



## **CONTACT INFORMATION**

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PRINTED: 07-20-2012

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: RED LAKE CAVERNS

ALTERNATE NAMES:

KERR MCGEE WELL 1

MOHAVE COUNTY MILS NUMBER: 154A

LOCATION: TOWNSHIP 26 N RANGE 16 W SECTION 30 QUARTER N2  
LATITUDE: N 35DEG 37MIN 05SEC LONGITUDE: W 114DEG 02MIN 20SEC  
TOPO MAP NAME: MT TIPTON SE - 7.5 MIN

CURRENT STATUS: EXP PROSPECT

COMMODITY:

SODIUM COMMON SALT  
GYPSUM ANHYDRITE  
URANIUM

BIBLIOGRAPHY:

KOESTER, EDWARD A. SALT DOMES IN ARIZ. OIL  
AND GAS CONSERVATION COM STATE OF ARIZ GEO  
REPORT NO 1, 1971, P. 6-10  
ADMMR RED LAKE CAVERN FILE



F. 6

**FEDERAL ENERGY REGULATORY COMMISSION**  
WASHINGTON, DC 20426

OFFICE OF ENERGY PROJECTS

**In Reply Refer To:**  
Gas/Hydro Branch, PJ-11.3  
Red Lake Gas Storage, L.P.  
Docket No. CP02-420-000

February 28, 2003

**To the Parties Addressed:**

The Federal Energy Regulatory Commission (Commission) is preparing an environmental review of Red Lake Gas Storage, L.P.'s (RLGS) proposed Red Lake Gas Storage Project in Mohave County, Arizona (Red Lake Project). The proposed facilities consist of two solution-mined underground salt caverns, about 52 miles of various diameter pipeline, a 25,000-horsepower (hp) compressor station, a 9,000-hp compressor station, four water withdrawal wells, four brine disposal wells, and appurtenant facilities. The Red Lake Project facilities are more fully described in the enclosed Notice of Intent to Prepare an Environmental Assessment for the Proposed Red Lake Project and Request for Comments on Environmental Issues (NOI) (Enclosure).

Based on responses to the NOI, comments presented at the public scoping meeting held on November 14, 2002, and its own review of issues raised, the FERC staff has determined that approval of the proposed project would constitute a major federal action with the potential to significantly affect the quality of the human environment. Therefore, the staff has now decided to prepare an Environmental Impact Statement (EIS) for this proposed project in accordance with the National Environmental Policy Act.

A draft EIS will be issued and circulated for review by all interested parties. All comments filed on the DEIS will be analyzed by the staff and considered in the final EIS. The staff's conclusions and recommendations will then be presented for the consideration of the Commission in reaching its final decision.

In light of potential reasonable alternative routes which have arisen, the FERC staff and its cooperating agencies plan to hold a second public scoping meeting in the near future to provide an additional opportunity for public comment. A notice announcing the time and place of the scoping meeting will be forthcoming and will be sent to everyone receiving this notice.

In addition to evaluating the environmental impacts of the Red Lake Project as originally proposed, we will also evaluate alternative routes to the proposed 36-inch-diameter gas delivery pipeline route to determine if any them are environmentally preferable to the proposed route for which RLGS is seeking authorization. The general location of the proposed facilities and alternative routes are shown in the Attachment and described as follows.

Alternate Route 1 begins at the proposed cavern/compressor station site near Red Lake, and heads east for about 3.0 miles. Here the route turns south for about 9.1 miles, within the Kingman Water Utility Corridor (KWUC), a U.S. Department of Interior, Bureau of Land Management (BLM) designated utility corridor<sup>1</sup>. At that point the route joins the right-of-way of the Citizens Utilities 2-inch-diameter pipeline and continues south for about 10.0 miles, still within the KWUC. Alternate Route 1 then jogs to the southwest for about 1.4 miles and continues southward, adjacent to El Paso Natural Gas Company's 6-inch-diameter pipeline for another 10.2 miles to the proposed interconnect and meter station. The total length of Alternate Route 1 is about 33.7 miles.

Alternate Route 2 follows the same route as Alternate Route 1 for the first 22.1 miles, and then turns southeast for about 2.3 miles within the AT&T Utility Corridor to a point about 0.5 mile north of U.S. Route 66. At that point, the route turns south for about 8.6 miles, passing about 0.75 mile east of Kingman Airport, and terminating at the proposed interconnect and meter station on the south side of Interstate 40. The total length of Alternate Route 2 is about 33.0 miles.

Alternate Route 3 follows the same corridor as Alternate Routes 1 and 2 for the first 12.1 miles, along the KWUC. At that point, Alternate Route 3 turns to the southeast for about 5.5 miles, then south for about 5.7 miles, passing about 2 miles east of Long Mountain. The route then crosses U.S. Route 66 and parallels the highway southwestward for about 3.0 miles along the Highway Utility Corridor to the point where it intersects Alternate Route 2. It then turns south and follows the Alternate Route 2 alignment, east of of Kingman Airport, to the proposed interconnect and meter station. The total length of Alternate Route 3 is about 34.4 miles.

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<sup>1</sup> Kingman Resource Area Proposed Resource Management Plan and Final Environmental Impact Statement, U.S. Department of the Interior, Bureau of Land Management, 1993, and Record of Decision for the Approval of the Kingman Resource Area Resource Management Plan, 1995.

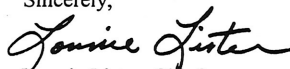
A fourth alternative was considered that would generally follow Antares Road from a point approximately 4 miles east of the cavern site to U.S. Route 66, then southwestward along U.S. Route 66 to a point where it would cross Alternate Route 2, and then south from there to the proposed interconnect and meter station site. This alternative was considered and rejected for several reasons including, length, cost, and the large number of residential properties potentially affected, as compared with the above-described alternatives and does not meet the requirements of the proposed action.

Many of the landowners potentially affected by these alternative routes are different from those who were previously notified about the proposed route. Nevertheless, this letter is being sent to all of the landowners that would potentially be affected by either the proposed route or the route alternatives and may not have received the initial NOI, and to all parties to the proceedings. We want to provide you with the opportunity to participate in the Commission's process and provide comments on environmental issues, as was provided to the potentially affected landowners along the proposed route. Both the proposed and the alternative routes will be analyzed in our EIS.

The procedures for filing environmental comments and/or interventions are detailed on pages 5 through 7, and Appendix 2 of the NOI. Although the original environmental scoping period for this project has expired, we are extending the comment period. We note that some of the potentially affected landowners northward of the point at which Alternate Routes 1, 2 and 3 converge within the KWUC are still being identified. However, much of this land is owned by the BLM. When the remaining landowners are identified, we will send them a supplemental notice and provide them with an opportunity to comment on environmental issues.

Please file your comments by **March 31, 2003**. Please address your comments to Magalie R. Salas, Secretary, at the address given in the Enclosure. If you have further questions about the Red Lake Project or about your participation in this proceeding, please call the Commission's Office of External Affairs at 1-866-208-FERC.

Sincerely,

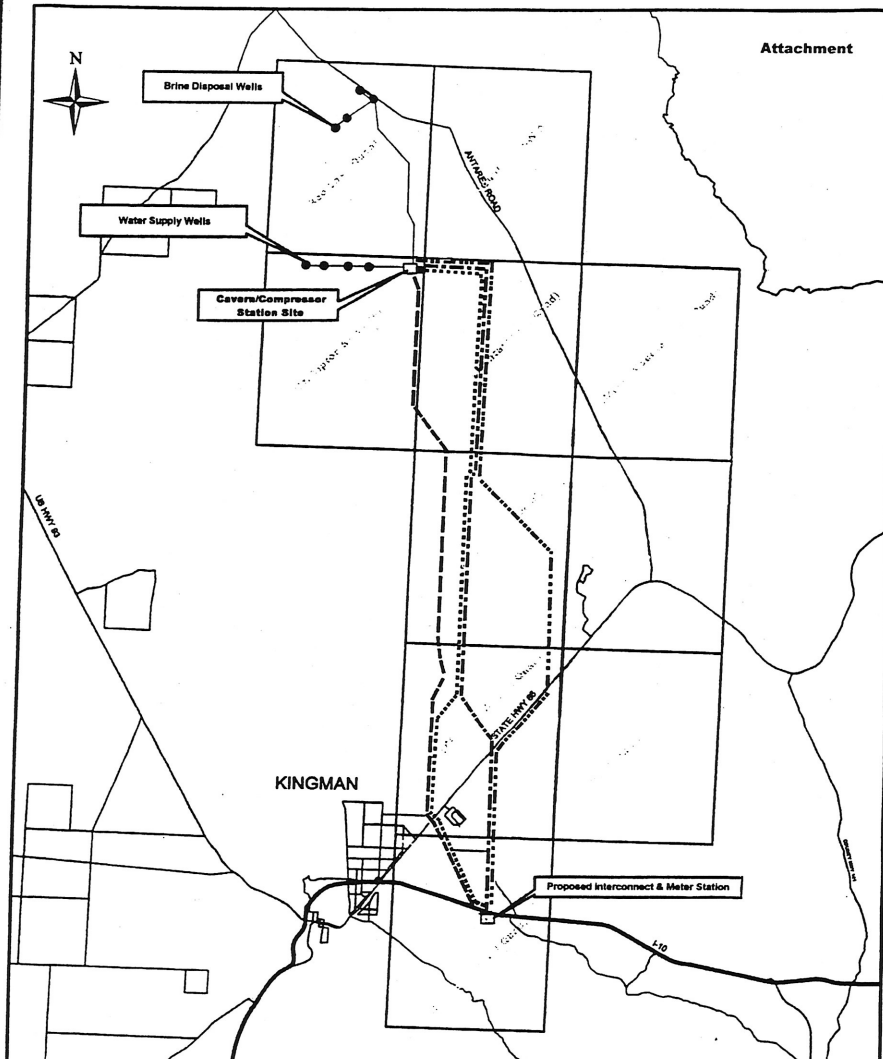


Lonnie Lister, Chief  
Gas/Hydro Branch  
Office of Energy Projects

Attachment (map)  
Enclosure (NOI)

cc: Public File, Docket No. CP02-420-000  
All Parties

Attachment



Alternative  
Gas Pipeline  
Routes

### Red Lake Gas Storage Project



#### Legend

- Proposed Route ————
- Alternate Route 1 - - - - -
- Alternate Route 2 - - - - -
- Alternate Route 3 - - - - -

ENCLOSURE

UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

Red Lake Gas Storage, L.P.

Docket No. CP02-420-000

NOTICE OF INTENT TO PREPARE AN  
ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED  
**RED LAKE GAS STORAGE PROJECT AND**  
REQUEST FOR COMMENTS ON ENVIRONMENTAL ISSUES

(October 1, 2002)

The staff of the Federal Energy Regulatory Commission (FERC or Commission) will prepare an environmental assessment (EA) that will discuss the environmental impacts of the Red Lake Gas Storage Project involving construction and operation of facilities by Red Lake Gas Storage, L.P. (RLGS) in Mohave County, Arizona.<sup>1</sup> These facilities would consist of: 2 underground salt caverns, about 52 miles of various diameter pipeline, 34,000 horsepower (hp) of compression, and appurtenant gas storage facilities. The EA will be used by the Commission in its decision-making process to determine whether the project is in the public convenience and necessity.

If you are a landowner receiving this notice, you may be contacted by a RLGS representative about the acquisition of an easement to construct, operate, and maintain the proposed facilities. RLGS would seek to negotiate a mutually acceptable agreement. However, if the project is approved by the Commission, that approval conveys with it the right of eminent domain. Therefore, if easement negotiations fail to produce an agreement, RLGS could initiate condemnation proceedings in accordance with state law.

A fact sheet prepared by the FERC entitled "An Interstate Natural Gas Facility On My Land? What Do I Need To Know?" was attached to the project notice RLGS provided to landowners. This fact sheet addresses a number of typically asked questions, including the use of eminent domain and how to participate in the Commission's proceedings. It is available for viewing on the FERC Internet website ([www.ferc.gov](http://www.ferc.gov)).

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<sup>1</sup>RLGS' application was filed with the Commission under Section 7 of the Natural Gas Act and Part 157 of the Commission's regulations.

**Summary of the Proposed Project**

RLGS proposes to construct the underground gas storage facilities in Mohave County, Arizona to provide firm and interruptible gas storage and hub services in interstate commerce. RLGS seeks authority to construct and operate:

1. two subsurface solution-mined salt caverns for gas storage;
2. 31.0 miles of 36-inch-diameter natural gas pipeline with a collocated fiber optic cable;
3. 4.7 miles of 6-inch-diameter natural gas pipeline;
4. 11.5 miles of 18-inch-diameter brine disposal pipeline;
5. 4.7 miles of 16-inch-diameter raw-water supply pipeline;
6. four raw water supply wells;
7. four brine disposal wells;
8. a 25,000-horsepower (hp) gas storage field compressor station;
9. a gas dehydration system;
10. a 4.9-mile-long access road;
11. electric power generators; and
12. an interconnecting facility containing a meter station, a 9,000-hp compressor station, and 18-inch-diameter interconnecting pipelines to El Paso Natural Gas Company (0.3-mile-long), Transwestern Pipeline Company (0.2-mile-long), and Questar Southern Trails Pipeline Company (0.4-mile-long).

The general location of the project facilities is shown in appendix 1.<sup>2</sup> If you are interested in obtaining detailed maps of a specific portion of the project, send in your request using the form in appendix 3.

#### **Land Requirements for Construction**

Construction of the proposed facilities would require about 746.9 acres of land. Following construction, about 414.3 acres would be maintained as new aboveground facility sites and permanent right-of-way. The remaining 332.6 acres of land would be restored and allowed to revert to its former use.

#### **The EA Process**

The National Environmental Policy Act (NEPA) requires the Commission to take into account the environmental impacts that could result from an action whenever it considers the issuance of a Certificate of Public Convenience and Necessity. NEPA also requires us<sup>3</sup> to discover and address concerns the public may have about proposals. This process is referred to as "scoping". The main goal of the scoping process is to focus the analysis in the EA on the important environmental issues. By this Notice of Intent, the Commission requests public comments on the scope of the issues it will address in the EA. All comments received are considered during the preparation of the EA. State and local government representatives are encouraged to notify their constituents of this proposed action and encourage them to comment on their areas of concern.

The EA will discuss impacts that could occur as a result of the construction and operation of the proposed project under these general headings:

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<sup>2</sup>The appendices referenced in this notice are not being printed in the Federal Register. Copies are available on the Commission's website at the "FERRIS" link or from the Commission's Public Reference and Files Maintenance Branch, 888 First Street, N.E., Washington, D.C. 20426, or call (202) 502-8371. For instructions on connecting to FERRIS refer to the last page of this notice. Copies of the appendices were sent to all those receiving this notice in the mail.

<sup>3</sup>"We", "us", and "our" refer to the environmental staff of the Office of Energy Projects (OEP).

- geology and soils
- water resources, fisheries, and wetlands
- vegetation and wildlife
- endangered and threatened species
- public safety
- land use
- cultural resources
- air quality and noise
- hazardous waste

We will also evaluate possible alternatives to the proposed project or portions of the project, and make recommendations on how to lessen or avoid impacts on the various resource areas.

Our independent analysis of the issues will be in the EA. Depending on the comments received during the scoping process, the EA may be published and mailed to Federal, state, and local agencies, public interest groups, interested individuals, affected landowners, newspapers, libraries, and the Commission's official service list for this proceeding. A comment period will be allotted for review if the EA is published. We will consider all comments on the EA before we make our recommendations to the Commission.

To ensure your comments are considered, please carefully follow the instructions in the public participation section beginning on page 5.

#### **Currently Identified Environmental Issues**

We have already identified several issues that we think deserve attention based on a preliminary review of the proposed facilities and the environmental information provided by RLGS. This preliminary list of issues may be changed based on your comments and our analysis.

- Impact on habitats unique to ephemeral waterbodies;
- Water use and brine disposal; and
- Impact on protected species and/or Federal Species of Concern (SC) including:



**Plants** – Parish's phacelia (SC), desert monopod, and three-hearts;  
**Birds** – Loggerhead shrike (SC), western burrowing owl, Swainson's hawk;  
**Mammals** – sensitive bat species; and  
**Reptiles/Amphibians** – Sonoran desert tortoise, chuckwalla, and rosy boa

**Public Participation**

You can make a difference by providing us with your specific comments or concerns about the project. By becoming a commentor, your concerns will be addressed in the EA and considered by the Commission. You should focus on the potential environmental effects of the proposal, alternatives to the proposal (including alternative locations and/or routes), and measures to avoid or lessen environmental impact. The more specific your comments, the more useful they will be. Please carefully follow these instructions to ensure that your comments are received in time and properly recorded:

- Send an **original and two** copies of your letter to:  
  
Magalie R. Salas, Secretary  
Federal Energy Regulatory Commission  
888 First St., N.E., Room 1A  
Washington, DC 20426
- Label one copy of the comments for the attention of Gas Hydro.
- Reference Docket No. CP02-420-000.
- **Mail your comments so that they will be received in Washington, DC on or before October 31, 2002.**

Please note that we are continuing to experience delays in mail deliveries from the U.S. Postal Service. As a result, we will include all comments that we receive within a reasonable time frame in our environmental analysis of this project. **However, the Commission strongly encourages electronic filing of any comments or interventions or protests to this proceeding.** See 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's web site at <http://www.ferc.gov> under the "e-Filing" link and the link to the User's Guide. Before you can file comments you will need to create a free account which can be created by clicking on "Login to File" and then "New User Account."

**If you do not want to send comments at this time but still want to remain on our mailing list, please return the Information Request (appendix 4). If you do not return the Information Request, you will be taken off the mailing list.**

#### **Becoming an Intervenor**

In addition to involvement in the EA scoping process, you may want to become an official party to the proceeding known as an "intervenor". Intervenor play a more formal role in the process. Among other things, intervenors have the right to receive copies of case-related Commission documents and filings by other intervenors. Likewise, each intervenor must provide 14 copies of its filings to the Secretary of the Commission and must send a copy of its filings to all other parties on the Commission's service list for this proceeding. If you want to become an intervenor you must file a motion to intervene according to Rule 214 of the Commission's Rules of Practice and Procedure (18 CFR 385.214) (see appendix 2).<sup>4</sup> Only intervenors have the right to seek rehearing of the Commission's decision.

Affected landowners and parties with environmental concerns may be granted intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding which would not be adequately represented by any other parties. **You do not need intervenor status to have your environmental comments considered.**

#### **Environmental Mailing List**

This notice is being sent to individuals, organizations, and government entities interested in and/or potentially affected by the proposed project. It is also being sent to all identified potential right-of-way grantors. By this notice we are also asking governmental agencies, especially those in appendix 3, to express their interest in becoming cooperating agencies for the preparation of the EA.

#### **Additional Information**

Additional information about the project is available from the Commission's Office of External Affairs, at **1-866-208-FERC** or on the FERC Internet website ([www.ferc.gov](http://www.ferc.gov)) using the FERRIS link. Click on the FERRIS link, enter the docket

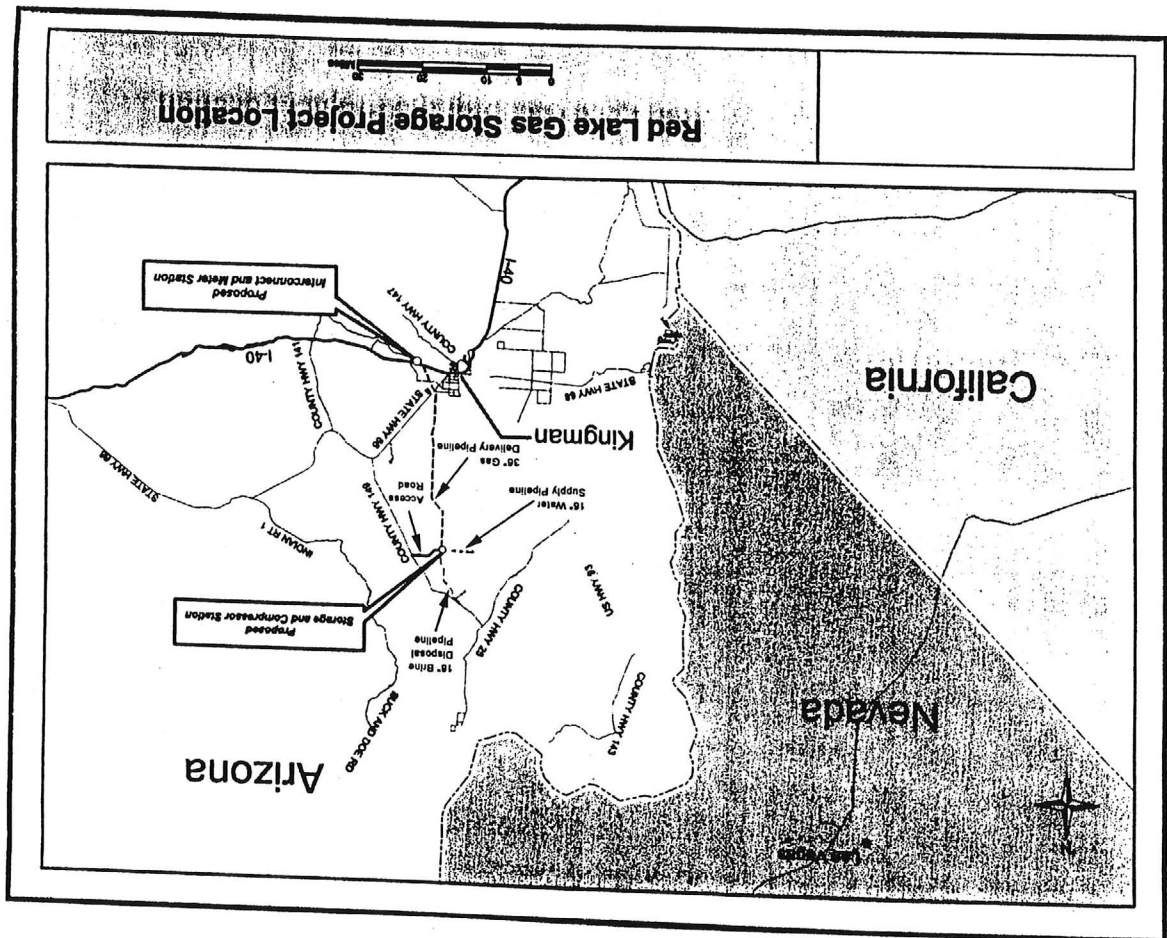
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<sup>4</sup>Interventions may also be filed electronically via the Internet in lieu of paper. See the previous discussion on filing comments electronically.

number excluding the last three digits in the Docket Number field. Be sure you have selected an appropriate date range. For assistance with FERRIS, the FERRIS helpline can be reached at (202) 502-8222, TTY (202) 502-8659. The FERRIS link on the FERC Internet website also provides access to the texts of formal documents issued by the Commission, such as orders, notices, and rulemakings.

Magalie R. Salas  
Secretary

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## How to Intervene in Commission Proceedings

There are two alternatives available to those wishing to participate in FERC proceedings involving the interstate sale and transportation of natural gas, hydroelectric dams, wholesale transactions of electric transmissions, and rates for the interstate transportation of petroleum products.

One approach is simply to file a protest or letter of support with the Commission. Such informal comments are made known to the Commission and its staff and are considered by the Commission in determining further appropriate actions. But, protests and letters of support are filed without becoming part of the official record if the case is set for hearing. **The Commission's rules direct protesters to provide copies of their protests to the party or parties against whom their complaints are directed.**

The second approach is to file as an intervenor. An intervenor is an official party to a proceeding and enjoys distinct advantages and responsibilities over those who only file informal comments of protest or support. Intervenors have the right to participate in hearings before an administrative law judge as well as other proceedings in the case. They may file briefs. Intervenors will be placed on a service list to receive copies of case-related Commission documents as well as filings by other intervenors in the proceeding. And they will have the legal standing to be heard by the Court of Appeals if they choose to pursue their opposition to the final order by the Commission in their case.

Filing for intervenor status is not complicated. There is no form to complete. Interested parties must file a motion requesting permission to intervene. The motion must identify the case by name and docket number and must clearly state your position and interest in the case.

For example, intervenors may demonstrate they are directly affected consumers, or they are elected representatives of affected parties, or that they own land near a proposed hydroelectric or pipeline site.

A motion to intervene must be served on the applicant and any other parties on the service list in the proceeding. An original and 14 copies are required to be filed with the Commission.

The Commission's Secretary maintains the service list. The service list may be accessed on the FERC Internet website ([www.ferc.gov](http://www.ferc.gov)). Service lists can be found under the "Documents & Filing" link.

Alternatively, if you are within the city of Washington, D.C. requests for service lists may be directed to the Public Reference Room, (202) 502-8371. If you are outside the city of Washington, D.C. requests should be directed to the Office of the Secretary, (202) 502-8400.

Notices of proposed rate changes, applications for hydro development and proposed natural gas pipelines, and other filings submitted to the Commission are printed daily in the *Federal Register*.

The notices are also available on the FERC website ([www.ferc.gov](http://www.ferc.gov)) using the FERRIS link. FERRIS, the Federal Energy Regulatory Records Information System, is a database containing the indexes and images of documents submitted to and issued by the FERC. Applications and subsequent filings may be viewed in FERRIS.

Each notice includes a deadline for filing requests for intervention. If the request to intervene is filed on time and there is no opposition to the request within 15 days of filing, intervenor status is granted automatically.

Disputed requests for intervenor status must be resolved by the Commission.

Anyone filing a motion to intervene out-of-time must show good cause why the motion should be accepted late.

If the intervention is filed after the matter has been set for hearing and is pending before an administrative law judge, the presiding judge has the authority to rule on contested motions to intervene.

Interventions, protests, or comments should be mailed to the Federal Energy Regulatory Commission, Office of the Secretary, 888 First St., N.E., Washington, DC 20426. As noted, these filings must cite the case name and docket number.

Appendix 3

COOPERATING AGENCIES

The following agencies are asked to indicate whether they want to be cooperating agencies for purposes of producing an EA:

U.S. Department of the Interior - Bureau of Land Management  
Arizona Department of Environmental Quality  
Arizona Department of Water Resources

These, or any other Federal, state, or local agencies wanting to participate as a cooperating agency should send a letter describing the extent to which they want to be involved. Follow the instructions below if your agency wishes to participate in the EA process or comment on the project:

Address your letter to:

Magalie R. Salas, Secretary  
Federal Energy Regulatory Commission  
888 First St., N.E., Room 1A  
Washington, DC 20426

Reference Docket No. CP02-420-000.

Send a copy of your letter to:

Gas/Hydro Branch, PR-11.3  
Federal Energy Regulatory Commission  
888 First Street NE, Room 61-44  
Washington, DC 20426

**Mail your letter so that it will be received in Washington, DC, on or before October 31, 2002.**

Cooperating agencies are encouraged to participate in the scoping process and provide us written comments. Agencies are also welcome to suggest format and content changes that will make it easier for them to adopt the EA. However, we will decide what modifications will be adopted in light of our production constraints.

## **Stauffer Chemical Company Drill Logs**

**Detrital Valley Salt Deposit (file) Mohave Co.**

**Red Lake Cavern (file) Mohave Co.** 

Stauffer Chemical drilled 4 holes up to 3,000 feet deep during 1960-62. The holes are located in Nevada north of Detrital Valley across Lake Mead. The holes penetrate the Muddy Creek Formation evaporite sequence. The logs of the are of interest and relevant to the Detrital Valley Salt Deposit (file) and Red Lake Cavern (file). Copies are located in the Detrital Valley Salt file.

**Nyal J. Niemuth**  
**November 1994.**

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Red Lake Gas Storage, L.P.

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We will also evaluate possible alternatives to the proposed project or portions of the project, and make recommendations on how to lessen or avoid impacts on the various resource areas.

Our independent analysis of the issues will be in the EA. Depending on the comments received during the scoping process, the EA may be published and mailed to Federal, state, and local agencies, public interest groups, interested individuals, affected landowners, newspapers, libraries, and the Commission's official service list for this proceeding. A comment period will be allotted for review if the EA is published. We will consider all comments on the EA before we make our recommendations to the Commission.

To ensure your comments are considered, please carefully follow the instructions in the public participation section beginning on page 5.

### **Currently Identified Environmental Issues**

We have already identified several issues that we think deserve attention based on a preliminary review of the proposed facilities and the environmental information provided by RLGS. This preliminary list of issues may be changed based on your comments and our analysis.

- Impact on habitats unique to ephemeral waterbodies;
- Water use and brine disposal; and
- Impact on protected species and/or Federal Species of Concern (SC) including:

**Plants** – Parish's phacelia (SC), desert monopod, and three-hearts;  
**Birds** – Loggerhead shrike (SC), western burrowing owl, Swainson's hawk;  
**Mammals** – sensitive bat species; and  
**Reptiles/Amphibians** – Sonoran desert tortoise, chuckwalla, and rosy boa

### **Public Participation**

You can make a difference by providing us with your specific comments or concerns about the project. By becoming a commentor, your concerns will be addressed in the EA and considered by the Commission. You should focus on the potential environmental effects of the proposal, alternatives to the proposal (including alternative locations and/or routes), and measures to avoid or lessen environmental impact. The more specific your comments, the more useful they will be. Please carefully follow these instructions to ensure that your comments are received in time and properly recorded:

- Send an **original and two** copies of your letter to:  
  
Magalie R. Salas, Secretary  
Federal Energy Regulatory Commission  
888 First St., N.E., Room 1A  
Washington, DC 20426
- Label one copy of the comments for the attention of Gas Hydro.
- Reference Docket No. CP02-420-000.
- **Mail your comments so that they will be received in Washington, DC on or before October 31, 2002.**

Please note that we are continuing to experience delays in mail deliveries from the U.S. Postal Service. As a result, we will include all comments that we receive within a reasonable time frame in our environmental analysis of this project. **However, the Commission strongly encourages electronic filing of any comments or interventions or protests to this proceeding.** See 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's web site at <http://www.ferc.gov> under the "e-Filing" link and the link to the User's Guide. Before you can file comments you will need to create a free account which can be created by clicking on "Login to File" and then "New User Account."

**If you do not want to send comments at this time but still want to remain on our mailing list, please return the Information Request (appendix 4). If you do not return the Information Request, you will be taken off the mailing list.**

### **Becoming an Intervenor**

In addition to involvement in the EA scoping process, you may want to become an official party to the proceeding known as an "intervenor". Intervenors play a more formal role in the process. Among other things, intervenors have the right to receive copies of case-related Commission documents and filings by other intervenors. Likewise, each intervenor must provide 14 copies of its filings to the Secretary of the Commission and must send a copy of its filings to all other parties on the Commission's service list for this proceeding. If you want to become an intervenor you must file a motion to intervene according to Rule 214 of the Commission's Rules of Practice and Procedure (18 CFR 385.214) (see appendix 2).<sup>4</sup> Only intervenors have the right to seek rehearing of the Commission's decision.

Affected landowners and parties with environmental concerns may be granted intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding which would not be adequately represented by any other parties. **You do not need intervenor status to have your environmental comments considered.**

### **Environmental Mailing List**

This notice is being sent to individuals, organizations, and government entities interested in and/or potentially affected by the proposed project. It is also being sent to all identified potential right-of-way grantors. By this notice we are also asking governmental agencies, especially those in appendix 3, to express their interest in becoming cooperating agencies for the preparation of the EA.

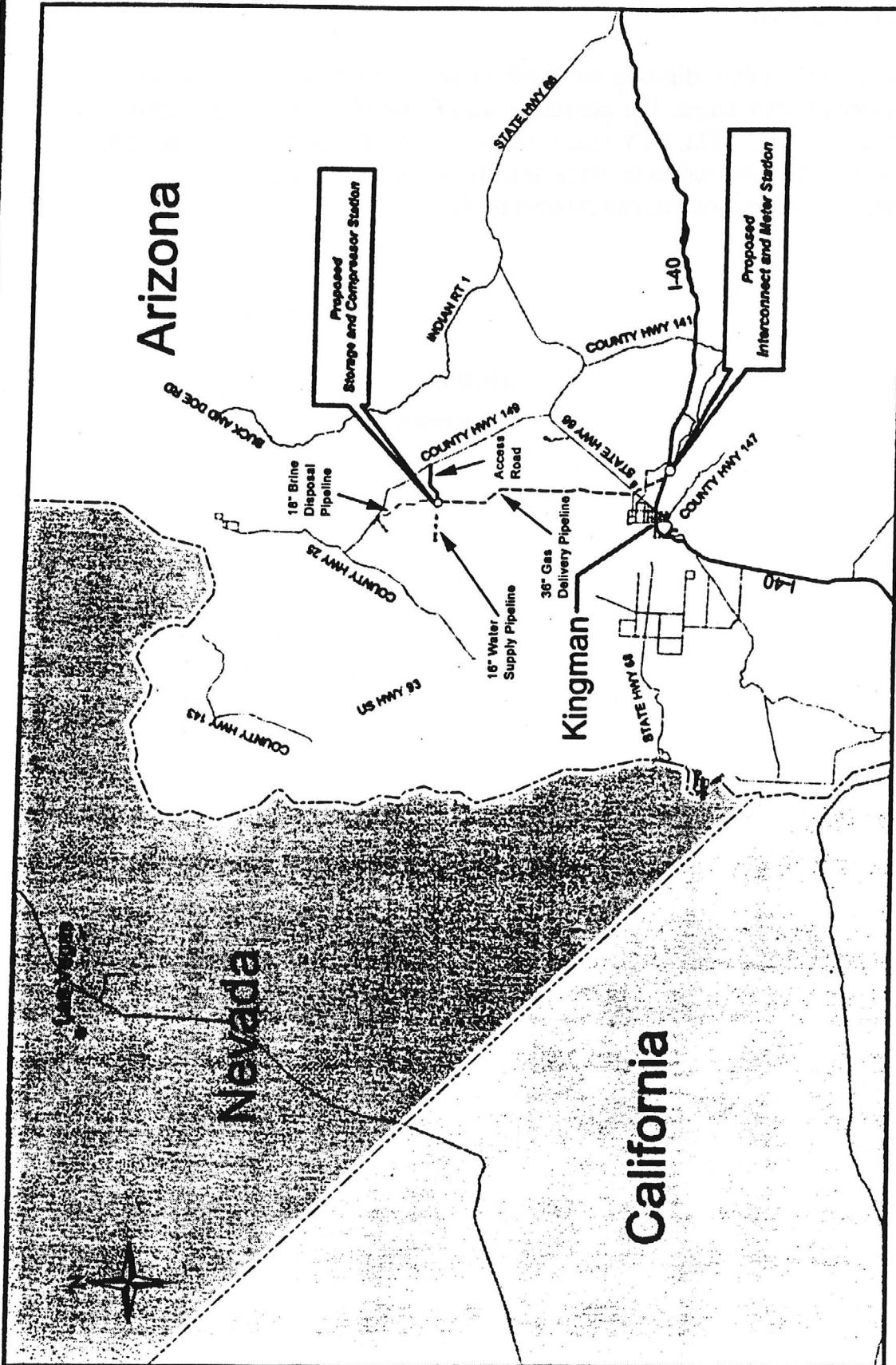
### **Additional Information**

Additional information about the project is available from the Commission's Office of External Affairs, at **1-866-208-FERC** or on the FERC Internet website ([www.ferc.gov](http://www.ferc.gov)) using the FERRIS link. Click on the FERRIS link, enter the docket

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<sup>4</sup>Interventions may also be filed electronically via the Internet in lieu of paper. See the previous discussion on filing comments electronically.





## Red Lake Gas Storage Project Location



number excluding the last three digits in the Docket Number field. Be sure you have selected an appropriate date range. For assistance with FERRIS, the FERRIS helpline can be reached at (202) 502-8222, TTY (202) 502-8659. The FERRIS link on the FERC Internet website also provides access to the texts of formal documents issued by the Commission, such as orders, notices, and rulemakings.

Magalie R. Salas

Secretary



## How to Intervene in Commission Proceedings

There are two alternatives available to those wishing to participate in FERC proceedings involving the interstate sale and transportation of natural gas, hydroelectric dams, wholesale transactions of electric transmissions, and rates for the interstate transportation of petroleum products.

One approach is simply to file a protest or letter of support with the Commission. Such informal comments are made known to the Commission and its staff and are considered by the Commission in determining further appropriate actions. But, protests and letters of support are filed without becoming part of the official record if the case is set for hearing. **The Commission's rules direct protesters to provide copies of their protests to the party or parties against whom their complaints are directed.**

The second approach is to file as an intervenor. An intervenor is an official party to a proceeding and enjoys distinct advantages and responsibilities over those who only file informal comments of protest or support. Intervenors have the right to participate in hearings before an administrative law judge as well as other proceedings in the case. They may file briefs. Intervenors will be placed on a service list to receive copies of case-related Commission documents as well as filings by other intervenors in the proceeding. And they will have the legal standing to be heard by the Court of Appeals if they choose to pursue their opposition to the final order by the Commission in their case.

Filing for intervenor status is not complicated. There is no form to complete. Interested parties must file a motion requesting permission to intervene. The motion must identify the case by name and docket number and must clearly state your position and interest in the case.

For example, intervenors may demonstrate they are directly affected consumers, or they are elected representatives of affected parties, or that they own land near a proposed hydroelectric or pipeline site.

A motion to intervene must be served on the applicant and any other parties on the service list in the proceeding. An original and 14 copies are required to be filed with the Commission.

The Commission's Secretary maintains the service list. The service list may be accessed on the FERC Internet website ([www.ferc.gov](http://www.ferc.gov)). Service lists can be found under the "Documents & Filing" link.

Alternatively, if you are within the city of Washington, D.C. requests for service lists may be directed to the Public Reference Room, (202) 502-8371. If you are outside the city of Washington, D.C. requests should be directed to the Office of the Secretary, (202) 502-8400.

Notices of proposed rate changes, applications for hydro development and proposed natural gas pipelines, and other filings submitted to the Commission are printed daily in the *Federal Register*.

The notices are also available on the FERC website ([www.ferc.gov](http://www.ferc.gov)) using the FERRIS link. FERRIS, the Federal Energy Regulatory Records Information System, is a database containing the indexes and images of documents submitted to and issued by the FERC. Applications and subsequent filings may be viewed in FERRIS.

Each notice includes a deadline for filing requests for intervention. If the request to intervene is filed on time and there is no opposition to the request within 15 days of filing, intervenor status is granted automatically.

Disputed requests for intervenor status must be resolved by the Commission.

Anyone filing a motion to intervene out-of-time must show good cause why the motion should be accepted late.

If the intervention is filed after the matter has been set for hearing and is pending before an administrative law judge, the presiding judge has the authority to rule on contested motions to intervene.

Interventions, protests, or comments should be mailed to the Federal Energy Regulatory Commission, Office of the Secretary, 888 First St., N.E., Washington, DC 20426. As noted, these filings must cite the case name and docket number.

COOPERATING AGENCIES

The following agencies are asked to indicate whether they want to be cooperating agencies for purposes of producing an EA:

U.S. Department of the Interior - Bureau of Land Management  
Arizona Department of Environmental Quality  
Arizona Department of Water Resources

These, or any other Federal, state, or local agencies wanting to participate as a cooperating agency should send a letter describing the extent to which they want to be involved. Follow the instructions below if your agency wishes to participate in the EA process or comment on the project:

Address your letter to:

Magalie R. Salas, Secretary  
Federal Energy Regulatory Commission  
888 First St., N.E., Room 1A  
Washington, DC 20426

Reference Docket No. CP02-420-000.

Send a copy of your letter to:

Gas/Hydro Branch, PR-11.3  
Federal Energy Regulatory Commission  
888 First Street NE, Room 61-44  
Washington, DC 20426

**Mail your letter so that it will be received in Washington, DC, on or before October 31, 2002.**

Cooperating agencies are encouraged to participate in the scoping process and provide us written comments. Agencies are also welcome to suggest format and content changes that will make it easier for them to adopt the EA. However, we will decide what modifications will be adopted in light of our production constraints.

P. 16

**FEDERAL ENERGY REGULATORY COMMISSION**  
WASHINGTON, DC 20426

OFFICE OF ENERGY PROJECTS

**In Reply Refer To:**  
Gas/Hydro Branch, PJ-11.3  
Red Lake Gas Storage, L.P.  
Docket No. CP02-420-000

February 28, 2003

**To the Parties Addressed:**

The Federal Energy Regulatory Commission (Commission) is preparing an environmental review of Red Lake Gas Storage, L.P.'s (RLGS) proposed Red Lake Gas Storage Project in Mohave County, Arizona (Red Lake Project). The proposed facilities consist of two solution-mined underground salt caverns, about 52 miles of various diameter pipeline, a 25,000-horsepower (hp) compressor station, a 9,000-hp compressor station, four water withdrawal wells, four brine disposal wells, and appurtenant facilities. The Red Lake Project facilities are more fully described in the enclosed Notice of Intent to Prepare an Environmental Assessment for the Proposed Red Lake Project and Request for Comments on Environmental Issues (NOI) (Enclosure).

Based on responses to the NOI, comments presented at the public scoping meeting held on November 14, 2002, and its own review of issues raised, the FERC staff has determined that approval of the proposed project would constitute a major federal action with the potential to significantly affect the quality of the human environment. Therefore, the staff has now decided to prepare an Environmental Impact Statement (EIS) for this proposed project in accordance with the National Environmental Policy Act.

A draft EIS will be issued and circulated for review by all interested parties. All comments filed on the DEIS will be analyzed by the staff and considered in the final EIS. The staff's conclusions and recommendations will then be presented for the consideration of the Commission in reaching its final decision.

In light of potential reasonable alternative routes which have arisen, the FERC staff and its cooperating agencies plan to hold a second public scoping meeting in the near future to provide an additional opportunity for public comment. A notice announcing the time and place of the scoping meeting will be forthcoming and will be sent to everyone receiving this notice.

In addition to evaluating the environmental impacts of the Red Lake Project as originally proposed, we will also evaluate alternative routes to the proposed 36-inch-diameter gas delivery pipeline route to determine if any them are environmentally preferable to the proposed route for which RLGS is seeking authorization. The general location of the proposed facilities and alternative routes are shown in the Attachment and described as follows.

Alternate Route 1 begins at the proposed cavern/compressor station site near Red Lake, and heads east for about 3.0 miles. Here the route turns south for about 9.1 miles, within the Kingman Water Utility Corridor (KWUC), a U.S. Department of Interior, Bureau of Land Management (BLM) designated utility corridor<sup>1</sup>. At that point the route joins the right-of-way of the Citizens Utilities 2-inch-diameter pipeline and continues south for about 10.0 miles, still within the KWUC. Alternate Route 1 then jogs to the southwest for about 1.4 miles and continues southward, adjacent to El Paso Natural Gas Company's 6-inch-diameter pipeline for another 10.2 miles to the proposed interconnect and meter station. The total length of Alternate Route 1 is about 33.7 miles.

Alternate Route 2 follows the same route as Alternate Route 1 for the first 22.1 miles, and then turns southeast for about 2.3 miles within the AT&T Utility Corridor to a point about 0.5 mile north of U.S. Route 66. At that point, the route turns south for about 8.6 miles, passing about 0.75 mile east of Kingman Airport, and terminating at the proposed interconnect and meter station on the south side of Interstate 40. The total length of Alternate Route 2 is about 33.0 miles.

Alternate Route 3 follows the same corridor as Alternate Routes 1 and 2 for the first 12.1 miles, along the KWUC. At that point, Alternate Route 3 turns to the southeast for about 5.5 miles, then south for about 5.7 miles, passing about 2 miles east of Long Mountain. The route then crosses U.S. Route 66 and parallels the highway southwestward for about 3.0 miles along the Highway Utility Corridor to the point where it intersects Alternate Route 2. It then turns south and follows the Alternate Route 2 alignment, east of of Kingman Airport, to the proposed interconnect and meter station. The total length of Alternate Route 3 is about 34.4 miles.

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<sup>1</sup> Kingman Resource Area Proposed Resource Management Plan and Final Environmental Impact Statement, U.S. Department of the Interior, Bureau of Land Management, 1993, and Record of Decision for the Approval of the Kingman Resource Area Resource Management Plan, 1995.


A fourth alternative was considered that would generally follow Antares Road from a point approximately 4 miles east of the cavern site to U.S. Route 66, then southwestward along U.S. Route 66 to a point where it would cross Alternate Route 2, and then south from there to the proposed interconnect and meter station site. This alternative was considered and rejected for several reasons including, length, cost, and the large number of residential properties potentially affected, as compared with the above-described alternatives and does not meet the requirements of the proposed action.

Many of the landowners potentially affected by these alternative routes are different from those who were previously notified about the proposed route. Nevertheless, this letter is being sent to all of the landowners that would potentially be affected by either the proposed route or the route alternatives and may not have received the initial NOI, and to all parties to the proceedings. We want to provide you with the opportunity to participate in the Commission's process and provide comments on environmental issues, as was provided to the potentially affected landowners along the proposed route. Both the proposed and the alternative routes will be analyzed in our EIS.

The procedures for filing environmental comments and/or interventions are detailed on pages 5 through 7, and Appendix 2 of the NOI. Although the original environmental scoping period for this project has expired, we are extending the comment period. We note that some of the potentially affected landowners northward of the point at which Alternate Routes 1, 2 and 3 converge within the KWUC are still being identified. However, much of this land is owned by the BLM. When the remaining landowners are identified, we will send them a supplemental notice and provide them with an opportunity to comment on environmental issues.

Please file your comments by **March 31, 2003**. Please address your comments to Magalie R. Salas, Secretary, at the address given in the Enclosure. If you have further questions about the Red Lake Project or about your participation in this proceeding, please call the Commission's Office of External Affairs at 1-866-208-FERC.

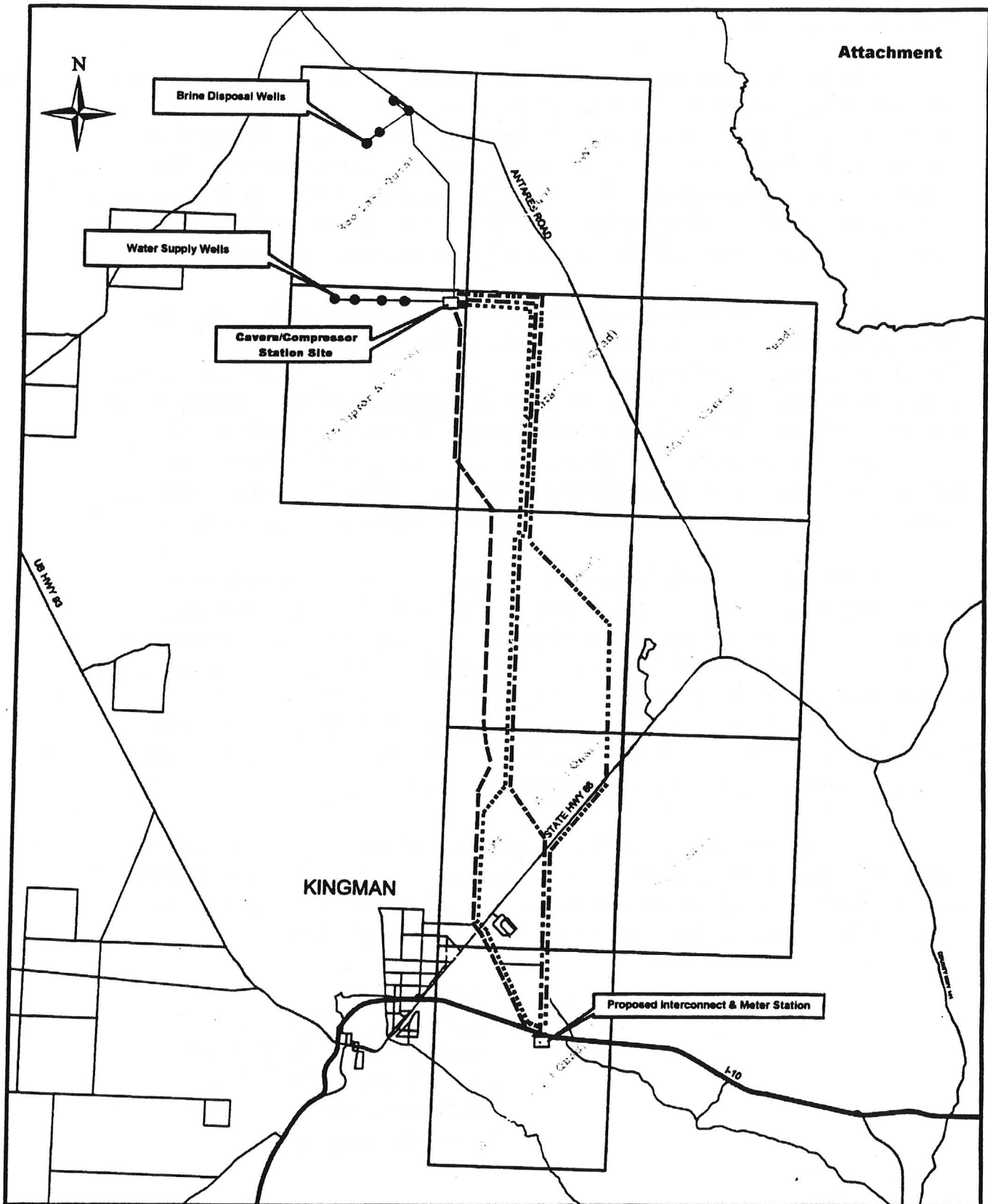
Sincerely,



Lonnie Lister, Chief  
Gas/Hydro Branch  
Office of Energy Projects

Attachment (map)  
Enclosure (NOI)

cc: Public File, Docket No. CP02-420-000  
All Parties



Alternative  
Gas Pipeline  
Routes

## Red Lake Gas Storage Project



### Legend

- Proposed Route ————
- Alternate Route 1 ······
- Alternate Route 2 - - - - -
- Alternate Route 3 - · - · - ·

RED LAKE

ERIC-DAWN CLAIMS

MOHAVE COUNTY

ARIZONA

October 17, 1977



THE NATURAL RESOURCE GROUP, LTD.



# THE NATURAL RESOURCE GROUP, LTD.

6 BROOKHAVEN DRIVE N.E. • ATLANTA, GEORGIA 30319

---

**FUEL SUPPLY**

**FEB 21 1978**

February 16, 1978

Mr. G.T. Austin  
Principal Uranium  
Exploration Engineer  
Washington Public Power Supply System  
Post Office Box 968  
3000 Geo. Washington Way  
Richland, Washington 99352

RE: Exploration Submittals AZ-9 and AZ-8

Dear Mr. Austin:

Thank you for your letter of February 13th regarding our uranium properties in Arizona. Enclosed are reports on these properties as you requested.

Our geologist, Ed Barge, has located both of these properties and I suggest you call him in Durango if you require additional information, or wish to visit the sites.

Yours truly,  
THE NATURAL RESOURCE GROUP, LTD.



S. STOKES TOMLIN, JR.

SST:cm  
Enclosures



RED LAKE

ERIC-DAWN CLAIMS

MOHAVE COUNTY

ARIZONA

Prepared By

*Edward M. Barge  
Consulting Geologist  
The Natural Resource Group, Ltd.  
Post Office Box 6  
Durango, Colorado 81301*

*303/247-4548*

*October 17, 1977*

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RED LAKE

ERIC-DAWN CLAIMS

MOHAVE COUNTY, ARIZONA

-LAND STATUS-

Twenty one sections comprising approximately 13,440 acres have been located by A.U. Mines, Inc., a Nevada Corporation. These claims (a total of 840) have been validated according to Arizona law and have been filed with all appropriate authorities, including the U.S. B.L.M. A land status map, enclosed with this report, details their location with respect to the surrounding lands.

Ownership is, in general, a "checker board", alternate sections being privately held. Originally the private ground was owned by the Santa Fe R.R. Although some of these sections have been subdivided, it is probable that most of the mineral estate is still held by Santa Fe. In addition, four sections in each township (2, 16, 32, 36) were granted to the State of Arizona. Several companies (as shown on the status map) have received "prospecting permits" from the state. These permits were issued in February and March of 1977.

A thorough search of the Mohave County records failed to reveal any existing unpatented claims in the area of interest. The only recordings were made in the "early 50's". No further filings or affidavits could be found. A field search found several very old, unrecognizable posts and additional stakes which were

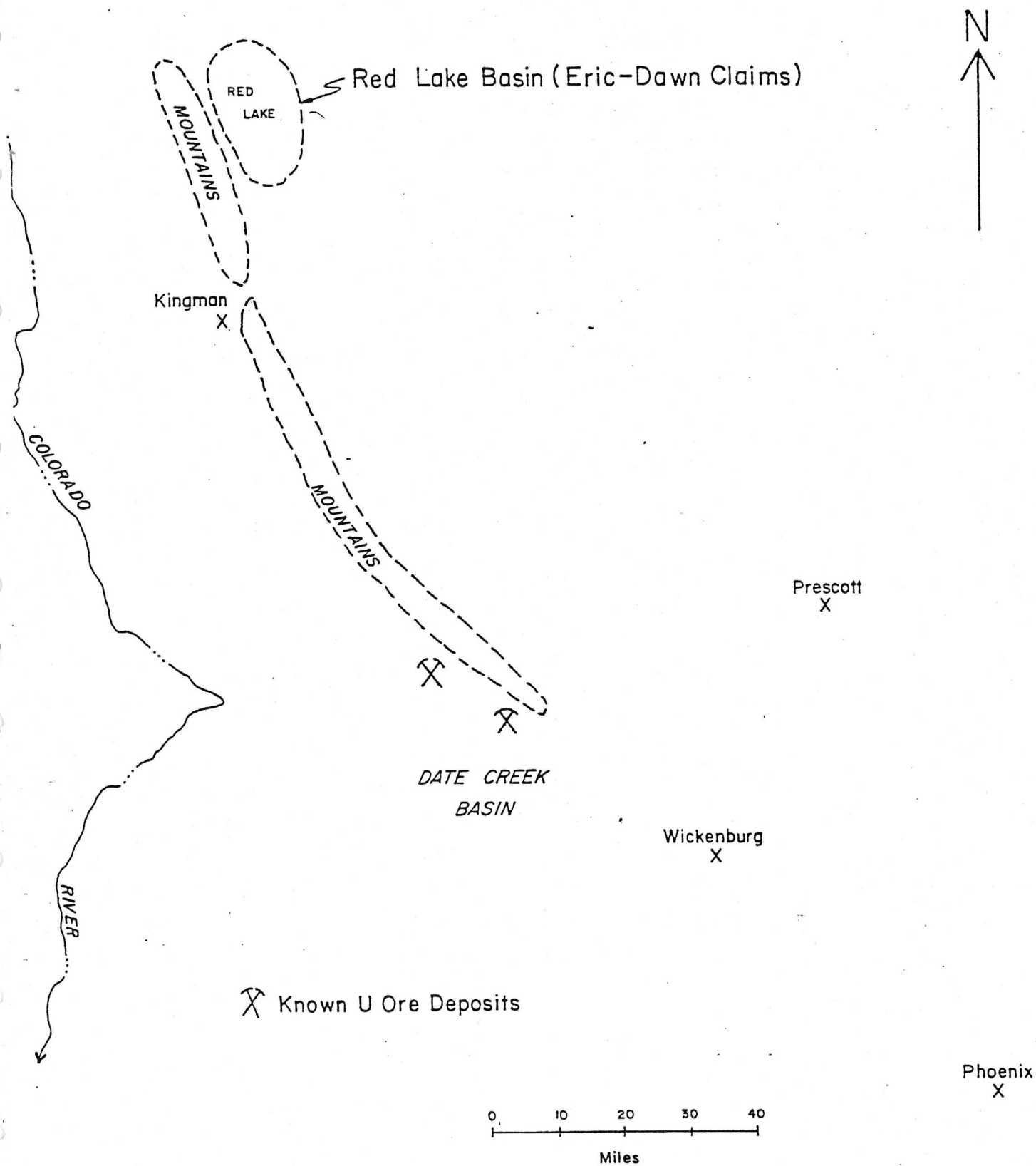


Fig. I Vicinity Map

recent. These recent stakes had notices which indicated claim activity by Minerals Exploration Company. However, they were never recorded. A report by N.J. Devlin, P.E., is attached.

Validation of the Eric-Dawn claims consisted of auger drilling a hole at least ten feet deep on each claim and gamma ray probing. A log of each hole was made. Photographs were made of each site. A general car-mounted scintillation survey preceded the drilling.

A.U. Mines, Inc. maintains a complete file of all pertinent data relative to the legal requirements evidencing mineral title.

#### -GEOLOGY-

The vicinity map, Fig. 1, gives the general location of the claims, which are situated in the Red Lake Basin. This part of Arizona is in the Basin and Range physiographic province. The southwestern edge of the Colorado Plateau borders Red Lake Basin on its northeastern side. Topographic relief of the surrounding mountains amounts to several thousand feet, but the claim area is practically flat. Water is scarce, although substantial amounts of underground water are present in portions of the claim area.

The geologic events leading up to the present structure are complex and have not been completely described. The core of the block-fault mountain ranges are composed of Precambrian granite, gneisses and schist. Tertiary volcanism has deposited flows, breccias, and ash and has also caused intrusions of dikes and plugs. The valleys are filled with sand, gravel and clay both fluvial and lacustrine. Tuff, limestone and chert are also present. The pre-Tertiary structure and stratigraphy in the Red Lake area are especially enigmatic. Below the Tertiary beds (below about 1,500' depth) lie thousands of feet of salt capped by gypsum and anhydrite. Age determinations by El Paso Natural Gas Company on samples of the halite indicate an age of about 200 m.y., which would mean a Permian source. Base metal mineralization in the form of veins occurs in the Wallapai Mining District in the Cerbat mountains bordering on the southwest side of Red Lake. "There are about 225 mines plus an estimated 1,000 shallow pits, shafts, and prospects in the district. The Precambrian rocks consist of a complex of amphibolite, hornblende schist, biotite schist, chlorite schist, diorite gneiss, granite and associated pegmatitic bodies, granite gneiss, schistose granite, granitic schist, and garnetiferous schist. Granite and amphibolite are the most widespread types and the granite is predominant."<sup>(1)</sup> Also in the same mountain range occurs a copper-moly porphyry deposit being exploited by Duval Corporation. Numerous veins carry significant amounts of uranium mineralization, but none have been commercially exploited.<sup>(2)</sup> Similar mineralization occurs in the Music Mountains to the east of Red Lake, and in Lost Basin in T.29N., R.17W. to the north of Red Lake.

As shown on the Vicinity Map, the nearest uranium ore deposits which have and are being commercially exploited lie in the Date Creek Basin, which is on the other side of the mountains from and south of Red Lake Basin. These deposits

are strataform in the Tertiary lake bed sequence of clay, sand and marl. Unverified reports place the reserves of Minerals Exploration Company at 25,000,000 lbs.  $U_3O_8$ . Urangesellschaft U.S.A., Inc. also has substantial reserves. There is much activity by several major companies in Date Creek Basin.

Red Lake Basin itself lies in a topographic depression having no exterior drainage outlet. The surface is covered by dune sand and silty clay. This same material was observed to the depth reached by the auger drilling. Two deep potash tests by Kerr McGee were drilled in 1958. A deep salt test was drilled by El Paso Natural Gas Company in 1970. Electric, gamma ray and lithologic logs of these holes are attached to this report. Their locations are shown on the Land Status Map.

Several water wells have also been drilled in the area. Results have been varied.<sup>(3)</sup> Two of the wells, shown on the status map produced over 1,000 g.p.m. Obviously, there exists an aquifer of sand or sandstone enclosed in the silty clay at a depth less than 800 feet. This channel system pinches out laterally (eastward) before reaching the Kerr McGee R.L. No. 2 hole, a distance of two miles. The channel trend is probably northerly along the east flank of the Cerbat Mountains. Other channel systems could be present on the other margins of the basin. The U.S.G.S. has recently drilled a lithium-brine test hole in the SW $\frac{1}{4}$  Sec. 24 T.27N., R117W., but the results are unknown.<sup>(4)</sup>

Although Red Lake is a topographic depression with no exterior drainage outlet on the surface, it is not a closed hydrologic basin at depth. The piezometric surface of the subsurface aquifer slopes to the north towards the Colorado River.

Thus, conditions paralleling Yeelirie, as explained later, only prevail in the upper 200 feet or so in the section, where hydraulic closure is present.

A study of the gamma-ray logs of the deep tests show several anomalous zones to exist. In the El Paso well, this zone was best developed. At numerous places over an interval of 346 feet from a depth of 940 feet to 1,286 feet the gamma-ray count reached or exceeded <sup>0.014%  $U_3O_8$</sup>  500 A.P.I. units. The conversion formula to equivalent  $U_3O_8$  is: %e $U_3O_8$  = A.P.I. units  $\times 2.81 \times 10^{-5}$ . This zone lies several hundred feet above the caprock and therefore does not represent <sup>40</sup>K.

An examination of the sonic log over this interval indicates that the radioactive lithology is most likely a rock with the characteristics of chalk or limey marl. This material would, of course, not be amenable to economic extraction. It does indicate, however, that uranium-bearing solutions have penetrated in the vicinity.

Surface radioactivity at Red Lake runs 2X to 4X over background at Kingman. However, probing of the auger holes failed to reveal a significant increase in radioactivity to the depth of ten feet.

#### -GEOLOGIC INFERENCES-

A study of a uranium prospect will eventually entail some degree of inference based upon comparisons with other known occurrences. The Red Lake prospect immediately brings to mind two possible comparisons. The Yeelirie calcrete



deposit in western Australia is the first comparison. Attached at the end of this report is a copy of a paper by Roger D. Morton of the University of Alberta which is self-explanatory. Fig. 3 is a localized geologic sketch map of Red Lake to compare with Fig. 2 which is Morton's. An outline of the evaporative environment from the lecture notes of Richard H. DeVoto, Colorado School of Mines, is also attached at the end of the report. The similarities to the environment at Red Lake are undeniable. However, only the beds in the top 200 feet or so of Red Lake Basin would be involved in a Tertiary evaporative environment.

The other situation that comes to mind is the "Redox cell" type common in Wyoming. Fig. 4 (5) and Fig. 5 (6) detail the geometrical relationships. An analogous sand channel intertonguing with lacustrine sediments in Red Lake could precipitate a uranium deposit at the Redox interface.

In lay terms, permeable sand aquifers which exist at depths of about 800 feet could have carried minute amounts of dissolved uranium from the surrounding mountains, where it is known to exist and over a long period of time uranium deposits could have formed where conditions favorable for precipitation and concentration occurred. The most plausible precipitating agent in Red Lake Basin would be escaping hydrogen sulfide gases generated from the caprock. Such gases are exceedingly common to salt dome caprocks and their action in reducing uranium solutions has been demonstrated in numerous places (i.e. Lisbon Valley, Utah, and South Texas). The specific sites for such deposition would most probably occur at the intersection of sand channels with underlying faults marginal to salt piercement domes, and in particular, west of the Kerr

McGee holes towards the water wells. This zone should be explored both north and south along the Cerbat Mt. front.

-RECOMMENDED EXPLORATION-

Both of the above geologic ideas should be tested by drilling. Procedures in uranium exploration have become fairly standardized and will not be elaborated upon here. The area lends itself to low cost rotary drilling. An eventual in-situ leaching method of extraction should not be overlooked.

A handwritten signature in cursive script, reading "E.M. Barge", is written over a horizontal line.

E.M. Barge  
Geologist

October 17, 1977

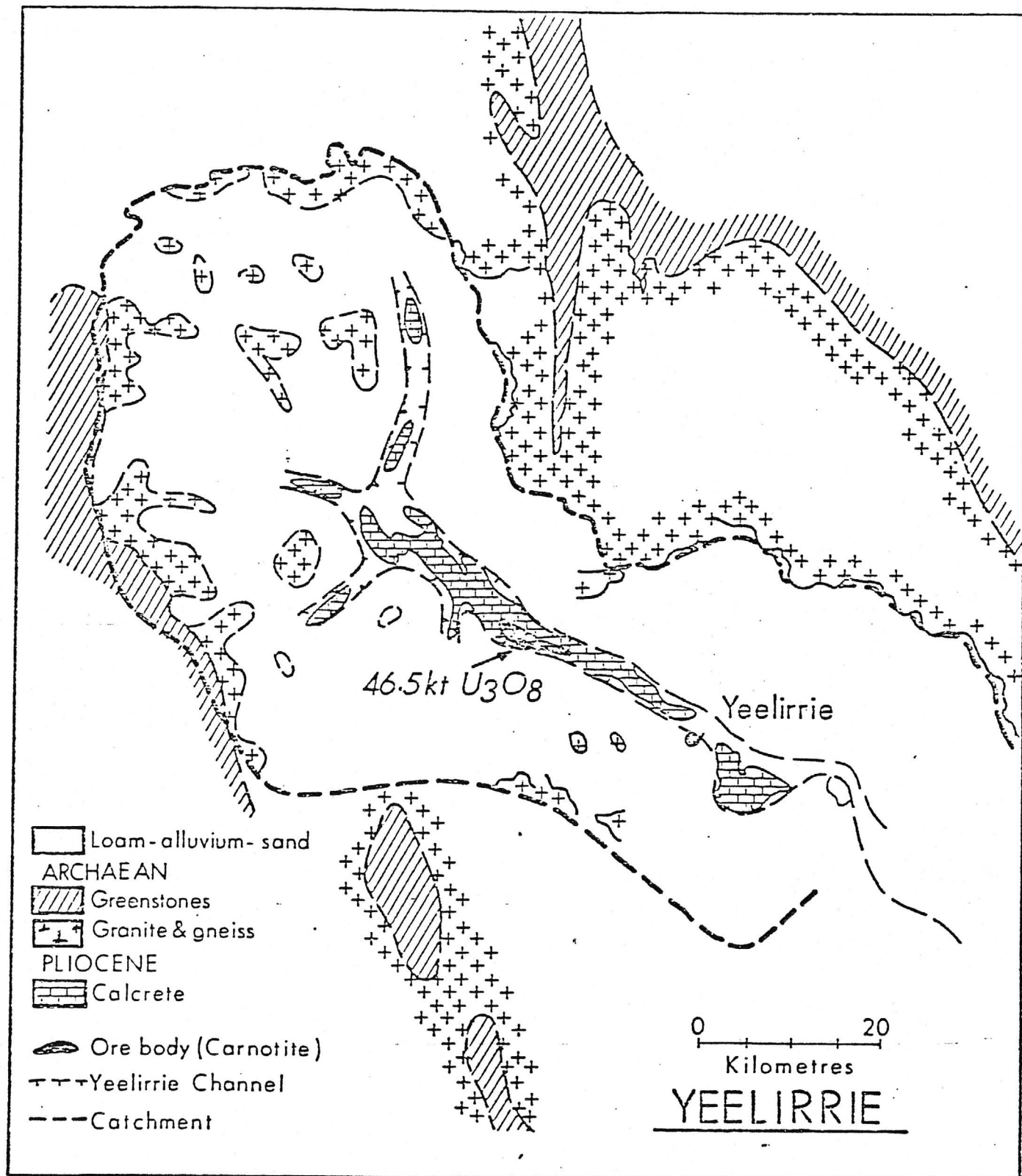


Fig. 2 Yeelirrie Geology

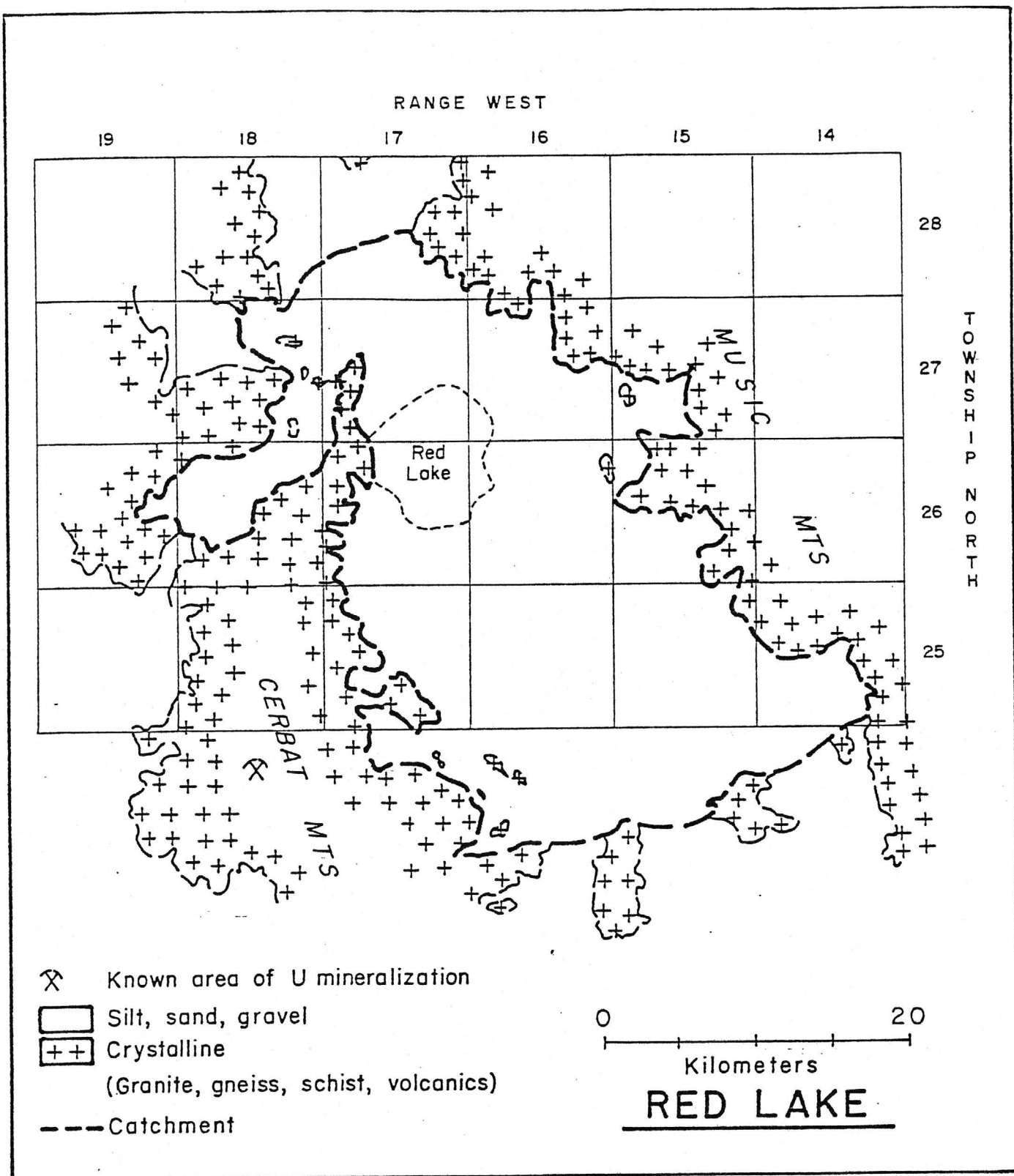


Fig.3 Red Lake Geology

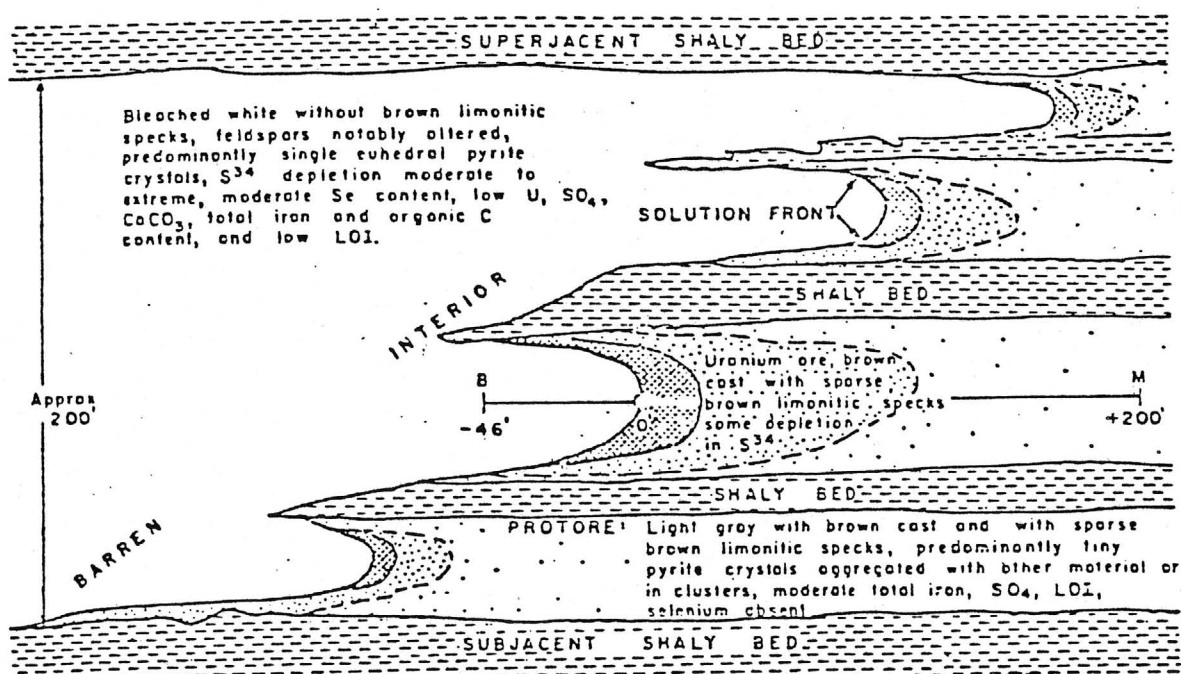
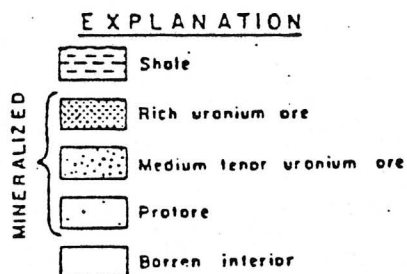


Fig. 4 Idealized cross section of solution front, Gas Hills, Wyoming.

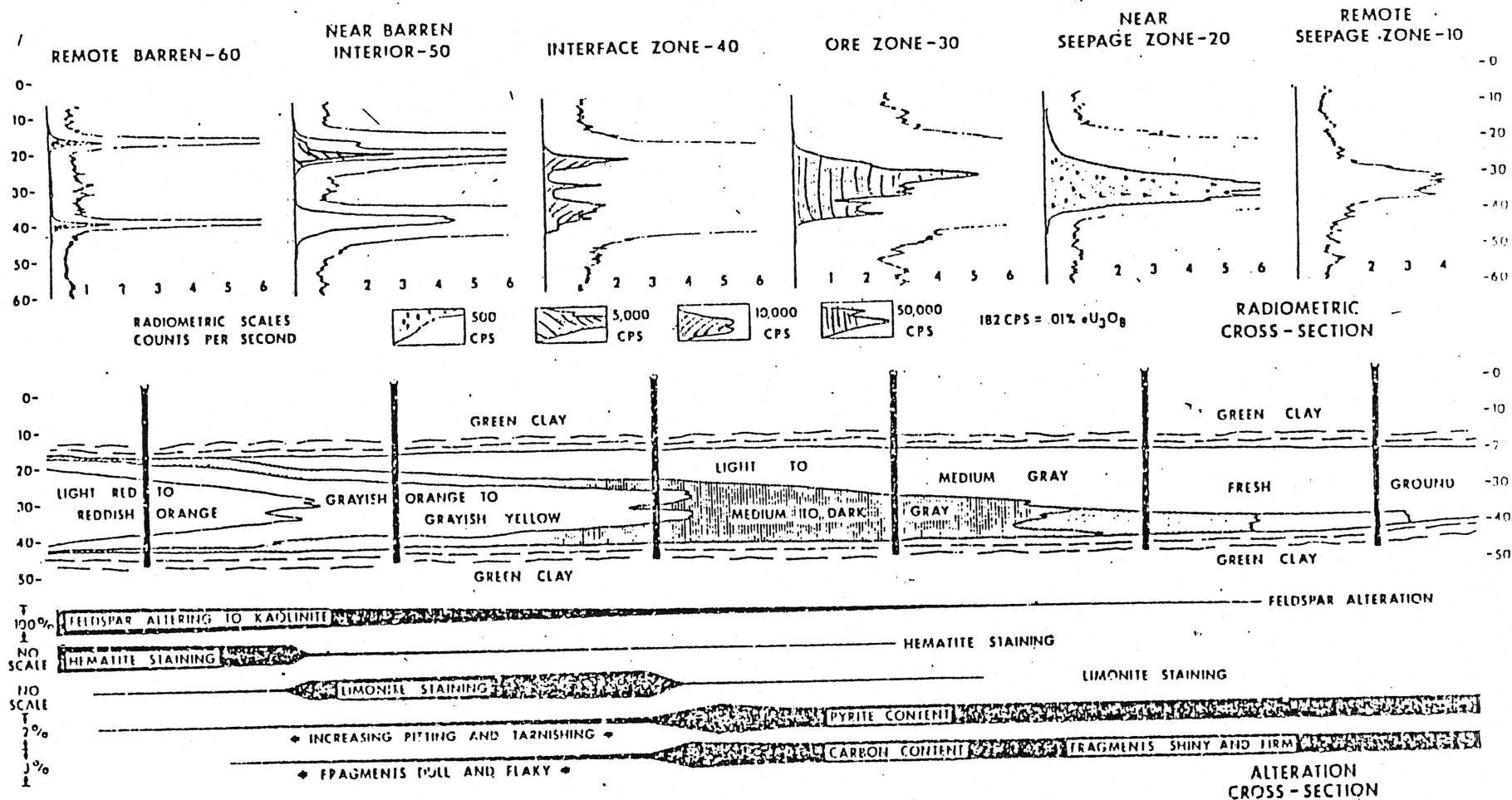


Fig. 5

- FOOTNOTES -

- (1) Arizona Zinc and Lead Deposits, Part 1, Arizona Bureau of Mines, April 1950, Page 139
- (2) Preliminary Report on Uranium Bearing Deposits in Mohave County, Arizona, A.E.C. Report RME-4026
- (3) Basic Hydrologic Data of the Hualapai, Sacramento, and Big Sandy Valleys, Mohave County, Arizona, Water-Resources Report No. 26, Arizona State Land Department, March 1966
- (4) Jim Vine, personal communications
- (5) Richard H. DeVoto lecture notes, Colorado School of Mines
- (6) Rubin, B., 1970, Uranium Roll-Front Zonation in the Southern Powder River Basin, Wyoming, Earth Sciences Bulletin, V.3, No. 4, Pages 5-12

A P P E N D I X



By: Roger D. Morton, Dept. of Geology, University of Alberta,  
Edmonton, Alberta, Canada.

## THE MAJOR URANIFEROUS DEPOSITS OF W. AND N. AUSTRALIA

The location of the major deposits and districts of W. and N. Australia are indicated in Figure 1, together with some basic comparative data to provide the geologist working in Saskatchewan with some scalar values concerning their distribution and magnitude. The following summaries will review the principal aspects of each deposit or district and outline the history of discovery. Wherever possible the current popular opinions concerning their geneses, expressed by the on-site company geologists and representatives of the Australian Bureau of Mineral Resources, will be summarized.

### 1. The Yeelirrie U-V Deposit, Western Australia (Western Mining Corp. Ltd.)

Situated 700 km NE of Perth, Near Wiluna, the Yeelirrie deposit was discovered on the basis of an anomaly detected during a government airborne scintillometric survey. The anomaly was not recommended for further investigation by the government agency as it was presumed to have been due to  $^{40}\text{K}$  only. However, the crew of the Western Mining Corp. Ltd. who were investigating similar anomalies further to the west recognized it as being possibly due to a potassium bearing, uraniferous-vanadiferous calcrete deposit. In 1972 Western Mining Corp. announced the discovery of a U-V orebody

carrying 46 k tonnes  $U_3O_8$ ; 24 k tonnes were contained in ore of grades exceeding 0.36%  $U_3O_8$ . The present reserves (at <\$33 kg, i.e. \$15/lb.  $U_3O_8$ ) are stated to be 46.5 k tonnes  $U_3O_8$  contained in an orebody with 30 million tonnes with an average grade of 0.15%  $U_3O_8$ .

The deposit is situated on the NE side of the Archean Yilgarn Block on the Great Western Australian Plateau, within an area underlain by granitic intrusives, granitic gneisses and greenstone belts; see fig. 2. The plutons are biotite adamellites, accompanied by pegmatites, aplites and quartz veins, all of which grade peripherally into granitic cataclasites with sheared pegmatites and quartz veins. The granitic rocks are often kaolinized and have been deeply weathered to produce lateritic deposits and silcretes.

The Yeelirrie sector belongs to the Salt Lake physiographic district which is characterized by internal drainage and abundant salt lakes and clay pans. Two plateaux have been distinguished:

- (i) The 'old' plateau, or paleoregolith which was developed when deep lateritic weathering followed a Cretaceous marine retrogression.
- (ii) The 'new' plateau which represents a Miocene-Pliocene rejuvenation and erosional phase which was followed by the present arid climatic conditions. In this case all the broad, meandering valleys are now choked with detritus and are dotted with evaporated salt lakes.

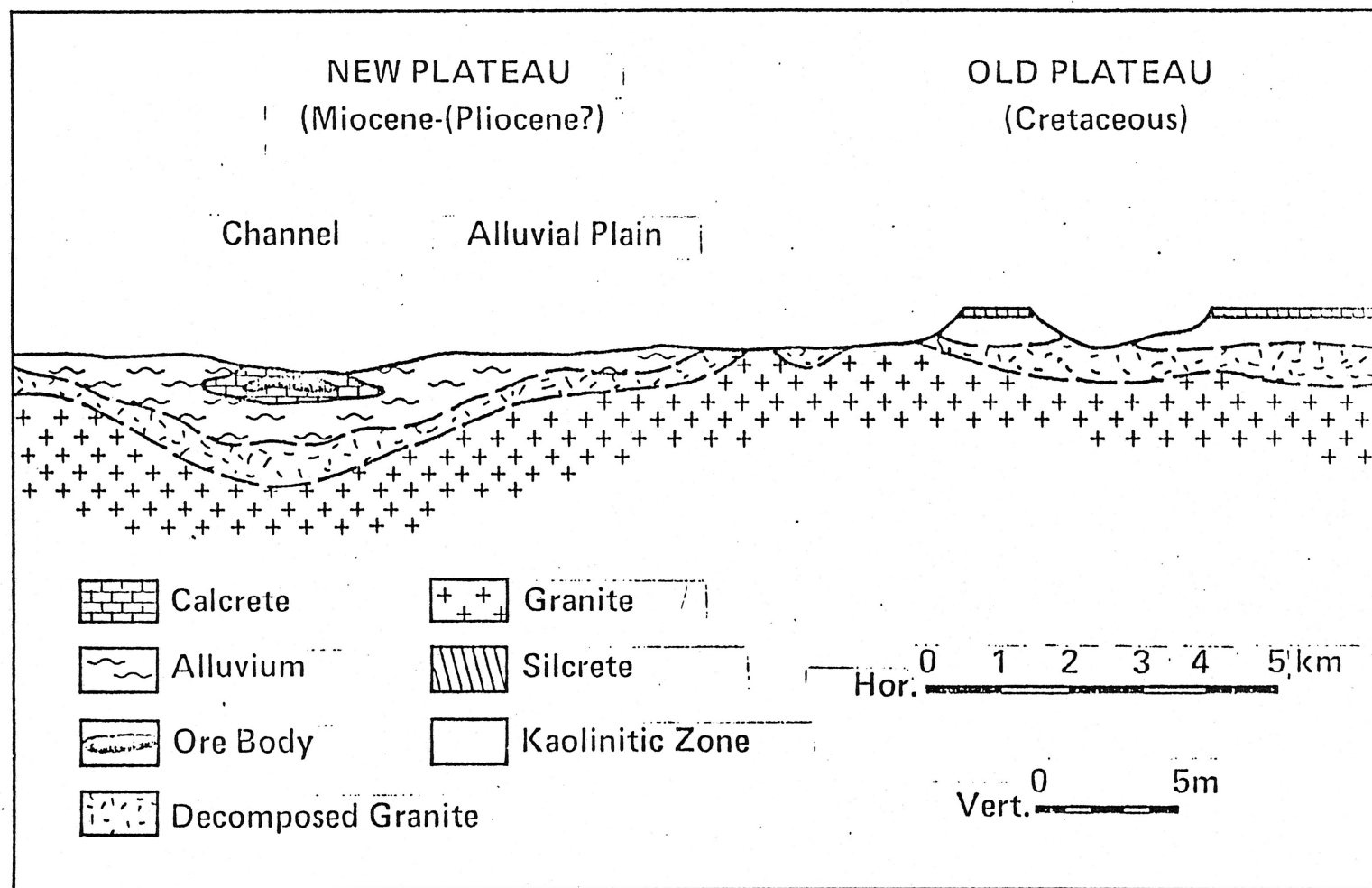


Fig. 3 Yeelirrie Cross section

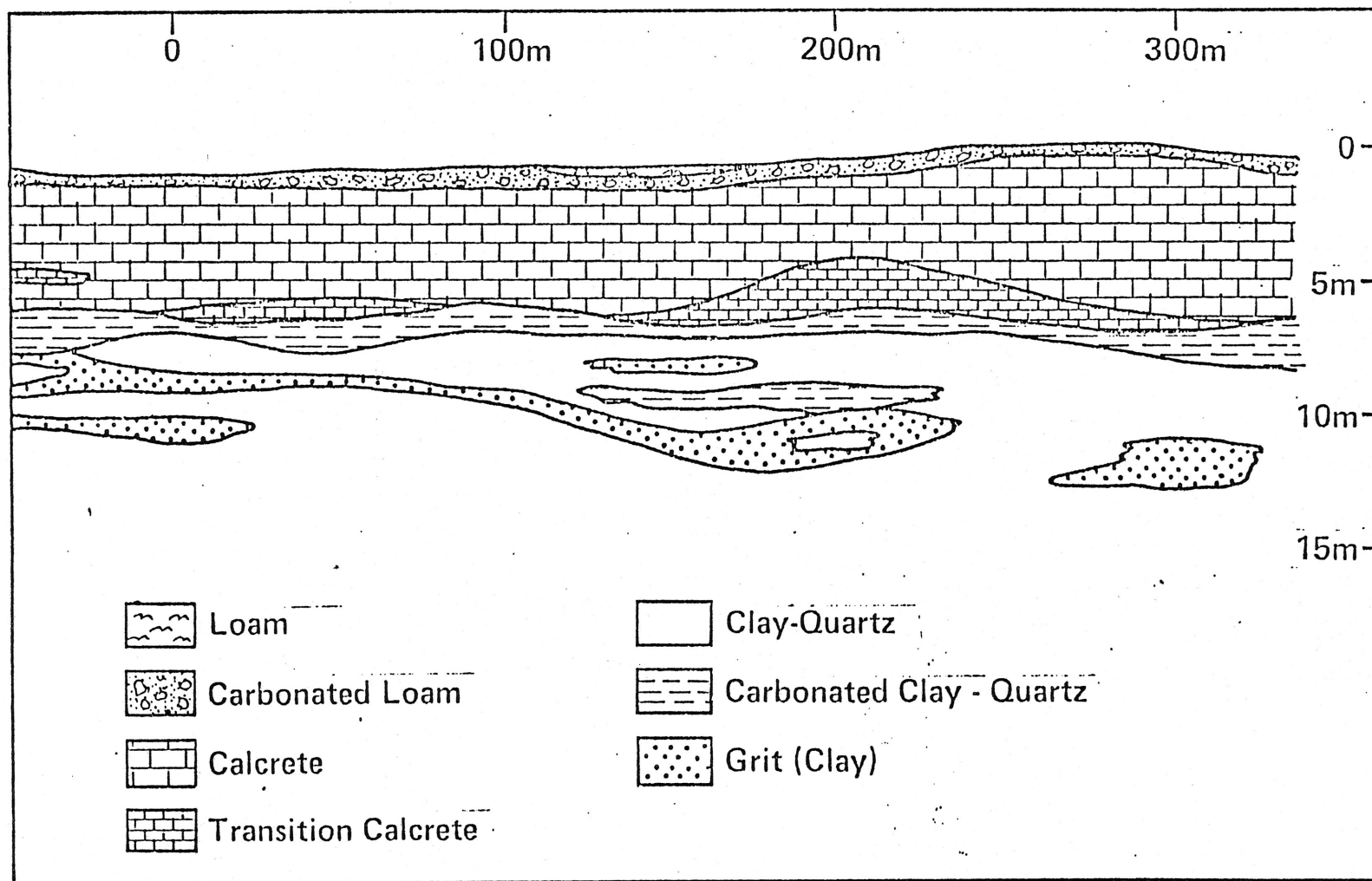


Fig. 4 Yeelirrie Cross section

The relationships are illustrated in figure 3.

The valley-fill detritus is composed of up to 30 m of fluvial clays with intercalated arkosic grit bands with occasional aeolian sand lenses. The surfaces of the alluvial deposits are commonly cemented by carbonates or silica to produce a hardpan. The evaporated lakes are underlain by up to 85 m of clays and loams overlain by sulfates and halite deposits.

Within the upper sections of the valley-fill profiles, occasionally uraniferous-vanadiferous. Pliocene(?) calcrete deposits commonly replace the detrital materials or occur interstitial to them; see figure 4. These lensoid calcretes are up to 6.5 km in width and up to 20 m thick.

Many compositional varieties of calcrete exist and textures range from banded and porcellaneous in the lower parts of the sections to nodular, pisolitic or cavernous in the upper sections. Most of the calcretes contain some angular, red claystone fragments. The calcretes are composed of abundant, fine-grained dolomite, lesser amounts of calcite, smectites (montmorillonite) and kandites (kaolinite) with minor amounts of gypsum, celestite and altered feldspars. The transition from calcrete to the underlying pelitic detritus (the so-called "clay-quartz unit") is gradual and thus a more calcite-rich "transition zone" is commonly identified.

The underlying "clay quartz unit" is composed of kandites

(kaolinite) and quartz with minor clay micas (illite), smectites (montmorillonite) and weathered feldspars.

The uranium-vanadium minerals associated with the calcretes occur in 3 different associations:

- (i) Coating cavities within the cavernous, nodular and pisolitic varieties of calcrete.
- (ii) Filling veinlets and coating fracture (joint or fault) surfaces in all varieties of calcrete.
- (iii) Disseminated through the underlying 'clay-quartz' detrital unit.

The assemblage observed within the ores is very fine-grained, euhedral to cryptocrystalline carnotite ( $K(UO_2)_2(VO_4)_2 \cdot 3H_2O$ ) with clays and silica. This association is found within an orebody 6 km x 0.5 km having an average depth of 8 m, easily accessible to open pit mining; see Plate 1.

It is probable that the epigenetic(?) carnotite deposit was developed by evaporative processes from U-and V-bearing groundwaters after the calcification of the detrital sediments. The U may have been derived from the deeply weathered kaolinized granitic suite and the V from the nearby greenstones.

## 2. The Nabarlek U Deposit, Northern Australia (Queensland Mines Ltd.)

Situated in Arnhem Land, some 270 km E of Darwin, this

L. Evaporative Environment

1. In oxidizing ground waters, evaporation causes precipitation
  - a. by increased U content
  - b. by  $\text{CaCO}_3$  or  $\text{CaSO}_4$  removal
2. Red Desert Basin schroederite deposits (Fig. 147)
3. contributive to carnotite  $\text{K}_2(\text{UO}_2)_2(\text{VO}_4)_2 \cdot \text{M}_2\text{O}$  in caliche or calcrete deposits
4. Yeelirrie, W. Australia (Fig. 148)
  - a. carnotite in calcrete
  - b. caliche soil in alluvial channel
  - c. 10-30 feet thick, 4 miles long
  - d. 100 million # $\text{U}_3\text{O}_8$ , 0.15% average grade
  - e. evaporitic soil
    1. evaporative concentration of U and V, therefore exceed solubility
    2. ground water from slightly reducing (below water table) to oxidizing environment (in vadose zone) causing insoluble carnotite to precipitate (Fig. 17)
    3. calcite precipitation,  $\text{CO}_2$  loss, less U can be complexed as uranyl dicarbonate
5. Evaporative environment, favorable factors
  - a. arid-subarid climate
  - b. confined drainage
  - c.  $\text{CO}_3^{=}$  source
  - d. U (and V) source



SCHUMBERGER

SONG LOG

GAMMA RAY

COMPANY EL PASO NATURAL GAS COMPANY

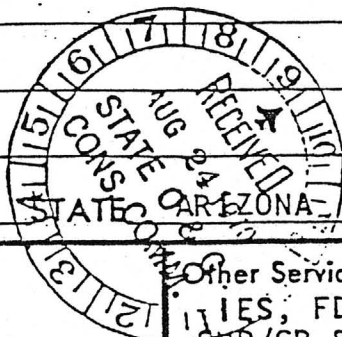
WELL RED LAKE #1

FIELD WILDCAT

COUNTY MOHAVE

LOCATION SW/4

Sec. 22 Twp. 26N Rge. 16W

Other Services:  
IES, FDC/GR,  
SNP/GR & HDT

ment Datum: GL, Elev. 2804  
 easured From DF, 10 Ft. Above Perm. Datum  
 ing Measured From DF

Elev.: K.B. --  
 D.F. 2814  
 G.L. 2804

No.	7/12/70		8/1/70		
	ONE	TWO			
Driller	1700	5994			
Logger	1695	5857			
Log Interval	1685	5855			
og Interval	210	1686			
Driller	12 3/4 @ 39	7" @ 691	@	@	
g-Logger	39	1686			
ie	9 7/8	6 1/4			
Fluid in Hole	FGM	SALT MUD			
Visc.	9.8	39	10.0	32	
Fluid Loss	--	-- ml	--	-- ml	ml
ce of Sample	FLOW LINE	FLOW LINE			
@ Meas. Temp.	1.15 @ 95 °F	.038 @ 80 °F	@	@	°F
@ Meas. Temp.	.97 @ 95 °F	.42 @ 70 °F	.019 @ 155 °F	@	°F
@ Meas. Temp.	-- @ -- °F	-- @ -- °F	@	@	°F
ce: R <sub>mf</sub> R <sub>mc</sub>	M --	M --			
@ BHT	-- @ -- °F	.02 @ 155 °F	@	@	°F
Since Circ.	4 HRS.	7 HRS.			
Rec. Temp.	TLTM °F	155 °F			°F
p. Location	3860 FARM	3860 FARM			
ded By	ROBERTSON	OREN			
ssed By	MR. MORRIS	MR. MORRIS			

The well name, location and borehole reference data were furnished by the customer.

FOLD HERE

REMARKS W.I. #07924

Changes in Mud Type or Additional Samples

Scale Changes

Date	Sample No.	Depth	Type Log	Scale Up Hole	Scale Down Hole
Depth—Driller					
Type Fluid in Hole					
Dens.	Visc.				
ph	Fluid Loss				
Source of Sample					
R <sub>m</sub> @ Meas. Temp.					
D. @ Meas. Temp.					
Run No.	Tool Type	Tool Pos.	Other		



Type fluid in hole									
Dens.	Visc.								
ph	Fluid Loss	ml							
Source of Sample									
R <sub>m</sub> @ Meas. Temp.	@	°F	@	°F	Run No.	Tool Type	Pad Type	Tool Pos.	Other
R <sub>ml</sub> @ Meas. Temp.	@	°F	@	°F					
R <sub>mc</sub> @ Meas. Temp.	@	°F	@	°F					
Source: R <sub>ml</sub> R <sub>mc</sub>									
R <sub>m</sub> @ BHT	@	°F	@	°F					
R <sub>ml</sub> @ BHT	@	°F	@	°F					
R <sub>mc</sub> @ BHT	@	°F	@	°F					
C.D.: USED S.O.: UPPER CENTRALIZER & VCD-B-430 RUN 1 RUN 2 CENTERED									
Equip. Used: CART. No. 446-B 430-B									
PANEL No. 449-C 512-C									
SONDE No. 510-D 510-D									
CALIBRATION:	BACKGND.	SOURCE	GALV. INCR.	SENS. TAP	SENS. TAP	TIME	RECORDING		
	CPS.	CPS.	DIVISIONS	(FOR CAL.)	(RECORD)	CONST.	SPEED (FT./MIN.)		
GAMMA RAY:		SEE FDC/GR				2	30 RUN 1		
	100	500	8.25	500	500	1	60 RUN 2		
Velocity (feet per second) = $\frac{1,000,000}{\text{Interval Transit Time (microseconds per foot)}}$									

GAMMA RAY API UNITS		DEPTHS	INTERVAL TRANSIT TIME MICROSECONDS PER FOOT		
0	250		T <u>3</u> R <sub>1</sub> <u>2</u> R <sub>2</sub>		
250	500		140	90	
				190	
CALIPER HOLE DIAM. IN INCHES					
8	10	12	14	16	18
9	11	13	15	17	

5"=100'

# GAMMA RAY

API UNITS

DEPTHS

# INTERVAL TRANSIT TIME

MICROSECONDS PER FOOT

0 250

250 500

140

T. 3 R. 2 R.

90

40

190

140

# CALIPER

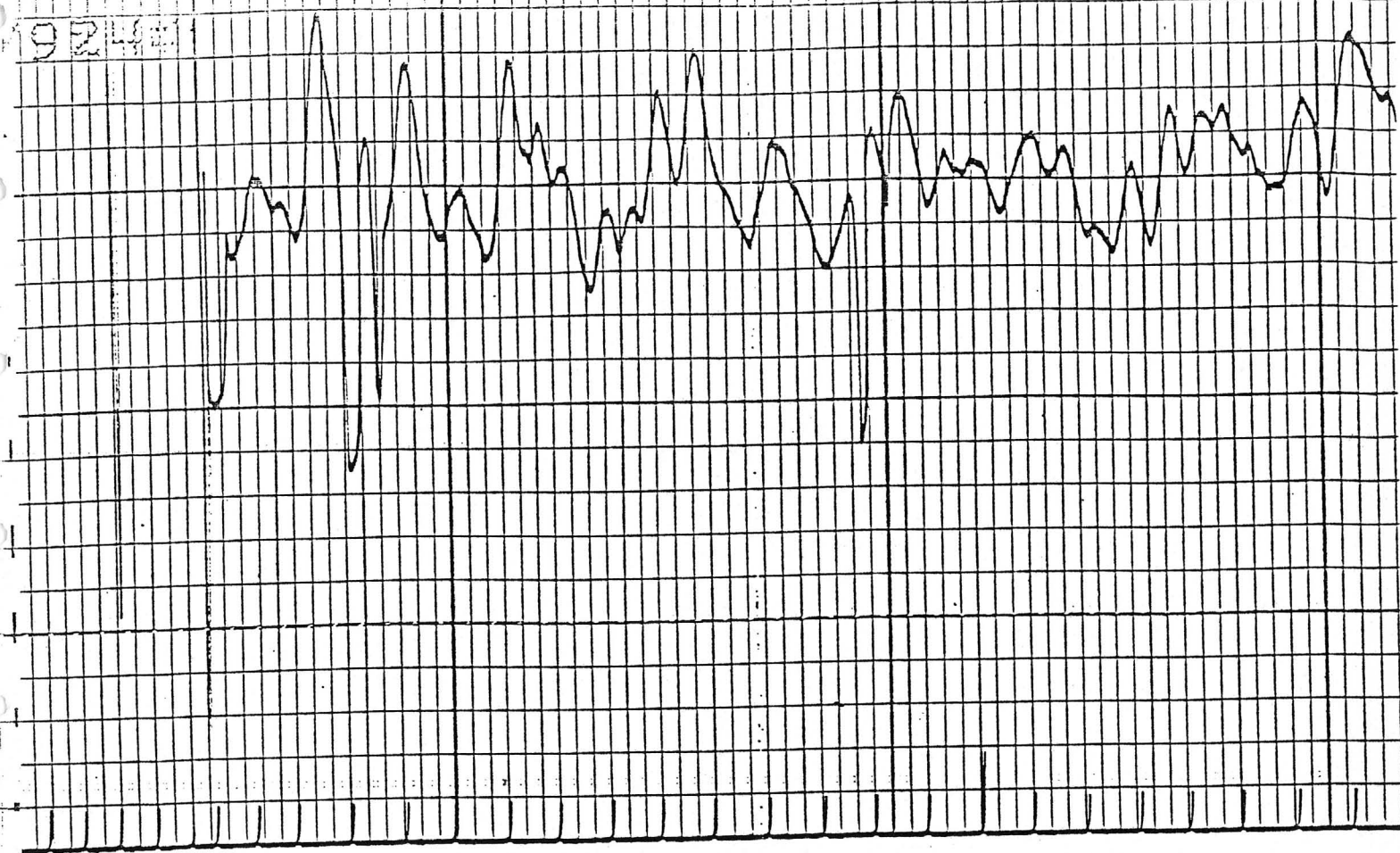
HOLE DIAM. IN INCHES

8 10 12 14 16 18

9 11 13 15 17

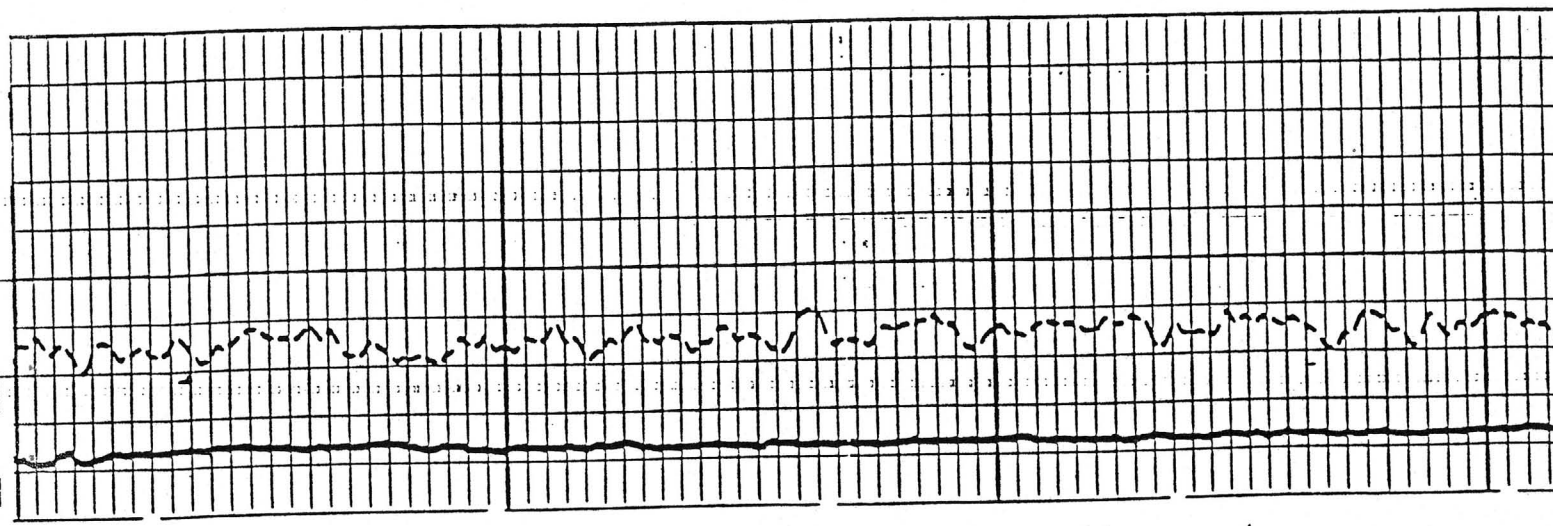
$$\% \text{ } U_3O_8 = \text{API units} \times 2.81 \times 10^{-5}$$

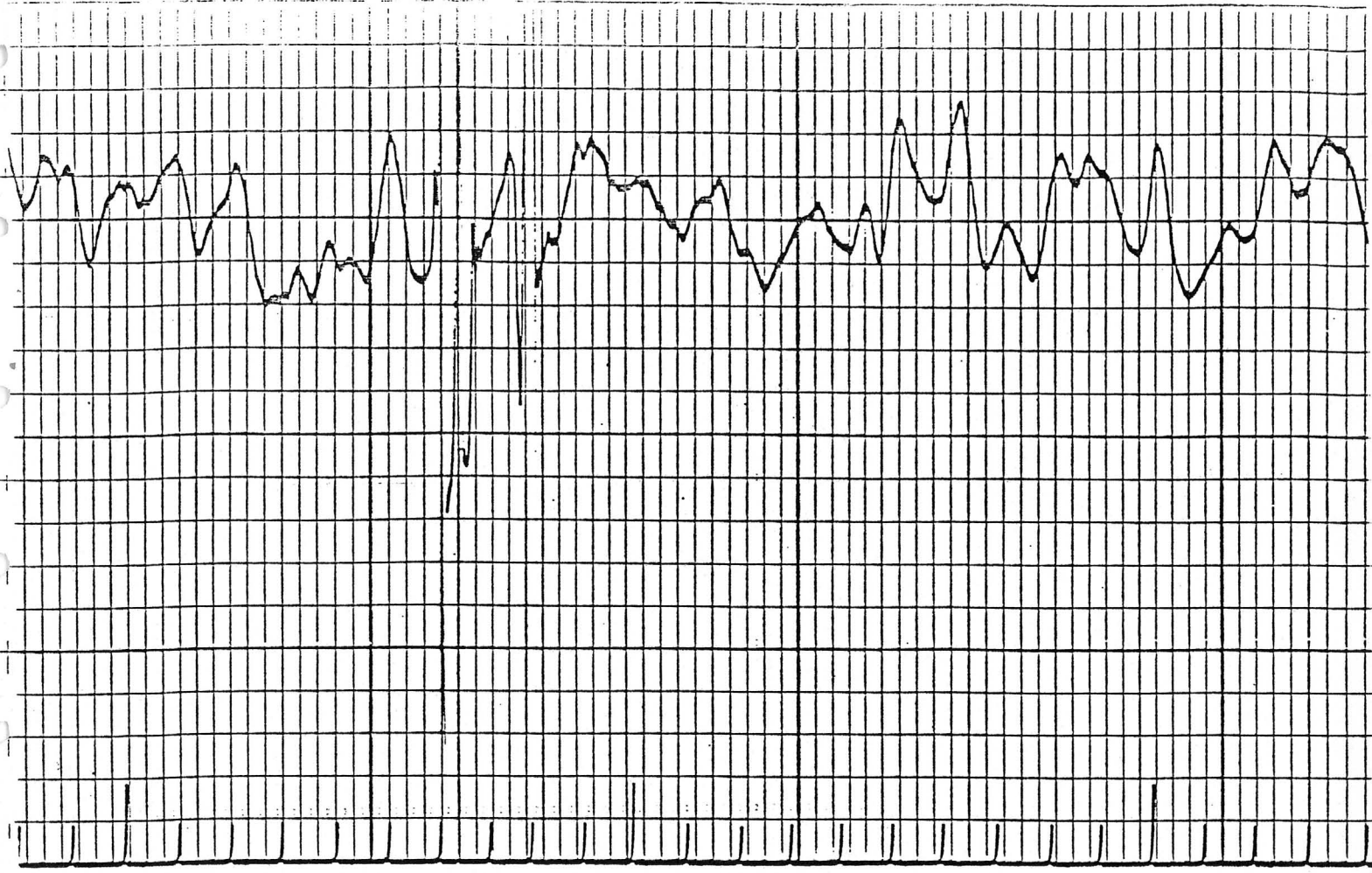
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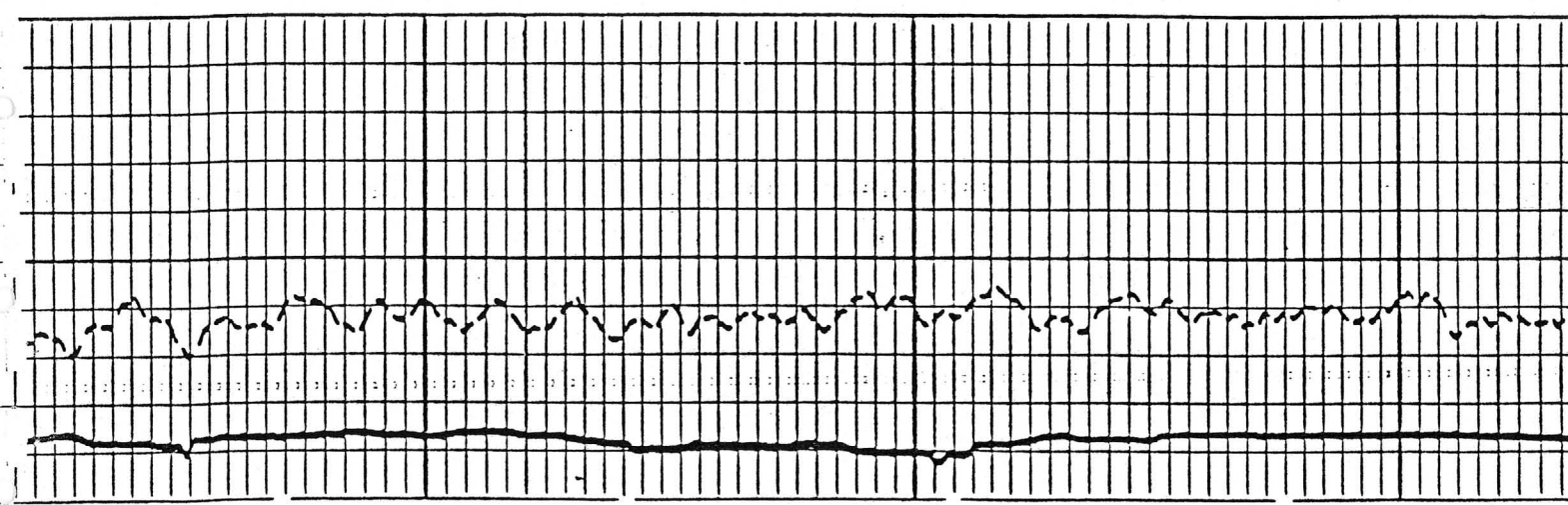
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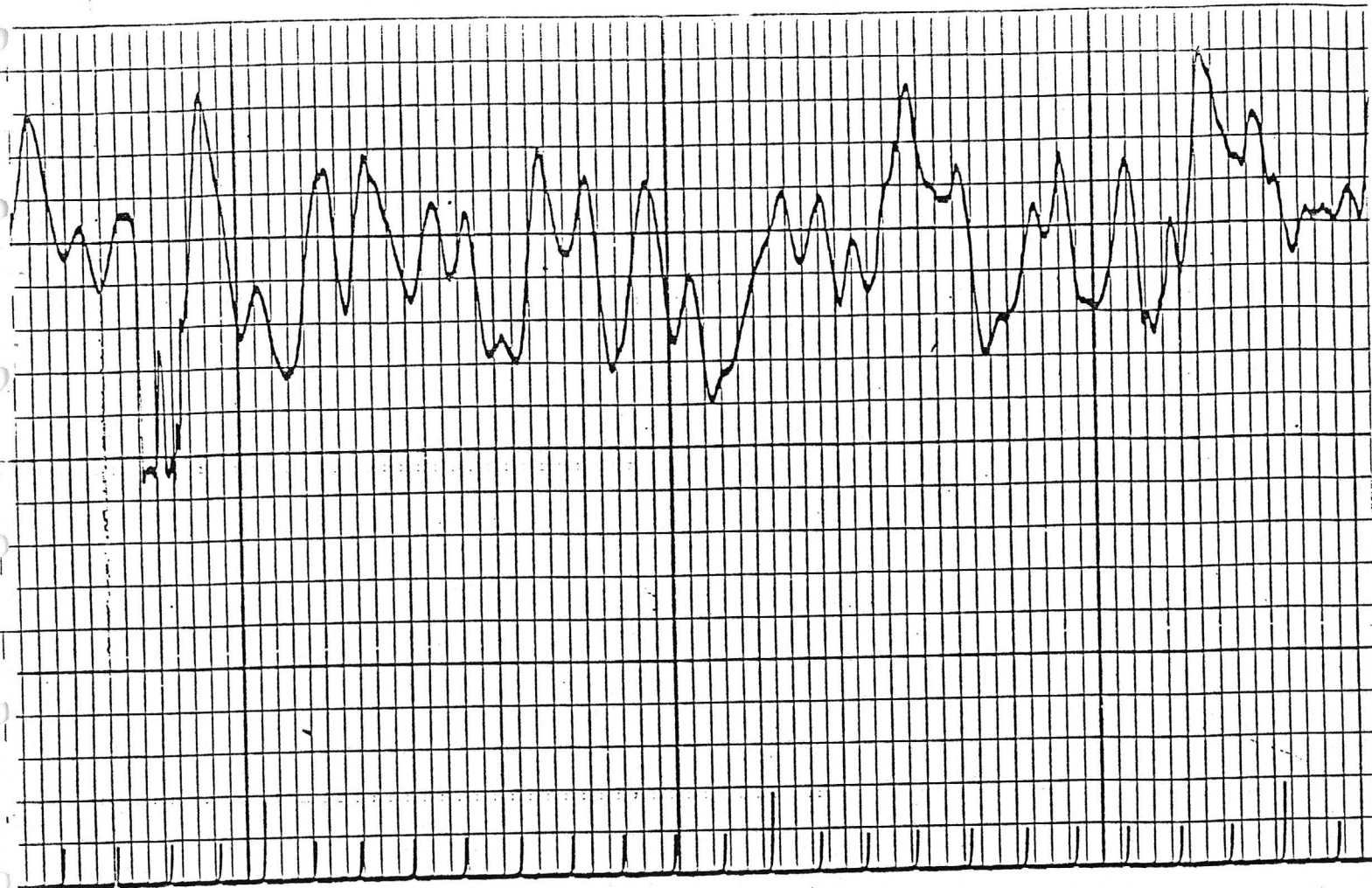


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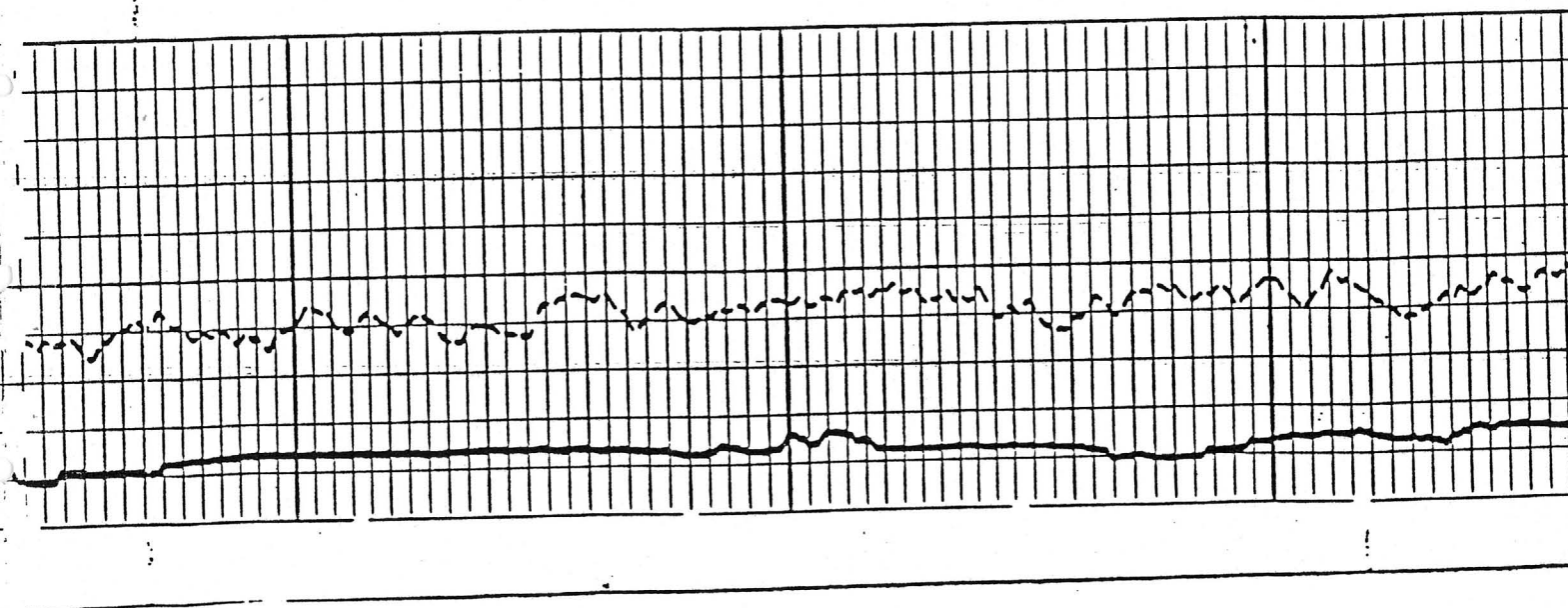
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0700

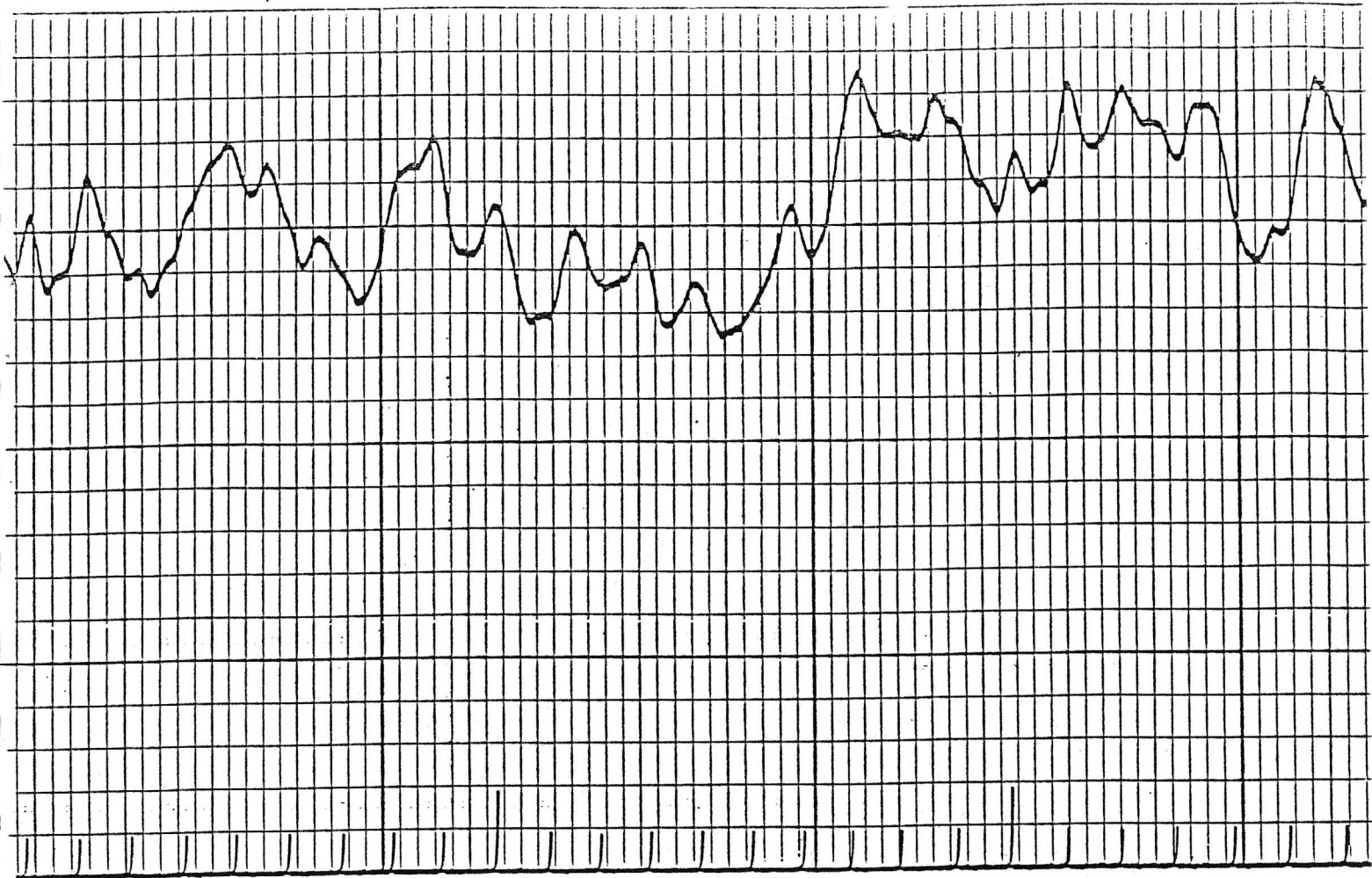




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0900



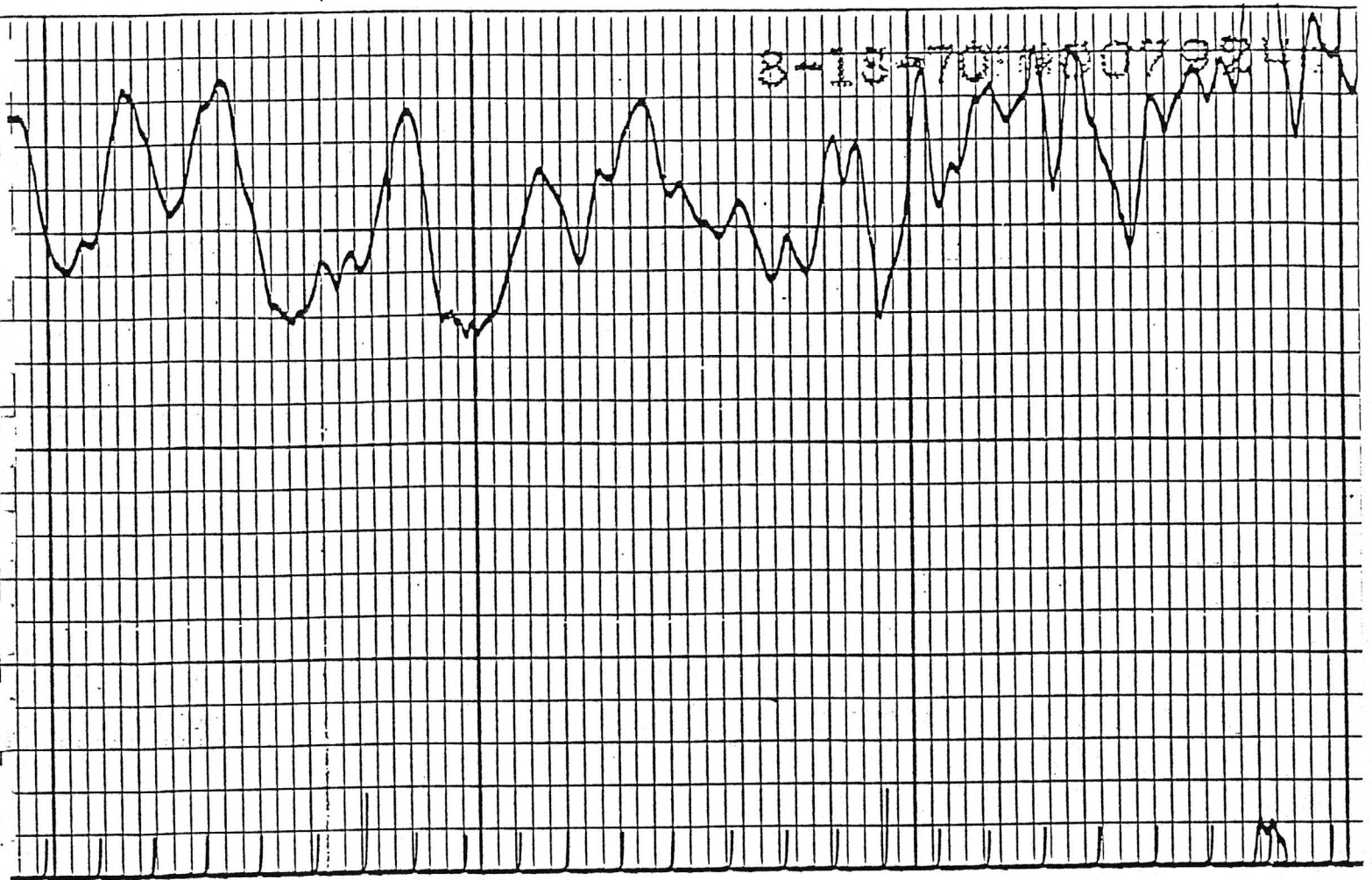


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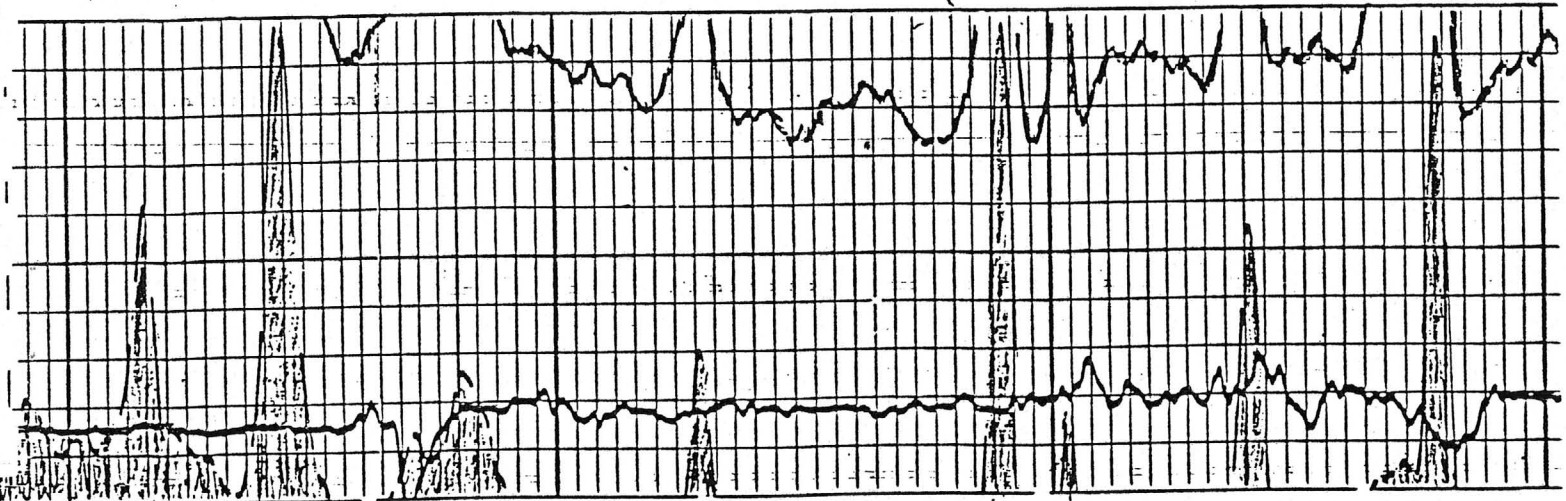




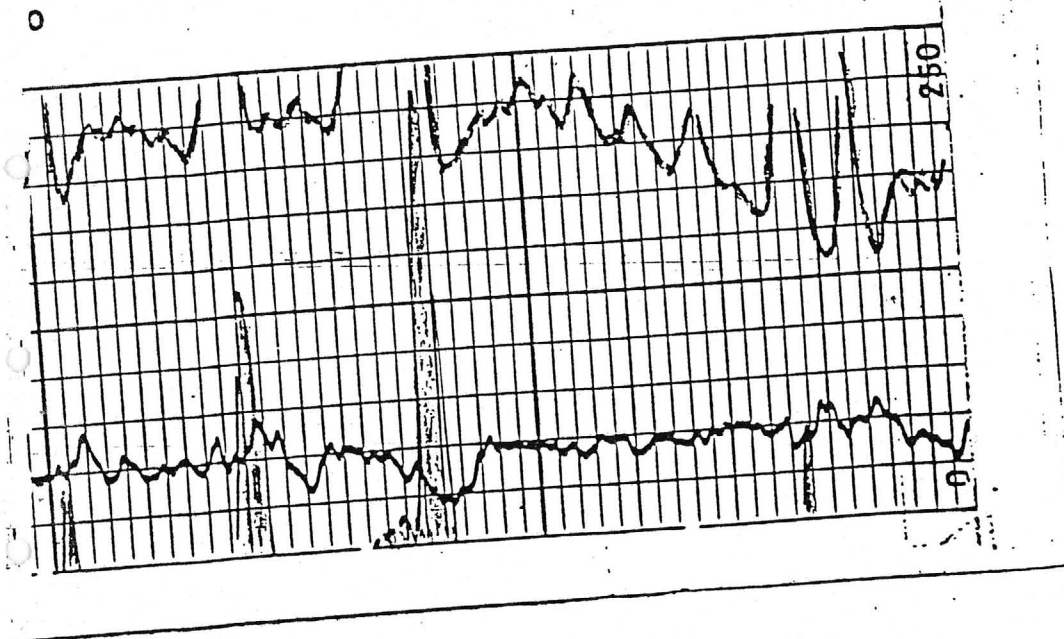
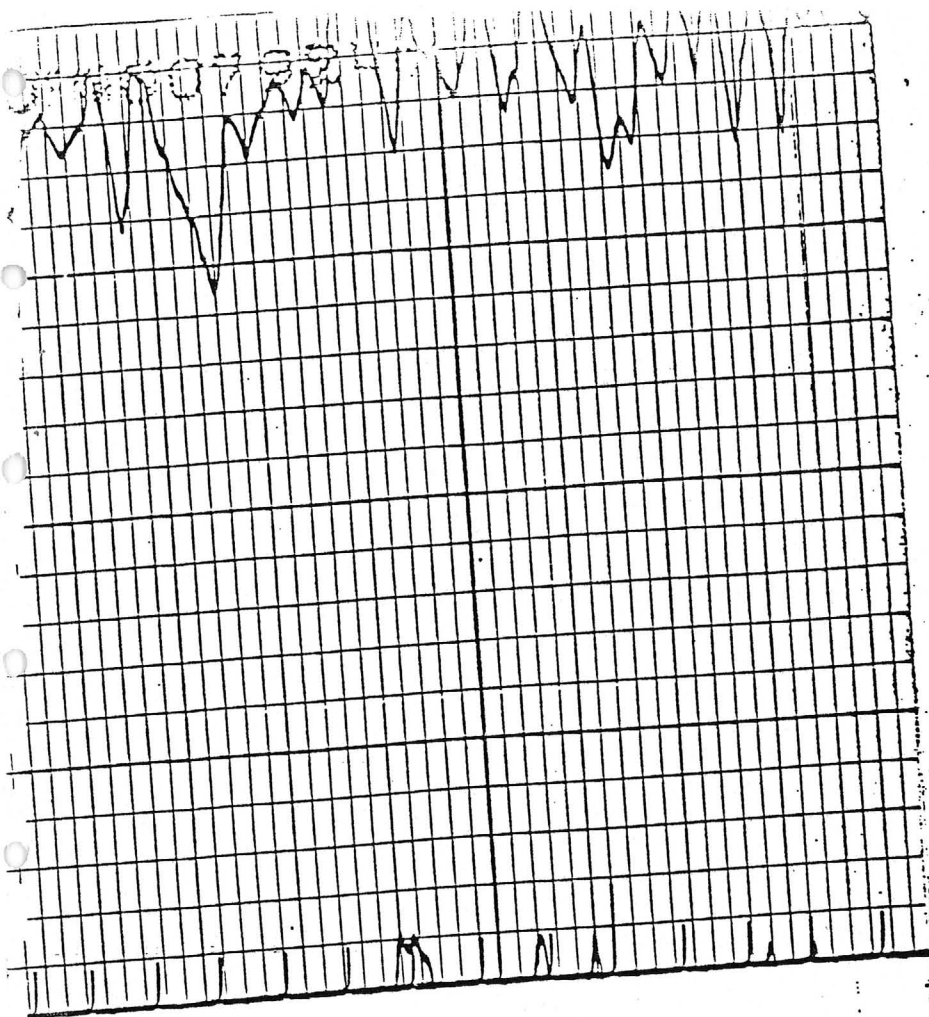


1100

1200







# SCHLUMBERGER WELL SURVEYING CORPORATION

HOUSTON, TEXAS

8-3

SCHLUMBERGER

Gamma Ray - Neutron

COMPANY KERR MCGEE OIL

INDUSTRIES INC.

WELL R. L. NO. 1

FIELD RED LAKE

LOCATION 30-26N-16W

100' FSL + 100' FEL

COUNTY MOJAVE

STATE ARIZONA

Other Surveys

Location of Well  
30-26N-16W.

M-d

Elevation: D.F.:  
K.B.: 2743  
or G.L.: NA

FILING No.

Depths Measured From GL Ft. above

RUN NO.

-1- GAMMA RAY

-1- NEUTRON

3-24-58

3-24-58

Reading

2606

2606

Reading

0

0

Age Measured

2606

2606

x. Depth Reached

2608 (+135)

2608

m Driller

2609

2609

mum Temp. °F.

119

119

d Nature

SALT WATER

SALT WATER

Level

SURFACE

SURFACE

ing Size

4

in.

4

in.

ing Weight

lb.

0

to

1310

lb.

0

to

1310

ing Size

in.

in.

ing Weight

lb.

to

to

to

lb.

to

to

to

Size

3 1/2

in.

1310

to

2609

3 1/2

in.

1310

to

2609

ize

in.

in.

to

Counters Used

1

1

Equipment

GLAM-J

NLAM-J

Panel

GNP-C

GNP-C

Rig Time

4:00

5:00

ork No.

1720-FULLERTON

1720-FULLERTON

erver

WILLIAMS

WILLIAMS

iness

MIRACLE

MIRACLE

PANEL SENS. TAP. FOR CAL.

200  
1000

GALV. INCREASE DIVISIONS

120  
110

TEST SOURCE CPS

80  
550

REMARKS: CALIBRATION : BACKGROUND CPS

50

GAMMA RAY :

NEUTRON :

2.3-C 14"

NEUTRON

STANDARD COUNTS/SECOND

500

CASING  
COLLARS

GAMMA RAY

MICROGRAMS RA-EQ/TON

MICROGRAMS RA-EQ/TON

500

STANDARD COUNTS/SECOND

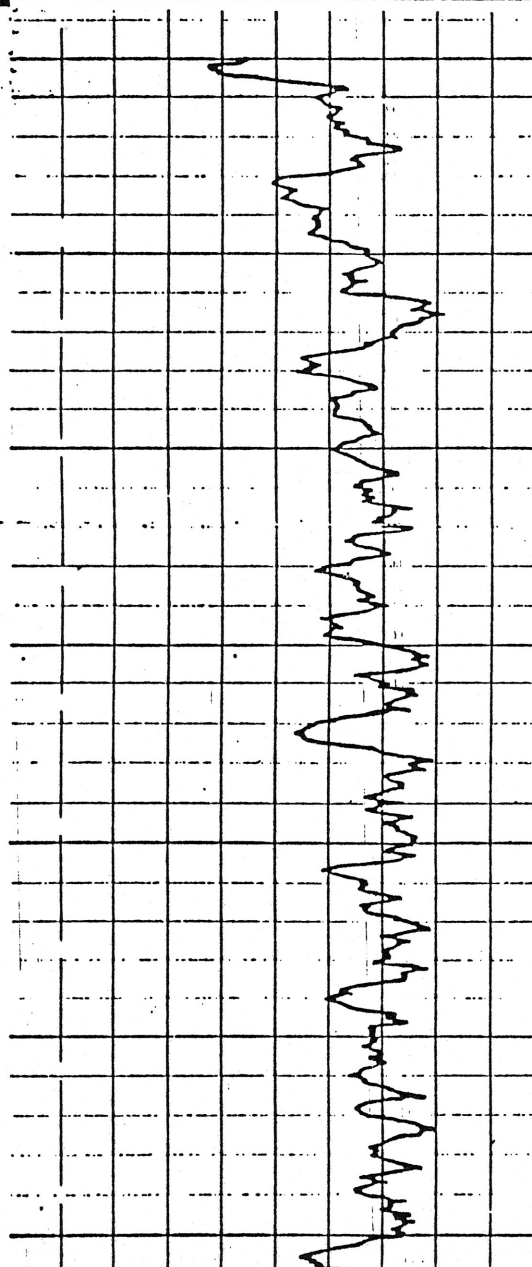
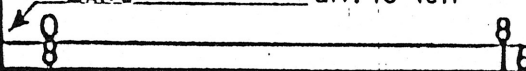
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INTERVAL: 2606 to 0

Sens. 200 T.C. 4

Logging Speed 17 ft./min.

ZERO 0 div. to left



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1 0100

0200

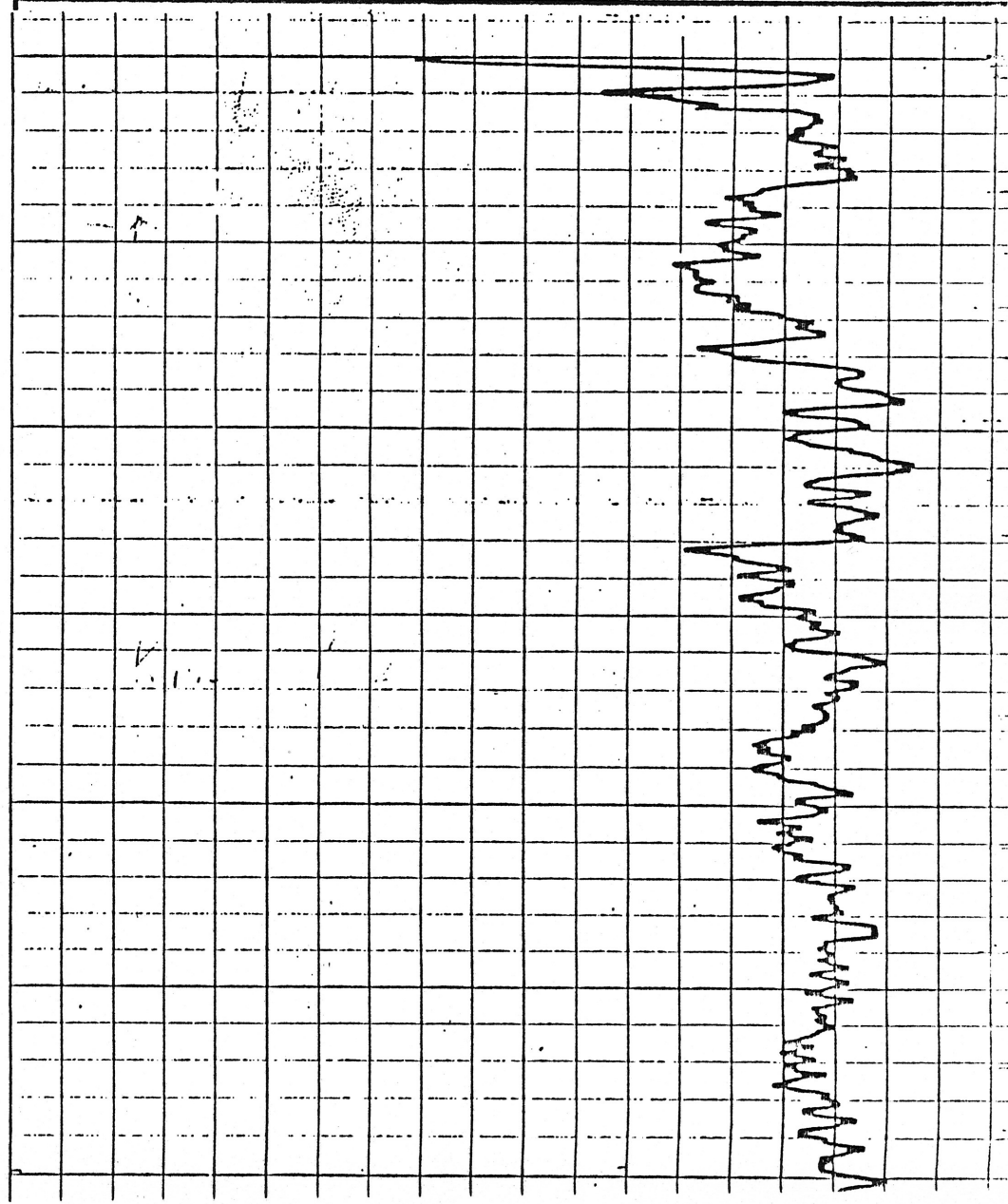
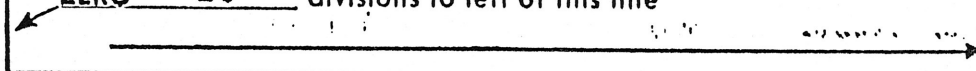
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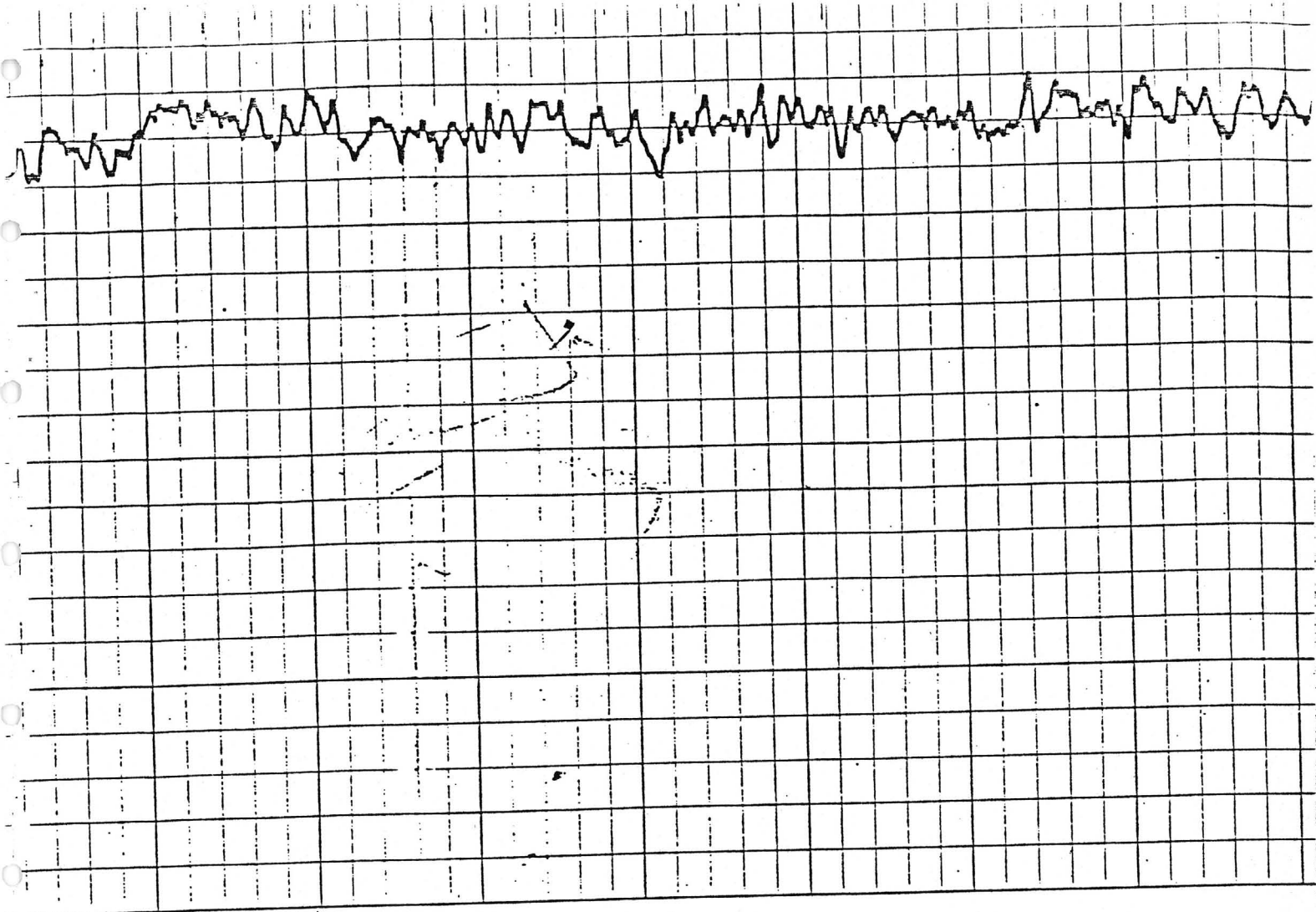
INTERVAL: 2606 to 0

Sensitivity 500 Time Constant 2

Logging Speed 33 ft./min.

ZERO 20 divisions to left of this line



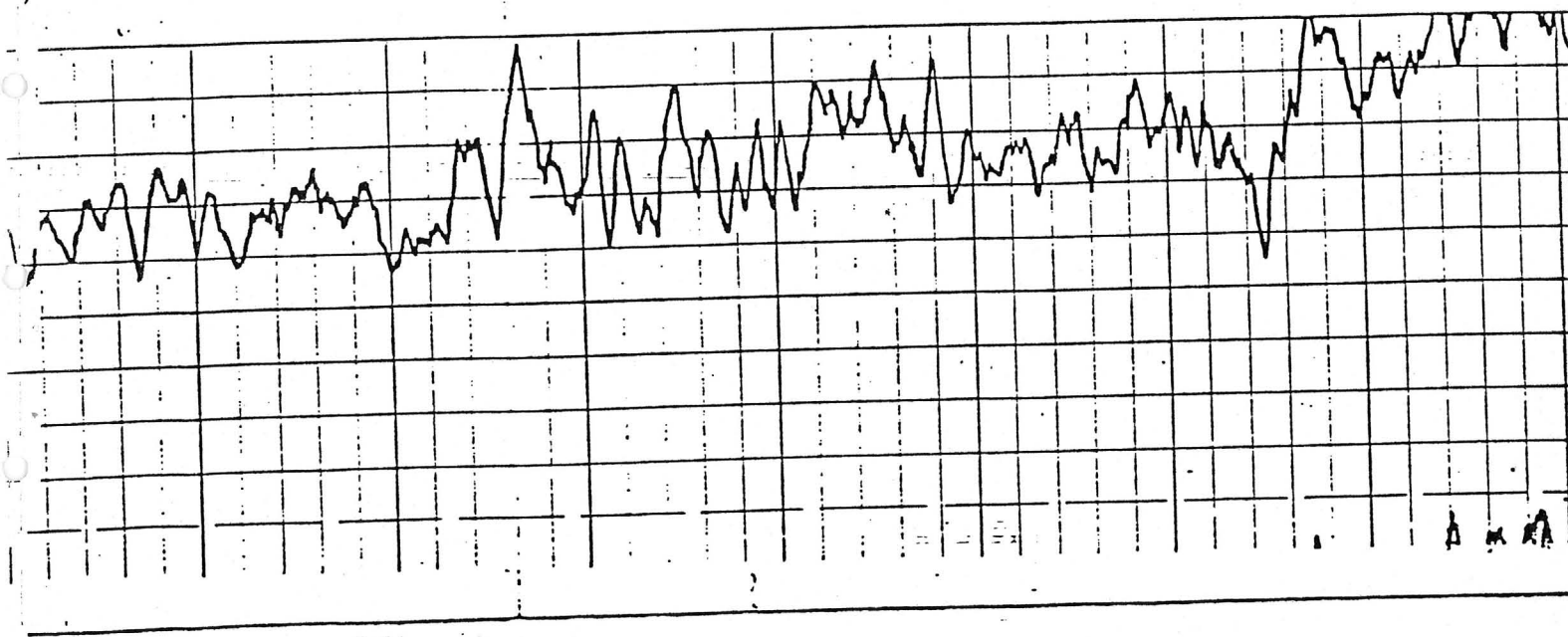


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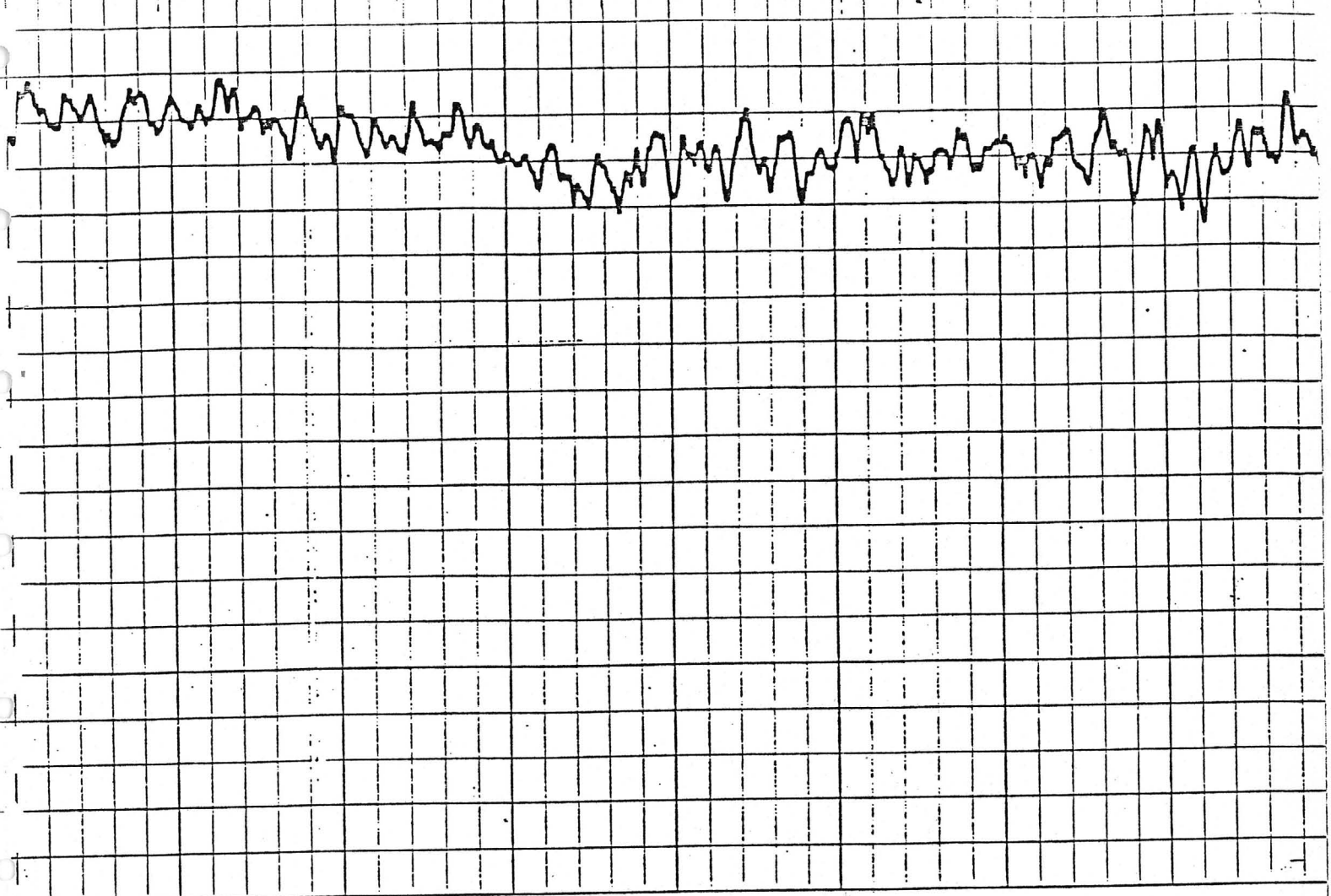
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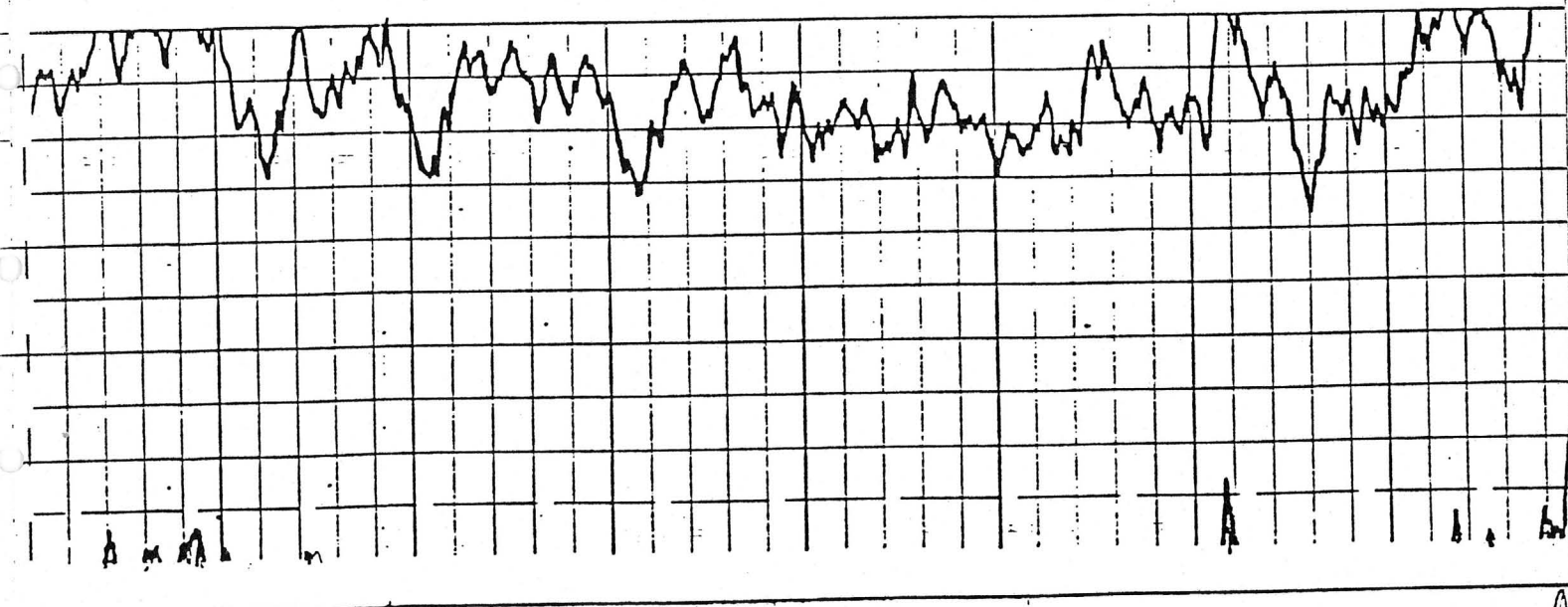


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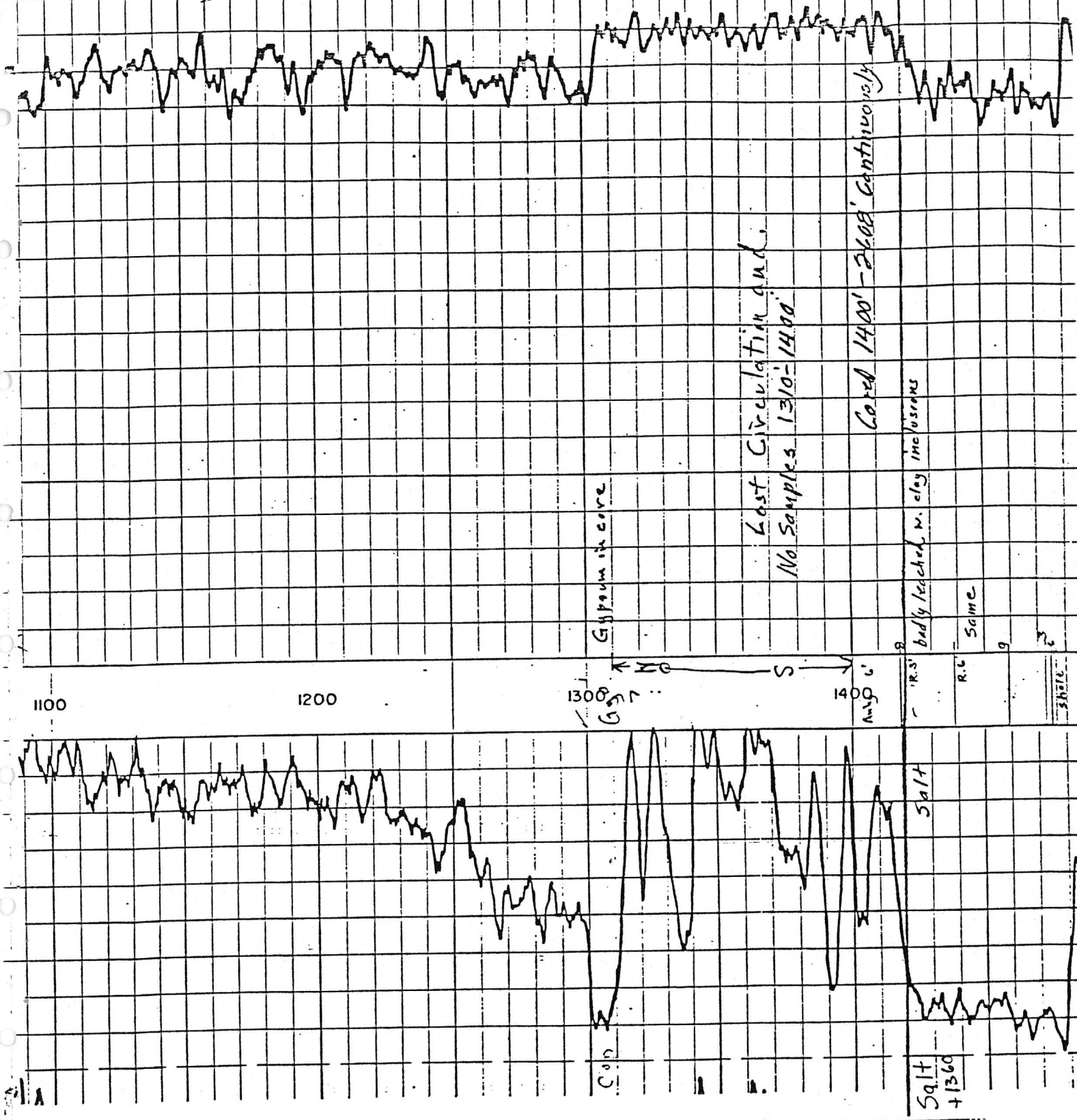
0800

0900

1000



Amplitude ↑



# SCHLUMBERGER WELL SURVEYING CORPORATION

HOUSTON, TEXAS



*Gamma Ray - Neutron* **8-2**

JN  
FIELD or  
RED LAKE  
LOCATION 28-26N-16W  
WELL R.L. NO. 2

COMPANY KERR MCGEE OIL  
INDUSTRIES, INC.

COMPANY KERR MCGEE OIL  
INDUSTRIES, INC.  
WELL R. L. NO. 2  
FIELD RED LAKE  
LOCATION 28-26N-16W  
NE NE 1  
COUNTY MOJAVE  
STATE ARIZONA

Other Surveys  
Location of Well  
**M-d**  
Elevation: D.F.:  
K.B.: 2817  
or G.L.:  
FILING No.

Log Depths Measured From GL Ft. above

RUN NO.	-I- GAMMA RAY	-I- NEUTRON
ate	4-29-58	4-29-58
rst Reading	2132	2132
ast Reading	0	0
otage Measured	2132	2132
ax. Depth Reached	2135	2135
ottom Driller	2135 + 482	2135
Maximum Temp. °F.	122	122
uid Nature	SALT WATER	SALT WATER
uid Level	SURFACE	SURFACE
Casing Size	4 in.	4 in.
Casing Weight	lb. 0 to 1439	lb. 0 to 1439
Casing Size	in.	in.
Casing Weight	lb. to	lb. to
nt Size	3 3/4 in. 1439 to 2135	3 3/4 in. 1439 to 2135
nt Size	in. to	in. to
No. Counters Used	ONE	ONE
Type Equipment	GLAM-J	NLAM-J
Type Panel	GNP-C	GNP-C
Oper. Rig Time	5:00	3:00
Truck No.	1720- FULLERTON	1720- FULLERTON
Observer	CREEL	CREEL
Witness	MIRACLE	MIRACLE

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REMARKS: CALIBRATION : BACKGROUND CPS TEST SOURCE CPS GALV. INCREASE DIVISIONS PANEL SENS. TAP. FOR C/  
GAMMA RAY : 50 80 120 200  
NEUTRON : 1.95C-16" 550 110 1000

CASING  
COLLARS

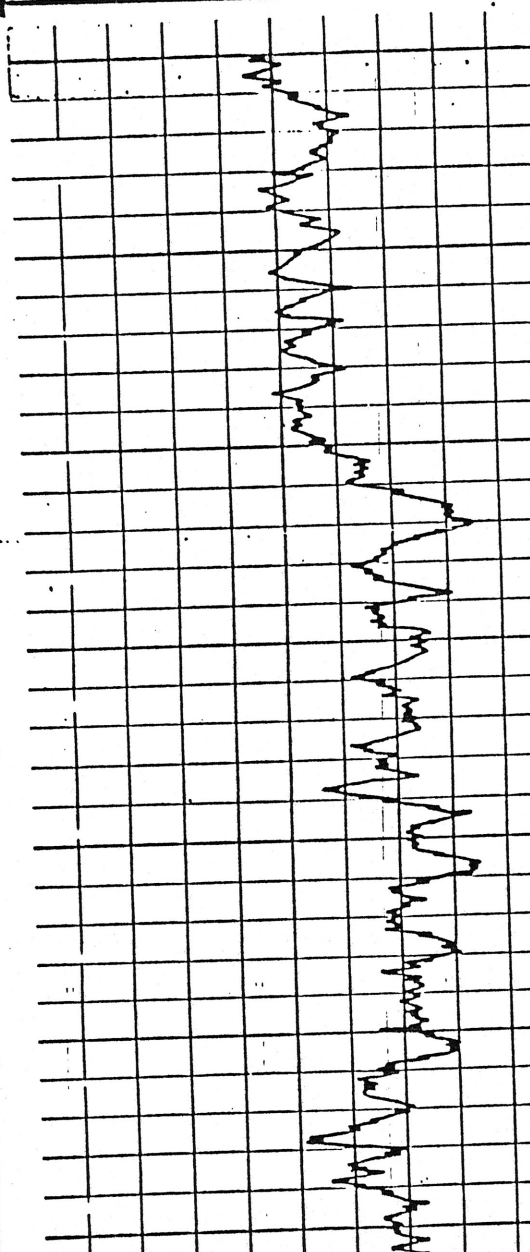
GAMMA RAY  
MICROGRAMS RA.FO.TON

NEUTRON

MICROGRAMS RA-EQ/TON

INTERVAL: 2132 to 0  
 Sens. 200 T.C. 4  
 Logging Speed 18 ft./min.  
 ZERO 0 div. to left

0 → 8



0000

Clay

Clay ss

Grv  
small

0100

Sst.

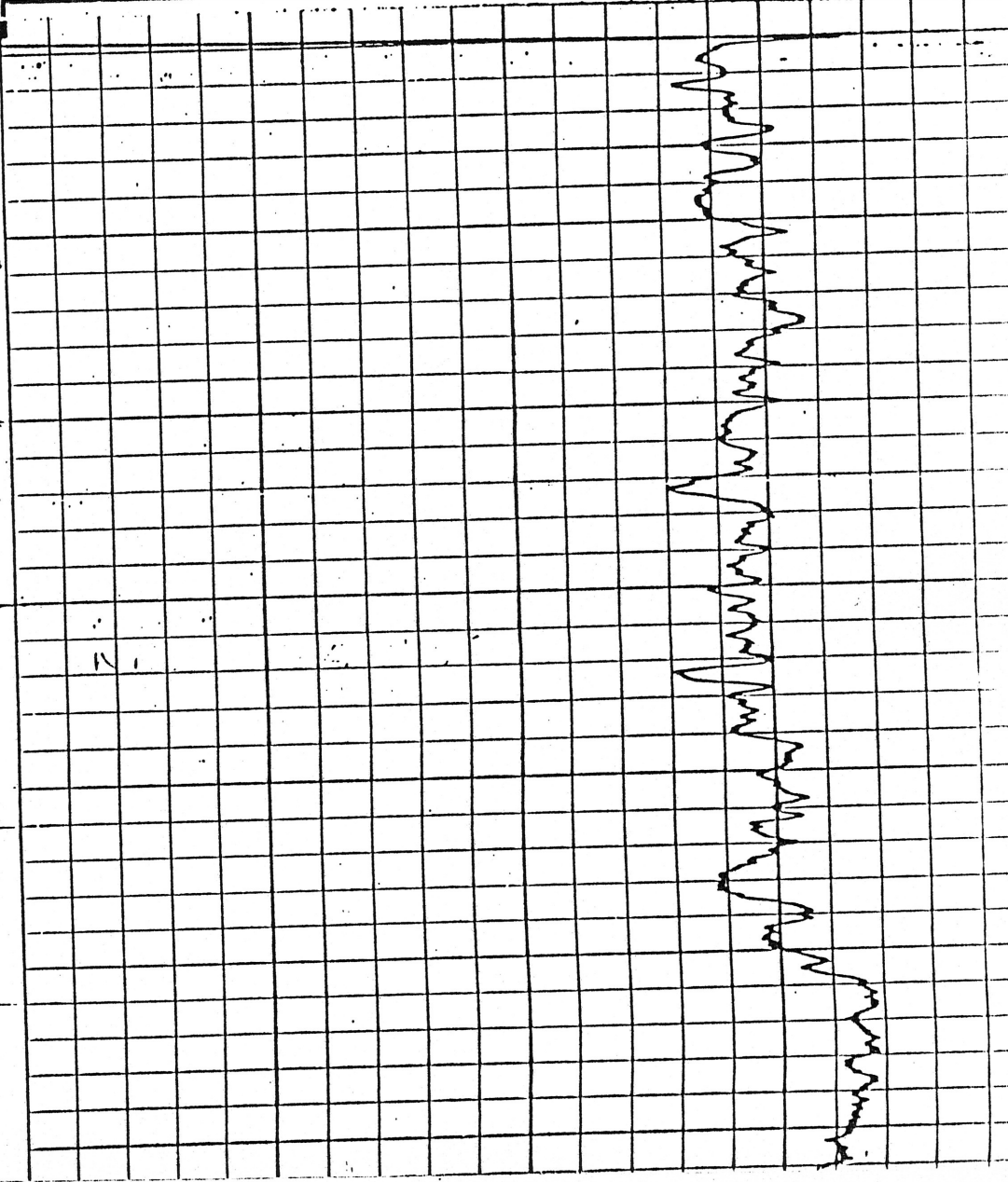
0200

0300

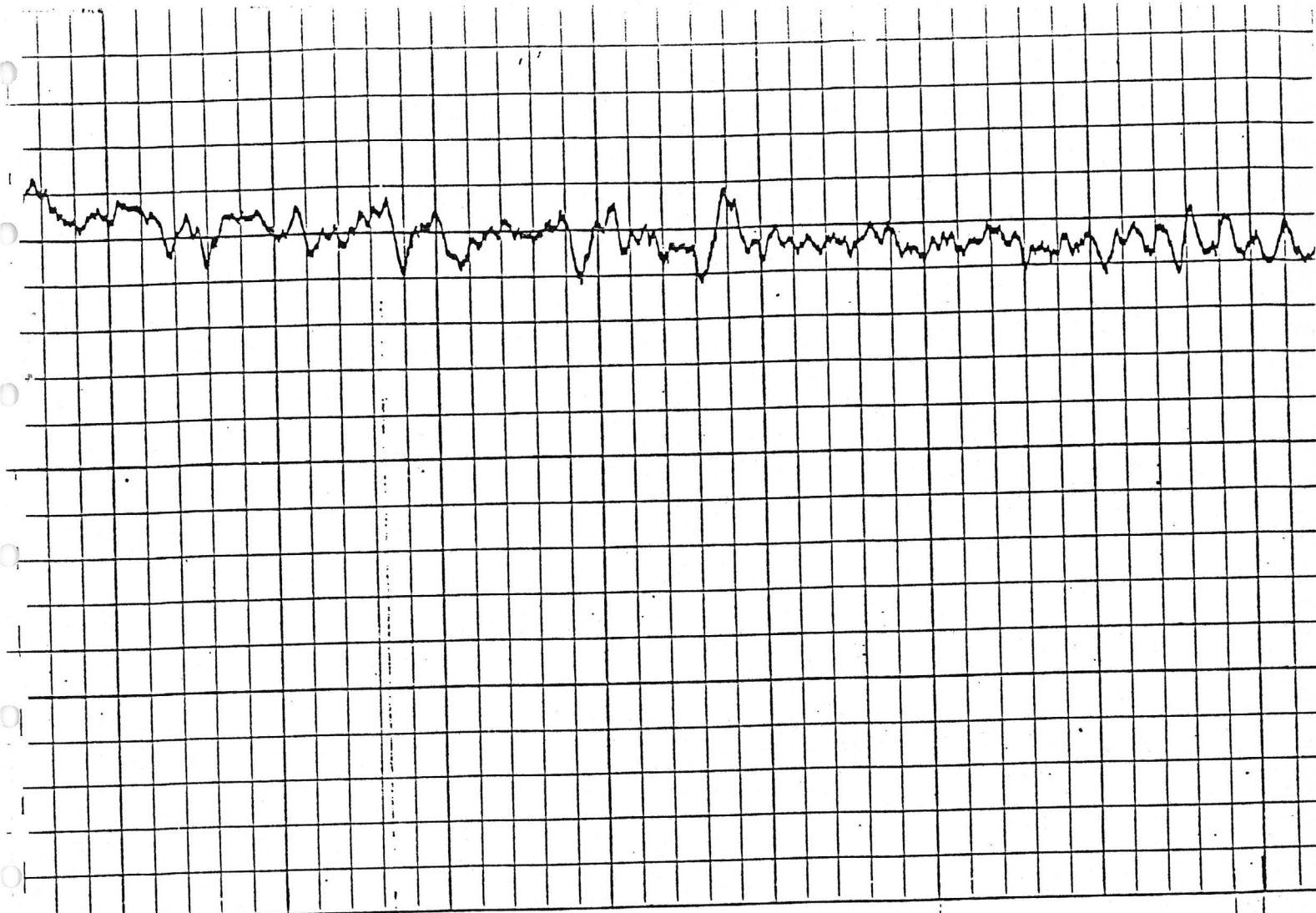
STANDARD COUNTS/SECOND

INTERVAL: 2132 to 0  
 Sensitivity 1000 Time Constant 2  
 Logging Speed 33 ft./min.  
 ZERO 0 divisions to left of this line

0 → 1000





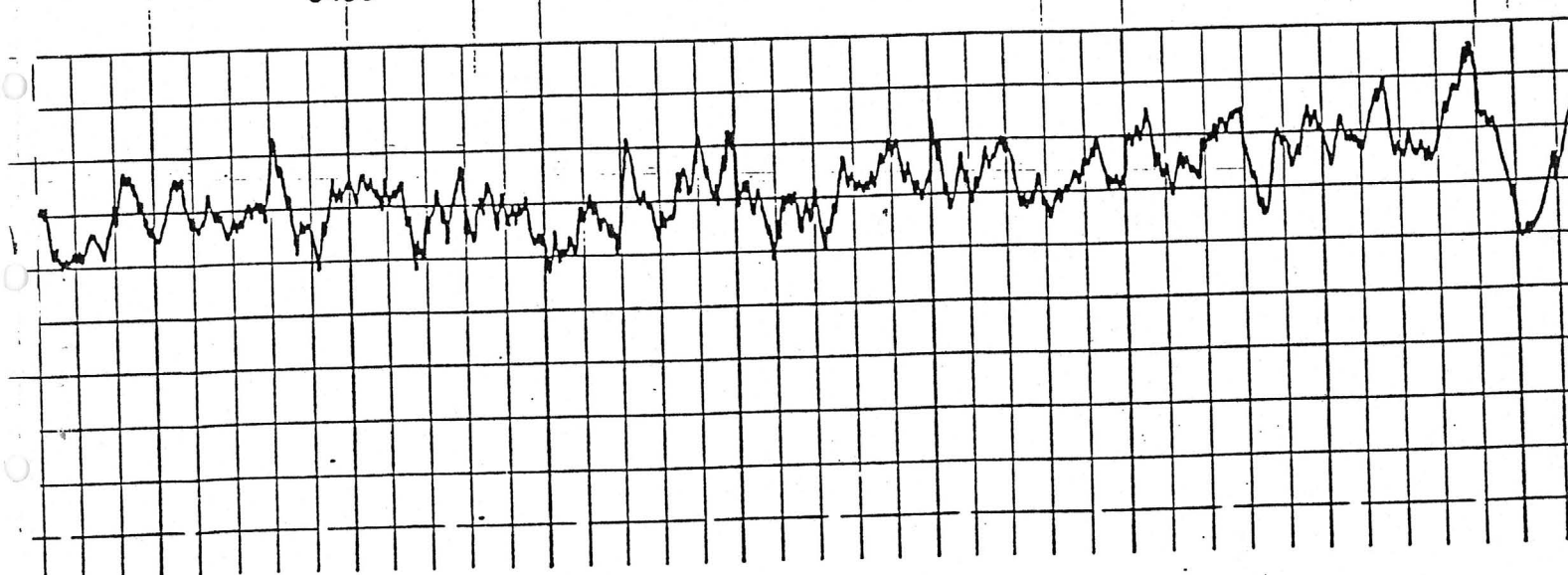


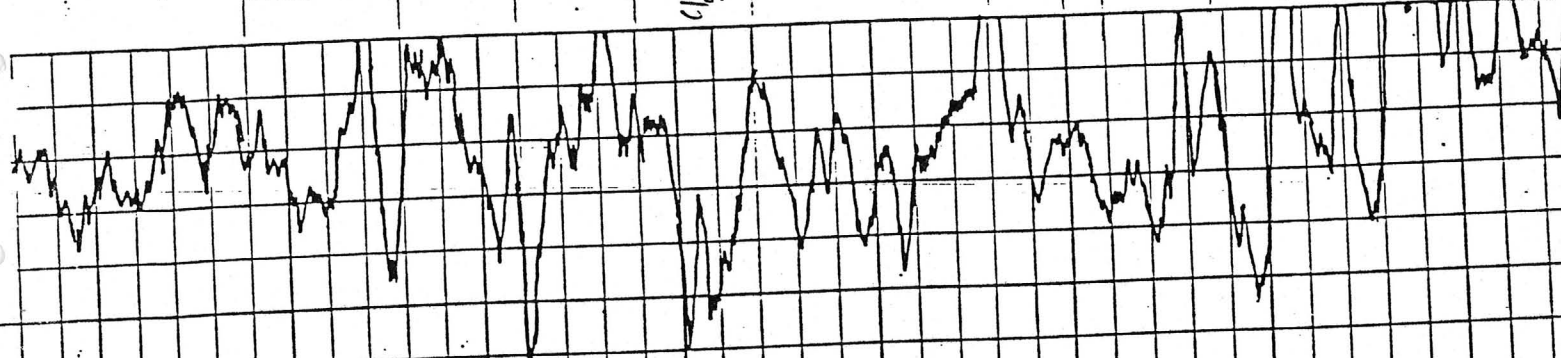
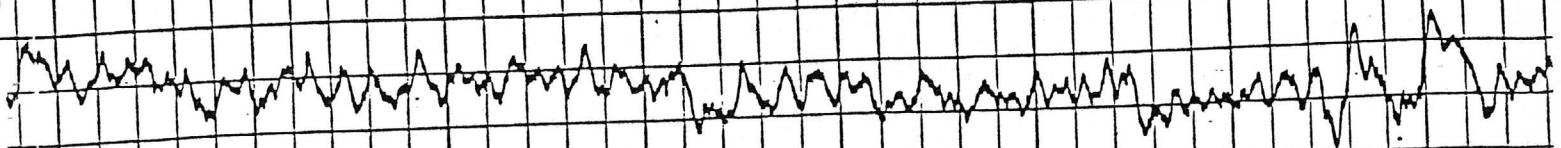
0400

0500

0600

0700





sl  
sl

0800

0900

1000

No Rec

Clay

Clay

1100

W.L.C.  
C. 121  
Clay with

Cored 1056-1056 No Recovery

Cored 1056-1076 Rec. 11' brown clay

Cored 1076-1096 Rec. 18' brown green clay



40

KERR-McGEE OIL INDUSTRIES, INC.  
LITHOLOGIC LOG OF DRILL HOLE



Hole Number: R.L. #1      Commenced: 2/17/1958

Project: Red Lake Potash      Completed: 3/26/1958

Location: 100' FSL & 100' FEL,  
Sec. 30, T26N., R16W.,  
GSR.      Total Depth: 2608 feet.

County: Mohave      None-Core: 1410 feet.

State: Arizona      Core: 1198 feet.

Casing: 4½" O.D. to 1310 feet

Collar elev: Unknown.

From	To	Interval	Description
0'-0"	10'-0"	10'-0"	Surface soil (Clay, brown & gray, few small rounded pebbles.).
10'-0"	20'-0"	10'-0"	Clay, brown, silty, few pebbles.
20'-0"	40'-0"	20'-0"	Clay, brown, silty, approximately 10% white loose clay.
40'-0"	50'-0"	10'-0"	Clay, brown, silty, slight white.
50'-0"	60'-0"	10'-0"	Clay, brown and white, silty, few small pebbles.
60'-0"	70'-0"	10'-0"	Gravel (small rounded), brown clay.
70'-0"	100'-0"	30'-0"	Gravel (small rounded).
100'-0"	110'-0"	10'-0"	Sand and gravel (small gravel).
110'-0"	150'-0"	40'-0"	Sand and gravel.
150'-0"	160'-0"	10'-0"	Sand and gravel, approximately 50% brown clay, silty.
160'-0"	170'-0"	10'-0"	Clay, brown, silty, few small pebbles.
170'-0"	180'-0"	10'-0"	Clay, brown, silty, 50% gravel.
180'-0"	210'-0"	30'-0"	Clay, brown, silty, few small pebbles.
210'-0"	300'-0"	90'-0"	Clay, brown, silty, occasional small pebble.
300'-0"	310'-0"	10'-0"	Sand and small gravel. Approximately 50% brown clay.
310'-0"	320'-0"	10'-0"	Sand and gravel, brown clay.
320'-0"	340'-0"	20'-0"	Clay, brown, silty. Approximately 50% sand & gravel.
340'-0"	350'-0"	10'-0"	Clay, brown, silty. 10% sand and gravel.
350'-0"	380'-0"	30'-0"	Clay, brown, silty, occasional small pebble.
380'-0"	400'-0"	20'-0"	Clay, brown, sandy, few small pebbles.
400'-0"	430'-0"	30'-0"	Clay, brown.
430'-0"	440'-0"	10'-0"	Clay, brown, occasional small pebble.
440'-0"	510'-0"	70'-0"	Clay, brown.
510'-0"	520'-0"	10'-0"	Brown clay, occasional pebble.
520'-0"	540'-0"	20'-0"	Clay, brown.
540'-0"	550'-0"	10'-0"	Clay, brown, occasional pebble.

From	To	Interval	Description
550'-0"	560'-0"	10'-0"	Clay, brown, approximately 15% small gravel.
560'-0"	590'-0"	30'-0"	Clay, brown, few small pebbles.
590'-0"	660'-0"	70'-0"	Clay, brown.
660'-0"	700'-0"	40'-0"	Clay, brown, approximately 30% coarse sand and small gravel.
700'-0"	710'-0"	10'-0"	Clay, brown.
710'-0"	780'-0"	70'-0"	Clay, brown, stringers of gray shale.
780'-0"	790'-0"	10'-0"	Clay, brown, stringers of shale, few pieces of gypsum.
790'-0"	800'-0"	10'-0"	Clay, brown, traces of gypsum.
800'-0"	810'-0"	10'-0"	Clay, brown, stringers of gray shale.
810'-0"	820'-0"	10'-0"	Clay, brown, stringers of gray shale, few pebbles.
820'-0"	830'-0"	10'-0"	Sand, medium to coarse grain, some brown clay.
830'-0"	840'-0"	10'-0"	Sand, medium to coarse grain, some brown clay, gray shale stringers.
840'-0"	850'-0"	10'-0"	Clay, brown, few small pebbles.
850'-0"	860'-0"	10'-0"	Clay, brown, stringers of gray clay, occasional small pebbles.
860'-0"	890'-0"	30'-0"	Clay, brown and gray.
890'-0"	910'-0"	20'-0"	Clay, gray brown.
910'-0"	930'-0"	20'-0"	Clay, gray brown, inclusions of red & gray clay.
930'-0"	970'-0"	40'-0"	Clay, gray.
970'-0"	980'-0"	10'-0"	Clay, brown & gray, few small pebbles.
980'-0"	990'-0"	10'-0"	Clay, brown and gray.
990'-0"	1020'-0"	30'-0"	Clay, brown, gray & slight bluish.
1020'-0"	1030'-0"	10'-0"	Clay, brown & gray, a little reddish brown.
1030'-0"	1100'-0"	70'-0"	Clay, brown & gray, a little bluish gray clay.
1100'-0"	1170'-0"	70'-0"	Clay, brown.
1170'-0"	1200'-0"	30'-0"	Clay, brown, little gray.
1200'-0"	1250'-0"	50'-0"	Clay, brown.
1250'-0"	1270'-0"	20'-0"	Clay, brown, a little gypsum.
1270'-0"	1300'-0"	30'-0"	Clay, brown, approximately 25% gypsum.
1300'-0"	1310'-0"	10'-0"	Gypsum - At 1310', set 4½" O.D. Casing - 2/25/1958.
1310'-0"	1400'-0"	90'-0"	Lost circulation - No samples.



KERR-McGEE OIL INDUSTRIES, INC.  
LITHOLOGIC LOG OF DRILL HOLE

<u>Hole Number:</u> R.L. #2	<u>Commenced:</u> 3/27/1958
<u>Project:</u> Red Lake Potash	<u>Completed:</u> 5/3/1958
<u>Location:</u> 100' FNL & 600' FEL, Sec. 28, T26N., R16W., GSR	<u>Total Depth:</u> 2135 Feet.
<u>County:</u> Mohave	<u>Non-Core:</u> 1290 feet. <u>Core:</u> 845 feet. <u>Casing:</u> 4 1/2" O.D. to 1290 feet (Pulled after completion)
<u>State:</u> Arizona	<u>Collar elev:</u> Unknown

From	To	Interval	Description
0'-0"	10'-0"	10'-0"	Surface soil. Few small rounded pebbles.
10'-0"	50'-0"	40'-0"	Clay, brown.
50'-0"	60'-0"	10'-0"	Clay, brown & white, silty, little sandstone.
60'-0"	100'-0"	40'-0"	Gravel, small.
100'-0"	150'-0"	50'-0"	Sandstone, medium to coarse grained, little brown clay.
150'-0"	210'-0"	60'-0"	Clay, light brown.
210'-0"	260'-0"	50'-0"	Clay, brown with large amount sandstone, medium coarse pebbles.
260'-0"	350'-0"	90'-0"	Clay, brown, silty.
350'-0"	400'-0"	50'-0"	Clay, brown, 40% sand & small pebbles.
400'-0"	450'-0"	50'-0"	Clay, brown, with small amount sandstone, medium coarse grained.
450'-0"	580'-0"	130'-0"	Clay, brown.
580'-0"	600'-0"	20'-0"	Clay, brown, silty, with 20% medium coarse grained sandstone.
600'-0"	690'-0"	90'-0"	No samples.
690'-0"	700'-0"	10'-0"	Clay, brown, with small sand - medium coarse.
700'-0"	790'-0"	90'-0"	Clay, brown, small amount sandstone - medium coarse.
790'-0"	830'-0"	40'-0"	Clay, brown, silty.
830'-0"	860'-0"	30'-0"	Clay, brown to red brown.
860'-0"	890'-0"	30'-0"	Clay, brown.
890'-0"	920'-0"	30'-0"	Clay, brown, with medium coarse conglomerate.
920'-0"	980'-0"	60'-0"	Clay, light brown.
980'-0"	1000'-0"	20'-0"	Clay, light brown to dark brown.
1000'-0"	1010'-0"	10'-0"	Clay, light gray to brown, slight sandstone, medium coarse.
1010'-0"	1036'-0"	26'-0"	Clay, brown to red brown.
1036'-0"	1056'-0"	20'-0"	<u>Cored</u> - No recovery.
1056'-0"	1076'-0"	20'-0"	<u>Recovery</u> - 11' brown clay.
1076'-0"	1096'-0"	20'-0"	<u>Recovered</u> 18' brown & green clay.
1096'-0"	1111'-0"	15'-0"	15' brown clay.

From	To	Interval	Description
1111'-0"	1150'-0"	39'-0"	Clay, brown.
1150'-0"	1180'-0"	30'-0"	Clay, light brown with slight gray shale.
1180'-0"	1250'-0"	70'-0"	Clay, dark brown.
1250'-0"	1280'-0"	30'-0"	Clay, brown with 10% sandstone, medium coarse.
1280'-0"	1290'-0"	10'-0"	Clay, brown with 10% sandstone, medium coarse, with slight gypsum & anhydrite. At 1290', pulled bit & ran core-barrel. Ran core from 1290'-2135' - 845' of interval cored. (1290'-1295' 1295'-1295')

CORED INTERVAL

1290'-0"	1305'-0"	15'-0"	Recovered 2" brown clay.
1305'-0"	1320'-0"	15'-0"	Recovered 8" brown & gray silty shale.
1320'-0"	1336'-0"	16'-0"	No recovery.
1336'-0"	1339'-0"	3'-0"	Brown clay.
1339'-0"	1356'-0"	17'-0"	Recovered 12' brown clay.
1356'-0"	1376'-0"	20'-6"	Recovered 18' brown clay, with little gypsum.
1376'-0"	1387'-0"	10'-4"	Brown and gray shale.
1387'-0"	1407'-0"	20'-0"	Brown and gray shale with little gypsum and anhydrite.
1407'-0"	1427'-0"	20'-0"	Shale blue, few pieces gypsum, occasional pebble.
1427'-0"	1447'-0"	20'-0"	Shale blue with small blebs of gypsum.
1447'-0"	1457'-0"	10'-0"	Blue and gray shale with little gypsum and anhydrite.
1457'-0"	1467'-0"	10'-0"	Bedded anhydrite and gypsum, with brown clay, inclusions.
1467'-0"	1487'-0"	20'-0"	60% anhydrite, little gypsum with brown clay partings.
1487'-0"	1500'-0"	17'-0"	20% anhydrite, blue shale.
1500'-0"	1538'-0"	38'-0"	Shale, brown to green, approximately 40% <sup>Top 10 ft</sup> clear halite. <sub>1505' GR</sub>
1538'-0"	1568'-0"	30'-0"	Halite, clear, approximately 12% brown to reddish brown clay, small blebs of anhydrite.
1568'-0"	1570'-0"	2'-0"	Halite very clear, coarse grained, inclusions of brown clay.
1570'-0"	1574'-0"	4'-0"	Halite, clear, medium grained, 15% gray clay inclusions.
1574'-0"	1594'-0"	20'-0"	Halite, clear coarse grained. Approximately 20% brown to reddish brown clay inclusions.
1594'-0"	1595'-0"	1'-0"	Brown clay parting.
1595'-0"	1615'-0"	20'-0"	Halite, clear, medium to coarse grained, varying amounts from 10% to 20% brown silty clay.
1615'-0"	1650'-0"	35'-0"	Halite, clear, medium to coarse grained. Approximately 12% brown to reddish brown to gray clay inclusions, 2" clay parting at bottom.
1650'-0"	1665'-0"	15'-0"	Halite, clear, medium to coarse grained. Approximately 5% brown clay.

# N. J. DEVLIN, Consulting Engineer

REGISTERED PROFESSIONAL CIVIL ENGINEER

May 27, 1977

P. O. BOX 431  
509 E. BEALE ST.  
KINGMAN, ARIZONA  
PHONE 753-2427

REFER TO: 2450

Mr. Ed Barge  
Consulting Geologist  
Box 6  
Durango, Colorado 81301

Dear Mr. Barge:

In accordance with your instructions, I accompanied Mr. Dan McCracken to the Red Lake area of the Hualapai Valley Northeast of Kingman, Arizona on May 26, 1977. The purpose of the trip was to search for, witness and note evidence of staking and Notice of Mining Claims other than those which you as Agent have recently been making in this area.

A systematic search of 6 Sections were made and the following is a summary of my findings. The Alphabetical Designations are the letters which you have assigned to each of the Sections under consideration.

## SECTION 26, TOWNSHIP 26 NORTH, RANGE 17 WEST (DESIGNATED AS "N")

In addition to the stakes which reportedly have been set under your direction in this Section, we found a system of 2 x 2 stakes approximately  $4\frac{1}{2}$ ' to 5' long. These stakes had apparently been set near the North and South end centerline to define a series of claims (600' x 1320') over the entire section. Only one of this series of stakes was standing, most have apparently been knocked over by cattle grazing in the area.

Each of the stakes found was examined for evidence of a Mining Claim Notice. Apparently such a notice at one time was attached, near the top of the stake, by two staples. At the time of our inspection, however, most of the notices had been removed, probably by wind or possibly by cattle. A total of 14 notices were found still attached to the stakes. The following information was taken from these Notices:

<u>CLAIM IDENTIFYING NO.</u>	<u>DISCOVERY DATE</u>	<u>COMPANY</u>	<u>AGENT</u>
RL-26-10	April 10, 1977	Minerals Exploration Co.	Flynn
RL-26-6	April 10, 1977	Minerals Exploration Co.	Flynn
RL-26-4	April 10, 1977	Minerals Exploration Co.	Flynn
RL-26-3	April 10, 1977	Minerals Exploration Co.	Flynn
RL-26-20	April 10, 1977	Minerals Exploration Co.	Flynn
RL-26-22	April 10, 1977	Minerals Exploration Co.	Flynn



<u>CLAIM IDENTIFYING NO.</u>	<u>DISCOVERY DATE</u>	<u>COMPANY</u>	<u>AGENT</u>
RL-26-23	April 10, 1977	Minerals Exploration Co.	Flynn
RL-26-26	April 10, 1977	Minerals Exploration Co.	Flynn
RL-26-30	April 10, 1977	Minerals Exploration Co.	Flynn
RL-26-32	April 10, 1977	Minerals Exploration Co.	Flynn
RL-26-31	April 10, 1977	Minerals Exploration Co.	Flynn
RL-26-34	April 10, 1977	Minerals Exploration Co.	Flynn
RL-26-33	April 10, 1977	Minerals Exploration Co.	Flynn
RL-26-35	April 10, 1977	Minerals Exploration Co.	Flynn

We found no evidence that stakes or other monuments had ever been set at the corners or end centerline corners of any of the claims described by the above notices or which would correspond to similiar notices attached to other 2 x 2 stakes found.

SECTION 30, TOWNSHIP 26 NORTH, RANGE 16 WEST (DESIGNATED AS "M")

In addition to the stakes which reportedly have been set under your direction in this section, we found a system of 2 x 2 stakes approximately  $4\frac{1}{2}'$  to 5' long. These stakes had apparently been set near the North and South end centerlines to define a series of claims (600' x 1320') over the entire section. None of this series of stakes found was standing having apparently been knocked over by cattle grazing in the area.

Each of the stakes found was examined for evidence of a Mining Claim Notice. Apparently such a notice at one time was attached, near the top of each stake, by two staples. At the time of our inspection, however, most of the notices had been removed, probably by wind or possibly by cattle. Only one notice was found still attached to the stake. The following information was taken from this Notice:

<u>CLAIM IDENTIFYING NO.</u>	<u>DISCOVERY DATE</u>	<u>COMPANY</u>	<u>AGENT</u>
RL-30-19	February 16, 1977	Minerals Exploration Co.	Flynn

We found no evidence that stakes or other monuments had every been set at the corners or end centerline corners of the claim described by the above Notice or which would correspond to similiar notices attached to other 2 x 2 stakes found.

SECTION 20, TOWNSHIP 26 NORTH, RANGE 16 WEST (DESIGNATED AS "O")

In addition to the stakes which reportedly have been set under your direction in this Section, we found a system of 2 x 2 stakes approximately  $4\frac{1}{2}'$  to 5' long. These stakes had apparently been set near the North and South end centerlines to define a series of claims (600' x 1320') over the entire section. None of this series of stakes found was standing having apparently been knocked over by cattle grazing in the area.

Each of the stakes found was examined for evidence of a Mining Claim Notice. Apparently such a notice at one time was attached, near the top of each stake, by two staples. At the time of our inspection, however, most of the notices had been removed, probably by wind or possibly by cattle. A total of 3 Notices were found still attached to the stakes. The following information was taken from these Notices:

<u>CLAIM IDENTIFYING NO.</u>	<u>DISCOVERY DATE</u>	<u>COMPANY</u>	<u>AGENT</u>
RL-20-16	February 16, 1977	Minerals Exploration Co.	Flynn
RL-30-10	February 16, 1977	Minerals Exploration Co.	Flynn
RL-20-9	February 16, 1977	Minerals Exploration Co.	Flynn

We found no evidence that stakes or other monuments had ever been set at the corners or end centerline corners of the claims described by the above Notices or which would correspond to similiar notices attached to other 2 x 2 stakes found.

SECTION 10, TOWNSHIP 26 NORTH, RANGE 16 WEST (DESIGNATED AS "L")

We did not find any stakes, monuments or notices in the entire section other than stakes or Notices which have reportedly been set under your direction. If there has been prior claims staked in this section, the evidence of such prior claims has been obscured or lost.

SECTION 28, TOWNSHIP 26 NORTH, RANGE 16 WEST (DESIGNATED AS "Y")

In addition to the stakes which reportedly have been set under your direction in this Section, we found a system of 2 x 2 stakes approximately  $4\frac{1}{2}'$  to  $5'$  long. These stakes had apparently been set near the North and South end centerlines to define a series of claims ( $600' \times 1320'$ ) over at least the North half of the Section. None of this series of stakes found was standing having apparently been knocked over by cattle grazing in the area.

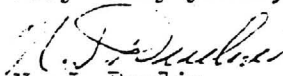
Each of the stakes found was examined for evidence of a Mining Claim Notice. Apparently such a Notice at one time was attached, near the top of each stake, by two staples. At the time of our inspection, however, most of the Notices had been removed probably by wind or possibly by cattle. A total of 5 Notices were found still attached to the stakes. The following information was taken from these Notices:

<u>CLAIM IDENTIFYING NO.</u>	<u>DISCOVERY DATE</u>	<u>COMPANY</u>	<u>AGENT</u>
RL-28-25	February 16, 1977	Minerals Exploration Co.	Flynn
RL-28-26	February 16, 1977	Minerals Exploration Co.	Flynn
RL-28-23	February 16, 1977	Minerals Exploration Co.	Flynn
RL-28-22	February 16, 1977	Minerals Exploration Co.	Flynn
RL-28-21	February 16, 1977	Minerals Exploration Co.	Flynn

SECTION 4, TOWNSHIP 25 NORTH, RANGE 16 WEST (DESIGNATED AS "Z")

We did not find any stakes, monuments or notices other than the stakes or notices which have reportedly been set under your direction. If there has been prior claims staked in this Section, the evidence of such prior claims has been obscured or lost.

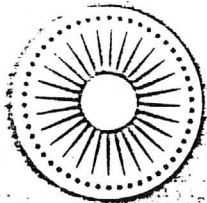
Very truly yours,

  
N. J. Devlin

Consulting Engineer

NJD:mr

cc: Mr. Dan McCracken



**ERDA**

UNITED STATES  
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

GRAND JUNCTION OFFICE  
GRAND JUNCTION, COLORADO 81501

**NEWS  
RELEASE**

No. 77-67  
Contact: Peter Mygatt  
Tel: 303/242-8621, Ext. 293

For Release Monday,  
June 27, 1977

ARIZONA/NEVADA/CALIFORNIA AERIAL RADIOMETRIC SURVEY TO BE  
CONDUCTED FOR ERDA'S NURE

A \$498,000 contract has been signed with Aero Service Division, Western Geophysical Company of America (a division of Litton Industries, Inc.), Houston, Texas, to conduct an aerial radiometric and magnetic survey in northern Arizona, southern Nevada, and a small part of southern California, for the Grand Junction (Colorado) Office, Energy Research and Development Administration (ERDA).

The contract, issued by Bendix Field Engineering Corporation, ERDA's operating contractor at the Grand Junction facility, specifies that Aero Service will survey four National Topographic Map Series quadrangles: Las Vegas, Kingman, Williams, and Prescott (see accompanying map).

The Houston firm is using both a fixed-wing aircraft (DC-3) and a helicopter to survey about 23,000 line miles on one-mile, three-mile, or five-mile spacing (depending on the locale) in an east-west direction, with 12-mile spacing for north-south tie lines.

The survey began in June and is scheduled for completion during January 1978. The final report will be published by quadrangles and placed on open file upon completion of data reduction.

Both Aero Service aircraft carry a scintillation gamma-ray detection system, multichannel analyzers, magnetometer, and ancillary electronic equipment, including that to record outside temperature and barometric pressure.

The survey is being conducted as part of the National Uranium Resource Evaluation (NURE), an ongoing program of ERDA's Grand Junction Office which includes the development and compilation of geologic and other information with which to assess the magnitude and distribution of uranium resources and to determine areas favorable for the occurrence of uranium in the United States.

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