example below. With the laboratory and survey site correlation available, HRI will develop a calibration curve for the purpose of determining what levels of activity measured by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

[1] 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[2] levels above levels 5-pCi/g and trigger further remediation effort.

CPM	Ra-226 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 l00-m^2 area. In soil more than 15 cm below the surface, the concentrations may be averaged in 15-cm layers in a 100-m^2 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^2 area and composited for analysis.



When sampling a contaminated area, which is less than 100 m^2, the hot spot will be sampled as part of a single 100-m2 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^2 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.

Instruction

Remove RAP § 8 Surface Reclamation (November 17, 2000) and replace with the following copy of RAP § 8 Surface Reclamation (Rev. March 16, 2001)

8. Surface Reclamation

a. 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, and wildlife habitat consistent with the present, and historical use of the area. It is anticipated that future land use will be similar to current uses.

b. 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 reclamation, pond decommissioning, and satellite area reclamation. It was assumed that following decommissioning, the Crownpoint process area would be sold with existing buildings in place.

Wellfield sizes and road lengths were estimated using the schematic diagram COP Figure 1.4-8. 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-5-2.

As shown in Attachment E-8-1, the total cost for final surface reclamation is $142,660.

Instruction

Remove Attachment E-8-1 in RAP (November 17, 2000) and replace with the following copy of Attachment E-8-1 (Rev. March 16, 2001)

Rev. March 16, 2001

Wellfield and Satellite Surface Reclamation

	Description	Unit	Total
I.	**Wellfield Area Reclamation**		
	Wellfields rea (acres)	40	
	Disking/seeding unit cost ($/acre)	$200	
	Subtotal reclamation costs for wellfield		$8,000
II.	**Wellfield Road Reclamation**		
	Length of wellfield roads (1000 ft)	3.6	
	Wellfield road reclamation unit cost ($/1000 ft)	$690	
	Subtotal wellfield road reclamation costs		$2,484
III.	**Pond Decomissioning (120')**		
	Assumptions:		
	Sediment disposal of 1 foot (ft3) deep	3972	
	2 Pond dimension are 120 ft x 120 ft. x 10 ft. or 1 acre footprint	1	
	Disposal of inner and outer liners		
	Soil below the liners is not contaminated.		
	Folded liner volume each (ft3).	600	
	Backhoe hourly rate (w/operator)	$37.75	
	Buldozer hourly rate (w/operator)	$37.75	
A.	Removal and loading		
1	Equipment		
	Number of backhoes	1	
	Number of hours	10	
	Number of bulldozers	1	
	Number of hours	10	
2	Labor		
	Number of persons	3	
	Number of hours	10	
	$/hr/person	$15.00	
	Total removal and loading costs	$1,205.00	
B.	Transportation and disposal liners & sediment		
	Transportation and disposal unit costs ($/ft3)	$2.78	
	Total transportation and disposal costs 2 liners	$14,366.67	
	Subtotal pond reclamation costs (2 ponds)		$31,143

IV.	**Pond Decomissioning (350')**				
	Assumptions:				
		Sediment disposal of 6 inches (ft3)		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 (ft3).		2700	
		Backhoe hourly rate (w/operator)		$37.75	
		Buldozer 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			$4,820.00	
	B. Transportation and disposal				
		Transportation and disposal unit costs ($/ft3)		$2.78	
	Total transportation and disposal costs (sediment and 1 liner)			$81,936	
	Subtotal pond reclamation costs (1 ponds)				$86,756
V.	**Soil**				
	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 (ft3)	$2.78		
	Subtotal NRC-licensed facility disposal costs		$1,210		
	Plant area soil D & D costs				$6,460
VI	**Final Sattellite Area Reclamation**				
	Assumptions:				
		Area of disturbance (acres)		10	
	A. Ripping overburden with dozer				
		Ripping unit cost per WDEQ Guideline No. 12, App.11 ($/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
	TOTAL WELLFIELD AND SATELLITE SURFACE RECLAMATION COSTS				**$142,660**

Instruction

Remove RAP § 9 Contingency/Profit (November 17, 2000) and replace with the following copy of RAP § 9 Contingency/Profit (Rev. March 16, 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 Attachment A-1 Contingency/Profit is $1,277,021.

Instruction

Remove RAP § F SURITY FUNDING SCHEDULE (November 17, 2000) and replace with the following copy of RAP § F SURITY FUNDING SCHEDULE (Rev. March 16, 2001)

F. SURITY FUNDING SCHEDULE

As stated a number of times throughout this RAP, wellfield development will be progressive throughout the lifetime of the Churchrock mining project and the resulting liability for wellfield (groundwater) restoration will grow over the life of the mine. As also stated a number of times throughout this RAP, restoration of groundwater will occur concurrently with mining activity. The RAP groundwater restoration budget was overly conservative in calculating the groundwater restoration liability because it assumed that total cost of groundwater restoration at the end of the mining activity with no concurrent activity having been completed. Over the first year of planned activity only a fraction of the mine area will have been developed and only a fraction of the groundwater restoration liability will have been created. The same is true for well plugging costs because all wells will not be drilled at once. As the project matures, depleted areas will have been reclaimed as new mine areas are being developed so the liability will not be purely cumulative. Therefore, HRI proposes to fund one third of the surety for groundwater restoration and plugging costs prior to the beginning of operations. Based on anticipated new development and the amount of completed reclamation, HRI would project anticipated costs for the upcoming year and place that amount of surety according to the provisions of LC 9.5.

The liabilities associated with certain other activities do not change as a result of wellfield development. Specifically equipment and buildings become contaminated immediately and require the full decommissioning cost from the beginning. HRI would propose to place 100% of the surety for decommissioning costs prior to the beginning of operations.

In summary, HRI proposes the following surety percentages and resulting amount is tendered before operations begin.

SURITY FUNDING SCHEDULE

Category	Initial Surety (%)	Initial Surety ($)
Groundwater Restoration	33.3	$2,377,271
Groundwater Stability Analysis	100	$80,000
Well Plugging	33.3	$133,782
Equipment Removal	100	$68,808
Wellfield Decommissioning and Decontamination	100	$106,372
Building Decommissioning and Decontamination	100	$249,874
Surface Reclamation	100	$142,660
Total Initial Surety		$3,158,766
Contingency/Profit 15 – 25 % (See A-1)		$523,706
Total with Contingency/Profit		$3,682,472