September 13, 1999

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

In the Matter of	)	
	)	
HYDRO RESOURCES, INC.	)	Docket No. 40-8968-ML
(2929 Coors Road, Suite 101	)	ASLBP No. 95-706-01-ML
Albuquerque, NM 87120)	)	
	)	

INTERVENORS EASTERN NAVAJO DINÉ AGAINST URANIUM MINING'S AND SOUTHWEST RESEARCH AND INFORMATION CENTER'S REPLY BRIEF ON REVIEW OF PARTIAL INITIAL DECISION LBP-99-13, FINANCIAL ASSURANCE FOR DECOMMISSIONING

INTRODUCTION

Pursuant to the Commission's July 23, 1999, Order, CLI-99-22, slip op. at 24, 50 NRC __ (July 23, 1999), Intervenors Eastern Navajo Diné Against Uranium Mining ("ENDAUM") and Southwest Research and Information Service ("SRIC") hereby reply to the Response Briefs filed by Hydro Resources Inc. ("HRI") and the Nuclear Regulatory Commission ("NRC" or "Commission") Staff regarding financial surety issues.[1] The record is quite clear that the NRC Staff issued a license to HRI without first requiring compliance with either of the Commission's regulations for decommissioning

[1]CLI-99-22 permitted a ten-page reply to each Response Brief. The Intervenors have consolidated their replies into one brief that is less than twenty pages in length.

U.S. NUCLEAR REGULATORY COMMISSION
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financing, Criterion 9 of Appendix A to Part 40 or 10 C.F.R. § 40.36. Therefore, the license was issued unlawfully and should be revoked.

ARGUMENT

I. THE NRC STAFF UNLAWFULLY ISSUED A LICENSE TO HRI WITHOUT REQUIRING HRI TO SATISFY CRITERION 9 OF APPENDIX A TO PART 40 OR 10 C.F.R. § 40.36.

In CLI-99-22, the Commission ruled that Criterion 9 of Appendix A to Part 40, rather than 10 C.F.R. § 40.36, governs decommissioning financing for the Crownpoint Project. *Id.*, slip op. at 22. The Commission also posed two questions directed to whether HRI's license application complied with the requirements of Criterion 9, *i.e.*, whether the financial assurance information submitted by HRI was adequate to meet the requirements for licensing, and what is the meaning of the Staff's statement that the issue of the adequacy of HRI's financial assurance plan is not ripe for review? *Id.*, slip op. at 24. In their Brief, the Intervenors demonstrated that the HRI license was issued improperly, without approval of any decommissioning plan or cost estimate for the Crownpoint Project, and that it is inappropriate and unlawful for the Staff to postpone its review of such information until after licensing.

In its response, HRI argues that Criterion 9 does not require pre-licensing submission and approval of decommissioning plans. The Staff supports this position, but also argues that Criterion 9 is not applicable to in situ leach ("ISL") mining, because it does not generate "tails." Therefore, the Staff contends that it lawfully applied 10 C.F.R.

§ 40.32 to allow HRI to defer the submission of decommissioning funding information. NRC Staff Brief at 17. The Staff's argument constitutes a complete reversal of its previous position that Criterion 9 applies to the Crownpoint Project. *See* CLI-99-22, slip op. at 22 ("The Staff has acknowledged that the financial assurance requirements in Criterion 9 of Appendix A to Part 40 do in fact apply to HRI.")

As discussed below, neither of these arguments has merit. If, as the Commission has ruled, Criterion 9 is applicable to the Crownpoint Project, it does not permit the deferral of a determination of the adequacy of decommissioning funding until after licensing. If Criterion 9 does not apply, as the NRC Staff argues, then the Staff must apply 10 C.F.R. § 40.36, which calls for essentially the same information as Criterion 9, and clearly requires the information to be submitted before licensing. HRI has satisfied neither Criterion 9 nor section 40.36. Whichever of these two regulations the Commission ultimately deems applicable, one thing is clear: the Staff lacks the discretion it claims to fashion its own loose regulatory scheme under 10 C.F.R. § 40.32.

A. The Staff's Issuance of HRI's License Violated Criterion 9 of Appendix A to 10 C.F.R. Part 40.

As the Commission recognizes in CLI-99-22, Criterion 9 of Appendix A to Part 40 requires that a decommissioning plan "must be submitted by the applicant along with its environmental report, prior to licensing." *Id.*, slip op. at 22. Both HRI and the NRC Staff concede that no such Commission-approved decommissioning plan exists for the Crownpoint Project or any portion thereof. HRI's Brief at 15, NRC Brief at 13-14. In

fact, shortly after the Intervenors filed their appellate brief before the Commission, the NRC Staff issued a Request for Additional Information ("RAI") to HRI, which seeks the very information that Criterion 9 required to be submitted prior to licensing.[2] Thus, the record on this appeal clearly establishes that the NRC Staff unlawfully issued a license to HRI, in violation of Criterion 9 to Appendix A.

Completely ignoring the holding of CLI-99-22, HRI and the Staff attempt to justify HRI's failure to support its license application with any decommissioning plan, by contending that Criterion 9 does not require the submission of the information until the eve of operation. HRI Brief at 4, NRC Brief at 12.

HRI and the Staff both argue that by using the term "licensee" instead of "applicant" in Criterion 9, the Commission demonstrated its intent that Criterion 9's requirements would only apply to already-licensed facilities. HRI Brief at 5, NRC Brief at 5. Thus, in their view, Criterion 9 allows licensees to defer submittal of decommissioning plans, as long as they are submitted before operations begin. *Id.* This argument is defective, for several principal reasons. First, it ignores the Commission's express holding in CLI-99-22, that decommissioning plans must be submitted "prior to licensing." *Id.*, slip op. At 22. Second, the argument ignores the regulatory history of

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[2]*See* Letter from John J. Surmeier, NRC, to Richard F. Clement, Jr., HRI, re: Restoration Costs and Surety Review Submittals (August 31, 1999). Enclosure 1 to the letter is the U.S. Nuclear Regulatory Commission Staff Request for Additional Information Concerning Hydro Resources, Inc.'s Proposed Surety Submittals. Enclosure 2 is a sample restoration/reclamation surety cost estimate. The Surmeier letter and its enclosures are attached to this brief as Exhibit 1. *See also* discussion in Section II below.

Appendix A. In promulgating Appendix A, the Commission recognized that it was necessary to regulate both existing *and* prospective operations. *See* preamble to Final Rule, Uranium Mill Licensing Requirements, 45 Fed. Reg. 65,521, 65,523 (October 3, 1980 ("It is critically important that the siting and design criteria of the regulations be implemented for new facilities so that mistakes of the past are not repeated.")

Finally, HRI's and the Staff's position is inconsistent with the Generic Environmental Impact Statement ("GEIS") for uranium milling, which discusses the importance of conducting the review of decommissioning funding documents *before* licensing. NUREG-0706, Final Generic Impact Statement on Uranium Milling (April, 1979). For example, the GEIS states that:

> A plan for decommissioning of the mill buildings and site, and for disposing of the tailings, in accordance with the requirements delineated above, must be proposed by applicants, and approved by appropriate agencies, *before issuance or renewal of licenses.*

Id. at 12-5. (emphasis added). Elsewhere, the GEIS also states that:

> Decisions regarding proper disposal of mill tailings must be made prior to the initiation of mill operations. In the model mill, tailings are produced at a rate of nearely three-quarter million tons per year. Nearly irrevocable commitments are made once milling operations have begun and several million tons of tailings have been generated. *Therefore, it is essential that a tailings disposal plan be worked out, approved, and agreed to before a license is granted.*
>
> Similarly, to ensure that milling operations are conducted in such a manner that decontamination of the mill can be carried out effectively and without complication and so that the full costs of mill operation are identified prior to its beginning, a decommissioning plan for the mill building and site must be worked out, approved, and agreed to by the operator, *before a license is granted.*

GEIS at 12-27 (emphasis added). These statements clearly demonstrate the Commission's intent to require the submission of decommissioning-related information *before* licensing.

HRI's and the Staff's attempts to discount the significance of the GEIS are without merit. For instance, HRI argues that the GEIS creates no enforceable requirements. HRI Brief at 6. Obviously, the GEIS does not constitute a regulation that is "enforceable" *per se.* It does, however, have significant binding effect in two respects. First, the GEIS is the Commission's designated vehicle for explaining the "detailed basis for the criteria" in Appendix A to Part 40. *See* Intervenors' Brief at 9, note 4, *citing* 45 Fed. Reg. 65,521, 65,529 (October 3, 1980). Thus, its precedential effect is equivalent to the preamble to the Final Rule that established Appendix A.

Moreover, the GEIS constitutes the National Environmental Policy Act ("NEPA") analysis on which the Commission relied for the promulgation of Appendix A. In the GEIS, the Commission evaluated a set of proposed regulations and determined that they would provide environmental protection consistent with the requirements of NEPA. (*See* GEIS, Section 1, Purpose and Scope of Statement, at page 2). In particular, as discussed above, the GEIS specifically anticipated that for prospective operations, decommissioning funding issues would be reviewed at the time of licensing. The GEIS also anticipated that the public would have an opportunity to participate in the determinations. *Id.* at 12-15 ("Opportunity for public hearings should be provided in any

mill or mill tailings licensing case.") If, as HRI argues, the Commission substantially changed Appendix A after publication of the GEIS to alter the requirement for submission of decommissioning plans by license applicants, then the GEIS no longer can be found to support Appendix A for purposes of compliance with NEPA. Under the circumstances, a new GEIS would have to be prepared that evaluates the significant change in the regulations.

B. The Staff's Actions in This Proceeding Are Inconsistent With Staff Guidance and Previous Staff Precedents.

In their August 13, 1999 Brief, the Intervenors cited NUREG-1569, Draft Standard Review Plan for In Situ Leach Uranium Extraction License Applications (September 1997), as well as examples of previous NRC Staff reviews of license applications for Criterion 9 compliance, for the proposition that the Staff has departed from its own guidance and practice in this case. Intervenors' Brief at 10-11. In response, HRI argues that the Draft Standard Review Plan "does not establish immutable requirements for regulatory compliance," and that the Commission should strike the documentation provided by Intervenors of other NRC Staff reviews. HRI Brief at 8-9. These arguments lack merit.

First, the Intervenors have never contended that the Draft Regulatory Guide constitutes binding precedent. Rather, it constitutes persuasive evidence of the Staff's longstanding interpretation of Criterion 9 through its practice in implementing Criterion 9. The fact that the Staff has now deviated from the norm is an indicator that the Staff's

actions in licensing HRI constitute an aberration rather than a valid and consistent interpretation of the regulations.

Second, the attachments to the Intervenors' brief should be considered, because they are offered as legal and policy precedents rather than factual evidence in this proceeding. None of the examples discussed in the attachments directly relate to the HRI proceeding, and thus they do not constitute supplements to the evidentiary record. Rather, these attachments provide information regarding legal precedents in the interpretation of the Commission's own regulations. Although the Staff's decisions are not legally binding precedents, contemporaneous Staff interpretations of Appendix A to Part 40 shed light on the Staff's understanding of the meaning of its own regulations.

In contrast to the attachments to the Intervenors' initial brief, the attachment to this Reply Brief does constitute relevant evidence that has not been included in the evidentiary record of this case. The Commission has recognized that such evidence may be considered where evidence is "newly discovered and tended to show that significant testimony in the record was false." Toledo Edison Co. , ALAB-430, 6 NRC 457, 459 (1977). The RAI, which was issued on August 31, 1999, directly controverts HRI's statement in its initial presentation that "Although Intervenors complain that HRI has not provided any information regarding estimated decommissioning costs, HRI has, in fact, submitted detailed plans addressing the full cycle economics of the CUP as part of its license application." HRI's Response to Intervenors' Briefs With Respect to HRI's

Technical and Financial Qualfications and Financial Assurance for Decommissioning at 19 (February 11, 1999). Accordingly, Exhibit 1 to this brief should be accepted as relevant and probative new evidence by the Commission.

C. HRI Was Required to Satisfy Either Criterion 9 or 10 C.F.R. § 40.36, But Satisfied Neither Requirement.

Apparently recognizing the weakness of its claim that Criterion 9 permits a license applicant to postpone submission of a decommissioning plan until after licensing, the NRC Staff takes the position that Criterion 9's requirement for a decommissioning plan does not apply at all. NRC Staff Brief at 6-7. This constitutes a complete reversal of the position taken by the Staff in its February, 1999, response to the Intervenors' evidentiary presentation, in which the Staff unequivocally argued that Criterion 9 is the governing regulation.[3] NRC Staff's Response to Intervenors' Presentations on Technical Qualification, Financial and Decommisioning Issues at 4 (February 18, 1999) ("NRC Staff Response").

Without a word of explanation regarding this last-minute turnabout, the NRC Staff now argues that "Criterion 9 appears to be better suited to a mill seeking to modify or renew its operations rather than a ISL mining license applicant," and that it is "is

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[3]The Staff tries to downplay its complete reversal by suggesting that "some" aspects of Criterion 9 apply to ISL mining. NRC Staff Brief at 10, note 13. According to the Staff, it has "previously emphasized in this proceeding that not all of the Criterion 9 provisions apply to ISL mining." *Id.*, citing NRC Staff Response at 5-8. However, nothing in this section of the NRC's February, 1999, Response even hints that the Staff considered any portion of Criterion 9 to be inapplicable.

reasonably applicable only to those uranium mill operators who (1) hold NRC licenses, and (2) had tailings piles previously created by their uranium milling operations or whose continued operations are expected to create additional waste and/or tailings."[4] Staff Brief at 5. According to the Staff, HRI produces no "tailings," and therefore is not subject to Criterion 9's requirement for a decommissioning plan. Under the Staff's reasoning, it is logical to conclude that an ISL mine is not a "milling operation" as defined in 10 C.F.R. § 40.4, because it produces no tailings.[5]

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[4]Curiously, the Staff seeks to bar the Intervenors' request that the Commission reconsider its ruling that 10 C.F.R. § 40.36 does not apply. NRC Staff Brief at 23. Having questioned the Commission's ruling that Criterion 9 applies, the Staff is in no position to make such an argument. In any event, as demonstrated by the equivocations of the Staff, the question of whether Criterion 9 or § 40.36 obviously is a difficult one. Under the circumstances, it was not inappropriate for the Intervenors to raise the applicability of § 40.36 in their brief.

[5]Although the Intervenors essentially agree with the NRC Staff that Criterion 9 is a poor fit for ISL mining, they submit that the Staff's reading of Criterion 9 is both narrow and tortured. Criterion 9, as quoted in the NRC Staff's Brief at 5, provides as follows:

> Financial surety arrangements [*e.g.*, surety bonds] must be established by each mill operator prior to the commencement of operations to assure that sufficient funds will be available to carry out the decontamination and decommissioning of the mill and site and for the reclamation of any tailings or waste disposal areas. The amount of funds to be ensured by such surety arrangements must be based on Commission-approved cost estimates in a Commission-approved plan for (1) decontamination and decommissioning of mill buildings and the milling site to levels which allow unrestricted use of these areas upon decommissioning, and (2) the reclamation of tailings and/or waste areas in accordance with technical criteria delineated in Section I of this Appendix. *The licensee shall submit this plan in conjunction with an environmental report that addresses the expected environmental impacts of the milling operation, decommissioning and tailings reclamation, and evaluates alternatives for mitigating these impacts* . . . . In establishing specific surety arrangements, the licensee's cost estimates must take into account total costs that would be incurred if an independent contractor were hired to perform the decommissioning and reclamation work.

The NRC Staff appears to have come full circle, into agreement with the Intervenors' position that ISL mining is not subject to Criterion 9 because it is not a "milling operation." *See* ENDAUM's and SRIC's Brief in Opposition to HRI's Application for a Materials License With Respect to Financial Assurance for Decommissioning at 3 (January 11, 1999). The Staff, however, fails to follow this reasoning to its logical and inevitable conclusion: if Criterion 9 does not apply, then 10 C.F.R. § 40.36 must apply. By its own terms, § 40.36 applies to all materials license applicants,

> "[e]xcept for licenses authorizing the receipt, possession, and use of source material for uranium or thorium milling, or byproduct material at sites formerly associated with such milling, for which financial assurance requirements are set forth in Appendix A of this part."

If, as the Staff argues, the Crownpoint ISL operation does not constitute a "milling" facility, then the operation is subject to 10 C.F.R. § 40.36.[6] The Staff completely lacks the "discretion" it claims under 10 C.F.R. § 40.32 to substitute its own alternative

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Appendix A, Criterion 9 (emphasis as added by NRC Staff). The Staff argues that mill tailings "are the only waste products specified in the italicized portion of the Criterion 9 excerpt as needing to be addressed in an environmental report," and that ISL mining "does not produce any mill tailings." NRC Staff Brief at 7. Even a cursory reading of Criterion 9 demonstrates the fallacy of the NRC's position. The italicized language of Criterion 9 refers in general to "decommissioning" as well as tailings reclamation. Moreover, the sentence directly preceding it requires the decommissioning plan to address "decontamination and decommissioning of mill buildings and the milling site to levels which allow unrestricted use of these areas upon decommissioning," as well as the reclamation of "waste areas."

[6]No party has argued that the Crownpoint Project is at a site "formerly associated with such milling," the other factor which would exempt it from § 40.36.

regulatory scheme in place of the Commission's duly promulgated decommissioning regulations. Moreover, the fact that the NRC Staff attempts to cloak its illegal conduct in the mantle of "Performance-Based Licensing" highlights the Intervenors' previously expressed concern that PBL is being used illegally to delegate oversight of facilities to the nuclear industry and to preclude public participation in the regulation of those facilities. NRC Staff Brief at 17. *See also* HRI Brief at 11.

II. HRI FAILED TO SUBMIT, AND THE STAFF HAS FAILED TO APPROVE, INFORMATION THAT WOULD SATISFY CRITERION 9 OR 10 C.F.R. § 40.36.

The record is clear beyond debate that HRI has not submitted, nor has the Staff approved, the decommissioning funding information required as a prerequisite to the issuance of a license under Criterion 9 or 10 C.F.R. § 40.36. As the Staff concedes in its Brief, "HRI's 1997 financial plan does not form an adequate basis on which to estimate what it would cost a third party to decommission HRI's Section 8 site, restore the groundwater there, and perform land reclamation there." NRC Brief at 20. Thus, even with respect to the limited portion of the licensed Crownpoint Project represented by Section 8, HRI has not submitted the information that would permit evaluation of the proper amount of the surety under Criterion 9 or 10 C.F.R. § 40.36.

The NRC Staff's recent RAI to HRI gives illustrative detail to the general statements made in the NRC's Brief. The amount of detail that is still lacking is quite astounding. For instance, at page 3 of the RAI, the Staff states that:

> HRI's proposed restoration and reclamation plan (hereafter referred to as 'rec plan') lacks sufficient enough detail for the NRC staff to make an adequate decision with respect to the acceptability of HRI's reclamation costs. Specifically, HRI's rec plan submittal lacks and details concerning cost basis figures and assumptions, calculations and/or methodologies used in deriving cost estimates, references, and clarity with respect to its cost detail figures.

Id. at 3. The RAI also states that:

> HRI's proposed rec plan fails to adequately address numerous areas of decommissioning regarding restoration and reclamation costs. The following areas are deficient in HRI's rec plan submittal: a) facility decommissioning costs are not inclusive (e.g., no costs identified for restoration and decommissioning efforts associated with the Crownpoint processing facility, nor for the proposed evaporation ponds at Section 8) and lack sufficient detail to determine their adequacy; b) ground-water restoration costs do not indicate a restoration method for the proposed 1.33 billion gallon restoration effort at Section 8 (i.e., 9 pore volumes); c) radiological survey and environmental monitoring costs are not reflected; d) no project management and miscellaneous costs are specified; e) no contractor profit indicated, and labor and equipment overhead costs are sketchy; and f) no contingency cost is reflected.

Id. at 4. Similarly, the RAI stated that:

> HRI proposed to initially bond for one-third of the total Section 8 project cost, which it estimates at $8,017,063 over a five year period. HRI further indicated that groundwater restoration at the first well-field would be $1,001,532. In order for the NRC staff to adequately review the proposed surety amount, HRI must submit a detailed plan with appropriate cost figures that clearly indicates all current and future activities requiring reclamation and decommissioning prior to the NRC's next annual surety review (e.g, surface construction and/or disturbances, facilities and equipment, etc.), in addition to restoration costs of the first well-field.

Id. at 5. The RAI also raises numerous questions about the surety instrument. Id. At 1-2.

As an example of the level of detail required, the NRC Staff attached to the RAI two sample restoration cost submittals, which are 28 and 36 pages long. *See* Exhibit 1.

Clearly, even with respect to Section 8 — which is only a fraction of the licensed area for which Criterion 9 and Section 40.36 require decommissioning funding information — HRI's submissions to date fall far short.

As noted in the Intervenors' Brief, the Presiding Officer did not address the adequacy of HRI's submissions or the NRC's conclusions regarding decommissioning funding estimates, with one exception: he rejected the Intervenors' argument that the Staff's requirement of 9 pore volumes is unreasonable. Intervenors' Brief at 22-24. In response, the NRC Staff argues that the Intervenors' expert's testimony "narrowly focused" on criticizing HRI's estimate of four pore volumes to restore groundwater. This argument ignores the fact that Dr. Sheehan, Intervenors' expert, testified that 9 pore volumes "seriously underestimates the number of pore volumes required for restoration," and also asserted that the cost of restoration reclamation is "at least $63 million at 9 pore volumes and almost certainly substantially more." Sheehan Direct Testimony at 15 note 6, and 18. In fact, by the NRC Staff's own admission, the 9 pore volume figure was based on an economic concept of diminishing marginal returns rather than a health and safety concept of successful restoration.[7] *See* Intervenors' Presentation at 15-16, citing

[7]The Staff's argument that the nine pore volume estimate is "subject to change" after a later restoration demonstration evades the general requirement that licensing determinations may not be postponed. NRC Brief at 13. *See* discussion in Intervenors' Brief at 20. While the regulations anticipate minor adjustments to decommissioning funding estimates over time, they do not contemplate that a determination of the essential accuracy of the original estimate may be postponed. In fact, it is one of the most fundamental concepts of decommissioning funding that a licensee, the agency, and the public, should have a good idea of decommissioning costs *before* embarking on a project, in order to avoid causing contamination that the licensee cannot afford to

FEIS at 4-40.

III. THE NRC MUST PROVIDE A LICENSING HEARING ON THE ADEQUACY OF THE AMOUNT OF THE SURETY AND THE SURETY ARRANGEMENTS.

The NRC concedes that the Intervenors are entitled to a hearing on the adequacy of HRI's decommissioning funding estimate and the adequacy of its proposed surety arrangements.[8] NRC Brief at 20. The Staff is silent, however, on the timing of that hearing. Certainly, the Staff has no intention of defending the Intervenors' right to a hearing at a meaningful juncture, which is the issuance of a license before resources have been irretrievably committed to a project that may prove too expensive to clean up. The Intervenors are entitled to a hearing on the adequacy of the decommissioning funding estimate and the surety arrangements for the entire Crownpoint project, before the project is allowed to commence.

IV. CONCLUSION

For the foregoing reasons, the Commission should reverse LBP-99-13, reject HRI's license application because it is inadequate to meet Atomic Energy Act and financial assurance requirements, and revoke HRI's license, SUA-1508, because it was

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clean up later.

[8]Although the language of Criterion 9 states that surety arrangements must be made prior to the commencement of operations, this does not absolve the NRC from providing a licensing hearing in a timely manner. The surety arrangements for an ISL mine clearly raise complex issues of fact that should be subject to evaluation in the context of a hearing. *see, e.g.*, the questions raised at page 1-2 of the NRC's RAI to HRI, Exhibit 1 to this Brief.

unlawfully issued.

Respectfully Submitted this 13th day of September, 1999.

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 31, 1999

Mr. Richard F. Clement, Jr., President
Hydro Resources, Inc.
PO Box 15910
Rio Rancho, NM 87174

SUBJECT: RESTORATION COSTS AND SURETY REVIEW SUBMITTALS

Dear Mr. Clement:

This letter is in response to Hydro Resources, Inc.'s (HRI's) proposed restoration costs and surety submittals dated February 4 and March 19, 1999, respectively. Included In your February 4 submittal was a letter to Ms. Katherine Yuhas of the New Mexico Environmental Department, dated September 11, 1997, providing updated restoration cost estimates for HRI's proposed Church Rock - Section 8 in-situ leach uranium mining project. HRI's March 19 submittal provided draft text for a performance bond, performance bond guarantee, and a trust agreement for the Crownpoint project. Enclosure 1 is the NRC staff's review and request for additional information concerning these submittals.

In addition, Enclosures 2 and 3 are examples of restoration cost submittals that provide an acceptable level of detail for NRC staff review. If you have any questions regarding this subject matter, please contact Mr. Robert Carlson of my staff at (301) 415-8165.

Sincerely,

John J. Surmeier, Chief
Uranium Recovery and
Low-Level Waste Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosures: As stated

cc: K. Yuhas, NMED
See Attached List

EXHIBIT
tabbies
1

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ENCLOSURE 1

U.S. NUCLEAR REGULATORY COMMISSION STAFF REQUEST FOR ADDITIONAL INFORMATION CONCERNING HYDRO RESOURCES, INC.'S PROPOSED SURETY SUBMITTALS

The following request for information (RAI) is composed of two sections. Section I contains the U.S. Nuclear Regulatory Commission (NRC) staff comments related to Hydro Resources, Inc.'s (HRI's) proposed "Performance Bond and Trust Agreement Formats" submittal, dated March 19, 1999. Section II consists of the NRC staff comments related to HRI's proposed "Church Rock - Section 8 Restoration and Reclamation" plan submittal, dated February 4, 1999.

When addressing this RAI, HRI should ensure that its responses correspond to the following numerical order of NRC staff comments for future tracking and closure purposes.

SECTION I - PERFORMANCE BOND AND TRUST AGREEMENT COMMENTS

1. **COMMENT:** Penal Sum Amount

   DISCUSSION:

   Neither the performance or performance guarantee bonds have penal sum amounts listed. Once HRI adequately addresses the NRC staff's subsequent comments regarding restoration and reclamation costs, a penal sum figure should be established for each of the aforementioned bonds.

   ACTION NEEDED:

   HRI should submit a penal sum amount for both the performance and performance guarantee bonds prior to NRC staff approval of HRI's surety instruments.

2. **COMMENT:** Performance Bond Provisions for Injection Well Plugging and Abandonment

   DISCUSSION:

   Under the current provisions of the performance bond for injection well plugging and abandonment, if HRI cannot provide alternate financial assurance during the 60 days following receipt of a notice of bond cancellation, the bond amount will be placed in the standby trust. The provisions also state that the cancellation will not occur during the 120-day period, beginning with receipt of the note of cancellation. These two dates are inconsistent. The NRC's "Technical Position on Financial Assurance for Reclamation, Decommission, and Long-Term Surveillance and Control of Uranium Recovery Facilities," dated October 1988, recommends that both dates should be 90 days.

ACTION NEEDED:

HRI should correct the above mentioned date discrepancies in the provisions of its performance bond.

3. **COMMENT:** Performance Bond Provisions for Closure Activities

DISCUSSION:

Under the current provisions of the performance bond for closure activities, if HRI cannot provide alternate financial assurance during the 60 days following receipt of a notice of bond cancellation, the bond amount will be placed in the standby trust. The provisions also state that the cancellation will not occur during the 120-day period, beginning with receipt of the note of cancellation. These two dates are inconsistent. The NRC's "Technical Position on Financial Assurance for Reclamation, Decommission, and Long-Term Surveillance and Control of Uranium Recovery Facilities," dated October 1988, recommends that both dates should be 90 days.

ACTION NEEDED:

HRI should correct the above mentioned date discrepancies in the provisions of its performance bond.

4. **COMMENT:** Standby Trust Agreement

DISCUSSION:

HRI's proposed standby trust instrument should be revised to be consistent with the recommended wording for standby trust agreements in the NRC's "Technical Position on Financial Assurance for Reclamation, Decommission, and Long-Term Surveillance and Control of Uranium Recovery Facilities," dated October 1988. Also, information contained in example Schedules A, B, and C of the NRC's standby trust need to be provided as recommended in the above mentioned technical position.

ACTION NEEDED:

HRI should revise its proposed standby trust agreement to be consistent with language found in the NRC's "Technical Position on Financial Assurance for Reclamation, Decommission, and Long-Term Surveillance and Control of Uranium Recovery Facilities," dated October 1988.

5. **COMMENT:** Consolidation of State and NRC Surety Instruments

DISCUSSION:

HRI's proposed Performance Guarantee Bond currently is written in terms of addressing the New Mexico Environmental Department's (NMED's) restoration and reclamation

requirements. In order to avoid unnecessary duplication and expense, 10 CFR Part 40, Appendix A, Criterion 9 (Financial Criteria) clearly allows for consolidation of State and Federal financial or surety arrangements established to meet restoration, reclamation, and decommissioning costs provided that "the portion of the surety which covers the decommissioning and reclamation of the mill, mill tailings site and associated areas ... is clearly identified and committed for use in accomplishing these activities." Although these activities are implied in HRI's proposed surety instrument and in its March 19, 1999, letter to NRC and NMED, the Performance Guarantee Bond should state directly the requirements of Criterion 9 above.

ACTION NEEDED:

HRI should revise the language of its proposed surety instrument to adhere to 10 CFR Part 40, Appendix A, Criterion 9 requirements regarding specific delineation of decommissioning and reclamation costs.

SECTION II - CHURCH ROCK-SECTION 8 RESTORATION AND RECLAMATION PLAN COMMENTS

6. **COMMENT:** Cost Details for Restoration and Reclamation Activities

DISCUSSION:

HRI's proposed restoration and reclamation plan (hereafter referred to as 'rec plan') lacks sufficient enough detail for the NRC staff to make an adequate decision with respect to the acceptability of HRI's reclamation costs. Specifically, HRI's rec plan submittal lacks any details concerning cost basis figures and assumptions, calculations and/or methodologies used in deriving cost estimates, references, and clarity with respect to its cost detail figures. This information should be descriptive enough for the NRC staff to determine the acceptability of HRI's proposed cost figures, and should be based on an independent contractor performing the decommissioning and reclamation work in accordance with 10 CFR Part 40, Appendix A, Criterion 9 requirements. Examples of acceptable "levels of detail" for cost estimates pertaining to surety submittals can be found in Appendix E of the NRC's draft "Standard Review Plan for In-Situ Leach Uranium Extraction License Applications" (NUREG-1569, dated October 1997), and Section 4 of the NRC's "Technical Position on Financial Assurances for Reclamation, Decommissioning, and Long-Term Surveillance and Control of Uranium Recovery Facilities" (dated October 1988).

ACTION NEEDED:

HRI should provide additional cost details for the restoration and reclamation activities associated with its surety submittal.

7. **COMMENT:** Cost Areas for Restoration and Reclamation Activities

DISCUSSION:

HRI's proposed rec plan fails to adequately address numerous areas of decommissioning regarding restoration and reclamation costs. The following areas are deficient in HRI's rec plan submittal: a) facility decommissioning costs are not inclusive (e.g., no costs identified for restoration and decommissioning efforts associated with the Crownpoint processing facility, nor for the proposed evaporation ponds at Section 8) and lack sufficient detail to determine their adequacy; b) ground-water restoration costs do not indicate a restoration method for the proposed 1.33 billion gallon restoration effort at Section 8 (i.e., 9 pore volumes); c) radiological survey and environmental monitoring costs are not reflected; d) no project management and miscellaneous costs are specified; e) no contractor profit indicated, and labor and equipment overhead costs are sketchy; and f) no contingency cost is reflected. As mentioned in Comment 6 above, this information should be descriptive enough for the NRC staff to determine the acceptability of HRI's proposed cost figures, and should be based on an independent contractor performing the decommissioning and reclamation work in accordance with 10 CFR Part 40, Appendix A, Criterion 9 requirements. Examples of acceptable "levels of detail" for cost estimates pertaining to surety submittals can be found in Appendix E of the NRC's draft "Standard Review Plan for In-Situ Leach Uranium Extraction License Applications" (NUREG-1569, dated October 1997), and Section 4 of the NRC's "Technical Position on Financial Assurances for Reclamation, Decommissioning, and Long-Term Surveillance and Control of Uranium Recovery Facilities" (dated October 1988).

ACTION NEEDED:

HRI should provide additional cost information in the areas of decommissioning listed above for the restoration and reclamation activities associated with its surety submittal.

8. **COMMENT:** Well-Field Zone Map

DISCUSSION:

HRI's proposed rec plan includes an enclosure titled "Church Rock Section 8 - Pore Volume Calculated By Zone." However, it is unclear what the Section 8 zone designations represent in this enclosure (e.g., UA, LA, UB, etc.). HRI should submit a proposed well-field map clarifying the zone designations and locations within Section 8.

ACTION NEEDED:

HRI should submit a proposed well-field map that clarifies the zone designations and locations within Section 8.

9. **COMMENT:** Proposed Bonding Figure

DISCUSSION:

HRI proposed to initially bond for one-third of the total Section 8 project cost, which it estimates at $8,017,063 over a five year period. HRI further indicated that groundwater restoration at the first well-field would be $1,001,532. In order for the NRC staff to adequately review the proposed surety amount, HRI must submit a detailed plan with appropriate cost figures that clearly indicates all current and future activities requiring reclamation and decommissioning prior to the NRC's next annual surety review (e.g., surface construction and/or disturbances, facilities and equipment, etc.), in addition to restoration costs of the first well-field.

ACTION NEEDED:

HRI should submit a detailed plan with appropriate cost figures for all current and future activities requiring reclamation and decommissioning prior to the NRC's next annual surety review.

ENCLOSURE 2

1999 RESTORATION/RECLAMATION SURETY COST ESTIMATE

SUMMARY

A.	Groundwater Restoration	$4,547,963
B.	Wellfield Reclamation	2,308,364
C.	Commercial Plant Reclamation/Decommissioning	339,445
D	R O Building Reclamation/Decommissioning	49,918
E.	Evaporation Pond Reclamation	407,536
F	Miscellaneous Site Reclamation	60,870
G.	Deep Disposal Well Reclamation	65,055
H.	I - 196 Brule Aquifer Restoration	26,466
	Subtotal	$7,805,617
I.	Contract Administration (10%)	780,562
J.	Contingency (15%)	1,170,843
	TOTAL	**$9,757,022**

Enclosure 2

BASIS OF COSTS:.

Costs used in the surety bond calculations are based on the following rationale:

1. Labor Rates: Labor rates are based on 1998 actual CBR labor for plant and wellfield operations including benefits and payroll taxes, plus 20% for contractors overhead and profit.

2. Disposal Costs: Disposal costs of byproduct material are based on a current disposal agreement held by CBR.

	Fee	Transport Cost	Total
Packaged Material	$10.00/cf	$2.42/cf	$12.42/cf
Soil, etc.	$81.00/cy	$66.00/cy	$147.00/cy

Disposal of non-byproduct material will be at a licensed landfill per NDEQ permit. $10 load fee plus transport cost of $360/20 tons @ 30 miles.

3. Power Costs Based on actual 1998 power costs including demand factor, energy charge, taxes, and service fees, $0.05/Kw-hr

4. Equipment Costs.

Equipment	Base(1) Rental Cost ($/hr)	Labor Cost ($/hr)	Oper. Cost ($/hr)	Fuel(2) Cost ($/hr)	Mob. &(3) Demob ($/hr)	Total ($/hr)
IT12 Loader	21	17	9	4	2	53
Shredder	12	--	--	incl.	incl.	12
Bulldozer (D8N)	85	17	19	12	2	135
Smeal	42	incl	incl.	incl.	incl.	42
Mixing Unit	12	--	--	incl.	incl.	12

(1) From Nebraska Machinery rental rates for IT12 and D8N. Shredder and mixing units are estimates.
(2) From Caterpillar Handbook, Edition 19 fuel consumption using $1.00/gal for diesel cost.
(3) Based on $2.08/mile at 90 miles one way x 2 trips/176 hours.

A. GROUNDWATER RESTORATION

Restoration costs are based on restoring Mine Units (MU) 1, 2, 3, 4, 5 and 6. MU-1, 2, 3, 4 and 5 are based on actual installed information. Construction of MU-6 is underway.

Mine Unit	Thickness (ft)	No. Patterns	Pattern Size (ft^2)	Porosity	Pore Volume (gals)	Mine Unit Total Area (Acres)
MU-1	19.6	38	10,624	0.29	17,165,000	9.3
MU-2	16.3	52	9,800	0.29	18,018,500	11.7
MU-3	12.5	57	10,284	0.29	15,894,490	13.4
MU-4	12.9	96	10,765	0.29	28,918,420	23.7
MU-5	14.4	187	7,557	0.29	44,142,110	31.8
MU-6	16.2	191	7,561	0.29	50,748,970	34.2
MU-7	15.0	200	10,000	0.29	65,076,000	45.9

MU-1

1) Remove 1 pore volumes (PV) groundwater transfer/sweep.
   - o Produce at 1,150 gpm with (36) 32 gpm downhole pumps (5 HP).
   - o Total horsepower = 180 HP
   - o Time to do work:
     1 PV x 17,165,000 gal/PV x 1 min/1,150 gal x
     1 hour/60 min = 249 hours

   a. Power Cost:
      249 hours x 180 HP x .75 Kw/HP x $0.05/Kw-hr = $1,681
   b. Labor Cost:
      249 hours x 2 man-day/8 hours x $136/man-day = 8,466

      $10,147

      or $0.59/1000 gal

2) Treat 4 PV with R.O and re-inject permeate using a 300 gpm R.O unit.
   - o 4 PV x 17,165,000 gal/PV x 1 min/300 gal x 1 hr/60 min = 3,814 hours

   a. Power cost:

Downhole pump HP	
300 gpm/32 gpm/pump x 5 HP pump	47 HP
Injection Pump	25 HP
R.O System	
R.O Unit pump	123 HP
Permeate pump	40 HP
Waste pump	8 HP
	243 HP

      3,814 hrs x 243 HP x .75 Kw/HP x $0.05/Kw-hr = $34,755

   b. Chemical Cost:
      Antiscalant: $31/gal x 0.20 gal/hr x 3,814 hrs = 23,647
      Reductant: $0.29/lb x 0.56 lb Na2S/1000gal x 4PV
      x 17,165,000 gal/PV= 11,150

   c. Labor Cost:
      3,814 hrs x 2 man-day/8 hours x $136/man-day = $129,676
      Total $199,228

      or $2.90/1,000 gal

3) Recirculate 1 PV with reductant @ 1,150 gpm

   a. Power Cost:

(36) 5 HP downhole pumps =	180 HP
(1) Injection pump =	30 HP
Total HP	210 HP

      210 HP x 249 hrs x .75 Kw/HP x $0.05/Kw-hr = $1,961
   b. Chemical Cost:
      1 PV x 17,165,000 gal/PV x 0.56 lb Na2S/1000 gal
      x $0.29/lb = 2,788
   c. Labor Cost: (see above) 8,466
      Total $13,215

      or $0.77/1000 gal

4) Spare parts, filters, consumables, etc.
for items 1-4 above are estimated to be $16,468/yr
- o Time to do work is 3,358 hours/24 hours
  = 140 days
- a. $16,468/yr x 140/365= $6,316

5) Sampling and Monitoring.
- o Number of wells to be sampled are a minimum of 10 per mine unit or 1/acre plus any monitor wells on excursion.
- a. Sample prior to restoration:
  10 wells x $150/well (32 parameter suite) = $1,500
- b. Phase I sampling (GW transfer/sweep)
  10 wells x $47/well (6 parameters) x 1 month = 470
- c. Phase 2 sampling (4PV R.O., 1PV reductant)
  10 wells x $150/well x 6 months = 9,000
- d. Phase 3 sampling (stabilization)
  10 wells x $150/well x 6 months = 9,000
- e Monitor well sampling:
  14 wells x 2 samples/month x $47 well x 13 months = 17,108
- f. Other lab analysis (radon, urinalysis, etc)
  $806/month x 5 months = 4,030

  Total sampling and monitoring $ 41,108

6) Supervisory labor for restoration work (including 33% overhead factor)
- a. (1) Engineer $6,256/month x 7 months = $43,792
- b. (1) Radiation Technician $5,212/month x 7 months = 36,484

  (Operator wages included in above calculations)

$ 80,276

MU-1 TOTAL **$350,290**

MU-2

1) Remove 1 PV, gw transfer/sweep
   - o 1 PV x 18,018,500 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 261 hours
   - a. 1 PV x 18,018,500 gal/PV x $0.59/1000 gal = $10,631

2) Treat 4 PV with R.O and inject permeate.
   - o 4PV x 18,018,500 gal/PV x 1 min/300 gal x 1 hr/60 min = 4,004 hours
   - a. 4 PV x 18,018,500 gal/PV x $2.90/1000 gal = $209,015

3) Recirculate 1 PV with reductant.
   - o Time = 261 hours
   - a 1PV x 18,018,500 gal/PV x $0.77/1000 gal = $13,874

4) Spare parts, etc.
   - o Total time to do work = 147 days
   - a. $16,468/yr x 147/365 = $6,632

5) Sampling and monitoring - 12 restoration wells plus 14 monitor wells.
   - a. Sample prior to restoration. 12 wells x $150/well (32 parameter suite) = $1,800
   - b Phase I sampling (gw transfer/sweep) 12 wells x $47/well x 1 month (6 parameters) = 564
   - c. Phase 2 sampling (4PV R O., 1PV reductant) 12 wells x $150/well x 6 months = 10,800
   - d. Phase 3 sampling (stabilization) 12 wells x $150/well x 6 months = 10,800
   - e Monitor well sampling 14 wells x 2 samples/month x $47 well x 13 months = 17,108
   - f. Other lab analysis (radon, urinalysis, etc) $806/month x 5 months = 4,030

   $45,102

7) Supervisory Labor (same as MU-1) $80,276

MU-2 TOTAL **$365,530**

MU-3

1)	Remove 1 PV, gw transfer/sweep.		
	o 1 PV x 15,894,490 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 230 hours		
	a. 1 PV x 15,894,490 gal/PV x $0.59/1000 gal =		$9,378
2)	Treat 4 PV with R.O. and inject permeate.		
	o 4PV x 15,894,490 gal/PV x 1 min/300 gal x 1 hr/60 min = 3,532 hours		
	a. 4 PV x 15,894,490 gal/PV x $2.90/1000 gal =		$184,376
3)	Recirculate 1 PV with reductant		
	o Time = 230 hours		
	a. 1PV x 15,894,490 gal/PV x $0.77/1000 gal =		$12,239
4)	Spare parts, etc.		
	o Total time to do work = 166 days		
	a. $16,468/yr x 166/365 =		$7,489
5)	Sampling and monitoring 18 restoration wells plus 14 monitor wells.		
	a. 18 wells x $150/well =	$2,700	
	b 18 wells x $47/well x 1 months =	846	
	c. 18 wells x $150/well x 5 months =	13,500	
	d. 18 wells x $150/well x 6 months =	16,200	
	e 14 wells x 2 samples/month x $47/well x 12 months =	15,792	
	f. Other lab: $806/month x 6 months =	4,836	
	Total		$53,874
6)	Supervisory Labor		
	a. (1) Engineer $6,256/month x 6 months =	$37,536	
	b (1) Radiation Technician $5,212/month x 6 months =	31,272	
	(Operator wages included in above calculations)		
			$ 68,808
	MU-3 TOTAL		**$336,164**

MU-4

1)	Remove 1 PV, gw transfer/sweep.		
	o 1 PV x 28,918,420 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 419 hours		
	a. 1 PV x 28,918,420 gal/PV x $0.59/1000 gal =		$17,062
2)	Treat 4 PV with R.O. and inject permeate.		
	o 4PV x 28,918,420 gal/PV x 1 min/300 gal x 1 hr/60 min = 6,426 hours		
	a 4 PV x 28,918,420 gal/PV x $2.90/1000 gal =		$335,454
3)	Recirculate 1 PV with reductant.		
	o Time = 419 hours		
	a. 1PV x 28,918,420 gal/PV x $0.77/1000 gal =		$22,267
4)	Spare parts, etc		
	o Total time to do work = 303 days		
	a. $16,468/Yr x 303/365 =		$13,671
5)	Sampling and monitoring 25 restoration wells plus 18 monitor wells.		
	a. 25 wells x 150/well=	$3,750	
	b. 25 wells x 47/well x 1 months=	1,175	
	c. 25 wells x 150/well x 9 months=	33,750	
	d. 25 wells x 150/well x 6 months=	22,500	
	e. 18 wells x 2 samples/month x 47/well x 16 months =	27,072	
	f. Other lab: $806/month x 10 months=	8,060	
			$96,307
6)	Supervisory Labor		
	a. (1) Engineer: $6,256/month x 10 months=	$62,560	
	b. (1) Radiation Technician. $5,212/month x 10 months (Operator wages included in above calculations)	52,120	
			$114,680
	MU-4 TOTAL		**$599,441**

MU-5

1)	Remove 1 PV, gw transfer/sweep.		
	o 1 PV x 44,142,110 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 640 hours		
	a. 1 PV x 44,142,110 gal/PV x $0.59/1000 gal =		$26,044
2)	Treat 4 PV with R.O. and inject permeate.		
	o 4PV x 44,142,110 gal/PV x 1 min/300 gal x 1 hr/60 min = 9,809 hours		
	a. 4 PV x 44,142,110 gal/PV x $2.90/1000 gal =		$512,048
3)	Recirculate 1 PV with reductant.		
	o Time = 640 hours		
	a. 1PV x 44,142,110 gal/PV x $0.77/1000 gal =		$33,989
4)	Spare parts, etc		
	o Total time to do work = 462 days		
	a $16,468/yr x 462/365 =		$20,844
5)	Sampling and monitoring 33 restoration wells plus 52 monitor wells		
	a 33 wells x $150/well=	$4,950	
	b 33 wells x $47/well x 1 months=	1,551	
	c 33 wells x 150/well x14 months=	69,300	
	d 33 wells x 150/well x 6 months=	29,700	
	e. 52 wells x 2 samples/month x 47/well x 21 months =	102,648	
	f. Other lab. $806/month x 15 months=	12,090	
			$220,239
6)	Supervisory Labor		
	a. (1) Engineer $6,256/month x 15 months=	$93,840	
	b (1) Radiation Technician. $5,212/month x 15 months (Operator wages included in above calculations)	78,180	
			$172,020
	MU-5 TOTAL		**$985,184**

MU-6

1) Remove 1 PV, gw transfer/sweep
   - o 1 PV x 50,748,970 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 735 hours
   - a. 1 PV x 50,748,970 gal/PV x $0.59/1000 gal = $29,942

2) Treat 4 PV with R.O. and inject permeate
   - o 4PV x 50,748,970 gal/PV x 1 min/300 gal x 1 hr/60 min = 11,278 hours
   - a. 4 PV x 50,748,970 gal/PV x $2.90/1000 gal = $588,688

3) Recirculate 1 PV with reductant.
   - o Time = 735 hours
   - a. 1PV x 50,748,970 gal/PV x $0.77/1000 gal = $39,077

4) Spare parts, etc.
   - o Total time to do work = 531 days
   - a. $16,468/yr x 531/365 = $23,958

5) Sampling and monitoring 33 restoration wells plus 52 monitor wells

a.	33 wells x $150/well=	$4,950	
b.	33 wells x $47/well x 1 months=	1,551	
c.	33 wells x 150/well x1o months=	79,200	
d	33 wells x 150/well x 6 months=	29,700	
e.	52 wells x 2 samples/month x 47/well x 32 months =	156,416	
f.	Other lab: $806/month x 18 months=	14,508	
			$286,325

6) Supervisory Labor:

a.	(1) Engineer: $6,256/month x 18 months=	$112,608	
b.	(1) Radiation Technician $5,212/month x 18 months (Operator wages included in above calculations)	93,816	
			$206,424

MU-6 TOTAL **$1,174,414**

MU-7 (One half of Mine Unit 7 is to be constructed in 1999, the total for MU-7 is calculated below and then one half is included in the surety total.)

1)	Remove 1 PV, gw transfer/sweep.			
	o 1 PV x 65,076,000 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 943 hours			
	a. 1 PV x 65,076,000 gal/PV x $0.59/1000 gal =		$38,395	
2)	Treat 4 PV with R.O. and inject permeate.			
	o 4PV x 65,076,000 gal/PV x 1 min/300 gal x 1 hr/60 min = 14,461 hours			
	a. 4 PV x 65,076,000 gal/PV x $2.90/1000 gal =		$754,882	
3)	Recirculate 1 PV with reductant.			
	o Time = 943 hours			
	a. 1PV x 65,076,000 gal/PV x $0.77/1000 gal =		$50,108	
4)	Spare parts, etc			
	o Total time to do work = 681 days			
	a. $16,468/yr x 681/365 =		$30,725	
5)	Sampling and monitoring 46 restoration wells plus 44 monitor wells.			
	a. 46 wells x $150/well=	$6,900		
	b 46 wells x $47/well x 2 months=	4,324		
	c. 46 wells x 150/well x21 months=	144,900		
	d. 46 wells x 150/well x 6 months=	41,400		
	e. 44 wells x 2 samples/month x 47/well x 29 months =	119,944		
	f. Other lab: $806/month x 23 months=	18,538	$336,006	
6)	Supervisory Labor.			
	a. (1) Engineer: $6,256/month x 23 months=	$143,888		
	b. (1) Radiation Technician: $5,212/month x 23 months (Operator wages included in above calculations)	119,876		
			$263,764	
	MU-7 TOTAL		**$1,473,880**	
	One Half of MU-7			**$736,940**
	TOTAL MU-1, 2, 3, 4, 5, 6 and one half of MU-7 RESTORATION COST			**$4,547,963**

B. WELLFIELD RECLAMATION

Wellfield Reclamation costs are based on removing and disposing of the wellfield pipe at a licensed facility. The soil around the production wells will also be removed and disposed of at a licensed facility.

Mine Unit	2" Prod & Inj. Lines (ft)	#3/8" O2 Hose	1-1/4" Stinger (ft)	2" Prod. Downhole Pipe	Producers	Injectors
MU-1	30,000		43,200	15,200	38	72
MU-2	34,000		47,400	20,800	52	79
MU-3	39,520		57,400	22,800	57	95
MU-4	68,900		101,400	38,400	96	169
MU-5	106,080	66,300	0	74,800	187	221
MU-6	128,700		91,200	76,400	191	304
MU-7	136,500		97,500	80,000	200	325

Pipe Volumes Normal Pipe Size	Wall Thickness (inches)	Pipe O D (Inches)	Volume[1] per Foot (ft^3/ft)
3/8" O2 Hose		0 375	0.0313
2" Sch. 40 downhole	0 154	2.375	0.0074
1-1/4" Sch 40 stinger	0 140	1 660	0.0044
2" SDR 13.5 inj. & prod	0 14815	2.2963	0.0069
4" SDR 35	0 1143	4.2286	0.0103
6" Sch. 40 process pipe	0 280	6.5600	0.0384
6" Trunkline	0 491	6.566	0.0651
8" Trunkline	0 639	8.548	0 1103
10" Trunkline	0 796	10.654	0.1712
12" Trunkline	0 944	12.637	0.2408

MU-1

1) Removal/disposal of 2" production and injection lines. Piping is rated SDR 13.5 and constructed of HDPE.

- o Two inch lines are buried 18-24" deep and can be pulled up with a loader. A two man crew should remove 450 ft per day. Two additional men will shred the pipe

a. Remove pipe:
30,000 ft x 2 man-days/450 ft
x $136/man-day = $18,133

b Shred pipe.
30,000 ft x 2 man-days/450 ft
x $136/man-day = 18,133

c. Equipment:
o IT12 loader, $53/hr x 533 hours = 28,249
o Shredder, $12/hr x 533 hours = 6,396

d. Disposal:
30,000 ft x .0069 ft^3/ ft x
$12.42/$ft^3$ x 1.25(1) = 3,214

74,125

or $2.47/ft

(1) 1.25 factor for void spaces

2) Removal/disposal of trunklines, including trunklines to plant buildings. Piping is rated SDR 13.5

a. Remove pipe:
5,400 ft x 2 man-days/200 ft
x $136/man-day = $7,344

b Shred pipe:
5,400 ft x 2 man-days/200 ft
x $136/man-day = 7,344

c. Equipment:
o IT12 loader, $53/hr x 216 hours = 11,448
o Shredder, $12/hr x 216 hours = 2,592

d Disposal:
6" - 1000 ft x 0.0651 ft^3/ft x
$12.42/$ft^3$ x 1.25 = 1,011
8" - 4,400 ft x 0.1103 ft^3/ft x
$12.42/$ft^3$ x 1.25 = 7,535

37,274

3) Removal/disposal of downhole pipe Downhole pipe is Sch 40 PVC.

- o From experience, 10 wells of downhole pipe can be removed each day with a 3 man crew and a smeal.

a. Removal of downhole pipe
43,200 ft stinger x 3 man-days/6,000 ft
x $136/man-day = 2,938
15,200 ft prod. x 3 man-days/6,000 ft

	x $136/man-day =	1,034	
b.	Shred pipe:		
	43,200 ft x 2 man-days/4,500 ft x $136/man-day =	2,611	
	15,200 ft x 2 man-days/4,500 ft x $136/man-day =	919	
c.	Equipment:		
	Smeal: $42/hour x 78 hours =	3,276	
	Shredder: $12/hour x 78 hours =	936	
d.	Disposal:		
	43,200 ft x .0044 ft³/ft x $12.42/ft³ x 1.25 =	2,951	
	15,200 ft x .0074 ft³/ft x $12.42/ft³ x 1.25 =	1,746	
			$16,411

or $0.26/ft (stinger pipe)
or $0.31/ft (2" production pipe)

4) Well Plugging.

o Assume 700 ft total depth/well average.

a.	Materials:		
	Cement - 564 lbs x $100/ton =	$28	
	Bentonite - 45 lbs x $190/ton =	4	
	Salt - 33 lbs x $56/ton =	1	
	Well Cap	10	
b.	Labor:		
	2 hours/well x 1 day/8 hours x 2 man-days x $136/man-day =	68	
c.	Equipment:		
	Backhoe - 1/2 hour/well x $46/hour =	23	
	Mixing Unit - 2 hours x $12/hour =	24	
		$158/well	
	110 production and injection wells x $158/well =	$17,380	
	11 monitor wells x $158/well =	1,738	
			$19,118

5) Wellfield surface area reclamation

o Remove and dispose of contaminated soil around well, scarify and seed well locations

a.	Remove and dispose of contaminated soil		
	10 ft³/well x 110 wells x 1 cy/27 ft³ x $147/cy =	$5,989	
	20 hours loader x $53/hour =	1,060	
	20 man-hours x $136/8 hours =	340	
b	Recontour and seed		
	9.3 acres x $300/acre =	2,790	
			$10,179

6) Wellfield house dismantle and disposal.

o Dismantle wellfield house (10'x20'x10')

a. Labor:
2 man-days x $136/man-day $272

b. Equipment (IT12)
2 hours x $53/hour = 106

c. Disposal at landfill
$370/load x 6,000 lbs/wellhouse
x 1 load/40,000 lbs = 56
Total per wellhouse $434

2 Wellhouses x $434/wellhouse = $868

MU-1 Total. **$157,975**

MU-2

1)	Removal/disposal of 2" production and injection lines			
	a. 34,000 ft x $2.47/ft =		$83,980	
2)	Removal/disposal of trunklines. Piping is rated SDR 13.5			
	a. Remove pipe: 2,900 ft x 2 man-days/200 ft x $136/man-day =	$3,944		
	b. Shred pipe: 2,900 ft x 2 man-days/200 ft x $136/man-day =	3,944		
	c. Equipment:			
	o 1T12 loader, $53/hr x 116 hours =	6,148		
	o Shredder, $12/hr x 116 hours =	1,392		
	d. Disposal:			
	6" - 1,600 ft x 0.0651 ft³/ft x $12.42/ft³ x 1.25 =	1,617		
	8" - 1,300 ft x 0.1103 ft³/ft x $12.42/ft³ x 1.25 =	2,226		
			19,271	
3)	Removal/disposal of downhole pipe			
	a. 47,400 ft stinger x $0.26/ft =	12,324		
	b. 20,800 ft production x $0.31/ft =	6,448		
			18,772	
4)	Well plugging			
	o 131 production and injection wells. 14 monitoring wells			
	a. 145 wells x $158/well =		22,910	
5)	Surface reclamation			
	a. Removal/disposal of contaminated soil 131 wells x $54/well =	7,074		
	b Recontour, seed 11.7 acres x $300/acre =	3,510		
			10,584	
6)	Wellfield house dismantle/disposal			
	a. 3 wellfield houses x $434/wellfield house =		1,302	
	MU-2 Total			**$156,819**

MU-3

1) Removal/disposal of 2" production and injection lines
   a. 39,520 ft x $2.47/ft = $97,614

2) Removal/disposal of trunklines. Piping is rated SDR 13.5.

   a. Remove pipe.
      2,950 ft x 2 man-days/200 ft
      x $136/man-day = $4,012
   b. Shred pipe:
      2,950 ft x 2 man-days/200 ft
      x $136/man-day = 4,012
   c. Equipment:
      o IT12 loader, $53/hr x 118 hours = 6,254
      o Shredder, $12/hr x 118 hours = 1,416
   d. Disposal:
      8" - 1,450 ft x 0.1103 ft³/ft x
      $12.42/ft³ x 1.25 = 2,483
      12" - 1,500 ft x 0.2408 ft³/ft x
      $12.42/ft³ x 1.25 = 5,608

      23,785

3) Removal/disposal of downhole pipe
   a. 57,400 ft stinger x $0.26/ft = $14,924
   b. 22,800 ft production x $0.31/ft = 7,068

      21,992

4) Well plugging
   o (152 production and injection wells, 14 monitor wells)
   a. 166 wells x $158/well = 26,228

5) Surface reclamation
   a. Removal/disposal of contaminated soil
      166 wells x $54/well = 8,964
   b. Recontour, seed
      13.4 acres x $300/acre = 4,020

      12,984

6) Wellfield house dismantle/disposal
   a. 4 wellfield houses x $434/wellfield house = 1,736

MU-3 Total **$184,339**

MU-4

1)	Removal/disposal of 2" production and injection lines			
	a. 68,900 ft x $2.47/ft=		$170,183	
2)	Removal/disposal of trunklines. Piping is rated SDR 13.5			
	a. Remove pipe:			
	7,400 ft x 2 man-days/200 ft			
	x $136/man-day =	$10,064		
	b. Shred pipe:			
	7,400 ft x 2 man-days/200 ft			
	x $136/man-day =	10,064		
	c. Equipment:			
	o IT12 loader, $53/hr x 296 hours =	15,688		
	o Shredder, $12/hr x 296 hours =	3,552		
	d. Disposal:			
	8" - 5,400 ft x 0.1103 ft³/ft x			
	$12.42/ft³ x 1.25 =	9,247		
	12" - 2,000 ft x 0.2408 ft³/ft x			
	$12.42/ft³ x 1.25 =	7,477		
			56,092	
3)	Removal/disposal of downhole pipe			
	a. 101,400 ft stinger x $0.26/ft=	26,364		
	b. 38,400 ft production x $0.31/ft=	11,904		
			38,268	
4)	Well plugging			
	o (265 production and injection wells, 18 monitor wells)			
	a. 283 wells x $158/well=		44,714	
5)	Surface reclamation			
	a. Removal/disposal of contaminated soil			
	283 wells x $54/well =	15,282		
	b. Recontour, seed			
	25 acres x $300/acre=	7,500		
			22,782	
6)	Wellfield house dismantle/disposal			
	a. 5 wellfield houses x $434/wellfield house =		2,170	
	MU-4 Total			**$334,209**

MU-5

1)	Removal/disposal of 2" production and injection lines		
	a. 106,080 ft x $2.47/ft=		$262,018
2)	Removal/disposal of trunklines Piping is rated SDR 13.5		
	a. Remove pipe:		
	17,800 ft x 2 man-days/200 ft		
	x $136/man-day =	$24,208	
	b. Shred pipe:		
	17,800 ft x 2 man-days/200 ft		
	x $136/man-day =	24,208	
	c. Equipment:		
	o IT12 loader, $53/hr x 712 hours =	37,736	
	o Shredder, $12/hr x 712 hours =	8,544	
	d. Disposal:		
	8" - 3,700 ft x 0.1103 ft³/ft x		
	$12.42/ft³ x 1.25 =	6,336	
	12" - 14,100 ft x 0.2408 ft³/ft x		
	$12.42/ft³ x 1.25 =	52,712	
			153,744
3)	Removal/disposal of downhole pipe		
	a. Dispose:		
	66,300 ft hose x 0.0313ft³/ft x$12.42/cf x 1.25=	32,217	
	Remove:		
	66,300 ft x 1 man-day/1,000ft x $136/man-day=	9,017	
	b. 74,800 ft production x $0.31/ft=	23,188	
			64,422
4)	Well plugging		
	o (408 production and injection wells, 52 monitor wells)		
	a. 460 wells x $158/well=		72,680
5)	Surface reclamation		
	a. Removal/disposal of contaminated soil		
	460 wells x $54/well =	24,840	
	b Recontour, seed		
	32 acres x $300/acre=	9,600	
			34,440
6)	Wellfield house dismantle/disposal		
	a. 7 wellfield houses x $434/wellfield house =		3,038
	MU-5 Total		**$590,342**

MU-6

1)	Removal/disposal of 2" production and injection lines			
	a. 128,700 ft x $2.47/ft=		$317,889	
2)	Removal/disposal of trunklines. Piping is rated SDR 13.5			
	a. Remove pipe:			
	12,000 ft x 2 man-days/200 ft x $136/man-day =	$16,320		
	b. Shred pipe:			
	12,000 ft x 2 man-days/200 ft x $136/man-day =	16,320		
	c Equipment:			
	o IT12 loader, $53/hr x 480 hours =	25,440		
	o Shredder, $12/hr x 480 hours =	5,760		
	d. Disposal:			
	8" - 2,000 ft x 0.1103 ft³/ft x $12.42/ft³ x 1.25 =	3,425		
	12" - 10,000 ft x 0.2408 ft³/ft x $12.42/ft³ x 1.25 =	37,384		
			104,649	
3)	Removal/disposal of downhole pipe			
	a. Dispose:			
	91,200 ft stinger x 0.26/ft =	23,712		
	b 76,400 ft production x $0.31/ft=	23,684		
			47,396	
4)	Well plugging			
	o (495 production and injection wells, 52 monitor wells)			
	a. 547 wells x $158/well=		86,426	
5)	Surface reclamation			
	a. Removal/disposal of contaminated soil			
	432 wells x $54/well =	23,328		
	b Recontour, seed			
	40.2 acres x $300/acre=	12,060		
			35,388	
6)	Wellfield house dismantle/disposal			
	a. 7 wellfield houses x $434/wellfield house =		3,038	
	MU-6 Total			**$594,786**

MU-7 (One half of Mine Unit 7 is to be constructed in 1999, the total for MU-7 is calculated below and then one half is included in the surety total.)

1)	Removal/disposal of 2" production and injection lines			
	a. 136,500 ft x $2.47/ft=		$337,155	
2)	Removal/disposal of trunklines Piping is rated SDR 13.5.			
	a. Remove pipe:			
	5,000 ft x 2 man-days/200 ft			
	x $136/man-day =	$6,800		
	b Shred pipe:			
	5,000 ft x 2 man-days/200 ft			
	x $136/man-day =	6,800		
	c. Equipment:			
	o IT12 loader, $53/hr x 200 hours =	10,600		
	o Shredder, $12/hr x 200 hours =	2,400		
	d. Disposal:			
	8" - 1,000 ft x 0.1103 ft³/ft x			
	$12.42/ft³ x 1.25 =	1,712		
	12" - 5,000 ft x 0.2408 ft³/ft x			
	$12.42/ft³ x 1.25 =	18,692		
			47,004	
3)	Removal/disposal of downhole pipe			
	a. Dispose:			
	• 97,500 ft stinger x 0.26/ft=	25,350		
	b 80,000 ft production x $0.31/ft=	24,800		
			50,150	
4)	Well plugging			
	o (525 production and injection wells, 90 monitor wells)			
	a. 615 wells x $158/well=		97,170	
5)	Surface reclamation			
	a. Removal/disposal of contaminated soil			
	615 wells x $54/well =	33,210		
	b Recontour, seed			
	40.2 acres x $300/acre=	12,060		
			45,270	
6)	Wellfield house dismantle/disposal			
	a. 7 wellfield houses x $434/wellfield house =		3,038	
	MU-7 Total		**$579,787**	
	One half of Mine Unit 7			**$289,894**
TOTAL WELLFIELD RECLAMATION MU-1, 2, 3, 4, 5, 6 and one half of MU-7				**$2,308,364**

C. COMMERCIAL PLANT RECLAMATION/DECOMMISSIONING

The plant interior components: tanks, pumps, steel structure, filters, piping and electrical components are from an in-situ plant that was moved from Texas to the Crow Butte site in 1988. The actual cost to perform this work, escalated to 1998 $'s, is used for bonding purposes with the breakdown of volumes of equipment and other structural items included.

1) Dismantle interior steel, tanks, pumps, filters, piping and electrical components (including labor, equipment, tools, etc.)
The volume of components to be dismantled are detailed below:

Interior structural steel - 75 tons
Tanks - 34 each
Pumps - 30 each
Piping - 8,250 feet
Filters - 4 each
Dryer - 1 each
Electrical boxes - 20 each (estimate)

- $66,600 (1988$) x 162.5 (April 1998 CPI Index)/ 118.3 (1988 average CPI Index) = $91,484

2) Dismantle plant building (including office and lab area)
- 146 tons of steel, siding, girts x $300 (1988 dismantle cost)/ton x 160.3/118.3 = $59,350

3) Decontaminate floor and walls of plant building:
Plant floor area is 30,000 sf. 5,450 sf will be removed and disposed of, and 7,000 sf is in warehouse, shop and water tank areas which will not be contaminated. The remaining floor area is 17,530 sf.
HCl will be sprayed on the floors and walls and recycled in the plant sumps for reuse until neutralized

Wall area is approximately 24,000 sf
Use 1 gal HCl/sf for wall area and 2 gal HCl/sf for floors

a. Material:
   Floors: 17,530 sf x 2 gal HCl/sf x $0.57/gal HCl = $19,984
   Walls: 24,000 sf x 1 gal HCl/sf x $0.57/gal HCl = 13,680
b. Labor:
   2 men x 30 days x $136/man-day = $8,160
c. HCl Disposal (to ponds).
   59,060 gal HCl x 5 HP/30 gpm x 75 Kw/HP x $0.05/Kw-hr= $370

d Decontamination equipment:

Sprayer pump	$500		
Tank (on hand)			
Recycle pump	500		
Sprayer with hose	1,000		
		$2,000	$44,194

4) Dispose of concrete

o Area which would be potentially contaminated and not decontaminated by HCl is 5,450 ft². The areas are in the trough drains, sumps, yellowcake dryer, belt filter, precipitation cells and eluant tanks. Average concrete thickness is 6"

a. Disposal.
5,450 ft² x .5 ft x $147/cy x 1 cy/27 ft³ = $14,836

b Removal:
5,450 ft² x $2.72/sf = $14,824 $29,660

5) Dismantle/dispose of tanks

o There are 27 process tanks to be disposed of at an NRC licensed disposal facility. All of the tanks are fiberglass and will be cut up into pieces for disposal Seven tanks are chemical storage tanks and will be disposed of at a licensed landfill

a. Labor
34 tanks x 2 man-days/tank x $136/man-day = 9,248

b Disposal.
27 tanks @ (14' dia x 14' high x 1/4" wall thickness)
27 tanks x 19.3 ft³/tank x 1.20(1) x $12.42/ft= 7,766

c. Clean and haul chemical tanks. 7 chemical storage tanks will be disposed of in a licensed landfill (1) truckload
$10 fee + $360 = 370
7 tanks x 1 man-day cleaning/tank x $136/man-day = 952

d. Equipment:
Saws, scaffolding, tools, etc = 5,708 $24,044

(1) void space factor

6) Dispose of pumps

o 30 process pumps are in the commercial plant plus 78 downhole pumps. Plant pumps are approximately 5 ft³ each, downhole pumps are 0.5 ft³ each

a. 30 pumps x 5 ft³/pump x $12.42/ft³ = $1,863

b 350 downhole pumps x 0.5 ft³/pump x $12.42/ft³ = 2,174 $4,037

7) Dispose of filters: (2) injection filters, (1) backwash filter and (1) yellowcake filter

a. .4 filters x 100 ft³/filter x $12.42/ft³= $4,968

8) Dispose of yellowcake dryer

o yellowcake dryer system is approximately 400 ft³ in volume

a. 400 ft³ x $12.42/ft³ = $4,968

9) Dispose of piping

o There is a total of 8,250 ft of process piping in the plant with an average diameter of approximately 6". Of the 8,250 ft, roughly 50% is used for yellowcake process. The other pipe is for chemical make-up, raw and potable water.

a NRC licensed disposal
4,125 ft x 0.04 ft³/ft x $12.42/ft³ x 1.25(1) = $2,562

b Landfill disposal
1 load @ $10 fee + $360 = 370 $2,932

(1) void space factor

10) Reclaim plant site

a. Dirtwork
20,000 cy x 1 hour/700 cy x $133/hour = $3,800

b. Seed:
4 acres x $300/acre = 1,200 $5,000

11) Supervisory labor for plant reclamation

a. (1) Engineer
$6,256/month x 6 months = $37,536

b. (1) Radiation Technician
$5,212/month x 6 months
(operator wages included in above calculation) = 31,272 $68,808

TOTAL COMMERCIAL PLANT RECLAMATION/DECOMMISSIONING **$339,445**

D. R.O. BUILDING RECLAMATION/DECOMMISSIONING

Use a factor based on square footage of commercial plant for total reclamation/decommissioning of R.O. building

a. $339,445 x 5,000 ft²/34,000 ft² = $49,918

TOTAL R.O. BUILDING RECLAMATION/DECOMMISSIONING **$49,918**

E. EVAPORATION POND RECLAMATION

Pond reclamation consists of removal and disposal of the pond liners, piping, and sludge to an NRC licensed disposal facility. The pond earthen embankments will be leveled, top soiled and seeded. The liner will be cut in sections and stacked for shipment.

1) Removal and disposal of pond liner systems

a. Five solar evaporation ponds at 250,000 ft²/each at commercial plant
Total thickness of liners is 100 mils.
5 ponds x 250,000 ft²/pond x 0.00833 ft thick x 1.25(1) x $12.42/ft³ = $161,654

b. Two solar evaporation ponds at R&D plant
Total liner thickness is 36 mils.
2 ponds x 50,000 ft² x 0.0030 ft thick x 1.25 x $12.42/ft³ = $4,657

c Labor for liner and pipe removal
Cut and stack 40,000 ft²/day with a four man crew (5 ponds x 250,000 ft²/pond + 2 ponds x 50,000 ft²/pond) x 4 man-days/40,000 ft² x $136/man-day = $18,360

d. Equipment for liner and pipe removal
Loader
176 hours x $53/hour = $9,328

$193,999

(1) void space factor

2) Removal/Disposal of leak detection pipe, SDR 35 pipe

a. Commercial pond pipe removal
5 ponds x 2,100 ft of 4" pipe/pond x .0103 ft³/ft x 1.25 x $12.42/ft³ = $1,679

b. R&D pond pipe removal
2 ponds x 600 ft of 3" pipe/pond x .0069 ft³/ft x 1.25 x $12.42/ft³ = 129

c. Pipe disposal:
24.60 ft³ x $12.42/ft³ x 1.25 = 382

$2,190

3) Removal/disposal of pond sludge

o Pond sludge removal is based on removal of sludge in R&D ponds after operation and restoration.

a. Sludge disposal:
38 barrels x 55 gallons/barrel x 1 cf/7.48 gallons x 1 cy/27 cf = 10.4 cy
Flow through R&D plant was 101,625,362 gallons, therefore, 1 cy of sludge per 9,772,000 gallons processed. Total flow for 1991 to 1997 will be approximately 6,066,700,000 gallons
6,066,700,000 gallons x 1 cy/9,772,000 gallons x $147/cy = $91,261

b. Labor
532 cy x 3 man-days/25 cy x $136/man-day = 8,682

c. Equipment (IT12):
$53/hour x 100 hours = 5,300

$105,243

4) Reclaim ponds.

- o Dirtwork volume per pond is approximately 60,000 cy/pond at commercial and 30,000 cy total at R&D based on post construction surveys
- o Total earthwork volume is 330,000 cy
- o Average dozing distance is 150 ft. A D8 will get 700 cy per hour(1).

a. Dirtwork:
330,000 cy x 1 hour/700 cy x $133 (including operator)/hour = $62,700

b Topsoil placement and seed
30 acres x $300/acre = 9,000

$71,700

(1) Caterpillar Handbook, Edition 19

5) Supervisory labor for pond reclamation

a (1) Engineer
$6,256/month x 3 months = $18,768

b (1) Radiation Technician
$5,212/month x 3 months (operator wages included in above calculation) = 15,636

$34,404

TOTAL EVAPORATION POND RECLAMATION **$407,536**

F. MISCELLANEOUS SITE RECLAMATION

1)	Reclaim/seed main access road.		
	a Road dirtwork.		
	4,000' long x 25' wide x 1' deep x		
	1 cy/27 ft^3 = 3,704 cy		
	3,704 cy x 1 hour/200 cy x $133/hour =	$2,463	
	b Wellfield road dirtwork:		
	25,000' long x 12' wide x 1/2' deep x		
	1cy/27 ft^3 = 5,556 cy		
	5,556 cy x 1hour/200cy x $133/hour=	3,695	
	c. Seed roadway:		
	2.3 acres x $300/acre =	690	
			$6,848
2)	Remove/dispose of pipe from commercial plant to ponds and from commercial plant to R.O. building.		
	o Pond pipeline (2) at 2,000' = 4,000 ft		
	o Pipe to R.O. (4) at 300' = 1,200 ft		
	o 5,200' average size 4" Sch 40		
	a Disposal		
	5,200 ft x .021 ft^3 x $12.42 ft^3 x 1.25 =	$1,695	
	b. Removal labor		
	5,200 ft x 3 man-days/200 ft x $136/man-day =	10,608	
	c Equipment:		
	o Loader:		
	5 days x $53/hour x 8 hours/day =	2,120	
	o Shredder.		
	5 days x $12/hour x 8 hours/day =	480	
			$14,903
3)	Remove electrical facilities.		
	a. Remove HV lines:		
	6,000 ft of HV line at $0.59/ft =	$3,540	
	b. Remove substations	1,175	
			$4,715
4)	Supervisory Labor		
	a. (1) Engineer		
	$6,256/month x 3 months =	$18,768	
	b. (1) Radiation Technician		
	$5,212/month x 3 months		
	(Operator wages included		
	in above calculations) =	15,636	
			$34,404
TOTAL MISCELLANEOUS SITE RECLAMATION			**$60,870**

G. DEEP DISPOSAL WELL RECLAMATION

Attachment A includes the cost estimate for the deep well plugging , abandonment and site reclamation. This information is from the June 6, 1996 Completion of Construction Report - Crow Butte Resources, Inc., Class I UIC Well submitted to the NDEQ A summary of the cost is given below, escalated to 1998 $.

1) Plugging and Abandonment $59,026 x 1.06=	$62,568	
2) Site Reclamation $2,346 x 1.06=	2,487	
TOTAL DEEP DISPOSAL WELL RECLAMATION		**$65,055**

H. I - 196 BRULE AQUIFER RESTORATION

The following estimate is based on the May 28, 1996 Remediation Plan using six pore volumes (pv) as the total water extracted.

1)Pump Wells I96a, j & n (Ground Water Sweep)		
a.Power:		
337,758 gals/pv x 3 pv x 1min/3gal x 1 hour/60min x 3kw x $0.05/kwhr=	$844	
b.Manpower:		
234 days x 0.13 man-day/ day x $136/man-day =	4,137	
		4,981
2) Bi-weekly sampling (in-house analyses)		
234 days x 1 man-day /14days x $136/man-day=		2,273
3) Bi-weekly I - 196i, m, l sampling		2,273
(Same as # 2)		
4) Pump additional wells:		
a. Pump from additionaal wells		
(Same as 1-3 above)	9,527	
b. Drill four additional wells.		
4 wells x 50 ft x $26 =	5,200	
		14,727
5) Well Abandonment		
a. 14 wells x $158/well=		2,212
TOTAL I-196 RESTORATION		**$26,466**

ENCLOSURE 3

Total Restoration and Reclamation Cost Estimate (Revised December 1998)		
I.	GROUNDWATER RESTORATION COST	$9,760,435
II.	EQUIPMENT REMOVAL & DISPOSAL COST	$141,975
III.	BUILDING DEMOLITION AND DISPOSAL COST	$1,647,318
IV.	WELLFIELD BUILDINGS & EQUIPMENT REMOVAL & DISPOSAL COST	$1,678,020
V.	WELL ABANDONMENT COST	$1,213,077
VI.	WELLFIELD AND SATELLITE SURFACE RECLAMATION COST	$82,160
VII.	TOTAL MISCELLANEOUS RECLAMATION COST	$579,441
	SUBTOTAL RECLAMATION AND RESTORATION COST ESTIMATE	$15,102,426
	OVERHEAD AND MANAGEMENT (10%)	$1,510,243
	SUBTOTAL	$16,612,669
	15% CONTINGENCY	$2,491,900
	TOTAL	$19,104,569
	TOTAL CALCULATED SURETY (IN 1998 DOLLARS)	$19,104,600

Enclosure 3

nd Water Restoration	A-Wellfield	B-[redacted]eld	C-Wellfield	C-19N Pattern	C-Hau[redacted]s	D-Wellfield	E-Wellfield	F-Wellfield	H-Wellfield
ssumptions									
Wellfield Area (ft2)	151900	690900	1274000	32500		279500	994500	2769000	780000
Wellfield Area (acres)	3.49	15.86	29.25	0.75	0.00	6.42	22.83	63.57	17.91
Affected Ore Zone Area (ft2)	151900	690900	1274000	32500	0	279500	994500	2769000	780000
Avg. Completed Thickness	15	15	15	15		15	15	15	15
Porosity	0.27	0.27	0.27	0.27		0.27	0.27	0.27	0.27
Flare Factor	2.94	2.94	2.94	2.94		2.94	2.94	2.94	2.94
Affected Volume (ft3)	6698790	30468690	56183400	1433250	1360000	12325950	43857450	122112900	34398000
Kgallons per Pore Volume	13529	61535	113468	2895	10173	24893	88575	246619	69470
nber of Patterns in Unit(s)									
Current	31	141	196	5	0	43	153	426	0
Total Estimated	31	141	196	5	0	43	153	459	100
nber of Wells in Unit(s)									
Production Wells	27	141	192			45	143	492	0
Current	0	0	0			0	0	30	138
Estimated next report period	27	141	192			45	143	522	138
Total Estimated									
Injection Wells	50	319	343			91	307	786	0
Current	0	0	0	Wells		0	0	69	222
Estimated next report period	50	319	343	included		91	307	855	222
Total Estimated				under					
Monitor Wells	18	67	78	C-Wellfield		38	86	134	81
Current	0	0	0			0	0	0	0
Estimated next report period	18	67	78			38	86	134	81
Total Estimated									
Restoration Wells	13	18	10			0	0	3	0
Current	0	20	10			0	0	10	0
Estimated next report period	13	38	35			15	30	35	30
Total Estimated	108	565	648	0	0	189	566	1546	471
Number of Wells per Wellfield	4093								
Total Number of Wells	500	450	550	550	550	600	550	650	500
Average Well Depth (ft)									
Restoration Well Installation Costs	0	20	25	0	0	15	30	32	30
Number of Restoration Wells	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000
Well Installation Unit Cost ($/Well)	$0	$80,000	$100,000	$0	$0	$60,000	$120,000	$128,000	$120,000
Subtotal Restoration Well Installation Costs per Wellfield	**$608,000**								
Total Restoration Well Installation Costs									
I. **Ground Water Sweep Costs**	1	1	1	1	1	1	1	1	1
PV's Required	13529	61535	113468	2895	10173	24893	88575	246619	69470
Total Kgals for Treatment	$0.77	$0.77	$0.77	$0.77	$0.77	$0.77	$0.77	$0.77	$0.77
Ground Water Sweep Unit Cost ($/Kgal)	$10,358	$47,114	$86,877	$2,216	$7,789	$19,060	$67,817	$188,824	$53,190
Subtotal Ground Water Sweep Costs per Wellfield	**$483,245**								
Total Ground Water Sweep Costs									
II. **Reverse Osmosis Costs**	5	5	5	5	5	5	5	5	5
PV's Required	67644	307673	567340	14473	50864	124467	442873	1233096	347351
Total Kgals for Treatment									

ound Water Restoration	A-Wellfield	[redacted]ield	C-Wellfield	C-19N Pattern	C-Ha[redacted]lfts	D-Wellfield	E-Wellfield	F-Wellfield	H-Wellfield
Reverse Osmosis Unit Cost ($/Kgal)	$1.33	$1.33	$1.33	$1.33	[redacted]3	$1.33	$1.33	$1.33	$1.33
Subtotal Reverse Osmosis Costs per Wellfield	$89,669	$407,851	$752,066	$19,185	[redacted]425	$164,994	$587,072	$1,634,592	$460,448
Total Reverse Osmosis Costs	**$4,183,302**								
Chemical Reductant Costs									
Number of Patterns	27	172	196	5		43	153	413	138
Chemical Reductant Unit Cost ($/pattern)	$245	$245	$245	$245		$245	$245	$245	$245
Subtotal Chemical Reductant Costs per Wellfield	$6,615	$42,140	$48,020	$1,225	$0	$10,535	$37,485	$101,185	$33,810
Total Chemical Reductant Costs	**$281,015**								
Elution Costs									
A. Elution Processing Costs									
Kgals/Elution Required	35000	35000	35000	35000	35000	35000	35000	35000	35000
Number of Elutions	2	11	19	1	2	4	15	42	12
Processing Unit Cost ($/Elution)	$525	$525	$525	$525	$525	$525	$525	$525	$525
Subtotal Processing Costs	$1,050	$5,775	$9,975	$525	$1,050	$2,100	$7,875	$22,050	$6,300
B. Deep Well Injection Costs									
Deep Well Injection Volume (Kgals/Elution)	12	12	12	12	12	12	12	12	12
Total Kgals for Injection	24	132	228	12	24	48	180	504	144
Deep Well Injection Unit Cost ($/Kgals)	$4.60	$4.60	$4.60	$4.60	$4.60	$4.60	$4.60	$4.60	$4.60
Subtotal Deep Well Injection Costs	$110	$607	$1,049	$55	$110	$221	$828	$2,319	$663
Subtotal Elution Costs per Wellfield	$1,160	$6,382	$11,024	$580	$1,160	$2,321	$8,703	$24,369	$6,963
Total Elution Costs	**$62,662**								
Monitoring and Sampling Costs									
A. Restoration Well Sampling									
Estimated Restoration Period (Years)	5	5	5	5	2	5	5	5	5
1. Well Sampling prior to restoration start									
# of Wells	5	20	31	5	7	9	31	21	6
$/sample	$150	$150	$150	$150	$150	$150	$150	$150	$150
2. Restoration Progress Sampling									
# of Wells	5	20	31	5	7	9	31	21	6
$/sample	$150	$150	$150	$150	$150	$150	$150	$150	$150
Samples/Year	1	1	1	1	1	1	1	1	1
# of Wells	5	20	31	5	7	9	31	21	6
$/sample	$34	$34	$34	$34	$34	$34	$34	$34	$34
Samples/Year	6	6	6	6	6	6	6	6	6
3. UCL Sampling									
# of Wells	18	70	78	5	20	29	55	89	69
$/sample	$19	$19	$19	$19	$19	$19	$19	$19	$19
Samples/Year	6	6	6	6	6	3	6	6	6
Sub-total Restoration Analyses	$19,860	$78,300	$103,980	$12,450	$10,566	$25,545	$90,870	$91,050	$50,850
B. Short-term Stability									
Estimated Stabilization Period (Months)	12	12	12	12	12	12	12	12	12
# of Wells	6	56	44	6	2	19	28	89	69
Samples/Year	6	6	6	6	6	6	6	6	6
$/sample	$19	$19	$19	$19	$19	$19	$19	$19	$19
# of Wells	5	20	31	6	2	9	31	21	6
Samples/Year	6	6	6	6	6	6	6	6	6
$/sample	$34	$34	$34	$34	$34	$34	$34	$34	$34

und Water Restoration	A-Wellfield	B[redacted]ld	C-Wellfield	C-19N Pattern	C-Hat[redacted]	D-Wellfield	E-Wellfield	F-Wellfield	H-Wellfield
# of Wells	5	20	31	6	[redacted]2	9	31	21	6
Samples/Year	2	2	2	2	2	2	2	2	2
$/sample	$150	$150	$150	$150	$150	$150	$150	$150	$150
Sub-total Short-term Analyses	$3,204	$16,464	$20,640	$3,708	$1,236	$6,702	$18,816	$20,730	$10,890
Subtotal Monitoring and Sampling Costs per Wellfield	$23,064	$94,764	$124,620	$16,158	$11,802	$32,247	$109,686	$111,780	$61,740
Total Monitoring and Sampling Costs	**$585,861**								
Mechanical Integrity Test (MIT) Costs									
Five Year MIT Unit Cost ($/well)	$94	$94	$94	$94	$94	$94	$94	$94	$94
Number of Wells (30% of Inj. and Rest. Wells)	19	107	113	0	0	32	101	267	76
Subtotal Mechanical Integrity Testing Costs per Wellfield	$1,777	$10,067	$10,660	$0	$0	$2,989	$9,503	$25,098	$7,106
Total Mechanical Integrity Testing Cost	**$67,200**								
)TAL RESTORATION COST PER WELLFIELD	$132,643	$688,318	$1,133,267	$39,364	$88,176	$292,146	$940,266	$2,213,848	$743,257
)TAL WELLFIELD RESTORATION COST	**$6,271,285**								

Building Utility Costs	Central Plant	Main Office	Satellite No.1	Satellite No.2	Satellite No.3
Electricity ($/Month)	$600	$1,000	$750	$750	$750
Propane ($/Month)	$0	$0	$1,600	$0	$1,000
Natural Gas ($/Month)	$1,400	$180	$0	$1,300	$0
Number of Months	48	60	36	48	48
Subtotal Utility Costs per Building	$96,000	$70,800	$84,600	$98,400	$84,000
Total Building Utility Costs	**$433,800**				

II. Irrigation Maintenance and Monitoring Costs	Irrigator No.1	Irrigator No.2
A. Irrigation Maintenance and Repair		
Irrigation Operation Months/Year	6	6
Cost per Month	$667	$667
Total Number of Years	5	5
Subtotal Maintenance and Repair Costs	$20,010	$20,010
B. Irrigation Monitoring and Sampling		
# of Irrigation Fluid Samples/Year	6	6
Cost/sample	$121	$121
# of Vegetation Samples/Year	4	4
Cost/sample	$165	$165
# of Soil Samples/Year	28	32
Cost/sample	$174	$174
# of Soil Water Samples/Year	12	2
Cost/sample	$121	$121
Total Number of Years	5	5
Subtotal Sampling Costs	$38,550	$35,980
Subtotal Maintenance and Monitoring Costs per Irrigator	$58,560	$55,990
Total Irrigation Maintenance and Monitoring Costs	**$114,550**	

VIII. Capital Costs (RO Purchase)	
Purchase/Installation Costs for 500 gpm RO Capacity	$500,000
Total Capital Costs	**$500,000**

IX. Vehicle Operation Costs	
Number of Pickup Trucks/Pulling Units (Gas)	10

round Water Restoration	A-Wellfield	[redacted]lfield	C-Wellfield	C-19N Pattern	C-H[redacted]ifts	D-Wellfield	E-Wellfield	F-Wellfield	H-Wellfield
Operating Unit Cost in $/hr (WDEQ Guideline No.12)	$8.77								
Average Operating Time (Hrs/Year)	1000								
Total Number of Years (Average)	4								
Total Vehicle Operation Costs	**$350,800**								
I. Labor Costs									
Number of Environmental Managers/RSOs	1								
$/Year	$60,000								
Number of Restoration Managers	1								
$/Year	$50,000								
Number of Environmental Technicians	2								
$/Year	$28,000								
Number of Operators/Laborers	7								
$/Year	$28,000								
Number of Maintenance Technicians	2								
$/Year	$28,000								
Number of Years	5								
Total Labor Costs	**$2,090,000**								
TOTAL GROUND WATER RESTORATION COSTS	**$9,760,435**								

ıment Removal & Disposal				Cer[redacted]ant	Satellite No.1	Satellite No.2	Satellite [redacted]				
Removal and Loading Costs											
A.	Tankage										
	Number of Tanks			26	8	14	18				
	Volume of Tank Construction Material (ft^3)			1028	162	290	397				
	1. Labor										
		Number of Persons		3	3	3	3				
		Ft^3/Day		25	25	25	25				
		Number of Days		41	6	12	16				
		$/Day/Person		$112	$112	$112	$112				
	Subtotal Labor Costs			$13,776	$2,016	$4,032	$5,376				
	2. Equipment										
		Number of Days		41	6	12	16				
		$/Day		$338	$338	$338	$338				
	Subtotal Equipment Costs			$13,858	$2,028	$4,056	$5,408				
	Subtotal Tankage Removal and Loading Costs			$27,634	$4,044	$8,088	$10,784				
B.	PVC Pipe										
	PVC Pipe Footage			5000	1000	4000	4000				
	Average PVC Pipe Diameter (inches)			3	3	3	3				
	Shredded PVC Pipe Volume Reduction (ft^3/ft)			0.016	0.016	0.016	0.016				
	Volume of Shredded PVC Pipe (ft^3)			80	16	64	64				
	1. Labor										
		Number of Persons		2	2	2	2				
		Ft/Day		200	200	200	200				
		Number of Days		25	5	20	20				
		$/Day/Person		$112	$112	$112	$112				
	Subtotal Labor Costs			$5,600	$1,120	$4,480	$4,480				
	Subtotal PVC Pipe Removal and Loading Costs			$5,600	$1,120	$4,480	$4,480				
C.	Pumps										
	Number of Pumps			50	10	14	13				
	Average Volume (ft^3/pump)			4.93	4.93	4.93	4.93				
	Volume of Pumps (ft^3)			246.5	49.3	69.02	64.09				
	1. Labor										
		Number of Persons		1	1	1	1				
		Pumps/Day		2	2	2	2				
		Number of Days		25	5	7	7				
		$/Day/Person		$112	$112	$112	$112				
	Subtotal Labor Costs			$2,800	$560	$784	$784				
	Subtotal Pump Removal and Loading Costs			$2,800	$560	$784	$784				
D.	Dryer										
	Dryer Volume (ft^3)			885							
	1. Labor										
		Number of Persons		5							
		Ft^3/Day		175							
		Number of Days		5							
		$/Day/Person		$112							
	Total Labor Cost			$2,800							
	Total Dryer Dismantling and Loading Cost			$2,800							

uipment Removal & Disposal	[redacted] Plant	Satellite No.1	Satellite No.2	Satell[redacted]48
Subtotal Equipment Removal and Loading Costs per Facility	$38,834	$5,724	$13,352	
Total Equipment Removal and Loading Costs	**$73,958**			
Transportation and Disposal Costs (NRC-Licensed Facility)				
A. Tankage				
Volume of Tank Construction Material (ft^3)	1028	162	290	397
Volume for Disposal Assuming 10% Void Space (ft^3)	1131	178	319	436
Transportation and Disposal Unit Cost ($/$ft^3$)	$17.19	$17.19	$17.19	$17.19
Subtotal Tankage Transportation and Disposal Costs	$19,442	$3,060	$5,484	$7,495
B. PVC Pipe				
Volume of Shredded PVC Pipe (ft^3)	80	16	64	64
Volume for Disposal Assuming 10% Void Space (ft^3)	88	18	70	70
Transportation and Disposal Unit Cost ($/$ft^3$)	$17.19	$17.19	$17.19	$17.19
Subtotal PVC Pipe Transportation and Disposal Costs	$1,513	$309	$1,203	$1,203
C. Pumps				
Volume of Pumps (ft^3)	246.5	49.3	69.02	64.09
Volume for Disposal Assuming 10% Void Space (ft^3)	271	54	76	70
Transportation and Disposal Unit Cost ($/$ft^3$)	$17.19	$17.19	$17.19	$17.19
Subtotal PVC Pipe Transportation and Disposal Costs	$4,658	$928	$1,306	$1,203
D. Dryer				
Dryer Volume (ft^3)	885			
Volume for Disposal Assuming Dryer Remains Intact (ft^3)	885			
Transportation and Disposal Unit Cost ($/$ft^3$)	$17.19			
Total Dryer Transportation and Disposal Costs	$15,213			
Subtotal Equipment Transportation and Disposal Costs per Facility	$40,826	$4,297	$7,993	$9,901
Total Equipment Transportation and Disposal Costs	**$63,017**			
III. Health and Safety Costs				
Radiation Safety Equipment	$1,250	$1,250	$1,250	$1,250
Total Health and Safety Costs	**$5,000**			
SUBTOTAL EQUIPMENT REMOVAL AND DISPOSAL COSTS PER FACILITY	$80,910	$11,271	$22,595	$27,199
TOTAL EQUIPMENT REMOVAL AND DISPOSAL COSTS	**$141,975**			

Building Demolition and Disposal	Central Plant	Dryer Building	Satellite No. 1	Satellite No. 2	Satellite No. 3	Sat. No.3 Fab. Shop	Yellow Cake Warehouse	South Warehouse	Suspended Walkway
I. Decontamination Costs									
A. Wall Decontamination									
Area to be Decontaminated (ft^2)	131000	0	0	0	0	0	0	0	0
Application Rate (Gallons/ft^2)	1	1	1	1	1	1	1	1	1
HCl Acid Wash, including labor ($/Gallon)	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50
Subtotal Wall Decontamination Costs	$65,500	$0	$0	$0	$0	$0	$0	$0	$0
B. Concrete Floor Decontamination									
Area to be Decontaminated (ft^2)	17820	0	6000	9600	9600	0	0	0	0
Application Rate (Gallons/ft^2)	4	4	4	4	4	4	4	4	4
HCl Acid Wash, including labor ($/Gallon)	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50
Subtotal Concrete Floor Decontamination Costs	$35,640	$0	$12,000	$19,200	$19,200	$0	$0	$0	$0
C. Deep Well Injection Costs									
Total Kgals for Injection	202.28	0	24	38.4	38.4	0	0	0	0
Deep Well Injection Unit Cost ($/Kgals)	$4.60	$4.60	$4.60	$4.60	$4.60	$4.60	$4.60	$4.60	$4.60
Subtotal Deep Well Injection Costs	$931	$0	$110	$177	$177	$0	$0	$0	$0
Subtotal Decontamination Costs per Building	$102,071	$0	$12,110	$19,377	$19,377	$0	$0	$0	$0
Total Decontamination Costs	**$158,021**								
II. Demolition Costs									
A. Building									
Assumptions:									
Dryer bldg. demolition unit cost of $0.73/$ft^3$ for additional radiation safety equipment									
Volume of Building (ft^3)	794000	30720	192000	320000	320000	37560	91000	333000	5600
Demolition Unit Cost per WDEQ Guideline No. 12 ($/$ft^3$)	$0.152	$0.000	$0.152	$0.152	$0.152	$0.152	$0.152	$0.152	$0.152
Dryer Building Demolition Unit Cost ($/$ft^3$)	$0.00	$0.73	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Subtotal Building Demolition Costs	$120,688	$22,426	$29,184	$48,640	$48,640	$5,709	$13,832	$50,616	$851
B. Concrete Floor									
Area of Concrete Floor (ft^2)	23760	0	8000	12800	12800	0	6500	18000	0
Demolition Unit Cost per WDEQ Guideline No. 12 ($/$ft^2$)	$8.13	$8.13	$8.13	$8.13	$8.13	$8.13	$8.13	$8.13	$8.13
Subtotal Concrete Floor Demolition Costs	$193,169	$0	$65,040	$104,064	$104,064	$0	$52,845	$146,340	$0
C. Concrete Footing									
Length of Concrete Footing (ft)	622	0	360	480	480	0	360	580	0
Demolition Unit Cost per WDEQ Guideline No.12 ($/linear ft)	$11.07	$11.07	$11.07	$11.07	$11.07	$11.07	$11.07	$11.07	$11.07
Subtotal Concrete Footing Demolition Costs	$6,886	$0	$3,985	$5,314	$5,314	$0	$3,985	$6,421	$0
Subtotal Demolition Costs per Building	$320,743	$22,426	$98,209	$158,018	$158,018	$5,709	$70,662	$203,377	$851
Total Demolition Costs	**$1,317,309**								
III. Disposal Costs									
A. Building									
Volume of Building (cy)	29407	1138	7111	11852	11852	1391	3370	12333	207
1. On-Site									
Assumptions:									
On-site disposal cost of $0.54/cy									
Percentage (%)	100	0	100	100	100	100	100	100	100
Volume for Disposal (cubic yards)	29407	0	7111	11852	11852	1391	3370	12333	207
Disposal Unit Cost ($/cy)	$0.54	$0.54	$0.54	$0.54	$0.54	$0.54	$0.54	$0.54	$0.54

Building Demolition and Disposal	Changehouse and Lab Bldg.	Maintenance Building	Main Office	Office Trailers	Process/Fire Water Bldg.	Potable Water Bldg.	Potable Water Tank Slab	Central Plant Tank Slabs	Exxon R&D RO Bldg.
I. Decontamination Costs									
A. Wall Decontamination									
Area to be Decontaminated (ft^2)	0	0	0	0	0	0	0	0	0
Application Rate (Gallons/ft^2)	1	1	1	1	1	1	1	1	1
HCl Acid Wash, including labor ($/Gallon)	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50
Subtotal Wall Decontamination Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0
B. Concrete Floor Decontamination									
Area to be Decontaminated (ft^2)	0	0	0	0	0	0	0	0	1260
Application Rate (Gallons/ft^2)	4	4	4	4	4	4	4	4	4
HCl Acid Wash, including labor ($/Gallon)	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50
Subtotal Concrete Floor Decontamination Costs	$0	$0	$0	$0	$0	$0	$0	$0	$2,520
C. Deep Well Injection Costs									
Total Kgals for Injection	0	0	0	0	0	0	0	0	5.04
Deep Well Injection Unit Cost ($/Kgals)	$4.60	$4.60	$4.60	$4.60	$4.60	$4.60	$4.60	$4.60	$4.60
Subtotal Deep Well Injection Costs	$0	$0	$0	$0	$0	$0	$0	$0	$23
Subtotal Decontamination Costs per Building	$0	$0	$0	$0	$0	$0	$0	$0	$2,543
Total Decontamination Costs									
II. Demolition Costs									
A. Building									
Assumptions:									
Dryer bldg. demolition unit cost of $0.73/$ft^3$ for additional radiation safety equipment									
Volume of Building (ft^3)	73000	27000	72000	20000	16500	6300	0	0	15120
Demolition Unit Cost per WDEQ Guideline No. 12 ($/$ft^3$)	$0.152	$0.152	$0.152	$0.152	$0.152	$0.152	$0.152	$0.000	$0.000
Dryer Building Demolition Unit Cost ($/$ft^3$)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Subtotal Building Demolition Costs	$11,096	$4,104	$10,944	$3,040	$2,508	$958	$0	$0	$0
B. Concrete Floor									
Area of Concrete Floor (ft^2)	5400	2100	6000	0	800	180	1256	7854	1260
Demolition Unit Cost per WDEQ Guideline No. 12 ($/$ft^2$)	$8.13	$8.13	$8.13	$8.13	$8.13	$8.13	$8.13	$8.13	$8.13
Subtotal Concrete Floor Demolition Costs	$43,902	$17,073	$48,780	$0	$6,504	$1,463	$10,211	$63,853	$10,244
C. Concrete Footing									
Length of Concrete Footing (ft)	300	200	340	0	120	54	0	0	144
Demolition Unit Cost per WDEQ Guideline No.12 ($/linear ft)	$11.07	$11.07	$11.07	$11.07	$11.07	$11.07	$0.00	$0.00	$11.07
Subtotal Concrete Footing Demolition Costs	$3,321	$2,214	$3,764	$0	$1,328	$598	$0	$0	$1,594
Subtotal Demolition Costs per Building	$58,319	$23,391	$63,488	$3,040	$10,340	$3,019	$10,211	$63,853	$11,838
Total Demolition Costs									
III. Disposal Costs									
A. Building									
Volume of Building (cy)	2704	1000	2667	741	611	233	0	0	560
1. On-Site									
Assumptions:									
On-site disposal cost of $0.54/cy									
Percentage (%)	100	100	100	100	100	100	0	0	100
Volume for Disposal (cubic yards)	2704	1000	2667	741	611	233	0	0	560
Disposal Unit Cost ($/cy)	$0.54	$0.54	$0.54	$0.54	$0.54	$0.54	$0.54	$0.54	$0.54

Building Demolition and Disposal	Exxon R&D Process Bldg.	D, E-Wellfield Booster Stat.	Morton No. 1-20 Bdlg.	Vollman No. 33-27 Bdlg.
I. Decontamination Costs				
A. Wall Decontamination				
Area to be Decontaminated (ft^2)	0	0	0	0
Application Rate (Gallons/ft^2)	1	1	1	1
HCl Acid Wash, including labor ($/Gallon)	$0.50	$0.50	$0.50	$0.50
Subtotal Wall Decontamination Costs	$0	$0	$0	$0
B. Concrete Floor Decontamination				
Area to be Decontaminated (ft^2)	1260	0	0	0
Application Rate (Gallons/ft^2)	4	4	4	4
HCl Acid Wash, including labor ($/Gallon)	$0.50	$0.50	$0.50	$0.50
Subtotal Concrete Floor Decontamination Costs	$2,520	$0	$0	$0
C. Deep Well Injection Costs				
Total Kgals for Injection	5.04	0	0	0
Deep Well Injection Unit Cost ($/Kgals)	$4.60	$4.60	$4.60	$4.60
Subtotal Deep Well Injection Costs	$23	$0	$0	$0
Subtotal Decontamination Costs per Building	$2,543	$0	$0	$0
Total Decontamination Costs				
II. Demolition Costs				
A. Building				
Assumptions:				
Dryer bldg. demolition unit cost of $0.73/$ft^3$ for additional radiation safety equipment				
Volume of Building (ft^3)	15120	8640	14400	14400
Demolition Unit Cost per WDEQ Guideline No. 12 ($/$ft^3$)	$0.152	$0.152	$0.152	$0.152
Dryer Building Demolition Unit Cost ($/$ft^3$)	$0.00	$0.00	$0.00	$0.00
Subtotal Building Demolition Costs	$2,298	$1,313	$2,189	$2,189
B. Concrete Floor				
Area of Concrete Floor (ft^2)	1260	0	600	600
Demolition Unit Cost per WDEQ Guideline No. 12 ($/$ft^2$)	$8.13	$8.13	$8.13	$8.13
Subtotal Concrete Floor Demolition Costs	$10,244	$0	$4,878	$4,878
C. Concrete Footing				
Length of Concrete Footing (ft)	144	0	100	100
Demolition Unit Cost per WDEQ Guideline No.12 ($/linear ft)	$11.07	$11.07	$11.07	$11.07
Subtotal Concrete Footing Demolition Costs	$1,594	$0	$1,107	$1,107
Subtotal Demolition Costs per Building	$14,136	$1,313	$8,174	$8,174
Total Demolition Costs				
III. Disposal Costs				
A. Building				
Volume of Building (cy)	560	320	533	533
1. On-Site				
Assumptions:				
On-site disposal cost of $0.54/cy				
Percentage (%)	100	100	100	100
Volume for Disposal (cubic yards)	560	320	533	533
Disposal Unit Cost ($/cy)	$0.54	$0.54	$0.54	$0.54

Building Demolition and Disposal	Central Plant	Dryer Building	Satellite No. 1	Satellite No. 2	Satellite No. 3	Sat. No.3 Fab. Shop	Yellow Cake Warehouse	South Warehouse	Suspended Walkway
Subtotal On-Site Disposal Costs	$15,880	$0	$3,840	$6,400	$6,400	$751	$1,820	$6,660	$112
2. NRC-Licensed Facility									
Percentage (%)	0	100	0	0	0	0	0	0	0
Volume for Disposal (ft^3)	0	2624	0	0	0	0	0	0	0
Volume for Disposal Assuming 10% Void Space (ft^3)	0	2886	0	0	0	0	0	0	0
Transportation and Disposal Unit Cost ($/ft^3$)	$17.19	$6.67	$17.19	$17.19	$17.19	$17.19	$17.19	$17.19	$17.19
Subtotal NRC-Licensed Facility Disposal Costs	$0	$19,250	$0	$0	$0	$0	$0	$0	$0
Subtotal Building Disposal Costs	$15,880	$19,250	$3,840	$6,400	$6,400	$751	$1,820	$6,660	$112
B. Concrete Floor									
Area of Concrete Floor (ft^2)	23760	0	8000	12800	12800	0	6500	18000	0
Average Thickness of Concrete Floor (ft)	0.75	0	0.67	0.67	0.67	0	0.5	0.5	0
Volume of Concrete Floor (ft^3)	17820	0	5360	8576	8576	0	3250	9000	0
Volume of Concrete Floor (cy)	660	0	199	318	318	0	120	333	0
1. On-Site									
Percentage (%)	75	0	75	75	75	0	100	100	0
Volume for Disposal (cy)	495	0	149	238	238	0	120	333	0
Disposal Unit Cost per WDEQ Guideline No.12 ($/cy)	$4.42	$4.42	$4.42	$4.42	$4.42	$4.42	$4.42	$4.42	$4.42
Subtotal On-Site Disposal Costs	$2,188	$0	$658	$1,053	$1,053	$0	$532	$1,473	$0
2. NRC-Licensed Facility									
Assumptions:									
Additional $2.00/$ft^3$ for segregation of concrete									
Percentage (%)	25	0	25	25	25	0	0	0	0
Volume for Disposal (ft^3)	4455	0	1340	2144	2144	0	0	0	0
Segregation and Loading Unit Cost ($/ft^3$)	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00
Transportation and Disposal Unit Cost ($/ft^3$)	$6.67	$6.67	$6.67	$6.67	$6.67	$6.67	$6.67	$6.67	$6.67
Subtotal NRC-Licensed Facility Disposal Costs	$38,625	$0	$11,618	$18,588	$18,588	$0	$0	$0	$0
Subtotal Concrete Floor Disposal Costs	$40,813	$0	$12,276	$19,641	$19,641	$0	$532	$1,473	$0
C. Concrete Footing									
Length of Concrete Footing (ft)	622	0	360	480	480	0	360	580	0
Average Depth of Concrete Footing (ft)	4	4	4	4	4	4	4	4	0
Average Width of Concrete Footing (ft)	1	1	1	1	1	1	1	1	0
Volume of Concrete Footing (ft^3)	2488	0	1440	1920	1920	0	1440	2320	0
Volume of Concrete Footing (cy)	92	0	53	71	71	0	53	86	0
On-ste Disposal Unit Cost per WDEQ Guideline No.12 ($/cy)	$4.42	$4.42	$4.42	$4.42	$4.42	$4.42	$4.42	$4.42	$4.42
Subtotal Concrete Footing Disposal Costs	$407	$0	$236	$314	$314	$0	$236	$380	$0
Subtotal Disposal Costs per Building	$57,100	$19,250	$16,352	$26,355	$26,355	$751	$2,588	$8,513	$112
Total Disposal Costs	**$166,988**								
III. Health and Safety Costs									
Radiation Safety Equipment	$1,000	$1,000	$1,000	$1,000	$1,000	$0	$0	$0	$0
Total Health and Safety Costs	**$5,000**								
SUBTOTAL BUILDING DEMOLITION AND DISPOSAL COSTS	$480,914	$42,676	$127,671	$204,750	$204,750	$6,460	$73,250	$211,890	$963
TOTAL BUILDING DEMOLITION AND DISPOSAL COSTS	**$1,647,318**								

Building Demolition and Disposal	Changehouse and Lab Bldg.	Maintenance Building	Main Office	Office Trailers	Process/Fire Water Bldg.	Potable Water Bldg.	Potable Water Tank Slab	Central Plant Tank Slabs	Exxon R&D RO Bldg.
Subtotal On-Site Disposal Costs	$1,460	$540	$1,440	$400	$330	$126	$0	$0	$302
2. NRC-Licensed Facility									
Percentage (%)	0	0	0	0	0	0	0	0	0
Volume for Disposal (ft^3)	0	0	0	0	0	0	0	0	0
Volume for Disposal Assuming 10% Void Space (ft^3)	0	0	0	0	0	0	0	0	0
Transportation and Disposal Unit Cost ($/$ft^3$)	$17.19	$17.19	$17.19	$17.19	$17.19	$17.19	$17.19	$17.19	$17.19
Subtotal NRC-Licensed Facility Disposal Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal Building Disposal Costs	$1,460	$540	$1,440	$400	$330	$126	$0	$0	$302
B. Concrete Floor									
Area of Concrete Floor (ft^2)	5400	2100	6000	0	800	180	1256	7854	1260
Average Thickness of Concrete Floor (ft)	0.5	0.5	0.5	0	0.5	0.5	1	1	0.5
Volume of Concrete Floor (ft^2)	2700	1050	3000	0	400	90	1256	7854	630
Volume of Concrete Floor (cy)	100	39	111	0	15	3	47	291	23
1. On-Site									
Percentage (%)	100	100	100	0	100	100	100	100	100
Volume for Disposal (cy)	100	39	111	0	15	3	47	291	23
Disposal Unit Cost per WDEQ Guideline No.12 ($/cy)	$4.42	$4.42	$4.42	$4.42	$4.42	$4.42	$4.42	$4.42	$4.42
Subtotal On-Site Disposal Costs	$442	$172	$491	$0	$65	$15	$206	$1,286	$103
2. NRC-Licensed Facility									
Assumptions:									
Additional $2.00/$ft^3$ for segregation of concrete									
Percentage (%)	0	0	0	0	0	0	0	0	0
Volume for Disposal (ft^3)	0	0	0	0	0	0	0	0	0
Segregation and Loading Unit Cost ($/$ft^3$)	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00
Transportation and Disposal Unit Cost ($/$ft^3$)	$6.67	$6.67	$6.67	$6.67	$6.67	$6.67	$6.67	$6.67	$6.67
Subtotal NRC-Licensed Facility Disposal Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal Concrete Floor Disposal Costs	$442	$172	$491	$0	$65	$15	$206	$1,286	$103
C. Concrete Footing									
Length of Concrete Footing (ft)	300	200	340	0	120	54	0	0	144
Average Depth of Concrete Footing (ft)	4	4	4	0	4	4	4	4	4
Average Width of Concrete Footing (ft)	1	1	1	0	1	1	1	1	1
Volume of Concrete Footing (ft^3)	1200	800	1360	0	480	216	0	0	576
Volume of Concrete Footing (cy)	44	30	50	0	18	8	0	0	21
On-site Disposal Unit Cost per WDEQ Guideline No.12 ($/cy)	$4.42	$4.42	$4.42	$4.42	$4.42	$4.42	$4.42	$4.42	$4.42
Subtotal Concrete Footing Disposal Costs	$196	$131	$223	$0	$79	$35	$0	$0	$94
Subtotal Disposal Costs per Building	$2,098	$843	$2,154	$400	$474	$176	$206	$1,286	$499
Total Disposal Costs									
III. Health and Safety Costs									
Radiation Safety Equipment	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Health and Safety Costs									
SUBTOTAL BUILDING DEMOLITION AND DISPOSAL COSTS	$60,417	$24,234	$65,642	$3,440	$10,814	$3,195	$10,417	$65,139	$14,880
TOTAL BUILDING DEMOLITION AND DISPOSAL COSTS									

Building Demolition and Disposal	Exxon R&D Process Bldg.	D, E-Wellfield Booster Stat.	Morton No. 1-20 Bdlg.	Vollman No. 33-27 Bdlg.
Subtotal On-Site Disposal Costs	$302	$173	$288	$288
2. NRC-Licensed Facility				
Percentage (%)	0	0	0	0
Volume for Disposal (ft^3)	0	0	0	0
Volume for Disposal Assuming 10% Void Space (ft^3)	0	0	0	0
Transportation and Disposal Unit Cost ($/$ft^3$)	$17.19	$17.19	$17.19	$17.19
Subtotal NRC-Licensed Facility Disposal Costs	$0	$0	$0	$0
Subtotal Building Disposal Costs	$302	$173	$288	$288
B. Concrete Floor				
Area of Concrete Floor (ft^2)	1260	0	600	600
Average Thickness of Concrete Floor (ft)	0.5	0	0.5	0.5
Volume of Concrete Floor (ft^3)	630	0	300	300
Volume of Concrete Floor (cy)	23	0	11	11
1. On-Site				
Percentage (%)	100	0	100	100
Volume for Disposal (cy)	23	0	11	11
Disposal Unit Cost per WDEQ Guideline No.12 ($/cy)	$4.42	$4.42	$4.42	$4.42
Subtotal On-Site Disposal Costs	$103	$0	$49	$49
2. NRC-Licensed Facility				
Assumptions:				
Additional $2.00/$ft^3$ for segregation of concrete				
Percentage (%)	0	0	0	0
Volume for Disposal (ft^3)	0	0	0	0
Segregation and Loading Unit Cost ($/$ft^3$)	$2.00	$2.00	$2.00	$2.00
Transportation and Disposal Unit Cost ($/$ft^3$)	$6.67	$6.67	$6.67	$6.67
Subtotal NRC-Licensed Facility Disposal Costs	$0	$0	$0	$0
Subtotal Concrete Floor Disposal Costs	$103	$0	$49	$49
C. Concrete Footing				
Length of Concrete Footing (ft)	144	0	100	100
Average Depth of Concrete Footing (ft)	4	4	4	4
Average Width of Concrete Footing (ft)	1	1	1	1
Volume of Concrete Footing (ft^3)	576	0	400	400
Volume of Concrete Footing (cy)	21	0	15	15
On-ste Disposal Unit Cost per WDEQ Guideline No.12 ($/cy)	$4.42	$4.42	$4.42	$4.42
Subtotal Concrete Footing Disposal Costs	$94	$0	$65	$65
Subtotal Disposal Costs per Building	$499	$173	$402	$402
Total Disposal Costs				
III. Health and Safety Costs	$0	$0	$0	$0
Radiation Safety Equipment				
Total Health and Safety Costs				
SUBTOTAL BUILDING DEMOLITION AND DISPOSAL COSTS	$17,178	$1,486	$8,576	$8,576
TOTAL BUILDING DEMOLITION AND DISPOSAL COSTS				

lfield Buildings & Equipment Removal & Disposal	[redacted]llfield	B-Wellfield	C-Wellfield	D-[redacted]ld	E-Wellfield	F-Wellfield	H-Wellfield
Wellfield Piping							
Assumptions:							
Number of Header Houses per Wellfield	5	18	20	4	15	42	15
Length of Piping per Header House (ft)	15000	15000	15000	15000	15000	15000	15000
Total Length of Piping (ft)	75000	270000	300000	60000	225000	630000	225000
A. Removal and Loading							
Wellfield Piping Removal Unit Cost ($/ft of pipe)	$0.31	$0.31	$0.31	$0.31	$0.31	$0.31	$0.31
Subtotal Wellfield Piping Removal and Loading Costs	$23,250	$83,700	$93,000	$18,600	$69,750	$195,300	$69,750
B. Transport and Disposal Costs (NRC-Licensed Facility)							
Average Diameter of Piping (inches)	2	2	2	2	2	2	2
Chipped Volume Reduction (ft^3/ft)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Chipped Volume per Wellfield (ft^3)	375	1350	1500	300	1125	3150	1125
Volume for Disposal Assuming 10% Void Space (ft^3)	413	1485	1650	330	1238	3465	1238
Transportation and Disposal Unit Cost ($/$ft^3$)	$17.19	$17.19	$17.19	$17.19	$17.19	$17.19	$17.19
Subtotal Wellfield Piping Transport and Disposal Costs	$7,099	$25,527	$28,364	$5,673	$21,281	$59,563	$21,281
Wellfield Piping Costs per Wellfield	$30,349	$109,227	$121,364	$24,273	$91,031	$254,863	$91,031
C. Capitol Costs							
PVC Pipe Shredder	$40,000						
Total Wellfield Piping Costs	**$762,138**						
Well Pumps and Tubing							
Assumptions:							
Pump and tubing removal costs included under ground water restoration labor costs							
60% of production/injection wells contain pumps and/or tubing							
A. Pump and Tubing Transportation and Disposal							
Number of Production Wells	27	141	192	45	143	522	138
Number of Injection Wells	50	319	343	91	307	855	222
1. Pump Volume							
Number of Production Wells with Pumps	16	85	115	27	86	313	83
Average Pump Volume (ft^3)	1	1	1	1	1	1	1
Pump Volume per Wellfield (ft^3)	16	85	115	27	86	313	83
2. Tubing Volume							
Assumptions:							
Average tubing length/wellfield based on average well depth minus 25 ft							
Number of Production Wells with Tubing	16	85	115	27	86	313	83
Number of Injection Wells with Tubing	30	191	206	55	184	513	133
Average Tubing Length per Well (ft)	475	425	525	575	525	625	475
Tubing Length per Wellfield (ft)	21850	117300	168525	47150	141750	516250	102600
Diameter of Production Well Fiberglass Tubing (inches)	2	2	2	2	2	2	2
Diameter of Injection Well HDPE Tubing (inches)	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Chipped Volume Reduction (ft^3/ft)	0.005	0.005	0.005	0.005	0.005	0.005	0.005

ellfield Buildings & Equipment Removal & Disposal		[redacted]/ellfield	B-Wellfield	C-Wellfield	D-[redacted]eld	E-Wellfield	F-Wellfield	H-Wellfield
	Chipped Volume per Wellfield (ft^3)	109	587	843	236	709	2581	513
	Volume of Pump and Tubing (ft^3)	125	672	958	263	795	2894	596
	Volume for Disposal Assuming 10% Void Space (ft^3)	138	739	1054	289	875	3183	656
	Transportation and Disposal Unit Cost ($/ft^3)	$17.19	$17.19	$17.19	$17.19	$17.19	$17.19	$17.19
	Subtotal Pump and Tubing Transport and Disposal Costs	$2,372	$12,703	$18,118	$4,968	$15,041	$54,716	$11,277
Pump and Tubing Costs per Wellfield		$2,372	$12,703	$18,118	$4,968	$15,041	$54,716	$11,277
Total Pump and Tubing Costs		**$119,195**						
		A/B-Wellfields			**D/E-Wellfields**			
Buried Trunkline								
Assumptions:								
A/B-Wellfields use the same trunkline								
D/E-Wellfields use the same trunkline								
Length of Trunkline Trench (ft)		6500		5900	12000		11700	13200
A. Removal and Loading								
Main Pipeline Removal Unit Cost ($/ft of trench)		$0.85		$0.85	$0.85		$0.85	$0.85
Subtotal Trunkline Removal and Loading Costs		$5,525		$5,015	$10,200		$9,945	$11,220
B. Transport and Disposal Costs (NRC-Licensed Facility)								
1. 3" HDPE Trunkline								
Piping Length (ft)		6500		5900	12000		11700	13200
Chipped Volume Reduction (ft^3/ft)		0.022		0.022	0.022		0.022	0.022
Chipped Volume (ft^3)		143		129.8	264		257.4	290.4
2. 10" HDPE Trunkline								
Piping Length (ft)		13000		0	0		0	0
Chipped Volume Reduction (ft^3/ft)		0.277		0.277	0.277		0.277	0.277
Chipped Volume (ft^3)		3601		0	0		0	0
3. 12" HDPE Trunkline								
Piping Length (ft)		0		11800	24000		0	0
Chipped Volume Reduction (ft^3/ft)		0.293		0.293	0.293		0.293	0.293
Chipped Volume (ft^3)		0		3457.4	7032		0	0
4. 14" HDPE Trunkline								
Piping Length (ft)		0		0	0		23400	26400
Chipped Volume Reduction (ft^3/ft)		0.359		0.359	0.359		0.359	0.359
Chipped Volume (ft^3)		0		0	0		8400.6	9477.6
Total Trunkline Chipped Volume (ft^3)		3744		3587.2	7296		8658	9768
Volume for Disposal Assuming 10% Void Space (ft^3)		4118		3946	8026		9524	10745
Transportation and Disposal Unit Cost ($/ft^3)		$17.19		$17.19	$17.19		$17.19	$17.19
Subtotal Trunkline Transport and Disposal Costs		$70,788		$67,832	$137,967		$163,718	$184,707
Trunkline Decommissioning Costs per Wellfield		$76,313		$72,847	$148,167		$173,663	$195,927
Total Trunkline Decommissioning Costs		**$666,917**						
V. Well Houses		90	498	570	151	480	1412	390
Total Quantity								

lfield Buildings & Equipment Removal & Disposal	A-Wellfield	B-Wellfield	C-Wellfield	D-W[redacted]ld	E-Wellfield	F-Wellfield	H-Wellfield
Average Well House Volume (ft^3)	12.5	12.5	12.5	12.5	12.5	12.5	12.5
A. Removal							
Total Volume (ft^3)	1125	6225	7125	1887.5	6000	17650	4875
Demolition Unit Cost per WDEQ Guideline No. 12 ($/ft^3$)	$0.152	$0.152	$0.152	$0.152	$0.152	$0.152	$0.152
Subtotal Well House Demolition Costs	$171	$946	$1,083	$287	$912	$2,683	$741
B. Survey and Decontamination							
Assumptions:							
Cost per Well House	$5	$5	$5	$5	$5	$5	$5
Subtotal Survey and Decontamination Costs	$450	$2,490	$2,850	$755	$2,400	$7,060	$1,950
C. Disposal							
Total Volume (cy)	42	231	264	70	222	654	181
Volume for Disposal Assuming 10% Void Space (cy)	46	254	290	77	244	719	199
Disposal Unit Cost per WDEQ Guideline No.12 ($/cy)	$5.45	$5.45	$5.45	$5.45	$5.45	$5.45	$5.45
Subtotal On-Site Disposal Costs	$251	$1,384	$1,581	$420	$1,330	$3,919	$1,085
Well House Removal and Disposal Costs per Wellfield	$872	$4,820	$5,514	$1,462	$4,642	$13,662	$3,776
Total Well House Removal and Disposal Costs	**$34,748**						
Header Houses							
Total Quantity	5	18	20	4	15	42	15
Average Header House Volume (ft^3)	1600	1600	1600	1600	1600	1600	1600
A. Removal							
Total Volume (ft^3)	8000	28800	32000	6400	24000	67200	24000
Demolition Unit Cost per WDEQ Guideline No. 12 ($/ft^3$)	$0.152	$0.152	$0.152	$0.152	$0.152	$0.152	$0.152
Subtotal Building Demolition Costs	$1,216	$4,378	$4,864	$973	$3,648	$10,214	$3,648
B. Survey and Decontamination							
Assumptions:							
Cost per Header House	$200	$200	$200	$200	$200	$200	$200
Subtotal Survey and Decontamination Costs	$1,000	$3,600	$4,000	$800	$3,000	$8,400	$3,000
C. Disposal							
Total Volume (cy)	296	1067	1185	237	889	2489	889
Volume for Disposal Assuming 10% Void Space (cy)	326	1173	1304	261	978	2738	978
Disposal Unit Cost per WDEQ Guideline No.12 ($/cy)	$5.45	$5.45	$5.45	$5.45	$5.45	$5.45	$5.45
Subtotal On-Site Disposal Costs	$1,777	$6,393	$7,107	$1,422	$5,330	$14,922	$5,330
Header House Removal and Disposal Costs per Wellfield	$3,993	$14,371	$15,971	$3,195	$11,978	$33,536	$11,978
Total Header House Removal and Disposal Costs	**$95,022**						
TOTAL REMOVAL AND DISPOSAL COSTS PER WELLFIELD	$113,899	$141,121	$233,814	$182,065	$122,692	$530,440	$313,989
TOTAL WELLFIELD BUILDINGS AND EQUIPMENT REMOVAL AND DISPOSAL COSTS	**$1,678,020**						

ll Abandonment	A-Wellf[illegible]	B-Wellfield	C-Wellfield	D[illegible]eld	E-Wellfield	F-Wellfield	H-Wellfield
Well Abandonment (Wellfields)							
# of Production Wells	27	141	192	45	143	522	138
# of Injection Wells	50	319	343	91	307	855	222
# of Monitoring Wells	18	67	78	38	86	134	81
#of Restoration Wells	13	38	35	15	30	35	30
Total Number of Wells	108	565	648	189	566	1546	471
Average Diameter of Casing (inches)	5	5	5	5	5	5	5
Average Depth (ft)	500	450	550	600	550	650	500
Well Abandonment Unit Cost ($/well)	$280	$277	$284	$287	$284	$290	$280
Subtotal Abandonment Cost per Wellfield	$30,267	$156,449	$183,773	$54,234	$160,518	$448,804	$131,998
Total Wellfield Abandonment Costs	**$1,166,043**						
Waste Disposal Well Abandonment	**Morton No.1-20**	**Vollman No.33-27**					
A. Well Plugging							
Drill Rig Operation ($/hr)	150	150					
Number of Hours	31	31					
Drill Rig Operating Costs	$4,650	$4,650					
Cementing Costs	$7,500	$7,500					
Equipment Transport Costs	$1,000	$1,000					
Well Cap Welding Costs	$1,000	$1,000					
Brine Makeup and Injection Costs	$1,500	$1,500					
Subtotal Well Plugging Costs per Well	$15,650	$15,650					
B. Pump Dismantling and Decontamination							
Number of Persons	2	2					
Number of Pumps	2	2					
Pumps/Day	0.5	0.5					
Number of Days	4	4					
$/Day/Person	$112	$112					
Subtotal Dismantling and Decon Costs per Well	$896	$896					
C. Tubing String Disposal (NRC-Licensed Facility)							
Length of Tubing String (ft)	9000	9000					
Diameter of Tubing String (inches)	2.875	2.875					
Volume of Tubing String (ft^3)	406	406					
Transportation and Disposal Unit Cost ($/$ft^3$)	$17.19	$17.19					
Subtotal Tubing String Disposal Costs per Well	$6,971	$6,971					
Subtotal Waste Disposal Well Abandonment Costs per Well	$23,517	$23,517					
Total Waste Disposal Well Abandonment Costs	**$47,034**						
TOTAL WELL ABANDONMENT COSTS	**$1,213,077**						

ield and Satellite Surface Reclamation	A/B-Wellfield	C-Wellfield	D-[redacted]ld	E-Wellfield	F-Wellfield	H-Wellfield
Wellfield Pattern Area Reclamation						
Pattern Area (acres)	25	31	9	28	100	25
Disking/Seeding Unit Cost ($/acre)	$200	$200	$200	$200	$200	$200
Subtotal Pattern Area Reclamation Costs per Wellfield	$5,000	$6,200	$1,800	$5,600	$20,000	$5,000
Total Wellfield Pattern Area Reclamation Costs	**$43,600**					
Wellfield Road Reclamation						
A. Road Construction Before January 1, 1997						
Length of Wellfield Roads (1000 ft)	12.2	11.3	2.4	13.3	15	0
Wellfield Road Reclamation Unit Cost ($/1000 ft)	$580	$580	$580	$580	$580	$580
Subtotal Pre-1997 Wellfield Road Reclamation Costs	$7,076	$6,554	$1,392	$7,714	$8,700	$0
B. Road Construction After January 1, 1997						
Length of Wellfield Roads (1000 ft)	0	0	0	0	2.4	6
Wellfield Road Reclamation Unit Cost ($/1000 ft)	$299	$299	$299	$299	$299	$299
Subtotal Post-1997 Wellfield Road Reclamation Costs	$0	$0	$0	$0	$718	$1,794
Subtotal Road Reclamation Costs per Wellfield	$7,076	$6,554	$1,392	$7,714	$9,418	$1,794
Total Wellfield Road Reclamation Costs	**$33,948**					
BTOTAL SURFACE RECLAMATION COSTS PER WELLFIELD	$12,076	$12,754	$3,192	$13,314	$29,418	$6,794
)TAL WELLFIELD SURFACE RECLAMATION COSTS	**$77,548**					
Satellite Area Reclamation	**Satellite No.1**	**Satellite No.2**	**Satellite No.3**			
Assumptions:						
Area of Disturbance (acres)	1	1	1			
Average Depth of Stripped Topsoil (ft)	1	0.67	0.67			
Surface Grade: Level Ground						
Average Length of Topsoil Haul (ft)	1000	500	500			
A. Ripping Overburden with Dozer						
Ripping Unit Cost per WDEQ Guideline No.12, App.11 ($/acre)	$581.67	$581.67	$581.67			
Subtotal Ripping Costs	$582	$582	$582			
B. Topsoil Application with Scraper						
Volume of Topsoil Removed (cy)	1613	1081	1081			
Application Unit Cost per WDEQ Guideline No.12, App.C ($/cy)	$0.60	$0.60	$0.60			
Subtotal Topsoil Application Costs	$968	$649	$649			
C. Discing and Seeding						
Discing/Seeding Unit Cost ($/acre)	$200	$200	$200			
Subtotal Discing/Seeding Costs	$200	$200	$200			
Subtotal Surface Reclamation Costs per Satellite	$1,750	$1,431	$1,431			
Total Satellite Building Area Reclamation Costs	**$4,612**					
OTAL WELLFIELD AND SATELLITE SURFACE RECLAMATION COSTS	**$82,160**					

WF REC

Miscellaneous Reclamation				
I. CPF/Office Area Reclamation				
Assumptions				
Concrete, asphalt, and building material used to backfill low areas				
No topsoil salvaged or applied (area is pre-law)				
CPF/Office area = 10 acres				
A. Ripping and Hauling Asphalt				
Assumptions				
Average haul distance (ft)	500			
Surface grade (%)	0%			
Average Thickness of Asphalt (ft)	0.5			
Surface Area (acres)	3.4			
Ripping Unit Cost per WDEQ Guideline No.12, App.I ($/acre)	$418.80			
Volume of Asphalt (cy)	2743			
Hauling Unit Cost per WDEQ Guideline No.12, App.C ($/cy)	$0.50			
Total Asphalt Ripping and Hauling Cost	$2,795			
B. Borrow Cover				
1. Topsoil Removal/Replacement				
Assumptions				
Surface area of borrow area (acres)	3			
Six inches of topsoil removed and replaced at borrow area				
Volume of topsoil (cy)	2420			
Topsoil Removal/Replacement Unit Cost ($/cy)	$1.00			
Total Topsoil Removal/Replacement Cost	$2,420			
2. Borrow Application				
Assumptions				
Final borrow cover depth will range from 0 to 4 ft, average = 1 ft				
Average haul distance = 1000 ft				
Surface grade (%)	0%			
Borrow Volume (cy)	16133			
Borrow Cover Unit Cost per WDEQ Guideline No.12, App.C ($/cy)	$0.60			
Total Borrow Application Cost	$9,680			
Total Borrow Cover Cost	$12,100			
C. Discing/Seeding				
Assumptions				
Includes discing/seeding of borrow area (3 acres)				
Surface Area (acres)	13			
Discing/Seeding Unit Cost ($/acre)	$200			
Total Discing/Seeding Costs	$2,600			
Total CPF/Office Area Reclamation	**$17,495**			
Access Road Reclamation	**CPF/Office Area**	**Satellite No. 1**	**Satellite No. 3**	**Vollman No. 33-27**
A. Assumptions				
CPF/Office Area Road is pre-law (no topsoil applied)				
Surface grade	5%	0%	0%	0%
Length of road (miles)	2.5	3	1	1
Average road width (ft)	25	30	30	25
B. Ripping and Hauling Asphalt				
Assumptions				
Average haul distance (miles)	1.25	0	0	0
Average Thickness of Asphalt (ft)	0.5	0	0	0
Asphalt Surface Area (acres)	7.6	0.0	0.0	0.0
Ripping Unit Cost per WDEQ Guideline No.12, App.I ($/acre)	$418.80	$418.80	$418.80	$418.80
Volume of Asphalt (cy)	6111	0	0	0
Hauling Unit Cost per WDEQ Guideline No.12, App.C ($/cy)	$1.61	$0.00	$0.00	$0.00
Subtotal Asphalt Ripping and Hauling Costs	$13,012	$0	$0	$0
B. Gravel Road Base Removal				
Assumptions				
Average haul distance (ft)	0	1000	1000	1000
Gravel Road Base Width (ft)	0	14	14	10
Gravel Road Base Area (acres)	0.0	5.1	1.7	1.2
Average Road Base Depth (ft)	0	0.5	0.5	0.25
Volume of Road Base (cy)	0	4107	1369	489
Removal Unit Cost per WDEQ Guideline No.12, App.C ($/cy)	$0.00	$0.60	$0.60	$0.60
Subtotal Gravel Road Base Removal Costs	$0	$2,464	$821	$293
C. Ripping Overburden with Dozer				
Overburden Surface Area (acres)	0.0	10.9	3.6	3.0
Ripping Unit Cost per WDEQ Guideline No.12, App.II ($/acre)	$581.67	$581.67	$581.67	$581.67
Subtotal Ripping Overburden Costs	$0	$6,345	$2,115	$1,763

Miscellaneous Reclamation						
D. Topsoil Application						
Assumptions .						
Average haul distance (ft)			0	5000	1500	1500
Topsoil Surface Area (ft^2)			0	475200	158400	132000
Depth of Topsoil (ft)			0	0.5	0.5	0.5
Volume of Topsoil (cy)			0	8800	2933	2444
Topsoil Unit Cost per WDEQ Guideline No.12, App.C ($/cy)			$0.00	$1.27	$0.69	$0.69
Subtotal Topsoil Application Costs			$0	$11,176	$2,024	$1,687
E. Discing/Seeding						
Assumptions						
Surface Area (acres)			7.6	10.9	3.6	3.0
Discing/Seeding Unit Cost ($/acre)			$200	$200	$200	$200
Subtotal Discing/Seeding Costs			$1,515	$2,182	$727	$606
Subtotal Reclamation Costs per Access Road			$14,527	$22,167	$5,687	$4,349
Total Access Road Reclamation Costs			**$46,730**			
III. Wastewater Pipeline Reclamation			**SAT2 to SAT1 WW Pipeline**	**SAT3 to SAT2 PSR**		
A. Pipeline Removal and Loading						
Length of HDPE Pipe Trench (ft)			24000	22000		
Main Pipeline Removal Unit Cost ($/ft of trench)			$0.85	$0.85		
Subtotal Pipeline Removal Costs			$20,400	$18,700		
B. Pipeline Transportation and Disposal (NRC-Licensed Facility)						
Pipe Diameter (inches)			3	4		
Chipped Volume Reduction (ft^3/ft)			0.022	0.032		
Subtotal Volume of Shredded PVC Pipe (ft^3)			528	704		
Transportation and Disposal Unit Cost ($/$ft^3$)			$17.19	$17.19		
Subtotal Pipeline Disposal Costs			$9,076	$12,102		
C. Discing/Seeding						
Assumptions:						
Width of Pipeline Trench (ft)			10	10		
Area of Pipeline Trench (acres)			5.5	5.1		
Discing/Seeding Unit Cost ($/acre)			$200	$200		
Subtotal Discing/Seeding Costs			$1,102	$1,010		
Subtotal Reclamation Costs per Pipeline			$30,578	$31,812		
Total Wastewater Pipeline Reclamation Costs			**$62,390**			
IV. Radium Settling Basin Reclamation			**East Radium Pond**	**West Radium Pond**		
A. Soil Sampling and Monitoring						
Number of Soil Samples			15	15		
$/Sample			$60	$60		
Subtotal Soil Sampling and Monitoring Costs			$900	$900		
B. Liner/Subsoil Removal and Disposal						
Assumptions:						
Clay liner and subsoil constitute by-product material						
Thickness of clay liner (ft)			0.25	0.25		
Thickness of contaminated subsoil (ft)			0.25	0.25		
Removal and Loading Unit Cost based on engineer's design						
report and Cat Performance Handbook						
Width of Pond (ft)			90	90		
Length of Pond (ft)			160	160		
Surface area of pond (ft^2)			14400	14400		
1. Removal and Loading						
Volume of Clay Liner (cy)			267	267		
Clay Liner Removal and Loading Unit Cost ($/cy)			$3	$3		
Subtotal Liner Removal and Loading Costs			$800	$800		
2. Transportation and Disposal						
Volume of Clay Liner (ft^3)			7200	7200		
Transportation and Disposal Unit Cost ($/$ft^3$)			$6.67	$6.67		
Subtotal Liner Transportation and Disposal Costs			$48,024	$48,024		
Subtotal Liner Removal and Disposal Costs			$48,824	$48,824		
C. Topsoil Application						
Assumptions:						
Area of surface disturbance (ft^2)			37500	37500		
Average thickness of topsoil (ft)			1	1		
Average haul distance (ft)			2000	2000		
Surface grade (%)			0%	0%		
Volume of Topsoil (cy)			1,389	1,389		
Topsoil Unit Cost per WDEQ Guideline No.12, App.C ($/cy)			$0.78	$0.78		

Miscellaneous Reclamation					
Subtotal Topsoil Application Costs		$1,083	$1,083		
D. Discing/Seeding					
Assumptions:					
Area of surface disturbance (acres)		1	1		
Discing/Seeding Unit Cost ($/acre)		$200	$200		
Subtotal Discing/Seeding Costs		$200	$200		
Subtotal Reclamation Costs per Radium Pond		$51,007	$51,007		
Total Radium Settling Basin Reclamation Costs		**$102,014**			
V. **Purge Storage Reservoir Reclamation**		**PSR-1**	**PSR-2**		
A. Soil Sampling and Analysis Costs		$3,000	$3,000		
B. Leachate Collection System Removal Costs		$5,000	$0		
C. Topsoil/Subsoil Application					
Assumptions:					
Average haul distance (ft)		1000	150		
Surface grade (%)		0%	0%		
Volume of Topsoil/Subsoil (cy)		83000	74000		
Topsoil/Subsoil Unit Cost per WDEQ Guideline No.12, App.C ($/cy)		$0.60	$0.00		
Topsoil/Subsoil Unit Cost per WDEQ Guideline No.12, App.E ($/cy)		$0.000	0.174		
Subtotal Topsoil/Subsoil Application Costs per Reservoir		$49,800	$12,876		
D. Discing/Seeding					
Surface Area (acres)		6	32		
Discing/Seeding Unit Cost ($/acre)		$200	$200		
Subtotal Discing/Seeding Costs		$1,200	$6,400		
Subtotal Reclamation Costs per Reservoir		$59,000	$22,276		
Total Purge Storage Reservoir Reclamation Costs		**$81,276**			
VI. **Irrigation Area Reclamation**		**Irrigator No. 1A**	**Irrigator No. 1B**	**Irrigator No. 2**	
A. Irrigation Equipment Removal Costs		$2,000	$0	$2,000	
B. Plowing					
Assumptions:					
Plowing Unit Cost ($/acre)		$30	$30	$30	
Irrigation Area (acres)		55	55	116	
Number of Cultivations		2	2	2	
Subtotal Plowing Costs		$3,300	$3,300	$6,960	
C. Discing/Seeding					
Discing/Seeding Unit Cost ($/acre)		$200	$200	$200	
Subtotal Discing/Seeding Costs		$11,000	$11,000	$23,200	
Subtotal Reclamation Costs per Irrigation Area		$16,300	$14,300	$32,160	
Total Irrigation Area Reclamation Costs		**$62,760**			
rilling Fluid Storage Cell Reclamation					
Assumptions:					
Each cell is 100 ft (width) by 100 ft (length) by 10 ft (depth)					
Volume of each cell, discounting side slopes (cy)		3704			
Surface area disturbance associated with each cell (acres)		1			
Average haul distance (ft)		500			
Surface grade (%)		0			
A. Topsoil/Subsoil Application					
Topsoil/Subsoil Unit Cost per WDEQ Guideline No.12, App.C ($/cy)		$0.50			
Topsoil/Subsoil Application Costs per Storage Cell		$1,852			
B. Discing/Seeding					
Discing/Seeding Unit Cost ($/acre)		$200			
Subtotal Discing/Seeding Costs		$200			
Subtotal Reclamation Costs per Storage Cell		$2,052			
Total Number of Storage Cells		5			
Total Drilling Fluid Storage Cell Reclamation Costs		**$10,260**			
VII. **Delineation Drillhole/Mud Pit Reclamation**					
Assumptions:					
Total number of delineation drillholes		850			
Percentage of drillholes that need bentonite in top 100 ft		20%			
Bentonite chips, labor, and seeding costs ($/drillhole)		$160			
Total number of mud pits that need backfilling with backhoe		40			
Mudpit reclamation cost ($/mudpit)		$30			
Area of surface disturbance (acres)		2			
A. Delineation Drillhole Top Off		$27,200			
B. Mud Pit Backfilling		$1,200			
C. Discing/Seeding					
Discing/Seeding Unit Cost ($/acre)		$200			

Miscellaneous Reclamation		
Subtotal Discing/Seeding Costs	$400	
Total Delineation Drillhole/Mud Pit Reclamation Costs	**$28,800**	
IX. Exxon Solvent Extraction (SX) Pond Reclamation		
Assumptions:		
Pond dimensions are 55 ft (width) by 130 ft (length) by 7 ft (depth)		
Liner and sludge constitute by-product material		
Soil beneath liner is not contaminated		
Average thickness of liner and sludge (ft)	1	
Backhoe operation unit cost = $45/hr (not including operator)		
Volume of By-Product Material (ft^3)	7150	
A. Removal and Loading		
1. Equipment		
Number of Backhoes	1	
ft^3/hr	300	
Number of Hours	24	
$/hr/Backhoe	45	
Equipment Costs	$1,073	
2. Labor		
Number of Persons	1	
Number of Hours	24	
$/hr/Person	$14	
Labor Costs	$334	
Total Removal and Loading Costs	$1,407	
B. Transportation and Disposal (NRC-Licensed Facility)		
Transportation and Disposal Unit Cost ($/$ft^3$)	$17.19	
Total Transportation and Disposal Costs	$122,909	
Total Exxon SX Pond Reclamation Costs	**$124,316**	
X. Revegetation of Exxon Reclaimed Lands		
Assumptions:		
Reseeding potential areas of erosion ($/acre)	$200	
Surface Area (acres)	217	
Total Exxon Reclaimed Lands Revegetation Costs	**$43,400**	
TOTAL MISCELLANEOUS RECLAMATION COSTS	**$579,441**	

RADIUM TREATMENT

Assumptions:

1. Based on actual 1998 operating costs from Satellite No. 2

Radium Treatment Costs per 1000 Gallons

Chemical	= $ 0.177
Filtration	= $ 0.021
Electricity	= $ 0.019
By Product Disposal of Sludge	= $ 0.097

TOTAL RADIUM TREATMENT COSTS PER 1000 GALLONS = $ 0.31

GROUNDWATER SWEEP (GWS)

Assumptions:

1. All pumps are 5 hp pumping at 5.0 gpm
2. Cost of electricity = $0.03/kwh
3. All water pumped is treated for radium removal at actual cost of $0.31/1000 gallons
4. All water pumped is disposed at irrigation facility with a 20 hp pump
5. Repair and maintenance costs estimated at $0.03/1000 gallons
6. Process sampling and analysis costs estimated at $0.03/1000 gallons
7. Labor costs are not included

Wellfield Pumping Costs per 1000 Gallons

$$\frac{1000\ \text{gal}}{} \times \frac{5\ \text{hp}}{5\ \text{gpm}} \times \frac{1\ \text{hr}}{60\ \text{min}} \times \frac{0.746\ \text{kwh}}{\text{hp}} \times \frac{\$\ 0.03}{\text{kwh}} = \$\ 0.373$$

Radium Treatment Costs per 1000 Gallons = $ 0.31

Pumping to Irrigator Costs per 1000 Gallons

$$\frac{1000\ \text{gal}}{} \times \frac{20\ \text{hp}}{400\ \text{gpm}} \times \frac{1\ \text{hr}}{60\ \text{min}} \times \frac{0.746\ \text{kwh}}{\text{hp}} \times \frac{\$\ 0.03}{\text{kwh}} = \$\ 0.019$$

Repair and Maintenance Costs per 1000 Gallons = $ 0.03

Process Sampling and Analysis Costs per 1000 Gallons = $ 0.03

TOTAL GWS COSTS PER 1000 GALLONS = **$ 0.77**

REVERSE OSMOSIS (RO)

Assumptions:

1. Based on actual 1998 operating costs at Satellite No. 1. Verified by Hydranautics RO System Design Software, Version 6.0 (1995)
2. Cost of electricity = $0.03/kwh
3. 80% permeate/20% reject split
4. Membrane life of 4 years with a cost of $695 per membrane element
5. Includes cost of pumping from wellfield to RO Unit
6. The 20% reject is treated for radium removal prior to irrigation at actual cost of $0.31/1000 gallons
7. The 20% reject is disposed at irrigation facility with a 20 hp pump at actual cost of $0.019/1000 gallons
8. The permeate is returned to the wellfield with a 20 hp pump at actual cost of $0.019/1000 gallons
9. Process sampling and analysis costs estimated at $0.03/1000 gallons
10. Labor costs are not included

Reverse Osmosis Costs per 1000 Gallons

Electricity	= $ 0.17
Chemicals	= $ 0.26
Membrane Replacement	= $ 0.15
Repair and Maintenance	= $ 0.26
Pumping from Wellfield	= $ 0.37
Pumping to Wellfield	=$ 0.019
Radium Treatment	
$ 0.31 X 0.2	= $ 0.0628
Pumping to Irrigator	
$ 0.019 X 0.2	= $ 0.004
Process Sampling and Analysis	= $ 0.03

TOTAL RO COSTS PER 1000 GALLONS = $ 1.33

CHEMICAL REDUCTANT

Assumptions:

1. Based on actual operating costs during restoration activities
2. H2S introduced to RO permeate at concentration of 400 mg/L
3. Volume distribution varies with each pattern, average = 200,000 gals/pattern (i.e., approximately one pore volume at 50% of pattern areas)
4. Chemical cost = $0.367/lb, includes tank rental and safety equipment
5. Labor costs are not included

Chemical Reductant Costs per Pattern

$$\frac{200\ \text{kgal}}{\text{pattern}} \times \frac{3785\ \text{L}}{1\ \text{kgal}} \times \frac{400\ \text{mg}}{1\ \text{L}} \times \frac{2.205\text{E-}06\ \text{lbs}}{\text{mg}} \times \frac{\$\ 0.367}{\text{lb}} = \$\ 245$$

TOTAL CHEMICAL REDUCTANT COSTS PER PATTERN = $ 245

ELUTION PROCESSING

Assumptions:

1. Based on actual operating costs

TOTAL PROCESSING COSTS PER ELUTION = $ 525

DEEP WELL INJECTION

Assumptions:

1. Pump 75 hp pumping at 45 gpm
2. Cost of electricity = $0.03/kwh
3. Repair and maintenance costs based on average injection volume of 8,000,000 gallons per year
4. Repair and maintenance costs estimated at $1.25/1000 gallons
5. Chemical costs based on average injection volume of 8,000,000 gallons per year
6. Labor costs are not included

Waste Disposal Pumping Costs per 1000 Gallons

$$\frac{1000\ gal}{} \times \frac{75\ hp}{45\ gpm} \times \frac{1\ hr}{60\ min} \times \frac{0.746\ kwh}{hp} \times \frac{\$\ 0.03}{kwh} = \$\ 0.62$$

Repair and Maintenance Costs per 1000 Gallons = $ 1.25

Chemical Costs per 1000 Gallons = $ 2.73

Scale Inhibitor	= $ 1.20
Corrosion Inhibitor	= $ 1.16
Oxygen Scavenger	= $ 0.37

TOTAL DEEP WELL INJECTION COSTS PER 1000 GALLONS = $ 4.60

WELL ABANDONMENT

Assumptions:

1. Based on 1998 PRI contractor costs.
2. Use backhoe for 0.5 hr/well to dig and reclaim pit. Backhoe cost at $45/hr.
3. Use drill rig for 1.25 hr/well to remove liner assembly at a cost of $110/hr.
4. A cementer is used to pump plug gel into well.
5. Use cementer and tow vehicle for 0.5 hr/well. Assume cementer and tow vehicle cost $20/hr to operate.
6. Labor for pulling hoses, running cementer, inserting plug gel, etc. will require 2 workers at $15/hr for 2.5 hrs/well.
7. Materials include a hole plug at $1.75 and one sack of plug gel/100 ft of 5 inch well casing. Cost of plug gel is $6.70/sack.

Well Abandonment Costs per 100 ft of Well Depth

Backhoe				
0.5 hours	X	$ 45	per hour	=$ 22.50
Drill Rig				
1.25 hours	X	$ 110	per hour	=$ 137.50
Cementer/Tow Vehicle				
0.5 hours	X	$ 20	per hour	=$ 10.00
Labor				
5 man hours	X	$ 15.00	per man hour	=$ 75.00
Materials (Fixed Cost)				
1 hole plug	X	$ 1.75	per hole plug	=$ 1.75
		Total Fixed Costs		=$ 246.75

Materials (Variable Cost)				
1 sack plug gel per 100 feet	X	$ 6.70	per sack	=$ 6.70

Cost per Well per Unit of Average Depth

Well Depth (ft)	
450	**=$ 277**
500	**=$ 280**
550	**=$ 284**
600	**=$ 287**
650	**=$ 290**

FIVE YEAR MECHANICAL INTEGRITY TESTS (MIT)

Assumptions:

1. Based on 1998 PRI contractor costs.
2. Use pulling unit for 0.25 hr/well at cost of $30/hr.
3. Use water truck for 0.5 hr/well at cost of $30/hr.
4. Use logging truck for 0.75 hr/well at cost of $45/hr.
5. Labor for operation of pulling unit will require 2 workers at $15/hr
6. Labor for operation of water truck will require 1 worker at $15/hr
7. Labor for operation of logging truck will require 1 worker at $30/hr

MIT Costs per Well

Equipment:

Pulling Unit						
0.25 hours	X	$ 30	per hour			=$ 7.50
Water Truck						
0.5 hours	X	$ 30	per hour			=$ 15.00
Logging Truck						
0.75 hours	X	$ 45	per hour			=$ 33.75

Labor:

Pulling Unit						
0.25 hours	X	$ 15	per hour	X	2 workers	=$ $7.50
Water Truck						
0.5 hours	X	$ 15	per hour			=$ 7.50
Logging Truck						
0.75 hours	X	$ 30	per hour			=$ 22.50

MIT COST PER WELL =$ 94

MAIN PIPELINE REMOVAL

Assumptions:

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

Main Pipeline Removal Costs per ft of Trench

Equipment

Trackhoe

$$\frac{\$\ 1600}{\text{week}} \times \frac{1\ \text{week}}{5\ \text{days}} \times \frac{2\ \text{days}}{1500\ \text{ft}} = \$\ 0.43$$

Fuel

$$\frac{\$\ 9}{\text{hour}} \times \frac{8\ \text{hrs}}{1\ \text{day}} \times \frac{2\ \text{days}}{1500\ \text{ft}} = \$\ 0.10$$

Labor

Trackhoe Operation

$$\frac{\$\ 15}{\text{man hr}} \times \frac{8\ \text{man hrs}}{1\ \text{day}} \times \frac{2\ \text{days}}{1500\ \text{ft}} = \$\ 0.16$$

Pipeline Extraction

$$\frac{\$\ 15}{\text{man hr}} \times \frac{16\ \text{man hrs}}{1\ \text{day}} \times \frac{1\ \text{day}}{1500\ \text{ft}} = \$\ 0.16$$

MAIN PIPELINE REMOVAL COST PER FT OF TRENCH =$ 0.85

WELLFIELD PIPING REMOVAL

Assumptions:

1. Trenching with backhoe at 3000 ft/day
2. Pipeline extraction and backfilling with backhoe at 3000 ft/day
3. Backhoe rental: $750/week
4. Fuel cost: $9/operating hour
5. Backhoe operation requires 1 worker at $15/hour
6. Pipeline extraction requires 2 workers at $15/hour (in addition to trackhoe operator)
7. Operating schedule: 8 hrs/day, 5 days/week

Main Pipeline Removal Costs per ft of Pipe

Equipment

Backhoe

$$\frac{\$\ 750}{\text{week}} \times \frac{1\ \text{week}}{5\ \text{days}} \times \frac{2\ \text{days}}{3000\ \text{ft}} = \$\ 0.10$$

Fuel

$$\frac{\$\ 9}{\text{hour}} \times \frac{8\ \text{hrs}}{1\ \text{day}} \times \frac{2\ \text{days}}{3000\ \text{ft}} = \$\ 0.05$$

Labor

Backhoe Operation

$$\frac{\$\ 15}{\text{man hr}} \times \frac{8\ \text{man hrs}}{1\ \text{day}} \times \frac{2\ \text{days}}{3000\ \text{ft}} = \$\ 0.08$$

Pipeline Extraction

$$\frac{\$\ 15}{\text{man hr}} \times \frac{16\ \text{man hrs}}{1\ \text{day}} \times \frac{1\ \text{day}}{3000\ \text{ft}} = \$\ 0.08$$

MAIN PIPELINE REMOVAL COST PER FT OF PIPE =$ 0.31

WELLFIELD ROAD RECLAMATION

Assumptions (Roads constructed before January 1, 1997):

1. Gravel road base removed at cost of $0.60/cy/1000 ft (WDEQ Guideline No. 12, Appendix C)
2. Gravel road base: average depth = 0.25 ft, average width = 10 ft
3. Roads scarified prior to topsoil application at cost of $30.51/acre (WDEQ Guideline No. 12, Appendix P)
4. Grading of scarified roads prior to topsoil application at cost of $33.27/acre (WDEQ Guideline No. 12, Appendix G)
5. Topsoil applied at cost of $0.60/cy/1000 ft (WDEQ Guideline No. 12, Appendix C, Surface Grade: level ground)
6. Stripped topsoil: average depth = 0.67 ft, average width = 25 ft
7. Discing/seeding cost of $200/acre is based on actual contractor costs

Gravel Road Base Removal Costs per 1000 ft of Road

$$\frac{1000\ ft}{} \times \frac{0.25\ ft}{} \times \frac{10\ ft}{} \times \frac{1\ cy}{27\ ft^3} \times \frac{\$0.60}{cy} = \$\ 56$$

Scarification Costs per 1000 ft of Road

$$\frac{1000\ ft}{} \times \frac{25\ ft}{} \times \frac{1\ acre}{4.356E{+}04\ ft^2} \times \frac{\$30.51}{acre} = \$\ 18$$

Grading Costs per 1000 ft of Road

$$\frac{1000\ ft}{} \times \frac{25\ ft}{} \times \frac{1\ acre}{4.356E{+}04\ ft^2} \times \frac{\$33.27}{acre} = \$\ 19$$

Topsoil Application Costs per 1000 ft of Road

$$\frac{1000\ ft}{} \times \frac{0.67\ ft}{} \times \frac{25\ ft}{} \times \frac{1\ cy}{27\ ft^3} \times \frac{\$0.60}{cy} = \$\ 372$$

Discing/Seeding Costs per 1000 ft of Road

$$\frac{1000\ ft}{} \times \frac{25\ ft}{} \times \frac{1\ acre}{4.356E{+}04\ ft^2} \times \frac{\$200}{acre} = \$\ 115$$

TOTAL WELLFIELD ROAD RECLAMATION COSTS PER 1000 FT OF ROAD (BEFORE JANUARY 1, 1997) = $ 580

Assumptions (Roads constructed after January 1, 1997):

1. Gravel road base will not be removed
2. Roads scarified prior to topsoil application at cost of $30.51/acre (WDEQ Guideline No. 12, Appendix P)
3. Grading of scarified roads prior to topsoil application at cost of $33.27/acre (WDEQ Guideline No. 12, Appendix G)
4. Topsoil applied at cost of $0.60/cy/1000 ft (WDEQ Guideline No. 12, Appendix C, Surface Grade: level ground)
5. Stripped topsoil: average depth = 0.4 ft, average width = 20 ft
6. Discing/seeding cost of $200/acre is based on actual contractor costs

Scarification Costs per 1000 ft of Road

$$\frac{1000\ ft}{} \times \frac{20\ ft}{} \times \frac{1\ acre}{4.356E{+}04\ ft^2} \times \frac{\$30.51}{acre} = \$\ 14$$

Grading Costs per 1000 ft of Road

$$\frac{1000\ ft}{} \times \frac{20\ ft}{} \times \frac{1\ acre}{4.356E{+}04\ ft^2} \times \frac{\$33.27}{acre} = \$\ 15$$

Topsoil Application Costs per 1000 ft of Road

$$\frac{1000\ ft}{} \times \frac{0.40\ ft}{} \times \frac{20\ ft}{} \times \frac{1\ cy}{27\ ft^3} \times \frac{\$0.60}{cy} = \$\ 178$$

Discing/Seeding Costs per 1000 ft of Road

$$\frac{1000\ ft}{} \times \frac{20\ ft}{} \times \frac{1\ acre}{4.356E{+}04\ ft^2} \times \frac{\$200}{acre} = \$\ 92$$

TOTAL WELLFIELD ROAD RECLAMATION COSTS PER 1000 FT OF ROAD (AFTER JANUARY 1, 1997) = $ 299

TRANSPORTATION AND DISPOSAL

Assumptions:

1. Based on actual 1997 costs for transportation to and disposal at an NRC-licensed disposal facility
2. Includes profit of transporter and disposal facility

By-product Material Transportation and Disposal Costs per ft^3

Type of Waste: Sludge, resin, and other by-product type wastes (e.g., tank and building construction materials, PVC/HDPE/fiberglass piping, pumps)

Transportation		Disposal		Total
$1.44 /$ft^3$	+	$15.75 /$ft^3$	=	**$17.19 /$ft^3$**

Type of Waste: Soil, sand, and demolished concrete

Transportation		Disposal		Total
$1.44 /$ft^3$	+	$5.23 /$ft^3$	=	**$6.67 /$ft^3$**

DISKING/SEEDING

Assumptions:

1. Based on actual contractor costs

TOTAL DISKING/SEEDING COSTS PER ACRE = $ 200

Abbreviations/Acronyms

$	Dollars
$/Kgal	Dollars per 1000 gallons
avg	average
ft	feet
ft2	square feet
ft3	cubic feet
gal	gallon
gpm	gallons per minute
H&S	Health and Safety
H2S	Hydrogen Sulfide
H2SO4	Sulfuric Acid
HCl	Hydrochloric Acid
Hp	Horsepower
Kgal	1000 gallons
Kwh	Kilowatt-hours
NaOH	Caustic Soda
[redacted]	Outside Diameter
[redacted]	personal protective equipment
PV	Pore Volume Estimate
reqm't	requirement
RO	Reverse Osmosis
WDW	Waste Disposal Well
yd3	cubic yards
yr	year

September 13, 1999

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE COMMISSION

In the Matter of	)	
	)	
HYDRO RESOURCES, INC.	)	Docket No. 40-8968-ML
P.O. Box 15910	)	ASLBP No. 95-706-01-ML
Rio Rancho, NM 87174	)	
	)	

CERTIFICATE OF SERVICE

I hereby certify that:

On September 13, 1999, I caused to be served copies of the following:

INTERVENORS ENDAUM'S AND SRIC'S REPLY TO THE NRC STAFF'S RESPONSE ON FINANCIAL ASSURANCE FOR DECOMMISSIONING

upon the following persons by U.S. mail, first class, and in accordance with the requirements of 10 C.F.R. § 2.712. Service was also made via e-mail to the parties marked below by an asterisk. The envelopes were addressed as follows:

Office of the Secretary
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Washington, D.C. 20555-0001
Attn: Rulemakings and Adjudications Staff

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Washington, DC 20555

Shirley Ann Jackson, Commissioner
U.S. Nuclear Regulatory Commission
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Nils J. Diaz, Commissioner
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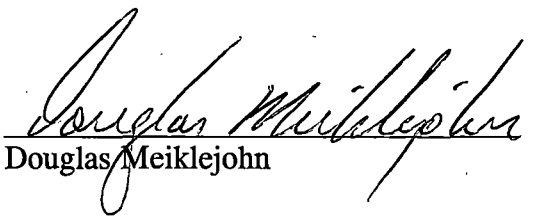
Dated at Santa Fe, New Mexico,
September 13, 1999,



Douglas Meiklejohn