40-9024

THE STATE OF WYOMING

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May 20, 1994

Mr. William J. Almas
Environmental Manager
Energy Fuels Nuclear, Inc.
1200 17th Street, Suite 2500
Denver, CO 80202

RE: Reno Creek Project Amendment Application, TFN 2 2/309

Dear Mr. Almas:

On November 23, 1993, an application was received from Energy Fuels Nuclear, Inc. (Energy Fuels) for an amendment to the Reno Creek ISL Project, Permit No. 479. Comments on this application were sent to Energy Fuels under cover of my letter dated January 21, 1994. You responded with a response package submitted under cover of your letter dated March 3, 1994.

Attached are comments resulting from the reviews by the staffs of the Land Quality Division and Water Quality Division. No comments have been received yet from the State Historic Preservation Office or the Wyoming Game and Fish Department.

As a result of these reviews, this application remains INCOMPLETE under W.S. § 35-11-406(e).

Energy Fuels is requested to respond to the attached review comments in the same format and numbering as these comments. A computer disk containing the comments in WordPerfect 5.1 and ASCII formats is also included in order to speed your reply.

Please feel free to call me if you have any questions.

Sincerely,

Glenn Mooney

Glenn Mooney
Senior Geologist
\gm
Attachment
cc: R. Chancellor w/attach.
NRC, MD, w/attach.
B. Lucht, WQD w/attach.
T. Collins, w/o attach.
J. Keck, SHPO, w/o attach.

479c2s1.gm

NMS

MEMORANDUM

TO: File, Energy Fuels Nuclear - Reno Creek; Permit No. 479 - TFN 2 2/309

FROM: Glenn Mooney, Compiler GM

DATE: May 20, 1994

SUBJECT: Second Review of Application

This review memo has been divided into two section, Completeness and Technical. Completeness comments must be satisfied before a declaration of Completeness can be made and Completeness publication as required by W.S. § 35-11-406(g) can be authorized.

The initials of the individual commentators or their agencies follow each comment or section. They are as follows: VB - Vanessa Buyok, DC - Don Crecelius, BG - Bob Giurgevich, SI - Steve Ingle, BL - Bob Lucht, Water Quality Division, GM - Glenn Mooney, SHPO - State Historic Preservation Office, JS - Jon Sweet, WGFD -Wyoming Game and Fish Department.

General Comments on March 3, 1994, Response Package

There was an error in the numbering and lettering of the January 21, 1994, memo in which there were two section Ds, two section Fs and two section Gs. Relettering the sections at this time might be confusing. To reduce the confusion somewhat, in this review memo the second Section D, the second Section F and the second Section G are now lettered D', F' and G' respectively.

1. Submitted Pages

   Energy Fuels has supplied nearly a complete replacement for the initial application, including text, tables and maps. Sections 6, 8, 14 and 18 were not revised nor were Plates 9.2-9.9, 14.1 and 18.1.

   Both a problem and advantage with the resubmitted text is that it has been submitted showing strikes for deleted material and italics for new language. This is very helpful for the permit review process but a clean copy of the text will be required once the final text has been agreed upon.

2. Attachment to William Almas Letter of March 3, 1994

   The Attachment that contained both Land Quality comments and Energy Fuels' responses created a considerable confusion when it was found that, contrary to the Land Quality Division's request that the response be submitted in the same format and numbering as the original comment letter, Energy Fuels had not done so.

   While Land Quality Division's comment memo of January 21, 1994, was flawed in having two Section I.D's, two Section I.F's and two Section I.G's, Energy Fuels

compounded the confusion greatly by relettering and renumbering the comments and responses in an apparently haphazard fashion.

For instance, on Page 11 of the response memo, comment G.1 was renumbered Comment F.6. Why 6 is not apparent as the previous comment was numbered 1. On Page 12 of the response memo, Comment No. 2 was numbered 7 and Comment No. 2 renumbered as No. 8. The response memo also contained two Section I.D's and two Section I.F's.

An attempt was made to use the same numbering scheme in this memo, but this was not possible near the end when the inclusion of additional technical comments in a logical order made departure from the old numbering scheme necessary.

Energy Fuels is again requested to respond in the same order as the review memo. A computer diskette containing the memo in electronic form will be submitted along with the written copy. This should assist in assemblage of Energy Fuels' reply.

I. COMPLETENESS COMMENTS

A. GENERAL COMMENTS ON APPLICATION

1. General (BG)

   a. Comment a. response is accepted.

   b. Comment b. response is accepted.

   c. i. Comment c.i. response is accepted.

   ii. Comment c.ii. response is inadequate. The legends for Plates 10.3-1 and 3-2 were not corrected. However, I defer this issue to G. Mooney who will include it as a Technical comment if appropriate. I no longer consider it a Completeness comment.

   iii. Comment c.iii. response now identifies the wellfield operation area in the legend. However, this is not a disturbed area boundary. Some map in the Mine Plan and/or Reclamation Plan must clearly identify the disturbed area acreage as listed on Form 1. This remains a Completeness comment.

   iv. Comment c.iv. response is accepted even though the legend remains incomplete due to no identification of the contour lines or contour interval.

v. Comment c.v. response is generally accepted.

2. Chapters 2 and 3, General Comments on Adjudication **(BG)**

a. Response a. is accepted.

b.i,ii. Responses b.i. and ii. are generally accepted. However, I did not review or verify the content of the new section 3.7.

c. Appendix A, General Comments **(VB)**

i. Response 2.c.i. is satisfactory.

d. Appendix B, General Comment **(VB)**

Response 2.d. is satisfactory.

e. Mailing List **(VB)**

Response 2.e. is satisfactory.

B. Section 1, INTRODUCTION

1. Introduction, Section 1.5, Page 1.5 and Page 1-4 **(SI)**

The response is acceptable. The company has paraphrased the language in the Rules and Regulations.

C. Sections 2, 3, and 4, ADJUDICATION REVIEW

1. Section 2, Owners of Record Within the Permit Area, Appendix A

a. Discrepancies **(VB)**

i. Response C.1.a.i. is satisfactory.

b. Section 2.4, Mineral Ownership, Page 2-9 **(GM)**

Energy Fuels has supplied pages showing the correct coal ownership.

No response is required.

2. Section 3, Adjacent Ownerships, Appendix B **(VB)**

a. Notification of Owners of Record.

i. Response 2.a.i. is satisfactory.

3. Section 2.2, Surface Rights, Page 2-3 **(GM)**

Surface Owner Consent

a. Section 22, SW¼

Surface owner consent was received from Bernice Groves.

No response is required.

b. Section 27, W½

Surface owner consent was received from Bernice Groves.

No response is required.

c. Section 28, All

Surface ownership was received from Bernice Groves.

No response is required.

d. Section 29, All except SW¼

Surface owner consent was received from James E. and Edra June Drake.

No response is required.

e. Section 29, SW¼

Surface owner consent was received from August G. Laur.

No response is required.

f. Section 30, E½SE¼

Surface owner consent was received from August G. Laur.

No response is required.

g. Section 31, NW¼NE¼

Surface owner consent was received from the Heirs of Sinadin Estate including Dorothy Reichmuth, Mrs. Terry Berquist, Nolan and Ann Diehl, Rev. Eugene Sullivan, and Rev. Gerald Sullivan.

No response is required.

h. Section 33, NE¼

Surface owner consent was received from Clayton and Cindy McGuire.

No response is required.

i. Section 33, NW¼

Surface owner consent was received from Bernice Groves.

No response is required.

j. Section 33, SW¼

Surface owner consent was received from Bernice Groves.

No response is required.

j. Section 34, W½

Surface owner consent was received from Clayton and Cindy McGuire.

No response is required.

k. Portions of Sections 21, 28, 29, and 33

Surface owner consent was obtained from the Wyoming Department of Transportation.

No response is required.

4. Section 4, Legal Description, Appendix C, Page 4-1 **(GM)**

Map 4-1 has been modified to depict the original Permit 479 Area.

No response is required.

5. Other Permits **(GM)**

a. Highway Crossing

Crossing of Highway 387 by pipelines, powerlines and cables will require Utilities Permits for each crossing from the Wyoming Department of Transportation. These are available from the headquarters office in Cheyenne.

These are pending. In a telephone conversation with William Almas of Energy Fuels on April 27, 1994, he indicated that application for these permits can be made no more than 30 days before the initiation of the work.

Energy Fuels must commit to obtaining the Utilities permits in a timely fashion.

b. Highway Access

These are pending. In a telephone conversation with William Almas of Energy Fuels on April 27, 1994, he indicated that application for these permits can be made no more than 30 days before the initiation of the work.

Energy Fuels must commit to obtaining the Access Permits in a timely fashion.

D. APPENDIX D-1, LAND USE

1. Section 5, Land Use and Ranking **(BG)**

a. Section 5.1, Land Use, Page 5-1

Responses a.i. through iii. are accepted. However, Energy Fuels must submit a clean page 5-1 without the strike-over units.

2. Section 5.1, Permit Area Land Use, Page 5-1 **(WGFD)**

No response was received from the Game and Fish Department regarding this matter. If any comments are received in the future, they will be promptly forwarded on to Energy Fuels.

D'. CHAPTERS 6 AND 7, HISTORY AND ARCHEOLOGY OF THE AREA (SHPO)

1. Archeological Survey **(GM)**

No comments were received from SHPO regarding Energy Fuels' response.

Energy Fuels has not had an archeological survey done of the entire proposed amendment area. To cover this omission, the Land Quality Division will propose that a Permit Condition be attached to the amendment that would require an archeological survey before disturbance for any lands not now not surveyed.

2. Section 7, Archeology **(SI)**

The response is acceptable. The company has added the provision for site investigation if deemed necessary.

F. SECTION 8, CLIMATOLOGY

1. Nearest Met Station **(SI)**

The response is **not** acceptable. The company has not presented information to justify why a station 72 miles away, which is influenced by Casper Mountain would provide better information than a station 35 miles away from the site.

G. SECTION 9, GEOLOGY, APPENDIX D-5

1. Section 9.4, Stratigraphic Section of the Reno Creek Area, Page 9-6 **(SI)**

The response is acceptable. The response indicates that the Felix Coal term was used to describe the sediment package that comprises the upper aquitard. The text has been changed in numerous places to reflect this.

2. Section 9.6, Seismicity, Page 9-7 **(SI)**

The response is acceptable. The discussion in the seismic section has been updated as requested.

3. Section 9.7, Exploration Holes, Page 9-7 **(GM)**

The question whether the exploration holes were originally naturally sealed or have been "squeezed" shut due to lithostatic pressure can best be answered by looking for their presence in the pump test data.

Even if the pump test data does not unequivocally show the presence of open drillholes, persistent excursions that resist control by other means may point to open drill holes. In that event, Energy Fuels must be prepared to shut down wellfield operations to locate, reenter and seal all drill holes in the area of the excursion.

4. Figure 9.1, Geologic Map of the Powder River Basin, Page 9-2 **(SI)**

The response is acceptable. The Campbell County Geologic Map has been referenced.

5. Figure 9.3, Typical Electric Log, Page 9-5 **(SI)**

The response is acceptable. The type of electric log is now shown of Figure 9.3.

F'. HYDROLOGY, APPENDIX 10, APPENDIX D-10

1. Section 10.2.3, Surface Water Quality, Page 10-3 **(SI)**

a. a. The response is acceptable. The company states in the text that the surface waters meet livestock standards for Wyoming and has provided trace metal values in Table 10.2-3.

b. The response is acceptable. The surface water data for the USGS stations has been provided.

2. Table 10.2-3, Surface Water Quality Data, Page 10-7 **(SI)**

The response is acceptable. The silver values have been corrected. A cursory review of the table shows no other anomalous values.

3. Section 10.3.2, Aquifer Characteristics, Page 10-10 **(SI)**

a. The response is acceptable. The response and footnote to the table indicate that the wells were screened over both intervals.

b. The response to this comment is acceptable. Based on this response a comment will be added to the aquifer test section of the review stating that pump tests performed on wells screened in multiple aquifers do not yield results that can be used in determining aquifer parameters for either aquifer.

4. Section 10.3.3, Confining Unit Characteristics, Page 10-11 **(SI)**

a. The response is acceptable. The response indicates that in a general sense the sands are fine grained and discontinuous. However, this information will need to be provided for each specific wellfield package.

b. The response is acceptable. The redefinition of the Felix Coal, as used by the company, clarifies this issue.

c. The response is acceptable. The company has included additional confirmation samples having equivalent results.

d. The response is acceptable. The labs that performed the testing have been identified in the text and in the response.

5. Section 10.3.3, Confining Unit Characteristics, Page 10-11 **(GM)**

a. Energy Fuels has explained that by the Felix coal aquitard, they meant the Felix Coal and the associated claystones, siltstones and carbonaceous shales above, below and between the Felix beds.

This explanation is acceptable.

No response is required.

6. Section 10.3.5, Groundwater Quality, Page 10-13

a. Well RI-15U Water Quality **(GM)(SI)**

The response is not acceptable. Well RI-15U is located approximately 4000 feet from the permit boundary and the presence of a recharge area is not discussed in the Geology section of the application. Please determine the cause of the problem in this well.

b. Lab Permeabilities

The response is not acceptable. The lab permeabilities will need to be verified using in place techniques.

7. Table 10.3.1, Reno Creek Basic Well Information, Page 10-16 **(GM)**

a. A corrected table has been supplied which shows the location and completion formation.

No response is required.

b. The response is acceptable.

c. The response is acceptable. See response to comment 3 (c), this section, Table 10.3-1 and Table 10.3-3.

8. Table 10.3-2, Inventory of Wells and Springs in the Vicinity of the Reno Creek Project, Pages 10-17 - 10-18 **(SI)**

The response is acceptable.

9. Table 10.3-3a, Comparison of Ore Sand Aquifer Characteristics Derived From EFNI (Hydro) and RME Pump Tests **(SI)**

a. The response is acceptable.

b. The response is acceptable.

10. Table 10.3.5, Groundwater Quality Data, Pages 10-25 to 10-10-42 **(GM)**

a. Problems with Table

i. Outliers

Energy Fuels has flagged suspected outliers. In the response memo on Page 20, Energy Fuels states that values more than two standard deviations from the mean were flagged as outliers. These criteria should be shown on the Table as well.

ii. Abandoned Wells

Energy Fuels has removed data from wells now abandoned.

No response is required.

iii. Additional Data

Energy Fuels states there is no additional data for active wells.

No response is required.

b. Bicarbonate Value Changes **(SI)**

The response is **not** acceptable. The response and text changes indicate that the early samples are valid, but contaminated. Please correct the text to state only that the early samples were contaminated and the 1993 data is considered to be most representative.

c. Verification of Samples **(SI)**

The response is acceptable.

11. Table 10.3-7, Summary of Laboratory Aquitard Properties, Page 10-55 **(SI)**

The response is acceptable.

12. Section 10.5.1.2, Well Field Simulation, Page 10-87 **(SI)**

a. Transmissivity

The response is acceptable for completeness.

b. Storage Coefficient

The response is acceptable for completeness. The editorial comment that the storage coefficient is a typical value for the Powder River Basin is misleading and may not be a valid statement.

c. Bleed Rate

The response is acceptable. Please note that the bleed rate and well field simulation will be determined as a part of the wellfield package, not from the simulation presented in the application.

d. Comment on Simulation

The response is acceptable. This item will be resolved technically through the upcoming pump test.

13. Section 10.5.4, Permit Monitoring, Page 10-88 **(SI)**

The response is acceptable.

14. Section 10.5.5, Predicted Heads Between Injected and Recovery Wells **(SI)**

The response is acceptable.

15. Sampling Procedures **(SI)**

The response is **not** acceptable. The comment requested that the sampling procedure be incorporated into the text.

16. Plate 10.2.1, Location of Regional Wells and Drainage Basins **(SI)(GM)**

Energy Fuels has supplied a clear copy of this map. The response is acceptable for completeness. The drainage basins should be delineated from the confluence with larger order stream. Further if the surface runoff was computed from the drainage basins shown on the plate, the calculations would be incorrect.

17. Plate 10.3.1, Piezometric Map for the Ore Sand Aquifer **(SI)**

a. The response is acceptable.

b. Well RI-13 **(BL)**

In Energy Fuels' response to completeness comment number 22, the statement is made that well RI-13 is blocked at 203.4 feet. This well and any other wells on the site which have been shown to be damaged should be re-entered and sealed before mining is started. In the event that these wells are needed for monitoring purposes, they should either be replaced or repaired.

18. Plate 10.3-2, Piezometric Map for the Upper Aquifer (SI)

The response is acceptable for completeness.

G'. CHAPTER 11, SOILS ASSESSMENT

1. Table 11.1, Topsoil Volume Summary, Page 11-4 (DC)

Response acceptable.

2. Section 11.3.2, Soil Mapping Unit Interpretation, Page 11-6 (DC)

EFNI has committed to sampling each soil unit to be disturbed as a part of the plant area, irrigation reservoir, and main access road. The sample sites will be shown on Plate 11.1 after they are obtained this spring. I recommend that at least eight samples be taken; 1) 2 sample sites from mapping unit EA 62 at the Plant Site, 2) 3 sample sites at the Irrigation Reservoir, (one each from mapping unit 801 AB, 802 AB, and 804 CD), and 3) 3 sample sites along the main Access Road (one each from mapping unit 807 CD, 804 CD, and 410).

3. Section 11.2.3, Soil Survey, Page 11.2 (DC)

Response acceptable, but add the sample locations to Plate 11.1 as stated once the samples are submitted.

4. Attachment 11.1, Soils Series Descriptions and Analyses (DC)

Response acceptable.

H. Chapter 12, Appendix D-8, Vegetation (BG)

1. General Comments (BG)

Section I.H.1. required no response.

2. Requirements (BG)

Responses to a., b. and c. are generally accepted with the proviso that Energy Fuels provide clean pages without the strike-over units. Section 12.2.8.3 should pluralize the word "tree".

3. Plate 12.1, Baseline Vegetation Inventory **(BG)**

Energy Fuels' response is understood. In my opinion, the legend remains incomplete. However, I no longer consider this a Completeness comment.

4. Table 12.3.2, 1993 Energy Fuels Upland Grassland Cover; Table 12.3.3, Energy Fuels Big Sagebrush Cover; Table 12.3.4, Energy Fuels Meadow Cover **(BG)**

Responses to comments a. and b. are accepted.

5. Addendum 4, Cover Raw Data **(BG)**

Section I.H.5. response is accepted.

6. Table 12.3.5, Summary of Cover **(BG)**

Section I.H.6. response is accepted.

7. References, Page 12-25 **(BG)**

Responses to comments a. and b. are jumbled and not accepted. The revised section 12.5 (References) has four citations which are jumbled.

1. 1992. Black Thunder Mine...Division.

2. 1992. Jacobs Ranch Mine...Division.

3. Kerr-McGee Coal Corporation...Division.

4. Thunder Basin Coal Company...Division.

I assume Energy Fuels desires only two (2) citations, one each:

- Kerr-McGee Coal Corporation. 1992. Jacobs Ranch Mine. Renewal/Amendment Application for Permit No. 271-T2 (TFN 2 6/288). Appendix D-8. Submitted to the Wyoming Department of Environmental Quality, Land Quality Division.

- Thunder Basin Coal Company. 1992. Black Thunder Mine. Renewal/Amendment Application for Permit No. 233-T4 (TFN 2 3/279). Appendix D-8. Submitted to the Wyoming Department of Environmental Quality, Land Quality Division.

Original comments I.H.7.a. and b. remain unanswered and remain Completeness comments.

8. Tables 12.3.2 through 12.3.4, Pages 12-13 - 12-22 **(BG)**

Section I.H.8. response is accepted with the proviso that Energy Fuels submit clean pages without the strike-over units.

9. Section 12.3.6, Stock Ponds, Page 12-10 **(BG)**

Section I.H.9. response is incomplete and not accepted. Section 12.3.6 (page 12-11) specifically identifies and discusses "stock watering ponds". Plate 12.1 identifies "areas wet during part of the year". The text and map must use the same terminology. Stock ponds are stock ponds. This remains a Completeness comment.

10. Section 12.1, Introduction, Page 12-1 **(BG)**

Section I.H.10. response is acceptable.

11. Section 12.2, Sampling Methodology, Page 12-1 **(BG)**

a. Comment a. response is acceptable with the proviso that Energy Fuels present a clean page 12-4.

b. Comment b. response is acceptable with the understanding that Energy Fuels present clean pages that eliminate all strike-over units.

c. Comment c. response is generally accepted.

d. Comment d. response is acceptable; Energy Fuels must present clean pages without strike-over units.

e. Comment e. response is accepted.

12. Table 12.3.1, Acreages of Each Vegetation Type Within the Permit Area, Page 12-12 **(BG)**

Section I.H.12. Response is accepted.

13. Section 12.2.4, Extended Reference Area Establishment, Page 12-3 **(BG)**

Section I.H.13. response is accepted with the proviso that Energy Fuels present pages which eliminate the distinction between "old" text and "new" text.

14. Section 12.2.8.3, Trees and Shrubs, Page 12-4 **(BG)**

Section I.H.14. response is incomplete. Energy Fuels' response states in part that no trees exist within the study area. A correct and complete response should relate to the official permit area, not a study area. This remains a Completeness comment.

I. Chapter 13, Wildlife

1. Section 13, Baseline Inventory Requirements, Page 13-1 **(WGFD)**

No response was received from the Game and Fish Department regarding this matter. If any comments are received in the future, they will be promptly forwarded on to Energy Fuels.

2. Section 13.3.1, Habitat Descriptions, Page 13-4 **(WGFD)**

No response was received from the Game and Fish Department regarding this matter. If any comments are received in the future, they will be promptly forwarded on to Energy Fuels.

3. Section 13.3.1, Tree Inventory, Page 13-4 **(WGFD)**

No response was received from the Game and Fish Department regarding this matter. If any comments are received in the future, they will be promptly forwarded on to Energy Fuels.

4. Section 13.3.1, Wetlands and impoundments, Page 13-4 **(WGFD)**

No response was received from the Game and Fish Department regarding this matter. If any comments are received in the future, they will be promptly forwarded on to Energy Fuels.

5. Section 13.0, Introduction, Page 13-1 **(GM)**

Energy Fuels has corrected their statement on requirements for wildlife monitoring.

No response is required.

J. Chapter 15, Mine Plan

1. Section 15.2, Orebody Description, Page 15-4 **(GM)**

Energy Fuels has stated that their references to the Felix Coal as an aquitard refers to the Felix Coal and its associated claystones, siltstones, etc.

This response is acceptable.

2. Section 15.4, General Description of Operations, Page 15-5 **(SI)**
The response is acceptable.

3. Section 15.5, Access and Wellfield Roads, Page 15-8 **(DC)**

a. Upgrading Roads **(DC)**

EFNI should provide a statement in Section 15.5 that a qualified individual will be on-site to monitor topsoil salvage at all well field access roads to insure that all suitable A and B horizon material is properly salvaged.

The statement regarding the presence of a qualified individual supervising topsoil stripping is needed for all topsoil salvage. Section 15.12 would be the logical location for this commitment.

b. Leaving Roads Unreclaimed **(SI)**

The response is acceptable.

c. Distinctions Between Topsoil and Subsoil **(BG)**

Section I.J.3.c. response is accepted. Energy Fuels must present clean text pages.

d. Wildlife Road Mortalities, Page 15-7 **(WGFD)**

No response was received from the Game and Fish Department regarding this matter. If any comments are received in the future, they will be promptly forwarded on to Energy Fuels.

e. Effects on Belle Fourche River **(SI)**

The response is **not** acceptable. The Belle Fourche and the other drainages discussed in the text will receive runoff and sediment from the disturbed areas. Please provide sediment control designs for the disturbed contributing areas.

f. Diversion and Crossing Design **(SI)**

The response is **not** acceptable. Please supply designs for the diversion and crossing in Section 29. Further review of Plate 15.1 shows additional crossing areas that should have designed crossings, such as K-Bar, in Mine Unit III.

g. Reference **(DC)(BG)**

Response is acceptable.

4. Section 15.6, Wellfield Design and Operation, Page 15-11 **(SI)**

a. The response is **not** acceptable. The company has supplied background and theory applying to fracture pressure, but has not addressed the specific comment. Please supply information to demonstrate that 100 psi is below the formation fracture pressure. **(SI)**

b. Fracture Pressure **(BL)**

Energy Fuels' response (found on page 37 of the response) to Completeness comment 4 by Steve Ingle skirts the issue. Steve's comment was that EFN should document what the fracture pressure is. EFN has attempted to show that fracturing would not cause a problem on this site. At 300 feet of depth, the fracture gradient would have to be .76 psi/ft of depth. This Division's experience, sandstones which are not extremely well cemented or which contain high formation pressure tend to fracture at low pressures. A fracture gradient as low as .60 psi/ft of depth may actually be the case. In the event that the fracture gradient was only .60 psi/ft, the injection pressure would have to be limited to

50 psig in order to say under this pressure at a depth of 300 feet. What is the projected fracture gradient of the Ore Sand?

5. Section 15.7.1, Wellfield Completion Methodology, Page 15-12 **(SI)**

The response is acceptable.

6. Section 15.7.2, Well Drilling Integrity Logging, Page 15-14 **(SI)**

The response is acceptable.

7. Section 15.8.1, Process Description, Page 15-18 **(SI)**

The response is **not** acceptable. Please include a contingency to remove other problem parameters from the bleed stream prior to application.

8. Section 15.8.5, Plant Building and Facilities

a. Site Power **(GM)**

The proposed powerline corridor is shown on Mine Plan Map, Plate 15.1.

No response is required.

b. Powerline Designs **(WGFD)**

No response was received from the Game and Fish Department regarding this matter. If any comments are received in the future, they will be promptly forwarded on to Energy Fuels.

c. Fence Designs, Page 15-2 **(WGFD)**

No response was received from the Game and Fish Department regarding this matter. If any comments are received in the future, they will be promptly forwarded on to Energy Fuels.

d. Water Transport Facilities **(BG)**

Section I.H.8.d. response is incomplete. The Mine Plan must:

i. specify how the pipeline will cross Wyoming Highway 387.

ii. specify the type of road associated with the pipeline using terminology from the 1993 Non-Coal Rules and Regulations, Chapter I, Section 2.(ay).

iii. specify that all surface disturbance associated with the pipeline corridor will be reclaimed according to specific Reclamation Plan procedures.

9. Section 15.9, Waste Water Treatment System, Page 15-27 **(SI)**

This comment was not addressed. Please supply the specifications for the clay barrier.

10. Section 15.10, Land Application of Wellfield Solutions

a. Waste Water Land Application Permit **(BG)**

Section I.H.10.a. has no distinct response from Energy Fuels. Though energy Fuels did not respond, I modify the original comment to state that LQD does not want the entire WQD-approved Waste Water Land Application Permit in the LQD permit. The LQD permit must eventually include specific sections which relate to the WQD Permit to applicable LQD performance standards. The LQD and Energy Fuels must reach agreement on which elements will occur in the LQD amendment application. The specific content of those sections and LQD technical review of their content will occur after WQD approval of the Waste Water Land Application Permit.

b. Baseline Soils Sampling **(DC)(GM)(JS)**

Figure 15.13 (referenced on page 43 of responses) cannot be located. **(DC)**

c. Annual Soils Sampling **(DC)**

Table 16.2 does not contain the parameter SAR as stated in the response. This table would be better located in Section 15 of the application and should have 'Soil Analysis' in the table title rather than as a footnote.

During the February meeting with LQD and EFNI, EFNI agreed to provide 'action levels' for four parameters. The response on page 43 only provides two. Action levels for Se and EC must be

provided. Also, the action levels and commitments discussed in the response must be incorporated into the text (Section 15).

Section 15.10.3.2 lists 3 soil mapping units within the irrigation area. 410 is incorrect according to Plate 11.1. The units listed should be 177 B, 336 B, and 395 CD.

When will the additional 12 soil samples be provided?

Section 16.3.2 contains the commitment to annually sample and report the soil samples taken within the irrigation area. How will the sample points be permanently (life of mine) marked in the field?

Plate 16.1 is referenced as showing the sample locations. Does Figure 15.13 (referenced in response to Comment I.J.10.b. but not located) contain the same information as Plate 16.1?

d. Baseline Groundwater Sampling Beneath Irrigation Site **(GM)**

Energy Fuels states on Page 15-60 that sodic soils caused by the irrigation operation could be treated by leaching with higher quality water to a depth of four feet. They should explain how the salinity leached to this depth can be prevented from affecting the roots of some plants at this depth or from migrating back to the surface.

Also, review of the soils data in Attachment No. 11.1 reveals that some soils are only present to limited depths in some cases. See Comment No. II.J.10.f.iii, below for details.

e. Groundwater Monitoring **(GM)**

This response is not acceptable. More details are needed on the monitoring program.

f. Reclamation Plan for Land Application Site **(GM)**

i. Detailed sampling of the Site soils to various depths.

Energy Fuels has committed to additional soil sampling in the Land Application Site area.

No response is required.

ii. Detailed sampling of near-surface groundwater beneath the site.

Energy Fuels has committed to the placement of two shallow groundwater monitoring wells in unsaturated sands within the Land Application area and one well in saturated sands within the Land Application area.

iii. Drafting of soil and groundwater cleanup plans in event of unacceptable levels of contamination.

Energy Fuels has run a simulation program to estimate the rate of salt buildup in the soils. The simulation program was based on the use of the wellfield bleed stream rather than the waste water stream. This is felt to be unrealistic as the waste water stream would be of somewhat lower quality than the wellfield stream since it would include r/o reject, plant washdown water and the wellfield bleed stream. There would also be the effects of evaporative concentration from storage in the irrigation storage reservoir.

To mitigate the effects of salt buildup in the irrigation site soils which Energy Fuels projects will reach the limits of a SAR of 5, they plan to plant tall wheatgrass and barley on the site.

While the planting of salt tolerant species such as tall wheatgrass and barley on the site may provide a temporary vegetative cover that will resist erosion during operation of the irrigation system, it is hard to see how this will provide long-term mitigation of salt damage to the soils.

Energy Fuels should also consider that it may not take long to reach a SAR of 5 on the site. Some samples of soils from the site show SARs above 3 and one, the Thedalund at depths of 24 to 45 inches had a SAR of 4.91 (Attachment 11.1, Page 11.1-121).

(a) Energy Fuels should explain more fully how the planting of tall wheatgrass and barley will mitigate the salt damage to topsoil over the long term.

(b) Energy Fuels should demonstrate how compensation will be made for higher natural SARs in the irrigation site soils.

iv. Other plans for mitigation of contamination effects.

Energy Fuels states on Page 15-60 that sodic soils caused by the irrigation operation could be treated by leaching with higher quality water to a depth of four feet. They should explain how the salinity leached to this depth can be prevented from affecting the roots of some plants at this depth or from migrating back to the surface.

Also, as noted above, review of the soils data in Attachment No. reveals that some soils are only present to relatively shallow depths.

g. Section 15.10.1, Description **(BG)**

Section I.H.10.g. response is acceptable.

h. Section 15.10.6, Trace Metals, Page 15-32 **(SI)**

i. Quantitative Data

This comment was not addressed. The text states that EFNI has no quantitative data showing concentrations of selenium or boron during leaching or restoration. Please refer to the R&D restoration reports and include the quantitative information in this discussion.

ii. Other Parameters

This comment was not addressed. The discussion only covers selenium and boron. Please include a discussion of other parameters that may be present in the streams.

11. Section 15.11, Projected Mining Schedule

a. Wellfield Data Package **(BG)**

Chapter 15 generally describes five mine units and outlines wellfield design and operation. The specific details of each mine unit wellfield and monitor well regime are lacking.
Historically other ISL Operators have provided individual wellfield operation packages for LQD review and approval as specific revision/updates to the original permit.

b. Components of Wellfield Data Package **(GM)**

Energy Fuels rewrote Section 15.11 to state that the five items comprising a wellfield data package would be supplied as requested.

No response is required.

c. Upper Control Limits (Page 15-37) **(SI)**

Please describe the methodology for determining Upper Control Limits.

12. Section 15.12, Topsoil Management Plan, Page 15-38

a. Topsoil Salvage Commitments **(BG)**

Section I.H.12.a. response is acceptable.

b.c. Topsoil Windrows and Topsoil Storage, Pages 15-10, 15-12 **(DC)**

Page 49 of the response refers to 'short term' and 'long term' disturbances in defining the need for stockpile stabilization or labelling. The text must define what EFNI considers long or short term. I would suggest that topsoil material stockpiled for one week or less may not require stabilization or labeling. However, EFNI should propose a modified labeling system such as the use of a specifically colored pin flag to identify topsoil that has been saved for a short time period. Any topsoil saved for longer than 'short term' must have a sign in place at the time stockpiling begins as per the LQD Regulations. These commitments must be added to the text, probably Section 15.12.

d. Section 15.12, Topsoil Management Plan, Page 15-39 **(GM)**

Energy Fuels has committed to the placement of topsoil and subsoil on opposite sides of the trench, mud pit, or drill site leveling. Alternatively, the topsoil may be placed at a greater distance from the trench or mudpit.

No response is required.

13. Solid Waste Handling **(BG)**

Section I.H.13. response is acceptable.

14. Plate 15.1, Mine Plan Map **(GM)(DC)(BG)**

Review of this map found the following problems:

a. comment a. response is acceptable.

b. comment b. response is incomplete as previously noted under comment I.H.8.d.

c. Energy Fuels has expressed confidence that the topsoil stockpiles will not interfere with drilling or operation of the wellfields.

No response is required.

d. The map now shows additional features associated with tne Irrigation Reservoir.

No response is required.

e. The diversion ditch above the Irrigation Reservoir is now shown on the Mine Plan Map.

No response is required.

f. Energy Fuels has explained that the seemingly overlapping monitor well rings will actually monitor separate ore zones so overlapping monitor well rings would be appropriate.

No response is required.

g. The map shows that the monitor well ring for Mine Unit II comes within 100 feet of the wellfield boundary. This is much closer than described in the mine plan text.

The map shows that the monitor well ring for Mine Unit II comes within 100 feet of the wellfield boundary. This is much closer than described in the mine plan text.

Energy Fuels states that monitor wells will be placed in the adjacent Section 32 at the proper monitor well distance, once surface owner consent is obtained for their placement.

This is not acceptable. The monitor well ring marks the outer edge of potential affected groundwater so all monitor wells must be located within the permit area.

Placement of monitor wells in Section 32 will require that this land be amended into the permit area. Alternatively, Energy Fuels must assure that no groundwater outside the permit area will be affected by the mining operation.

h. The map's caption now depicts the shaded area as fenced portions of the wellfields.

No response is required.

i. The map now shows the proposed route of the irrigation pipeline.

No response is required.

15. Map Plate 15.2, Treatment Pond Cross Sections and Details **(GM)**

This map's cross sections now clearly show that the topsoil has been salvaged before construction of the pond.

No response is required.

K. Chapter 16, Environmental Monitoring and Reporting

1. Section 16.1.1.1, General Description, Page 16-1 **(SI)**

The response is acceptable.

2. Section 16.1.1.2, Baseline Groundwater Quality for Detection of Excursions, Page 16-2 **(SI)**

a. Sampling Frequency

(i), (ii). The response is **not** acceptable. The company has agreed to 4 sample rounds, but in the response has stated that sampling will be every 7 days, instead of 14. Please change the sample interval to 14 days. Part (ii) was my comment 10 in this section.

b. Number and Density of Monitor Wells

The response to the following comment is acceptable. The response is unnumbered. Section 16.1.1.2. Please specify the minimum number and density (wells per acre) for baseline ore zone sampling.

3. Section 16.1.1.3, Excursion Monitor Well Monitoring During Mining, Page 16-4

a. Sulfate as an Excursion Parameter **(GM)(SI)**

The response is acceptable.

b. Bicarbonate and Carbonate Excursion Parameters **(GM)**

Energy Fuels has agreed to use total alkalinity as an excursion parameter.

No response is required.

c. Sampling Frequency **(SI)**

The response is acceptable.

4. Section 16.1.1.4, Excursion Reporting and Corrective Actions, Page 16-4 **(SI)**

a. Outlier Determination

The response is acceptable. Outlier determination is in Section 16.1.1.4, not Section 16.1.1.5 as stated in the response.

b. Confirmation Sampling

The response is acceptable.

c. Sampling of Wells on Excursion

The response is acceptable.

d. Monthly Report Contents

The response is acceptable.

5. Section 16.1.2.3, Post Mining Restoration Sampling and Reporting, Page 16-6 **(SI)**

   a. Monitor Well Sampling

      The response is **not** acceptable. The company has not presented a discussion of monitor well sampling during restoration as requested. Section 16.1.2.3. Please include a discussion of monitor well sampling during restoration.

   b. Stability Period Sampling

      The response is acceptable.

6. Section 16.1.3, Radium Pond Leak Detection System, Page 16-7 **(SI)**

   The response is **not** acceptable. Any fluids found in the leak detection inspection tubes should be chemically analyzed, not just when there is five gallons of water present in the inspection tube. Five gallons is far more water than would be expected to condense due to natural processes. Furthermore the diameter of the PVC inspection tube has not been specified.

7. Section 16.2, Surface Water and Sediment Monitoring, Page 16-8 **(SI)**

   a. Location

      Response to this comment has been deferred by the company. The comment states: Section 16.2. The surface water monitoring stations should be located within the permit area.

   b. Frequency of Monitoring

      Response to this comment has been deferred by the company. The comment states: Section 16.2. The frequency of monitoring should be semi-annually, not annually.

8. Section 16.5, Wildlife Monitoring, Page 16-10

   a. Fish and Wildlife Service Mitigation Plan **(BG)**

      Section 1.K.8.a. response is accepted. The LQD may consider a Form 1 condition to address this issue.

b. Section 16.5, Endangered Species Reporting, Page 16-10 **(WGFD)**

No response was received from the Game and Fish Department regarding this matter. If any comments are received in the future, they will be promptly forwarded on to Energy Fuels.

c. Section 16.5, Raptor Special Purpose Permits, Page 16-10 **(WGFD)**

No response was received from the Game and Fish Department regarding this matter. If any comments are received in the future, they will be promptly forwarded on to Energy Fuels.

d. Section 16.5, Ferret Clearance, Page 16-10 **(WGFD)**

No response was received from the Game and Fish Department regarding this matter. If any comments are received in the future, they will be promptly forwarded on to Energy Fuels.

e. Section 15.9, and Section 16.5, Radium Settling Ponds, Page 15-26 **(WGFD)**

No response was received from the Game and Fish Department regarding this matter. If any comments are received in the future, they will be promptly forwarded on to Energy Fuels.

f. Section 16.5, Standard Wildlife Monitoring, Page 16-10 **(WGFD)**

No response was received from the Game and Fish Department regarding this matter. If any comments are received in the future, they will be promptly forwarded on to Energy Fuels.

L. Chapter 17, Restoration and Reclamation Plan

1. Section 17.1.3, Restoration During Commercial Operations, Page 17-2 **(SI)**

The response is acceptable.

2. Section 17.1.3, Restoration During Commercial Operations

a. Best Available Technology and Use of a Reductant, Page 17-3 **(GM)**

The statement that Best Available Technology (BAT) would be used during restoration operations was a misstatement. The text referred instead to Best Practicable Technology (BPT) which is also referenced in the Wyoming Environmental Quality Act (W. S. § 35-11-103(f)(i)).

My point remains the same. Restoration of uranium in situ operations in a timely manner is best accomplished using a reductant such as hydrogen sulfide. If Energy Fuels does not wish to plan on the use of a reductant in their restoration they are ignoring the experience of at least three companies in the area that have successfully used reductants in their operations.

To cover the costs to the State in the case of a possible bond forfeiture, the reclamation bond estimate to be acceptable must include the costs for the use of a reductant.

b. Split Sampling, Page 17-4 **(GM)**

Energy Fuels has added provisions for the NRC and DEQ to be notified so that they might be present to take split samples at the end of the stabilization period.

No response is required.

3. Sections 17.2.1 and 17.2.5.1, Post-Mining Land Use, Page 17-4 **(BG)**

Section 1.L.3. response is accepted. Energy Fuels must supply pages without strike-over units.

4. Section 17.2.2, Contouring Plan, Page 17-5 **(SI)**

a. Foundation Disposal

The response is acceptable.

b. Pond Residue Disposal

The response is acceptable to the this reviewer, however NRC will have the final decision concerning disposal of the residues. The comment states: Section 17.2.2, page 17-5. The text does not state where or how the residues will be disposed.

5. Section 17.2.4.2, Final Reclamation Procedures, Page 17-8 **(BG)**

Section I.L.5. response is understood. However, the application still lacks consent statements from all surface owners and this requirement will be restated as a Technical comment similar to that originally written.

6. Section 17.2.5.2, Reclamation Success Standards, Page 17-9 **(BG)**

Section I.L.6.a. through d. responses are generally acceptable. The overall final bond release procedures are complete. I will likely have one or more Technical comments on the methodology.

7. Section 17.2.4.2, Final Revegetation Procedures, Page 17-7 **(WGFD)**

No response was received from the Game and Fish Department regarding this matter. If any comments are received in the future, they will be promptly forwarded on to Energy Fuels.

8. Section 17.2.4.2, Tree Restoration, Page 17-7 **(WGFD)**

No response was received from the Game and Fish Department regarding this matter. If any comments are received in the future, they will be promptly forwarded on to Energy Fuels.

9. Section 17.2.2., Contouring Plan, Wetlands, Page 17-4 **(WGFD)**

No response was received from the Game and Fish Department regarding this matter. If any comments are received in the future, they will be promptly forwarded on to Energy Fuels.

10. Section 17.3, Well Abandonment Procedure, Page 17-10 **(GM)**

Energy Fuels proposed to abandon wells by placement of cement or high solids abandonment mud across and 50 feet above the completion interval. Cement or high solids well abandonment mud will also be placed in the upper 30 feet of the well casing. The mud or cement will be either suspended in an acceptable manner or the casing between the upper and lower mud or cement intervals will be filled with material such as sand, gravel or scoria.

No response is required.

11. Section 17.4, Reclamation Bond Estimate, Page 17-11 **(GM)**

Review of the bond estimate found it to be quite complete with only a few changes required. A detailed review of the bond and discussion of the bond may be found below in the Technical Review for Section 17.

The bond may be considered adequate for Completeness purposes.

III. Technical Comments

These Technical Comments are presented for general information. Energy Fuels may respond concomitantly with the Completeness Comments, but adequate responses are not necessary to declare the application complete.

A. Adjudication

1. Appendix A, Surface Owners **(VB)**

Comments 1 through 9 of II.B. and comments 1 through 6 of III.B. of the original memo to the file dated December 14, 1993 did not receive any responses, therefore, these comments were not rechecked (non-imperative comments).

2. Section 2, Surface Owner Consents **(GM)**

Energy Fuels has obtained surface owner consents from Robert Roush and Sunburst Ranch Company. Neither of these entities are listed as surface owners, however. They are listed as possible surface lessees of portions of the proposed permit area.

As surface lessees, their consent to the operation is not required. Energy Fuels is encouraged to work with any surface lessees to lessen the impact of each operation on the other.

No response is required.

B. Section 9, Geology - New Comments

1. Abandoned Drill Holes **(BL)**

Last Friday, Bill Almas called concerning the status of the Water Quality Division's portion of the review. I told him that my review was already sent to you. I discussed some of my review comments with him, including the problem of un-plugged drillholes. He stated their contention that these drillholes need not be plugged because there would not be

sufficient pressure in the ore sand to cause water to flow to the upper aquifer under any conditions. In order to test EFN's position on this issue, several calculations have been made. It is possible to calculate the area around each injection well which will have sufficient pressure to drive the lixiviant into the upper aquifer, using the equation found in Chapter XIII, Water Quality Rules and Regulations for class I injection wells. It so happens that the radius calculated in this case is the exact parameter which is needed.

Section 5(b)(iv)(A) of Chapter XIII, Water Quality Rules and Regulations states that the cone of influence is calculated as:

$$r = \left(\frac{2.25\,KHt}{S10^{x}} \right)^{1/2} \qquad \text{(EQUATION 1)}$$

where: $$x = \left(\frac{W}{G} - B \right) \left(\frac{4\pi KH}{2.3Q} \right) \qquad \text{(EQUATION 2)}$$

r = Radius of the cone of influence of an injection well (feet)
K = Hydraulic conductivity of the injection zone (feet/day)
H = Thickness of the injection zone (feet)
t = Time of injection (days)
S = Storage coefficient (dimensionless)
Q = Injection rate (cubic feet/day)
B = Original hydrostatic head of injection zone (feet) measured from the base of the injection zone
W = Hydrostatic head of underground source of drinking water (feet) measured from the base of the injection zone
G = Specific gravity of fluid in the injection zone (dimensionless)
π = 3.142 (dimensionless)"

This equation calculates the radius around an injection well which will have sufficient pressure during operation of that well to drive the injected fluid into an overlying aquifer. In this equation, the overlying aquifer is referred to as the "underground source of drinking water (USDW)", and the ore sand is the "receiver". The equation makes no allowance for withdrawal from the ore sand. For this reason, this equation is a very conservative approach. In effect, this is testing whether there would be an excursion into the upper aquifer, even if there were no withdrawal from the ore sand.

Page 10-16 of the application states that the Hydraulic Conductivity of the ore sand is 1.8 ft/day.

The thickness of the injection zone is the entire thickness of the zone being injected into which is hydrologically continuous. This is regardless of the interval actually perforated. The applicant wishes to inject into the ore sand at a depth of between 160 feet and 310 feet as shown on Cross Section C-C'. This cross section was selected because it represents the conditions in the north half of section 31. At this location, the pressure in the ore sand is at its maximum baseline level when compared to the pressure in the overlying aquifer. There is the least difference in baseline conditions between the ore sand and the overlying aquifer. The thickness of the injection zone is therefore, 310 - 160 = 150' feet.

The pumping time is the duration of the permit being sought, in this case 8 years or 2920 days (page 15-7 of the application). This value is entered in days. The pumping time used is the total planned duration of the project.

The Coefficient of Storage as reported on page 10-16 of the application is 1.3 E-4 for the ore zone. This is also the value used for all modeling as shown on page 10-93 of the application. The EPA guidance document concerning the use of this equation recommends that the thickness of the aquifer multiplied times E-6 be used when there is no data. In this case, that assumption would yield 150 E-6 = 1.5 E-4. This is good agreement with the value presented in the application. The coefficient of storage is a dimensionless number.

There are two terms in equation 1 which now must be determined. B, the original hydrostatic head of injection zone (feet), and W, the hydrostatic head of underground source of drinking water (USDW) (feet). The important point in determining these values is that they must both be measured from the same datum. In the regulations for class I wells, it states that they should both be measured from the base of the injection zone. By measuring them from the base of the injection zone, one is always subtracting one positive number from another positive number. In this case the number reported in the application is the pressure in the overlying aquifer and in the ore zone measured above MSL. The maps which show the groundwater gradient were used and it was found that the upper aquifer has an initial head of 5030 feet while the ore zone has a head of 4980 feet.

The next step is to convert the Q or discharge rate into the units required by the equation. In this application the unit presented is gallons per minute (gal/min). The conversion must be made to cubic feet per day. There are 7.48 gallons per cubic foot, and 1440 min/day. The applicant wishes to inject a total of 2000 gallons/minute into approximately 200 injection wells, or 10 gallons per minute per well.

Q = 10 gallons/min = (10 gal/min)(1440 min/day/7.48 gal/ft^3
Q = 1,925 cubic feet per day

The next step is to determine the specific gravity of the fluid in the injection zone. Fresh water has a specific gravity of 1.00.

At this point, we are ready to calculate the exponential term (EQUATION 2) which goes in the denominator under the radical. The equation for this exponential term is, in itself, quite complex. The equation is:

$$x = \left(\frac{W}{G} \cdot B \right) \left(\frac{4\pi KH}{2.3Q} \right) \qquad \text{(EQUATION 2)}$$

$$x = \left(\frac{5030 \text{ ft}}{1.0} \cdot 4980 \text{ ft} \right) \left(\frac{4(3.14)(1.80\text{ft/day})(150\text{ft})}{(2.3)(1{,}925 \text{ ft}^3\text{/day})} \right)$$

$$x = (50)(.7663) = 38.31$$

The final calculation is then made into equation 1 as follows:

$$r = \left(\frac{2.25\, KHt}{S10^{x}} \right)^{1/2} \qquad \text{(EQUATION 1)}$$

$$r = \left(\frac{(2.25)(1.80\text{ft/day})(150\text{ft})(2920\text{days})}{(1.3 \times 10^{-4})(10^{38.31})} \right)^{1/2}$$

r = 8.17 E-15 feet

The above calculation is significant because it shows that there would be no leakage potential from the injection zone if 10 gallons per minute were injected into a single well for 8 years and there were no balancing withdrawal from the ore zone at all. The main controlling parameter appears to be the total volume of injection. In order to determine how critical this parameter actually is, the same calculation was re-done using 20, 30, 40 and 50 gallons per minute. The result of these sensitivity analyses are as follows:

Total Discharge to a Single Well		x	r
gal/min	ft^3/day		
10	1925	38.31	8.17 E-15
20	3850	19.15	9.66 E-10
30	5775	12.77	.0481
40	7725	9.57	1.91
50	9650	7.66	17.27

This analysis shows that up to 30 gallons per minute could be injected into a single injection well completed into the ore sand for the entire 8 years of production with no removal of any of the lixiviant from the ore zone before the radius of the cone of impression was greater than the diameter of the well.

For this reason, the Water Quality Division will drop its objection to Energy Fuel's proposal to accept whatever plugging has already been done for all wells which penetrate only the ore zone. During the pre-permitting meetings with Energy Fuels, it was conceded that no monitoring of any aquifer below the leaching area would be required. At the very least, if there are any un-sealed holes within the wellfields that penetrate significantly deeper than the Ore Sand, these holes should be re-entered and sealed into the lower confining zone.

C. AQUIFER TESTS (Attachment 10.1)

The individual pump tests presented in the application will be reviewed in depth and commented on during the technical review.

1. Section 10a.1, Page 10A-1 **(SI)**

   The response is acceptable for completeness. The variable pumping rate for this test makes the results suspect.

2. Section 10A.5.2 **(SI)**

   The response is acceptable for completeness. This test will be reviewed in depth during the technical review.

3. Pump Tests **(SI)**

The response is acceptable for completeness. The tests will be reviewed in depth during the technical review.

4. Figure 10A-7 **(SI)**

The response is acceptable for completeness. This test will be reviewed in depth during the technical review.

5. Figure 10B-9 **(SI)**

The response is acceptable for completeness. This test will be reviewed in depth during the technical review. As a note the response states that the increase "is likely due to a higher rate for one minute or less". What is meant by a higher rate? Certainly not a higher pumping rate.

6. Figure 10B-10 **(SI)**

The response is acceptable for completeness. This test will be reviewed in depth during the technical review.

7. Figure 10B-11

The response is acceptable for completeness. These tests will be reviewed in depth during the technical review.

8. The response is acceptable for completeness. All pump tests will be reviewed in depth during the technical review. This response is only acceptable because of the forthcoming technical analysis. The specific response provided to this comment is confusing to this reviewer.

9. The response is acceptable for completeness. The company has verbally agreed to perform an multi-well test in the proposed Unit 1 area.

The responses to comments 1-8 would not have been acceptable for a technical review. As is suggested in comment 8, the company should also critically review the pump test data.

D. Section 10, Hydrology - New Comments

1. Table 10.3-1, Reno Creek Basic Well Information, Page 10-25 **(GM)**

   The following Wells shown on Plate 10.5-1, Hydrologic Monitoring Site Locations, are not listed in this Table:

RI-1	RI-5
RI-2	RI-6
RI-4	

   Additionally, Plate 10.5-1 lists Well RI-42C but Table 10.3-1 lists it as Well RI-42.

   This discrepancy must be explained or corrected.

2. Plate 10.5-1, Hydrologic Monitoring Site Locations **(GM)**

   The following Wells listed in Table 10.3-1, Reno Creek Basic Well Information, Page 10-25, are not shown on this map:

RI-12	RI-34
RI-14	RI-38U
RI-28	RI-43
RI-33U	

3. Section 10.5.3, Excursion Control, Page 10-91 **(BL)**

   Section 10.5.3 on page 10-91 states that an excursion is controlled as soon as a gradient has been established back toward the wellfield. The only evidence of a gradient toward the wellfield is an additional 1% wellfield bleed rate in the nearest production wells, or the nearest injection wells have been turned off. The Water Quality Division contends that controlling an excursion involves more than simply a theoretical calculation showing that the gradient reversal has been established. After all, in most cases, that calculation could have been done in advance and showed that the excursion was controlled while it occurred.

   At other sites, excursions have occurred and have taken years to recover in some cases. In those cases, the Water Quality Division has never been comfortable with the interpretation that the excursion is controlled without any direct evidence that the gradient reversal has even occurred. In many cases, companies have relied on the mere fact that the monitor well on excursion status has a reduced static water level as evidence that the

gradient reversal exists. There are other ways to cause this to happen without necessarily meaning that a gradient exists toward the wellfield.

How will Energy Fuels Nuclear document that a gradient reversal has been actually accomplished during an excursion?

What is needed is a commitment to install additional monitor wells in the area of an excursion if the excursion status has not been completely eliminated within 90 days of the date when the well went on excursion.

4. Section 10.5.2, Recommended Spacing of Monitoring Ring, Page 10-91 **(BL)**

The first paragraph states that: "A recommended spacing of 400 feet on all sides places the monitoring wells significantly inside the reversal zone." This implies that all of the wells will be 400 feet apart. The second paragraph then states that on side gradients 600 feet will be used and up gradient 800 feet will be used. In checking Figure 10.5.3, it is clear that the second paragraph is what is actually used. Energy Fuels should clarify these statements to make it clear.

The spacing described appears to clearly apply to the distance between adjacent monitor wells. Is it also supposed to apply to the distance between the monitor wells and the wellfield? This point is also unclear. A statement should be added to Section 10.5.3 to clearly describe the distance from the wellfield to the monitor wells in addition to the distance between monitor wells.

If it is intended that upgradient monitor wells be 800 feet away from the wellfield and also 800 feet apart, this is unacceptable to this division. This proposal not only increases the distance between wells but also doubles the buffer zone on the upgradient side. Energy Fuels should be willing to place monitor wells at a uniform distance out from the wellfield.

5. Plate 10.2.1, **(BL)**

It appears that the well shown on Plate 10.2-1 as permit number 1560 is also the well shown as number 43731db on Table 10.3-6. If this is true, then the Plate should show this well with the WQ designation. Table 10.3-6 should show either the name or the state engineer's permit number to allow cross reference between the plate and the table.

6. Groundwater Classification Outside Permit Area (**BL**)

With this memo, the Water Quality Division tentatively classifies the water outside of the permit area and in the Ore Zone and the Upper Aquifer as Class III throughout Township 43 North, Range 73 West, and the east half of Township 43 North, Range 74 West, and the north half of Township 42 North, Range 73 West, and the northeast one quarter of Township 42 North, Range 74 West; with the sole exception of the ore sand within one half mile of the Willard 5 well (State Engineer's permit 2882) located in Township 43 North, Range 73 West, Section 25 NW¼SW¼. This tentative classification is made on the basis of the regional groundwater study submitted with the application.
With two exceptions all of the wells shown on the regional groundwater study inside the above legally described area meet the quality standards for class III groundwater and none of the wells with the exception of the Willard 5 well meet the standards for class I or II groundwater of the state.

The two exceptions are the well in T42N, R73W, Section 10 SW, and the well in T42N, R73W, Section 27 NESW. These two wells contain more radium than the allowable limit for class III groundwater, thus they meet only the quality standards for Class IV(a) groundwater. At the same time, however, these two wells are being used for stock watering purposes. For this reason, they are class III by use.

7. Groundwater Classification - Ore Zone Sand (**BL**)

With this memo, the Water Quality Division hereby tentatively classifies the groundwater inside the permit area and in the Ore Sand as follows: In T43N, R73W, Section 31 and 29 SW1/4 the groundwater is class III. All other groundwater inside the permit boundary and in the ore zone is Class IV(a). The above classifications are made because the groundwater in monitor well RI-1 and RI-2 meets all of the quality standards for class III groundwater of the state. None of the monitor wells within the permit area meet the quality standards for either class I or II groundwater of the state. All of the remaining monitor wells within the permit area contain Radium in excess of the standards for Class III groundwater of the state. These wells meet only the standards for class IV(a) groundwater of the state under Chapter VIII, Wyoming Water Quality Rules and Regulations. This classification is tentative and will be reviewed during the approval process for each wellfield.

8. Groundwater Classification - Upper Aquifer (**BL**)

With this memo, the Water Quality Division hereby tentatively classifies the groundwater in the Upper Aquifer as follows:

Within the permit area shown on plate 10.3-2, the Upper Aquifer is class III with the following exceptions: In T43N, R73W, Section 29 SE1/4 and Section 33 E1/2NE1/4 the Upper Aquifer is Class IV(a). In T43N, R73W, Section 33 W1/2NE1/4 the Upper Aquifer is Class I. The above classification is based on monitor wells RI-15U which meets class I groundwater standards and wells RI-42C and RI-43C which meet only class IV(a) standards. Wells RI-24U, RI-25U, and RI-30U meet only class III standards. For well RI-24U the only parameter which did not also meet class II standards was RSC which was 1.85 meq/l. This classification is tentative and will be reviewed during the approval process for each wellfield.

9. Residual Sodium Carbonate (RSC) (**BL**)

In making the above classifications, the Water Quality Division calculated the RSC for a number of wells in the area. This calculation shows that this water is unacceptable for Class II purposes in many cases. For this reason, the Water Quality Division requests that Energy Fuels Nuclear calculate RSC for all wellfield data packages submitted for approval.

E. Chapter 15, Mine Plan

1. Sections 15.5 and 15.12, Topsoil Handling (**BG**)

Section III.C.1. response was indirect in that no revised text was submitted. Given that Energy Fuels requests an alternate topsoil (A and B horizon) salvage and protection plan, I feel it is crucial that the Mine Plan text be crystal clear in describing and making distinctions among topsoil handling practices. The clarity is crucial for execution of straightforward, unbiased field inspections. I restate this Technical comment as originally written:

> Sections 15.5 and 15.12 discuss/present some elements of Energy Fuels' commitments on salvage and protection of topsoil/subsoil. The sections are somewhat overlapping and inconsistent in use of the terms topsoil and subsoil. I suggest Energy Fuels present a tabular summary of permit-wide topsoil/subsoil handling commitments in Section 15.12. Attachment 1 is a suggested table; please make other appropriate entries.

2. Section 15.8.5, Plant Building and Facilities, Page 15-21 **(GM)**

Energy Fuels has added a section to their mine plan stating that any cracks in the plant floor will be sealed on a regular basis.

No response is required.

F. Mine Plan -New Comments

1. Table 15.5 Soils

Table 15.5, under the column labeled Comments and the row labeled Soils, the wording should be "Samples at **four** depths...".

2. Section 15-4, General Description of Operations, Page 15-6 **(GM)**

In the first paragraph of this section, Energy Fuels stated that only one R&D test was conducted at Reno Creek. This is not correct. The first R&D test was a single pattern test using a sulfuric acid-based lixiviant in 1978-79. It was spectacularly unsuccessful, the acid reacted with calcite in the formation and very quickly rendering the formation impermeable that made full groundwater restoration impossible.

The text should be corrected to reflect the earlier experiment.

3. Well Completion, Page 15-14 **(BL)**

On page 15-14 the statement is made that the borehole/casing annulus of all wells will be filled with "loose cement" if the cement pumped through the cement shoe does not return to the surface. This implies that cement powder will be dumped into this space dry. The wording should be modified to show that a neat cement slurry will be pumped into this space using a tremie pipe.

4. Well Completion Procedures, Page 15-14 **(BL)**

This discussion should also state that the pressure necessary to hold back the cement will be recorded. This is a required portion of the "cement pressure - single point resistivity (sic)" Mechanical Integrity Test procedure which has been approved by the EPA Office of Drinking Water under 40 CFR 146.8(b)(2).

5. Section 15.7.2, Mechanical Integrity Testing, Page 15-15 **(BL)**

This section states that the single point resistance log will be run before the screened liner is set in the hole. This test must be run after all drilling tools are out of the hole and the hole is ready for use. This is mandatory under the EPA's approval of this method.

6. Figure 15.9 **(BL)**

a. Figure 15.9 shows a sump in the satellite building.

Where is the waste from this sump routed?

7. Figure 15.10 **(BL)**

Figure 15.10 shows the laboratory.

a. Where is waste from the laboratory drains routed?

8. Section 15.8.5, Plant Building and Facilities **(GM)**

Review of the Satellite Plant Process Flow Diagram, Figure 15.7, Page 15-22, and Satellite Building, Figure 15.9, Page 15-25, and the Major Equipment List, Table 15.1 does not show the presence of any type of filtration equipment. Will filtration of the lixiviant take place in the satellite plant and is there room in the satellite plan for the bulky filters?

If filters are to be used Energy Fuels must submit new figures and a new equipment list table that show their locations.

If sand filters are to be used, the cost of their decontamination or disposal must be added to the reclamation bond.

9. Section 15.10.3.2, Soils (Land Application Site), Page 15-46, Attachment 11.1, Plate 11.1 - Baseline Soils Inventory **(GM)**

Energy Fuel's description of the soils here points out several problems and discrepancies:

a. On Plate 11.1 in an area mapped as 336B, Forkwood Cushman Loam Complex, an area was mapped as Shingle. However, in the description of this complex on Page ATT 11.1-53, this complex is not listed as having Shingle soil as a member. Please explain.

b. In Section 15.10.7.2.3, Soil Reclamation, on Page 15-60, on possible method of cleansing the soils of soil buildup would be to flush them with an application of up to four feet of clean water. It is hoped this water would flush the salts to depths of four feet or greater.

However, several of the soil types mapped in the irrigation site have depths less than four feet. The Cushman soils commonly have a "soft, effervescent shale" at a depth of 29 inches and the Theedle soils have a soft shale at a depth around 36 inches. Additionally the Shingle soils mapped have depths of between 0 and 6 inches.

What will the effects such shallow soils have on the retention of the applied water and on any necessary soil reclamation methods?

Energy Fuels should attempt to gather as much data as possible about the soils of the Land Application site and consider the possible effects of varying soil depths and water retention capabilities.

10. Section 15.10.6.2, Land Grading, Page 15-56

a. Grading Problems **(DC)**

How does Energy Fuels propose to protect the topsoil resource if the land to be irrigated is graded and surface material pushed into low spots and drainages?

b. Alternative to Grading **(GM)**

Energy Fuels states they will grade and earthen bridge across some of the deeper channels on the Land Application site to allow the irrigation pivot system to cross. Since grading or similar disturbance may initiate erosion this should be avoided when possible. One alternative would be construction of a treated timber bridge that would allow the relatively light and narrow-tracked pivot system to cross unimpeded.

11. Section 15.10.6.14, Irrigation Sequencing, Page 15-55 **(SI)**

This page contains handwritten changes and should be replaced.

12. Land Application, Page 15-29 **(BL)**

Page 15-29 states that 50 to 100 gallons per minute of reverse osmosis brine will be routed to land application. Page 15-42 states that there will be a 35% brine to permeate split on the reverse osmosis system. This means that the TDS of the 50 to 100 gallons of brine will be at least double and probably close to triple what the bleed stream is of the lixiviant. Since the total flow to the land application system is only 260 gallons per minute, a significant percentage of the flow is reverse osmosis brine.

Has the increase in TDS, chloride, bicarbonate, etc. for this brine been factored into the estimates provided in Table 15.3 for the quality of the effluent to the land application system?

13. Land Application **(BL)**

Section 55(b) found on page 129 of Chapter XI, Wyoming Water Quality Rules and Regulations states that:

"(b) Indigenous or crop plant species shall be capable of survival and maintenance under conditions of increase soil moisture, salinity, and alkalinity, the classes of which shall be determined by use of Figure 1, Tables 1-3 and a soil textural analyses. Waste and wastewater analyses required for this evaluation include electrical conductivity (EC in umhos/cm @25°C), sodium (Na^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), bicarbonate (HCO_3), chloride (Cl^-), sulfate (SO_{42-}), Boron (B) and Selenium (Se), and calculation of Sodium Adsorption Ratio (SAR) by use of the formula:

$$SAR = \frac{(Na^+)}{\sqrt{\frac{(Ca^{2+}) + (Mg^{2+})}{2}}}$$

(endquote)"

Table 15.3 should also include the Electrical Conductivity, RSC and SAR for the wastewater to be land applied. Values reported on this table should be shown in both mg/l and meq/l for the parameters already reported.

Information already reported shows that the wastewater will be unacceptable for land application if sodium bicarbonate is used. See Section 56 of Chapter XI, Figure I and Table III. The above information is required in

order to properly assess the suitability of this wastewater for land application.

Page 15-20 states that the maximum amount of HCO_3 will be 5000 mg/l. This value leads to the necessity to calculate the RSC to determine the impact of this wastewater on cation exchange reactions in the soil.

Section 15.11. Projected Mining Schedule **(SI)**

Please describe all the elements and justifications to be included in the wellfield package.

14. Monitor Well Construction

The Water Quality Division finds that the proposed monitor well construction technique is in conformance with the applicable sections of Chapter XI, Part G, Water Quality Rules and Regulations when dealing with surface seals, casing and cementing. It is unclear what the justification is for using an open hole completion technique. For those holes with short completion intervals, (10 or 20 feet) this may be appropriate. For holes with as much as 65 feet of completed interval, how will Energy Fuels know that the interval being monitored is still the entire zone? If the open hole portion collapses, the zone effectively monitored will become only the top few feet of the completed zone. How does Energy Fuels Nuclear know that open hole completions have worked in the past. In my experience, wells with open hole completions may provide a place to draw water from, but there is no way to insure that they will remain open for several years. This is especially true in Wasatch sands.

15. Plate 15-1, Mine Plan Map **(GM)**

This map depicts the oxygen tank as placed in an area where native topsoil is presumably still located. Will a road be necessary to access this tank? If so, it should be shown on this map.

G. Chapter 16, Environmental Monitoring And Reporting

1. Summary of Monitoring and Reporting Commitments **(BG)**

Section III.D.1. response is understood, but the original Technical review comment stands as written:

> This section only requires that sampling frequency will be increased to weekly during an excursion. No additional parameters will be sampled for. Energy Fuels Nuclear must include a

commitment to monitor wells on excursion status for a full suite of parameters as shown on Table 16.1, sufficient to determine if a class of use violation exists. This sampling need not be done weekly, but there should be some date after an excursion has been declared at which a full suite sampling will be done. This sampling should be done periodically, perhaps every 90 days until the well is no longer in excursion status.

H. Chapter 16 - New Comments

1. Section 16.1.1.5, Excursions **(BL)**

This section only requires that sampling frequency will be increased to weekly during an excursion. No additional parameters will be sampled for. Energy Fuels Nuclear must include a commitment to monitor wells on excursion status for a full suite of parameters as shown on Table 16.1, sufficient to determine if a class of use violation exists. This sampling need not be done weekly, but there should be some date after an excursion has been declared at which a full suite sampling will be done. This sampling should be done periodically, perhaps every 90 days until the well is no longer in excursion status.

2. Section 16, Irrigation Reservoir and Land Application System

a. Section 16.1.3, Radium Settling Pond Leak Detection System, Page 16-10 **(GM)**

Energy Fuels states that if more than five gallons of liquid can be evacuated from the leak detection system, the liquid will be analyzed for the parameters given in Table No.1.

This is unacceptable. To contain five gallons of fluid the 4-inch diameter leak detection pipe would have to be filled to a depth of between 7 and 8 feet. If the fluid in the pond is not at an equivalent depth, the level in the leak detection tube may never rise to a level where a total of 5 gallons of fluid could be collected.

Generally, if any fluid is found in the leak detection tubes, it is either condensate or fluid leaked though the pond liner. A quick check for conductivity level would establish whether there is any chance the fluid is the result of leakage. Only in rare cases would an analysis for the numerous parameters listed in Table No. 1 be necessary.

Energy Fuels should commit to sampling any quantity of fluid more than, say 100 ml., for conductivity. If the conductivity is high enough to warrant suspicion that it is fluid from a leak, a quick field test for chloride and possibly TDS should establish whether the liquid is condensate or from a leak.

Energy Fuels should never wait until 5 gallons of fluid from a possible leak has accumulated before subjecting the fluid to an elaborate and time-consuming analysis. A quick and simple analysis of any available fluid will allow a much faster response to a possible leak.

I. Chapter 17, Restoration and Reclamation Plan

1. Section 17.2.4, Revegetation Practices

   a. Table 17.1, Final Reclamation Seed Mixture, Page 17-7 **(BG)**

      Section III.E.1.a. response is accepted. Energy Fuels must submit page 17-8 without the strike-over entry.

2. Section 17.2.5, Evaluation of Reclamation Success, Page 19-9 **(BG)**

   Section III.E.2. response is understood but awaits final resolution. The original Technical comment remains unanswered.

3. Section 17.4, Reclamation Bond Estimate, Page 17-11 **(GM)**

   a. Land Application Site Reclamation Costs

      Due to the uncertainties over effects of potential salt and selenium buildup in the soils and groundwater associated with the Land Application Site, it is likely a large contingency amount will be added to the Unknowns Contingency category of the reclamation bond. This money would be available for use in monitoring, cleanup and mitigation of the Land Application Site if it became unacceptably contaminated.

   b. Detailed Bond Review

      A detailed review of the bond estimate found it to be very complete with only a few items missing. The major concerns with the estimate are the assumptions of the cost of several items.

Following is a list of those items for which the cost is not accepted without discussion or documentation.

i. The cost of sand was omitted from the sandblasting of the plant's tanks, piping and pumps, Section 3.B.2 on Page ATT 17.1.8. The cost of $250.00 for 250 units of sand was added.

ii. The cost of heating the plant building was omitted. It is recognized that the cost of heating the office building is covered in the Other Costs section of Part I.B. of the Reclamation Bond Estimate, Attachment No. ATT 17.1, Page ATT 17.1-3. A cost of $1000 per month for propane was used, base on Total Mineral's (Total) estimate of February 11, 1993.

iii. The cost of using a reductant was added as a new section. Reductant costs from Total's estimate were used. This amounted to $0.304/kgal. to treat one Pore Volume. This cost also came from Total's February 11, 1993, estimate. The costs or circulating the wellfield for one Pore Volume were also added.

iv. The cost of repair and maintenance were added to both the Groundwater Sweep and Reverse Osmosis Stages of the groundwater restoration plan. The costs amount to $0.061/-kgal for the Groundwater Sweep Phase and $0.279/kgal for the Reverse Osmosis Phase. These are also from the Total estimate. The cost of repair and maintenance was also added to the new Reductant Phase of the restoration operation. A cost of $0.122/kgal. was used, extrapolating on the electric power (and the number of pumps in service) used in the wellfield during the Reverse Osmosis Phase. One Pore Volume was calculated to consist of 20,238 kilogallons from Page 15 of the amendment application.

v. The cost of a replacement set of reverse osmosis membranes are included at $12,000.00. This is especially important since Energy Fuels plans on obtaining a used r/o unit that may have membranes with a limited lifetime.

vi. The cost of seed were altered slightly based on the following estimate from Stacy Page, District III Revegetation Specialist:

Western wheatgrass - 3 lbs. @ $3.40/lb =	$10.20
Bluebunch wheatgrass - 3 lbs. @ $1.60/lb =	4.80
Thickspike wheatgrass - 3 lbs. @ $1.75/lb =	5.25
Prairie sandreed - 2 lbs @ $4.50/lb =	9.00
Indian ricegrass - 2 lbs. @ $8.00/lb =	16.00
Green needlegrass - 2 lbs. @ $4.00/lb. =	8.00
Totals 15 lbs =	$53.25

vii. No costs for remediation of the irrigation site are proposed at this time. The results of the Ecological Risk Assessment now underway will be reviewed before setting any costs for this activity.

viii. The first year of operations spreadsheet submitted by Energy Fuels was revised with the above costs. A total of $1,141,,951.22 was reached, compared to Energy Fuels' first year bond total of $1,092,644.00. Both these totals must be considered as tentative since alterations to either the mine or reclamation plans could have significant effects on the totals.

The revised spreadsheet is attached as Attachment No. 1.

J. Section 17 - New Comments

1. Section 17.3, Well Abandonment **(BL)**

a. This section has been changed to now state that wells will be abandoned by filling with plug gel only in the screened interval and at the surface. The area in between is to be filled with gravel. Section 70(e)(i), of Chapter XI, Wyoming Water Quality Rules and Regulations states that "Sealing materials shall have a permeability of 10^{-7} cm/sec or less."

i. What evidence can Energy Fuels present that plug gel will have this permeability several years after being placed in a hole?

ii. What quality control methods will be used to insure that the plug gel will be properly placed?

iii. What will be the original concentration of the plug gel?

iv. What will be done to insure that the filler material between the two seals does not settle into the bottom seal and destroy its integrity?

v. What will be done to insure that the top seal remains in place?

b. Filling of Abandoned Wells **(BL)**

Section 70(d) of Chapter XI, Wyoming Water Quality Rules and Regulations governs the placement of materials in an abandoned well. Section 70(d)(ii) states that "The well shall be filled with the appropriate material as described in paragraph e. from the bottom of the well up." Leaving a well filled with water is not acceptable under this regulation. Section 70(d)(v) states that "To assure that the well is filled and there has been no bridging of the material, verification shall be provided that the volume of the material placed in the well at least equals the volume of the empty hole." Section 17.3 should be revised to include appropriate record keeping.

c. Abandoned Well Markers **(BL)**

Section 70(f) of Chapter XI, Wyoming Water Quality Rules and Regulations requires that well markers be permanent. During reclamation, Land Quality usually requires that all traces of the well be removed. In order to comply with these conflicting requirements, Energy Fuels should place a marker in the top of the well magnetic in nature so that the well could be relocated if the need arises after final reclamation.

2. Section 17.4.1, Reclamation Bond Estimate **(GM)**

Energy Fuels bases its costs for disposal of radiologically contaminated materials at the White Mesa disposal site. To support this cost, Energy Fuels must demonstrate that they have a signed agreement for disposal of material at the cited cost and that this agreement is transferable to either the State of Wyoming or the NRC in the case of bond forfeiture.

\gm

Attachments

cc: R. Chancellor w/attachments
479arv2 gm

Attachment to
G. Mooney Memo

Dated 5-20-94

RENO CREEK ISL PROJECT 5-19-94

YEAR ONE - BOND ESTIMATE WORKSHEET

1. GROUNDWATER RESTORATION

A. GROUNDWATER SWEEP PHASE

	Op. Days	Hrs/day	Total Hrs.	$/Hr.	COST
Electrical cost	224	24	5376	$0.75	$4,019.10
	Use Rate	Totl Lbs.	$/lb		
Chemical cost - barium chloride	28	18897	0.423		$7,993.43
	No.	$RATE	Ann. Cost	% Yr	
Labor cost					
supervisor	1	$60,000.00	$60,000.00	62	$37,200.00
operators	2	$30,000.00	$60,000.00	62	$37,200.00
	Op. Days	Months	$/Month		
Other costs	224	7.5	$2,500.00		$18,666.67
		Pore Volumes	Units	$/KGal.	
Repair and Maintenance		4	20238	0.061	$4,938.07
				Subtotal	$105,079.20

B. REDUCTANT TREATMENT

	Op. Days	Hrs/day	Total Hrs.	$/Hr.	COST
Electrical cost					
Wellfield	28	24	672	$1.50	$1,008.00
	Use Rate	Totl Lbs.	$/lb		
Chemical cost					
- barium chloride	28	18897	0.423		$7,993.43
		Pore Volumes	Units	$/KGal.	
- hydrogen sulfide		1	20238	0.304	$6,152.35
	No.	$RATE	Ann. Cost	% Yr	
Labor cost					
supervisor	1	$60,000.00	$60,000.00	7.7	$4,620.00
operators	2	$30,000.00	$60,000.00	7.7	$4,620.00
	Op. Days	Months	$/Month		
Other costs	28	0.9	$2,500.00		$2,333.33
		Pore Volumes	Units	$/KGal.	
Repair and Maintenance		1	20238	0.061	$1,234.52
				Subtotal	$27,961.63

C. REVERSE OSMOSIS PHASE

	Op. Days	Hrs/day	Total Hrs.	$/Hr.	COST
Electrical cost					
Wellfield	56	24	1344	$1.50	$2,016.00
R.O.	56	24	1344	$9.49	$12,754.56

		Use Rate	Ttl Units	$/Unit		COST
Chem Cost	- Sul.Acid	0.003	121427	0.034		$4,128.52
	- Bar. Cl	28	9448	0.423		$3,996.50
Labor cost		!	$RATE	Ann. Cost	% Yr	
supervisor		1	$60,000.00	$60,000.00	16	$9,600.00
operators		2	$30,000.00	$60,000.00	16	$9,600.00
Other costs		Op. Days	Months	$/Month		
		56	1.9	2500		$4,666.67
Plant Heating		Op. Days	Months	$/Month		
Propane		56	1.9	$1,000.00		$1,866.67
Repair and Maintenance			Pore Volumes	Units	$/KGal.	
			2	20238	0.279	$11,292.80
					Subtotal	$59,921.72

D. IRRIGATION OPERATIONS

Elect. Cost	Op. Days	Hrs/day	Total Hrs.	$/Hr..	COST
PUMP	211	24	5064	0.658	$3,332.11
IRRIGATOR	211	24	5064	0.25	$1,266.00
				Subtotal	$4,598.11

E. STABILIZATION SAMPLING

	Months	No.	No.	Cost/Smp	COST
Labor	6	5	30	$10.00	$300.00
Analysis	6	5	30	$150.00	$4,500.00
				Subtotal	$4,800.00

F. EQUIPMENT

Description	
Pickup Truck	$5,000.00
Pickup w. Pump	$10,000.00
Pump reel	$5,000.00
Cementer	$5,000.00
Lab equipment	$5,000.00
500 gpm RO	$250,000.00
Replacement RO Membranes	$12,000.00
Subtotal	$280,000.00

TOTAL GROUNDWATER RESTORATION

TOTAL $482,360.66

2. WELLFIELD ABANDONMENT AND RECLAMATION

A. WELL PLUGGING

Labor Cost	No.	Hrs/Well	Totl Hrs.		COST
Supervisor	370	1	370	20	$7,400.00
Laborers	370	2	740	15	$11,100.00

Material Cost	No.	Vol.ft3	$/ft3	$/Well	COST
	370	48	2.38	114.24	$42,268.80
				Subtotal	$60,768.80

B. BUILDING REMOVAL

Decontamination	No.	No. Hrs/Bldg		Ttl. Hrs.	$/Hr.	COST
Supervisor	1	10	2.5	25	20	$500.00
Laborer	2	10	2.5	50	15	$750.00

Equipment Rental	No.	No. Hrs/Bldg		Ttl. Hrs.	$/Hr.	COST
Press. Washers	2	10	2.5	50	6	$300.00
Pickup	1	10	2.5	25	8.5	$212.50

Demolition	No. Bldg	Vol/ft3	Totl. Vol.	$/ft3	COST
Unit Cost	10	1600	16000	0.17	$2,720.00

Haul–Volume	No. Bldg	Vol/ft3	Totl. Vol.	Vol/Load	No. Loads
	10	10.4	104	20	5.0

	No. Loa	Mi.Loads	Totl Mi.	$/Mi.	COST
–Cost	5	55	275	$2.00	$550.00

Dispose–Unit Cost	Totl.Tons	$/Ton	COST
	104	$3.00	$312.00
		Subtotal	$5,344.50

C. BURIED PIPE REMOVAL

Excavate	No. Pat.	Len./Pat.	Length	Width	Depth	Vol. Yd3
	116	152	17632	2	3	3918.2

Cost	Vol.	$/Yd3	COST
	3918.22	$3.10	$12,146.49

Remove, Cut and Load	No.	Days	Hrs/Day	Totl Hrs		COST
Supervisor	1	7	8	56	20	$1,120.00
Laborer	2	7	8	112	15	$1,680.00

Equipment Rental	No.	Days	Hrs/Day	Ttl. Hrs.		COST
Pickup	1	7	8	56	8.5	$476.00
Saws	2	7	8	112	2.35	$263.20

Backfill–Volume	Vol/Yd3	Rt/Yd/Hr	Hours
	3918.2	75	52.2

Eq.Rental–Backhoe	No.		Hours		
	1		30	52.0	$1,560.00
Haul– Vol. 20yd3 cutup pipe=20yd3			Tons	$/Ton	COST
–Cost			20	$52.50	$1,050.00
Dispose Vol. 20cy3 cutup pipe			Tons	$/Ton	COST
–Cost			20	$40.00	$800.00
				Subtotal	$19,095.69

C. ELECTRICAL REMOVAL	No.	Days	Hrs/Day	Ttl. Hrs.		COST
Cable Removal						
Labor–Electrician	1	3	8	24	30	$720.00
–Laborer	1	3	8	24	15	$360.00
Starter Removal						
Labor–ElectElectrician	1	2.5	8	20	30	$600.00
–Laborer	1	2.5	8	20	15	$300.00
Power Disconnect						
Labor–ElectElectrician	1	1	8	8	30	$240.00
–Laborer	1	1	8	8	15	$120.00
Pole Removal						
Labor–ElectElectrician	1	1	8	8	30	$240.00
–Laborer	1	1	8	8	15	$120.00
Equipment Rental						
–Pickup	1	7.5	8	60	8.5	$510.00
–Boom truck	1	2	8	16	25	$400.00

Haul – Volume=2320lbs cable + 3016lbs starters + 2733lbs poles = 8096 lb = 4 tons

– Cost	No.Loa	Mi. Load	Total Miles		$/Mile	COST
	0.2	55	11		$2.00	$22.00
			Total Tons		$/ton	COST
Dispose			4		$3.00	$12.00
– Unit cost					Subtotal	$3,644.00

E. WELLFIELD ROAD RECLAMATION

Gravel removal: volume = 5150' x 12' wide x .25' thick = 572 yd3

– Cost	Vol Yd3	$/Yd3	COST
	572	$0.60	$343.20

Ripping and grading (24' wide x 5150')x43,560ft2 = 2.8 acres

	Acres	$/Acre	COST
– Ripping Cost	2.8	$50.00	$140.00
– Grading cost	2.8	$100.00	$280.00

Replace topsoil – 6" ts over 24' width; Volume = 5150' x 24' x 0.5' = 2289 yd3

	Vol Yd3	$/Yd3	COST
– Cost	2289	$0.50	$1,144.50
		Subtotal	$1,907.70

F. FENCE REMOVAL

	Length	$/Ft	
– Cost	13000	$1.06	$13,780.00
		Subtotal	$13,780.00

G. REVEGETATION

Total area of wellfield patterns is 116 pat. x 4900ft3 = 13 acres

	Acres	Ft2	$/ft2	COST
Ground preparation	13	566280	$0.00	$1,817.76

	Acres	$/Acre	COST
Seeding	17	$50.00	$850.00
	17	$40.00	$680.00
		Subtotal	$3,347.76

TOTAL WELLFIELD ABANDONMENT AND RECLAMATION $107,888.45

3. PLANT FACILITIES RECLAMATION

A. 1. SATELLITE BUILDING REMOVAL

Building is 100'x40'x15'sitting on 6" concrete slab wwith concrete apron at both ends

Decontamination	No.	No. Hrs/Day		Ttl. Hrs.		COST
Foreman	1	2.5	8	20	$20.00	$400.00
Laborer	4	2.5	8	80	$15.00	$1,200.00
RST	1	2.5	8	20	$30.00	$600.00

Equipment Rental	No.	No. Hrs/Day		Ttl. Hrs.		COST
Press. Washers	3	2.5	8	60	$6.00	$360.00
Pickup	1	2.5	8	20	$8.50	$170.00

Demolition	No. Bldg	Vol/ft3	Totl. Vol.	$/ft3	COST
Unit Cost	1	60000	60000	$0.17	$10,260.00

Haul–Volume	Totl Tons	Tons/Ld	No. Loads
	125	20	6.0

	No. Loa	Mi.Loads	Totl Mi.	$/Mi.	COST
–Cost	7	55	385	$2.00	$770.00

Dispose–Unit Cost	Totl.Tons	$/Ton	COST
	125	$3.00	$375.00

A. 2. TANKS, PIPING PUMPS — Subtotal $14,075.00

Decontamination	No.	No. Hrs/Day		Ttl. Hrs.		COST
Supervisor	1	10	8	80	$20.00	$1,600.00
Laborer	4	10	8	320	$15.00	$4,800.00
RST	1	10	8	80	$30.00	$2,400.00

Equipment Rental	No.	No. Hrs/Day		Ttl. Hrs.		COST
Press. Washers	2	10	8	160	$6.00	$960.00
Pickup	1	10	8	80	$8.50	$680.00
Sand Blast	2	10	8	160	$4.81	$769.60

Materials	Units	$/Unit	COST
Sand	250	$1.00	$250.00

Demolish and Load	No.	No. Hrs/Day		Ttl. Hrs.		COST
Supervisor	1	14	8	112	$20.00	$2,240.00
Laborer	4	14	8	448	$15.00	$6.720.00
Welder	1	14	8	112	$35.00	$3,920.00
Equipment Rental						
– Pickup	1	14	8	112	$8.50	$952.00
– Boom truck	1	14	8	112	$25.00	$2,800.00

Haul – Volume = 86,439 lbs – 43.2 tons, say 3 loads. Contaminated = 28,813 lbs

		No.	Mi/Load	Total	$/Mi.	COST
– Cost	Uncontaminated	3	55	165	$2.00	$330.00
				Tons	$/Ton	
	Contaminated			14.4	$52.50	$756.00

Dispose		Tons	$/Ton	COST
	Uncontaminated	43.2	$3.00	$129.60
	Contaminated	14.4	$40.00	$576.00

Subtotal $29,883.20

A. 3. SATELLITE ELECTRICAL

REMOVE, CUT, LOAD	No.	No. Hrs/Day		Ttl. Hrs.		COST
Labor – Electrician	1	2.5	8	20	30	$600.00
– Laborer	2	2.5	8	40	15	$600.00
Welder	1	2.5	8	20	35	$700.00
Equipment Rental						
– Pickup	1	2.5	8	20	8.5	$170.00
– Boom truck	1	2.5	8	20	25	$500.00

Haul – volume is small, assume 1 load, 3 tons

	No.	Mi/Load	Total	$/Mi.	COST
	1	55	55	$2.00	$110.00

Disposal	Total Tons	$/Ton	COST
–Unit cost	3	3	$9.00

Subtotal $2,689.00

A. 4. SATELLITE FOUNDATIONS

Decontamination	No.	No. Hrs/Day		Ttl. Hrs.		COST
Supervisor	1	1.5	8	12	$20.00	$240.00
Laborer	4	1.5	8	48	$15.00	$720.00
RST	1	1.5	8	12	$30.00	$360.00

3

Equipment Rental	No.	No. Hrs/Day		Ttl. Hrs.		COST
Press. Washers	2	1.5	8	24	$6.00	$144.00
Pickup	1	1.5	8	12	$8.50	$102.00

Materials	Lbs. Acid	$/Lb.	COST
Acid	3000	$0.15	$450.00

Demolition	Vol/yd3	$/Yd3	COST
Unit Cost	100	68.5	$6,850.00

Haul–Volume = Uncontaminated 90 yd3 3 = 376,650 lbs @ 150lbs/ft3 = 188t,
Contaminated = 10yd3 = 40,500lbs @ 150lbs/ft3 = 20.5t.

–Cost	No. Loa	Mi.Loads	Totl Mi.	$/Mi.	COST
Uncontaminated	8	55	440	$2.00	$880.00

	Tons	$/Ton	COST
Contaminated	20.5	$52.50	$1,076.25

Dispose–Unit Cost	Tons	$/Ton	COST
Uncontaminated	188	$3.00	$564.00

	Tons	$/Ton	COST
Contaminated	20.5	$40.00	$820.00

3 B. 1 WATER TREATMENT BUILDING REMOVAL Subtotal $12,206.25

Building is 60'x30'x12'sittingon a 6" concrete slab with 15' concrete apron at one end

Decontamination	No.	No. Hrs/Day		Ttl. Hrs.		COST
Supervisor	1	1	8	8	$20.00	$160.00
Laborer	4	1	8	32	$15.00	$480.00
RST	1	1	8	8	$30.00	$240.00

Equipment Rental	No.	No. Hrs/Day		Ttl. Hrs.		COST
Press. Washers	2	1	8	16	$6.00	$96.00
Pickup	1	1	8	8	$8.50	$68.00

Demolition and Loading	Tot'l Vol	$/ft3	COST
-Unit Cost	21600	0.17	$3,672.00

Haul-Volume	Totl Tons	Tons/Ld	No. Loads
	61	20	3.0

-Cost	No. Loa Mi.Loads	Totl Mi.	$/Mi.	COST
	3 55	165	$2.00	$330.00

Dispose	Total Tons	$/Ton	COST
Unit Cost Cost	61	$3.00	$183.00

B. 2. Tanks, Piping, Pumps — Subtotal $5,229.00

Decontamination	No.	No. Hrs/Day		Ttl. Hrs.		COST
Supervisor	1	3.5	8	28	$20.00	$560.00
Laborer	4	3.5	8	112	$15.00	$1,680.00
RST	1	3.5	8	28	$30.00	$840.00

Equipment Rental	No.	No. Hrs/Day		Ttl. Hrs.		COST
Press. Washers	2	3.5	8	56	$6.00	$336.00
Pickup	1	3.5	8	28	$8.50	$238.00
Sandblast	2	3.5	8	56	$4.81	$269.36

*Materials	Units	$/Unit	COST
Sand	250	$1.00	$250.00

Demolish and Load	No.	No. Hrs/Day		Ttl. Hrs.		COST
Supervisor	1	5	8	40	$20.00	$800.00
Laborer	4	5	8	160	$15.00	$2,400.00
Welder	1	5	8	40	$35.00	$1,400.00

3

Equipment Rental						
-Pickup	1	5	8	40	8.5	$340.00
-Boom truck	1	5	8	40	25	$1,000.00

Haul-Volume = Uncontaminated = 25932 lbs = 2lbs. = 13 tons say 1 load
Contaminated = 8644 lbs = 4.3t.

-Cost	No. Loa Mi.Loads	Totl Mi.	$/Mi.	COST
Uncontaminated	1 55	55	$2.00	$110.00

	Tons	$/Ton	COST
Contaminated	4.3	$52.50	$225.75

Dispose–Unit Cost	Tons	$/Ton	COST
Uncontaminated	13	$3.00	$39.00

	Tons	$/Ton	COST
Contaminated	4.3	$40.00	$172.00

*Subtotal $10,660.11

B. 3. WATER TREATMENT ELECTRICAL

REMOVE, CUT, LOAD	No.	No. Hrs/Day	Ttl. Hrs.		COST
Labor–Electrician	1	1.5	8	12	30	$360.00
–Laborer	2	1.5	8	24	15	$360.00
Welder	1	1.5	8	12	35	$420.00
Equipment Rental						
–Pickup	1	1.5	8	12	8.5	$102.00
–Boom truck	1	1.5	8	12	25	$300.00

Haul – volume is small, assume 1 load, 2 tons

	No. Mi/Load	Total	$/Mi.	COST
	1	55	55	$2.00	$110.00

Disposal	Total Tons	$/Ton	COST
–Unit cost	2	3	$6.00

Subtotal $1,658.00

B. 4. WATER TREATMENT FOUNDATIONS

Decontamination	No.	No. Hrs/Day	Ttl. Hrs.		COST
Supervisor	1	1	8	8	$20.00	$160.00
Laborer	4	1	8	32	$15.00	$480.00
RST	1	1	8	8	$30.00	$240.00

Equipment Rental	No.	No. Hrs/Day	Ttl. Hrs.		COST
Press. Washers	2	1	8	16	$6.00	$96.00
Pickup	1	1	8	8	$8.50	$68.00

Materials	Lbs. Acid	$/Lb.	COST
Acid	1000	$0.15	$150.00

Demolition	Vol/yd3	$/Yd3	COST
Unit Cost	39	68.5	$2,671.50

Haul–Volume = Uncontaminated 35.1 yd3 = 142,155 lbs @ 150lbs/ft3 = 71t,
Contaminated = 3.9 yd3 = 15,795lbs @ 150lbs/ft3 = 7.9t.

– Cost	No. Loa	Mi.Loads	Totl Mi.	$/Mi.		COST
Uncontaminated	3	55	165	$2.00		$330.00
		Tons	$/Ton			COST
Contaminated		7.9	$52.50			$414.75
Dispose – Unit Cost		Tons	$/Ton			COST
Uncontaminated		71	$3.00			$213.00
		Tons	$/Ton			COST
Contaminated		7.9	$40.00			$316.00
3. C. OFFICE BUILDING REMOVAL – Building is 60' x 30' x 10', not on a slab					Subtotal	$5,139.25
Gutting – Area = 1800ft2						
			Area/ft2	$/ft2		COST
– Cost			1800	2.87		$5,166.00
Demolition – Volume = 18000ft3						
			Vol./ft3	$/ft3		COST
– Cost			18000	0.17		$3,060.00
		Tot Tons	Tons/Ld	No. Loads		
Haul – Volume		55	20	3		
– Cost	No.	Mi.Load	Totl Mi.	$/Mi.		COST
	3	55	165	$2.00		$330.00
Dispose – Unit Cost		Tons	$/Ton			COST
		55	$3.00			$165.00
3. D. FENCE REMOVAL					Subtotal	$8,721.00
			Length	$/Ft		
– Cost			2670	$1.06		$2,830.20
3. E. PLANT SITE RECLAMATION					Subtotal	$2,830.20
Plant operations area is approx. 325' x 400' with 3' of gravel 1204 yd3, 3 acres						
Gravel Removal						
– Cost			Vol/Yd3	$/Yd3		COST
			1204	$0.60		$722.40
Ripping and Grading						
			Acres	$/Ac.		COST
– Ripping Cost			3	$50.00		$150.00
– Grading Cost			3	$100.00		$300.00
Replace topsoil – assume 9" topsoil, 97,500ft3, 3611 yd3						
– Cost			Vol/Yd3	$/Yd3		COST
			3611	$0.50		$1,805.50

	Acres	$/Ac.	COST
– Seed	3	$53.25	$159.75
– Seeding	3	$40.00	$120.00
		Subtotal	$3,257.65

3. F. RECLAIM WAREHOUSE AND PILOT SITE

Resin disposal – 3500 ft3 of unused resin to be disposed.
53 lbs/ft3 – 93 tons
Haul

–Cost	No. Mi.Load	Totl Mi.	$/Mi.	COST
	5 750	3750	$1.75	$6,562.50

Dispose

	Tons	$/Ton	COST
	93	$40.00	$3,720.00

Building Removal – Plant Building is 80'x40'x16" on 8" concrete slab
– Shop Building is 25'x20'x12' on 6" concrete slab
– Generator Building is 20'x20'x8"on 6" concrete slab

Demolition and Loading	Vol./Ft3	$/ft3	COST
– Unit Cost – Plant	51200	$0.17	$8,704.00
– Shop	6000	$0.17	$1,020.00
– Generator	3200	$0.17	$544.00

Foundations	Vol/Yd3	$/Yd3	COST
– Unit Cost – Plant	79	$68.50	$5,411.50
– Shop	9.26	$68.50	$634.31
– Generator	7.41	$68.50	$507.59

Haul – Volume
– Plant = 86 yd3 rubble
– Shop = 19.3 yd3 rubble
– Generator or = 15.9 yd3 rubble

	Tot Tons	Tons/Ld	No. Loads
	121	20	$6.00

	No. Mi.Load	Totl Mi.	$/Mi.	COST
	6 55	330	$3.00	$990.00

Dispose – Unit Cost	Total Ton	$/Ton	COST
	121	$3.00	$363.00

Fence Removal
Total Fence = 5575'

– Cost	Length	$/Ft	
	5575	$1.06	$5,909.50

Gravel Removal

Volume – Plant area – 594yd3
– Road = 345 yd3
– Cost

	Vol/Yd3	$/Yd3	COST
	939	$0.60	$563.40

Ripping and Grading – Area = 63,050 ft2 = 1.45 acre

	Acres	$/Ac.	COST
– Ripping Cost	1.45	$50.00	$72.50
– Grading Cost	1.45	$100.00	$145.00

Replace topsoil – assume 6" topsoil, 32050ft2, 938 yd3

	Vol/Yd3	$/Yd3	COST
– Cost	938	$0.50	$469.00

	Acres	$/Ac.	COST
– Seed	1.45	$53.25	$77.21
– Seeding	1.45	$40.00	$58.00

Miscellaneous: Remove mud tanks @ $150, remove culvert @ $55 $205.00

Subtotal $35,956.51

PLANT FACILITIES RECLAMATION TOTAL $132,305.17

4. WATER TREATMENT PONDS AND IRRIGATION RESERVOIR

A. WATER TREATMENT PONDS

Fence Removal
Total Fence = 1080'

	Length	$/Ft	COST
– Cost	1080	$0.96	$1,036.80

Pond sludge and liner removal– Volume = 152.7 yd3

	No.	No. Hrs/Day		Ttl. Hrs.		COST
Supervisor	1	4.5	8	36	$20.00	$720.00
Laborer	4	4.5	8	144	$15.00	$2,160.00

Equipment Rental	No.	No. Hrs/Day		Ttl. Hrs.		COST
Pickup	1	4.5	8	36	$8.50	$306.00
Loader	1	4.5	8	36	46.25	$1,665.00

Remove Leak Detection – Volume = 185 cy3

Supervisor	1	1.5	8	12	$20.00	$240.00
Laborer	4	1.5	8	48	$15.00	$720.00

Equipment Rental	No.	No. Hrs/Day		Ttl. Hrs.		COST
Pickup	1	1.5	8	12	$8.50	$102.00
Loader	1	1.5	8	12	46.25	$555.00

Radiation Surveys	No.	No. Hrs/Day		Ttl. Hrs.		COST
Labor: RST	1	1	8	8	30	$240.00

	No. Pon	Smple/Pnd	$/Sample	COST
Samples	2	5	50	$500.00

Backfill Ponds – Volume = 9450 yd3	Vol/Yd3	Yd3/Day	Days
Dozing	9450	1650	6

Equip. Rental	No. Day	$/Day	COST
– Dozer	6	1075	$6,450.00
– Grader	6	545	$3,270.00

Reclaim – Topsoil Volume = 4840 yd3	Vol/Yd3	$/Yd3	COST
– Replace topsoil	4840	0.5	$2,420.00

Revegetate – assume 4 acres incldg peripheral dist.	Acre	$/Acre	COST
– Seed	4	53.25	$213.00
– Seeding	4	40	$160.00

Haul and Dispose – Liner, Sludge, and Leak Detection
= 337.7 yd3; 1 yd3 = 2800 lbs/wet. Total = 473 Tons

	Totl.Ton	$/Ton	COST
Haul	473	52.5	$24,832.50
Dispose	473	40	$18,920.00
Subtotal			$64,510.30

B. IRRIGATION RESERVOIR

Diversions and Ditches: requires 1 day with grader and 2 days with
Loader @ 1500 yd3/day. Volume = 2820 yd3 in Diversions

Equip. Rental	No. Day	$/Day	COST
– Loader	2	615	$1,230.00
– Grader	1	545	$545.00

Remove Dam – Phase I volume = 34,500 yd3 of fill. Requires 28 days
with dozer @ 1225 yd3/day

Equip. Rental	Vol/Yd3	$/Yd3	COST
– Dozer	34500	0.98	$33,810.00

	No. Day	$/Day	COST
– Grader	7	545	$3,815.00

Replace Topsoil – Volume = 24,740 yd3 in Phase I

	Vol/Yd3	$/Yd3	COST
– Cost	24740	0.5	$12,370.00

	Acre	$/Acre	COST
Revegetate – assume 20 acres			
– Seed	20	53.25	$1,065.00
– Seeding	20	40	$800.00
Subtotal			$53,635.00
WATER TREATMENT PONDS AND IRRIGATION RESERVOR TOTAL			$118,145.30

5. OTHER STRUCTURES AND FACILITIES

A. TRUNKLINES

Volume = Estimated pipeline in first year is 5151 ft.
Trench 4' deep, 2' wide. Volume = 2'x4'x 515041,200 t3 = 1526yd3,

	Vol/Yd3	$/Yd3	COST
Equipment Rental– Backhoe	1526	$3.10	$4,730.60

Remove and decontaminate; estimate is 7 days

Labor:	No.	No. Hrs/Day		Ttl. Hrs.		COST
Foreman	1	7	8	56	$20.00	$1,120.00
Laborer	4	7	8	224	$15.00	$3,360.00
RST	1	7	4	28	$30.00	$840.00
Eq. Rental:						
Pickup	1	7	8	56	$8.50	$476.00
Backhoe	2	7	8	112	$17.38	$1,946.56
Saws	2	7	8	112	$2.38	$266.56

Materials – 2 gal. acid/5ft. section, total pipe 10,300',
acid required = 4120 gal.

	Vol. gal.	$/Gal	COST
– Cost	4120	0.15	$618.00

Backfill trench Volume = 21 yd3 – Backfill at 75 yd3/hr. = 105 hrs.

	No. Hr		COST
	21	17.38	$364.98

Haul–Volume = Uncontaminated 150 yd3 = 150 t= 772.5t,
Contaminated = 150 yd3 = 150 tons

–Cost	No. Lds	Mi.Loads	Totl Mi.	$/Mi.	COST
Uncontaminated	8	55	440	$2.00	$880.00

	Tons	$/Ton	COST
Contaminated	150	$52.50	$7,875.00

Dispose–Unit Cost	Tons	$/Ton	COST
Uncontaminated	150	$3.00	$450.00
Contaminated	150	$40.00	$6,000.00

Reclamation – Area = 5150' x 6' wide = 30,900 ft2 say 1 acre

	Acres	$/Ac.	COST
– Seed	1	$53.25	$53.25
– Seeding	1	$40.00	$40.00
		Subtotal	$29,020.95

B. POWERLINES – NO COST

C. ACCESS ROAD

Length is approx. 1950', road width is 20', 6"gravel; 9" of topsoil to replace
Volume = 1950' x 20' x 5' = 19,500ft3 = 725 yd3

Gravel Removal

Volume = 725 yd3	Vol/Yd3	$/Yd3	COST
– Cost	725	$0.60	$435.00

Ripping and Grading – Area = 30' x 1950' = 1.3 acre	Acres	$/Ac.	COST
– Ripping Cost	1.3	$50.00	$65.00
– Grading Cost	1.3	$100.00	$130.00

Replace topsoil – Volume = 1950' x 20' x .75' = 29,250ft3 = 1083yd3

– Cost	Vol/Yd3	$/Yd3	COST
	1083	$0.50	$541.50

Revegetate	Acres	$/Ac.	COST
– Seed	1.3	$53.25	$69.23
– Seeding	1.3	$40.00	$52.00
		Subtotal	$1,292.73

D. IRRIGATION SITE

Remove Irrigation – Estimate 3 days

	No.	No. Hrs/Day		Ttl. Hrs.	$/Hr.	COST
Labor:						
Foreman	1	3	8	24	$20.00	$480.00
Laborer	4	3	8	96	$15.00	$1,440.00
Equipment						
Pickup	1	3	8	24	8.5	$204.00

Grade Site and Berms – Estimate 5 days

Eq. Rental:	No.	No. Hrs/Day		Ttl. Hrs.		COST
Grader	1	5	8	40	$40.75	$1,630.00

Revegetate	Acres	$/Ac.	COST
– Seed	5	$53.25	$266.25

– Seeding	5	$40.00	$200.00
		Subtotal	$4,220.25

E. MISCELLANEOUS – ESTIMATE 8 MONTHS DURING FINAL SURFACE RECLAMATION

	No.Mon	$/Month	COST
	4	2500	$10,000.00
		Subtotal	$10,000.00

OTHER FACILITIES AND STRUCTURES – TOTAL	$44,533.93

SUMMARY

GROUNDWATER RESTORATION	$482,360.66
WELLFIELD ABANDONMENT AND RECLAMATION	$107,888.45
PLANT FACILITIES RECLAMATION	$132,305.17
WATER TREATMENT PONDS AND IRRIGATION RESERVOIR	$118,145.30
OTHER STRUCTURES AND FACILITIES	$44,533.93
Subtotal	$885,233.50

PROJECT DESIGN	5 %	$44,261.68
CONTRACTOR PROFIT, OVERHEAD, MOBILIZATION	8 %	$70,818.68
INVESTIGATION AND STABILIZATION	2 %	$17,704.67
PROJECT MANAGEMENT	4 %	$35,409.34
ON–SITE MONITORING	2 %	$17,704.67
SITE SECURITY AND INSURANCE	1 %	$8,852.34
LONG–TERM ADMINISTATION AND ACCOUNTING	2 %	$17,704.67
UNKNOWNS	5 %	$44,261.68
Total Contingencies 29 %		
GRAND TOTAL		**$1,141,951.22**