

Bruce King
GOVERNOR

STATE OF NEW MEXICO

ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 968, Santa Fe, New Mexico 87503
(505) 827-5271

George S. Goldstein, Ph.D.
SECRETARY

Larry J. Gordon, M.S., M.P.H.
DEPUTY SECRETARY

Thomas E. Baca, M.P.H., Director

MEMORANDUM

February 23, 1981

TO: Maxine S. Goad, Program Manager, Ground Water Section

FROM: David G. Boyer, Geohydrologist, Ground Water Section

SUBJECT: DISCHARGE PLAN FOR MOBIL OIL CORPORATION'S MONUMENT URANIUM
IN SITU LEACH PILOT PROJECT (DP-137)

Mobil Oil Corporation's response (dated December 19, 1980) to the request by the Environmental Improvement Division (EID) for additional information (dated September 29, 1980) has been reviewed by myself and others and some additional information and clarification is still needed. Also, a few new questions have arisen as a result of Mobil's ground water restoration activity currently underway at their Section 9 site.

The deficiencies detailed in the EID request of last September have not yet been completely answered. Most important of these is the possible presence of thin or discontinuous shale zones, or the perforation of an injection well (Well 28u322) in more than one sandy zone, that could lead to a vertical excursion. Some questions also remain about parameter selection for the computer model Mobil is using at the Monument site.

Standard ground water aquifer calculations made by EID using the information provided in Appendix B (Hydrologic Testing) of the discharge plan, together with the assumptions about Conoco's dewatering listed in Mobil's December response, indicate that drawdowns and velocities are comparable to those provided in Tables A and B of their December response. This analysis shows that Conoco's currently planned dewatering operation will not cause Mobil's in situ uranium pilot to have an impact outside Mobil's project area although some slight imbalance may occur that will require adjustment of rates by Mobil.

A most important part of this and other in situ projects is the requirement that the discharge will not result in concentrations in excess of standards at any place of withdrawal for present or reasonably foreseeable future use. Essentially, this requires restoration of the aquifer, which is currently being undertaken by Mobil at Section 9. A successful restoration, or indications that restoration can be successfully completed at that site, will be an important factor to be considered by EID as the review of this discharge plan continues, and prior to recommendation of approval by the EID.

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MEMORANDUM TO MAXINE S. GOAD

RE: MOBIL'S MONUMENT URANIUM IN SITU LEACH PILOT PROJECT (DP-137)

February 23, 1981

A. COMMENTS ON PREVIOUSLY REQUESTED MATERIAL

Ground Water Geology*

1. The response to the question on the thickness and continuity of the shale zones separating the "B" zone from the overlying and underlying zones also within the Westwater Canyon Member of the Morrison Formation is not considered complete. Accurate and adequate information is necessary to evaluate the possibility of vertical excursions into other zones of the Westwater Canyon Member. Several discrepancies and additional amplifying information needed is detailed below:
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 - b. Logs for wells 28u116 and 28u131 are not included and should be provided for the same intervals and at the same scale as in "a." above.
 - c. On page B-128 of the Discharge Plan, the statement is made that the shallow Dakota monitoring well, 28u89, was only drilled to approximately 1,630 feet through the Dakota to a point above the Westwater Canyon Member. However, Figure 2 of Mobil's December 19, 1980 response shows the log of that well extending to a depth greater than 2,000 feet. This discrepancy needs to be resolved, including information on plugging, if the well was originally deeper than 1,630 feet.

*Numbering of questions is the same as EID letter of 9/29/80, and Mobil's response of 12/19/80. Numbers omitted from this memorandum indicate the response to the question was satisfactory.

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- d. Results of the Hydrology tests in Appendix B indicate possible problems in two wells that could indicate connection with the upper and/or lower zones. That report concluded that Wells 28u105 and 28u322 "exhibited significantly less drawdown than other observation wells located a similar distance away from the pumped well. . . . This would indicate that perhaps these two [pump test] observation wells are perforated in more than one sand interval or that the aquifer zone tapped by these two wells is significantly thicker than that tapped by the other observation wells" (Appendix Page 17, 18). Figure 7 of Appendix B shows a decrease in the rate of drawdown in 28u322 after about 100 minutes of pumping which could also indicate leakage from an adjacent aquifer. Additional detailed discussion of the hydraulics of both wells is needed with respect to the anomalies described above and the implications as to extent and integrity of the thin confining shale zones. This is especially important for injection well 28u322 since, if it is indeed perforated in more than one zone, a vertical excursion would occur shortly after injection is begun. Even if no perforation into an adjacent sand zone has occurred, Mobil should address how it intends to vary flow injection rates to take into consideration the changes in permeability or thickness indicated by the results of the pumping test analysis in Appendix B.
3. In the response to Question 3, Mobil describes the procedure used to plug exploration holes. The existence and plugging history of exploration holes drilled by operators other than Mobil within a one-quarter mile radius of the center of the project (Well 28u323) should be addressed.

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1. The date of re-working of well 15-B-19 should be clarified. October 28, 1980 is given on page 9 of the response, while October 28, 1968 is given on page 8.
4. Mobil has indicated that they will not perform water quality sampling on Wells 28u306, 28u318, 28u304 located about 1,000 feet from the production well. However, a record of water levels could be useful to aid in interpreting drawdowns resulting from injection-restoration operations by Mobil and dewatering by other operators in the Crownpoint vicinity.
5. Mobil should indicate when baseline sampling data is to be submitted to the EID.

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3. Additional detail on the procedure and frequency of annulus monitoring needs to be provided. Also, the location (such as a central operations center) of the wellhead injection pressure gauges for continuous monitoring should be provided.
- 4a. Two of the model assumptions given in the response seem to be incorrect. The results of the hydrologic test in the vicinity of the pumped well indicate an approximate transmissivity (T) of 790 gpd/ft for zone "B" at the project site. The thickness of the "B" unit to be leached is approximately 60 feet (from Figure 4, Mobil Response, dated 12/19/80). Using these two values, the permeability is 13.2 gpd/ft² or about 730 md. The thickness and permeability values given in the response for the Monument model are 100 feet and 300 md, respectively. An actual zone thickness less than the model, and actual permeability greater than the model would cause leachate to move a greater horizontal distance and at a faster rate than the model would predict if injection pressure and volumes remain constant. Mobil should address these apparent discrepancies between the model assumptions and field data supplied with the discharge plan.
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5. The response gives maximum ground water velocities of 41.0 feet per year and 59.4 feet per year, respectively, for Case 1 and Case 2 dewatering scenarios at the Conoco mine about 2.5 miles away. Although these values would not result in leachate movement to a monitoring well during the injection and restoration phase of the project, dewatering still has the potential of causing an imbalance in the system (especially Well 28u321) that Mobil operators should anticipate and correct if necessary. Mobil should commit to taking into account the schedule and progress of Conoco's dewatering and should be prepared to adjust injection and production rates to avoid unwanted and possibly undetectable movement toward Conoco's operation.

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RE: MOBIL'S MONUMENT URANIUM IN SITU LEACH PILOT PROJECT (DP-137)

February 23, 1981

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- (1) Will pressures on the barren lixiviant and pregnant leachate lines between the well area and the plant be monitored on a continuous basis (such as a central operating location) with automatic alarms and/or cutoffs?
 - (2) Will the pipe to the waste pond be tested for integrity anytime after it is placed in service?
- b. In the event of any surface accidents of the type described in Section 4.1 of the discharge plan that may release fluids to the environment, Mobil should be required to notify EID of the specifics of the accident including the accident extent, the quantity and quality of fluids released, and the detailed corrective measures to be undertaken.
7. Estimates of dissolved radiological constituents in the waste streams to the pond should be provided as part of the discharge plan. Information of this type that was generated at Section 9 during both leaching and restoration would be helpful.
- 9a. Mobil has declined to routinely monitor molybdenum or sulfate in the waste pond monitoring wells at Section 28. However, these constituents are still important to watch for since they are mobile in the subsurface. Perhaps, a reasonable solution would be to monitor for them in the pond wells and pond riser pipe on some relatively frequent schedule if fluids are detected in the pond riser pipe.
- b. Mobil has agreed to sample the pond riser pipes at Section 9 evaporation ponds for fluids three days per week. Having the same schedule of riser pipe monitoring at Section 28 is desirable.
10. and 11. The EID is not prepared to comment on the response to these questions at this time. The EID has just recently employed both a geochemist and a uranium geologist who, together with existing hydrologists and other staff, will examine the methodology submitted by Mobil and other operators for determination of "baseline" parameters and excursion indicators. Early submittal by Mobil of their complete data for Section 28 will assist in this effort. Once these new people are thoroughly familiar with these problems, EID will be able to more adequately reply to Mobil's response. This examination should be completed within 4 to 5 weeks.

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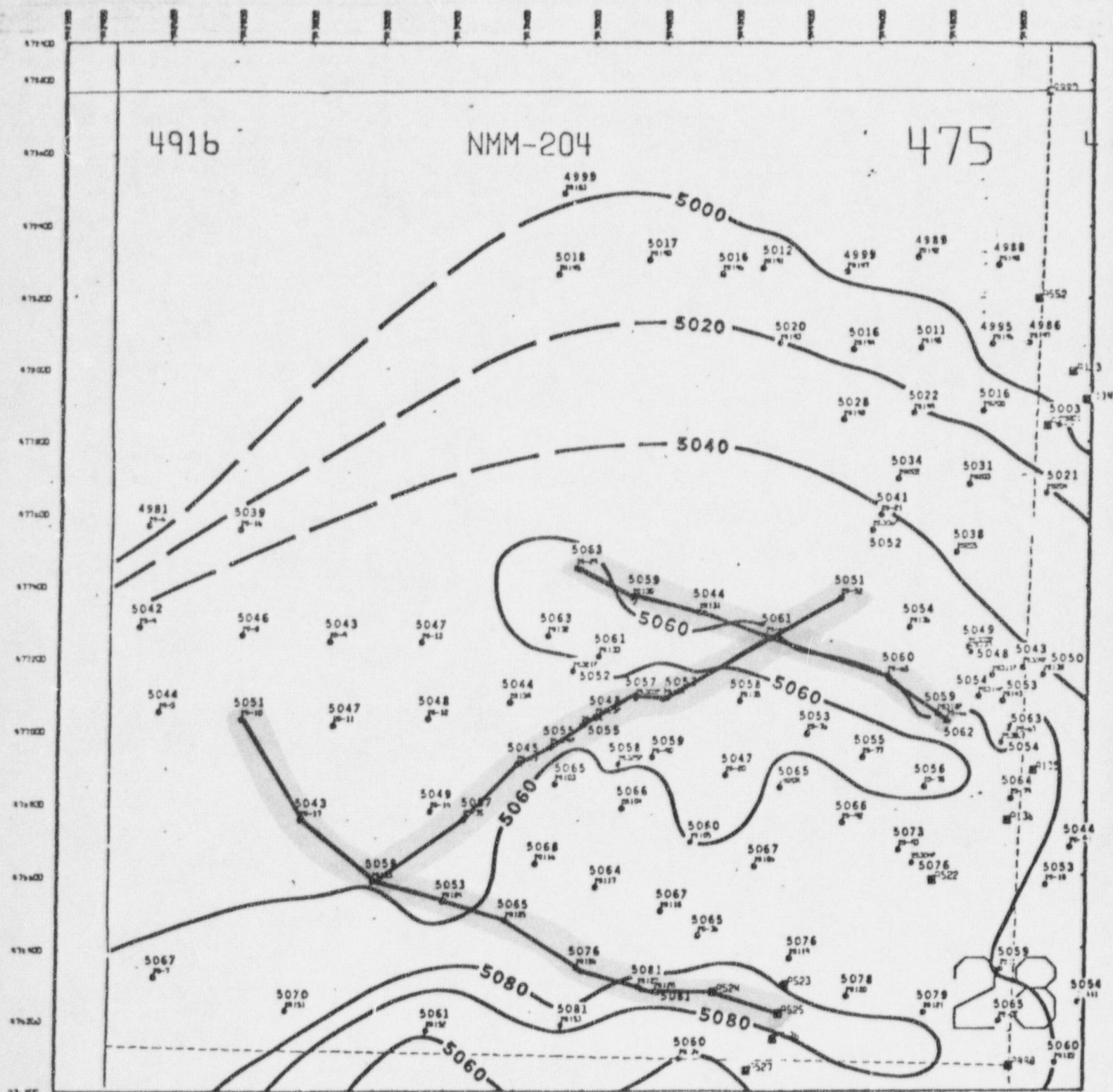
February 23, 1981

Excursion Correction Program, Appendix E

2. Instead of consulting with EID as to locations of additional monitoring wells in the event of an excursion, Mobil intends only to notify EID of the proposed location(s). This response is unacceptable considering that an excursion outside of the project area can have a severe impact on ground water quality. Therefore, it is essential that EID be able to have input in the number, placement, and depth of any secondary monitoring wells as may be required by Paragraphs D and H of the excursion correction program.
3. Mobil has already agreed to terminate injection of leaching agents at Section 28 if leachates are present in a secondary monitoring well (Paragraphs H and J). Therefore, their response to Question 3 is contradictory. Termination of injection of leaching agents is believed to be both proper and necessary in the event that leachate is detected in a secondary monitoring well. Mobil should also be required to receive New Mexico Environmental Improvement Division approval prior to resuming injection of leachates after such termination has occurred.

B. NEW MATERIAL (NOT PREVIOUSLY REQUESTED)

1. Page B-149. Based on experience at the Section 9 location, Mobil should provide EID with the total number of evaporation ponds and total volume expected to be necessary to contain waters from both the production and restoration operations that are expected to last a total of 28 months. The reference to "one or more disposal ponds" in the discharge plan is inadequate since if a large number of such ponds are necessary, additional protective measures such as flood protection diking or secondary containment facilities may need to be considered.
2. Page B-149. Depth to ground water and approximate water quality information in the area immediately beneath the pond(s) should be provided. If the aquifer is confined, the nature of the confining bed should be described.
3. Page B-150. It is unclear from Figure B.2.1.6.2-1 whether the slotted pipe for the leak detection system extends diagonally across and under the center of the pond.
4. Page B-198. Section B 4.2.3 referred to on this page is not included in the discharge plan.





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Thomas E. Baca, M.P.H., Director

RADIATION PROTECTION BUREAU

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DEPUTY SECRETARY

February 23, 1981

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. D. B. Cooper
Producing Manager - Uranium
Mobil Oil Corporation
P. O. Box 5444
Denver, CO 80217

Dear Mr. Cooper:

Pursuant to Section 3-312, New Mexico Radiation Protection Regulations, we are hereby informing you that Mobil application dated July 29, 1980 for a radioactive material license has been accepted, effective this date, for detailed review and evaluation. A copy of public notice of the application acceptance will be forwarded.

You are advised that EID acceptance of the application does not indicate that any judgment has been made on the merits of the application. Therefore, additional information may be required in the future as the review of your application proceeds.

In order for our detailed review to proceed, I am requesting certain additional information based on your response of December 19, 1980.

The project manager assigned to your application is Ms. Kathleen Coleman, telephone (505)827-5271, ext. 234. Please direct inquiries concerning the processing of your application to Ms. Coleman.

Sincerely,

Gerald W. Stewart
Program Manager
Uranium Licensing Section

1807060389

REQUEST FOR ADDITIONAL INFORMATION

(based on Mobil response of December 19, 1980)

1. Mobil should supply a title report for NW/4 Section 28, T17N, R12W which EID has been informed that Mobil plans to use for this project so that EID may determine whether integrity of the operation will or will not be compromised by any competing usage of the site. If other areas will be required for this project, a title report for these areas will be required.
2. NM EID requests that Mobil provide documentation that the USGS has no objection to the Monument Section 28 project with respect to archeological sites. Such documentation need not contain any references to specific archeological sites or locations.
3. Mobil's response in Table B (p. 25) indicates that radon pre-operational sampling is not continuous. As EID's detailed review proceeds, it may become necessary to supplement this data by obtaining continuous radon measurements. We will keep you advised on this matter.
4. Mobil should provide the EID with a detailed disposal plan for waste accumulated at the site and transportation of yellowcake slurry.
5. Mobil should supply a geotechnical stability analysis for the waste pond construction, as well as calculations concerning the adequacy of one-foot freeboard to prevent overtopping by wind-induced waves.
6. Mobil's responses to questions 11 and 17 indicate that additional information will be submitted. This should be submitted for our review.
7. Mobil should identify the alternate sites considered for this project (this should amplify sentence 1, paragraph 3 "Introduction to Responses" contained in Mobil's letter dated December 19, 1980). A legal description should be provided for each site and comments concerning any significant difference for each site relative to environmental and health and safety impacts and ability to meet radiological standards (Part 4, NM EID Radiation Protection Regulations).



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Larry J. Gordon, M.S., M.P.H.
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February 25, 1981

CERTIFIED MAIL
RETURN RECEIPT REQUESTED


Mr. D. B. Cooper
Producing Manager - Uranium
Mobil Oil Corporation
P. O. Box 5444
Denver, CO 80217

Dear Mr. Cooper:

A copy of the Public Notice concerning Mobil In-Situ Monument Project (Section 28) is attached for your information. The notice was sent on February 25, 1981 to the following newspapers:

Albuquerque Journal
Farmington Daily Times
Gallup Independent
Grants Daily Beacon
Sandoval County Times Independent
Santa Fe New Mexican
Navajo Times Publishing

Sincerely,


Gerald W. Stewart
Program Manager

PUBLIC NOTICE

The Environmental Improvement Division (EID) has received an application for a Radioactive Material License from Mobil Oil Corporation, P. O. Box 5444, Denver, Colorado 80217 to construct and operate a proposed pilot in-situ uranium leaching facility to be located on the NW/4, Section 28, T17N, R12W, in McKinley County, New Mexico.

During the early part of the evaluation period, the Division will invite several state and federal agencies as well as other interested parties to review and comment upon the application. Various sections within the EID will review and comment upon the application. The EID may, at its discretion, retain consultants to assist it in its evaluation of the application. Relevant comments and questions received by the EID from various agencies and interested parties will be forwarded to the applicant for its response. Correspondence associated with the application will be on file with the Radiation Protection Bureau and will be available for inspection by the applicant and any other interested parties.

The Division has required the company to provide complete plans and other materials concerning, among other things, the public health, safety and environmental aspects of the proposed activity.

The license application will be analyzed carefully by the Division. During this analysis, the application will be carefully reviewed to ensure that there are no deficiencies, that the application meets all applicable requirements and that there is no reason to believe that the uranium leaching facility will violate any laws or regulations. If the Division is so satisfied, it will issue a Radioactive Material License, to expire five years from the date of issuance of the license.

The activities of all licensees are inspected periodically to assure compliance with regulations and license conditions.

The application is available for review at the following locations:

Santa Fe:

1. EID Central Office
Radiation Protection Bureau
725 St. Michael's Drive - Crown Building
Hrs: Monday-Friday, 8:00 am-5:00pm.

Albuquerque:

1. EID District I Office
4219 Montgomery Blvd, NE
Hrs: Monday-Friday, 8:00 am-5:00pm.

Grants:

1. EID District I Office
708 Uranium Avenue
Milan, NM

Hrs: Monday-Friday, 8:00 am-5:00 pm.

It is anticipated that the review period will require about three to four months. Written comments and requests for public hearing will be accepted for 30 days after publication of this notice.

Written comments regarding this license application should be directed to Uranium Licensing Section, Radiation Protection Bureau, Environmental Improvement Division, P. O. Box 968, Santa Fe, NM 87503.

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February 23, 1981

CERTIFIED MAIL--RETURN RECEIPT REQUESTED

Mr. G. A. Cresswell, Manager
Hydrological and Environmental Affairs
Uranium/Minerals Division
MOBIL OIL CORPORATION
Post Office Box 5444
Denver, Colorado 80217

RECEIVED
FEB 24 1981
RADIATION PROTECTION SECTION

SUBJECT: DISCHARGE PLAN FOR MONUMENT IN SITU LEACH PILOT PROJECT, DP-137

Dear Mr. Cooper:

Environmental Improvement Division review of Mobil's December 19, 1980 response to EID questions concerning the above referenced discharge plan has been carried out by Mr. David Boyer, with input from other Division staff. Mr. Boyer finds that some additional information and clarification is necessary as a result of Mobil's response. The additional information needed is listed in the memorandum attached hereto, and is hereby requested.

If you have any questions pertaining to the information requested or to the handling of this discharge plan, please do not hesitate to contact Mr. Boyer or myself at the above address and telephone number. A technical meeting between Mobil and the EID staff reviewing the plan is suggested if Mobil has additional questions regarding the requested information.

Sincerely,

Maxine S. Goad

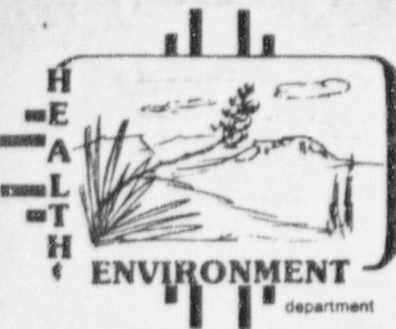
MAXINE S. GOAD
Program Manager
Ground Water Section

MSG/js

cc: ✓ Gerald Stewart, EID, Radiation
William Bennett, EID, District I Manager
Carl Woolfolk, EID, Milan Field Office

Attachment

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February 23, 1981

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 - (2) Will the pipe to the waste pond be tested for integrity anytime after it is placed in service?
- b. In the event of any surface accidents of the type described in Section 4.1 of the discharge plan that may release fluids to the environment, Mobil should be required to notify EID of the specifics of the accident including the accident extent, the quantity and quality of fluids released, and the detailed corrective measures to be undertaken.
7. Estimates of dissolved radiological constituents in the waste streams to the pond should be provided as part of the discharge plan. Information of this type that was generated at Section 9 during both leaching and restoration would be helpful.
- 9a. Mobil has declined to routinely monitor molybdenum or sulfate in the waste pond monitoring wells at Section 28. However, these constituents are still important to watch for since they are mobile in the subsurface. Perhaps, a reasonable solution would be to monitor for them in the pond wells and pond riser pipe on some relatively frequent schedule if fluids are detected in the pond riser pipe.
- b. Mobil has agreed to sample the pond riser pipes at Section 9 evaporation ponds for fluids three days per week. Having the same schedule of riser pipe monitoring at Section 28 is desirable.
10. and 11. The EID is not prepared to comment on the response to these questions at this time. The EID has just recently employed both a geochemist and a uranium geologist who, together with existing hydrologists and other staff, will examine the methodology submitted by Mobil and other operators for determination of "baseline" parameters and excursion indicators. Early submittal by Mobil of their complete data for Section 28 will assist in this effort. Once these new people are thoroughly familiar with these problems, EID will be able to more adequately reply to Mobil's response. This examination should be completed within 4 to 5 weeks.

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MEMORANDUM TO MAXINE S. GOAD

RE: MOBIL'S MONUMENT URANIUM IN SITU LEACH PILOT PROJECT (DP-137)

February 23, 1981

Excursion Correction Program, Appendix E

2. Instead of consulting with EID as to locations of additional monitoring wells in the event of an excursion, Mobil intends only to notify EID of the proposed location(s). This response is unacceptable considering that an excursion outside of the project area can have a severe impact on ground water quality. Therefore, it is essential that EID be able to have input in the number, placement, and depth of any secondary monitoring wells as may be required by Paragraphs D and H of the excursion correction program.
3. Mobil has already agreed to terminate injection of leaching agents at Section 28 if leachates are present in a secondary monitoring well (Paragraphs H and J). Therefore, their response to Question 3 is contradictory. Termination of injection of leaching agents is believed to be both proper and necessary in the event that leachate is detected in a secondary monitoring well. Mobil should also be required to receive New Mexico Environmental Improvement Division approval prior to resuming injection of leachates after such termination has occurred.

B. NEW MATERIAL (NOT PREVIOUSLY REQUESTED)

1. Page B-149. Based on experience at the Section 9 location, Mobil should provide EID with the total number of evaporation ponds and total volume expected to be necessary to contain waters from both the production and restoration operations that are expected to last a total of 28 months. The reference to "one or more disposal ponds" in the discharge plan is inadequate since if a large number of such ponds are necessary, additional protective measures such as flood protection diking or secondary containment facilities may need to be considered.
2. Page B-149. Depth to ground water and approximate water quality information in the area immediately beneath the pond(s) should be provided. If the aquifer is confined, the nature of the confining bed should be described.
3. Page B-150. It is unclear from Figure B.2.1.6.2-1 whether the slotted pipe for the leak detection system extends diagonally across and under the center of the pond.
4. Page B-198. Section B 4.2.3 referred to on this page is not included in the discharge plan.

